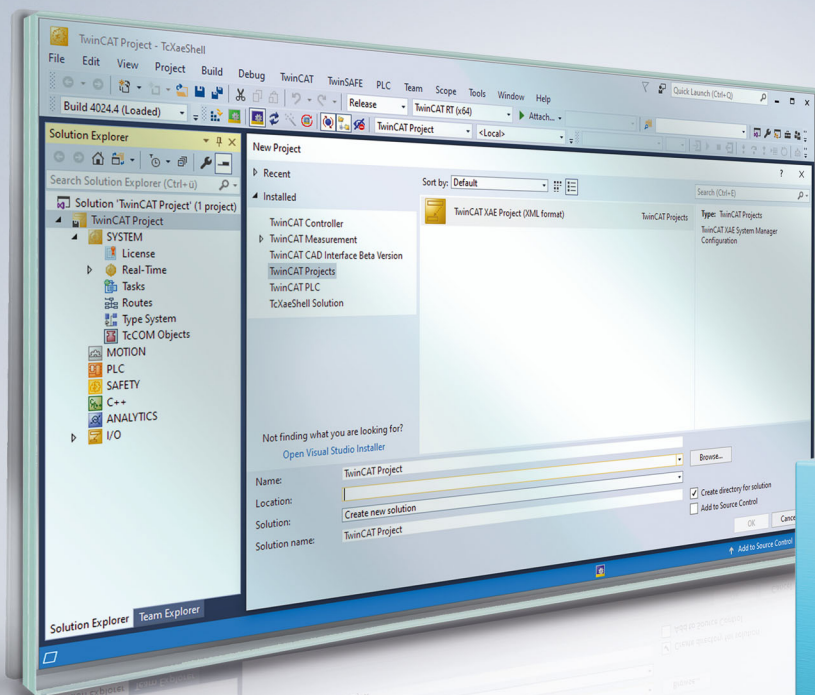


# BECKHOFF New Automation Technology

Manual | EN

# TE2000

TwinCAT 3 | HMI Engineering





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# 1 Foreword

## 1.1 Notes on the documentation

This description is intended exclusively for trained specialists in control and automation technology who are familiar with the applicable national standards.

The documentation and the following notes and explanations must be complied with when installing and commissioning the components.

The trained specialists must always use the current valid documentation.

The trained specialists must ensure that the application and use of the products described is in line with all safety requirements, including all relevant laws, regulations, guidelines, and standards.

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The documentation has been compiled with care. The products described are, however, constantly under development.

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## Personnel qualification

This description is only intended for trained specialists in control, automation, and drive technology who are familiar with the applicable national standards.

## Signal words

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

### Personal injury warnings

 <b>DANGER</b>
Hazard with high risk of death or serious injury.
 <b>WARNING</b>
Hazard with medium risk of death or serious injury.
 <b>CAUTION</b>
There is a low-risk hazard that could result in medium or minor injury.

### Warning of damage to property or environment

<b>NOTICE</b>
The environment, equipment, or data may be damaged.

### Information on handling the product



This information includes, for example:  
recommendations for action, assistance or further information on the product.



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To stay informed about information security for Beckhoff products, subscribe to the RSS feed at <https://www.beckhoff.com/secinfo>.

## 2 Overview

### 2.1 Product description

TwinCAT HMI is a tool for creating HMIs (Human Machine Interfaces). Like TwinCAT, it is integrated directly into Visual Studio. A graphical WYSIWYG editor is used for the configuration, i.e. no programming is required.

Controls from the toolbox can be arranged on the user interface and linked with real-time variables, e.g. from the PLC or from a C++ module. User Controls can be used to graphically create and configure specific controls. JavaScript developers can develop their own controls. During development, the functionality can be tested with live data from the real-time system. Modifications are also possible in this live mode.

The logic of the HMI can either be implemented on the client side in JavaScript or as a server extension. A server extension allows you to develop extensions in C#.

Because the HMI is web-based and responsive - based on HTML5 and JavaScript - the resolution and orientation adapt automatically. This allows the same page to be used for different display sizes, aspect ratios and orientations.

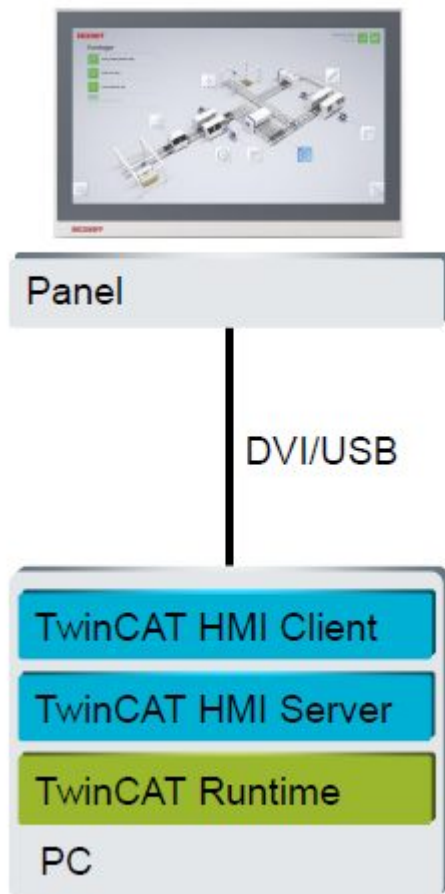


### 2.2 Scenarios

The HMI can be integrated into a wide range of scenarios.

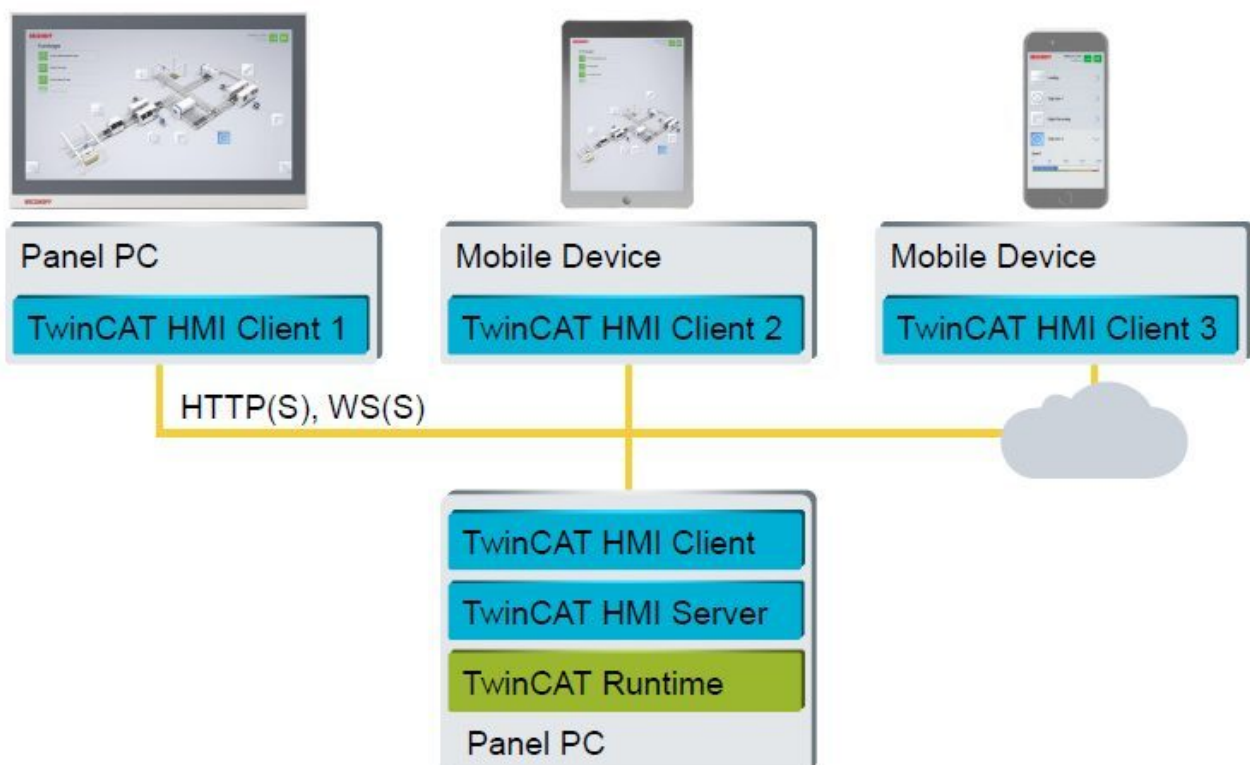
In a network, different controllers can exchange their data with one or more clients. The clients can run on local PCs or Panel PCs, or on mobile devices such as tablets or smartphones.

## Local-Client



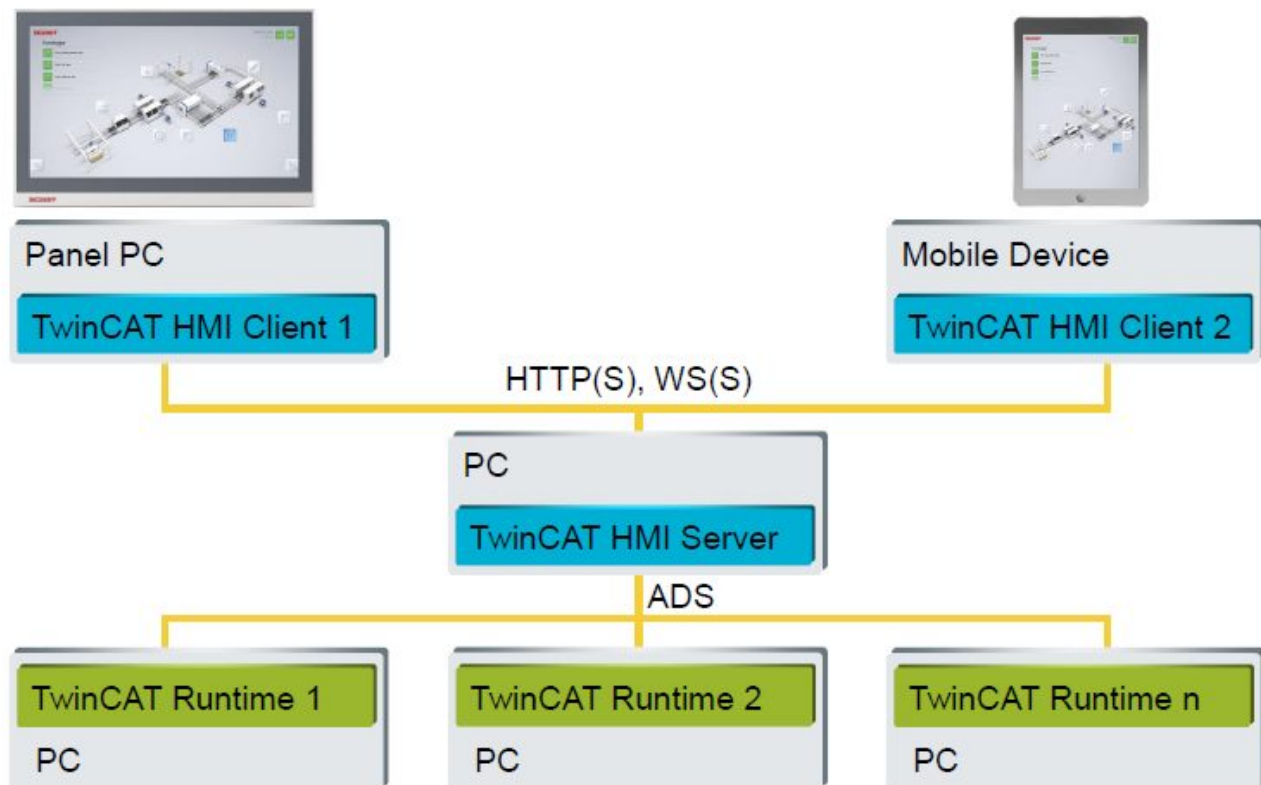
## Multi-client

An HMI can be configured for different resolutions and can be called up by several devices simultaneously.



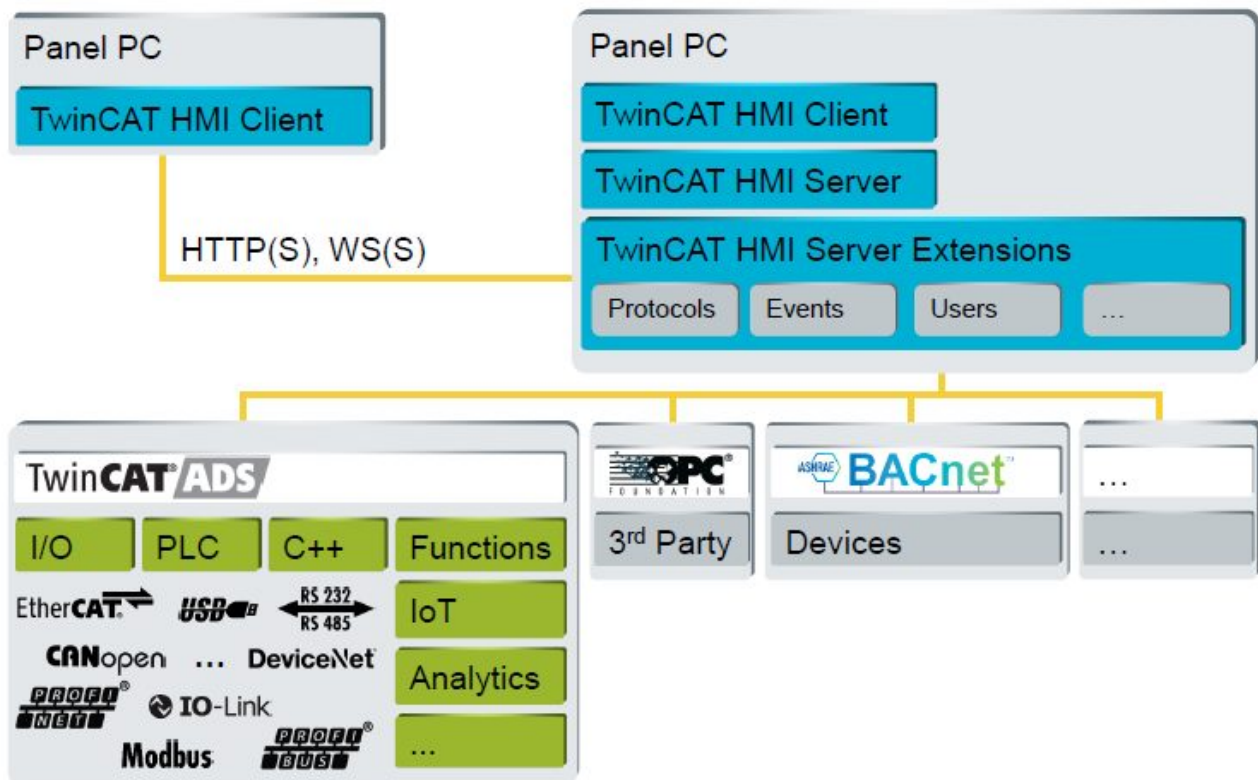
## Multi-runtime

The TwinCAT HMI can connect several real-time systems. TwinCAT runtimes can be programmed in PLC languages, C/C++ or MATLAB®/Simulink®.



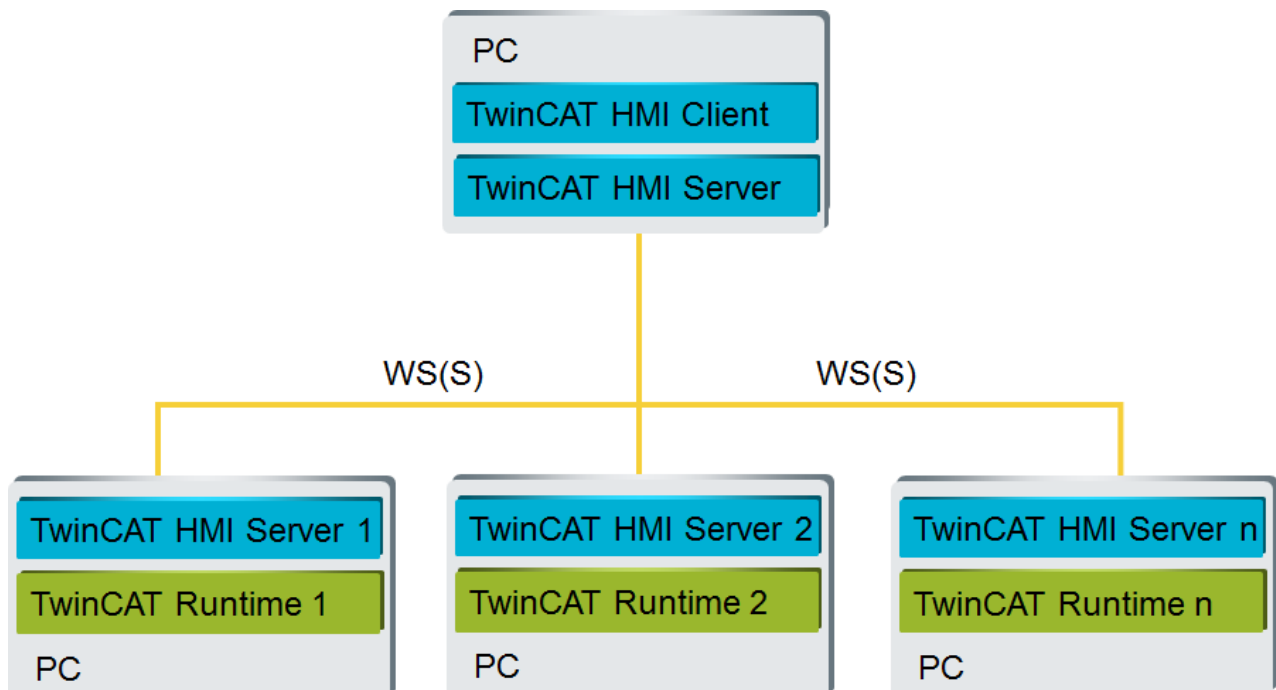
## Multi-protocol

The TwinCAT HMI server can communicate with all TwinCAT runtimes via the ADS extension. Third-party controllers can be connected via the OPC UA extension. Additional protocols can also be integrated via the Server Extensions SDK.



### Multi-server

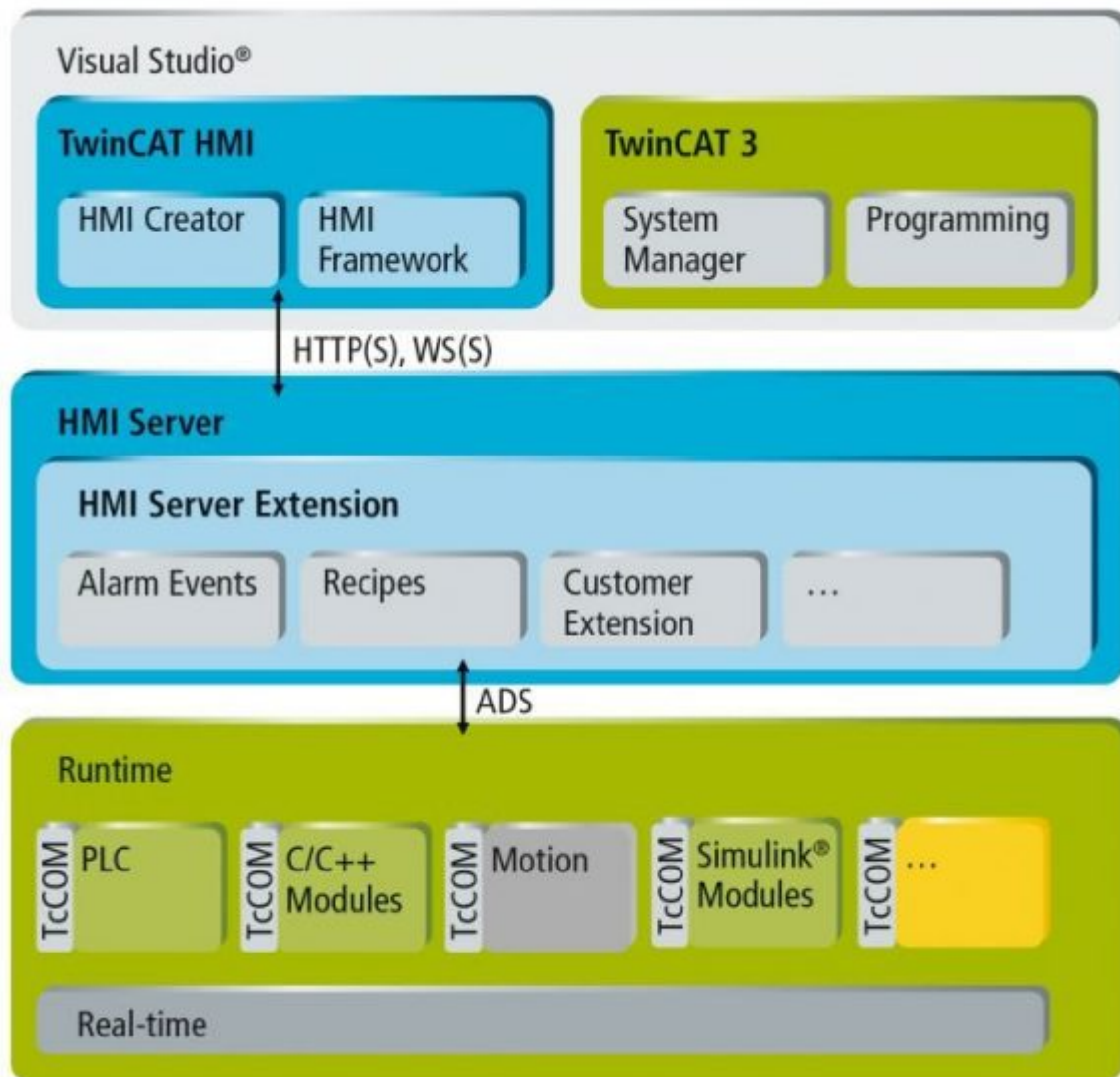
The TwinCAT HMI server can communicate with other TwinCAT HMI servers. This enables so-called server-to-server communication. Server-to-server communication offers the possibility of exchanging any data points among the servers. This enables, for example, higher-level systems to be created.



## 2.3 Architecture

### 2.3.1 Engineering

The TwinCAT HMI integrates into the Visual Studio® development environment from Microsoft. TwinCAT3 provides the free Visual Shell, which can also be used with the TwinCAT HMI. This allows you to develop the PLC and the HMI in one tool. TwinCAT HMI Creator is an editor for graphical development of the HMI. The TwinCAT HMI framework comes with predefined controls. Communication with the TwinCAT HMI Server takes place via secure network connections. The TwinCAT HMI Server has a modular structure. HMI Server Extensions provide additional functions. Furthermore, you can develop your own customer extensions to execute non-real-time-relevant business logics centrally in the server. The TwinCAT ADS protocol (Automation Device Specification) is supported, which enables communication with all TwinCAT devices.

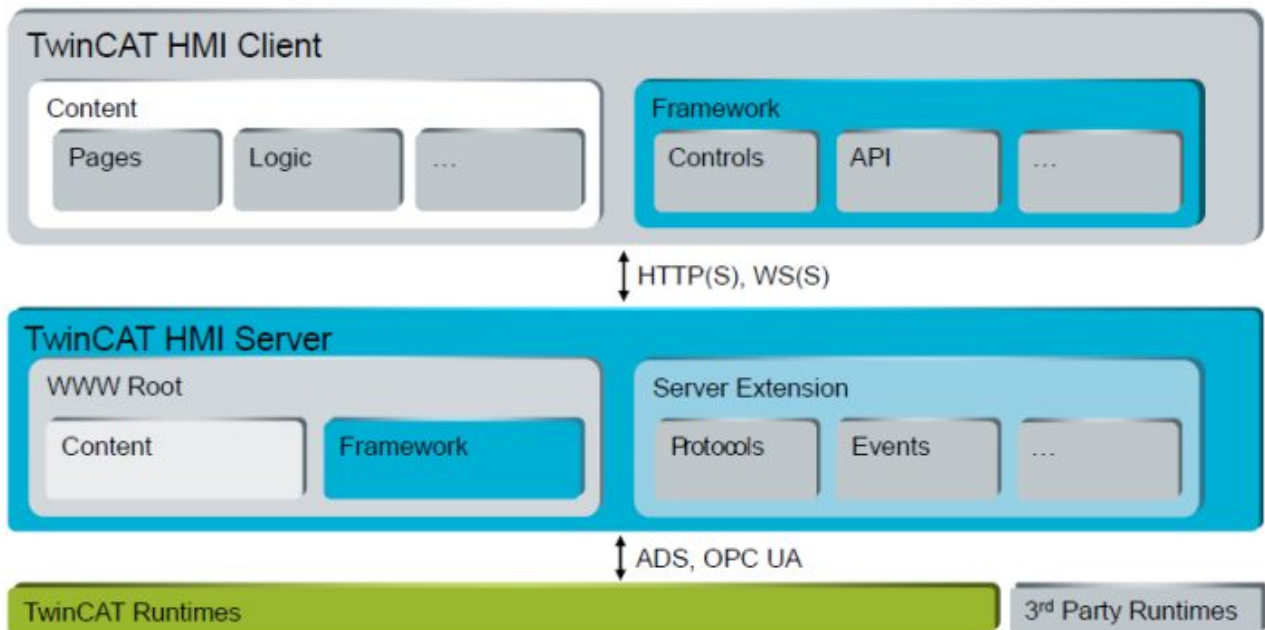


### 2.3.2 Client/Server

The TwinCAT HMI is essentially based on a client-server architecture. No additional software installation is required for the TwinCAT HMI Client. It is an HTML5-capable web browser that does not require any additional extensions. The browser connects to the TwinCAT HMI server, which provides the HMI in a virtual directory (WWW root). The HMI is passed to the client via HTTP(S) protocol. The HMI project consists of content such as pages and images and the TwinCAT HMI framework, which is based on JavaScript and dynamizes the web-based HMI. Among other things, the framework provides the controls and establishes a secure web socket connection (WS(S)) to the server in order to be able to communicate with it.



The TwinCAT HMI server has a modular structure. Additional functionalities can be provided via server extensions, such as the messaging system or other protocols. The server supports the TwinCAT ADS protocol and can therefore communicate with all TwinCAT devices. Third-party systems can be connected via OPC UA extensions.



## 2.4 Business model

The business model of the TwinCAT HMI is based on that of TwinCAT 3 XAE. All products can be unlocked via a 7-day trial license, which can be renewed at any time. Only the TwinCAT HMI server is licensed. No data points are counted. Only the simultaneous client connections (e.g. browser) and the number of active targets (controllers) are taken into account. The TwinCAT HMI Server includes a client and a target connection as standard. Additional TF20x0 packages are available for further connections. Further TF20x0 server extensions can also be licensed optionally.



## 3 Installation

### 3.1 System requirements

#### TE2000 TC3 HMI Engineering:

Technical data	Version 1.14
Min. TwinCAT version	3.1.4026.0
INFO: Older TwinCAT versions are supported as target via ADS. The TwinCAT Remote Manager enables switching to TwinCAT version 3.1.2024.x. The TF2000 HMI Server can be installed from version 14.3 under TwinCAT version 3.1.4024.	
TcPkg Workload	TE2000.HMIEngineering.XAE
Supported Visual Studio versions	2017 Version >= 15.9 (Community, Professional) with ASP.NET** 2019 Version >= 16.4 (Community, Professional) 2022 Version >= 17.6.14 (Community, Professional) TwinCAT XAE Shell (32 and 64-bit)
Operating system	Windows 10 (32/64-bit), Windows 11
.NET Framework SDK version	>= 4.7.2

Technical data	Version 1.12
Min. TwinCAT version	3.1.4024.0
Min. TwinCAT level	TC1000 TC3   ADS
Supported Visual Studio versions	2017 Version >= 15.9 (Community, Professional) with ASP.NET** 2019 Version >= 16.4 (Community, Professional) TwinCAT XAE Shell (TcXaeShell)
Operating system	Windows 10 (32/64-bit), Windows 11
.NET Framework SDK version	>= 4.7.2

Technical data	Version 1.10
Min. TwinCAT version	3.1.4022.0
Min. TwinCAT level	TC1000 TC3   ADS
Supported Visual Studio versions	2013 Version >= 12.0.40629 with Update 5* (Shell, Community, Professional) 2015 Version >= 14.0.25431 with Update 3* (Community, Professional) 2017 Version >= 15.0 (Community, Professional) with ASP.NET** TwinCAT XAE Shell (TcXaeShell)
Operating system	Windows 8/10 (32/64-bit)
.NET Framework version	>= 4.7.2

\* Visual Studio updates can be found via the menu item "Extras/Extensions and Updates".

\*\*ASP.NET can be added through the Visual Studio Setup process.



**TwinCAT HMI Client:**

Technical data	Version 1.12
Supported browser versions	>= Google™ Chrome™ 85 >= Mozilla Firefox 80 >= Microsoft Edge 85 >= Apple® Safari® 14

Technical data	Version 1.10
Supported browser versions	>= Google™ Chrome™ 58 >= Mozilla Firefox 53 >= Microsoft Edge 40
Supported mobile browsers	>= Google™ Chrome™ for Android 58 >= Apple® Safari® for iOS 9

**Framework control development:**

Technical data	Version 1.12
Supported Visual Studio® versions	2017 Version >= 15.9 (Community, Professional) with ASP.NET 2019 Version >= 16.4 (Community, Professional) TwinCAT XAE Shell (TcXaeShell) (JavaScript)

Technical data	Version 1.10
Supported Visual Studio® versions	2013 Version >= 12.0.40629 with Update 5 (Community, Professional) 2015 Version >= 14.0.25431 with Update 3 (Community, Professional) 2017 Version >= 15.0 (Community, Professional) with ASP.NET

**Server extension development**

Technical data	Version 1.12
Supported Visual Studio® versions	2017 Version >= 15.9 (Community, Professional) with ASP.NET 2019 Version >= 16.4 (Community, Professional)
.NET Framework version	>= 4.8
.NET (Core) Desktop Runtime	>= 3.1

Technical data	Version 1.10
Supported Visual Studio® versions	2013 Version >= 12.0.40629 with Update 5 (Community, Professional) 2015 Version >= 14.0.25431 with Update 3 (Community, Professional) 2017 Version >= 15.0 (Community, Professional) with ASP.NET
.NET Framework version	>= 4.7.2



A full version of Visual Studio is required for developing server extensions. The TwinCAT XAE Shell is not sufficient.

## 3.2 Version overview

### Version 1.12

Version number	Designation
1.12.760.x	Version 1.12 Release 10
1.12.758.x	Version 1.12 Release 9
1.12.756.x	Version 1.12 Release 8
1.12.754.x	Version 1.12 Release 7
1.12.752.x	Version 1.12 Release 6
1.12.750.x	Version 1.12 Release 5
1.12.748.x	Version 1.12 Release 4
1.12.746.x	Version 1.12 Release 3
1.12.744.x	Version 1.12 Release 2
1.12.742.x	Version 1.12 Release 1

### Version 1.10

Version number	Designation
1.10.1336.x	Version 1.10 Release 5
1.10.1171.x	Version 1.10 Release 4
1.10.1018.x	Version 1.10 Release 3
1.10.765.x	Version 1.10 Release 2
1.10.683.x	Version 1.10 Release 1

### Version 1.8

Version number	Designation
1.8.861.0	Version 1.8 Release 4
1.8.737.0	Version 1.8 Release 3
1.8.670.0	Version 1.8 Release 2
1.8.616.0	Version 1.8 Release 1

### 3.2.1 Modifications



Note that there may be small differences in behavior between different versions. If this requires a change when using the newer version, this is documented below.

#### Differences between version 1.10 and version 1.12

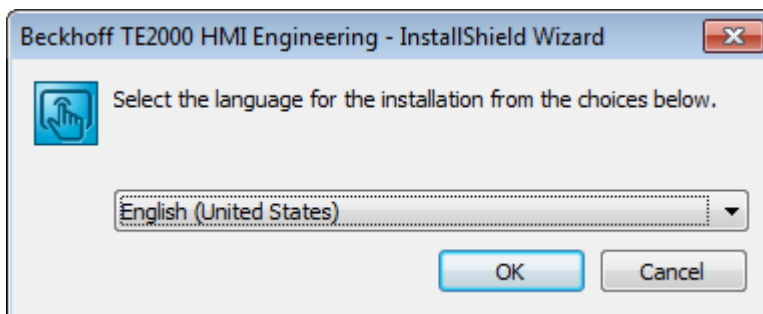
- Due to performance optimizations, the time behavior when loading [Content](#) [► 795] pages has changed.
- From version 1.12, multiple control classes can exist with the same type name. In rare cases, custom code must be adapted. The [details](#) [► 1521] are documented separately.

## 3.3 Installation

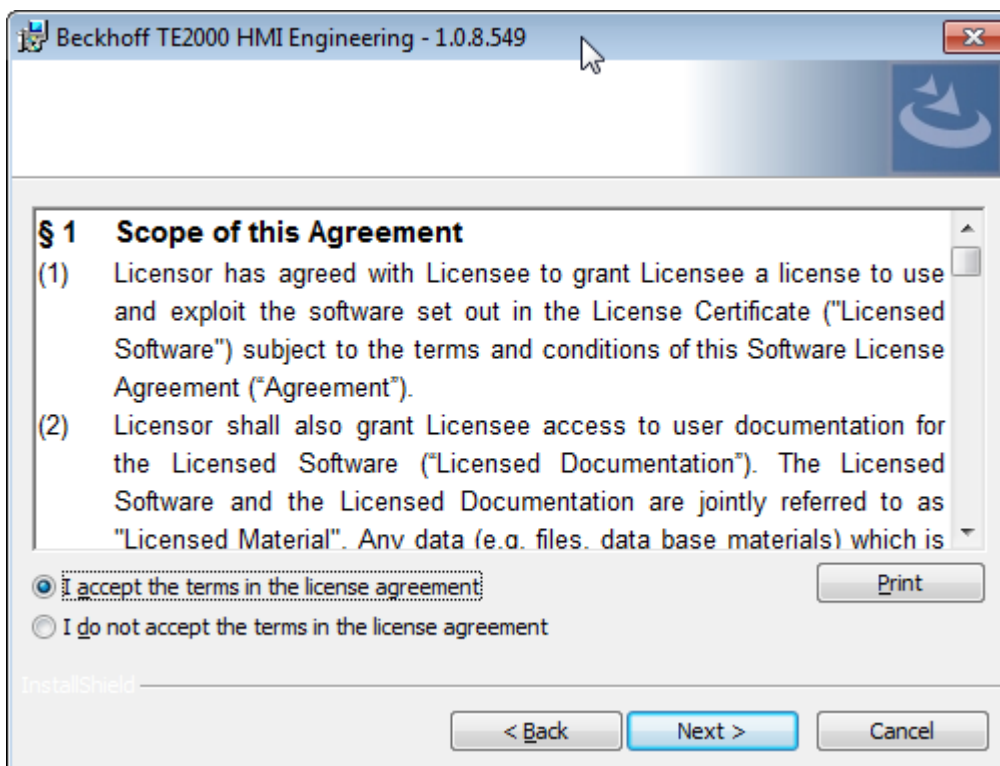
The TwinCAT 3 function for Windows-based operating systems is installed step-by-step.

1. Close all running Visual Studio instances so that the setup can integrate into the installed Visual Studio environments.

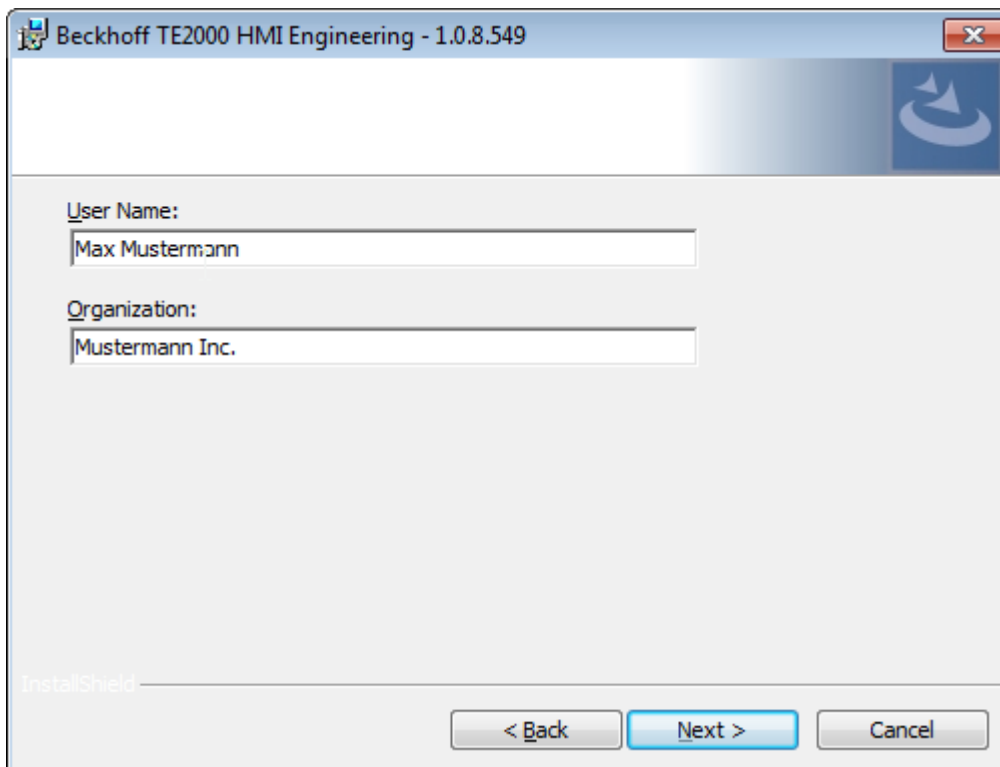
2. Double-click the downloaded file *TE2000-HMI-Engineering*.  
Start the installation under Windows with "Run As Admin" by right-clicking the setup files and selecting the corresponding option in the context menu.
3. Select the language to guide you through the installation.



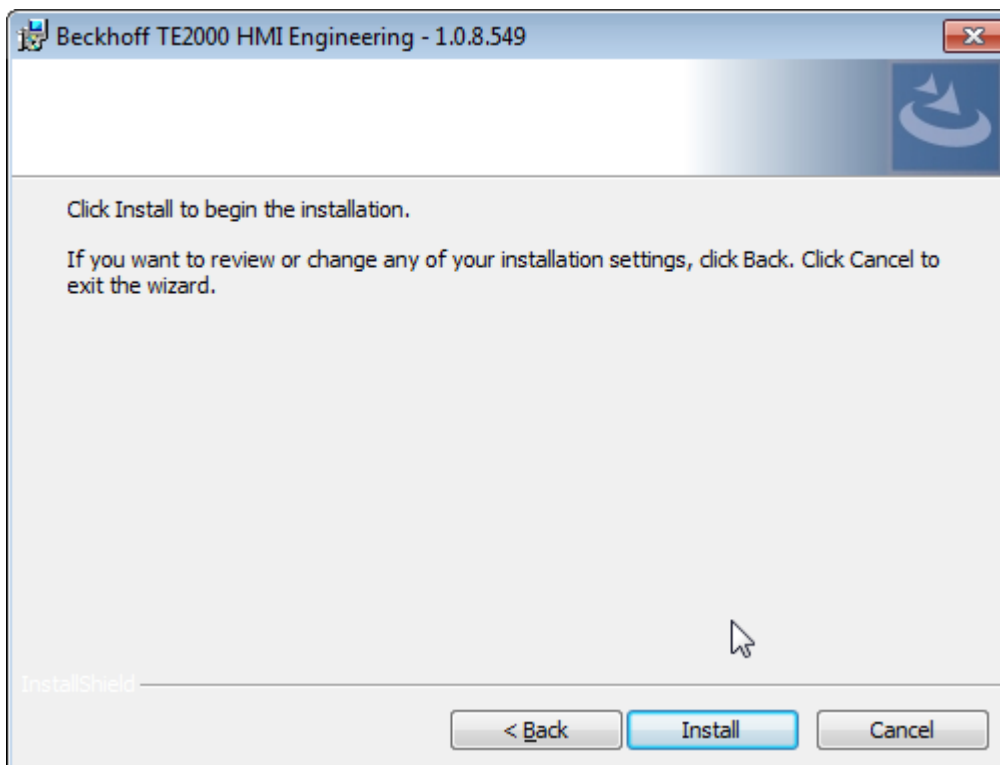
4. Click on **Next** and then accept the end user agreement.



5. Enter your user data.

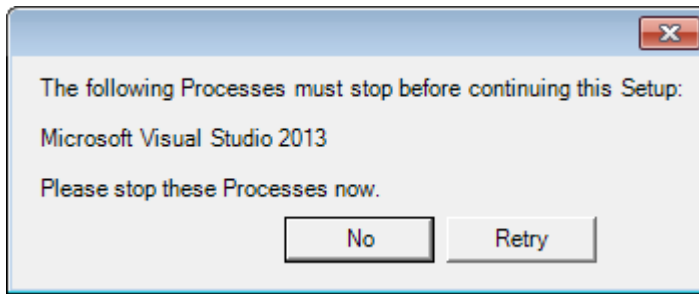


6. Start the installation and click **Install**.

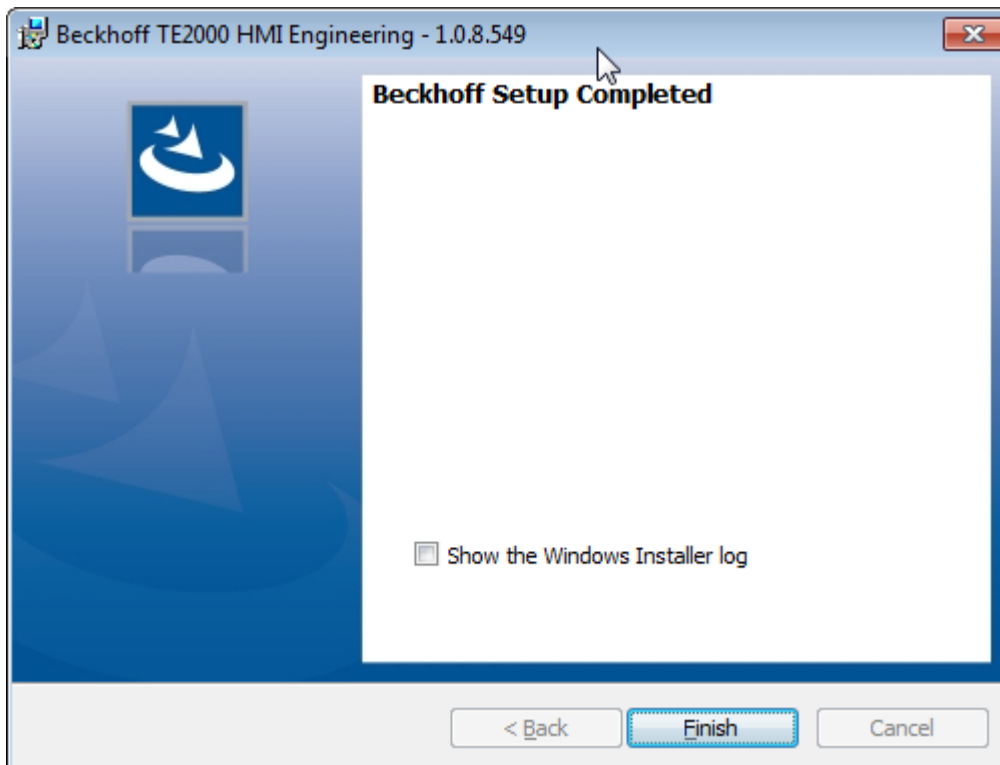


7. If not all Visual Studio instances are closed, the setup will pause.

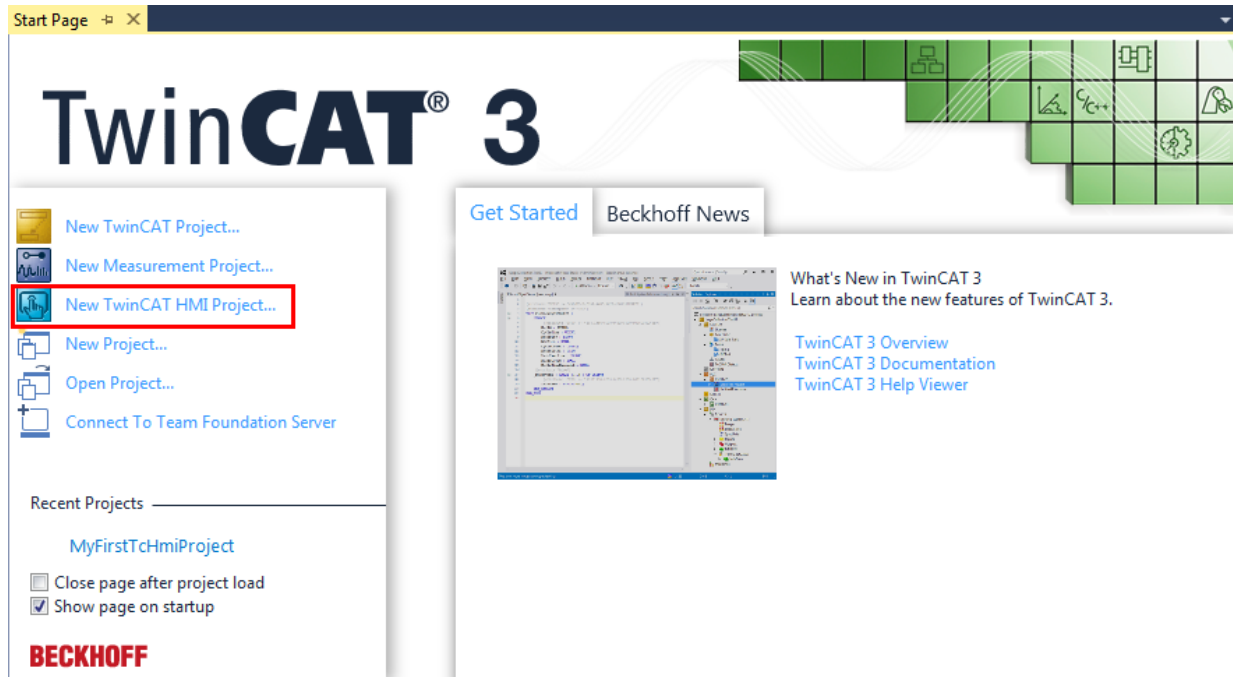
8. Please close all Visual Studio instances and click **Retry**.



9. Select **Finish** to exit the setup.

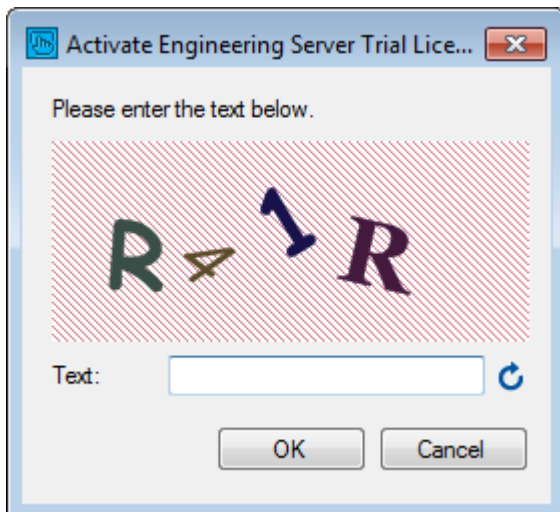


- ⇒ The installation is complete and the TE2000 HMI Engineering is integrated into the Visual Studio environment with its own project templates.



### 3.4 Licensing

If no TF2000 HMI server license is available on the Engineering system when a TwinCAT HMI project is first created, a 7-day test license can be generated. The suggested character string must be typed and confirmed with **OK**.

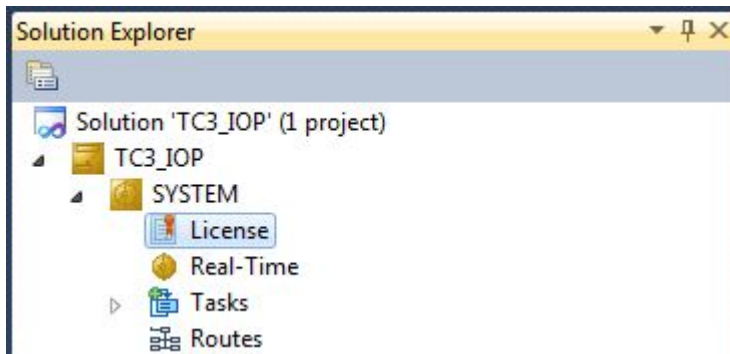


The trial license can be renewed at any time after it has expired.

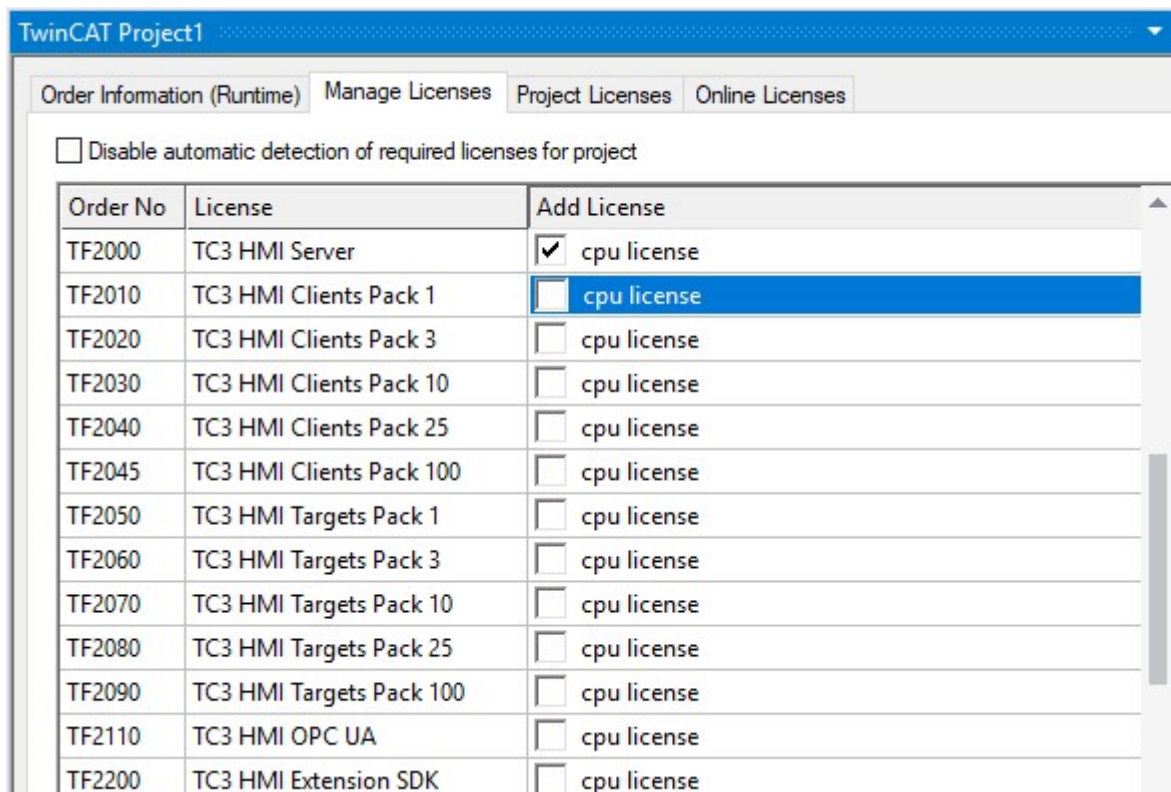
#### Licensing a full version

1. Start TwinCAT XAE
2. Open an existing TwinCAT 3 project or create a new project

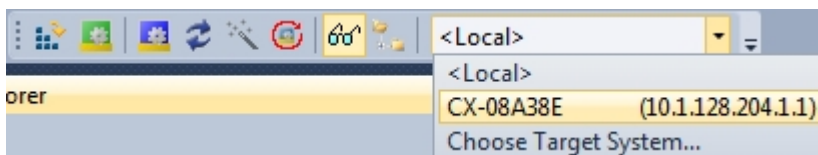
3. In the **Solution Explorer**, navigate to the entry **SYSTEM/License**



4. Open the **Manage Licenses** tab and add a **Runtime License** for your product (in this screenshot **TF2000: TC3 HMI Server**).



5. **Optional:** If you wish to add the license for a remote device, you must first connect to this device via the TwinCAT XAE toolbar

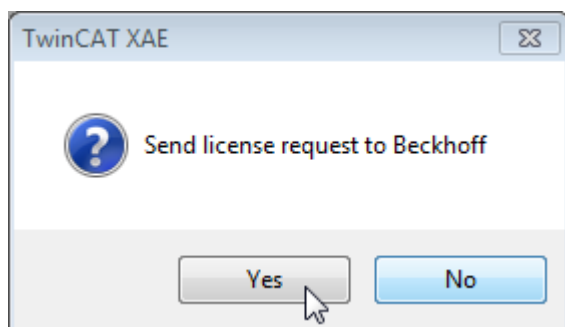


6. Open the **Order Information** tab. The **System ID** and **HW Platform** fields cannot be changed. They describe the platform to be licensed. In general, a TwinCAT 3 license is bound to two key figures:  
 The **System ID** uniquely identifies your device.  
 The **HW platform** is a key figure for the performance of the device.

7. Optionally, you can enter your own order number and a comment for your own needs

Order No	License	Instances	Current Status
TC1000	TC3 ADS	cpu license	expires on Jun 5, 2017 (trial lice...
TF2000	TC3 HMI Server	cpu license	expires on Jun 5, 2017 (trial lice...

8. On the **Order Information** tab, click the **Generate License Request File...** button to generate a license request file that is validated by a Beckhoff license server (if you do not know your **Beckhoff License ID** , contact your Beckhoff sales representative).
9. After you have saved the License Request File, the system asks whether the file should be sent to the Beckhoff license server by email:



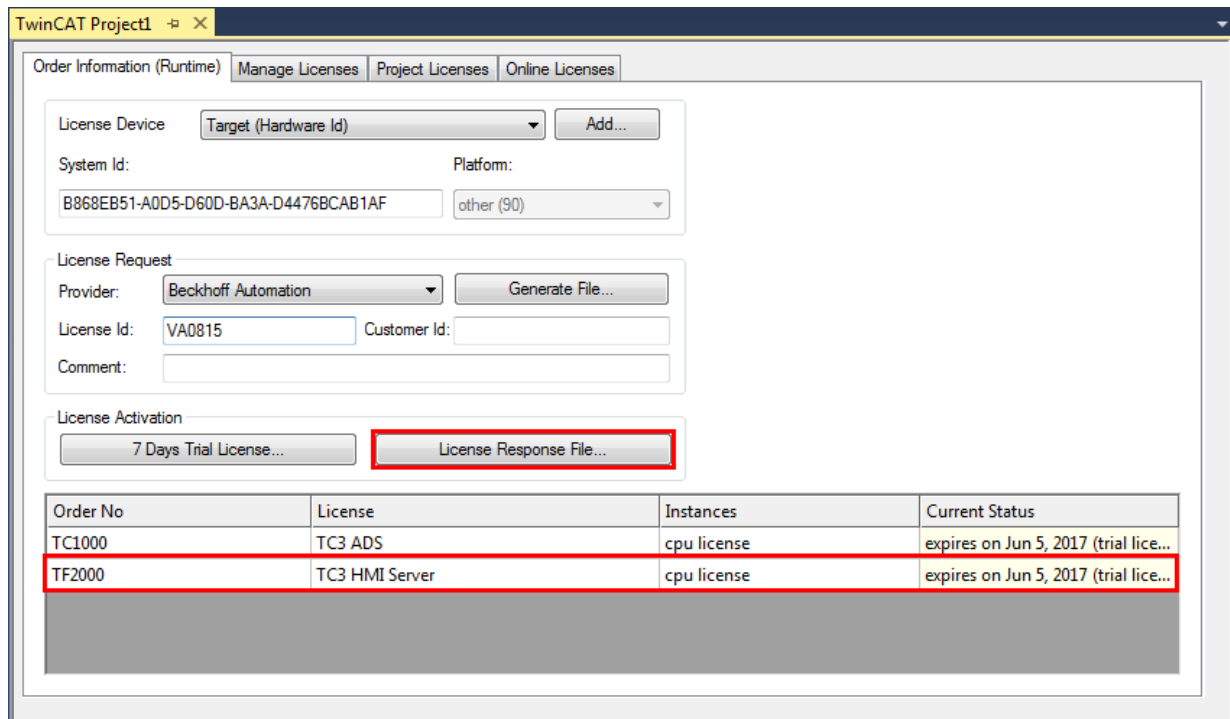
10. If you confirm the dialog with **Yes**, your default email client opens and creates a new email for [tclicense@beckhoff.com](mailto:tclicense@beckhoff.com) containing the license request file.
11. Send this activation request to Beckhoff



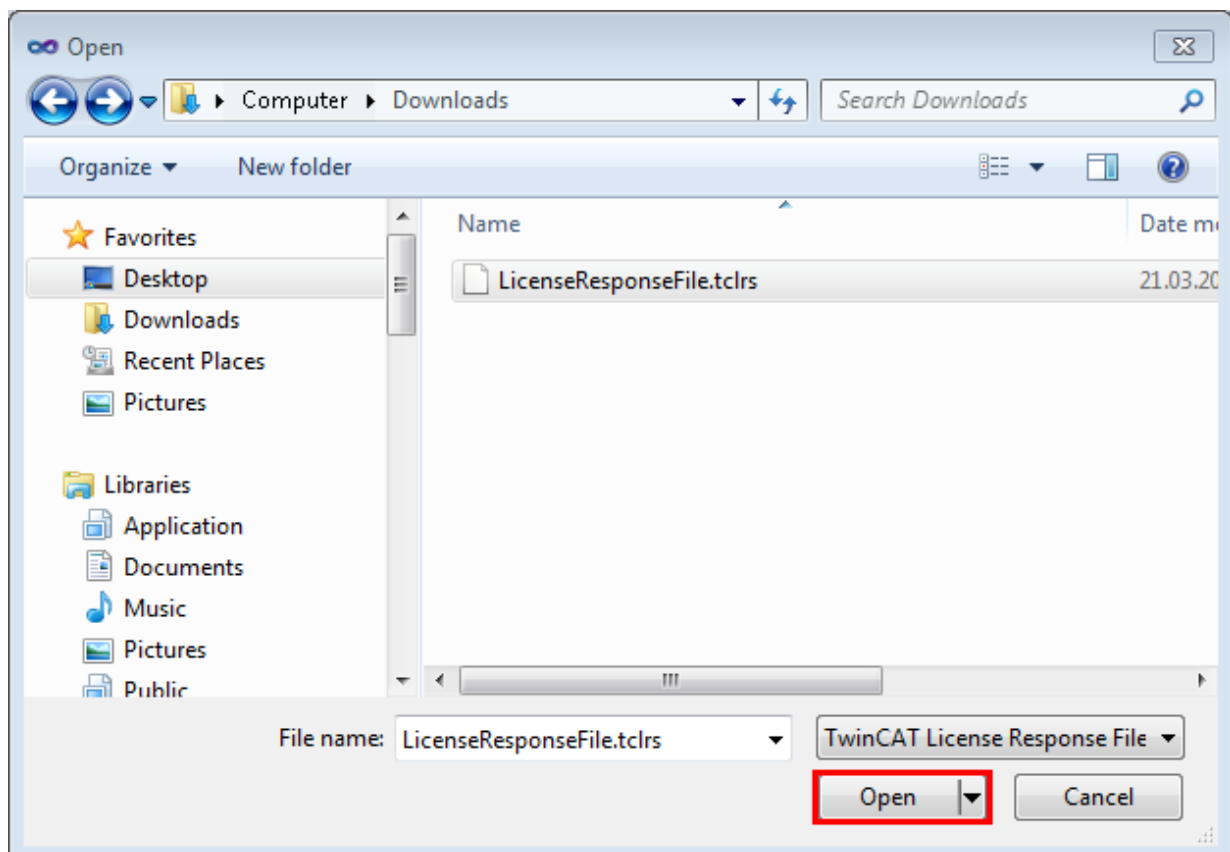
The License Response File is sent to the same email address that sent the License Request File.



12. Shortly afterwards, you will receive a license file from the Beckhoff license server.  
Import the file via the **Activate License Response File...** button to activate the product

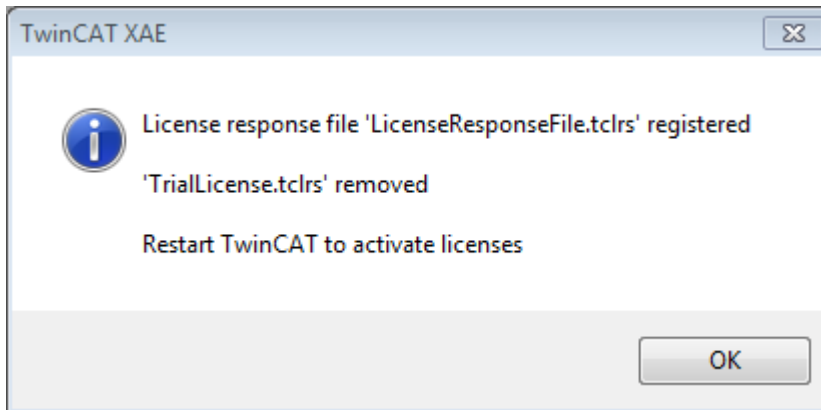


13. Select the **License Response File** you received in your folder system



14. The License Response File is imported and all licenses contained in it are activated (all affected demo licenses are removed)

## 15. Restart TwinCAT to activate the license



⇒ The license file is automatically copied to your local hard disk under ...\\TwinCAT\\3.1\\Target\\License.

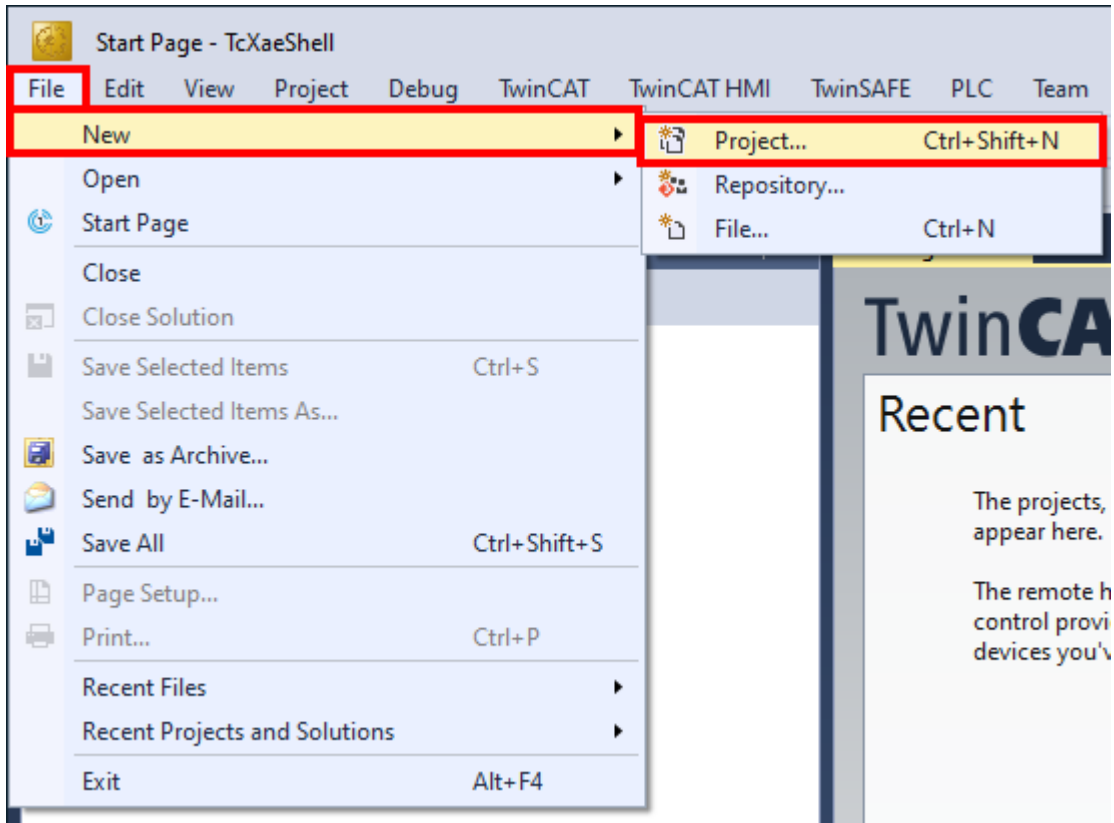
## 4 Quick start

### 4.1 Creating a new project

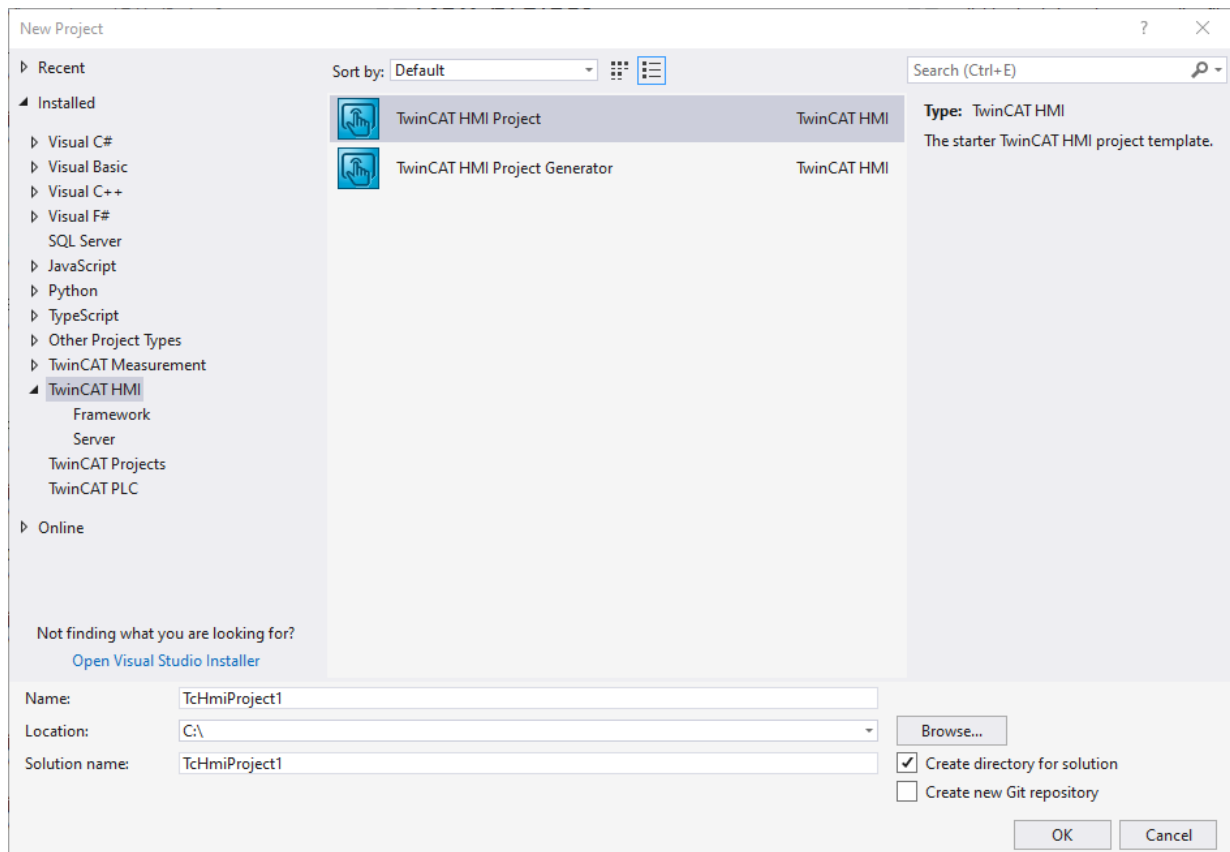
VS2017 / VS2019 / TwinCAT XAE Shell (menu)

✓ Start Visual Studio or the TwinCAT XAE Shell.

1. Click **File > New > Project**.



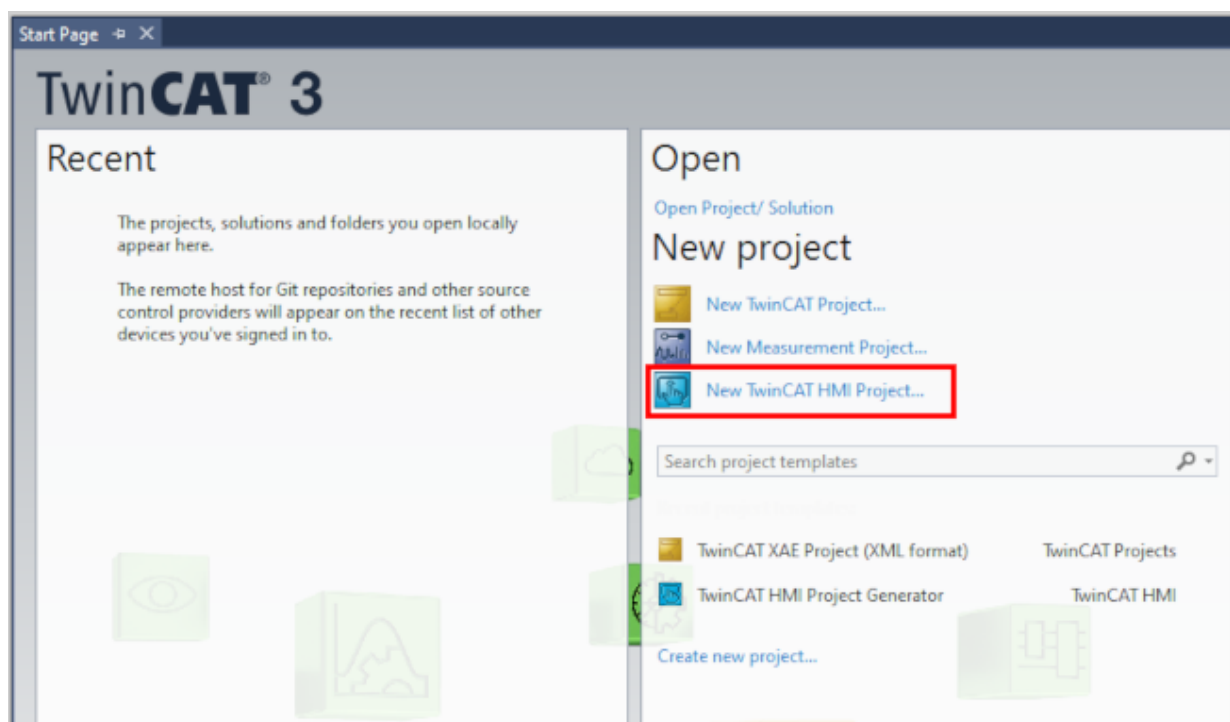
## 2. Select a project template.

3. Confirm your selection with **OK**.

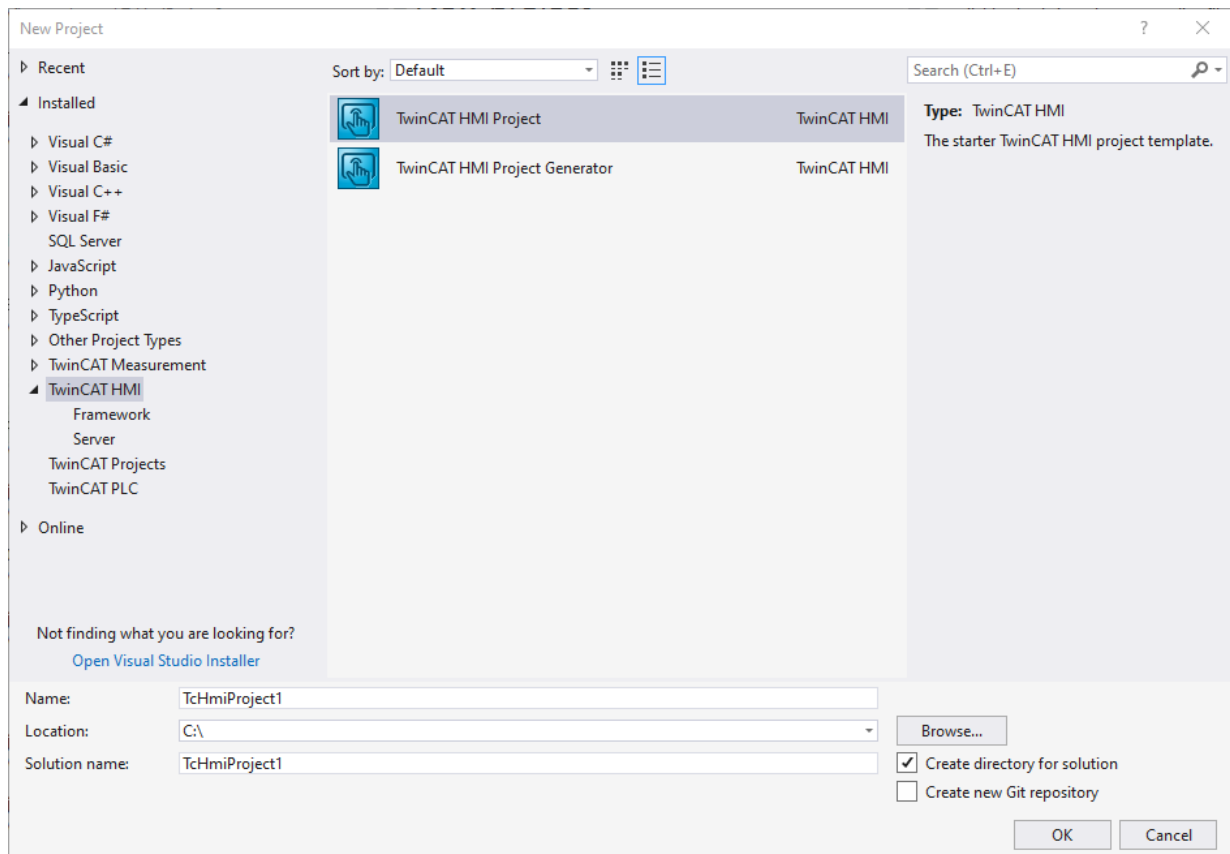
⇒ With this you have created a new project.

**VS2017 / VS2019 / TwinCAT XAE Shell (start page)**

✓ Start Visual Studio or the TwinCAT XAE Shell.



## 1. Select a project template

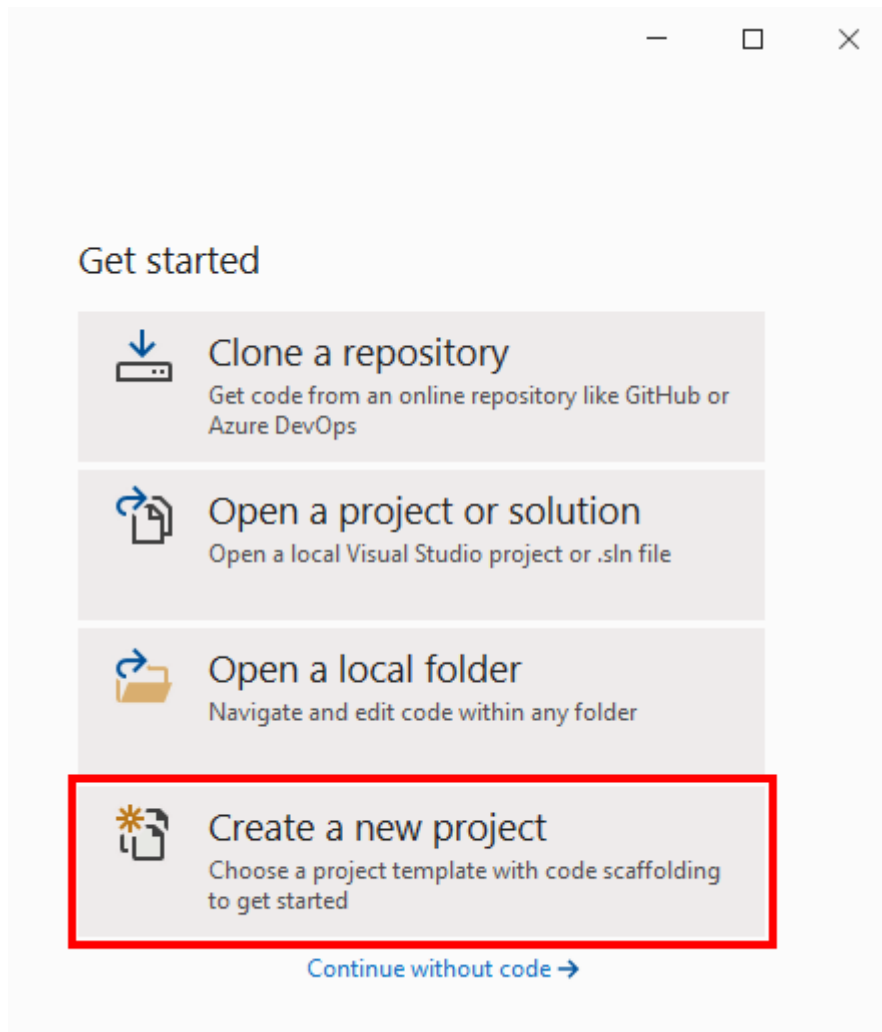


## 2. Confirm your selection with **OK**.

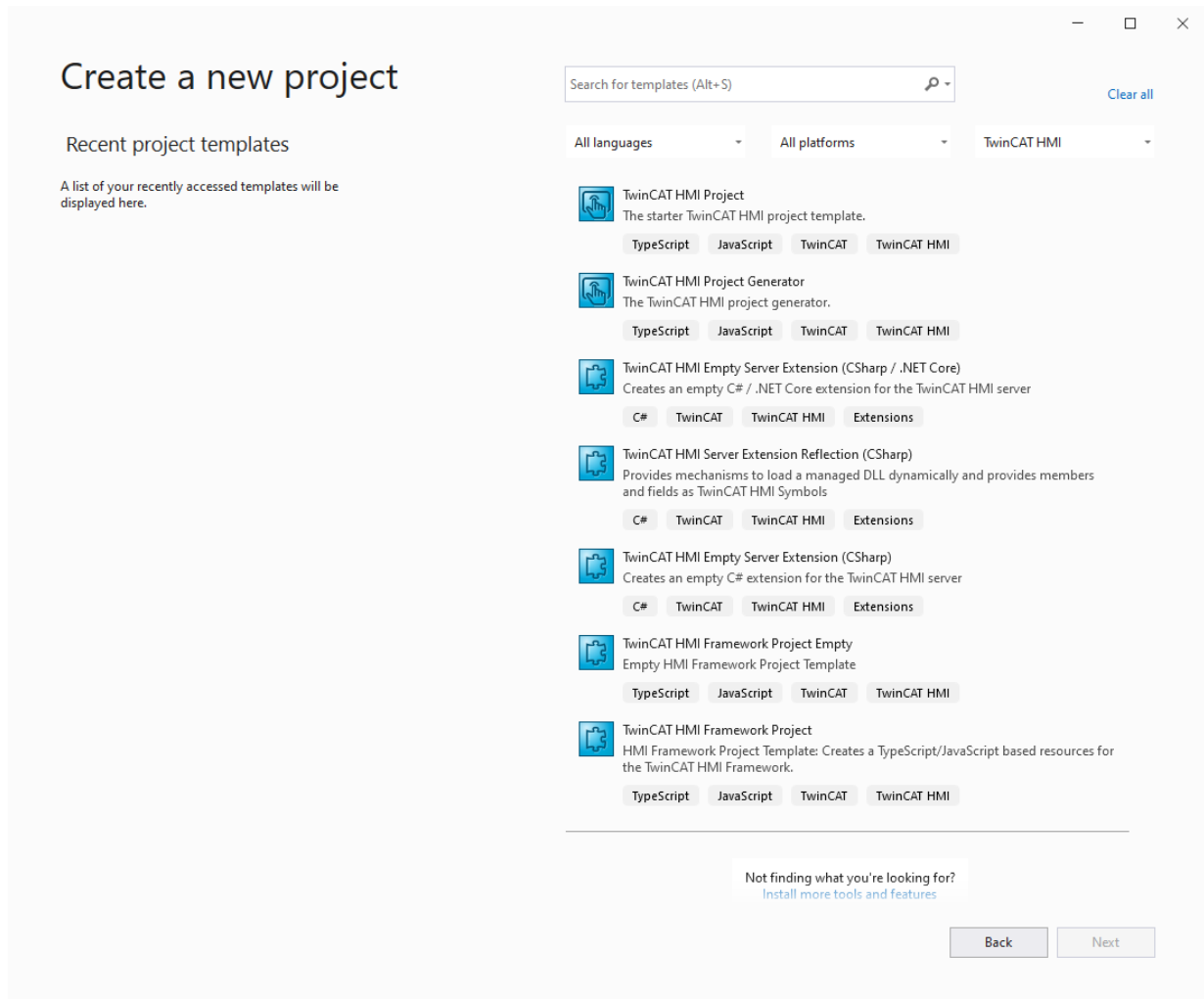
⇒ With this you have created a new project.

**VS2019 (dialog)**

- ✓ Start Visual Studio or the TwinCAT XAE Shell.



## 1. Select a project template.



The following project templates are available for selection:

#### HMI:

- TwinCAT HMI Project
- [TwinCAT HMI Project Generator \[► 1055\]](#) (Quick Start [\[► 1063\]](#))

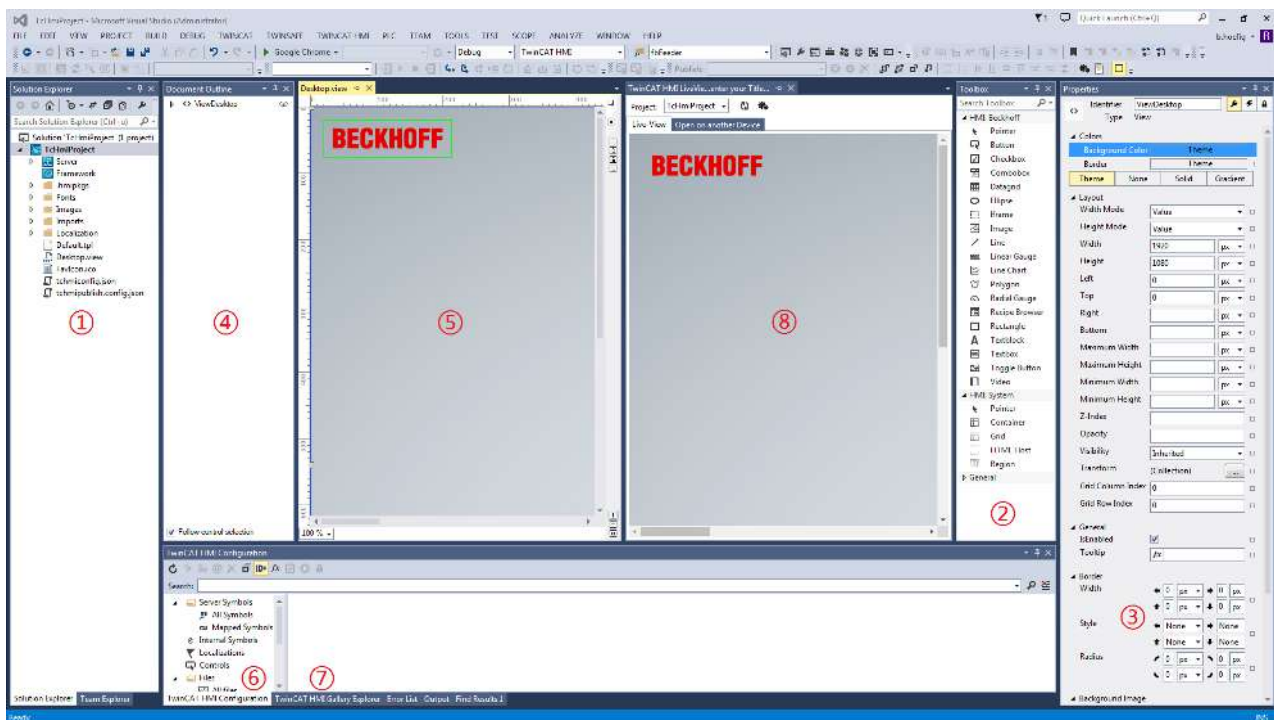
#### HMI Framework:

- [TwinCAT HMI Framework Project \[► 1521\]](#)
- [TwinCAT HMI Framework Project Empty \[► 1521\]](#)

#### HMI Server Extension:

- [TwinCAT HMI Empty Server Extension \(CSharp / .NET Core\) \[► 1452\]](#)
- [TwinCAT HMI Empty Server Extension \(CSharp\) \[► 1452\]](#)
- [TwinCAT HMI Server Extension Reflection \(CSharp\) \[► 1452\]](#)

## 4.2 HMI Engineering interface



### 1 Solution Explorer

The Solution Explorer displays the HMI project tree. It is possible to add and manage various project types in one Solution. For example, it is possible to add a TwinCAT 3 project to the same Solution as a TwinCAT HMI project.

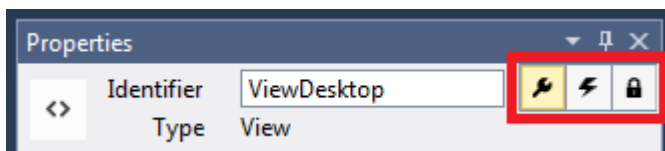
### 2 Toolbox

The Toolbox contains all the available visualization elements, known as controls. These can be added to the graphic editor of the designer ⑤ by drag-and-drop. A predefined set of controls is supplied with the TwinCAT HMI.

### 3 Properties

The Properties window displays various properties depending on the object that is selected. The selected object could be a visualization control in the graphic editor of the Designer ⑤ or the Document Outline respectively, or it could be an object in the Solution Explorer ①.

If you have selected a visualization control there are three different views between which you can switch using the following buttons:



The left button (wrench) displays the general view with the various properties of this control. The central button (lightning bolt) displays all available events and the right button (lock) is for viewing the access rights to this control.



#### 4 Document Outline (Standard VS tool window)

The Document Outline displays an overview of all the controls that have been added to the Designer ⑤. As in the graphic editor, individual elements can be selected directly in the Document Outline, for example in order to change their properties in the Properties window. Controls can also be moved in the Document Outline, for example into or out of a container.

#### 5 Designer

The Designer is the front-end development tool and is divided into two editors – a graphic editor in which controls can be added from the Toolbox ② by drag-and-drop and then changed in the Properties window ③, and a code editor. The code is generated automatically in the background and can be directly and synchronously edited. In the top right-hand corner there are two buttons ⑨ for switching between these two editors. The three buttons in the bottom right-hand corner ⑪ are used to display both editors at the same time and to select the arrangement of the windows.



There are various quick-access buttons ⑩ on the right-hand side. With these buttons you can open the Document Outline ④, the TwinCAT HMI Configuration ⑥, the TwinCAT HMI Gallery Explorer ⑦ and the TwinCAT HMI LiveView ⑧.

#### 6 TwinCAT HMI Configuration

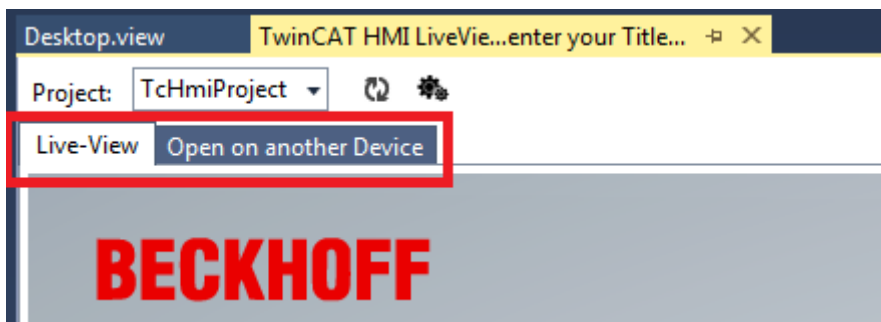
The configuration is the central TwinCAT HMI tool window, where you can access all available types of symbols (e.g. server symbols, internal symbols and localizations) and the User Management settings.

#### 7 TwinCAT HMI Gallery Explorer

The Gallery Explorer contains predefined graphics that can be added directly to the graphic editor or to the Solution tree by drag-and drop.

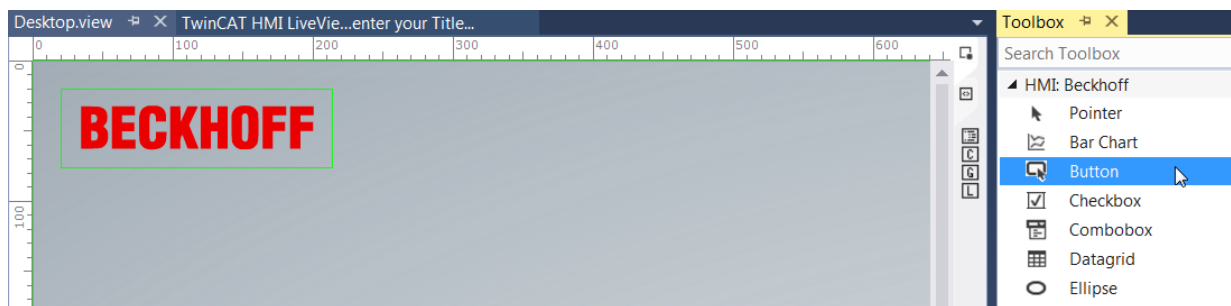
## 8 TwinCAT HMI LiveView

In the LiveView the visualization can be tested directly online without having to download the changes first. It can be started as an additional tool window inside Visual Studio (left-hand tab) or in a web browser by URL link (right-hand tab).

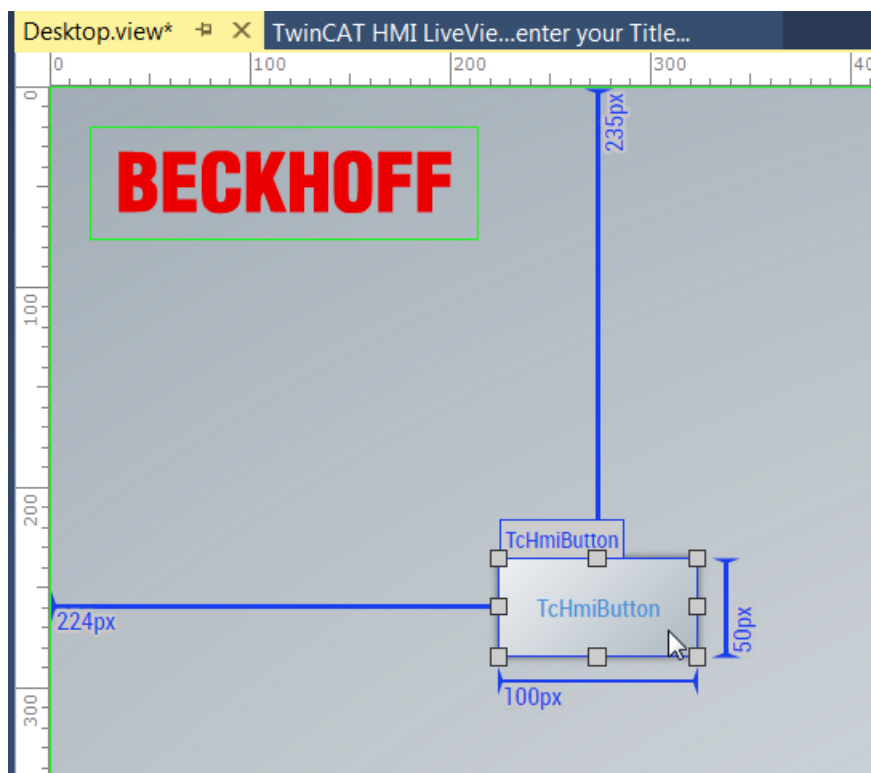


## 4.3 Adding controls

1. Open the Designer.
2. Switch to the Toolbox.



3. Drag and drop a control into the graphic editor.



## 4.4 Adding events

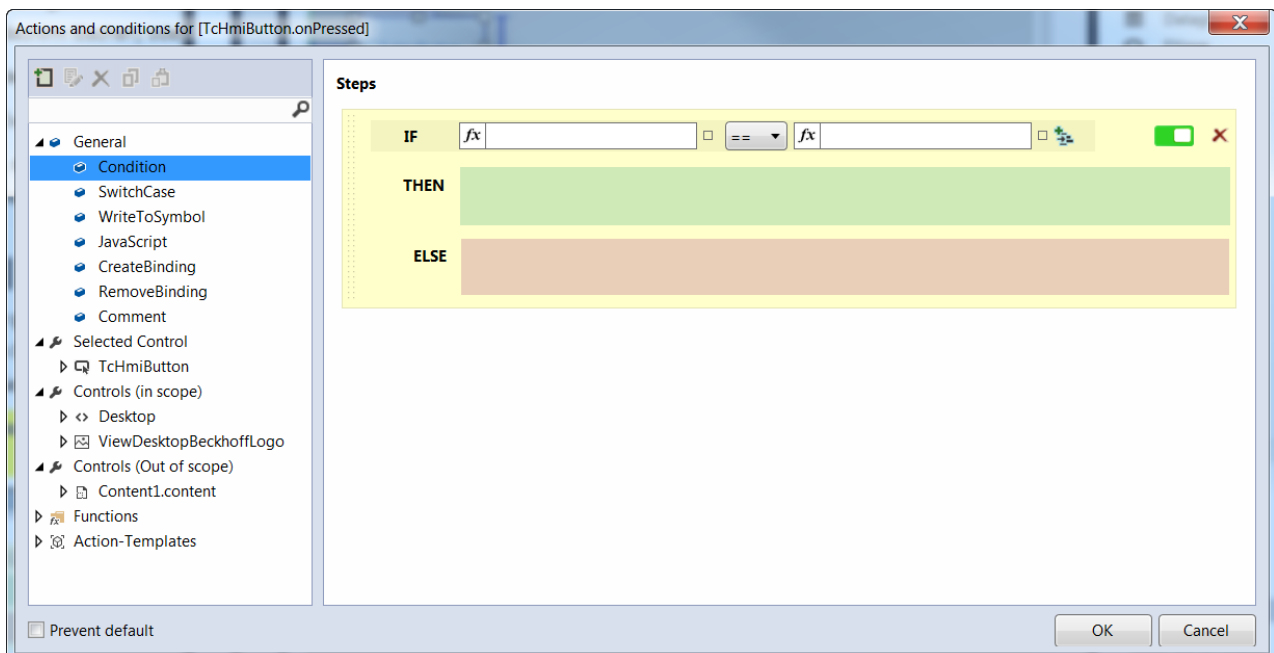
All available events can be found in the Event view of the Properties window ③, divided into four categories.

- All user-specific events (e.g. change of a symbol) are listed in the "Custom" category.
- All events generated by the system are listed in the "Framework" category.
- All events that interact with the operator are listed in the "Operator" category.
- All events that only this control has at its disposal are listed in the "Control" category.

You can add a logical operation to each event that will be executed automatically if the event occurs. To add a logical operation, select one of the events and click on the pencil button:



The "Actions and Conditions [▶ 61]" dialog opens, a graphic editor for implementing your logical operation. You can also double-click on the control to implement a standard event. In the case of a button, for example, the standard event would be "is pressed".

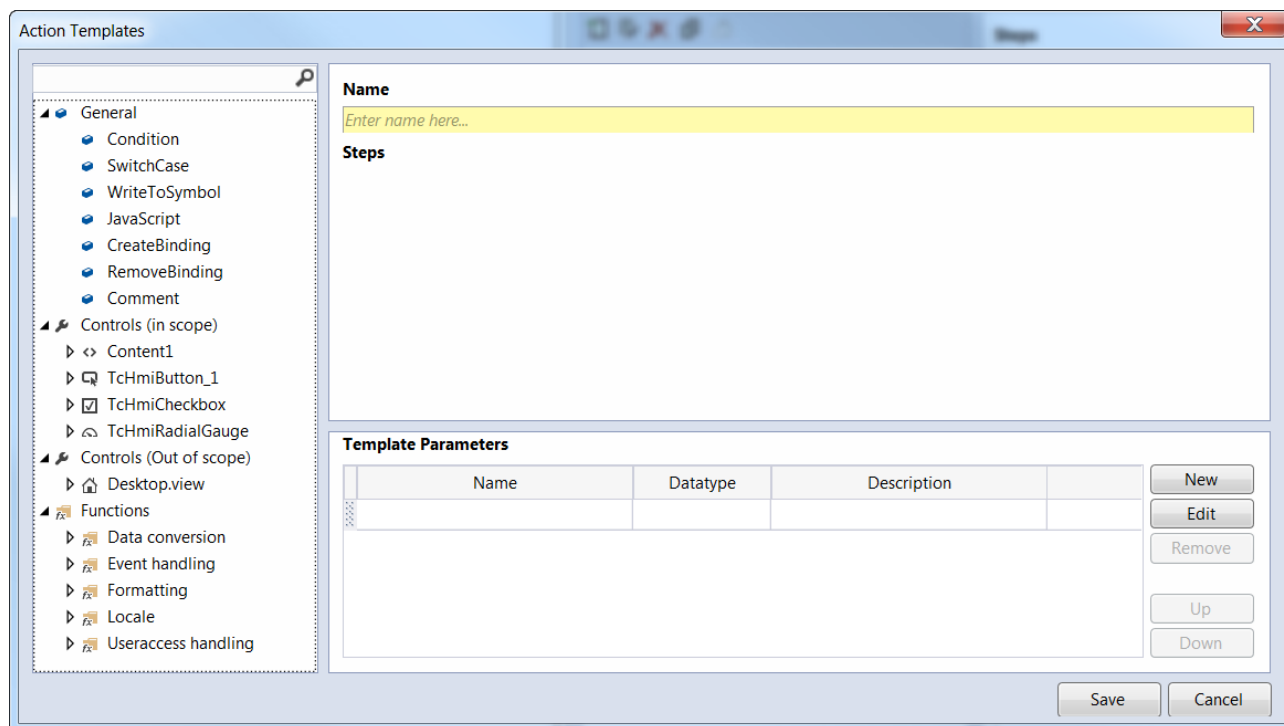


The editor consists of a left-hand and a right-hand part. In the left-hand part, all predefined actions are available in a tree view. The right-hand part is a graphic editor into which the actions and functions can be dragged and dropped.


There are four different categories in the Toolbox:

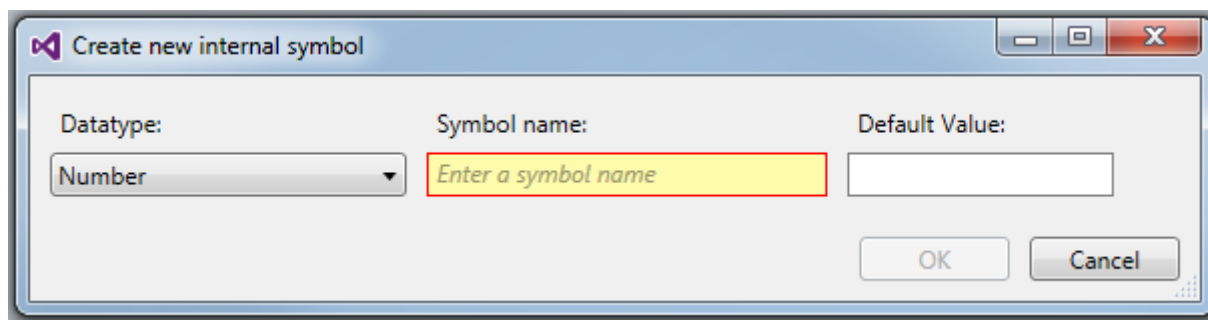
- General: General actions and conditions that are not directly assigned to a control
- Controls: All controls that are available within the scope. All properties are listed underneath each control.
- Controls (Out of scope): These controls are not in the current scope.
- Functions: Various functions that can also be used within the editor

In case a special logical operation is to be used several times you can build your own templates, which can then be found later in the Toolbox under the category "Action templates [▶ 71]". You can manipulate the Action Templates with the menu bar of the Toolbox, e.g. add, edit, delete, copy and paste. The Action Templates dialog has the same base functions as the "Actions and Conditions" editor, plus a name box and an area for editing the template parameters.



## 4.5 Adding an internal variable

1. Open the [configuration window](#) [► 77].
2. Switch to the "[Internal Symbols](#) [► 87]" tab.
3. Click on the **New Symbol** button , double-click on **create new internal symbol** or drag **create new internal symbol** onto the desired destination.
4. Enter the data type, a symbol name and a default value.



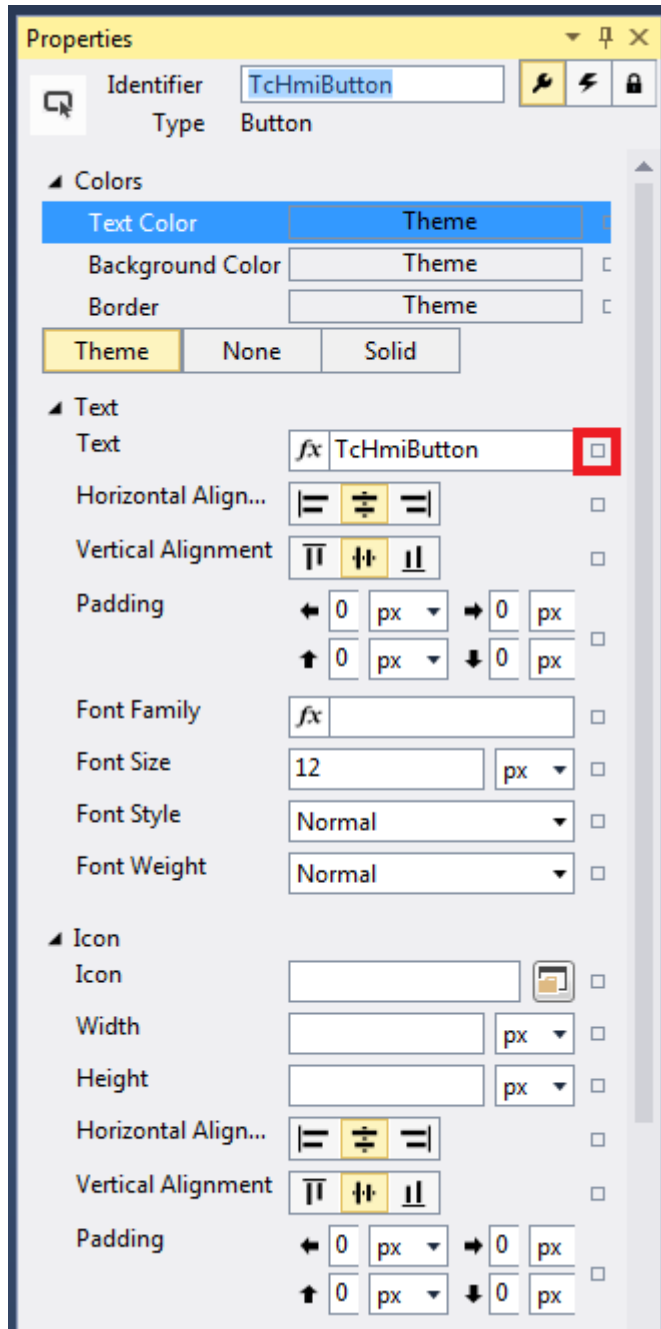
## 4.6 Creating a data binding

There are three different ways to create a data binding, i.e. mapping a symbol to an entry in the Properties.

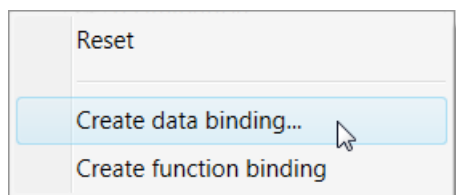
### Create a data binding via "Select Binding Source"

1. Select the control whose property you wish to map.
2. Open the Properties and select the correct entry.

3. The first way is to use the dialog **Select Binding Source**. To do this, click on the button to the right of the property of the entry.

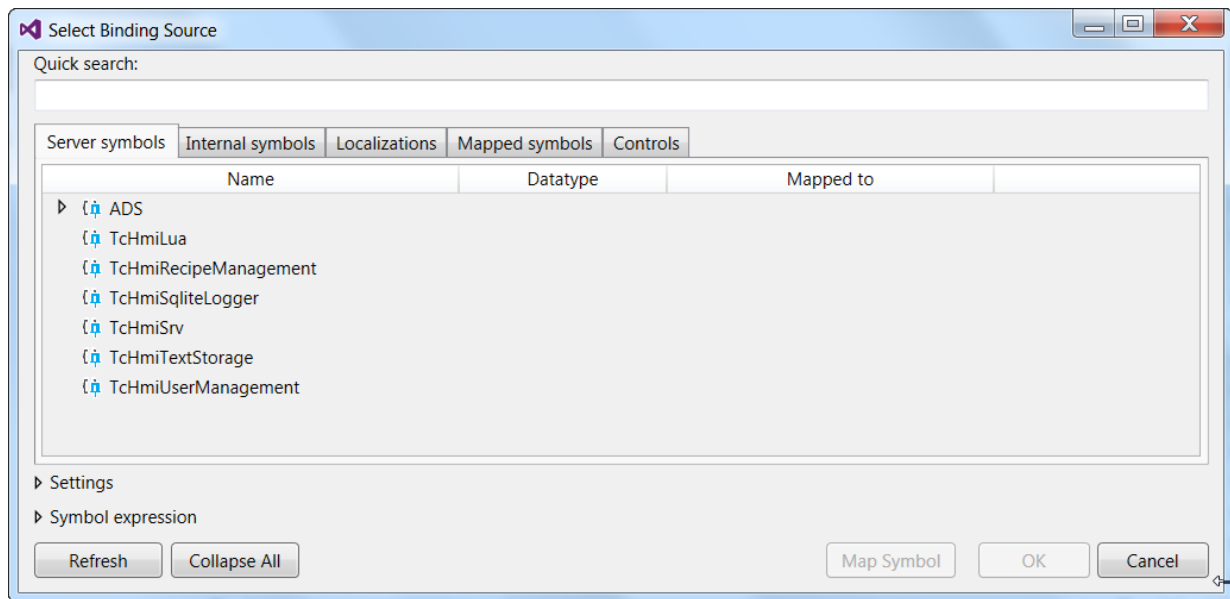


4. then select **Create data binding**



⇒ The window **Select Binding Source** opens.

5. In the dialog **Select Binding Source** you will find all types of available symbols on the various tabs:



**Server symbols:** all symbols that are available on the server under the ADS entry, e.g. the PLC variables.

**Internal symbols:** all internal symbols that have been created in the [Configuration](#) [► 79] (see: [Adding an internal variable](#) [► 40])

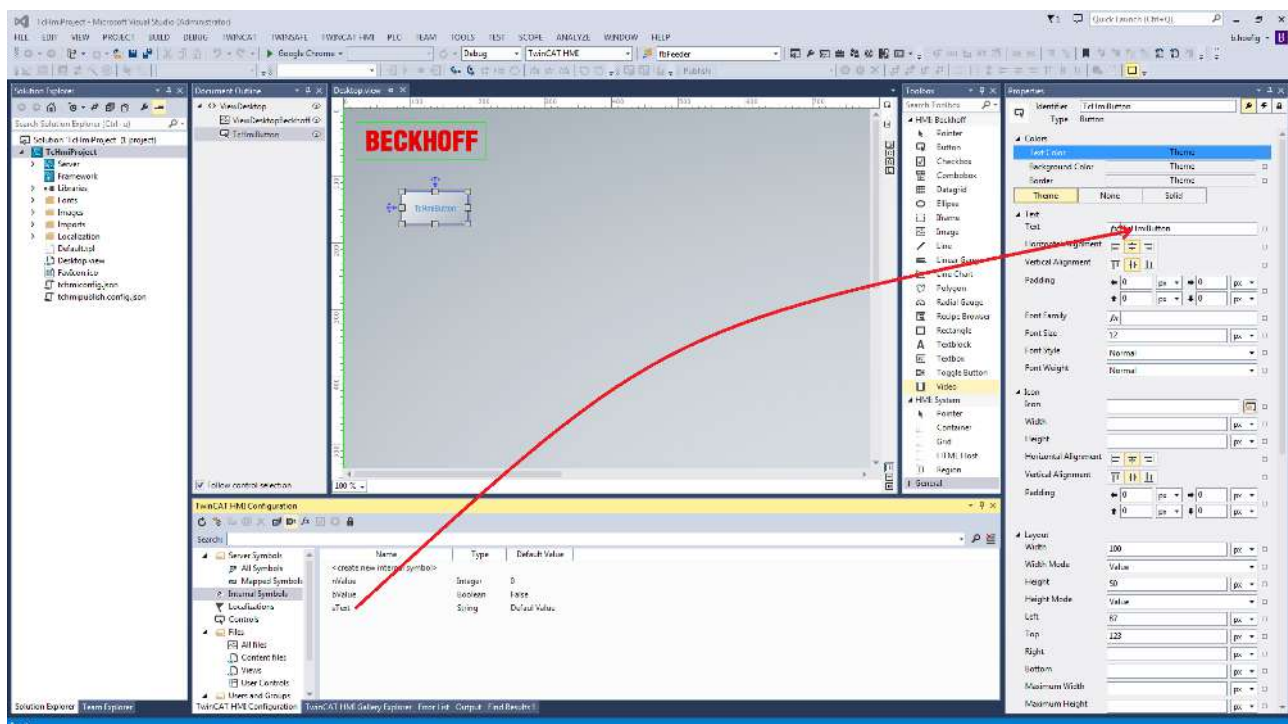
**Localizations:** Localization symbols, i.e. the localized text entries that you have created in the [Localization editor](#) [► 88].

**Mapped symbols:** Server symbols that are already mapped and are available in the engineering (e.g. Data Binding).

**Controls:** Each control has different properties whose values can be set or read.

### Creating a data binding by drag-and-drop.

You can drag and drop a symbol from the Configuration ⑥ into the Properties input box:

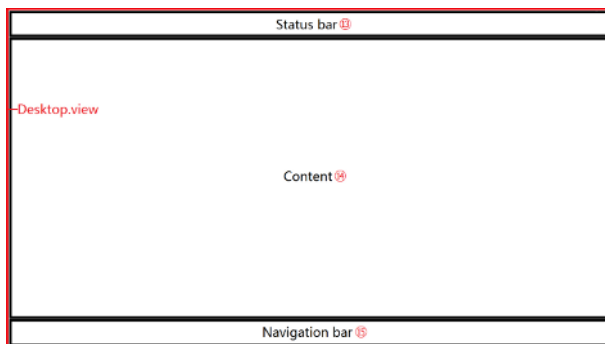


### Creating a data binding for already mapped symbols

If the symbol is already mapped, you can enter the name of the symbol directly in the Properties field. In this case an autocomplete function is available.

## 4.7 Navigation concept

The desktop view is the start page for the application on which you can create your visualization. A good method of increasing the tidiness is to split the visualization into various parts. To do this, divide it into various content objects. These content objects can be displayed in different areas of the desktop view. For example, the visualization could be divided into three areas in the desktop view: a status bar ⑬, a content area ⑭ and a navigation bar area ⑮. Various content objects can be displayed in the content area during the runtime. The contents of the status bar area and the contents of the navigation bar area can also be changed.



### 4.7.1 Creating navigation

1. Switch to the Solution Explorer.
2. Add the desired number of content objects:
  - 2.1 Right-click on the TwinCAT HMI project entry or on one of the folders.
  - 2.2 Select **Add** and **New Item** and select **Content**.
3. Open the view or the content where you wish to add the navigation.
4. Add a region and buttons in order to switch between the contents.
5. Set the **Target Content** attribute in order to define the start content.
6. Add a **SetTargetContent** action to the **.onPressed** event of all buttons and set the corresponding content.

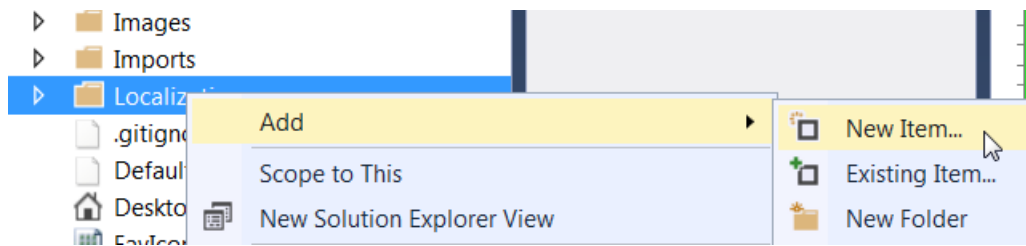
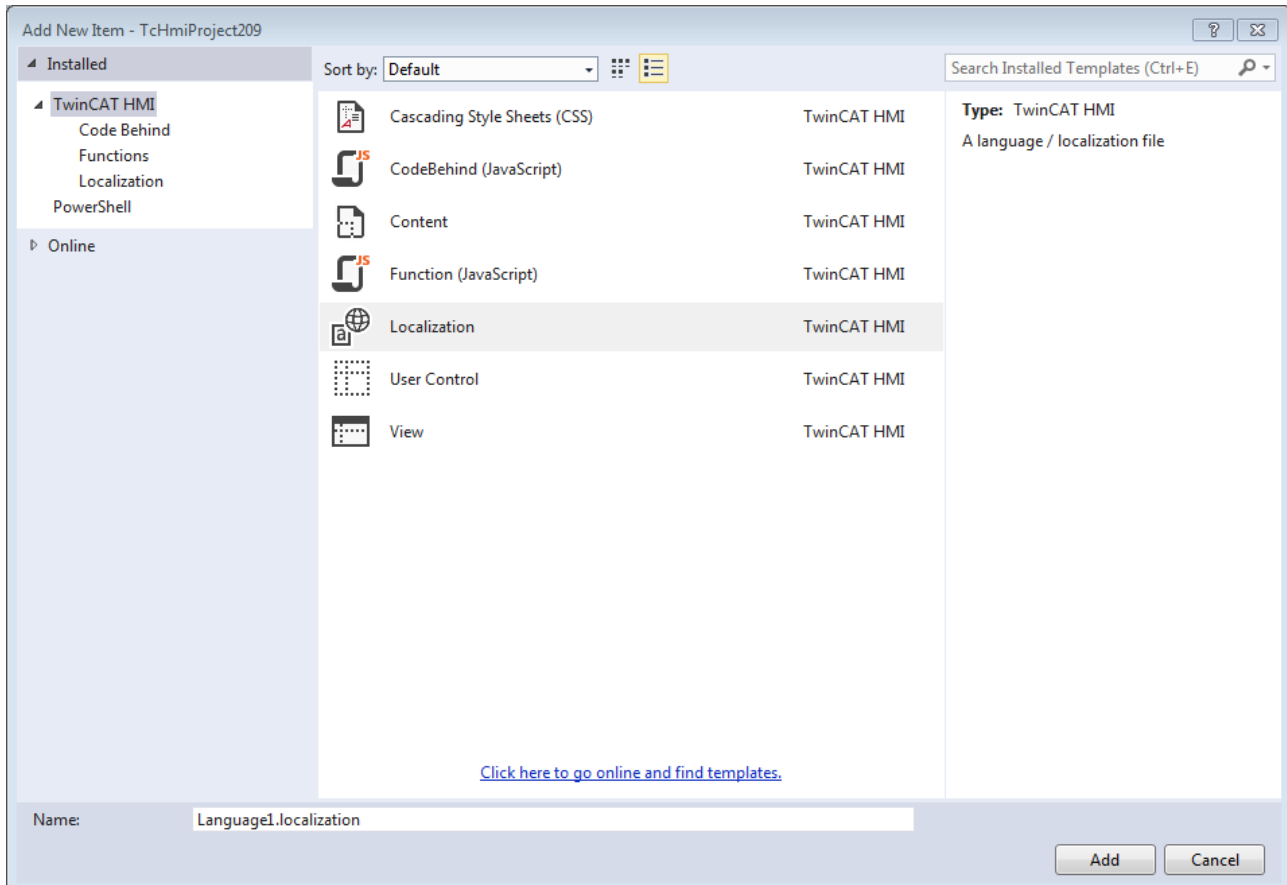
## 4.8 Change the language

Localized texts are defined in the TwinCAT HMI by key/value pairs. Several translations can be added for each key. Each language can be edited in the Localization editor.

### 4.8.1 Adding a new language

To add a new language, create a new localization object.

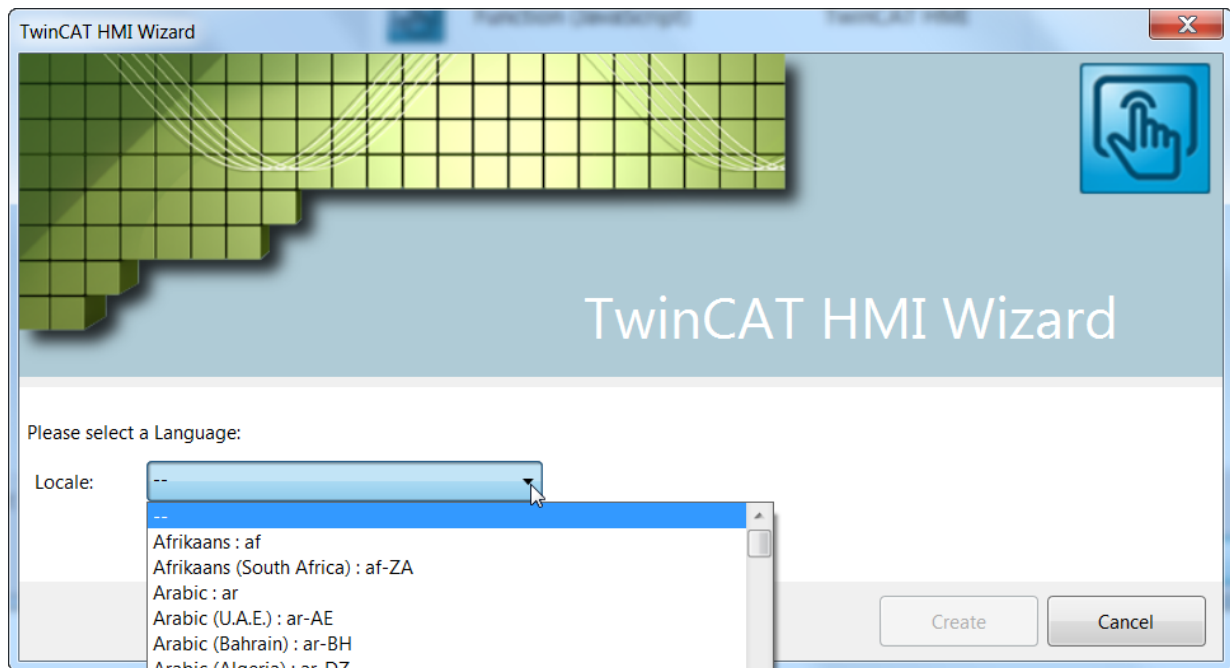
1. Right-click on the Localization folder.

2. Select **Add / New Item**3. Select **Localization** and click on **Add**

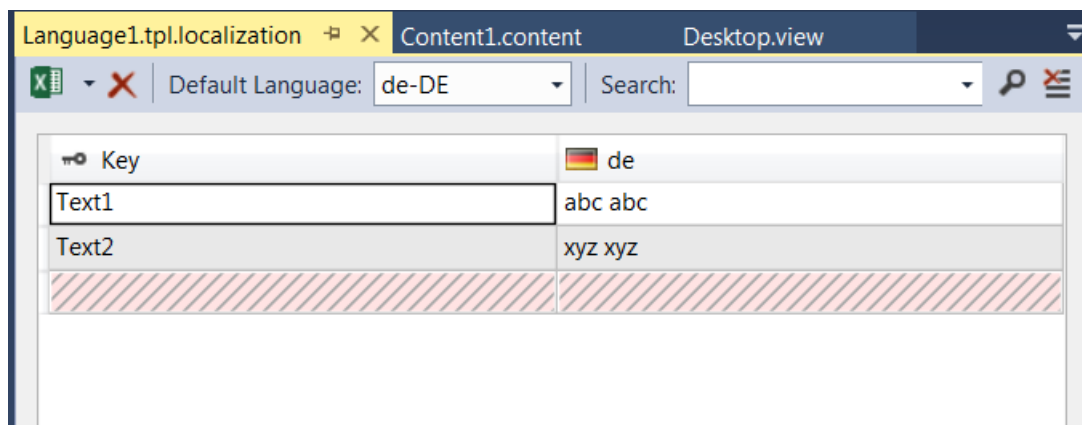
⇒ The TwinCAT HMI Wizard starts



4. Select a language and click on **Create**

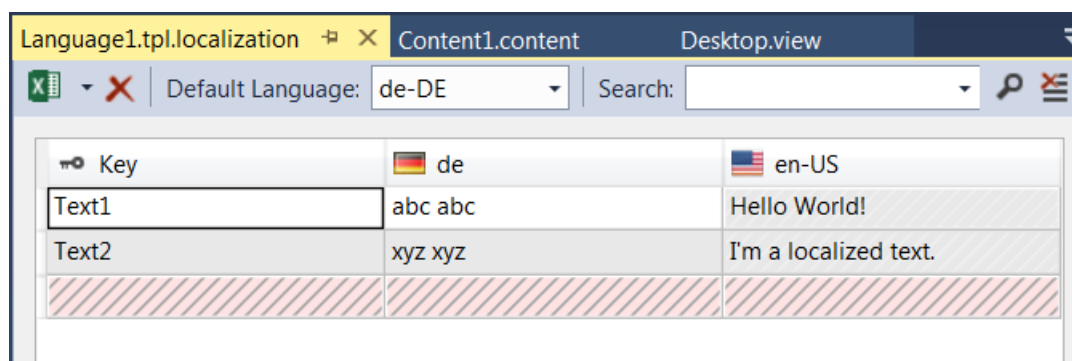


⇒ The Localization editor starts




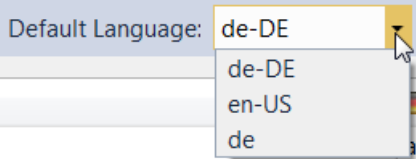



## 4.8.2 Doing translations in the Localization editor

The Localization editor has a column for the key and another for the translation. You can display all available languages in the same editor. To do this, right-click on the column header and select one of the languages in the drop-down menu.



In the upper area of the editor there is a toolbar that offers the following options:

- 
 Default Lan
  - Export as Excel
  - Import from Excel
  - Export as CSV
  - Import from CSV
 Export or import data to or from an Excel file
-  Delete entry
- 
 Drop-down menu default language
-  Search or delete search

You can create a new entry in the red and gray shaded row with a double click.

### 4.8.3 Switching the language

For language switching there is a special control called [Localization Select \[► 458\]](#).

Alternatively, you can use the [SetLocaleEx \[► 938\]](#)-action in the dialog "[Actions and Condition \[► 61\]](#)" to switch between different languages.

For example, you could use two buttons to switch between two languages. The ".onPressed" event of the buttons would be used to call the SetLocalEx action and to change the corresponding language.

## 4.9 User Control

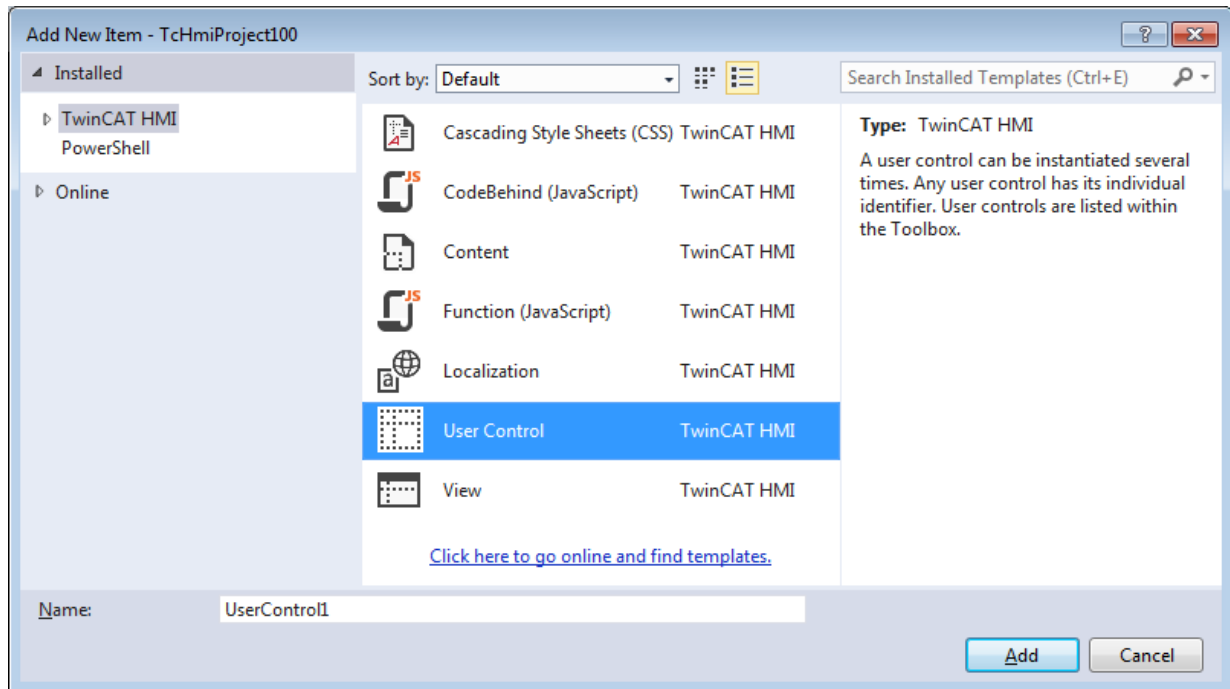
It is possible in a User Control to swap out part of the visualization to a new control in order to be able to reuse it more easily. This control can be designed as a general module with the help of parameter values.

### 4.9.1 Creating a User Control

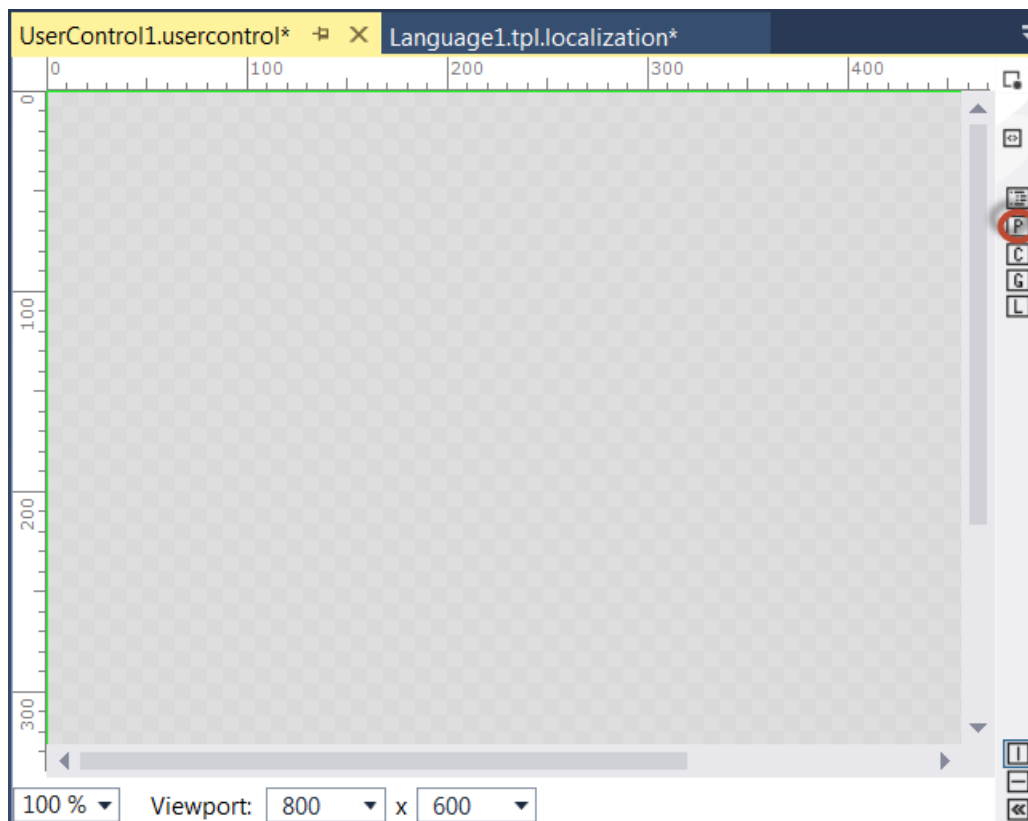
A User Control is an object type of its own.

1. Right-click on the TwinCAT HMI project or on a folder

2. Select **Add / New Item** and **UserControl**.

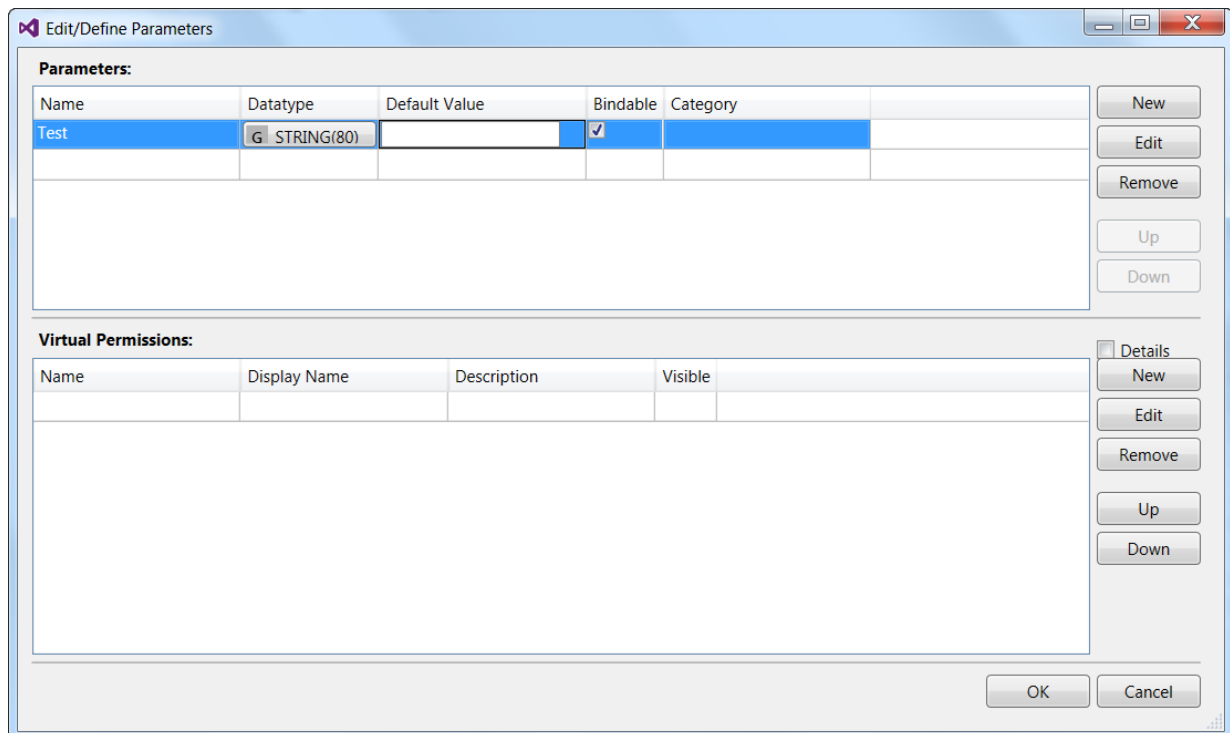


3. The User Control editor appears. It is very similar to the Designer, except that there is additionally a parameter editor (P button) on the right-hand side for quick access.



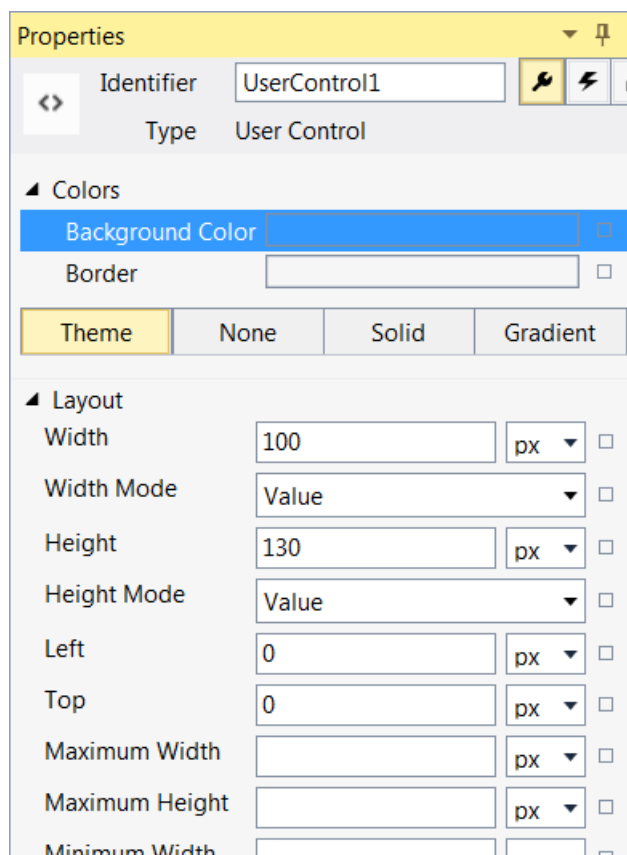
4. Drag a control out of the toolbox into the User Control editor
5. Click on **P** to open the Parameter editor.
6. Enter the name of the parameter in the dialog **Edit/Define Parameters**. The "Display Name" is generated automatically after the parameter name has been entered.
7. In the **Data type** column, select the data type from a drop-down menu. If the data type is a structure, select the corresponding structure type in the **Options** column.

8. In the **Bindable** column, define whether the parameter may be mapped to a symbol later on.

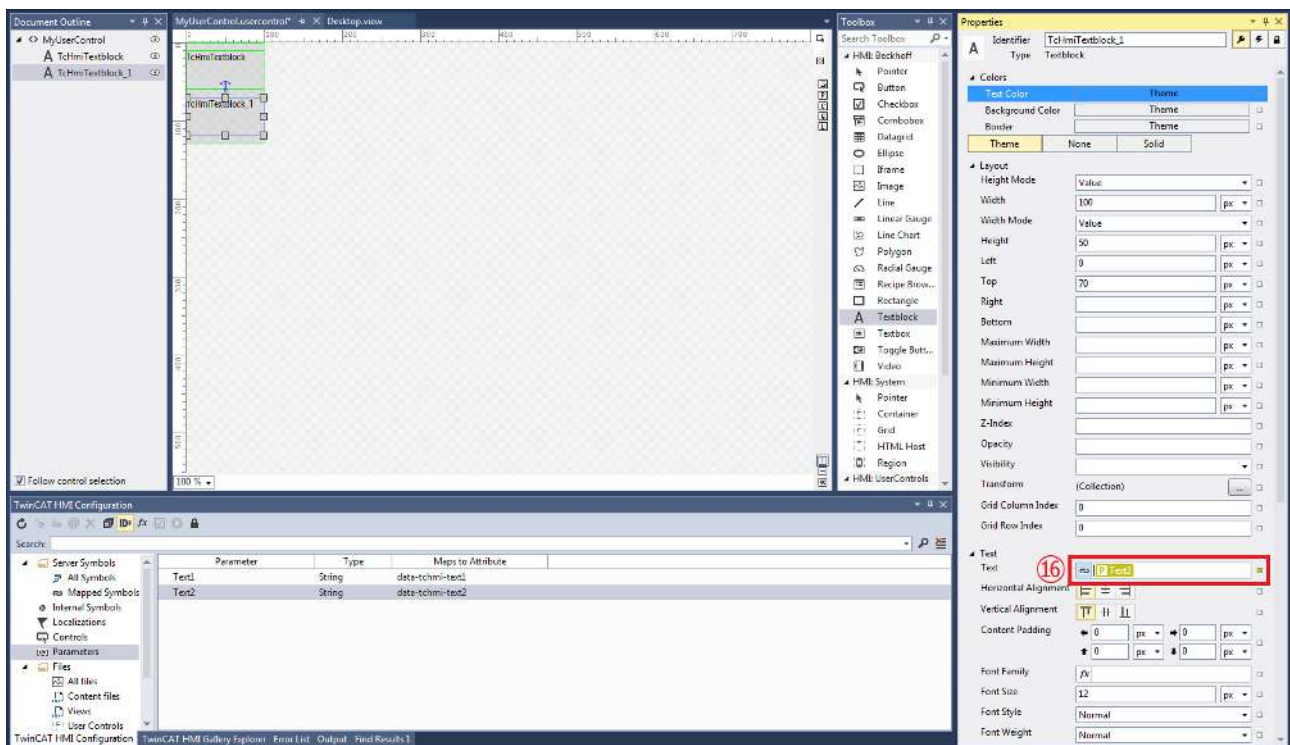
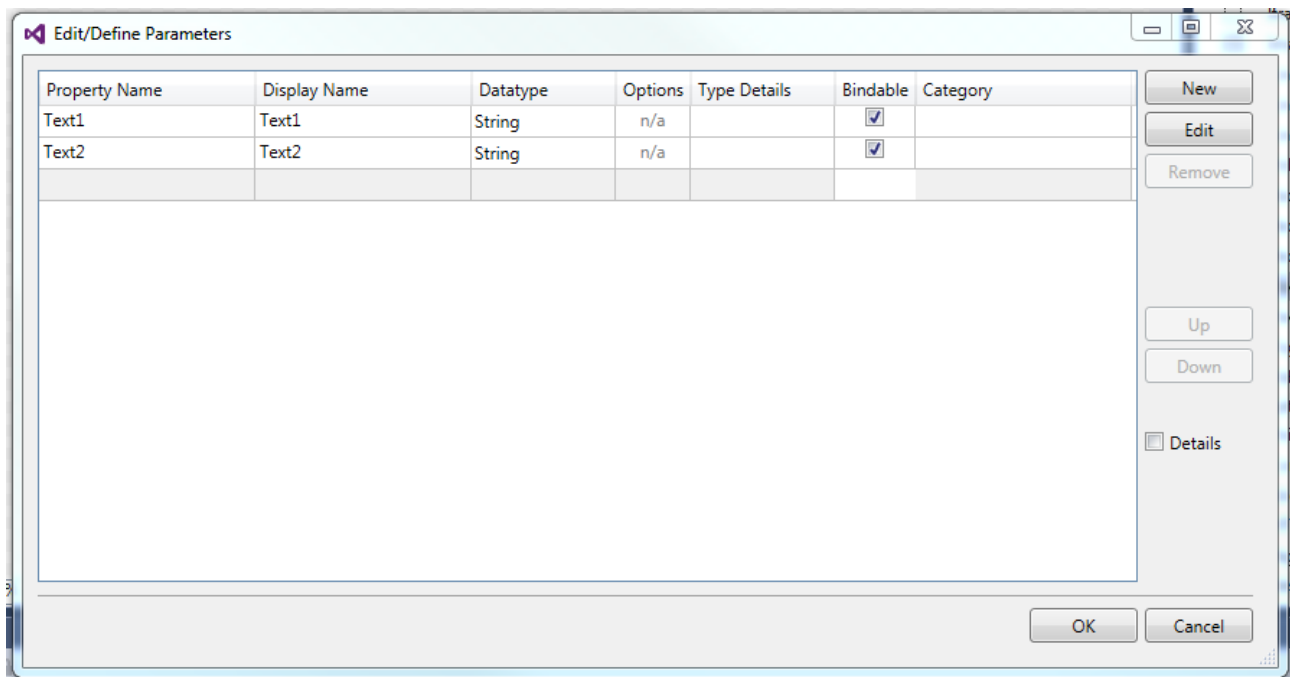


- ⇒ You can now use the newly created parameters inside the User Control with their mapping properties (see [Creating a data binding](#) [► 40]).

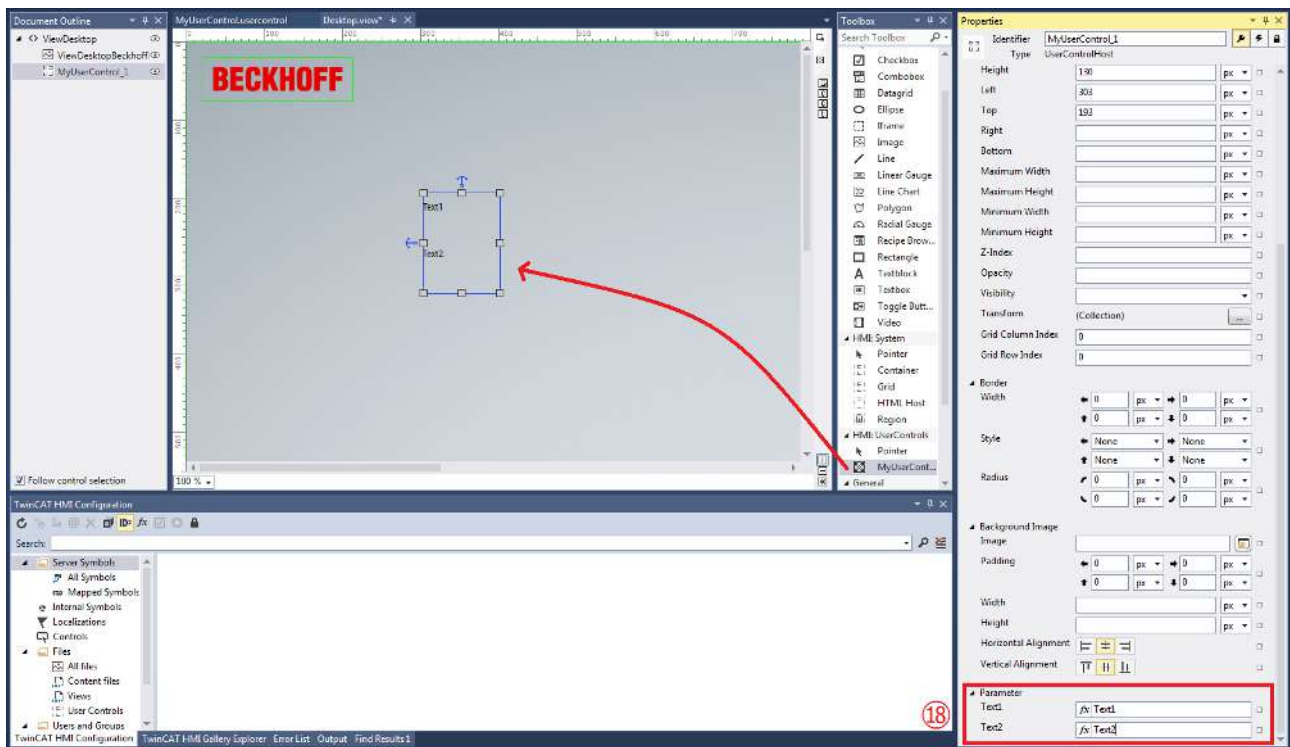
As a simple example, the illustration below shows the properties of an added User Control whose size is 100 x 130 pixels.



Two text blocks have been added to this User Control, each bound to a parameter of the type String (see ⑩).



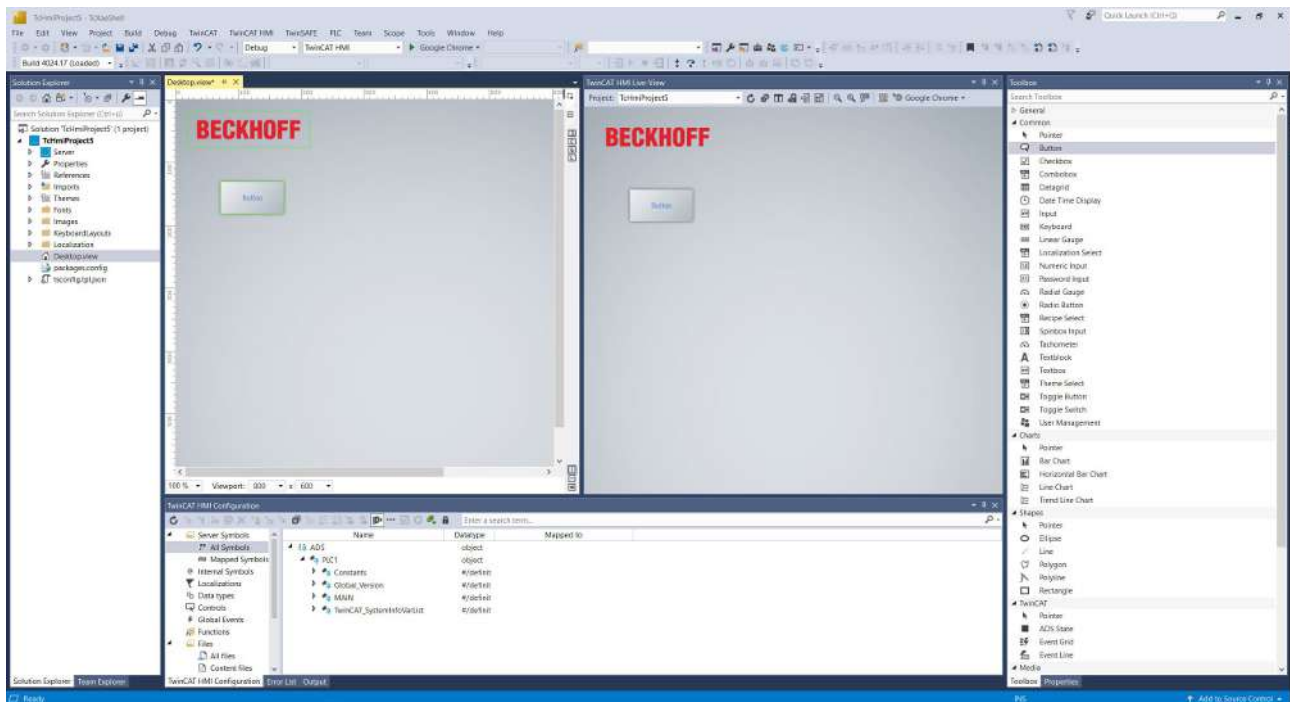
The User Controls that were added to the project are now available via the Toolbox; you can add them to the Designer by drag-and-drop. The parameters have been added to the properties of the User Control and are displayed in the Properties window ⑩. If they were created as bindable it is also possible to map them to a symbol.



## 4.10 Installing packages

In versions 1.8 and 1.10, most server extensions or TwinCAT HMI controls were already included in a new HMI project. In version 1.12, the new package management based on NuGet allows you to install only those extensions that you actually need. This allows a more flexible and modular structure of the HMI project. If, for example, you want to use recipe management or the historization of data, you have to install the corresponding NuGet package in the project. For further details please refer to "[Installing a NuGet package](#) [► 1030]".

## 5 Development environment

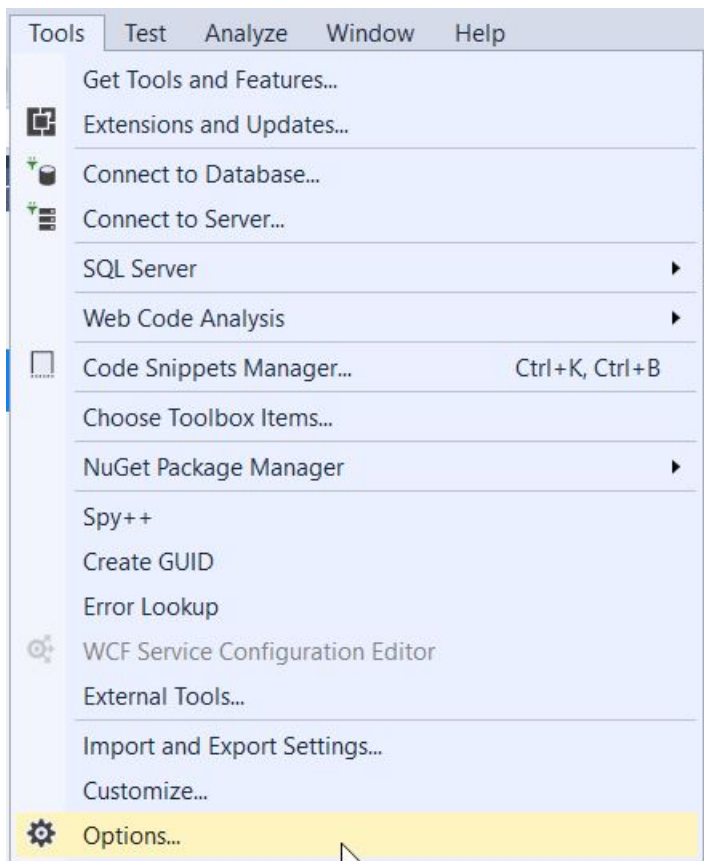


The development environment of the TwinCAT HMI consists of the following windows:

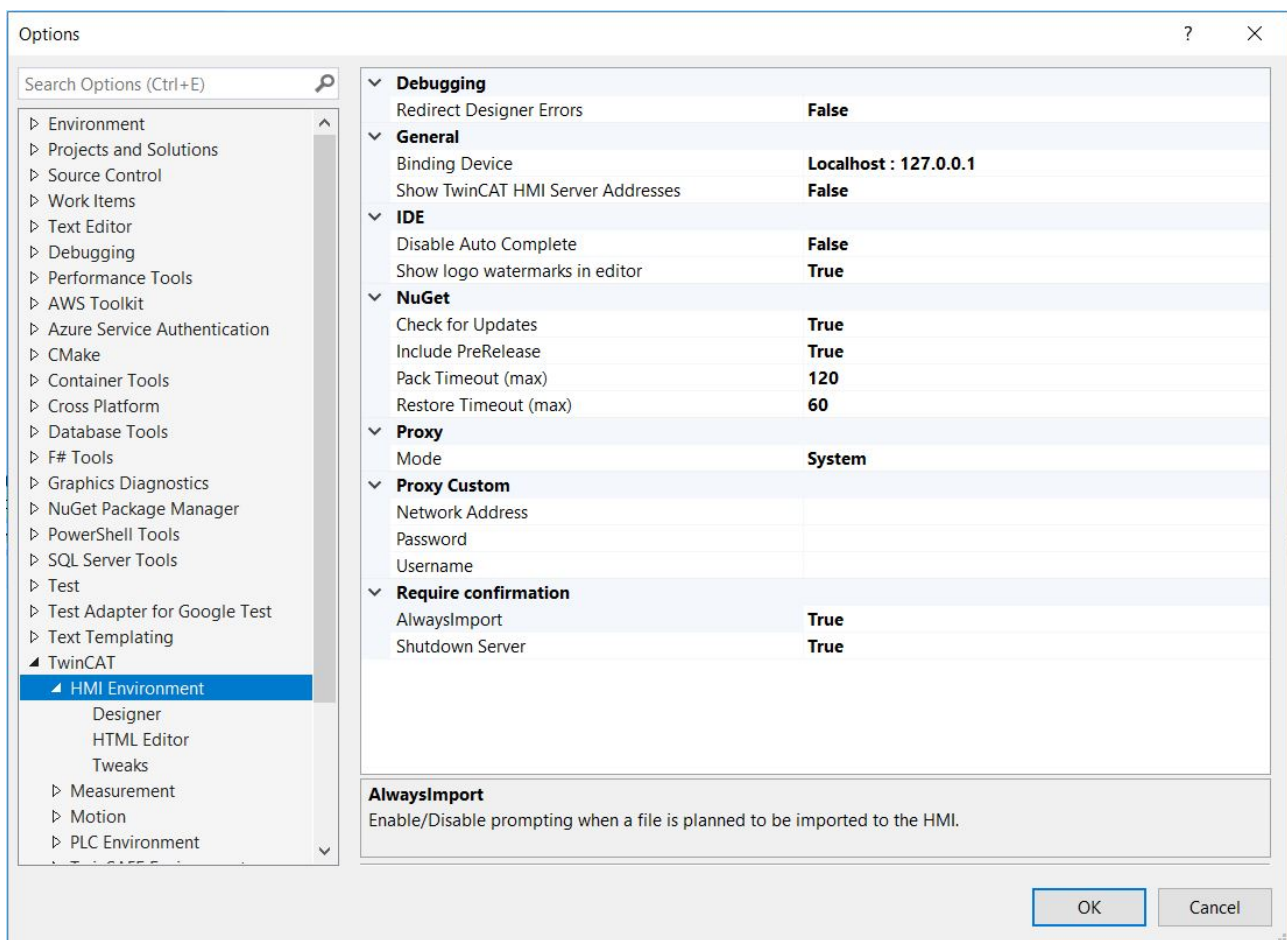
- [Solution Explorer](#) [► 53]
- [Document Outline](#) [► 74]
- [Designer](#) [► 56]
- [HMI LiveView](#) [► 74]
- [Toolbox](#) [► 113]
- [Properties](#) [► 60]
- [HMI Configuration](#) [► 77]
- [Gallery Explorer](#) [► 957]
- [Server Configuration](#) [► 956]

The development environment can be configured via global settings. To do this, click on the tab **Tools** in the menu and select the entry **Options**.





Then navigate to the category **TwinCAT - HMI Environment**. There you can change the default settings of the HMI development environment.



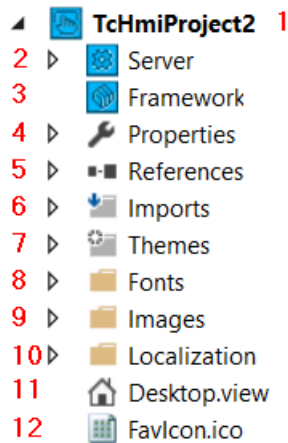




Changing the default settings of the development environment applies globally to all instances of the development environment and cannot be saved on a project-by-project basis.

## 5.1 Solution Explorer

The Solution Explorer manages all available projects in a Solution. After creating a new TwinCAT HMI project the following project structure is constructed:



1. **TcHmiProject:** The project node offers access to the [Project Settings](#) [► 53].
2. **Server:** The server node contains the [Server Settings](#) [► 956] and lists the loaded server extensions.
3. **Framework:** The framework node enables the referencing of [Framework Controls](#) [► 1476].
4. **Properties:** Lists the internal configuration files of the project.
  - **Default.tpl:** Template file used for the generation of the HTML code.
  - **tchmi.framework.Schema.tpl.json:** Contains the type information for the framework.
  - **tchmi.project.Schema.tpl.json:** Contains the type information for the project.
  - **tchmiconfig.tpl.json:** Contains the configuration of the project. (From version 1.12.750.1 only the tchmiconfig.json file is available)
  - **tchmimanifest.json:** Manifest file of the project.
  - **tchmipublish.config.json:** Contains the [Publish profiles](#) [► 949] of the project.
5. **References:** Offers the option to reference TwinCAT HMI packages.
6. **Imports:** Folder for contents such as images or videos that are added dynamically (e.g. by drag-and-drop via the Gallery Explorer).
7. **Themes:** The folder contains all [themes](#) [► 1005] that have been added to the project.
8. **Fonts:** This folder contains fonts that apply irrespective of the theme.
9. **Images:** Folder for images.
10. **Localization:** This folder contains the language files required for the project.
11. **Desktop.view:** The start page that is displayed when starting the HMI.
12. **FavIcon.ico:** The icon displayed in the title bar of the browser.

### 5.1.1 Project properties

Following the selection of the HMI project node the properties of the HMI project are displayed in the Properties window.

The screenshot displays the Beckhoff development environment interface. On the left, the **Solution Explorer** shows the project structure for **TcHmiProject44**, including folders for **Server**, **Framework**, **Properties**, **References**, **Imports**, **Themes**, **Fonts**, **Images**, **Localization**, and files **Desktop.view** and **FavIcon.ico**.

The main area on the right shows the **Properties** window for **TcHmiProject44 Project Properties**. It is organized into several expandable sections:

- Build Information**:
 

Creation	03/05/2019 06:29
Product Version	1.10.1336.210
- Communication**:
 

Device Ip	127.0.0.1
TcHmiSrv's Port	3000
WebSocket Router's Port	10101
- Creator**:
 

Default Viewport Height	768
Default Viewport Width	1024
- Deployment**:
 

Interval	500
Subscription Mode	Change
Theme Name	Base
Timeout	5000
Title	Please enter your Title...
Verbose Level	ErrorsWarnings
Version	1.0.0.0
- General**:
 

Company Name	
Company's Website	
LoginPage	Default
Scale Mode	None
Startup View	Desktop.view
- Infrastructure**:
 

Framework Binaries	C:\TwinCAT\Functions\TE2000-HMI-Engineering\
Server Binaries	C:\TwinCAT\Functions\TE2000-HMI-Engineering\
- IPC**:
 

LOG_DESIGNER_MODE_COM_MESSAGES	False
LOG_TCHMISERVER_MESSAGES	False
- Misc**:
 

Project File	TcHmiProject44.hmiproj
Project Folder	C:\Users\TimH\Source\Repos\TcHmiProject44\T
- Region and Language**:
 

Default Language	(Use Browser Default)
Time Format Locale	(Use Browser Default)
Time Zone	(Use Browser Default)
- Viewport (meta-attribute)**:
 

Scaling	Initial:Default, Minimum:Default, Maximum:D
Width and Height	width:Default, height:Default

At the bottom of the Properties window, there is a section for **Company Name** with the description: "The name of the company which provides or uses the HMI. Any new value will be HTML en..."

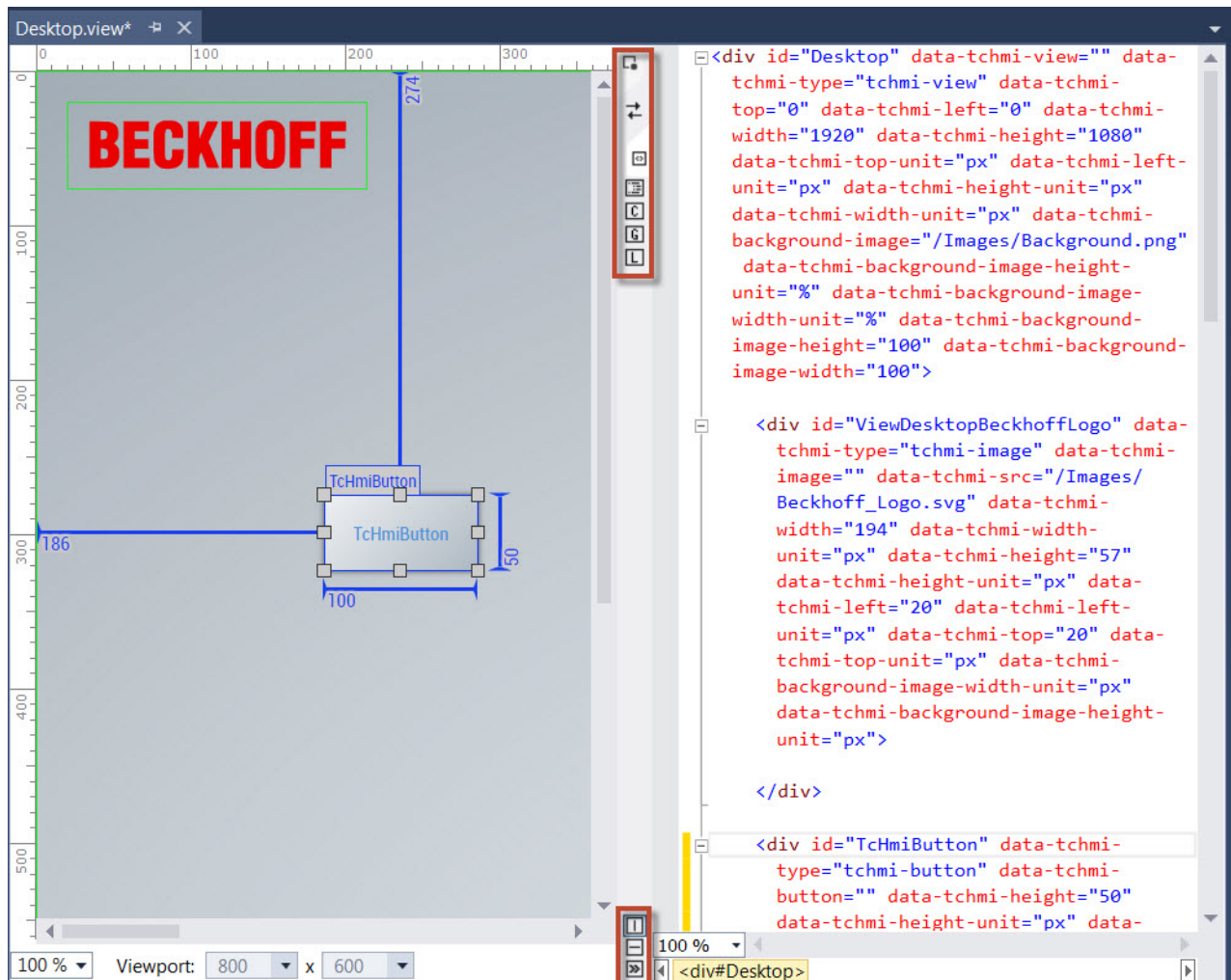
### Explanations:

- **Creation**: Date and time when the setup of the TwinCAT HMI was created.
- **Product Version**: Version no. of the TwinCAT HMI.
- **Device IP**: Local IP address.
- **TcHmiSrv's Port**: Port number of the server on which a client can reach the server via HTTP(S).

- **WebSocket Router's Port:** WebSocket port number required for the WebSocket connection between an HMI client and the server instance.
- **Default Viewport Height:** Default value for the height of a Viewport when a new HMI page is added. Various resolutions of the HMI can be simulated via the Viewport.
- **Default Viewport Width:** Default value for the width of a Viewport when a new HMI page is added. Various resolutions of the HMI can be simulated via the Viewport.
- **Interval:** Global update rate [ms] for refreshing the HMI server symbols.
- **Subscription Mode:** Update mode between server and client.
  - Change: The client is only informed of changes to the symbol values.
  - Poll: The client receives the symbol value cyclically, even if no change has taken place.
- **Theme Name:** Name of the active theme (in engineering and of the initially active theme in the client).
- **Timeout:** WebSocket timeout for communication between server and client.
- **Title:** Title of the HMI, which is displayed in the browser (tab).
- **Verbose Level:**
  - 0 = no messages
  - 1 = error messages only
  - 2 = error messages and warnings
  - 3 = error messages, warnings and infos
  - 4 = error messages, warnings, infos and debug messages
- **Version:** Version number of this project.
- **Company Name:** Optional name of the company providing or using the HMI.
- **Company's Website:** URL of the company providing or using the HMI.
- **Login Page:** Login page of the HMI, which is displayed when authentication is active.
- **Scale Mode:** Scaling mode of the HMI. This setting only applies if the Viewport is configured with absolute values (pixel specifications).
  - ScaleToFit: The width or height of the HMI is scaled to the current size of the browser window without a scrollbar appearing.
  - ScaleToWidth: The height is scaled accordingly to the width (while maintaining the aspect ratio with scrollbar).
  - ScaleToHeight: The width is scaled accordingly to the height (while maintaining the aspect ratio with scrollbar).
  - ScaleToFill: The height and width are stretched to the maximum width and height of the browser window (the aspect ratio is not maintained).
- **Startup View:** The start page (View) of the HMI, which is loaded when opening the HMI in the browser.
- **Framework Binaries:** Local directory from which the components of the framework are provided.
- **Server Binaries:** Local directory from which the components of the server are provided.
- **LOG\_DESIGNER\_MODE\_COM\_MESSAGES:** Defines whether the communication between Visual Studio and the Designer is to be displayed.
- **LOG\_TCHMISERVER\_MESSAGES:** Defines whether the communication of the TcHmi server is to be displayed.
- **Project File:** The name of the project file.
- **Project Folder:** Absolute storage location of the project.
- **Default Language:** Default language that is loaded for the HMI project. This setting can be overwritten by the settings per user or switched in the client.
- **Time Format Locale:** Time format of the currently set time zone that is loaded for the HMI project. This setting can be overwritten by the setting per user.
- **Time Zone:** Time zone that is loaded for the HMI project. This setting can be overwritten by the setting per user.
- **Viewport (meta attribute):** Meta attributes that define the scaling behavior and adaptability of the HMI.

## 5.2 Designer

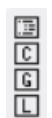
The Designer is the front-end development tool of the HMI. It is divided into two editors – a graphic editor and a code editor. The code is generated automatically behind the graphic editor and can be directly edited.



In the top right-hand corner there are three buttons for switching between these two editors or - if both are displayed - swapping the views.

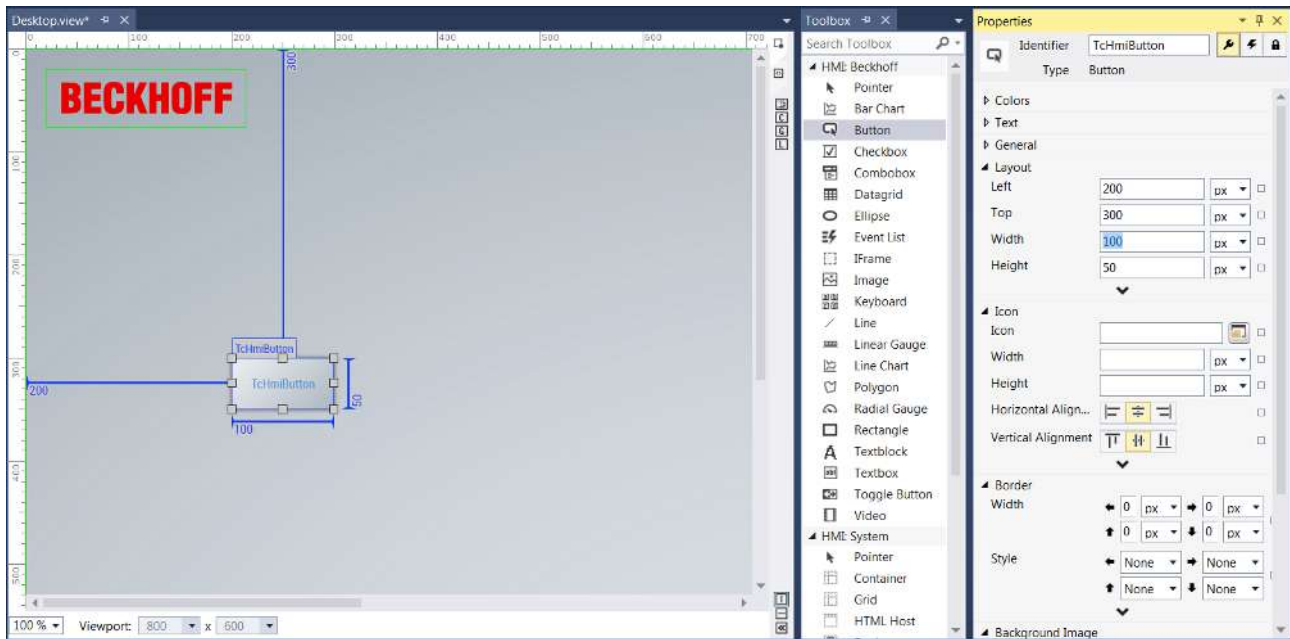


The three buttons in the bottom right-hand corner are used to display both editors at the same time and to select the arrangement of the windows (horizontal or vertical).



There are various quick-access buttons on the right-hand side. With these buttons you can open the Document Outline window, the TwinCAT HMI Configuration window, the TwinCAT HMI Gallery Explorer G and the TwinCAT HMI LiveView L.

## 5.2.1 Graphic editor:

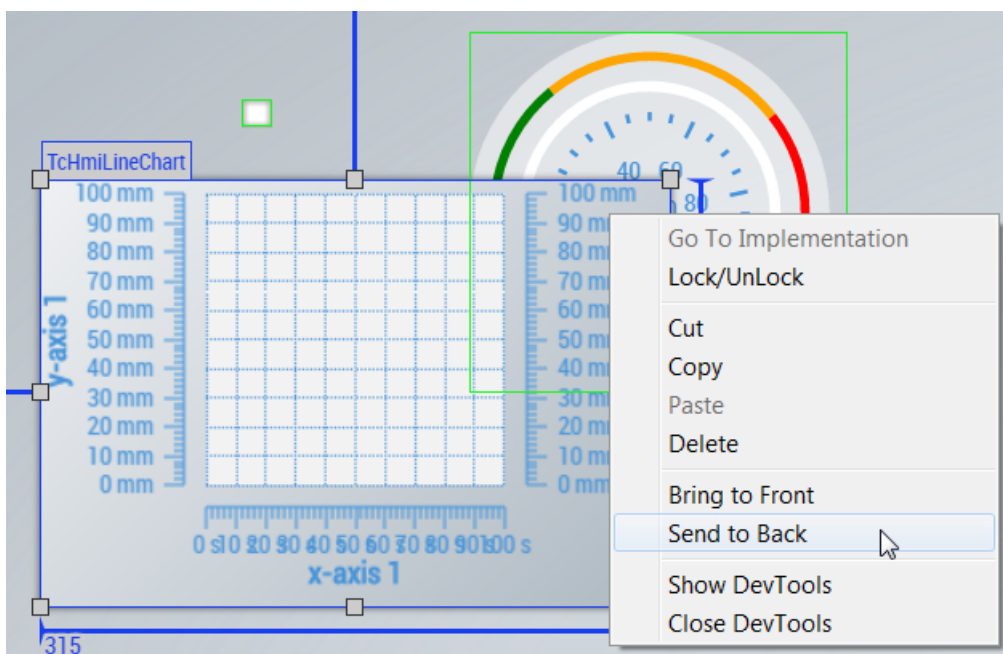


You can design your interface in the graphic editor of the Designer. To do this, drag controls from the Toolbox and drop them into the editor. The automatically assigned names and sizes of the controls are displayed. You can set all properties in the Properties window.

If controls overlap in the editor, you can define which should be in the foreground and which in the background with a right mouse click.



This changes the attribute Z-Index (► 776)



### Control selection

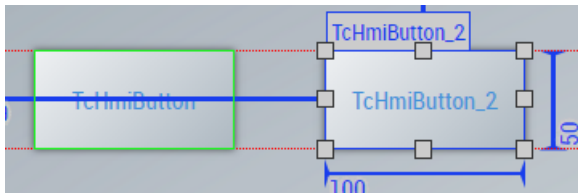
A control can be selected by mouse click. This control is additionally selected if the Ctrl key on the keyboard is pressed simultaneously.

It is also possible to mark several controls with a selection frame. You can draw this frame by left-clicking next to all the controls and then moving the mouse. If the Ctrl key is pressed, the frame is also drawn within a container, otherwise the container would be moved.

All controls that *touch* the rectangular frame are selected after releasing the mouse button. If the Alt key is pressed, then only those controls that are *completely enclosed* are selected. Here too, it is possible to select additional controls using the Ctrl key.

### Positioning aid

With the control trap you can align controls alongside others and lock them in position.



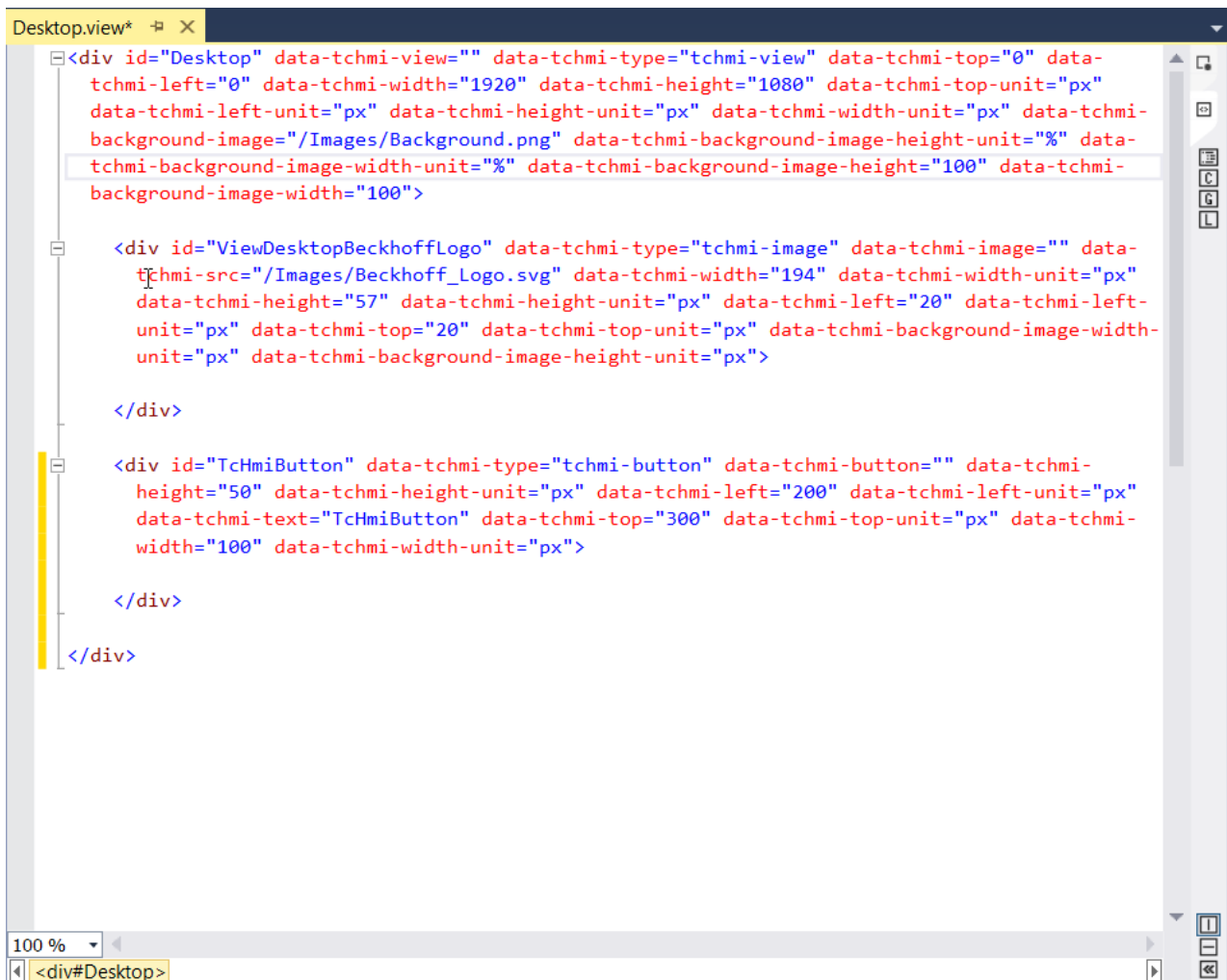
This function can be deactivated with the **Alt** key.

If you hold the **Shift** key down when moving a control, it will only be moved horizontally or vertically.

If you hold the **Shift** key down when enlarging a control at the corner, the aspect ratio will be kept constant.

If you press the **Ctrl** key you can copy one or more controls – even into another container.

## 5.2.2 HTML editor

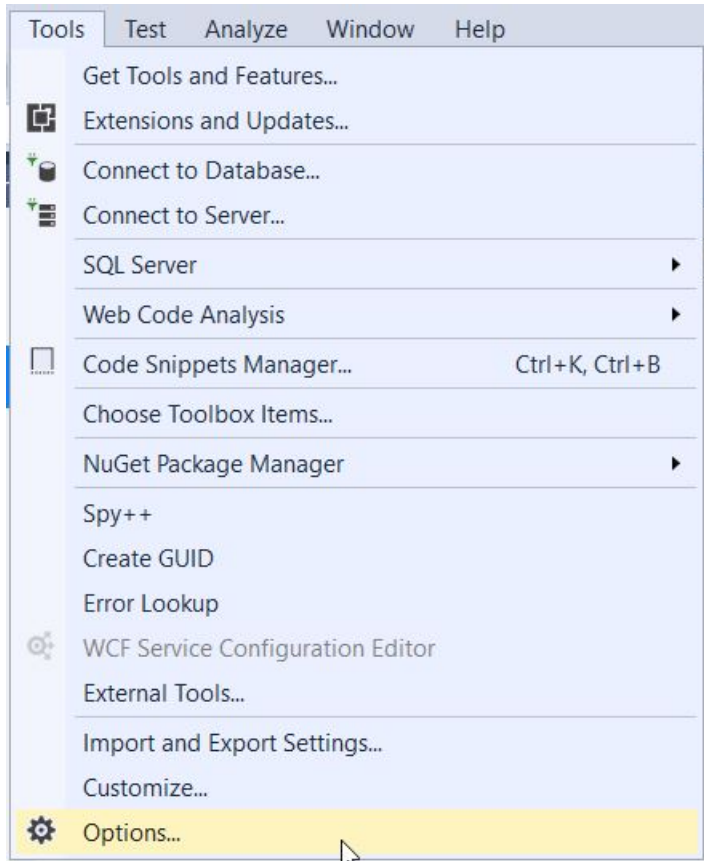




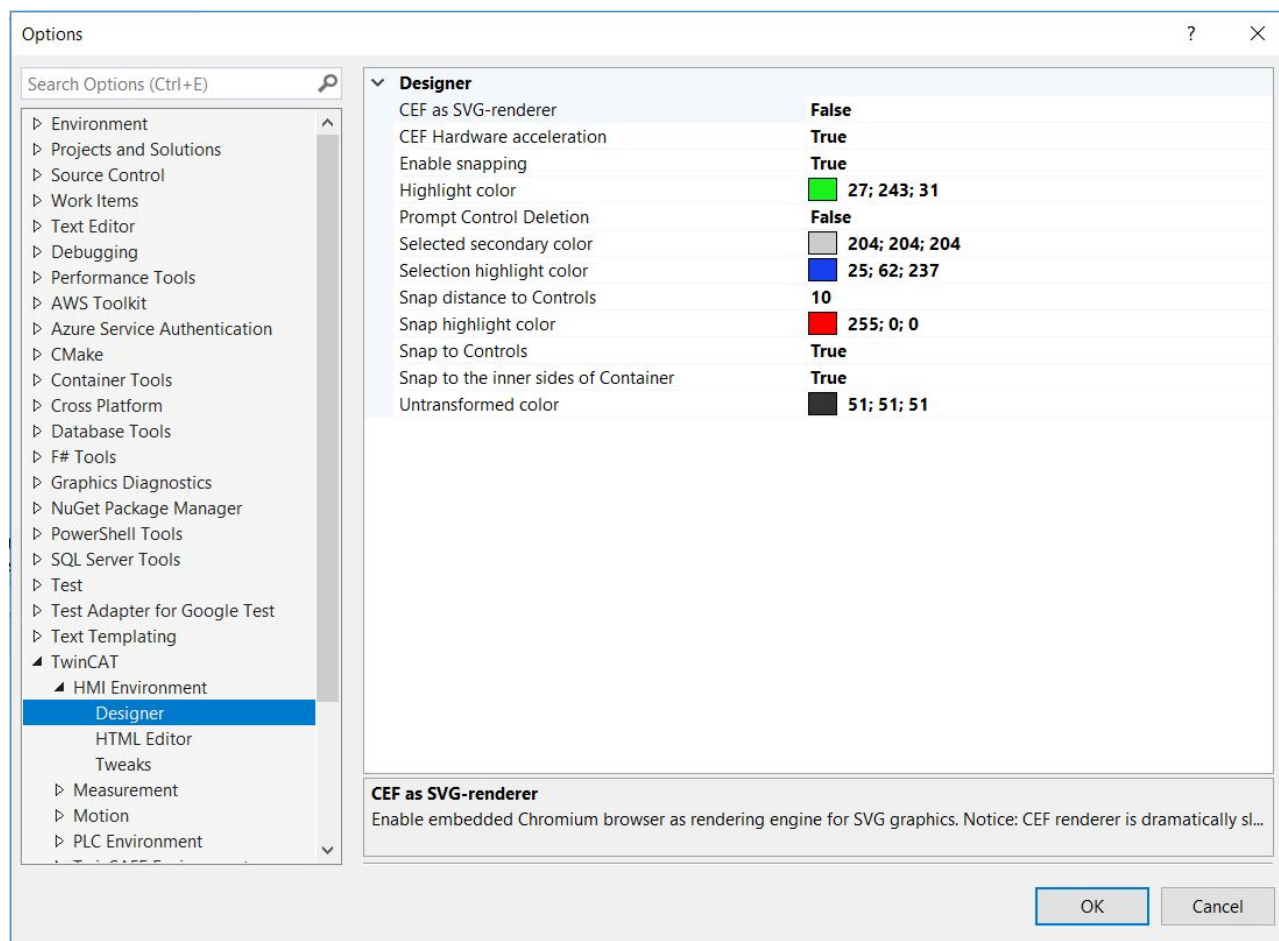
In the HTML editor you can edit directly and check the code generated. Designer and HTML editor work synchronously.

### 5.2.3 Changing default settings

In the global settings of the development environments, you can change the default settings of the Designer (e.g. highlight colors). To do this, click on the tab **Tools** in the menu and select the entry **Options**.



Then navigate to the category **TwinCAT - HMI Environment - Designer**. There you can change the default settings of the Designer.



Changing the default settings of the Designer applies globally to all instances of the development environment and cannot be saved on a project-by-project basis.



Available from version 1.12.742.0

## 5.3 Properties

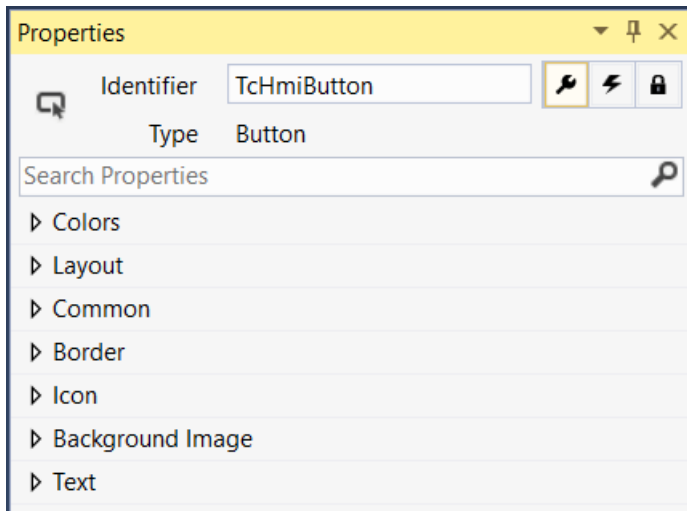
The Properties window displays various properties depending on the object that is selected. The selected object can be a control in the graphic editor or an object in the Solution Explorer.

The name and symbol of the control are displayed in the **Identifier** field. If you have selected a control there are three different views between which you can switch with the following buttons:

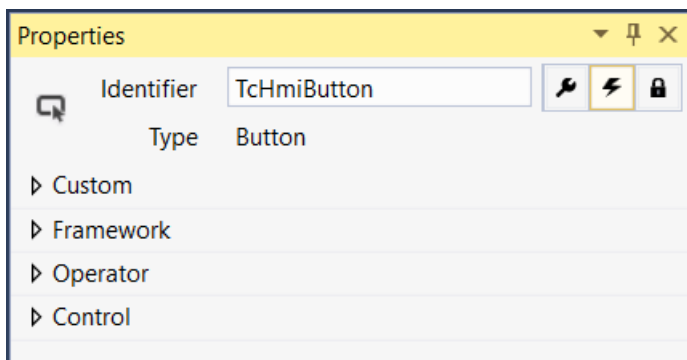


The left-hand button (wrench) displays the general view with the various properties of this control:

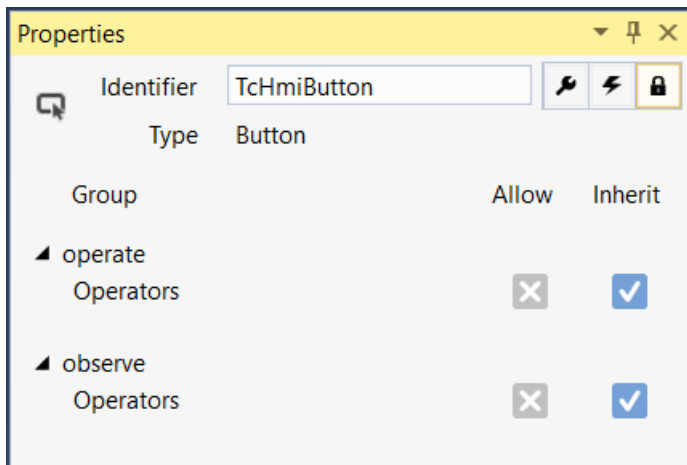




The central button (lightning bolt) displays all available events:

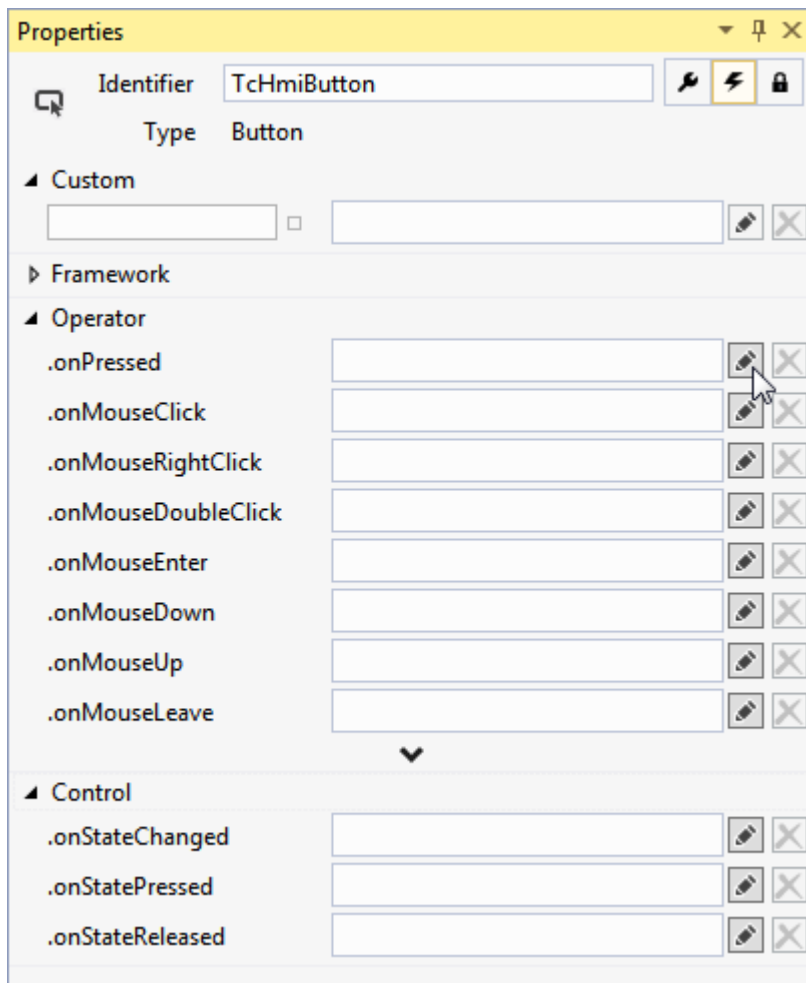


The right-hand button (lock) displays the [access rights \[► 855\]](#) to this control:



## 5.4 Actions and Conditions Editor

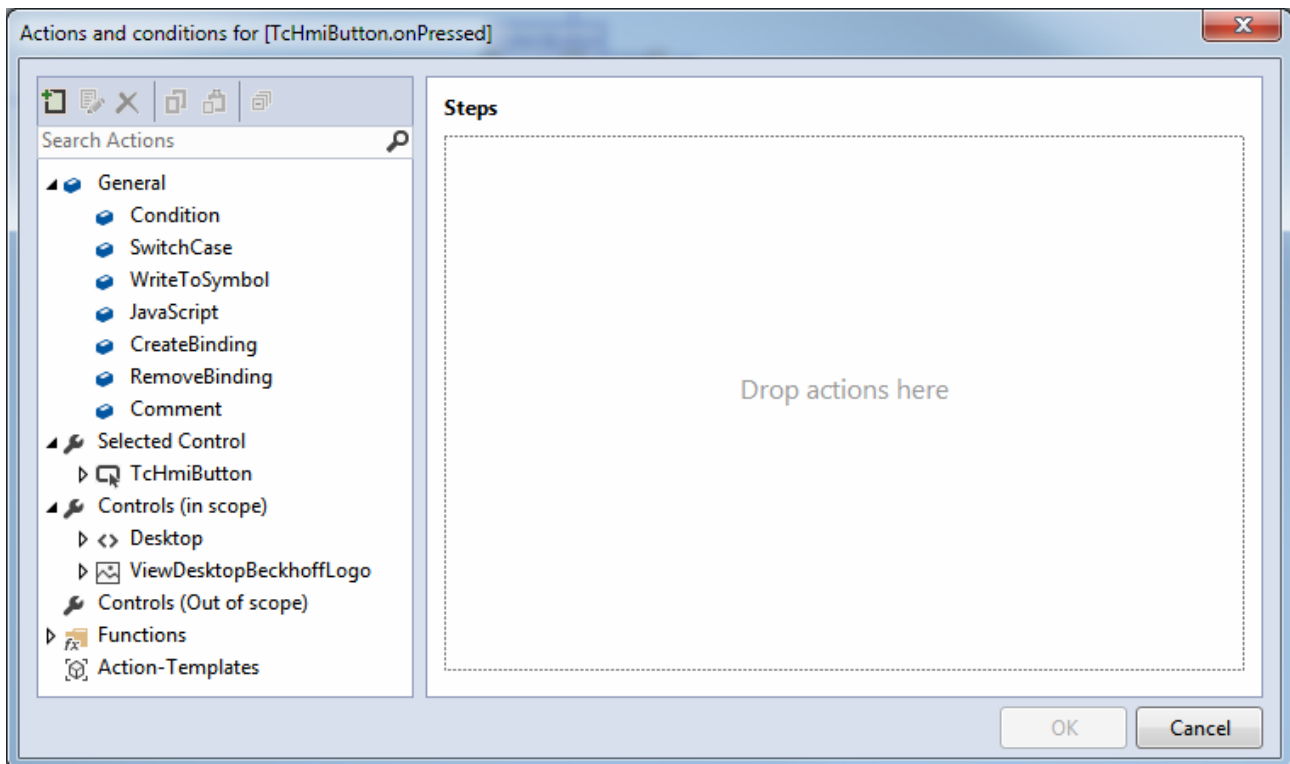
The Actions and Conditions Editor allows you to configure control events. To open the Actions and Conditions Editor, select a control and click on the events in the Properties window.



There are several areas here in which various events of the control can be configured:

- **Framework:** This covers events that are triggered from the system and concerns the life cycle of the control (init, attach, detach, destroy) as well as changes of size (resize) or movements (moved).
- **Operator:** These are events that are triggered by the operator, for example click, double-click.
- **Control:** Many controls trigger events. These are, for example, a change in a state symbol of a button or the time at which the loading of an image was completed.
- **Custom:** Further events are possible here. Here, any icon can be entered or selected from the context menu. If its value changes, an action is executed. The configuration of [TwinCAT Speech \[► 1270\]](#) events is also possible here.

Clicking the Edit icon (pen) opens the Actions and Conditions Editor for the event associated with the selected control.



The actions are listed in the left part of the editor. The right part is a graphic editor into which the actions can be moved by dragging and dropping.

The toolbox is divided into different categories:

- [General](#) [► 63]: General actions and conditions that are not directly assigned to a control.
- **Selected Control**: Properties of the selected control that can be changed during runtime.
- [Controls](#) [► 69] (in scope): All available controls on the same HMI side as the control. The properties of the control that can be changed during runtime are listed below the control.
- **Controls (Out of scope)**: The controls that are not on the same HMI side as the control.
- [Functions](#) [► 70]: Various functions that can also be used within the editor.
- [Action Templates](#) [► 71]: Defined templates for actions that can be reused.

You can perform the following actions in the Actions and Conditions Editor:



Add an Action Template



Edit an Action Template



Delete an Action Template



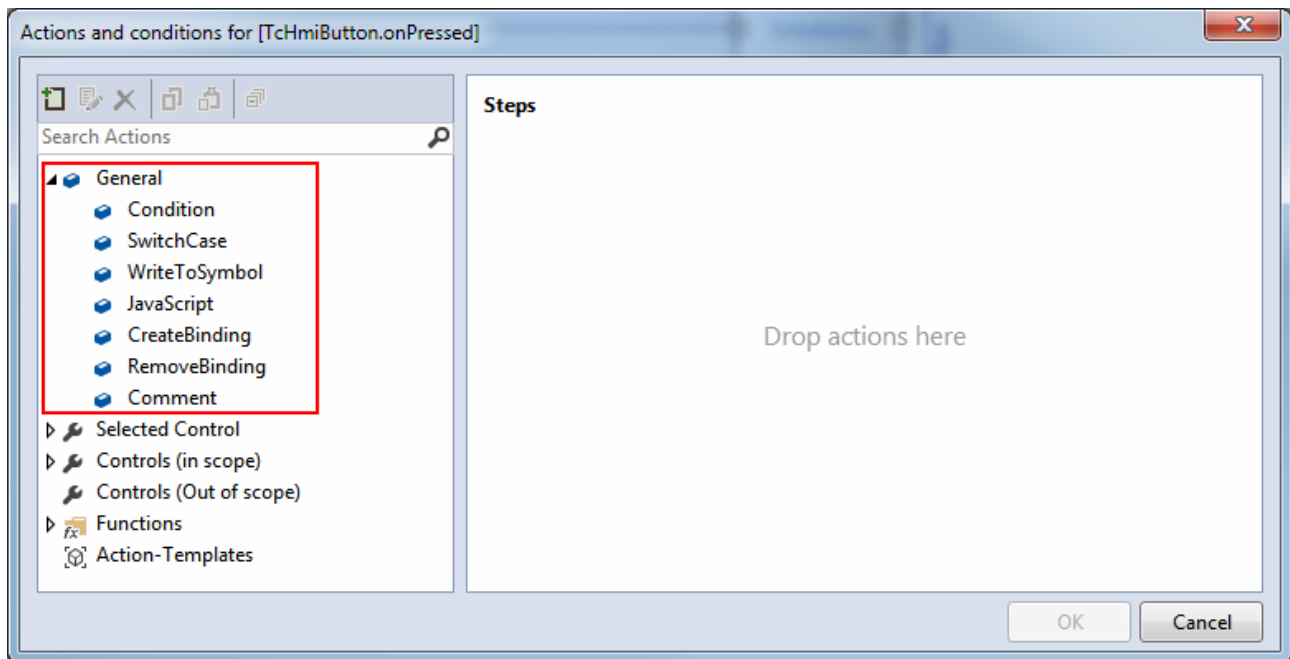
Copy an Action Template



Expand/collapse folder

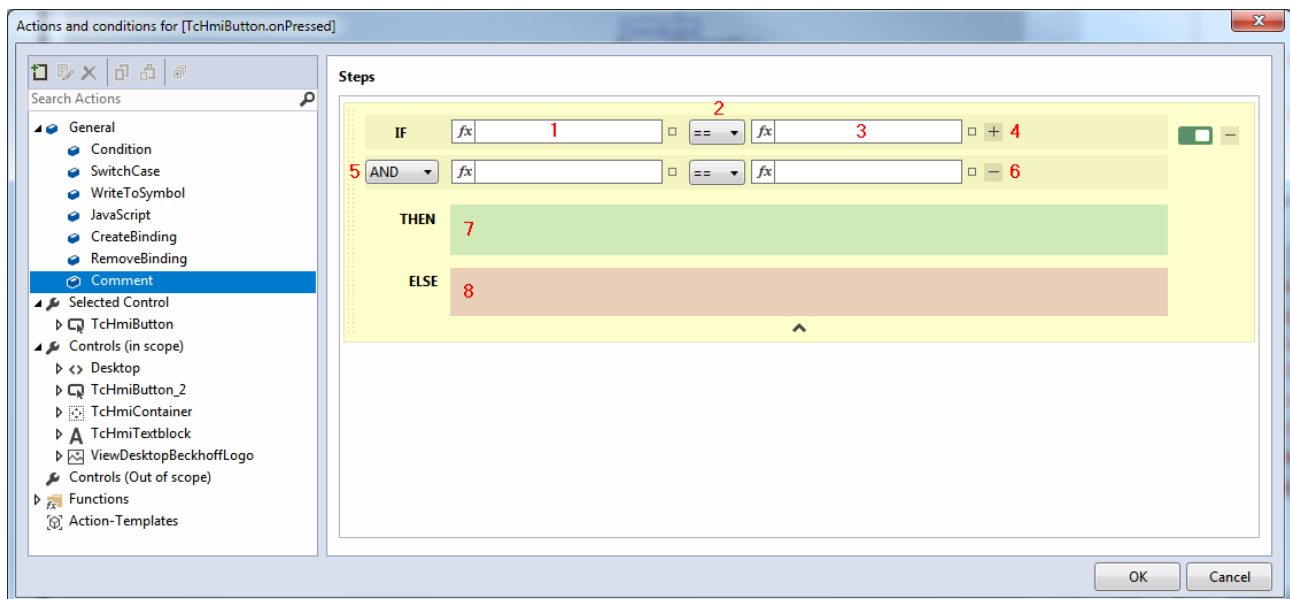
### 5.4.1 General

The general actions can be used independently of a control.



### 5.4.1.1 Condition

A condition is an If statement within the Actions and Conditions Editor.



#### Explanations:

**1 Condition:** Condition of the If statement. A [Binding \[► 108\]](#) to a symbol can be created.

**2 Comparison operator:** Comparison operator of the If statement. The selection is made via the combo box (==, !=, >=, >, <=, <).

**3 Comparison value:** Comparison value of the If statement. A [Binding \[► 108\]](#) to a symbol can be created.

**4 Add a condition:** Click the button to add another condition to the If statement.

**5 Logical operator:** Logical operator between the conditions. The selection is made via a combo box (AND, OR).

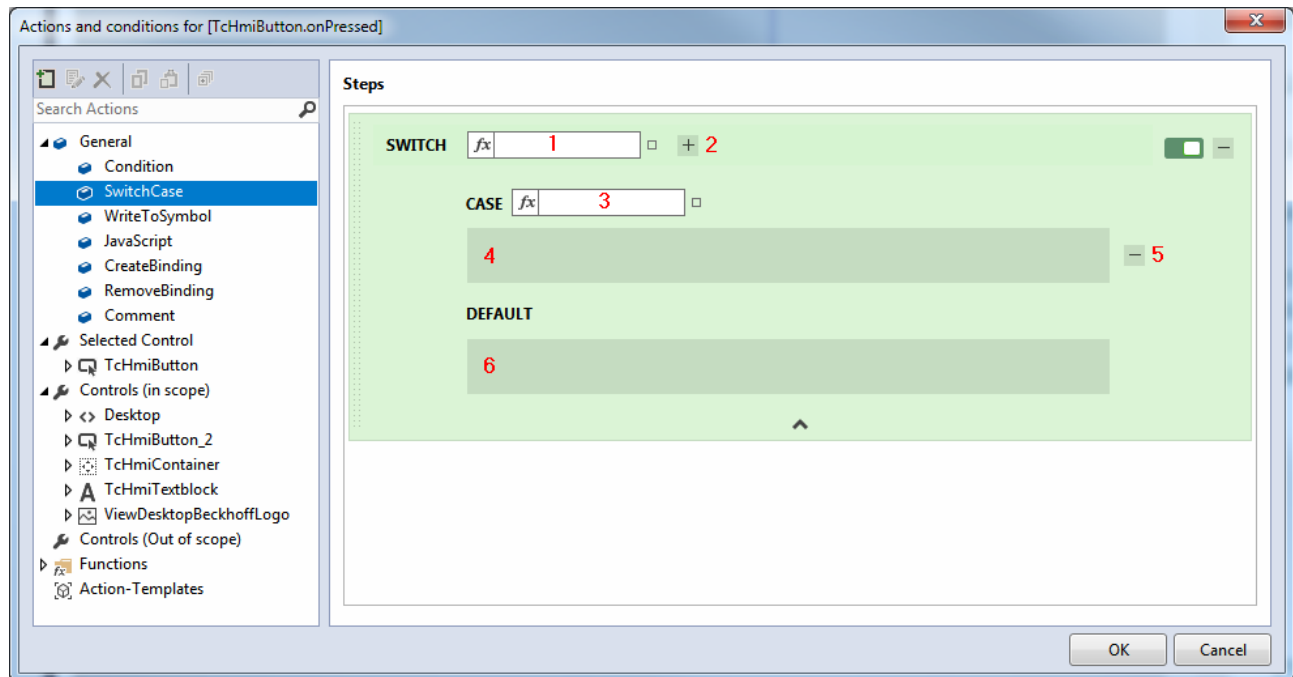
**6 Remove condition:** Click the button to remove a previously added condition.

**7 Then branch:** Then branch of the If statement that is executed if the condition is met.

**8 Or branch:** Or branch of the If statement that is executed if the condition is not met.

### 5.4.1.2 SwitchCase

A SwitchCase statement refers to a case distinction within the Actions and Conditions Editor.

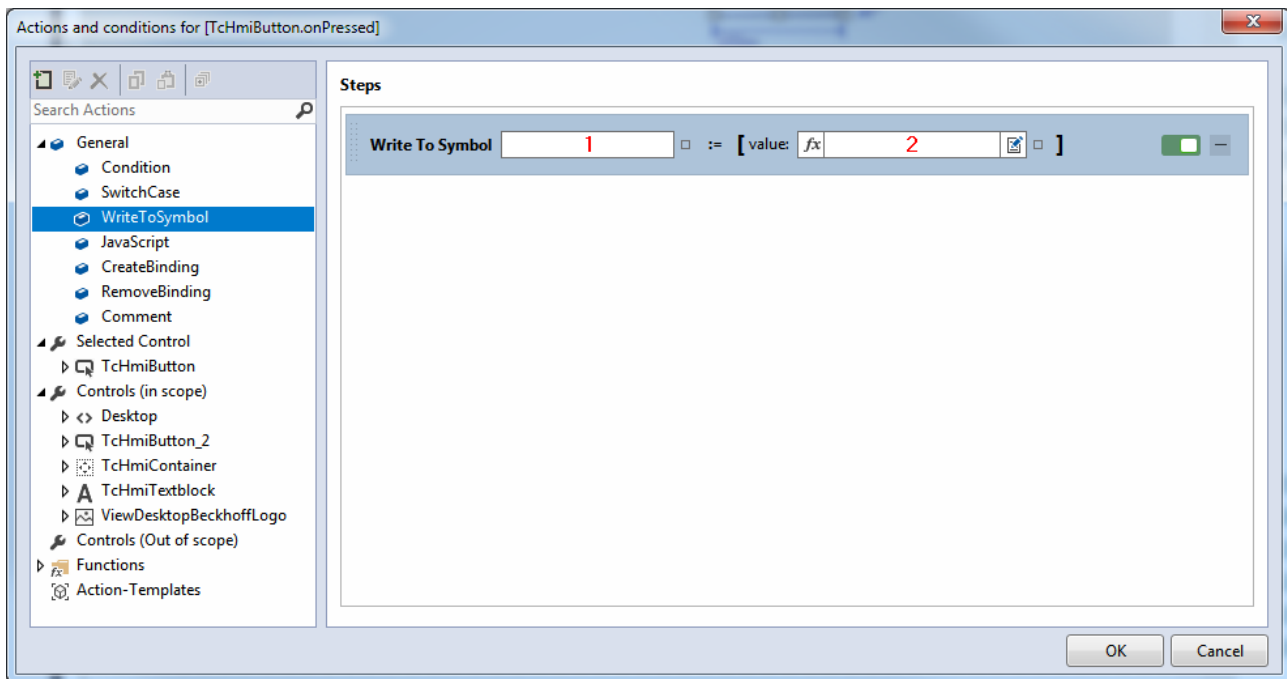


#### Explanations:

- 1 Condition:** Condition of the case distinction. A [Binding \[► 108\]](#) to a symbol can be created.
- 2 Add case:** Click the button to add another case to the case distinction.
- 3 Case:** Individual case that is compared with the condition. A [Binding \[► 108\]](#) to a symbol can be created.
- 4 Then branch:** This branch is executed if the case meets the condition.
- 5 Remove case:** Click the button to remove a previously added case.
- 6 Default branch:** This branch is executed if no case meets the condition.

### 5.4.1.3 WriteToSymbol

The WriteToSymbol action writes any value to a symbol ([server symbol \[► 79\]](#), [internal symbol \[► 87\]](#)) or to a [control \[► 113\]](#) property.

**Explanations:**

**1 Symbol:** Symbol or control property to be written to. A [binding](#) [► 108] is required.

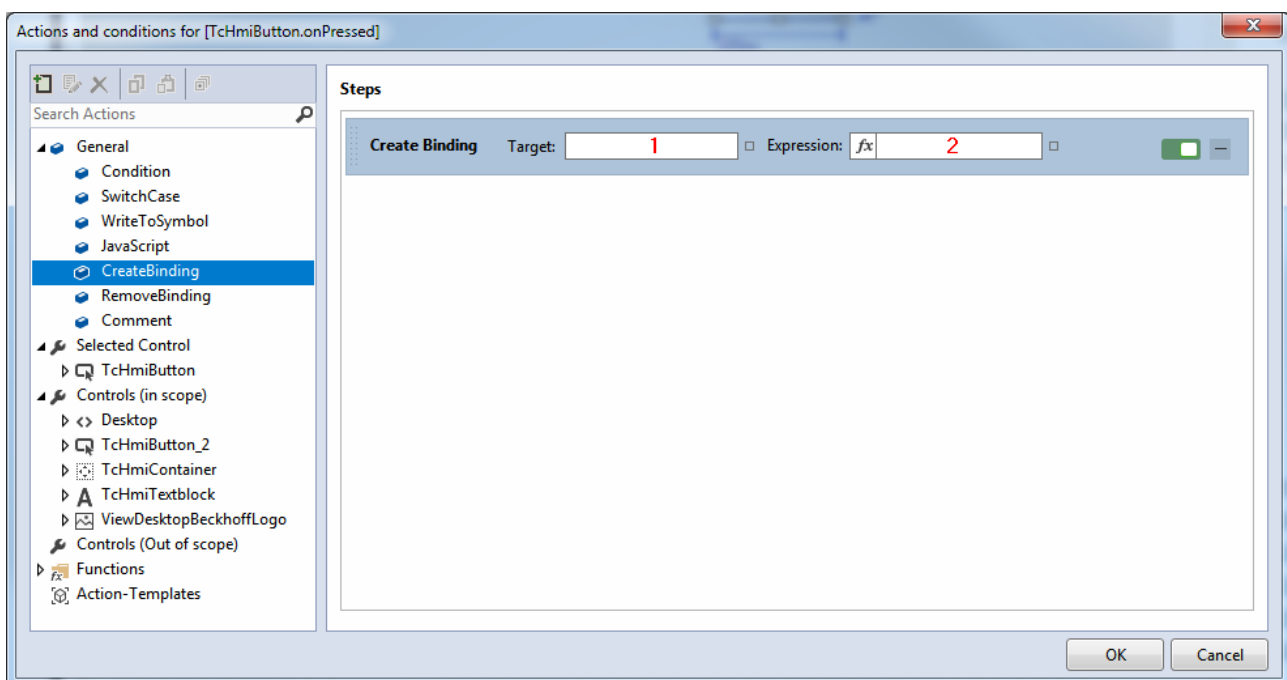
**2 Value:** Value to be written to the symbol. A binding to another symbol or a control property can be created.

#### 5.4.1.4 JavaScript

A JavaScript action consists of JavaScript code and enables the execution of simple JavaScript functions.

#### 5.4.1.5 CreateBinding

The CreateBinding action creates a [binding](#) [► 108] to a control property at runtime.

**Explanations:**

**1 Target:** The control property for which the binding is to be created.

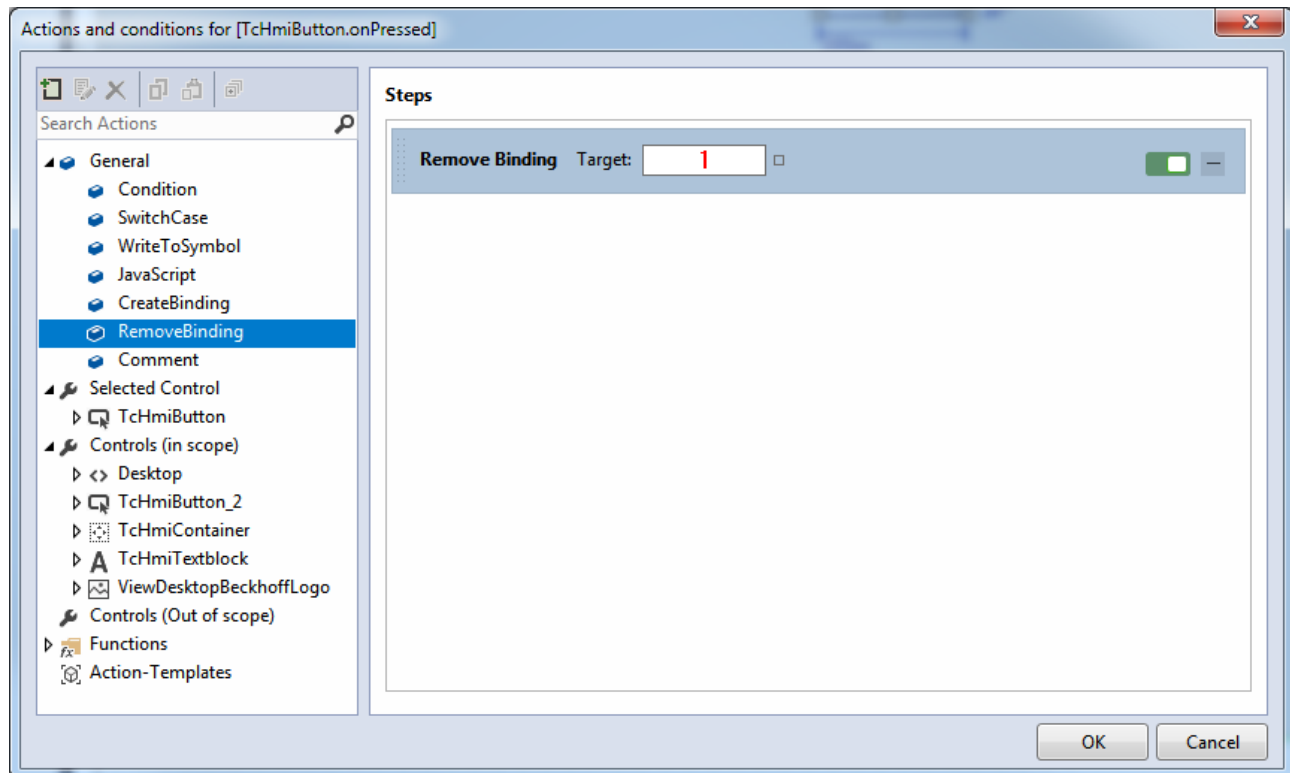
**2 Expression:** Expression ([symbol](#) [► 79], [control property](#) [► 113] or [localized text](#) [► 88]) to be bound to the target.



As of version 1.10.1336.0, this functionality is taken over by the [createBinding](#) [► 925] function.

#### 5.4.1.6 RemoveBinding

The RemoveBinding action removes a binding from a control property at runtime.



#### Explanations:

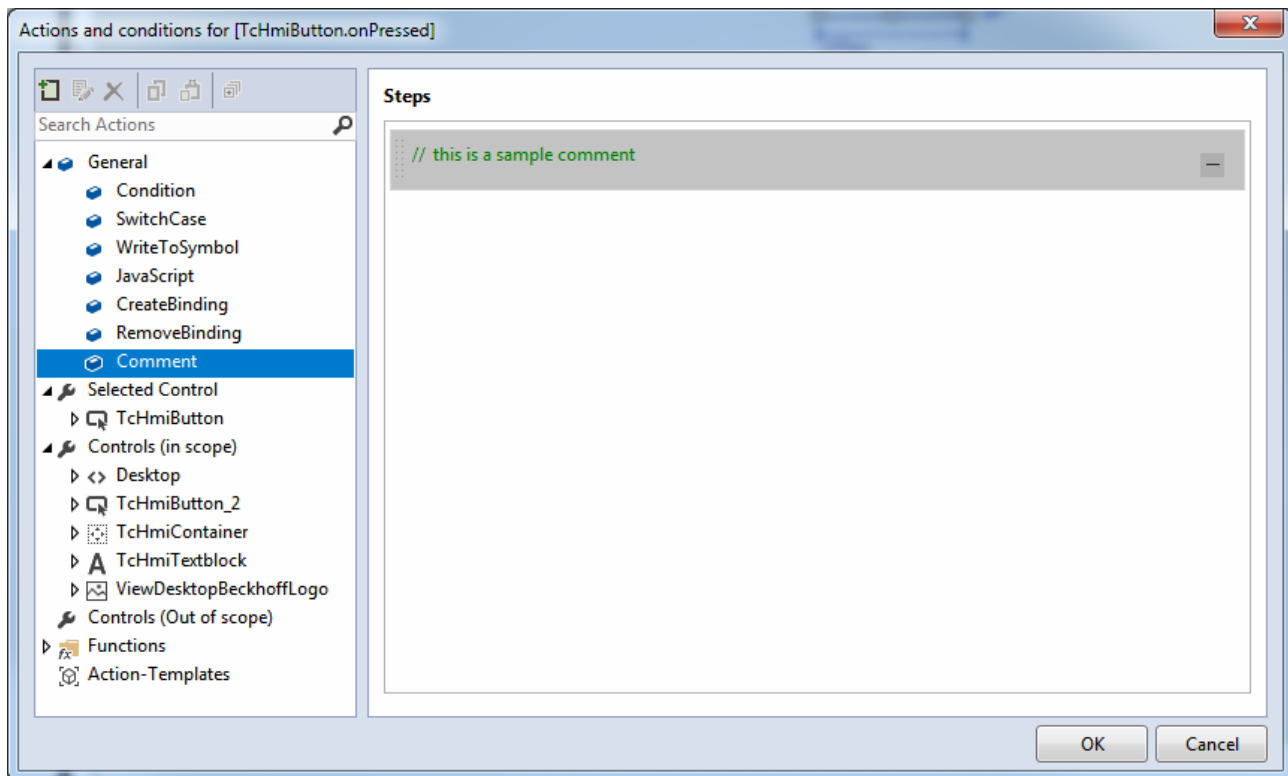
**1 Target:** Control property from which the [binding](#) [► 108] is to be removed.



From version 1.10.1336.0, this functionality is taken over by the [removeBinding](#) [► 926] function.

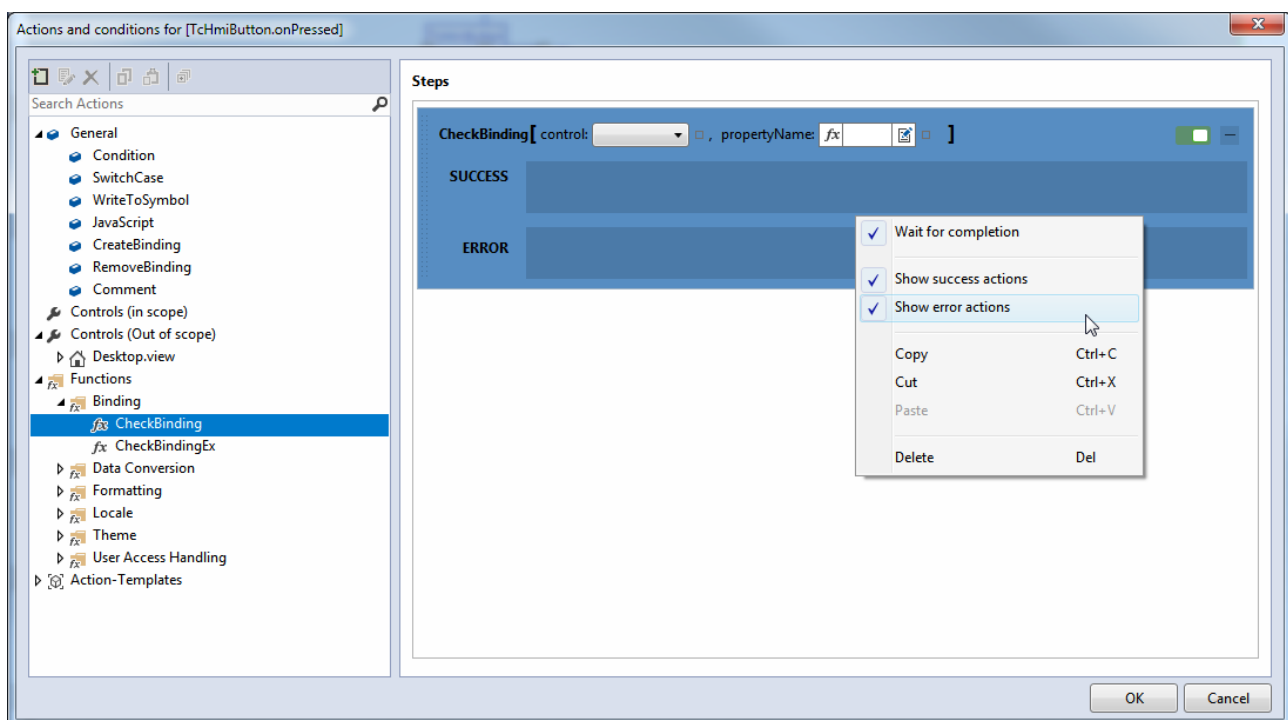
#### 5.4.1.7 Comment

The comment action inserts a comment in the Actions and Conditions Editor. The comment is used for information or as a structuring aid with more complex logics and is not interpreted during runtime.



### 5.4.1.8 Feedback from actions

All actions in the Actions and Conditions Editor can provide feedback on the success of the action. A "Success" and an "Error" branch can be displayed for each action by right-clicking on it.



#### Explanations:

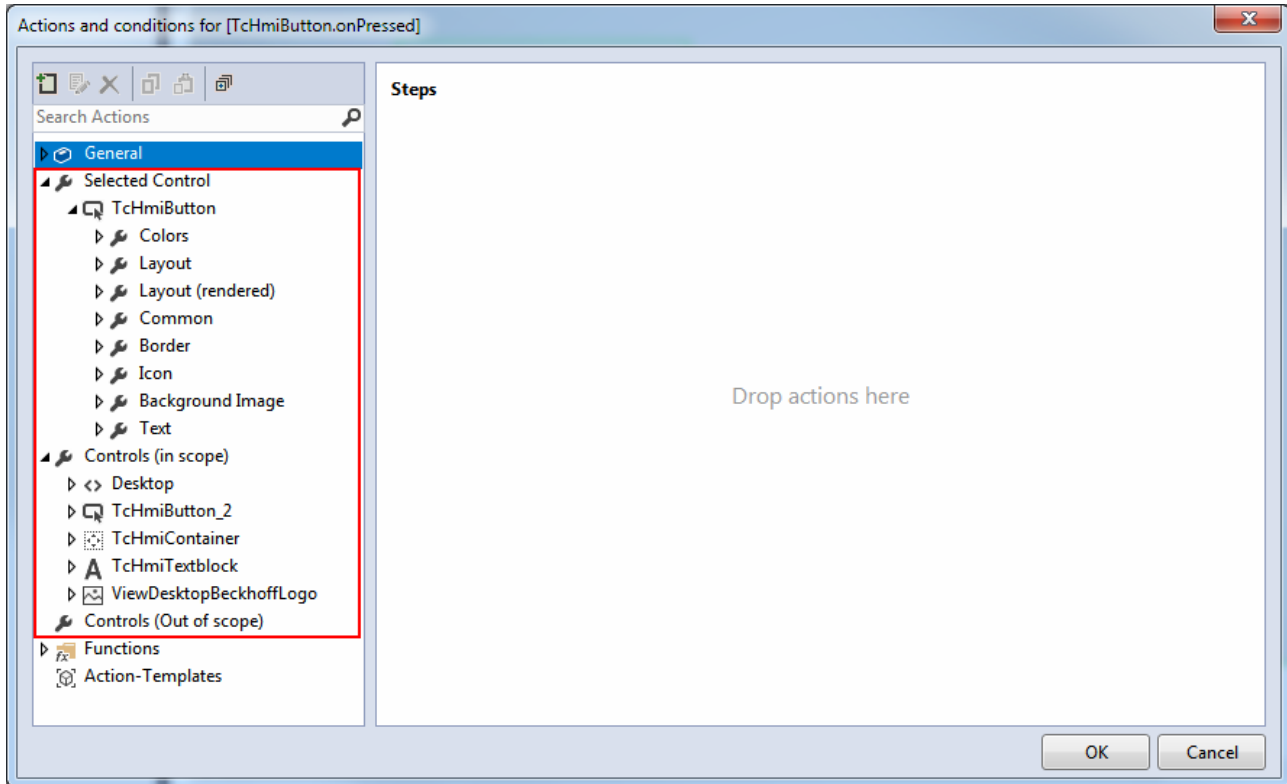
- The "Success" branch is called if the action was executed without errors. For JavaScript code containing a context object [► 1465], the context object must return "Success".
- The "Error" branch is called if an exception occurs during execution of the action. For JavaScript code that contains a context object, the "Error" branch is called if an exception or an "Error" message of the context object occurs.



- With an asynchronous logic, the function "Wait for completion [► 1464]" waits for the action to be executed. With a synchronous logic, this function has no effect.

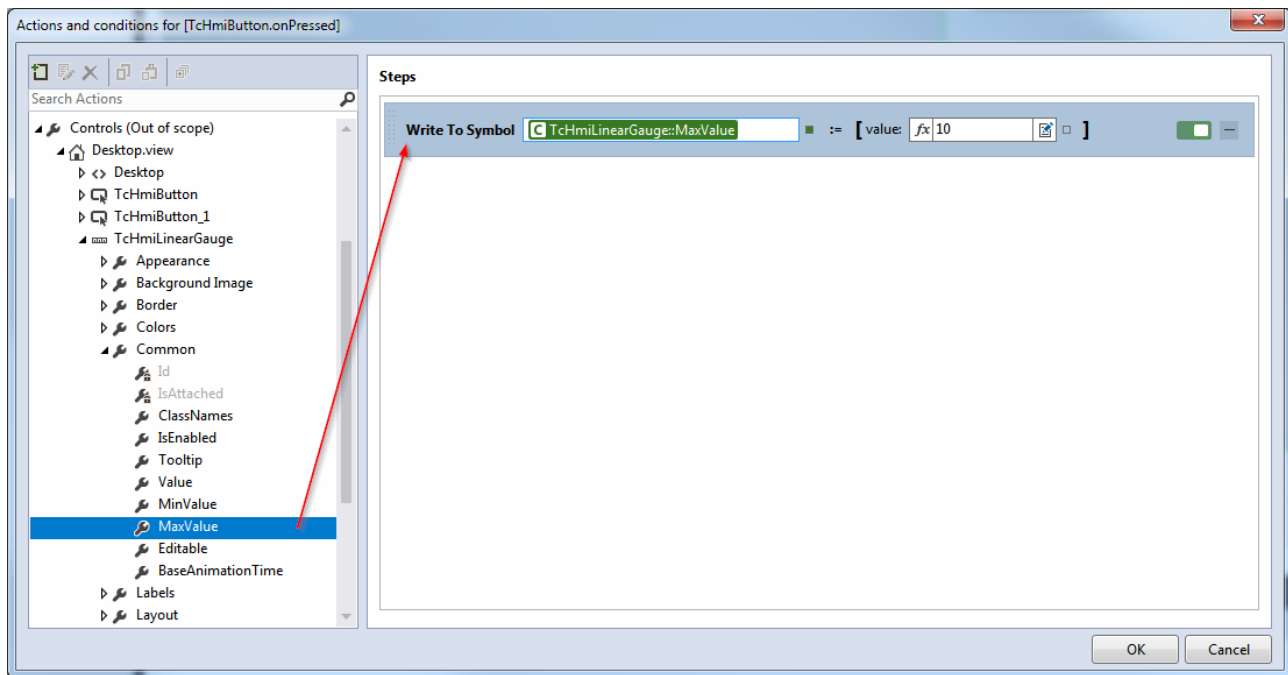
## 5.4.2 Controls

The Actions and Conditions Editor allows you to change all control properties at runtime (similar to the static configuration in the [Properties window \[► 60\]](#)). In addition to the properties of the selected control, the properties of all controls instantiated within all HMI pages can be changed.



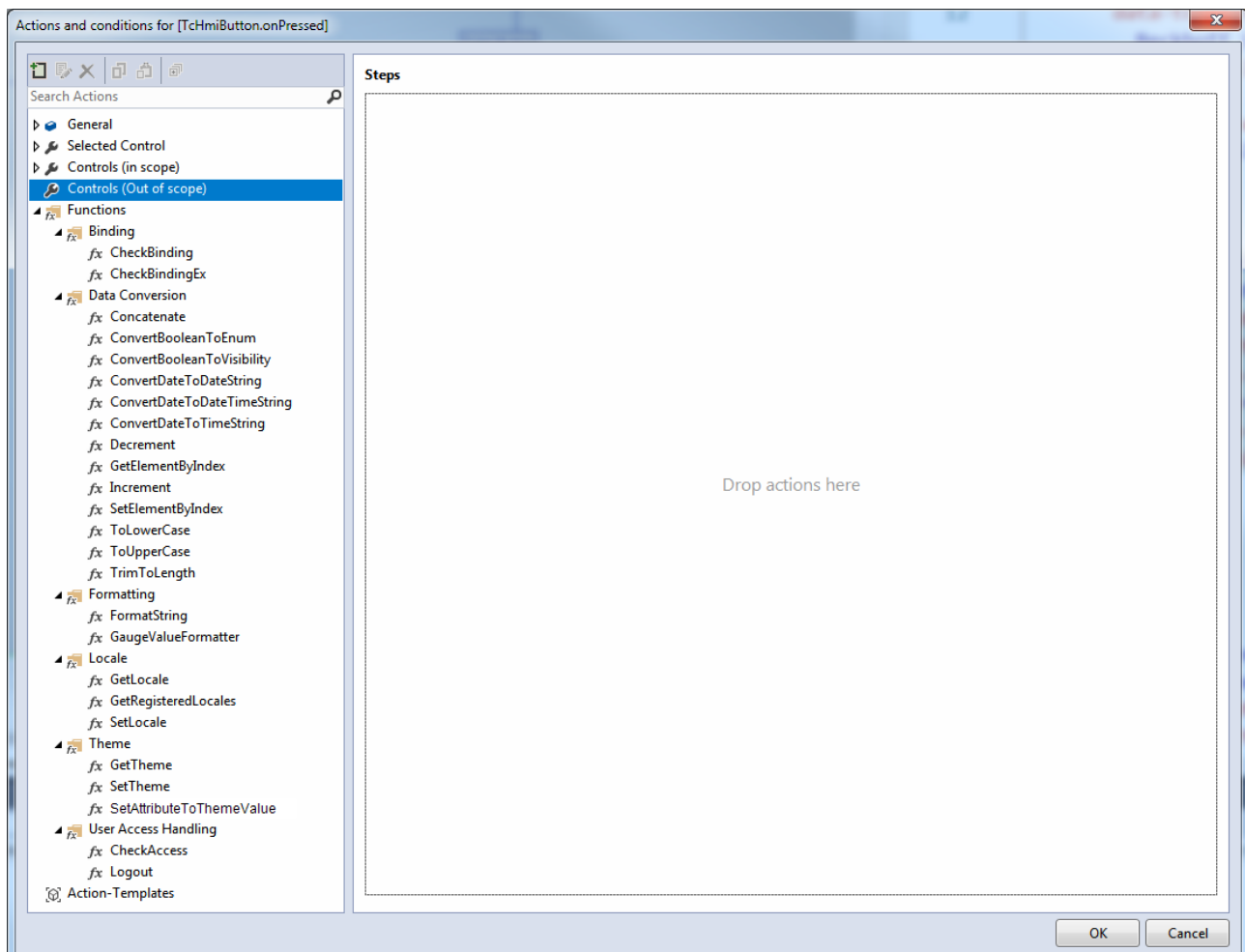
The control properties of the instantiated controls are listed in the left column of the Actions and Conditions Editor. Drag & drop can be used to add the properties to the right part of the editor. Drag & drop automatically adds the control property to a WriteToSymbol action.

The following example shows setting the maximum value of a [linear gauge \[► 432\]](#) by pressing a button (onPressed event [► 782]).



### 5.4.3 Functions

Various functions are available graphically in the Actions and Conditions Editor. In addition, user-specific functions [▶ 1466](#) are listed there according to their category. The functions can also be used in the Properties window [▶ 60](#).



The functions are listed in the left column of the Actions and Conditions Editor. Drag & drop can be used to add the functions to the right part of the editor. Not all functions are useful in all contexts.

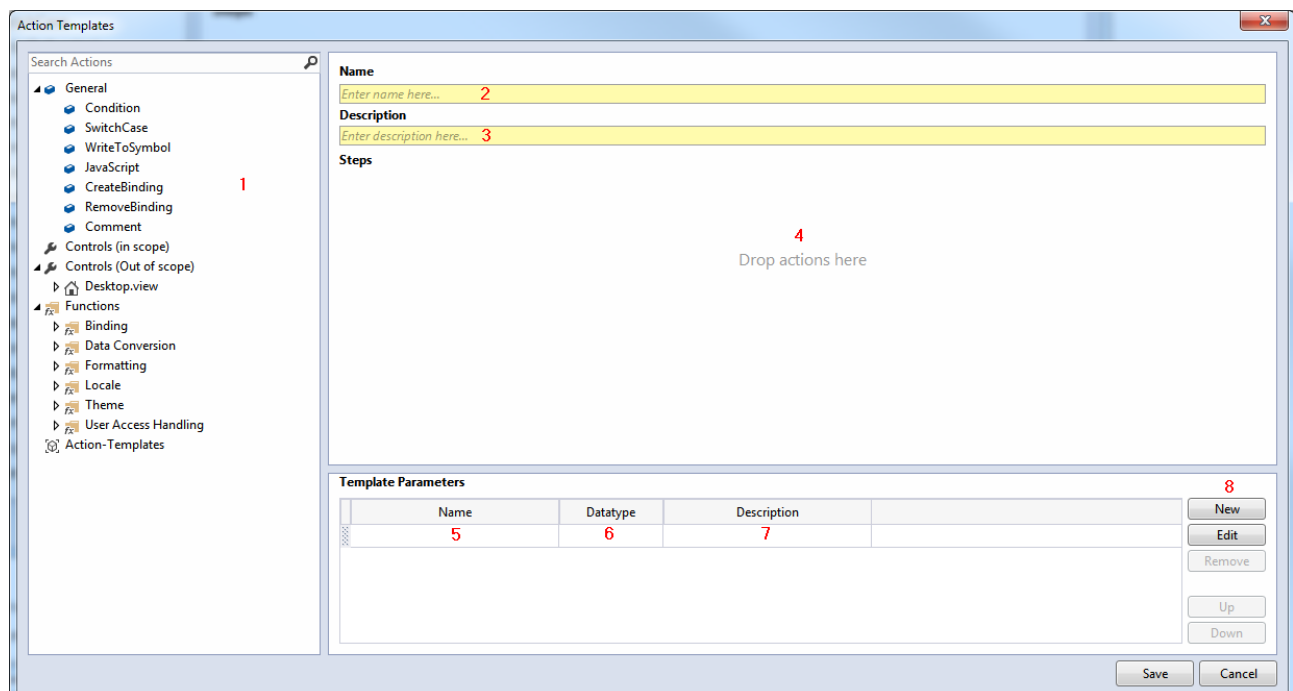
## 5.4.4 Action Templates

Action Templates allow you to reuse multiple actions that are often used together in the project. Reuse is made possible by passing on so-called template parameters. Action Templates are used like an action in the Actions and Conditions Editor. The template parameters are also transferred to the Action Template there.

All the functions of the Actions and Conditions Editor are available within the Action Template.

### 5.4.4.1 Editor

The Action Template Editor can be opened via the Actions and Conditions Editor or the [Configuration window](#) [► 77]. The editor allows you to create and edit Action Templates. The editor is structured like the Actions and Conditions Editor and contains the following extensions:



#### Explanations:

**1 Explorer:** The Explorer offers the same categories as the Actions and Conditions Editor.

**2 Template name:** Name of the Actions Template displayed under Action Templates in the Actions and Conditions Editor.

**3 Template description:** Description of the Action Template that is displayed during mouseover over the Action Template in the Actions and Conditions Editor.

**4 Action editor:** Graphic editor that records the Actions and Conditions using drag & drop. The functionality is the same as the Actions and Conditions Editor.

**5 Parameter name:** Name of a Template Parameter that is passed to the Action Template.

**6 Parameter data type:** Data type of the Template Parameter.

**7 Parameter description:** Description of the Template Parameter that is displayed during mouseover over the parameter in the Actions and Conditions Editor.

#### 8 Parameter buttons:

- **New:** Adds a new Template Parameter.
- **Edit:** Edits an existing Template Parameter.

- **Remove:** Removes an existing Template Parameter.
- **Up:** Moves an existing Template Parameter up one position.
- **Down:** Moves an existing Template Parameter down one position.

### 5.4.4.2 Example

The following description shows the creation of an Action Template as an example. The example describes an Action Template for switching any Boolean value.

1. In the Action and Conditions Editor, click "Add Action Template". The Action Template Editor [► 71] opens.
2. Enter a name and a description for the Action Template.

The screenshot shows the 'Action Templates' dialog box. On the left is a tree view of 'Search Actions' with categories like General, Condition, SwitchCase, WriteToSymbol, JavaScript, CreateBinding, RemoveBinding, Comment, Controls (in scope), Controls (Out of scope), Desktop.view, Functions, and Action-Templates. The main area has three sections: 'Name' (containing 'ToggleBool'), 'Description' (containing 'The action template toggles a boolean value.'), and 'Steps' (containing 'Drop actions here'). Below these is the 'Template Parameters' section, which is currently empty. To the right of the table are buttons for 'New', 'Edit', 'Remove', 'Up', and 'Down'. At the bottom right are 'Save' and 'Cancel' buttons.

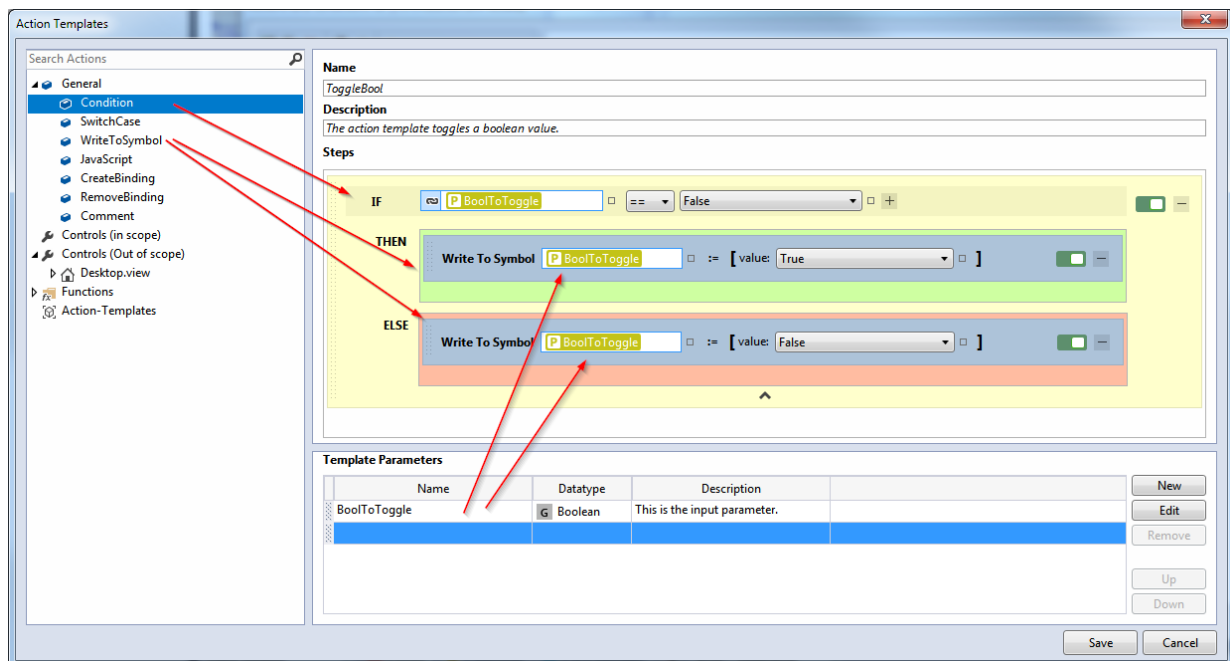
3. Add a Template Parameter of type "Boolean" to the Action Template.

This screenshot shows the 'Template Parameters' section after adding a parameter. The table has the following data:

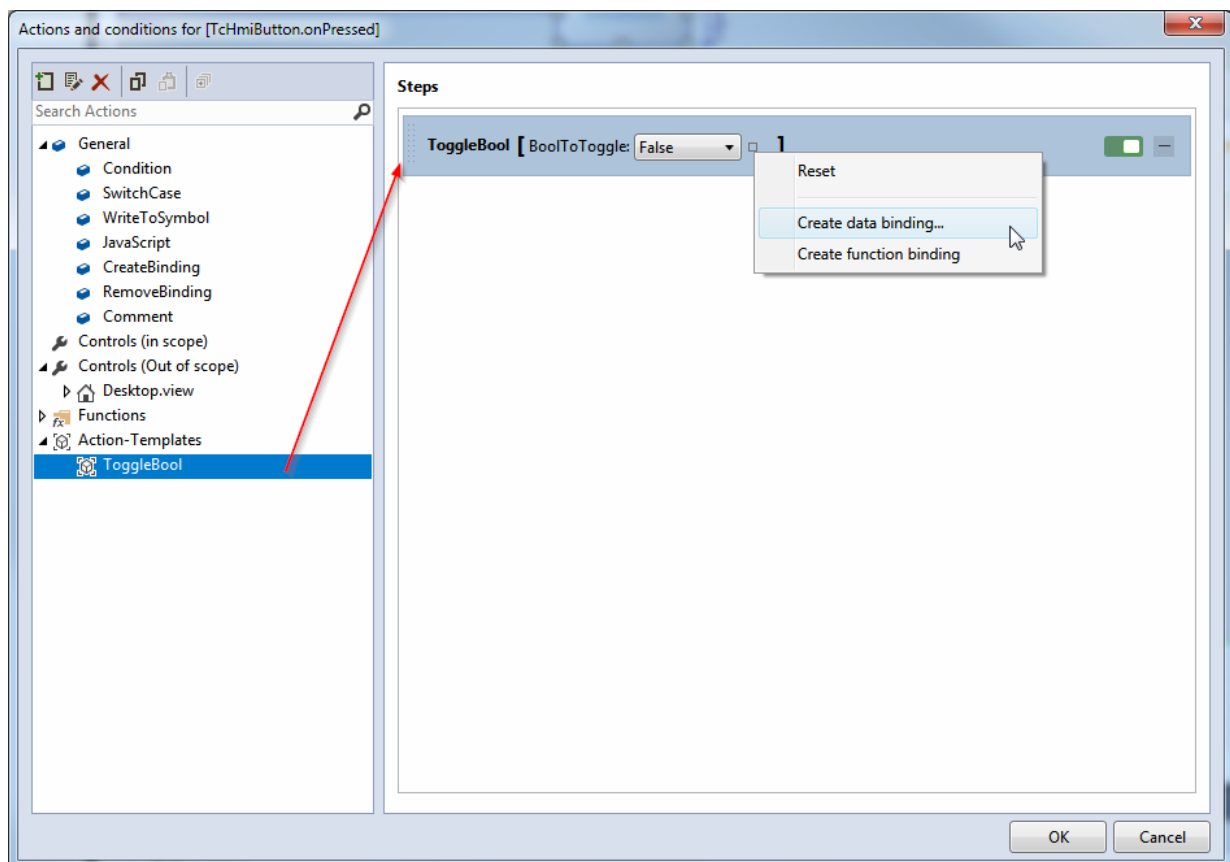
Name	Datatype	Description
BoolToToggle	Boolean	This is the input parameter.

The row is highlighted in yellow. To the right of the table are buttons for 'New', 'Edit', 'Remove', 'Up', and 'Down'.

4. Drag a condition [► 64] into the editor area and implement the logic for switching the Boolean value using WriteToSymbol actions [► 65]. You can insert the Template Parameter into the editor area using drag & drop.

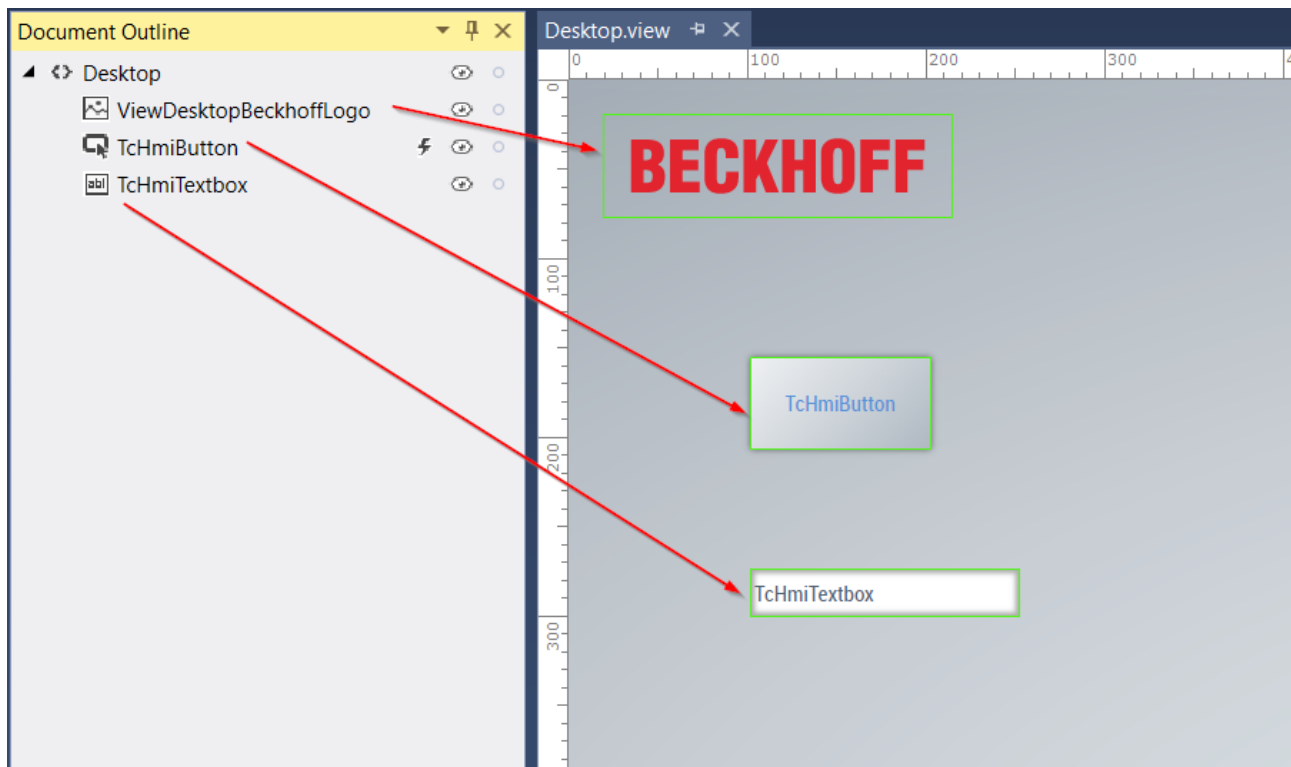







5. The Action Template can now be used as a normal action. In the Actions and Conditions Editor, drag the Action Template into the editor area and link an icon of type "Boolean" to the template parameter.



## 5.5 Document Outline

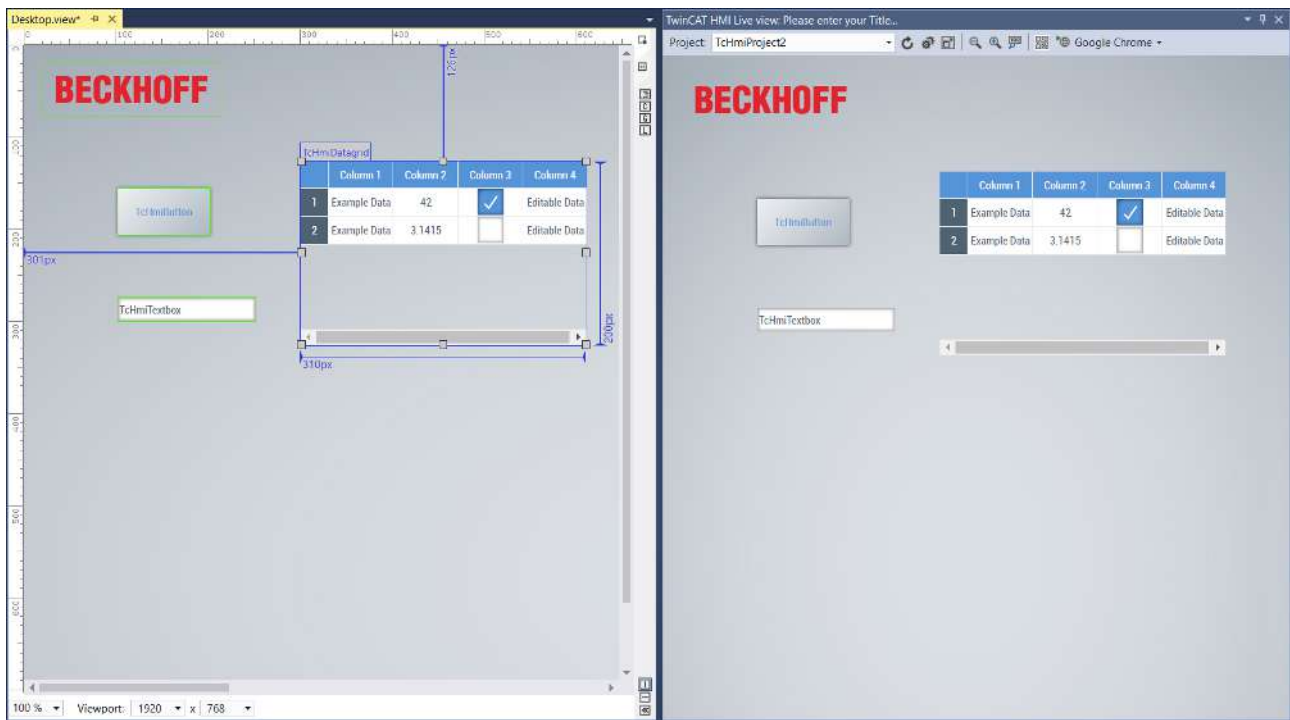
The Document Outline shows an overview of all controls that are located on the view or content page currently open in the Designer. Individual elements can be selected directly in the Document Outline, for example in order to change their properties in the Properties window.



- By clicking on  you can hide individual controls so that they are no longer displayed in the Designer. The controls are still displayed in the LiveView or in the browser. The controls are made visible again by clicking on  .
- You can lock controls to prevent them being shifted by clicking on  . Clicking on  unlocks the controls so that they can be shifted again.
- The lightning bolt icon  indicates that events are configured for this control. A click on the icon opens the Properties window and displays the events.
- If controls are superimposed on one another in the Designer, thus making them inaccessible via the graphic editor, they can be selected directly via the Document Outline.
- It is also possible to influence the order of the controls by drag-and-drop. (See detail page [Positioning of controls](#) [► 116]). In addition, you can shift the controls into containers or grids or remove them from a container or grid.

## 5.6 LiveView

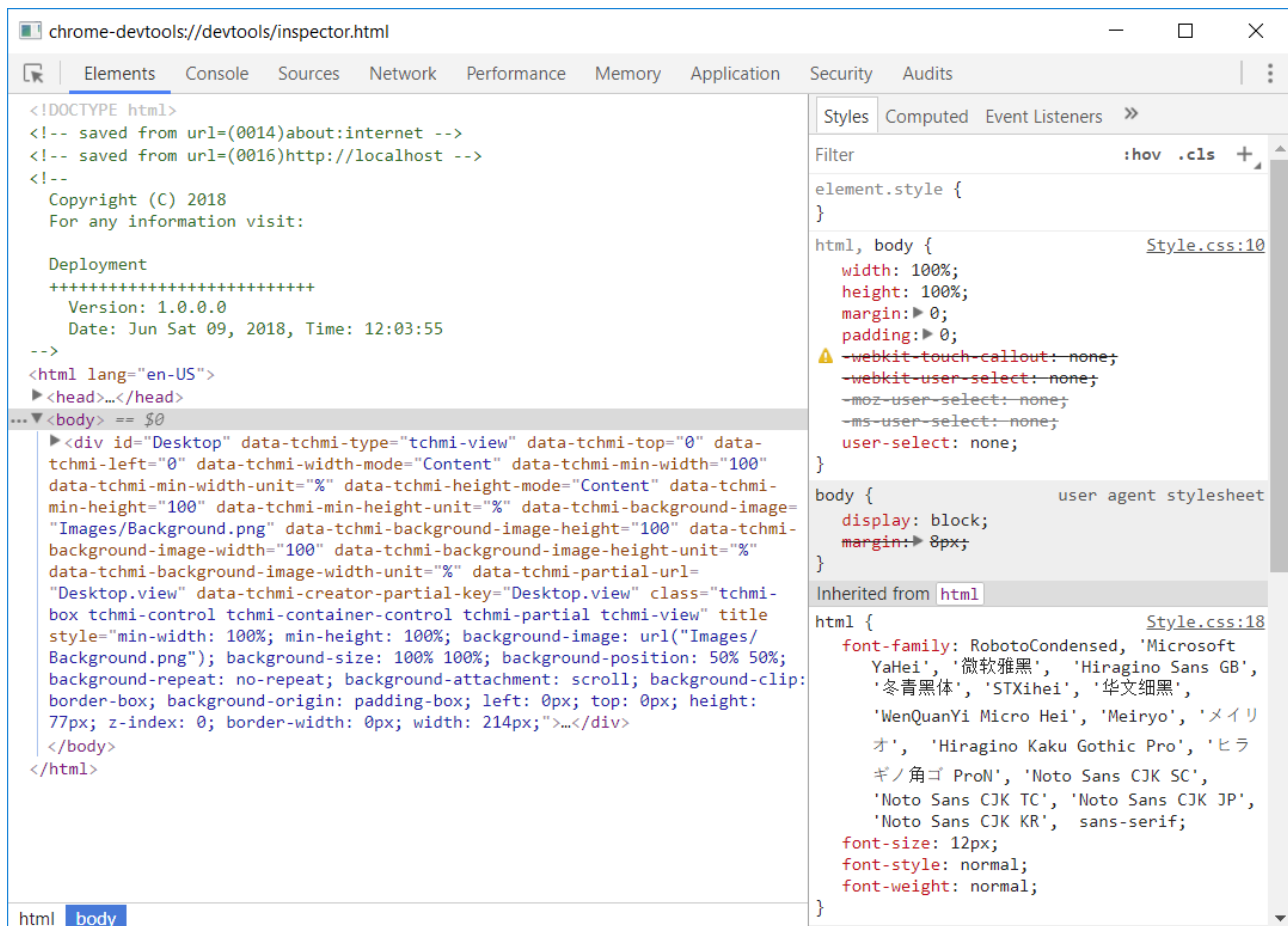
In the LiveView the current configuration of the HMI can be tested directly online with values from the PLC without the changes first having to be published on a server. The LiveView can be opened directly as a tool window in Visual Studio. The LiveView synchronizes itself directly with the Designer without you first having to save the changes. If, for example, you shift a control in the Designer, it will be shifted automatically in the LiveView.



The LiveView toolbar offers various options:

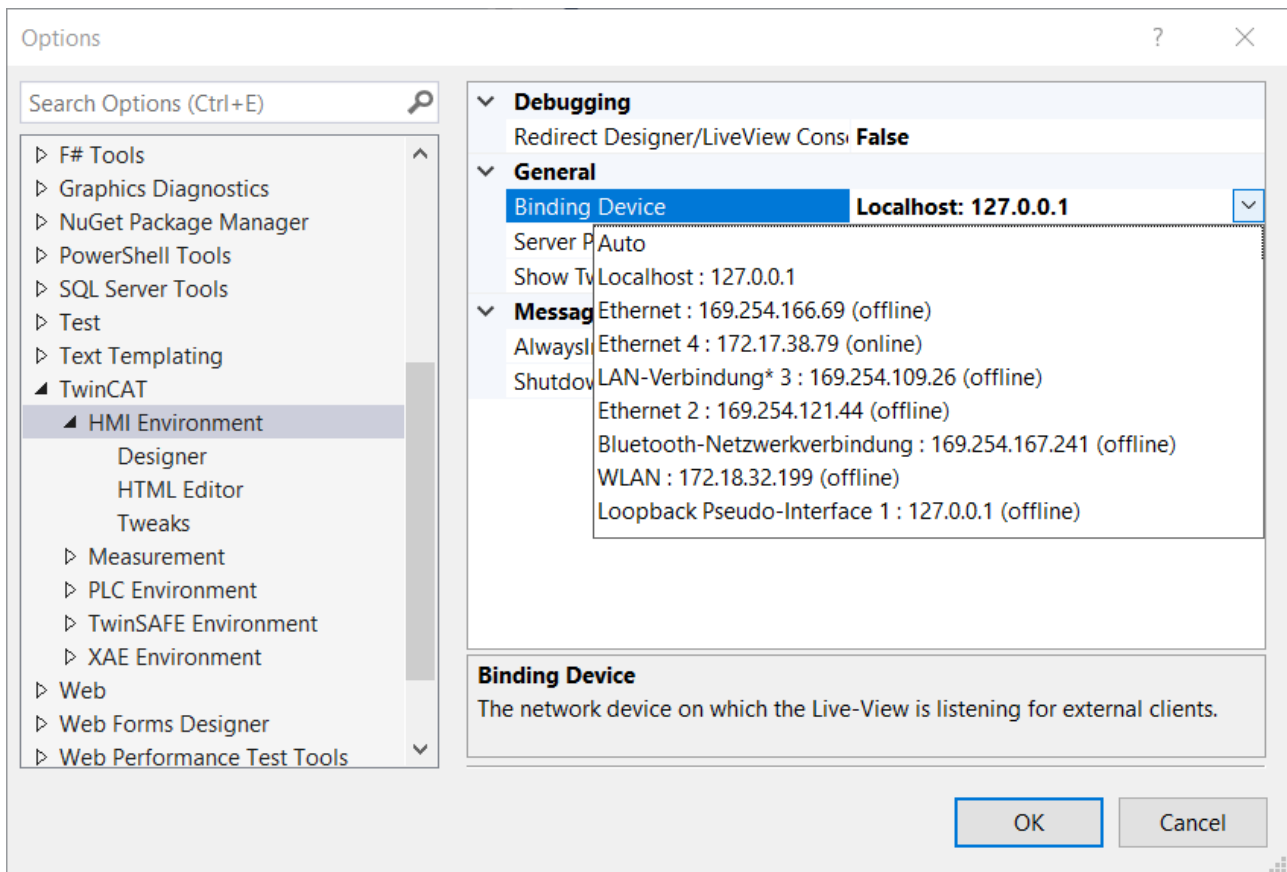


1. HMI project for which the LiveView is displayed. If there are several HMI projects in the Solution, you can switch between the various projects.
2. Refresh button: Refreshes the LiveView when changes have been made in the Designer that couldn't be automatically refreshed.
3. Developer Tools button: Opens the [Developer Tools \[► 1595\]](#) of the browser engine. These can be used for debugging purposes:



4. Full-screen mode: This button opens the LiveView in full-screen mode. The full-screen mode can be exited again by pressing the Esc key.
5. Zoom-Out: Zooms out of the LiveView.
6. Zoom In: Zooms into the LiveView.
7. Reset Zoom: Resets the zoom to the normal view.
8. QR code display: Displays a QR code for the LiveView in order to open the LiveView on another device (e.g. a Smartphone). So that the LiveView can be opened via an external device you have to set the binding to a network card in the Visual Studio settings. The settings can be found under: Menu bar/Tools/Options/TwinCAT/HMI Environment/Binding Device

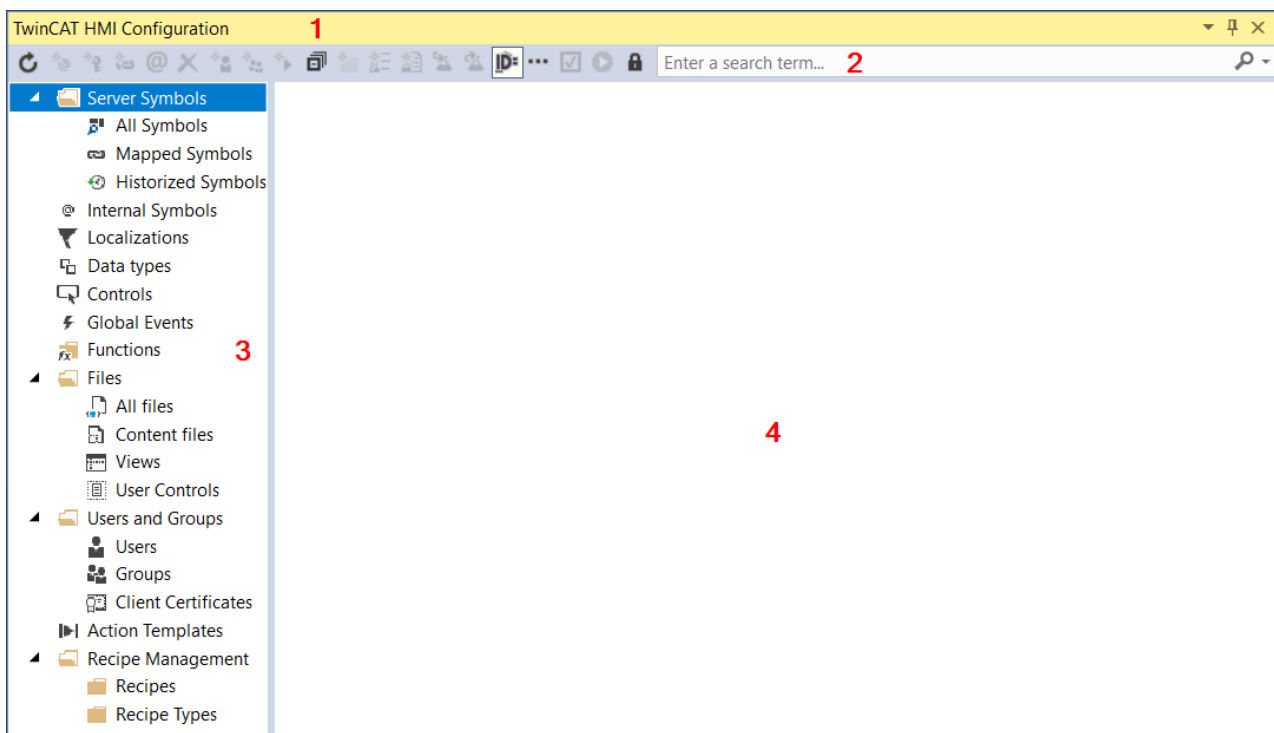




9. Opens the LiveView in an available browser. If several browsers are installed on the operating system you can choose between the browsers.

## 5.7 TwinCAT HMI Configuration

The **Configuration** window is the central configuration window in the TwinCAT HMI. It offers an overview of all elements in the project and enables the configuration of these elements. Furthermore, the user management and all data types can be configured via the window.



The **Configuration** window contains a toolbar (1), a search bar (2), a project element explorer (3) and a display area (4).

Depending on the node selected, various buttons are available in the toolbar in the right-hand explorer:



Refresh: This button refreshes the Configuration window.



Create Internal Symbol: This button adds a new internal symbol to the project.



Create Localized Symbol: This button adds a new localized key to the language tables in the project.



Create Server Symbol: This button adds a new symbol to the server.



Map Symbol: This button maps a server symbol.



Unmap Symbol: This button removes a mapping from a symbol.



Add User: This button adds a new user to the user management.



Add Group: This button adds a new user group to the user management.



Collapse All: This button collapses all expanded folders.



Automap Symbols: This button activates the automatic mapping of symbols. If the button is activated the symbol is automatically mapped in the background. If the button is deactivated the Dialog Map symbol appears; a mapping for the symbol can be assigned in this dialog.



Show advanced Items: This button shows all configuration options and is intended for power users.



Toggle all On-/Offline: This button switches the state of all symbols between online and offline. No communication takes place with the server in the offline state.

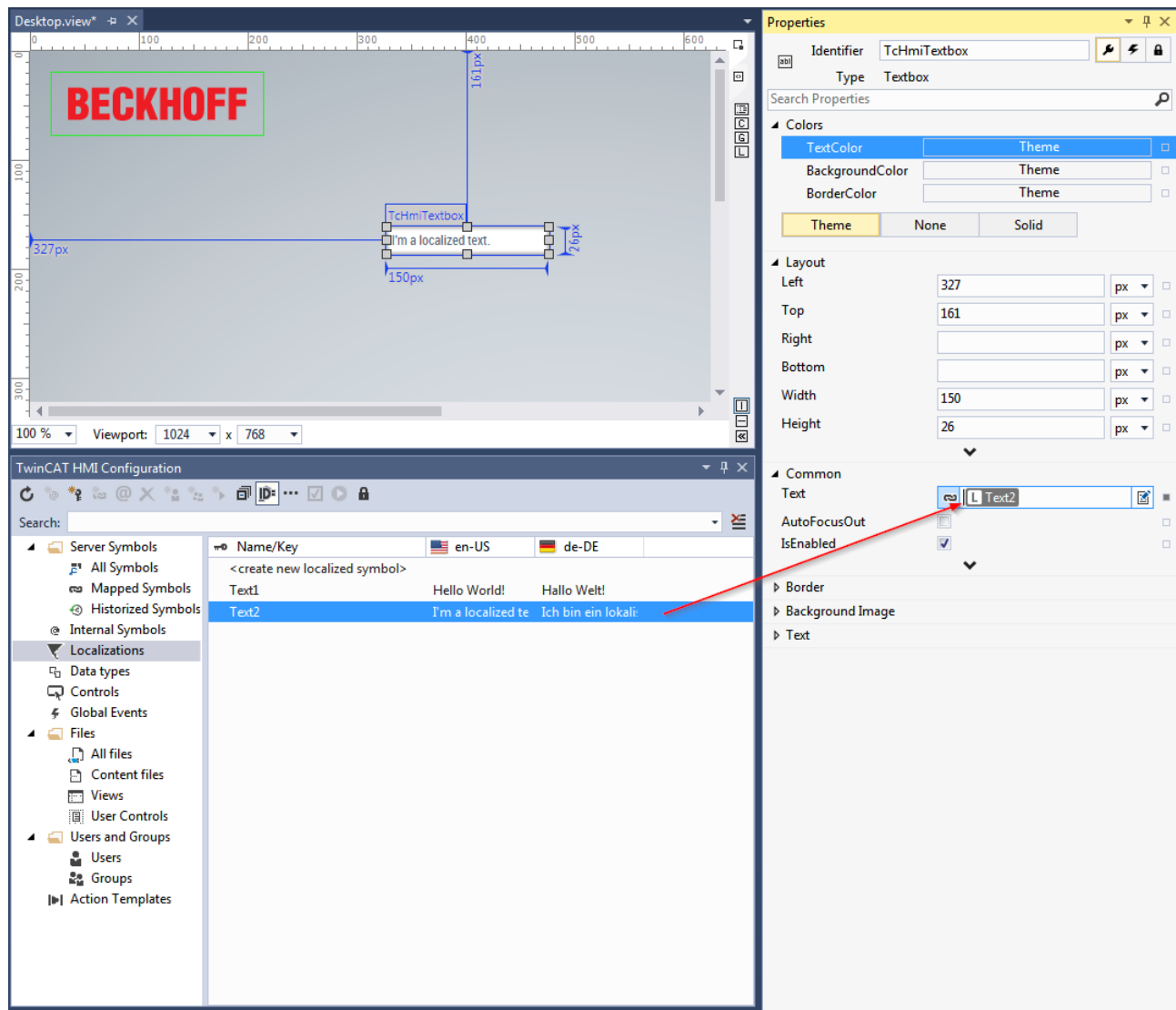


Show live values for mapped symbols: This button shows live values from the PLC for mapped symbols in the Configuration window.



Edit permissions: This button opens the permissions management for the project elements.

The **Configuration** window can interact with the [Properties window](#) [► 60] by drag-and-drop.



## 5.7.1 Server symbols

Server Symbols lists all symbols that are saved in the TwinCAT HMI server.

### 5.7.1.1 All Symbols

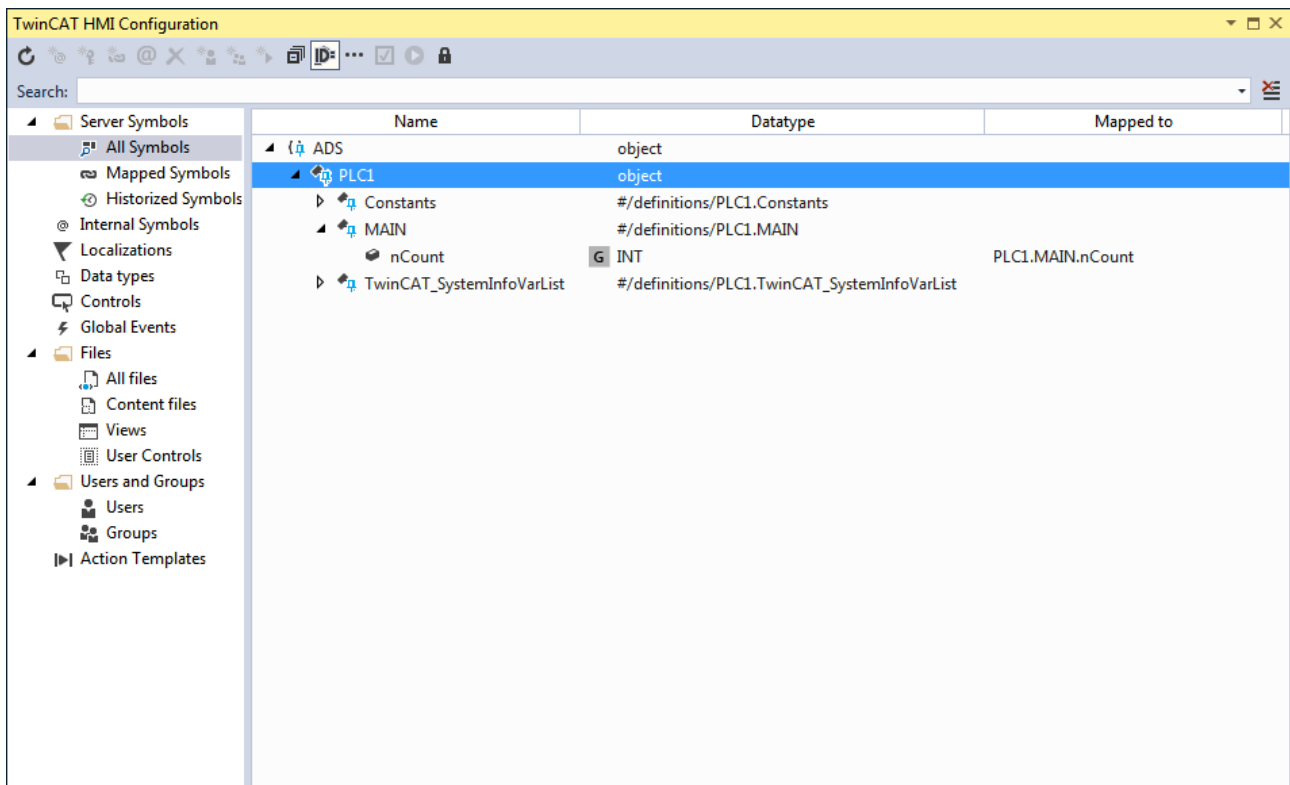
All Symbols lists all symbols of the extensions available in the server. The user-specific server extensions are also listed here.



Map Symbol: This button maps a server symbol.

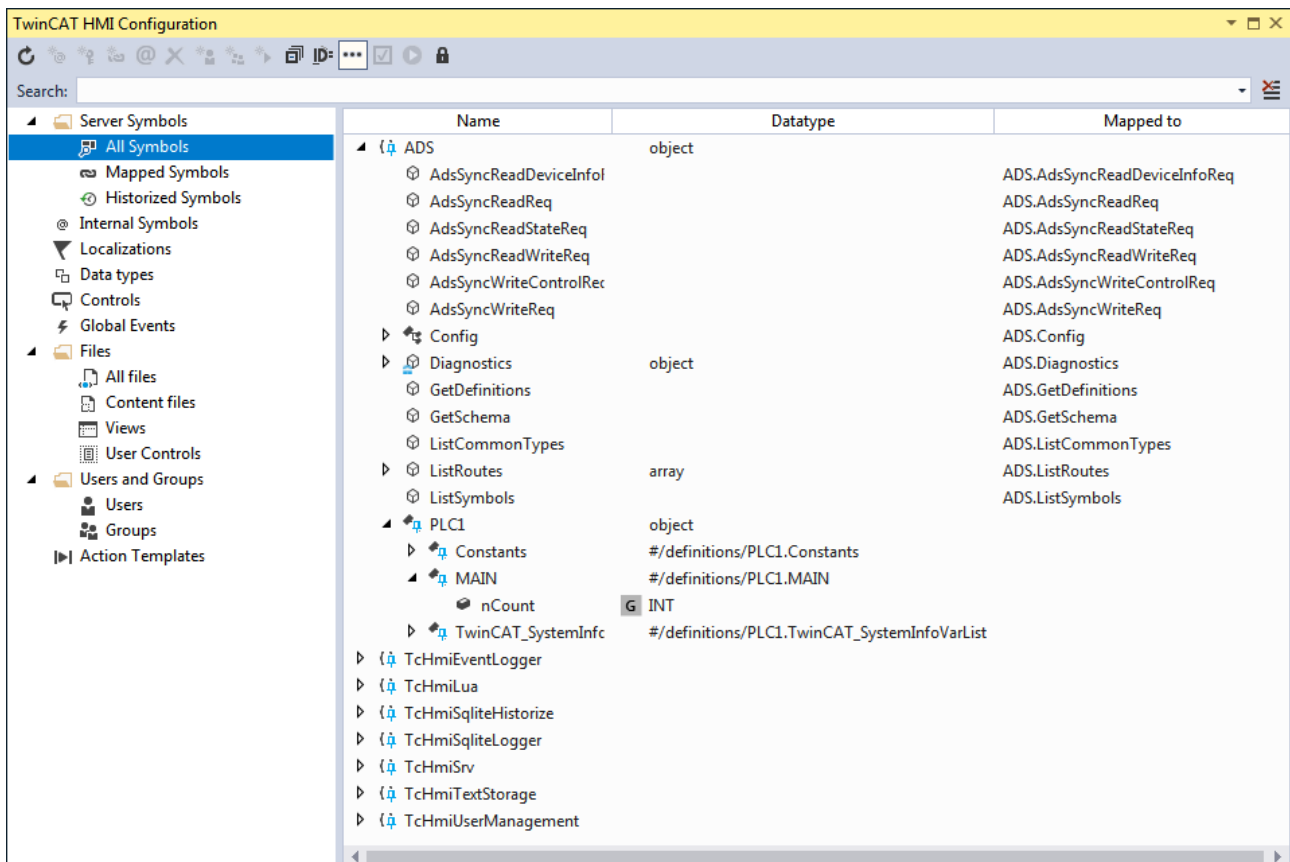


Show advanced Items: This button shows all configuration options and is intended for power users.



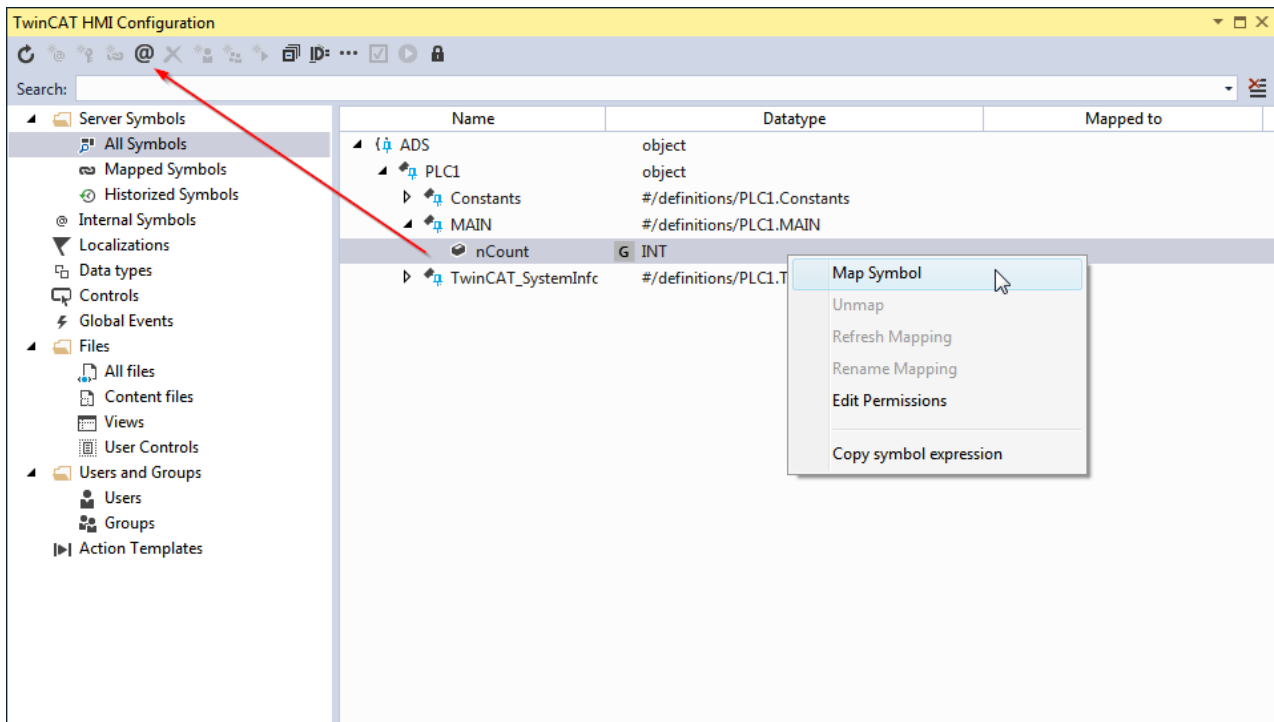
### Show Advance Properties

If **Show Advanced Items** is activated, symbols and further extensions are available to power users.

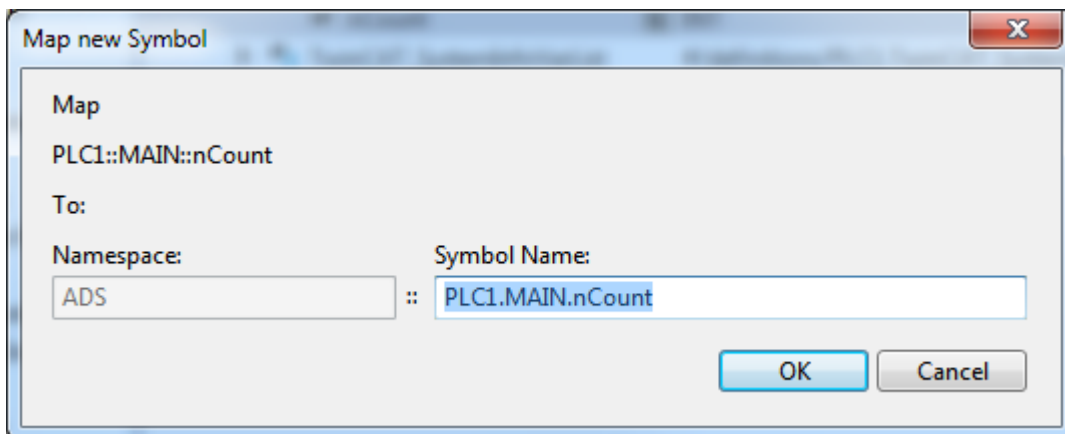


### Create Mapping

Server symbols can be mapped with a right-click on the symbol or by clicking on the **Map Symbol** button.



A name can be assigned for the mapping in the dialog **Map new Symbol**.



### 5.7.1.2 Mapped symbols

Mapped symbols lists all symbols that have been mapped in the server.



**Create Server Symbol:** This button adds a new symbol to the server.



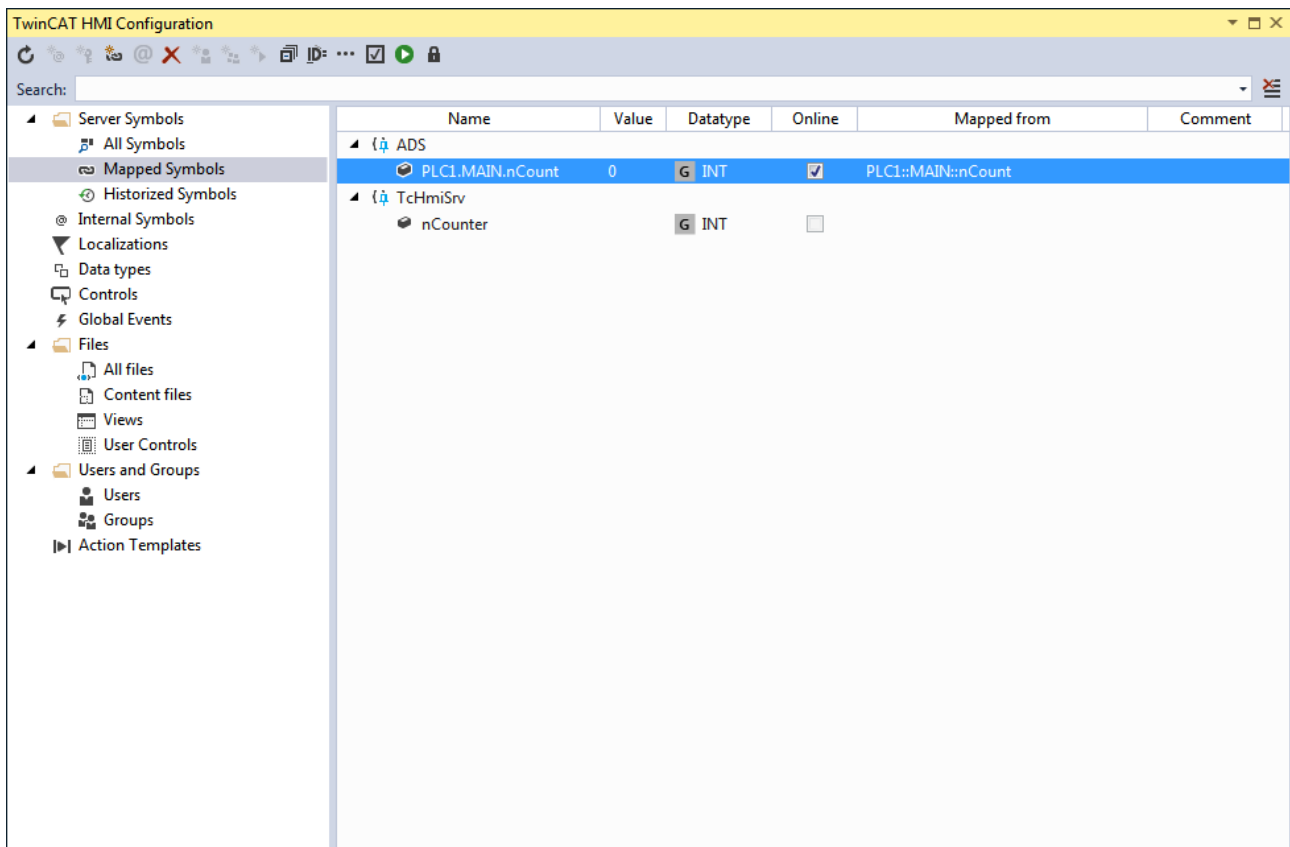
**Unmap Symbol:** This button removes a mapping from a symbol.



**Toggle all On-/Offline:** This button switches the state of all symbols between online and offline. No communication takes place with the server in the offline state.

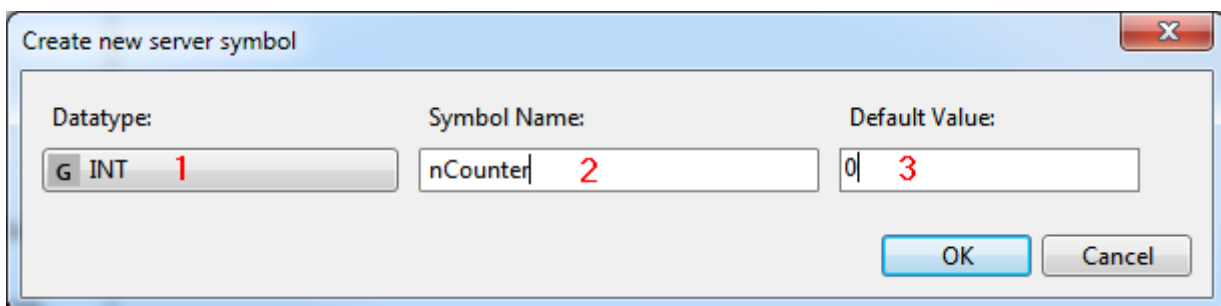


**Show live values for mapped symbols:** This button shows live values from the PLC for mapped symbols in the Configuration window.



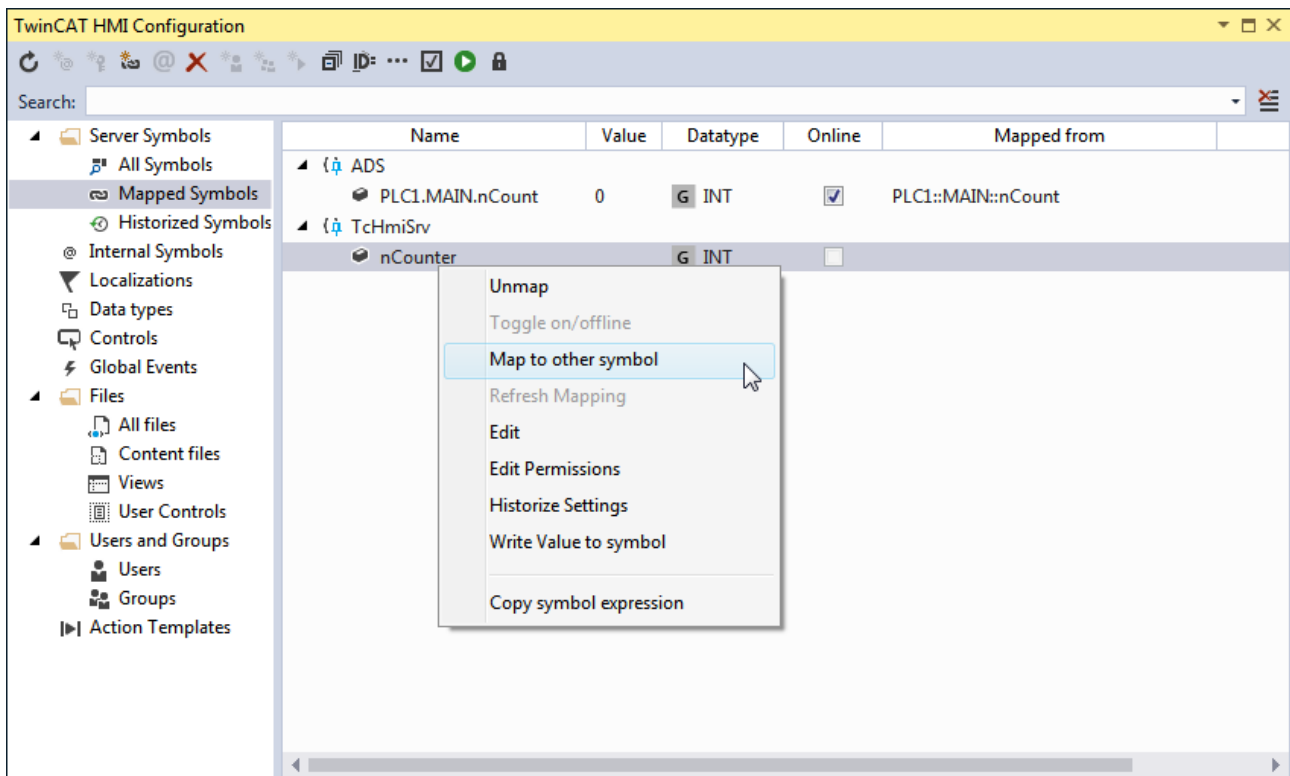
### Create Server Symbol

Server symbols can be created centrally in the server under **Mapped Symbols**. They can also be used offline without a PLC. Clicking on the button **Create Server Symbol** opens a dialog for adding server symbols.



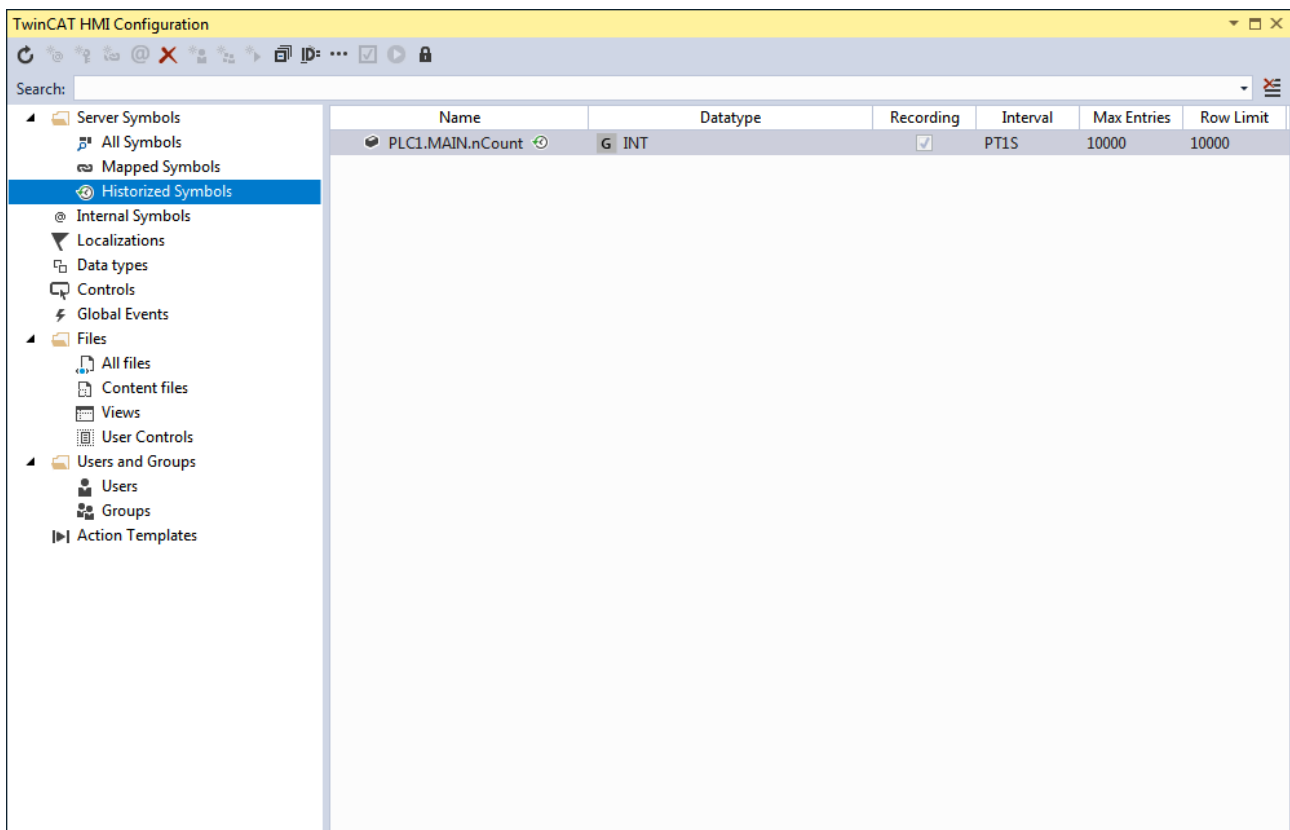
1. **Data type:** Data type of the new symbol.
2. **Symbol Name:** Name of the new symbol.
3. **Default Value:** Default value of the symbol that is assigned when starting the server.

Server symbols that were created offline can be bound with a different symbol (e.g. from the PLC) later on. To do this, click on **Map to other symbol** in the context menu and select the symbol via the window **Select Binding Source**.



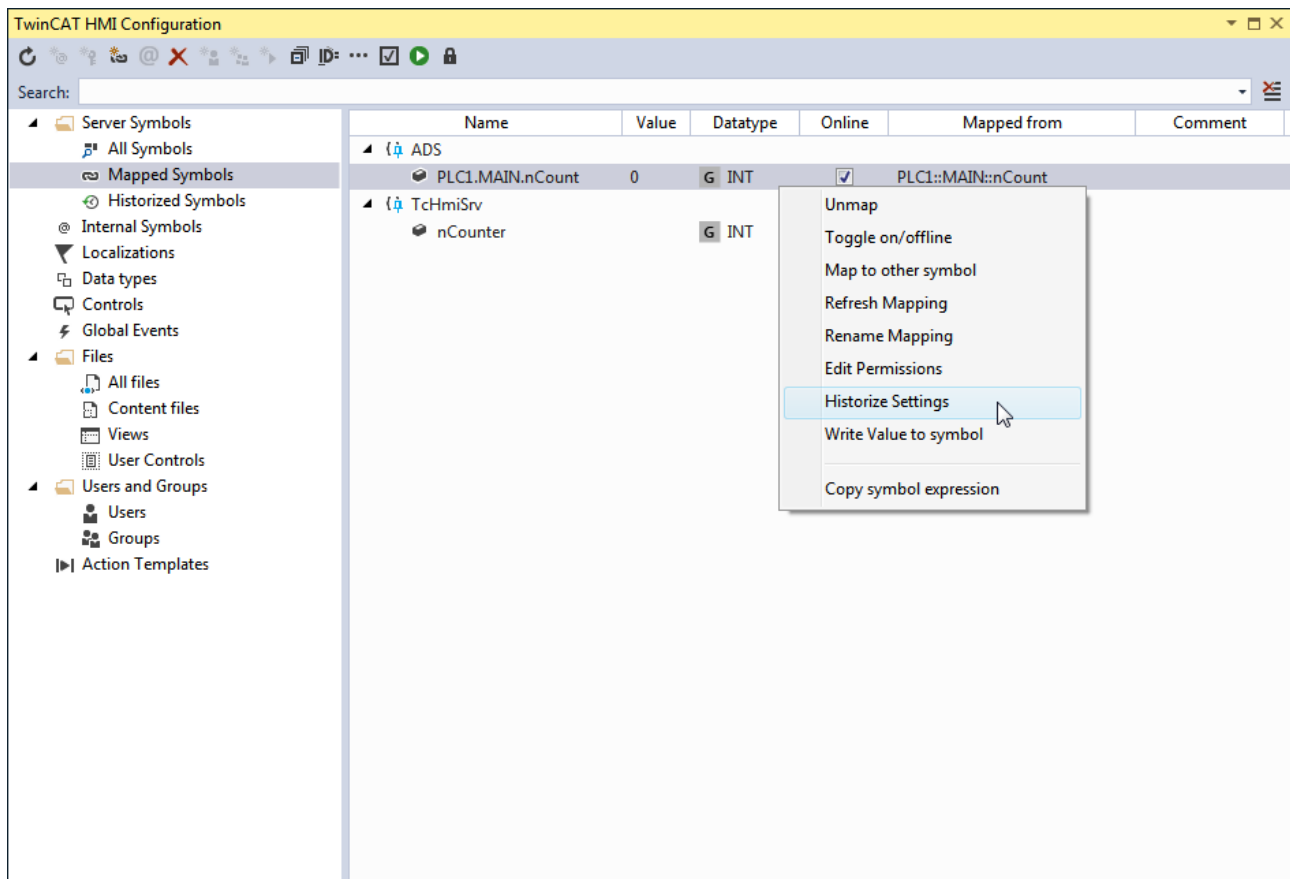
### 5.7.1.3 Historized Symbols

Historized Symbols lists all symbols that are historized by the server.

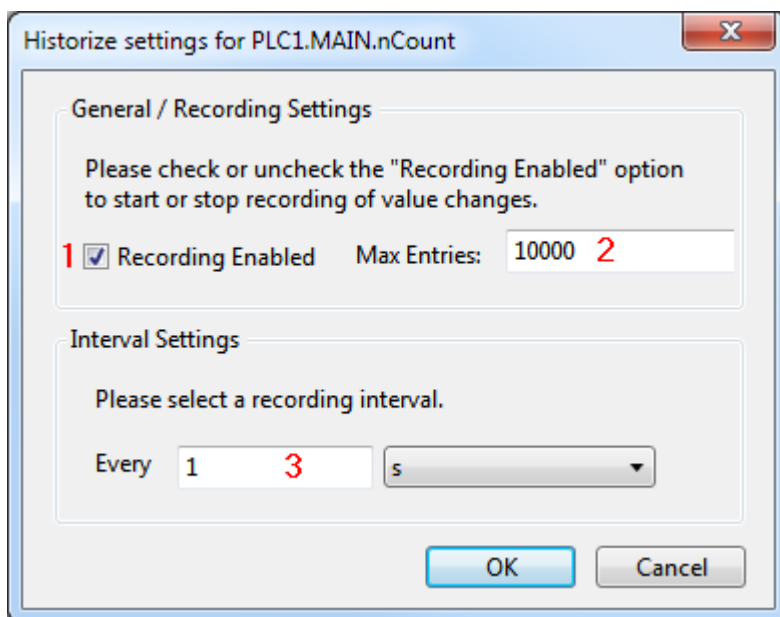


#### Create Historized Symbol

A historized symbol is created via the mapped symbols. To do this, click on **Historize Settings** in the context menu for a mapped symbol:

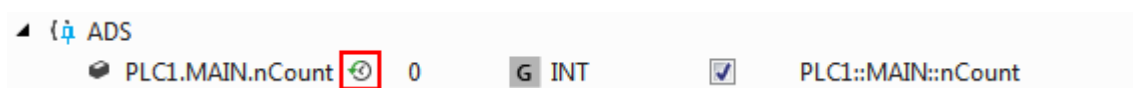


The configuration for the historization of the symbol takes place in the dialog **Historize Settings**:



1. **Recording Enabled:** This setting activates the historization of the symbol.
2. **Max Entries:** Maximum number of entries in the ring buffer of the historized symbol.
3. **Interval:** Interval at which the data records are written to the ring buffer.

A historized symbol is identified by the following icon after the symbol name:






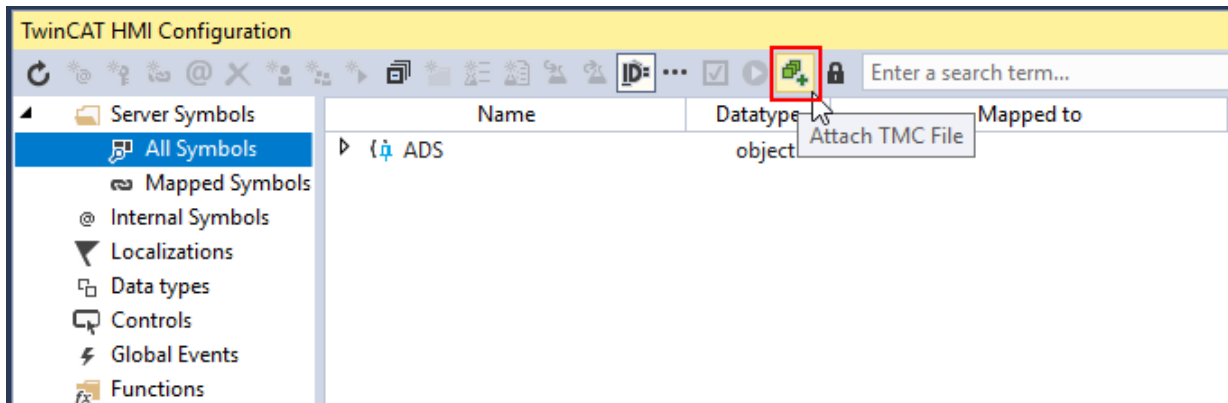
### 5.7.1.4 Offline symbols (TMC)

If there is no connection to the target systems during the engineering stage, the TMC file of a TwinCAT PLC can be imported. This gives the user offline access to all PLC symbols. Once a connection to the target system is available, the symbols can be switched to the online connection.

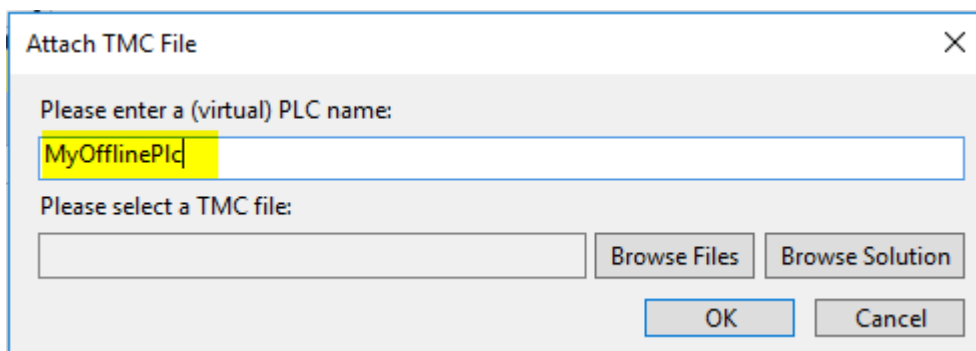
#### Integrating a TMC file

1. Open the **TwinCAT HMI Configuration** window

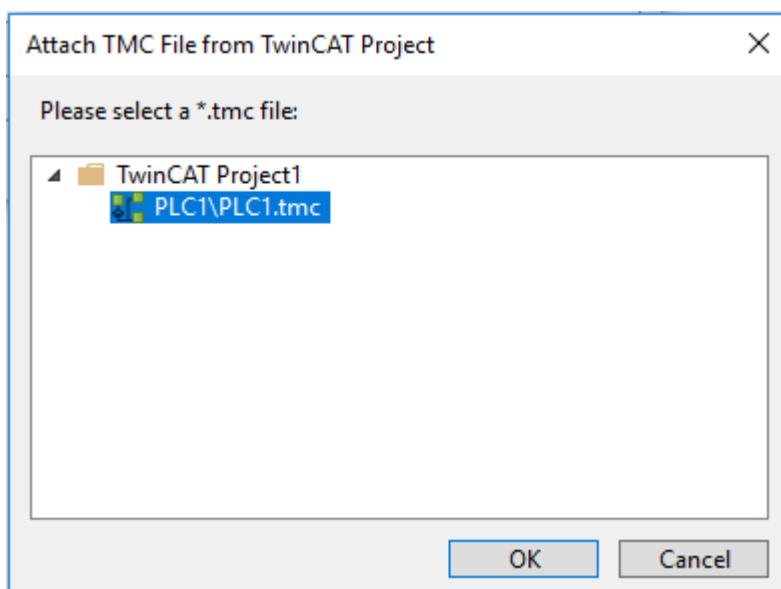
2. Click  to add a TMC file:



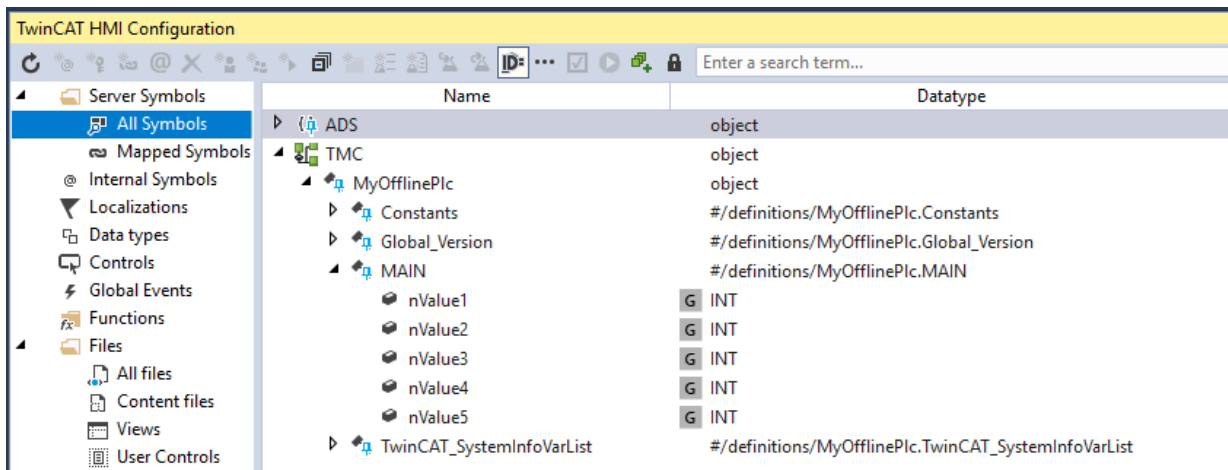
3. Enter a meaningful name for the PLC in the dialog that appears. This name is used for the any mappings that are created and is retained when switching to the PLC connection. Confirm with **OK**.



4. Select the TMC file from the file system by clicking **Browse Files** or integrate it via **Browse Solution** if the TwinCAT project is in the same Solution.



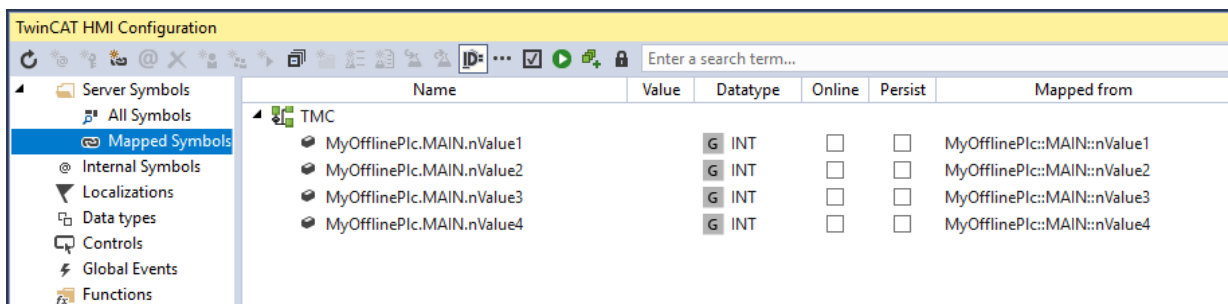
5. Confirm both dialogs by clicking **OK**.
6. The entry **TMC** now appears under **All Symbols**, where you will find the offline PLC that was added.



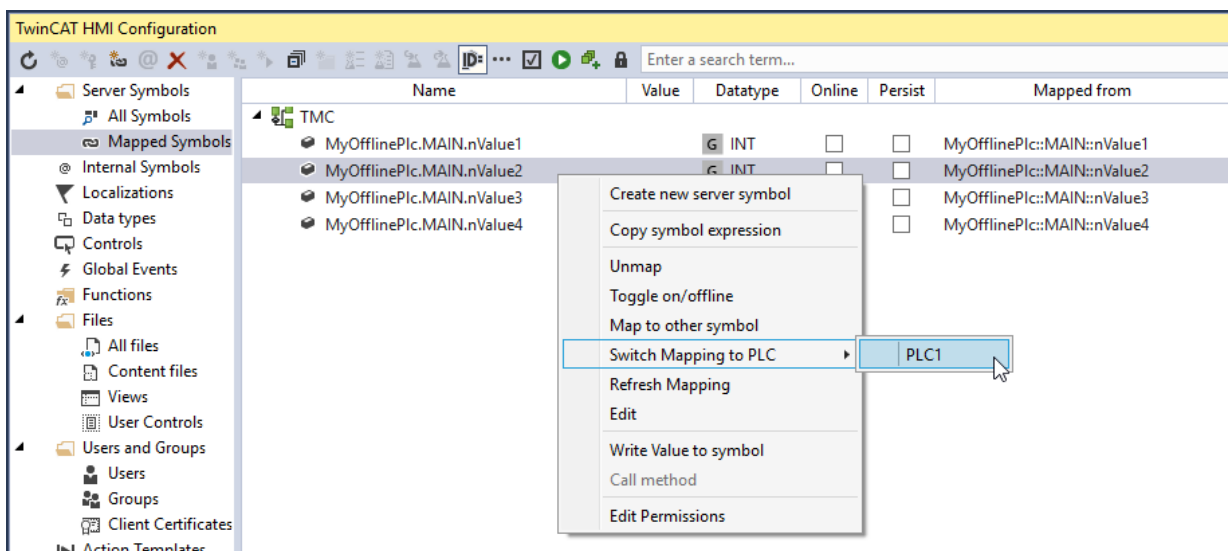
⇒ You can create mappings for the symbols as usual.

### Switching from offline to online connection

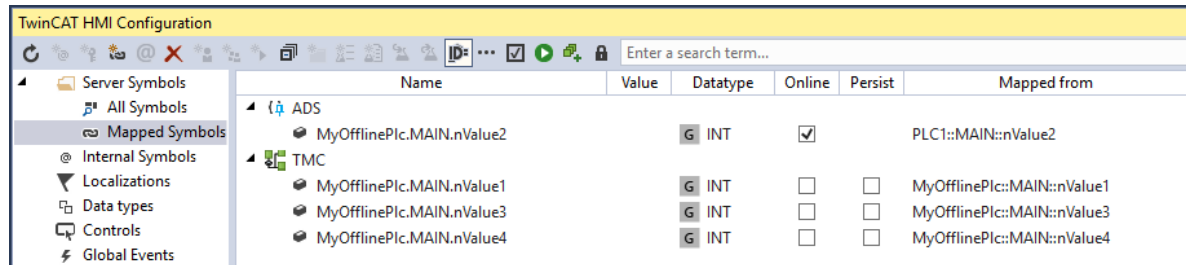
1. Once a connection to the PLC is available, you can switch the mappings to the online connection. To do this, open the **TwinCAT HMI Configuration** window and navigate to the **Mapped Symbols**:



2. Select a symbol, right-click **Switch Mapping to PLC** and select the corresponding PLC (in this case PLC1). This step requires the symbol to be available in the PLC.

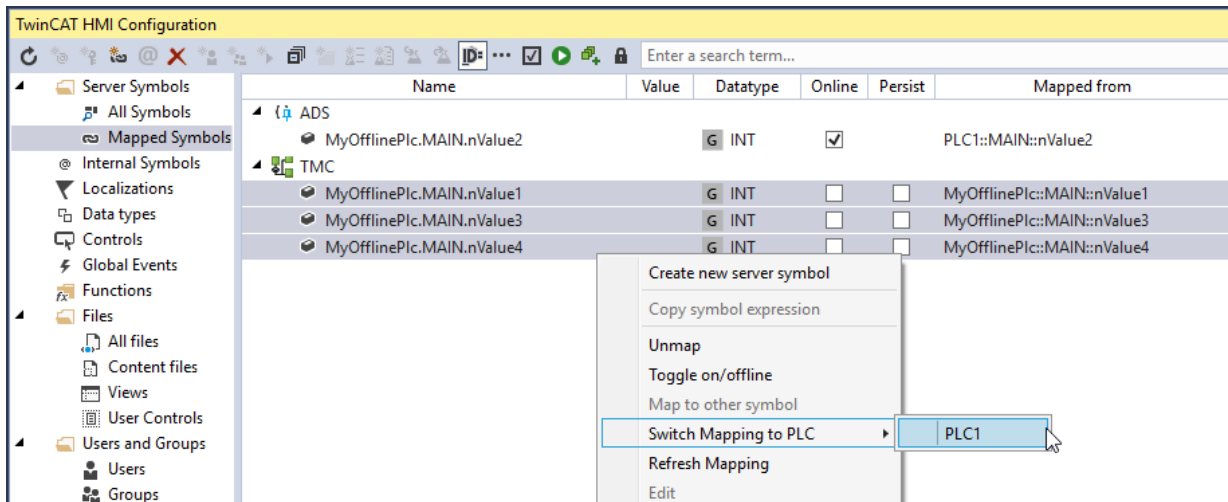


- ⇒ The mapping is removed from the TMC symbols and listed below the online connections. You now have access to the live data of the PLC.



Name	Value	Datatype	Online	Persist	Mapped from
ADS					
MyOfflinePlc.MAIN.nValue2	G	INT	<input checked="" type="checkbox"/>		PLC1::MAIN::nValue2
TMC					
MyOfflinePlc.MAIN.nValue1	G	INT	<input type="checkbox"/>	<input type="checkbox"/>	MyOfflinePlc::MAIN::nValue1
MyOfflinePlc.MAIN.nValue3	G	INT	<input type="checkbox"/>	<input type="checkbox"/>	MyOfflinePlc::MAIN::nValue3
MyOfflinePlc.MAIN.nValue4	G	INT	<input type="checkbox"/>	<input type="checkbox"/>	MyOfflinePlc::MAIN::nValue4

3. You may switch several mappings to an online connection at the same time if they are available in the same PLC. To do this, select several mappings, right-click **Switch Mapping to PLC** and select the PLC:



- ⇒ The connection of the selected symbols was switched to the online connection.



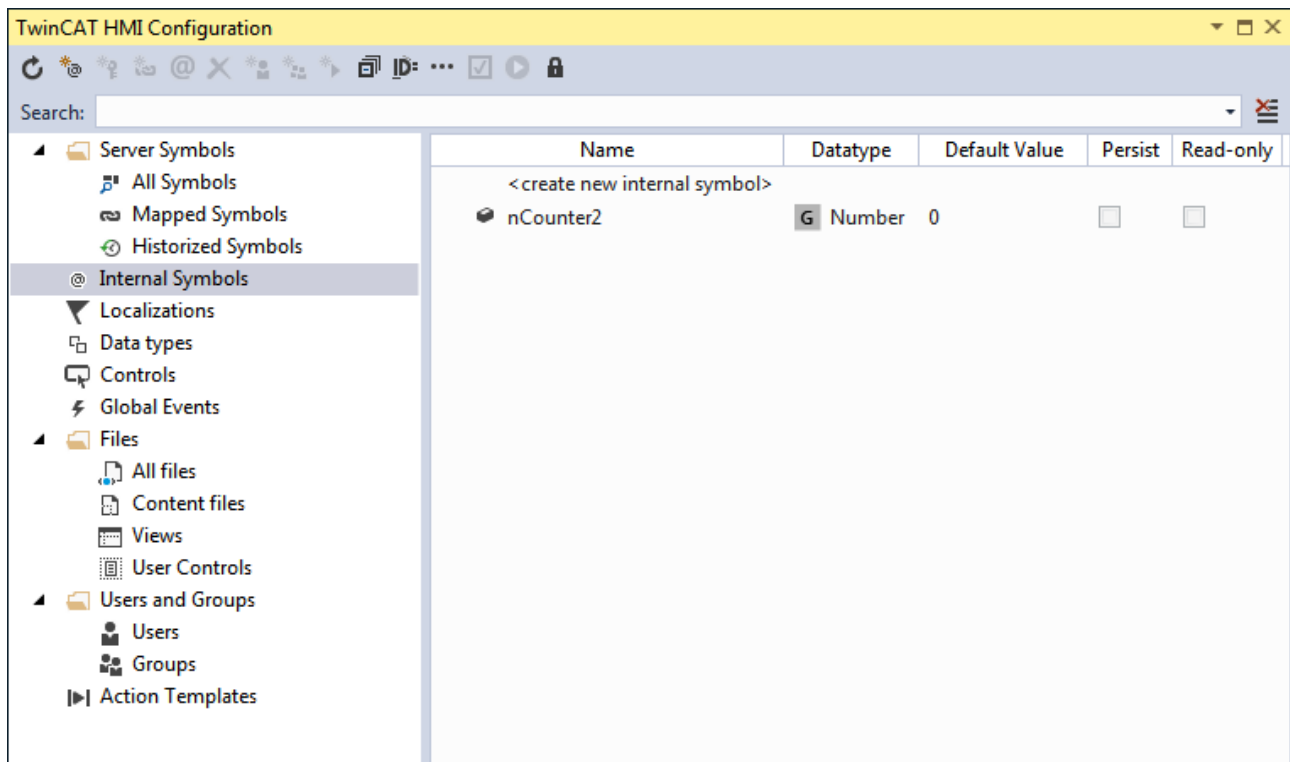
Available from version 1.12.742.0

## 5.7.2 Internal symbols

Internal symbols are independent of the server and are valid within a browser instance. The internal symbols thus enable variables to be saved individually for each client.

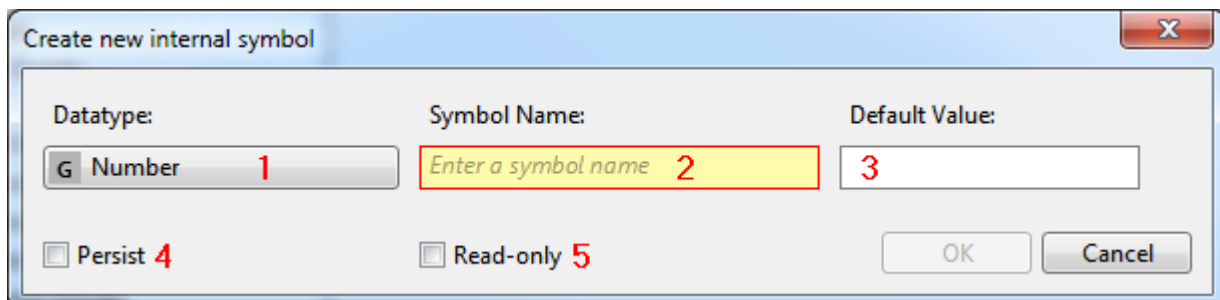


Create Internal Symbol: This button adds a new internal symbol to the project.



### Create Internal Symbol

Clicking on the button **Create Internal Symbol** or double-clicking on **<create new internal symbol>** opens a dialog for adding internal symbols:



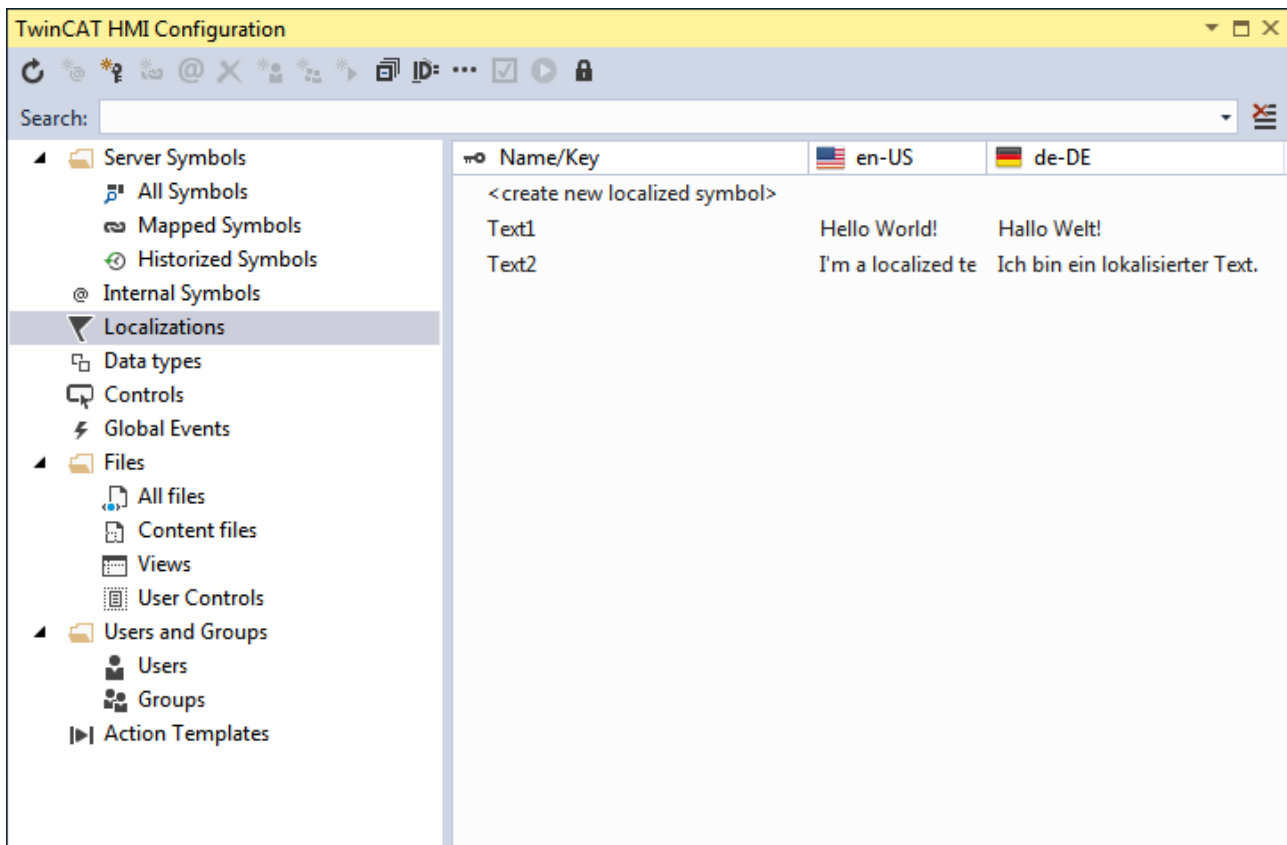
1. **Data type:** Data type of the internal symbol. The selection is made via the combobox.
2. **Symbol Name:** Name of the internal symbol.
3. **Default Value:** Default value of the internal symbol that is set when loading the client.
4. **Persist:** Defines whether the symbol is saved persistently in the client. A persistent internal symbol is available at the next start of the HMI.
5. **Read-only:** Defines whether the symbol may only be read or whether read and write access is allowed.

### 5.7.3 Localizations

Localizations list all available [localization texts](#) [► 998]. You can bind the entries with the control properties by drag-and-drop.

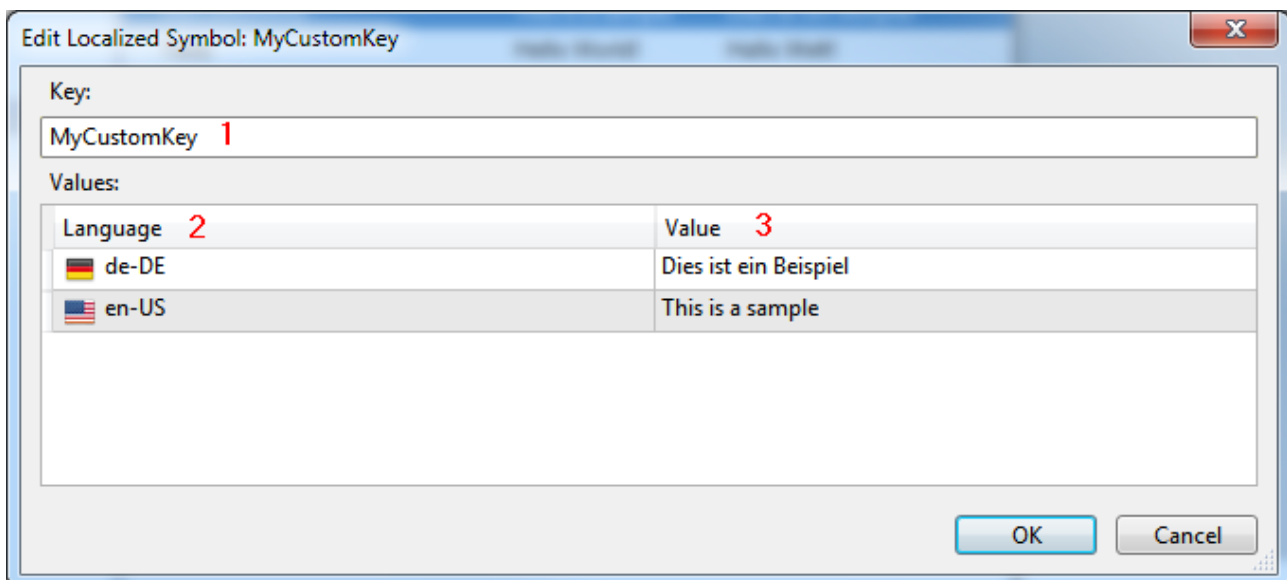


**Create Localized Symbol:** This button adds a new localized key to the language tables in the project.



### Create Localized Symbol

The dialog **Create new localized symbol** is opened by clicking on the button **Create Localized Symbol**, double-clicking on **<create new localized symbol>** and dragging and dropping the entry **<create new localized symbol>** onto a control property.

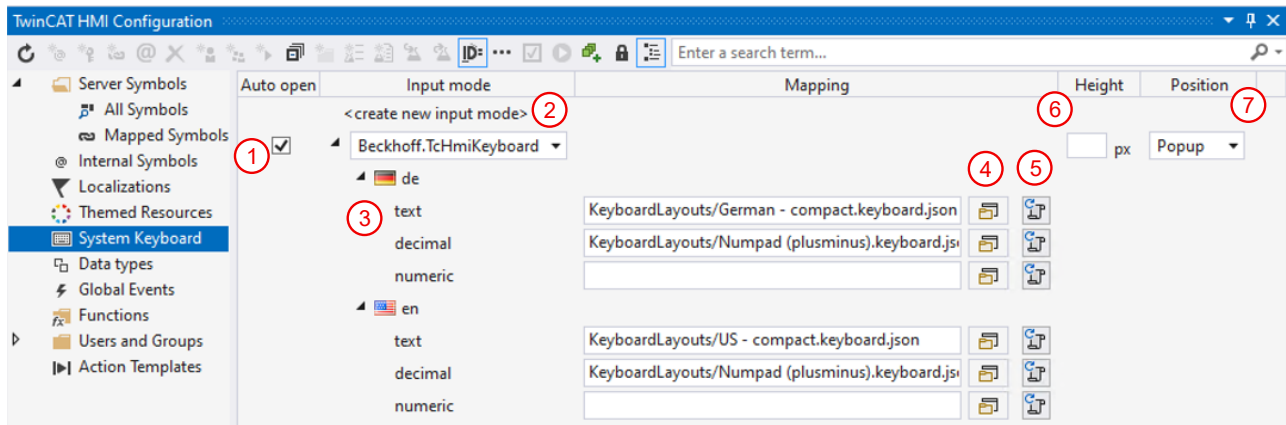


1. **Key**: Key of the localized text. The key may only be assigned once.
2. **Language**: All available languages.
3. **Value**: Text of the key in the respective language.

### 5.7.4 System Keyboard

The System Keyboard makes it possible to have the system display keyboards for input fields globally for the HMI project. It can be configured in the HMI project in the "TwinCAT HMI Configuration" *tool window*.

## Configuration



1. Auto open: opens the System Keyboard when an input element is focused.
2. <create new input mode>: adds another *Input Mode* to display a specific keyboard layout.
3. *Input MODES*: different layouts can be configured by default. If none is configured, the Fallback takes effect.

Input Mode	Description	Fallback Input Mode
numeric	Integer inputs	decimal
decimal	Decimal numbers	text
text	Text	Configured Fallback language in HMI project properties [► 53]

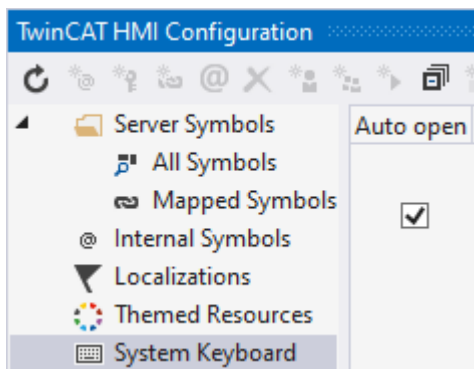
4. Selection in the keyboard layouts stored in the HMI project. All keyboard layouts stored in the HMI project are listed. If required, further layouts can be added to the project as [TwinCAT HMI Item \[► 960\]](#).
5. Resets the layout to the *Fallback*.
6. *Height*: the size of the keyboard is determined by the height in terms of the number of pixels. If no specification is made, the height of the *Keyboard Layout* is used.
7. *Position*: defines the position of the System Keyboard.

Position	Description
Popup (default)	The System Keyboard is displayed as a popup. The last position is saved when closing.
Footer	The System Keyboard is displayed in the <i>footer</i> of the HMI.

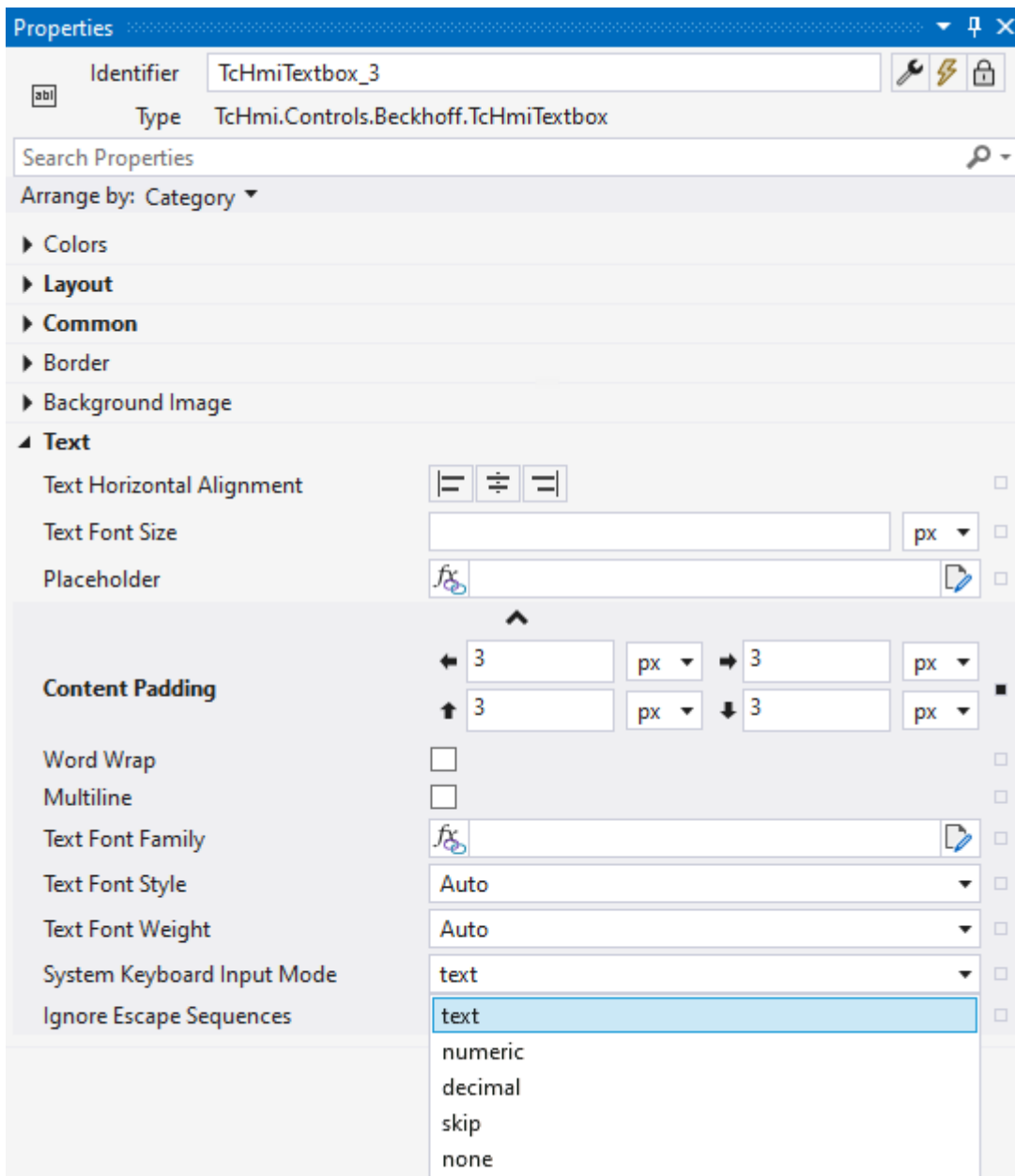
## Quick start

### Configuring the System Keyboard

1. Open the TwinCAT HMI Configuration tool window and select the **System Keyboard** entry.
2. Activate the checkbox for the *Auto open* property:



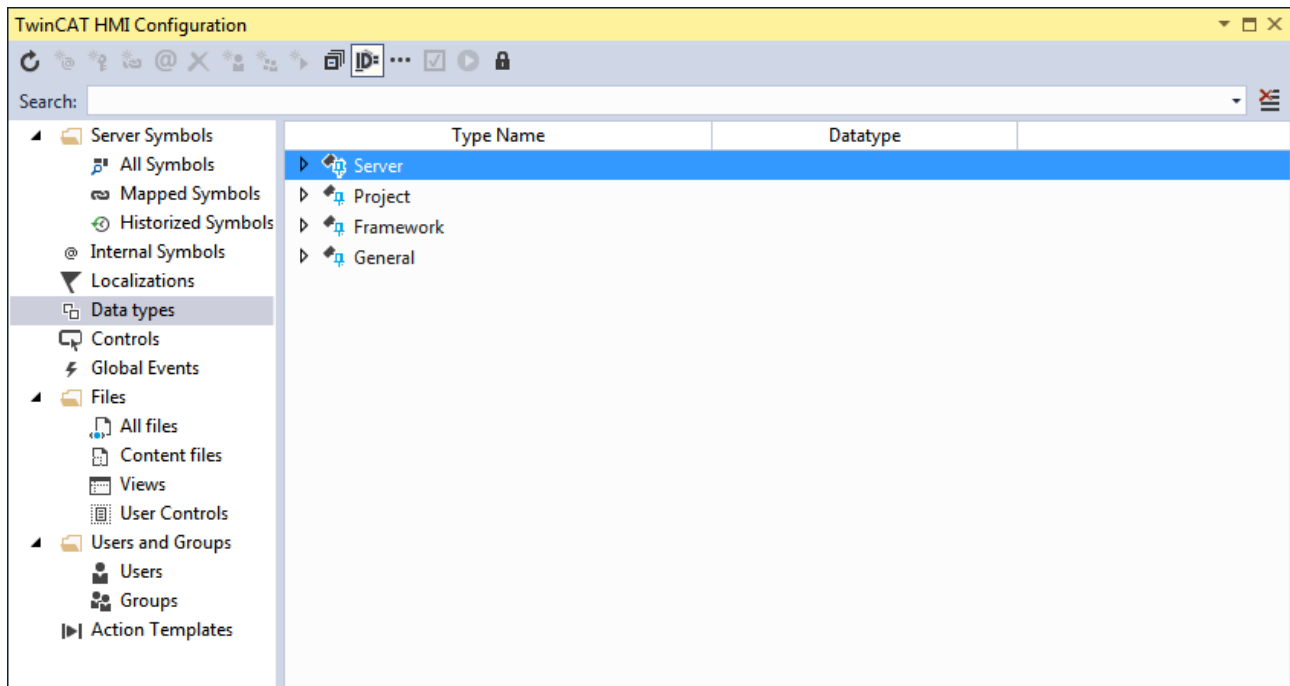
3. The System Keyboard is automatically opened with the configured layout for all input elements when focusing (see point 3, [System Keyboard configuration](#) [► 90]).
4. To select a different layout when focusing on an input element, the behavior can be adjusted via the *System Keyboard Input Mode* property (Text category):



System Keyboard Input Mode	Description
text	Opens the configured layout for the Input Mode <i>text</i> .
numeric	Opens the configured layout for the Input Mode <i>numeric</i> .
decimal	Opens the configured layout for the Input Mode <i>decimal</i> .
skip	No System Keyboard is opened.
none	The System Keyboard is closed if one is open.

## 5.7.5 Data types

Data types list all available data types of the TwinCAT HMI and the current project.

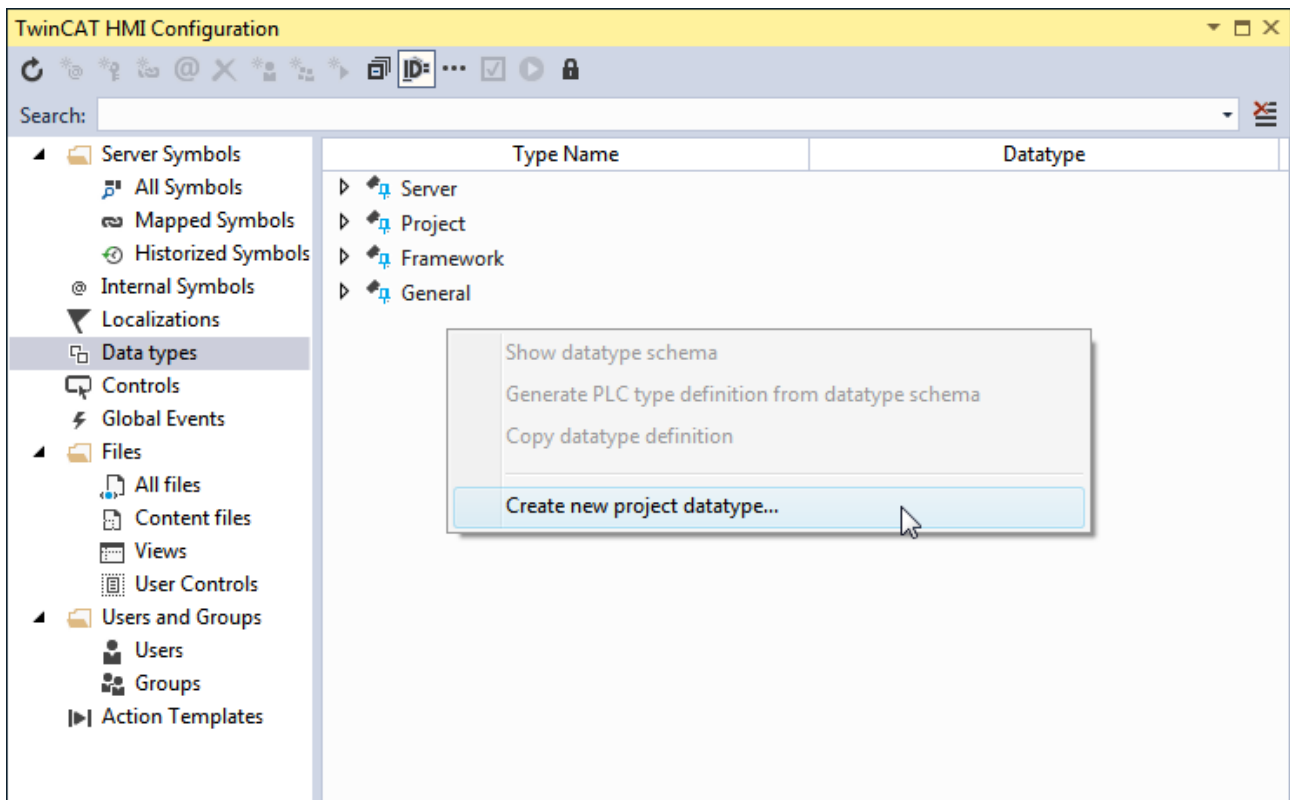


- **Server:** All server data types.
- **Project:** User-specific project data types that were created by the [Scheme Generator](#) [► 92].
- **Framework:** All framework data types (including data types from framework controls).
- **General:** Base data types.

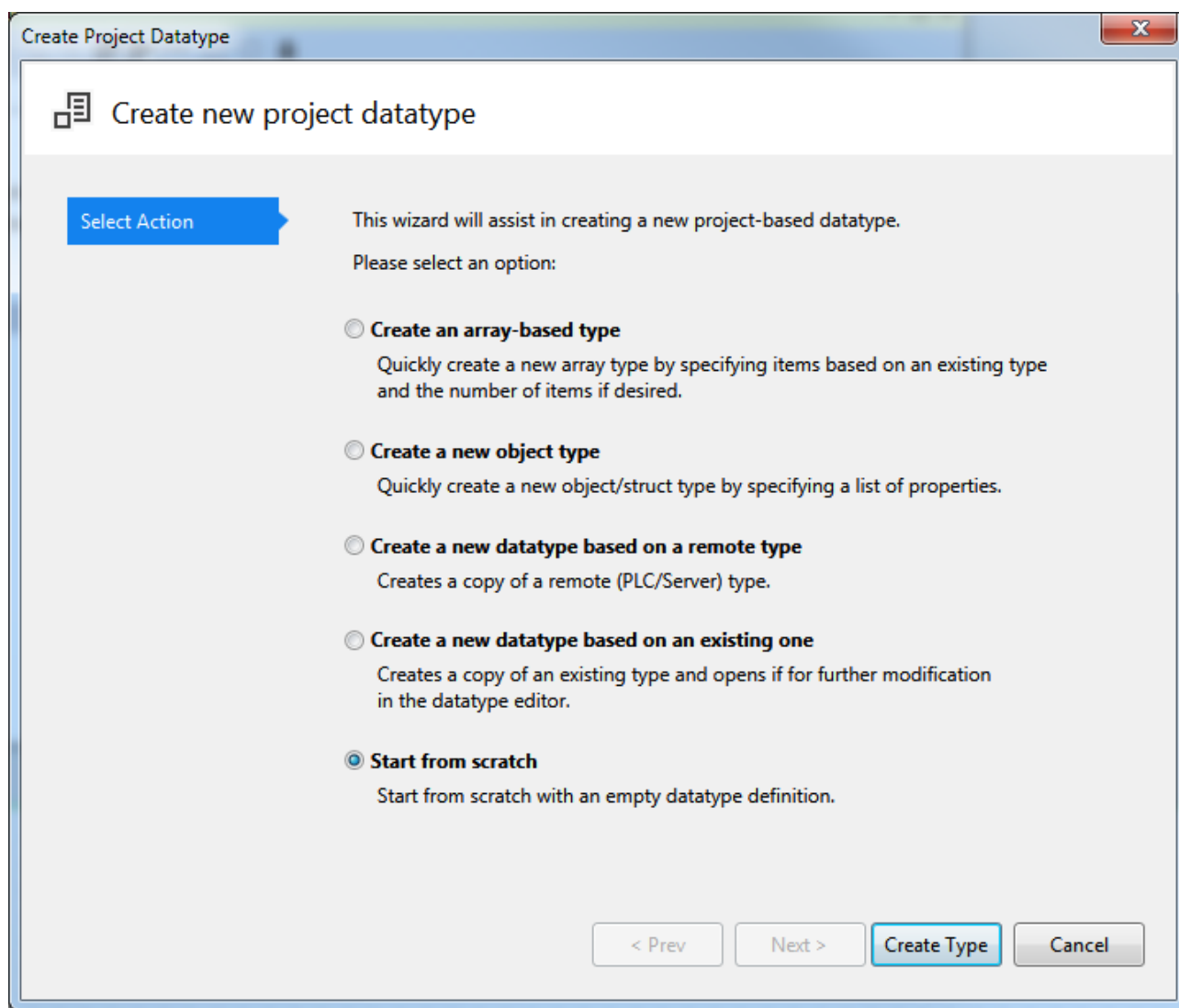
### 5.7.5.1 Creating a data type

A new user-specific project data type can be created on the **Data types** tab. To do this, right-click inside the window and select **Create new project datatype...** from the context menu.



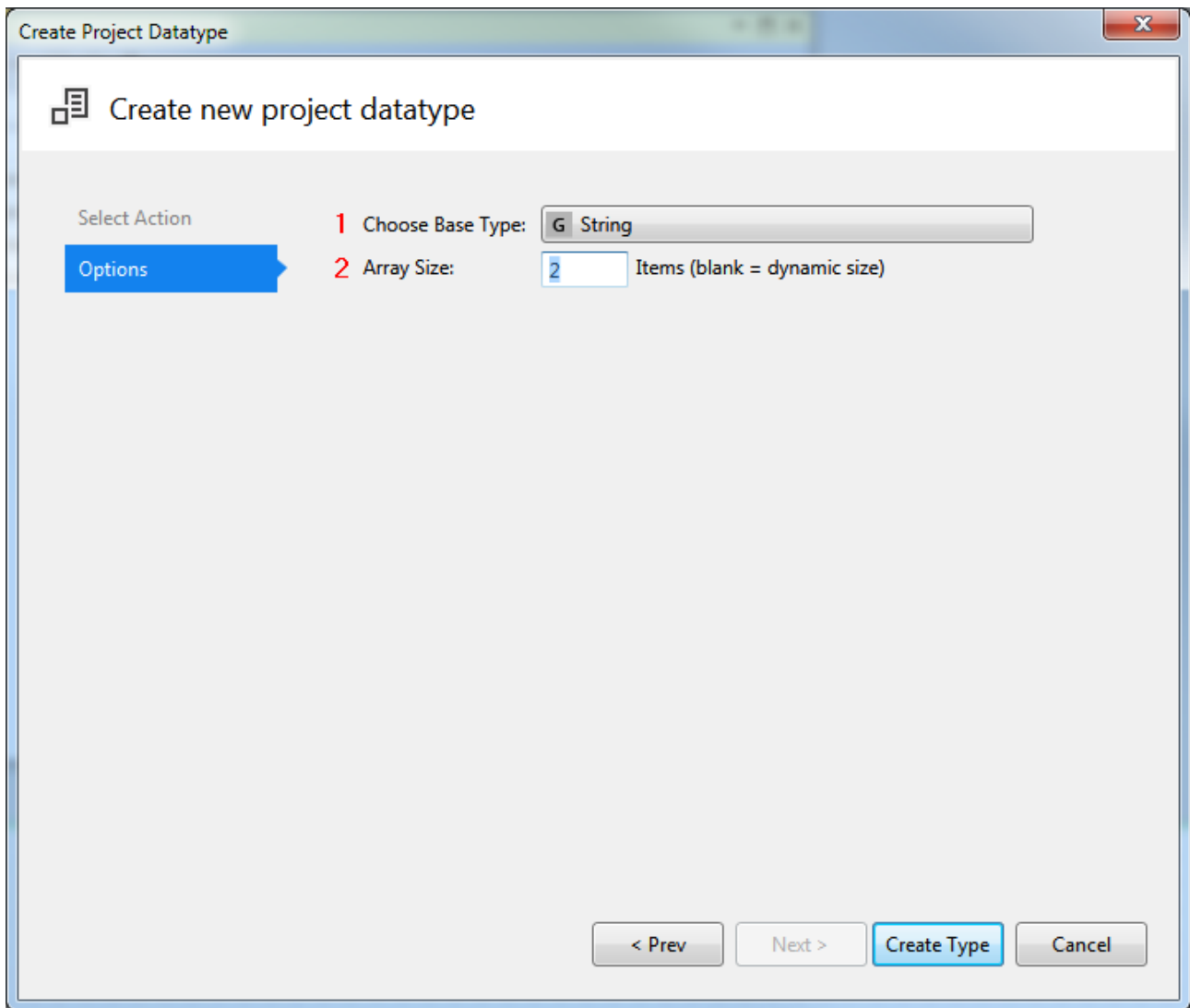


In the subsequent dialog you select the basis on which the new data type is to be created.



#### 5.7.5.1.1 Array

**Create an array-based type** creates a new project data type based on an array. The subsequent dialog configures the array:



1. **Choose Base Type:** Base data type on which the array is based.
2. **Array Size:** Size of the array. A dynamic array is generated by entering no value.

Clicking on **Create Type** opens the [Scheme Generator](#) [► 98].

#### 5.7.5.1.2 Object

**Create a new object type** creates a new project data type based on an object. Properties can be added to the object in the subsequent dialog:

Create Project Datatype

Create new project datatype

Select Action

Options

Properties:

Name <sup>1</sup>	Datatype <sup>2</sup>
Name	G String
Count	G Number

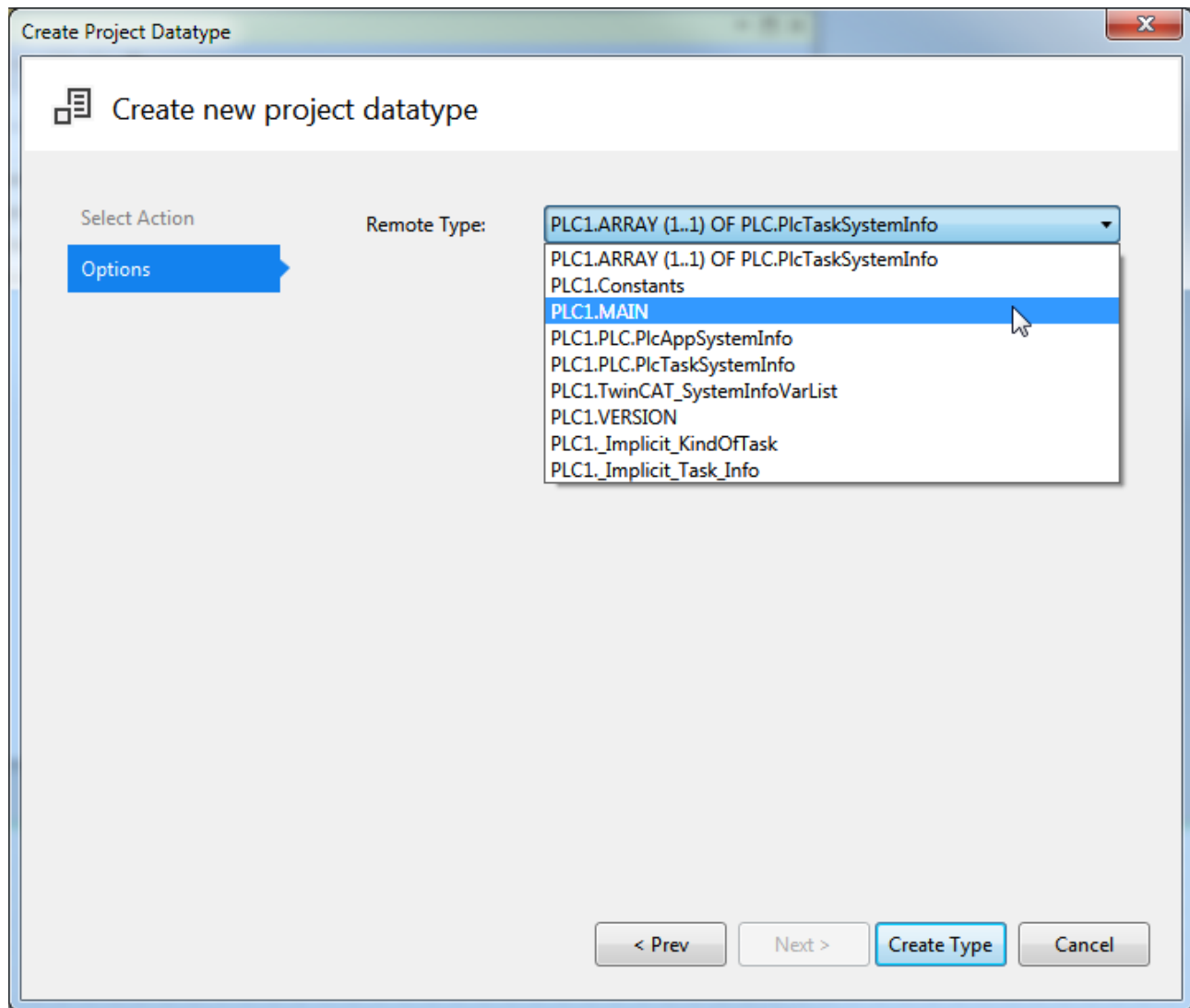
< Prev   Next >   Create Type   Cancel

1. **Name:** Name of the object property.
2. **Data type:** Data type of the property.

Clicking on **Create Type** opens the [Scheme Generator](#) [► 98].

### 5.7.5.1.3 Remote data type

**Create a new datatype based on a remote type** creates a new project data type on the basis of an existing data type on the server or a PLC. In the subsequent dialog the remote data type can be selected on whose basis the new data type is to be created:

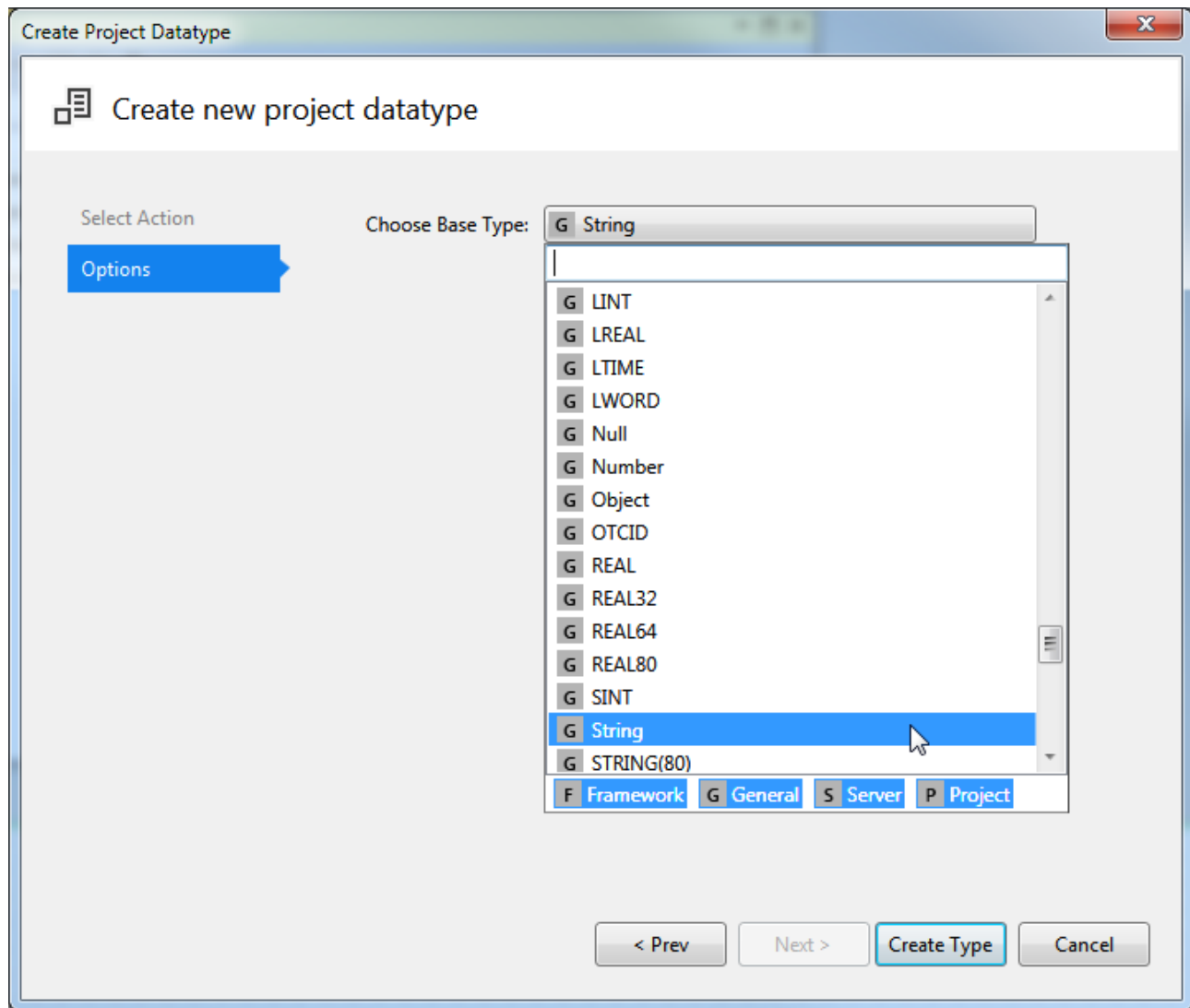


For example, function blocks from a PLC can be selected in the dialog. The data type can be created on this basis.

Clicking on **Create Type** opens the [Scheme Generator](#) [► 98].

#### 5.7.5.1.4 Expand data type

**Create new datatype based on an existing one** creates a new project data type based on any data type. This function is used to expand an existing data type. The subsequent dialog enables the selection of the data type via a combobox:

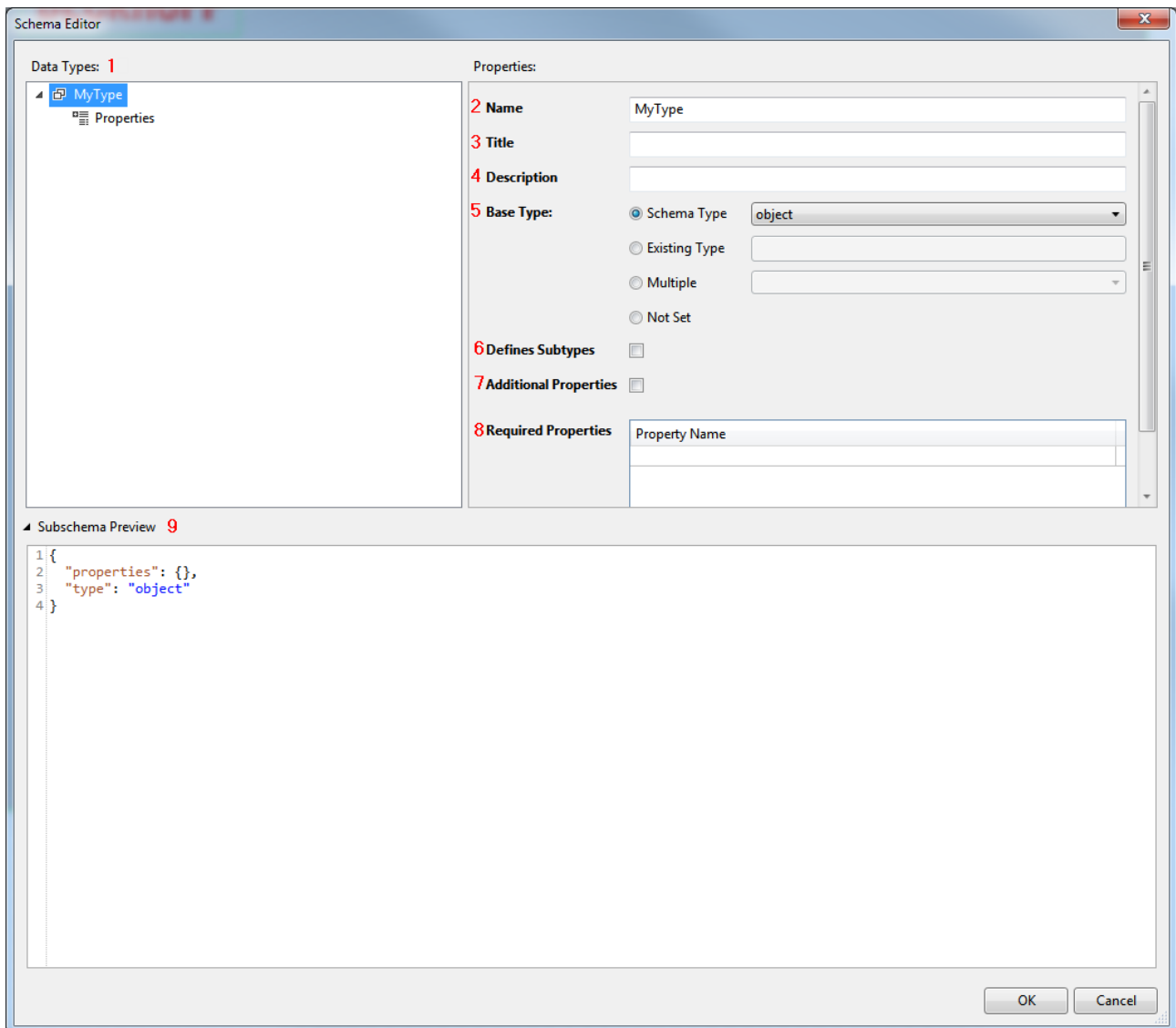


All data types including the project data types are available in the combobox.

Clicking on **Create Type** opens the [Schema Generator](#) [► 98].

#### 5.7.5.1.5 Schema Generator

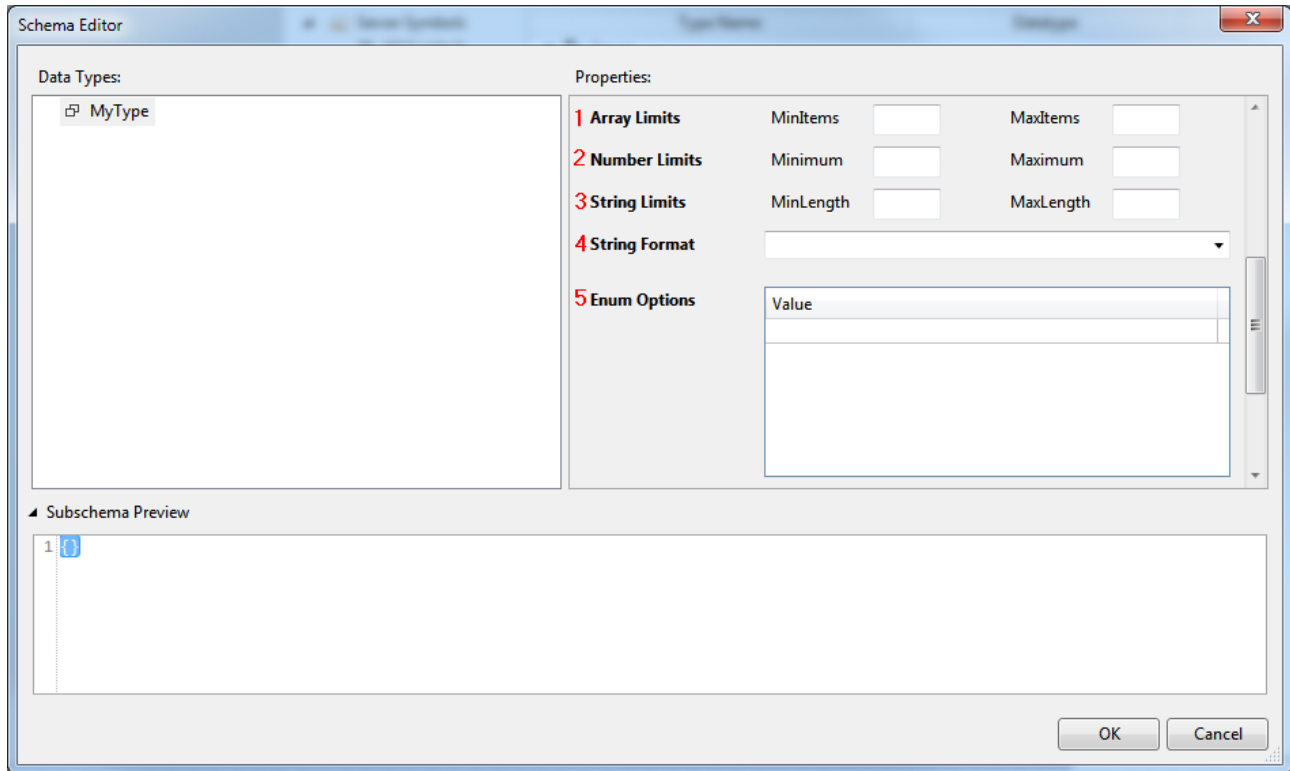
The Schema Generator is called at the completion of every process of creating a data type. In addition, it is possible to start directly with the Schema Generator if **Start from scratch** is selected.



1. **Data Type Explorer:** The Data Type Explorer displays the structure of the data type in a tree view.
2. **Name:** Name of the data type.
3. **Title:** Title of the data type.
4. **Description:** Description of the data type.
5. **Base Type:** Base data type of the data type.
  - **Schema Type:** JSON base data types.
  - **Existing Type:** Arbitrary TwinCAT HMI data type.
  - **Multiple:** Arbitrary data types with [restrictions \[► 100\]](#): AnyOf, AllOf or OneOf (see JSON documentation).
  - **Not Set:** Do not set a data type. This necessitates a manual [restriction \[► 100\]](#) of the data type.
6. **Define Subtypes:** Enables the definition of subtypes within the schema. A subtype is a user-specific data type within the user-specific data type.
7. **Additional Properties:** Adds optional properties to the data type. Optional properties enable the addition of further properties that are not required, but are validated (see JSON documentation).
8. **Required Properties:** Defines all properties that are required. One property is entered per row. The data type is not valid if it is lacking a required property.
9. **Subschema Preview:** Provides a preview of the generated schema of the selected node in the Data Type Explorer.

### 5.7.5.1.5.1 Restricting a data type

If "Multiple" or "Not Set" is selected as the base data type, additional fields are shown in the Properties area of the Schema Editor. The additional fields enable the restriction of the data type.

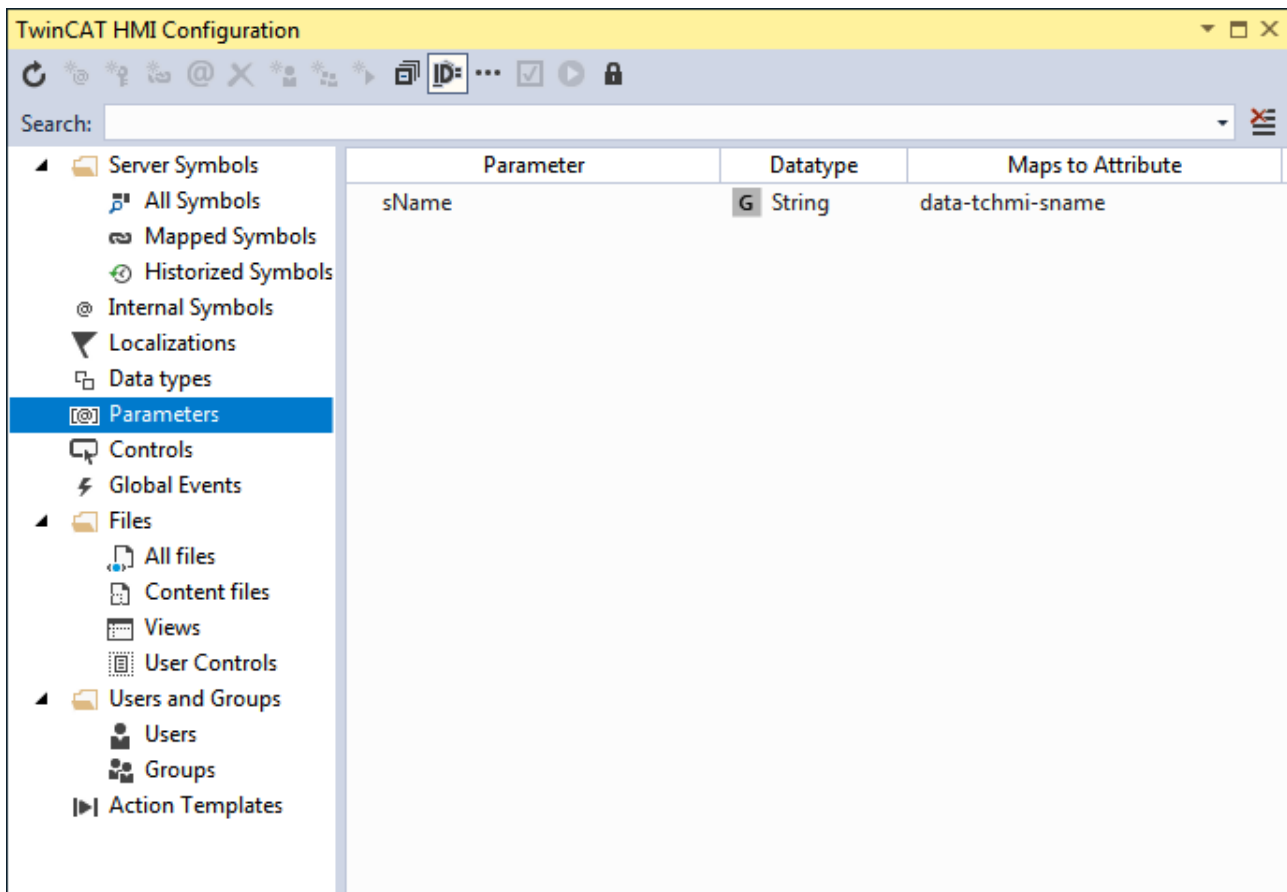


1. **Array Limits:** Defines a minimum and maximum array length.
2. **Number Limits:** Defines minimum and maximum limits for a numerical value.
3. **String Limits:** Defines a minimum and maximum length for a string.
4. **String Format:** Defines the format of a string.
5. **Enum Options:** Defines an enumeration and its entries. One entry is made per row.

## 5.7.6 Parameter

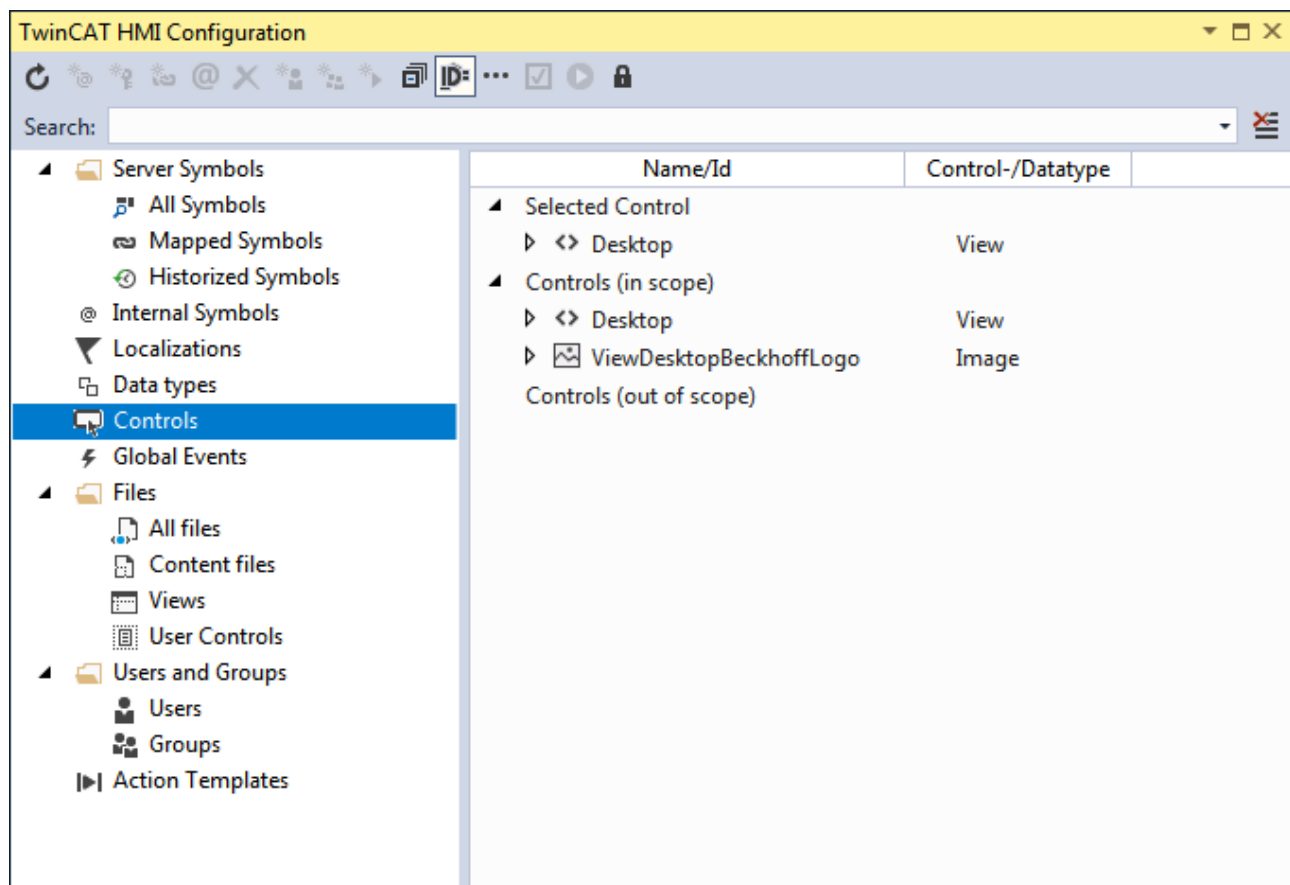
Parameter lists all the parameter values of a User Control. The Parameter category is visible only if a User Control has the focus.





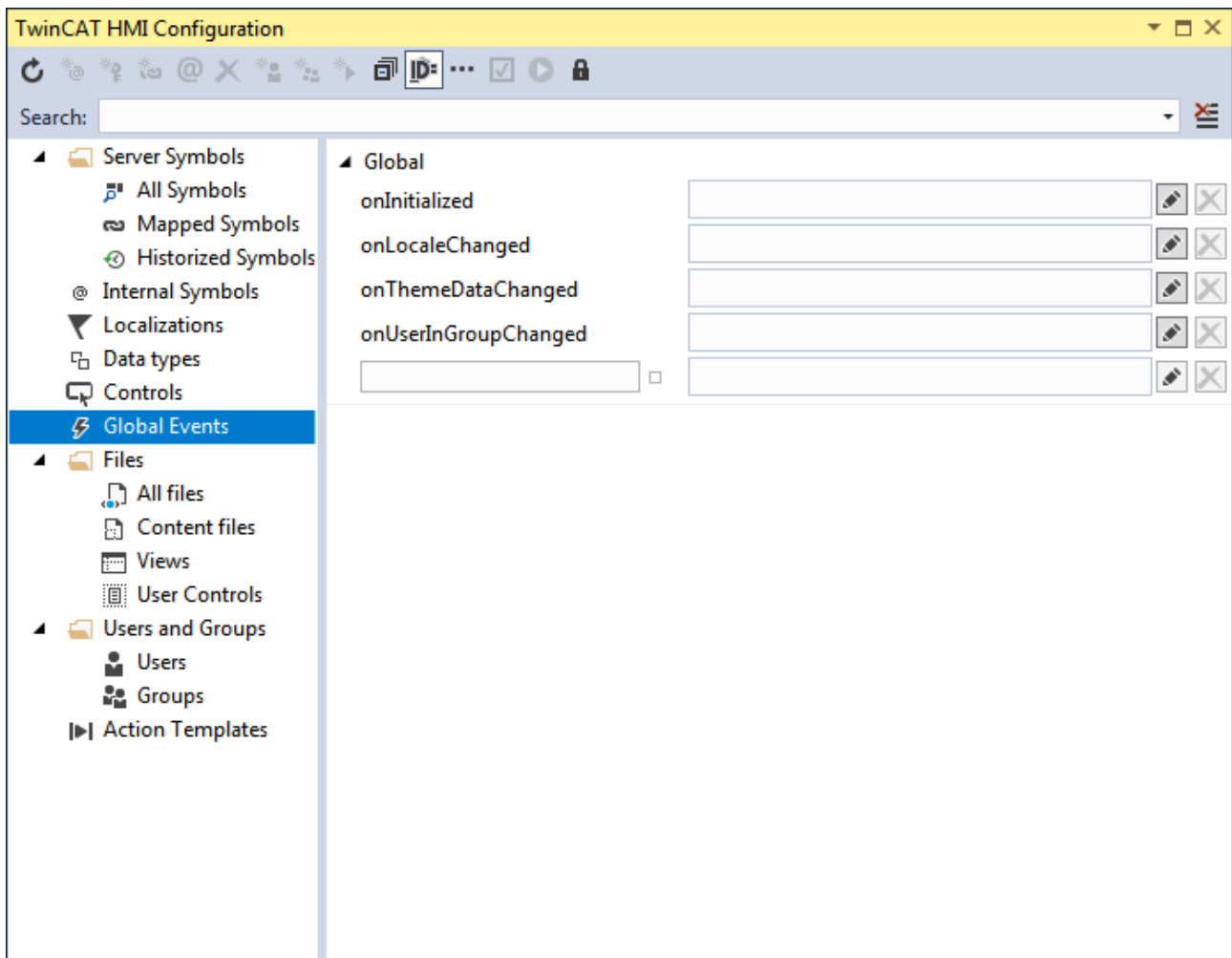
### 5.7.7 Controls

Controls lists all available controls (instanced controls) and offers the option of inserting the properties of the controls into other editors by drag-and-drop.



### 5.7.8 Global Events

Global Events lists all events of the TwinCAT HMI that can neither be assigned to any control nor to any HMI page.

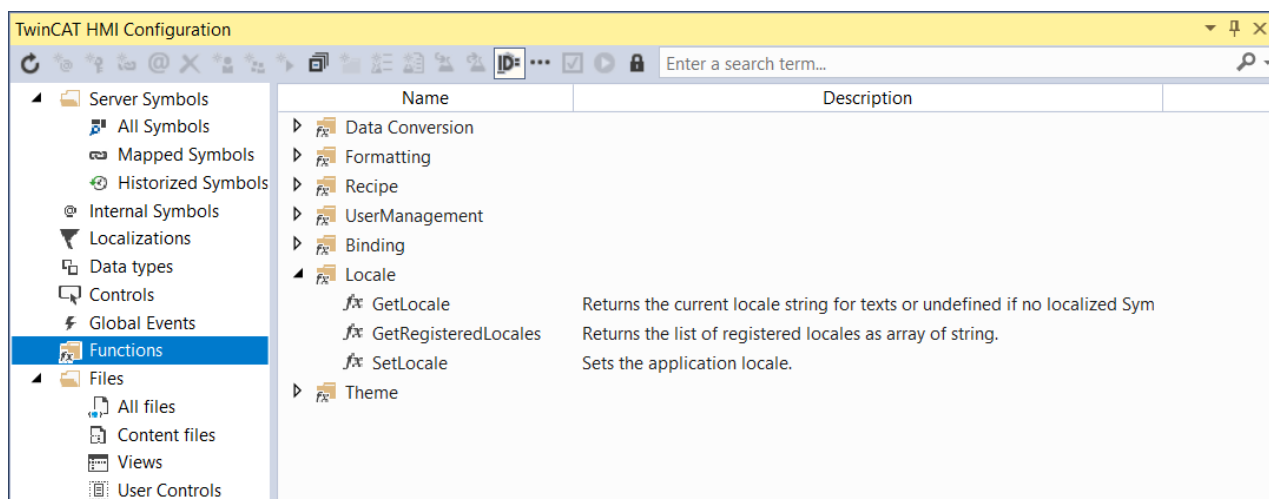


#### Global Events:

- **onInitialized:** The event is triggered as soon as the system has been initialized and the main control (View) is loaded. Other controls may not be loaded or visible at this time.
- **onLocaleChanged:** The event is triggered as soon as a language has been loaded.
- **onThemeDataChanged:** The event is triggered as soon as all JSON and CSS files have been loaded following a change of theme. Furthermore the event is triggered as soon as a new font has been loaded.
- **onUserInGroupChanged:** The event is triggered if the group membership of the current user is now known to the system or has changed.

### 5.7.9 Functions

The functions list all functions available in the project. These include the functions [provided by \[► 924\]](#) TwinCAT HMI and the [user-specific functions \[► 1466\]](#).

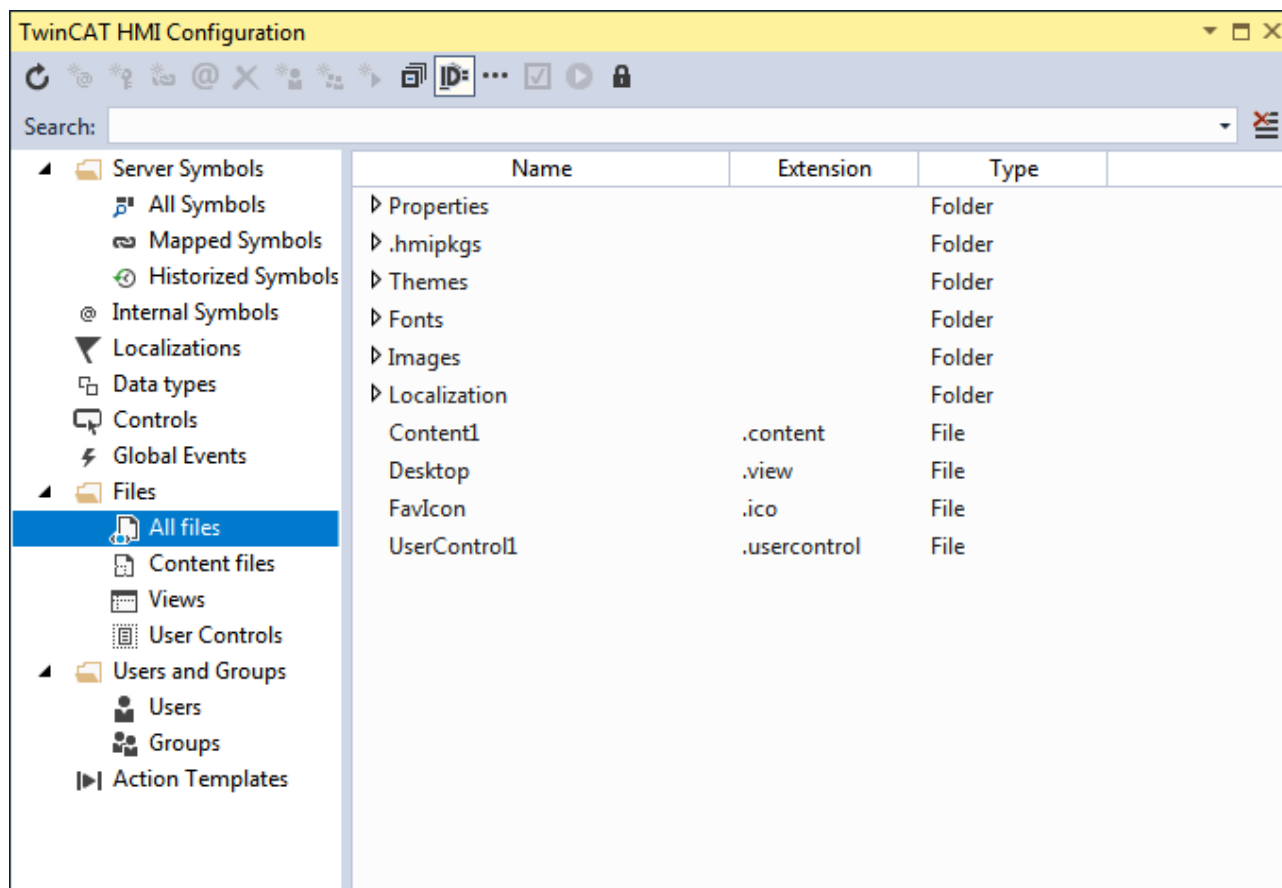


## 5.7.10 Files

Files lists the files used in the project, categorized according to the project folders.

### 5.7.10.1 All Files

Lists all available files of the TwinCAT HMI project.



### 5.7.10.2 Content Files

Lists all content files (pages) of the project.

### 5.7.10.3 Views

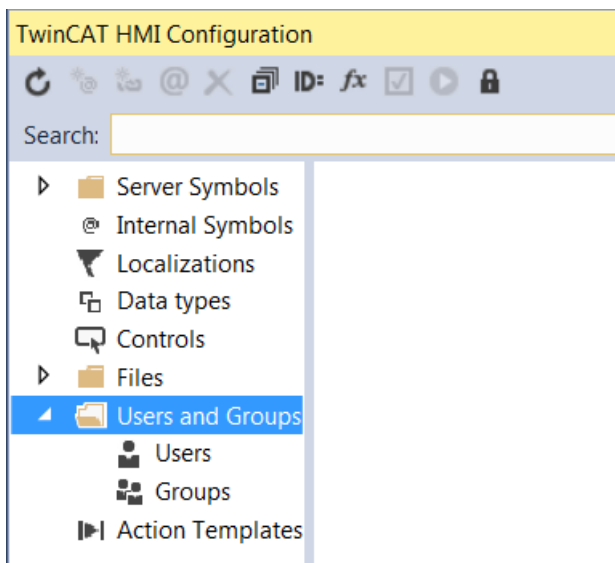
Lists all views of the project. A view is the parent element of an HMI. The StartView can be set in the [Project properties](#) [► 53].

### 5.7.10.4 User Controls

Lists all User Controls in the project.

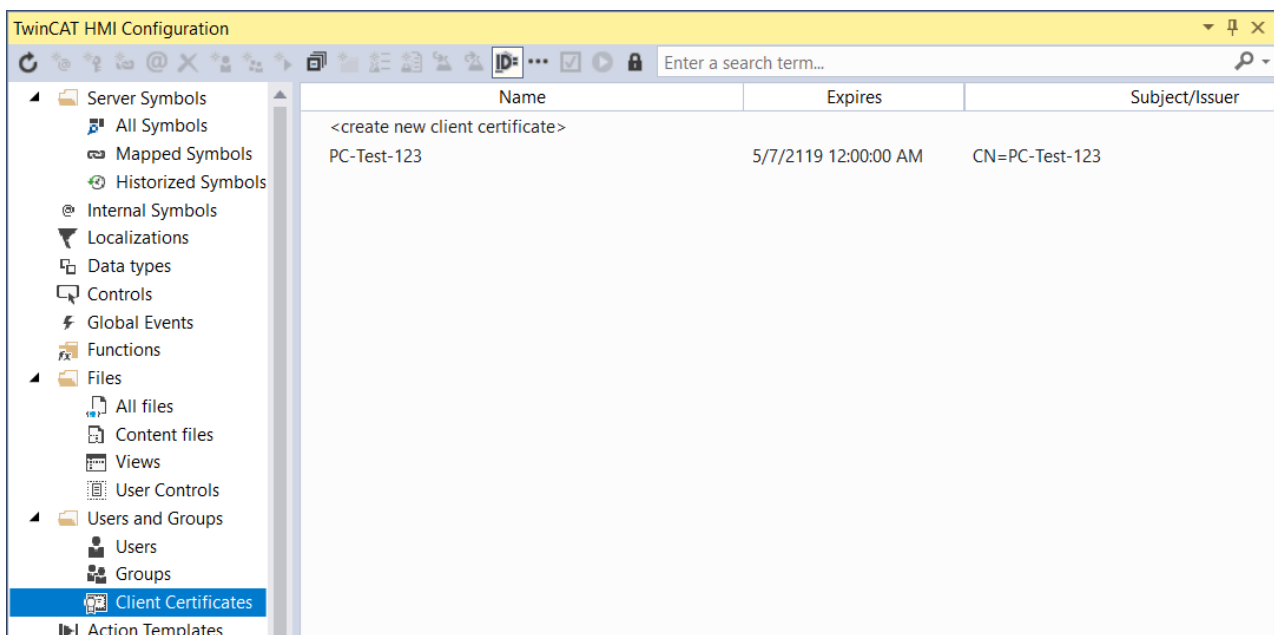
## 5.7.11 Users and user groups

Lists all available users and user groups. Explanations of the configuration can be found in [User Management](#) [► 963].



## 5.7.12 Client certificates

The client certificates list all client certificates that are stored in the project. The creation and use of the client certificates are described in the [user management](#) [► 986].

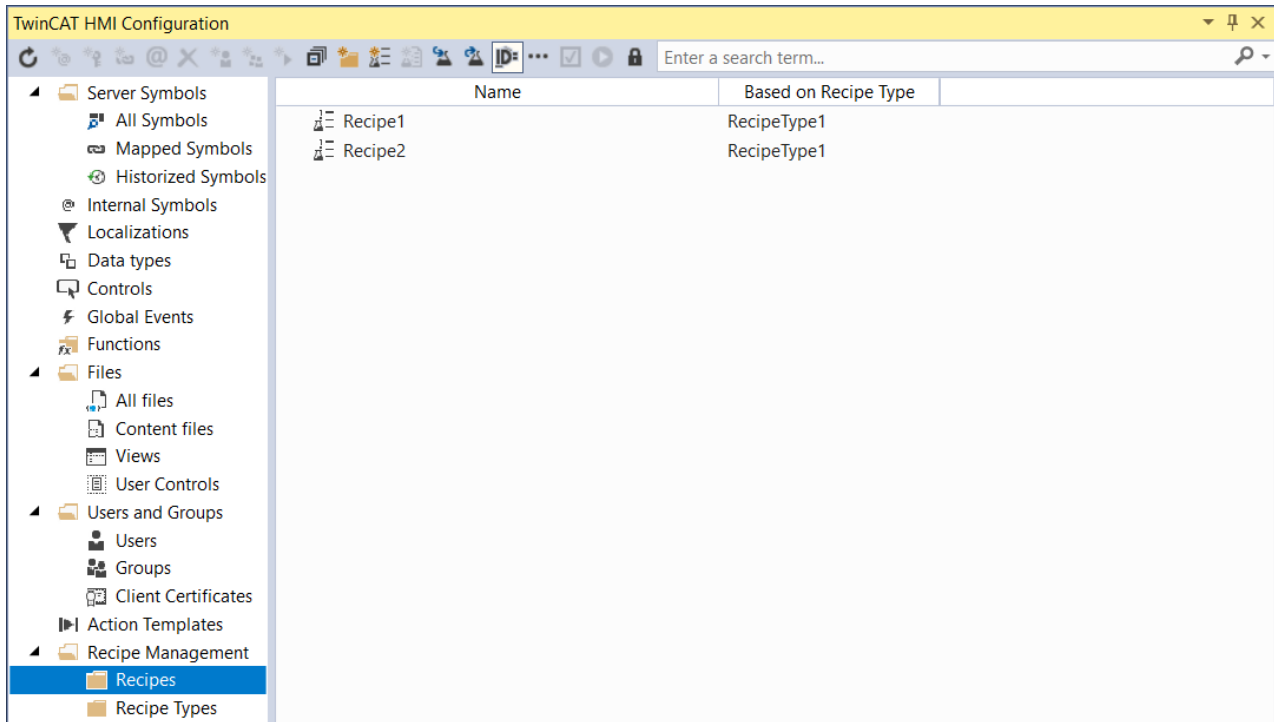


## 5.7.13 Action Templates

Action Templates lists all [Action Templates](#) [► 71] used in the project.

## 5.7.14 Recipe management

The [recipe management](#) [► 1155] contains all recipes and recipe types that have been configured for the project. With a double click on a recipe or a recipe type the corresponding [editors](#) [► 1159] of the recipe management are opened.

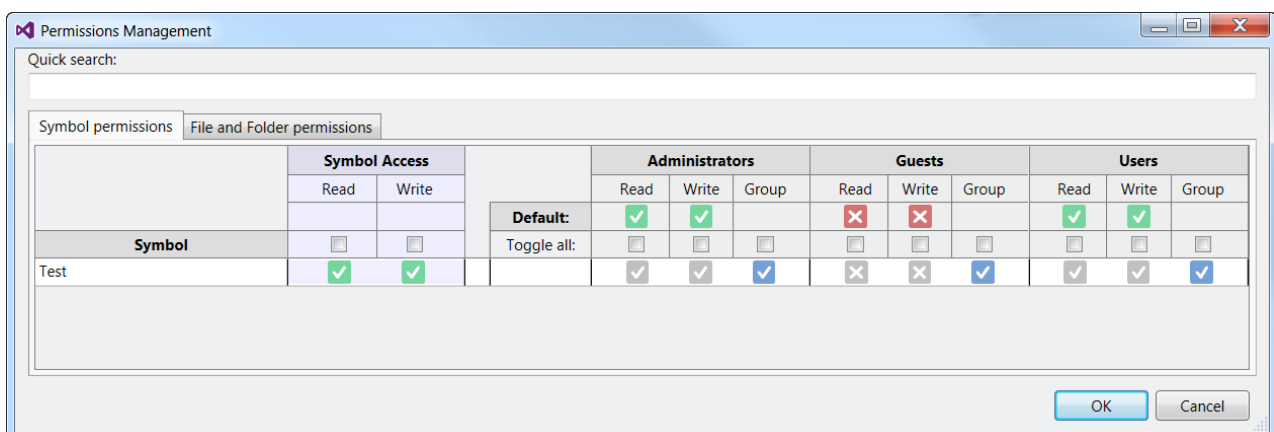


## 5.7.15 Permissions Management

The permissions management enables the configuration of the [rights](#) [► 963] for all project elements.



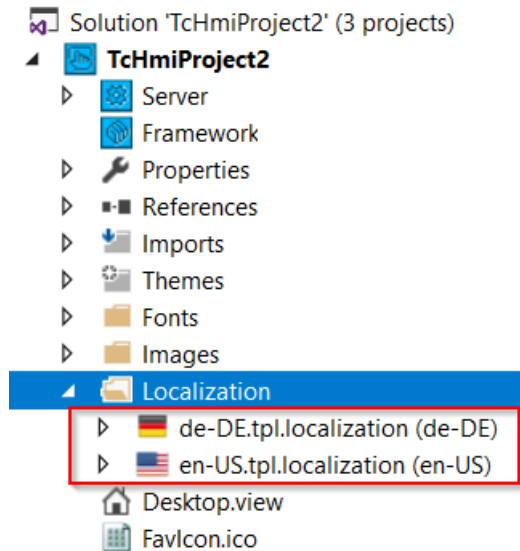
Edit permissions: This button opens the permissions management for the project elements.



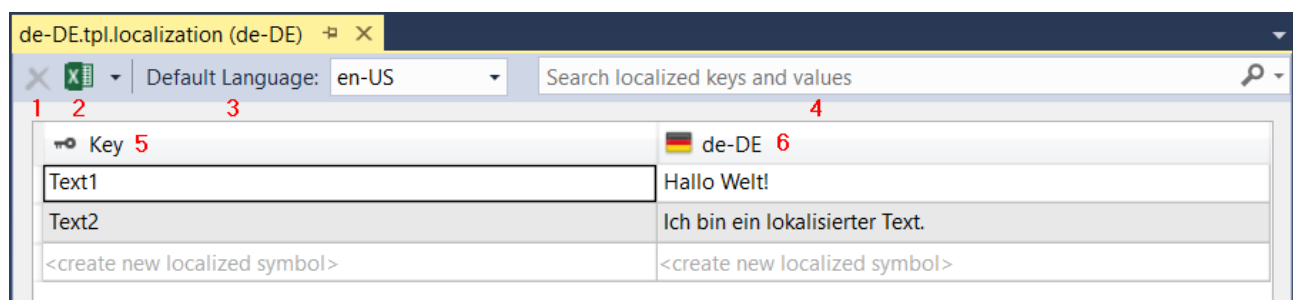
Further information on rights can be found in the chapter [Rights system](#) [► 969].

## 5.8 Localization editor

You can open the Localization editor in the Solution Explorer by double-clicking on the respective language file.



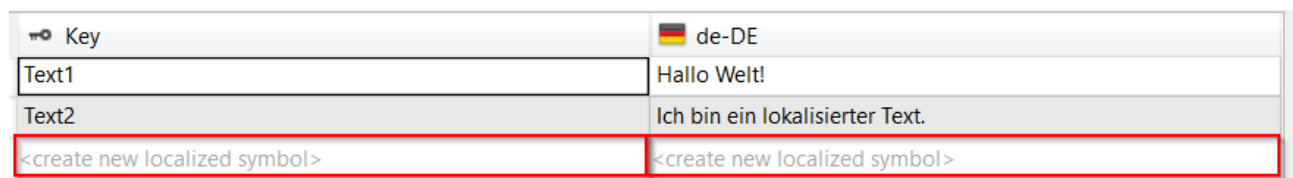
The Localization editor enables the editing of language files.



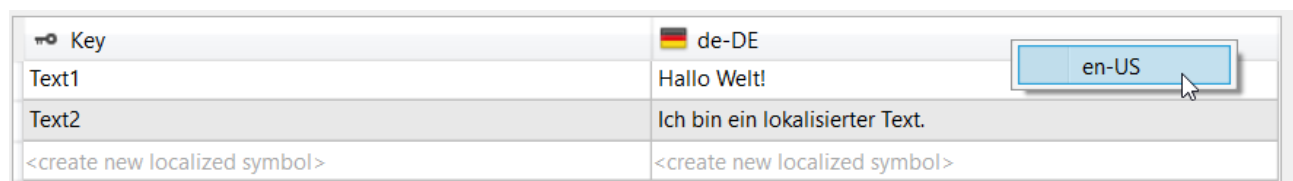
1. Removes a selected entry (key and language entry) from the language table.
2. Export or import the Excel table or CSV.
3. Defines the default language in the HMI project.
4. Search for keys or language entries.
5. The key must be unique and is linked with a control in the Designer at a later date. The language entry of the currently active language is then automatically displayed.
6. The language entry contains the text for the key.

### Adding a new language entry

To create a new localization entry, click in the last row of the table on **create new localized symbol**. A unique key must exist for each entry.

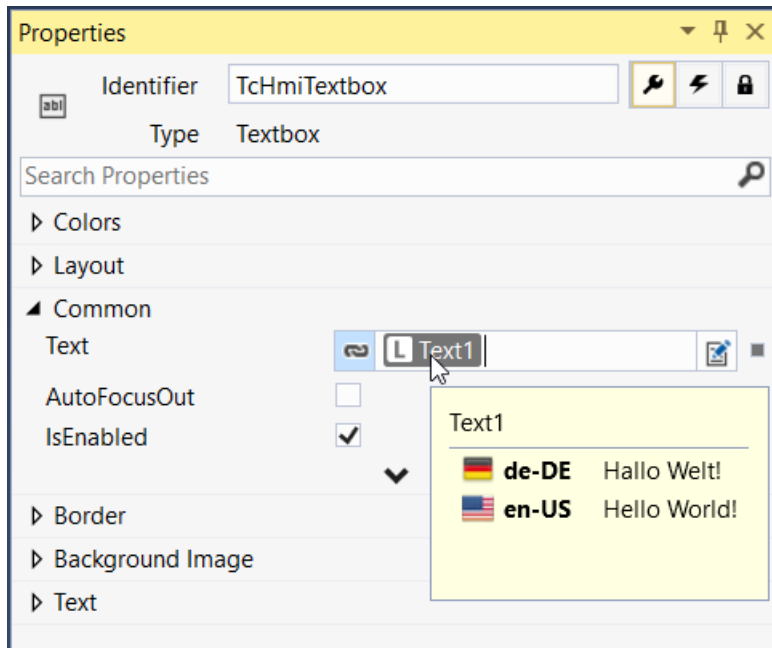


Further languages can be displayed via the context menu of the table.



It is not possible to edit the additionally displayed language in this table. To do that you have to open the respective table for the language.

In the Designer you can link the language key directly to the property of a control as a symbol. The language symbols are marked by an "L". When hovering with the mouse pointer over a language symbol, the corresponding language entries are displayed.

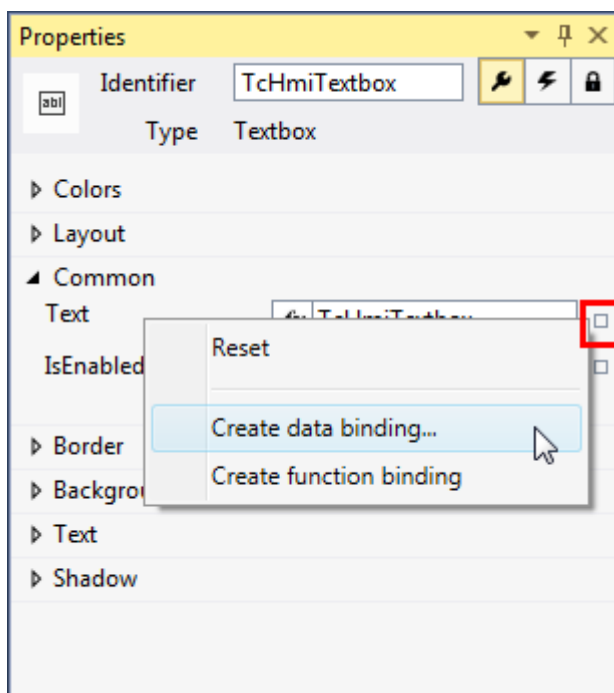


## 5.9 Symbols and Bindings

A binding links any symbol to a [property \[► 60\]](#) of a control. A binding automatically updates the property of the control when the value of the symbol changes.

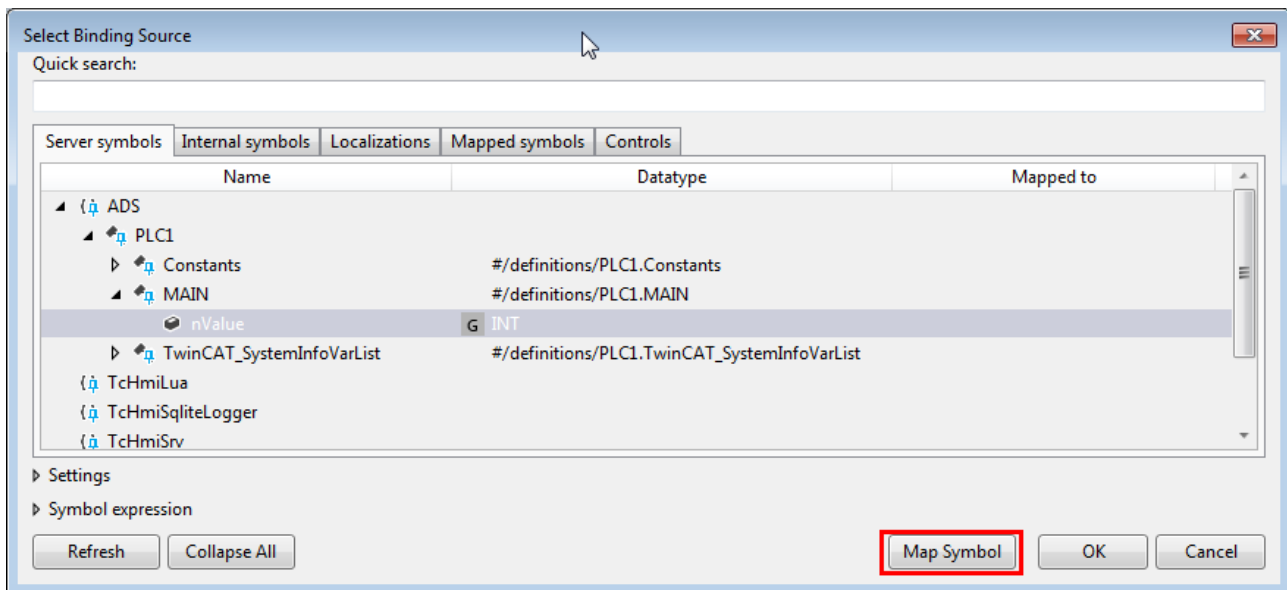
### 5.9.1 Create binding

Under [Properties \[► 60\]](#) you can configure a binding by clicking the  symbol.

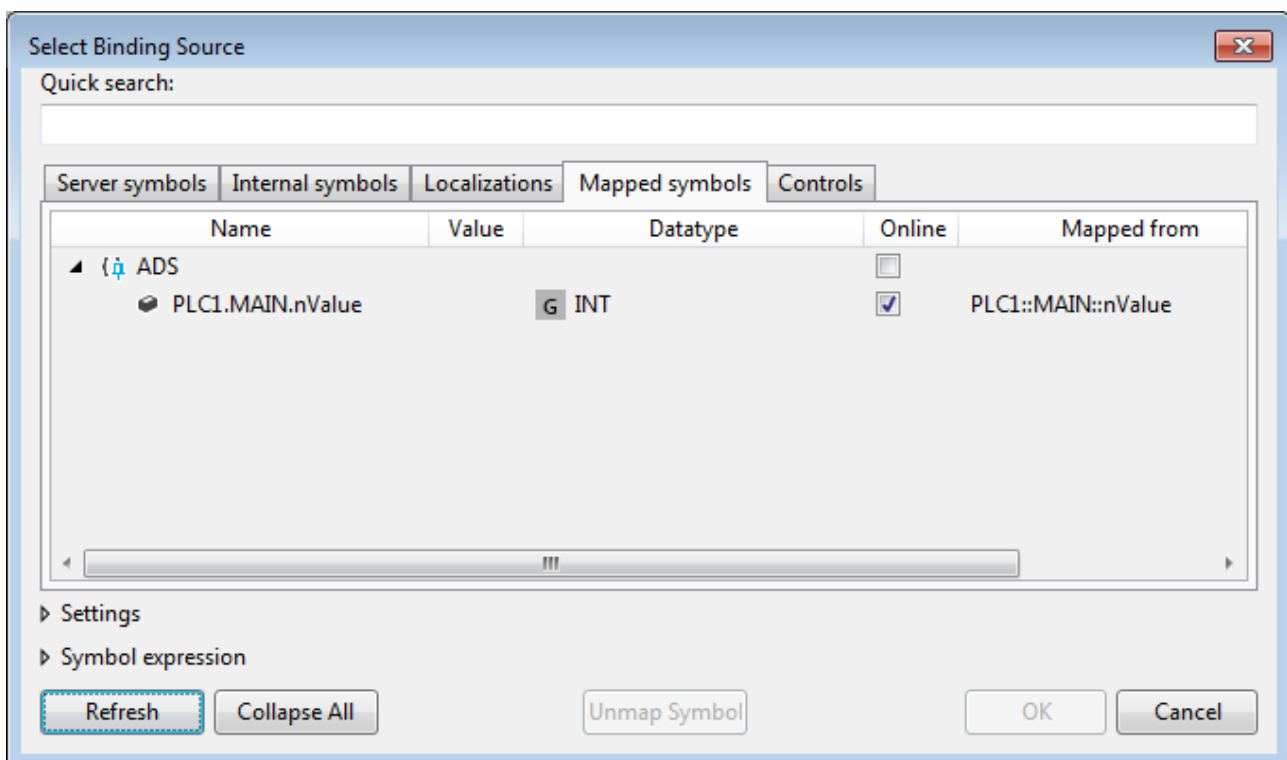




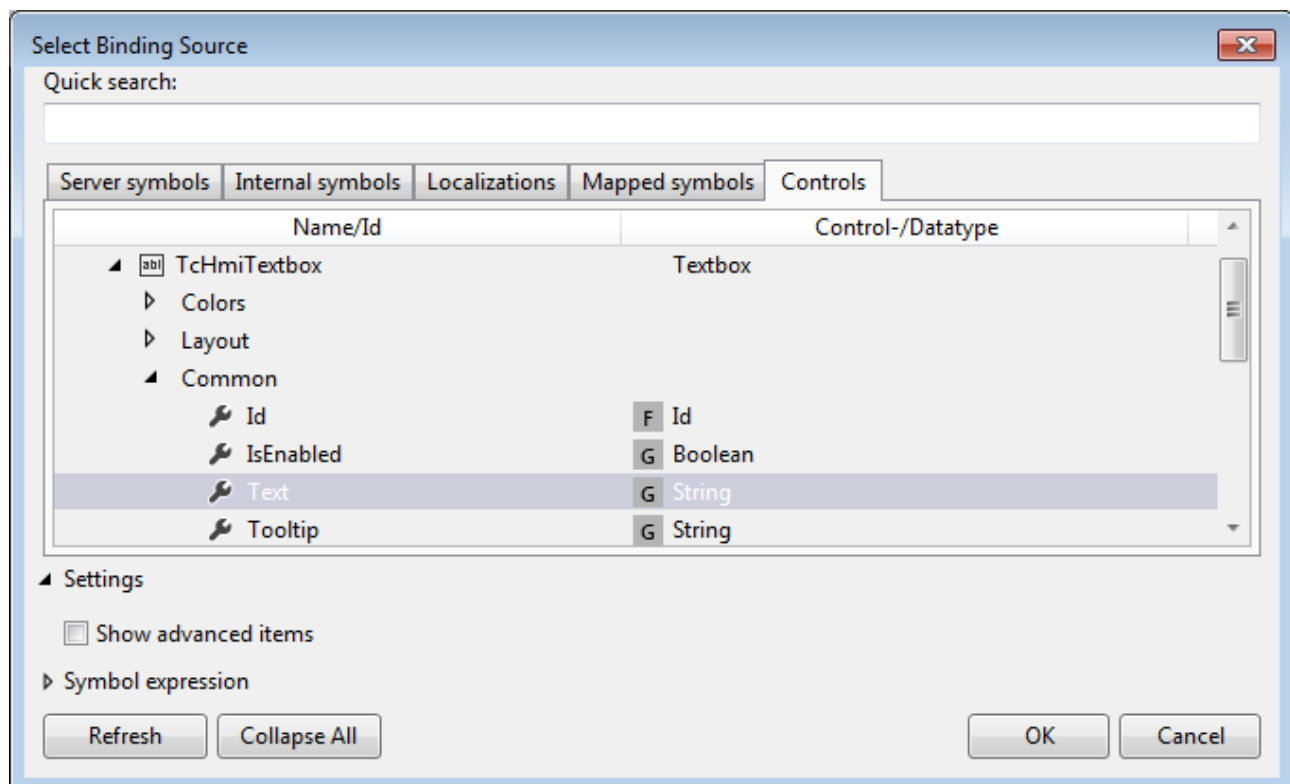
The Select Binding Source dialog displays all available symbols, categorized by symbol type. Server symbols must be mapped before they are bound to a control property. The mapping is created by clicking the **Map Symbol** or automatically by clicking **OK**.



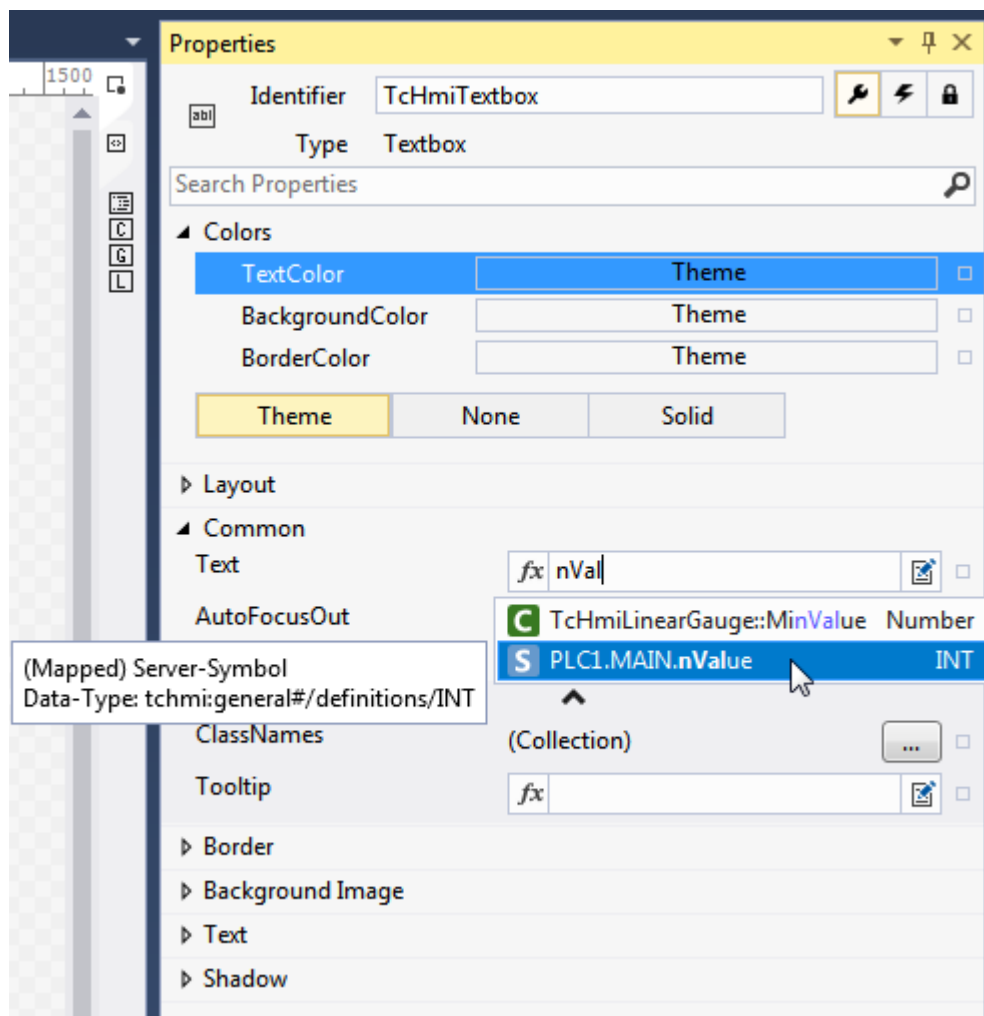
The mapped server symbols are available under **Mapped symbols** after the mapping has been created.



Besides internal variables and localization symbols, properties of other controls can also be bound (e.g. the current text of a text box [► 639]).



Alternatively, the symbols in input fields can be bound directly to a property of a control using auto-completion.



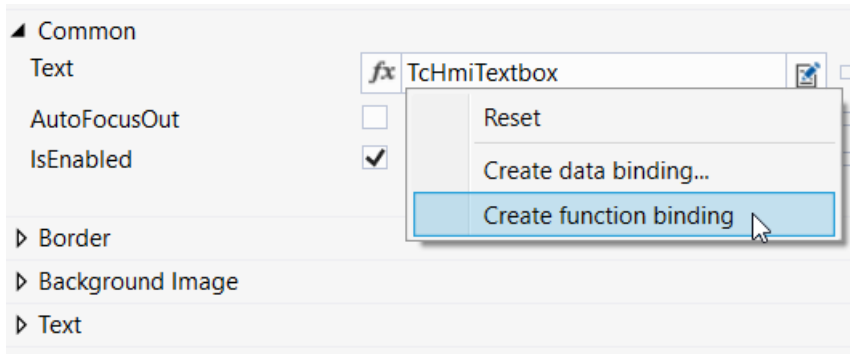


Available from version 1.10.

## 5.9.2 Create function binding

In addition to variable bindings, a function binding can be created. A function binding can be created for all control properties, if the JavaScript functions return a suitable value for the property of the control. A function binding can be used for [conversions](#) [► 1469], for example.

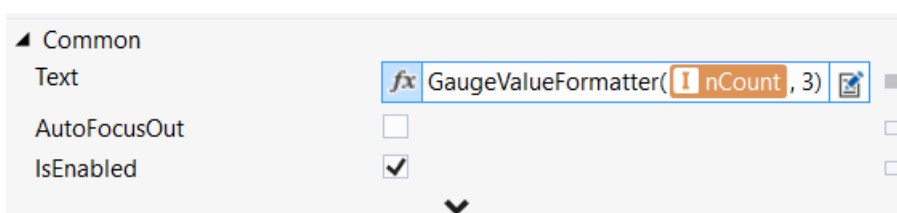
A function binding is created with the **Create function binding** command.



An active function binding is identified by **fx** highlighted in blue.



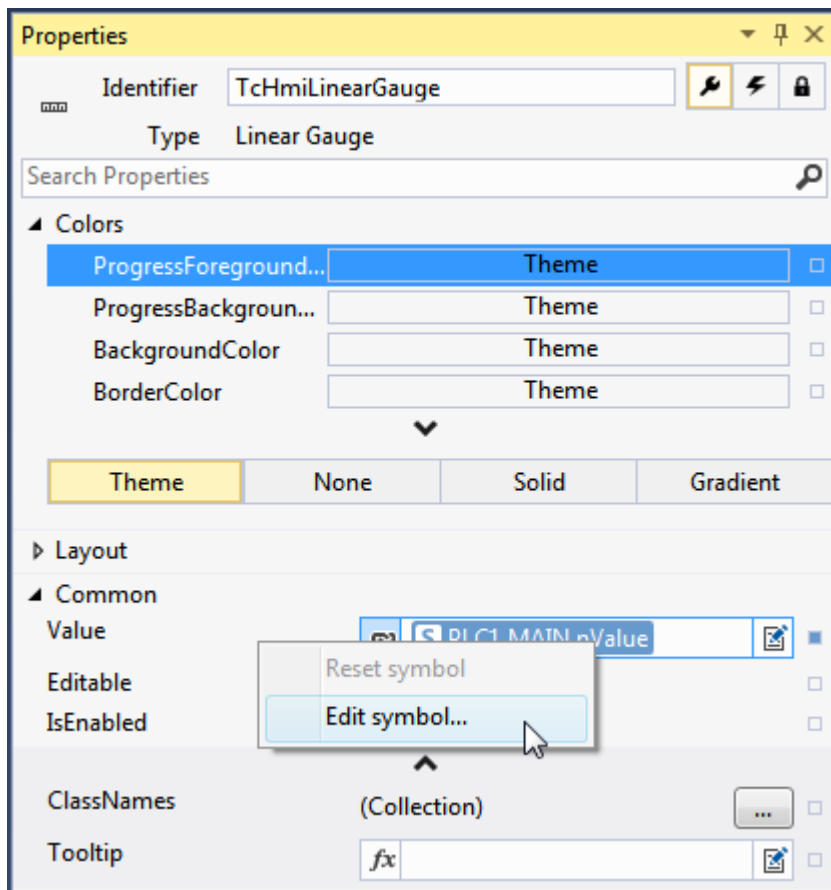
The parameter values of the function are transferred directly in the Properties window.



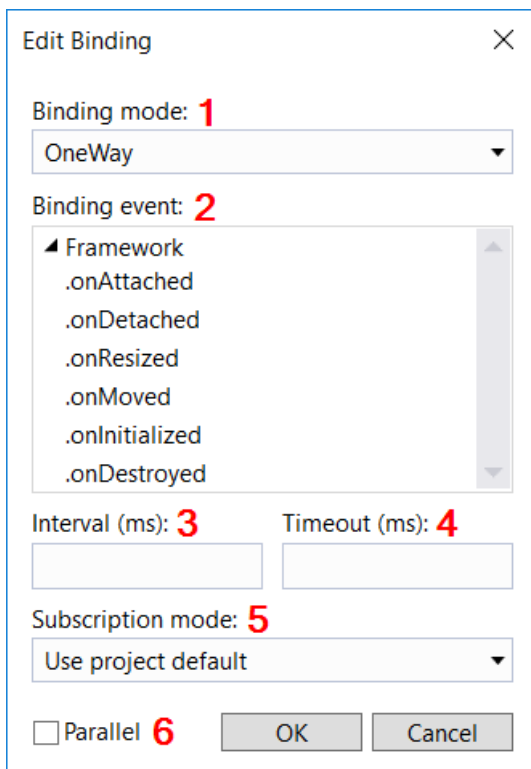
In addition, it is possible to implement custom JavaScript functions and create a function binding for them. Further information can be found [here](#) [► 1466].

## 5.9.3 Configure binding

A binding created for a property of a control can be configured via the Edit Binding dialog. The dialog can be opened by right-clicking or double-clicking on the bound symbol.



The Edit Binding dialog offers various configuration options, depending on the symbol type:



**1 Binding mode:** Binding mode determines whether the binding acts in one direction or in both directions.

- **One-way binding** (read-only): The value of the symbol is read.
- **Two-way binding** (read and write access): The value of the symbol is read and the symbol is written when a specific event is triggered.

**2 Binding event:** The binding event can only be optionally configured for TwoWay bindings. It determines at which event the symbol is written to (e.g. [onValueChanged](#) [► 456] for a [linear gauge](#) [► 432]). If no event is selected for a TwoWay binding, the value is automatically written back if the value changes.

- **Event:** An event of the current control for which the symbol is to be written to.

**3 Interval:** The interval specifies the time within which the binding is to be queried or updated. The interval can only be set for server symbols.

- **Time (ms):** Time in milliseconds.

**4 Timeout:** The timeout defines the time after which a read or write access to the symbol leads to an error if no response is sent from the server. The timeout can only be set for server symbols.

- **Time (ms):** Time in milliseconds.

**5 Subscription Mode:** Update mode between server and client.

- **Use project default:** The global setting is used, which is defined in the [project properties](#). [► 53]
- **Change:** The client is only informed of changes to the symbol value.
- **Poll:** The client receives the symbol value cyclically, even if no value change has taken place.

**6 Parallel:** This property defines whether a command is to be executed by the server in parallel or in a queue. The decision whether processing is to take place in parallel or in a queue depends on the respective application. By default, all commands are executed in a queue. This property can only be set for server symbols.

- **Parallel (disabled):** All commands to the server are queued and processed one after the other. Execution may take a little longer if there are several commands in the queue.
- **Parallel (enabled):** The commands are sent directly to the server without being queued. The commands are executed directly. With this option, it can happen that the execution order of commands sent in short succession is switched.

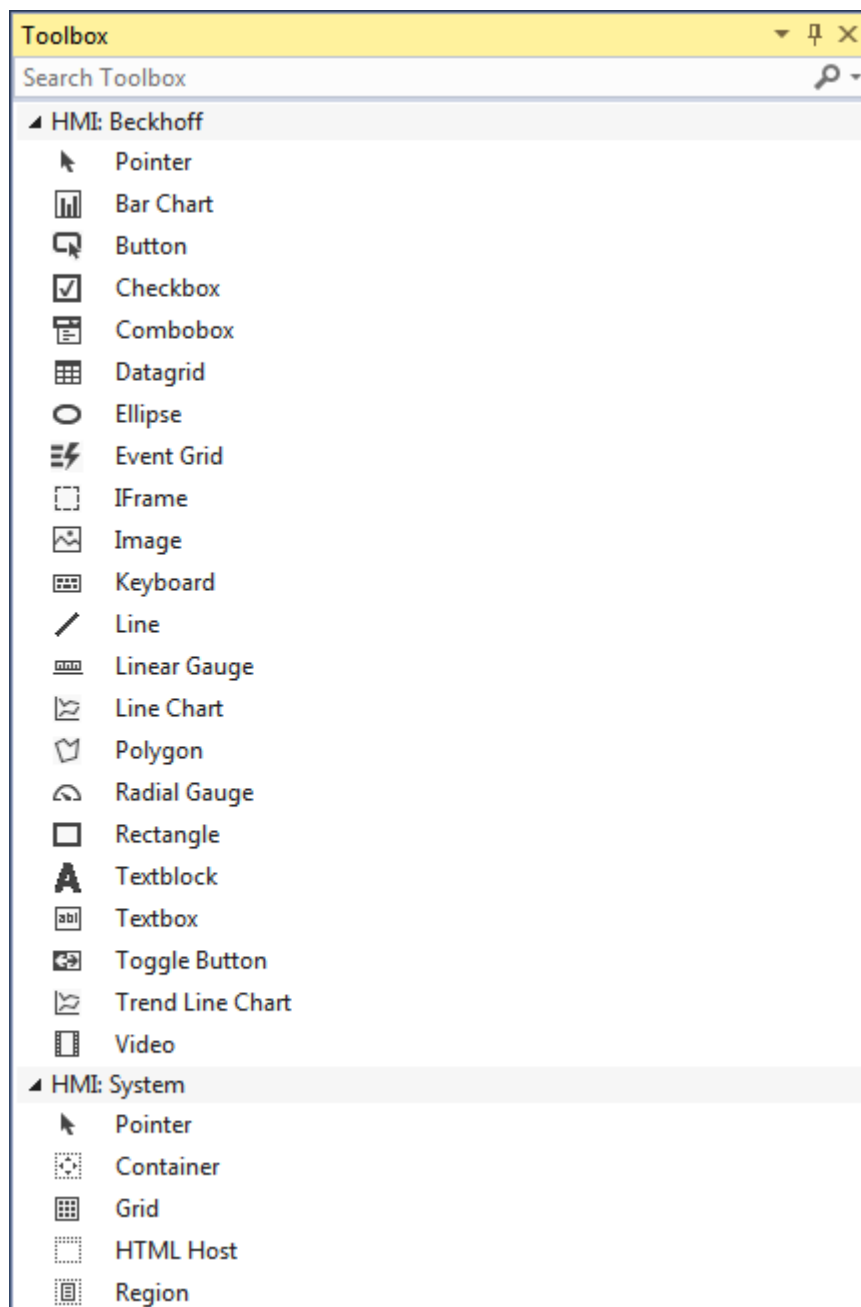


Available from version 1.10.

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## 5.10 Controls

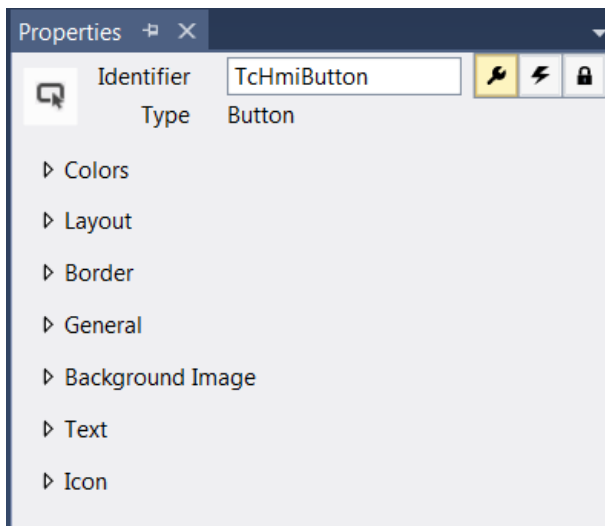
A predefined set of controls is supplied in the toolbox with the TwinCAT HMI:



## Properties


Each control can be equipped with various properties. The properties are set in the **Properties** under the

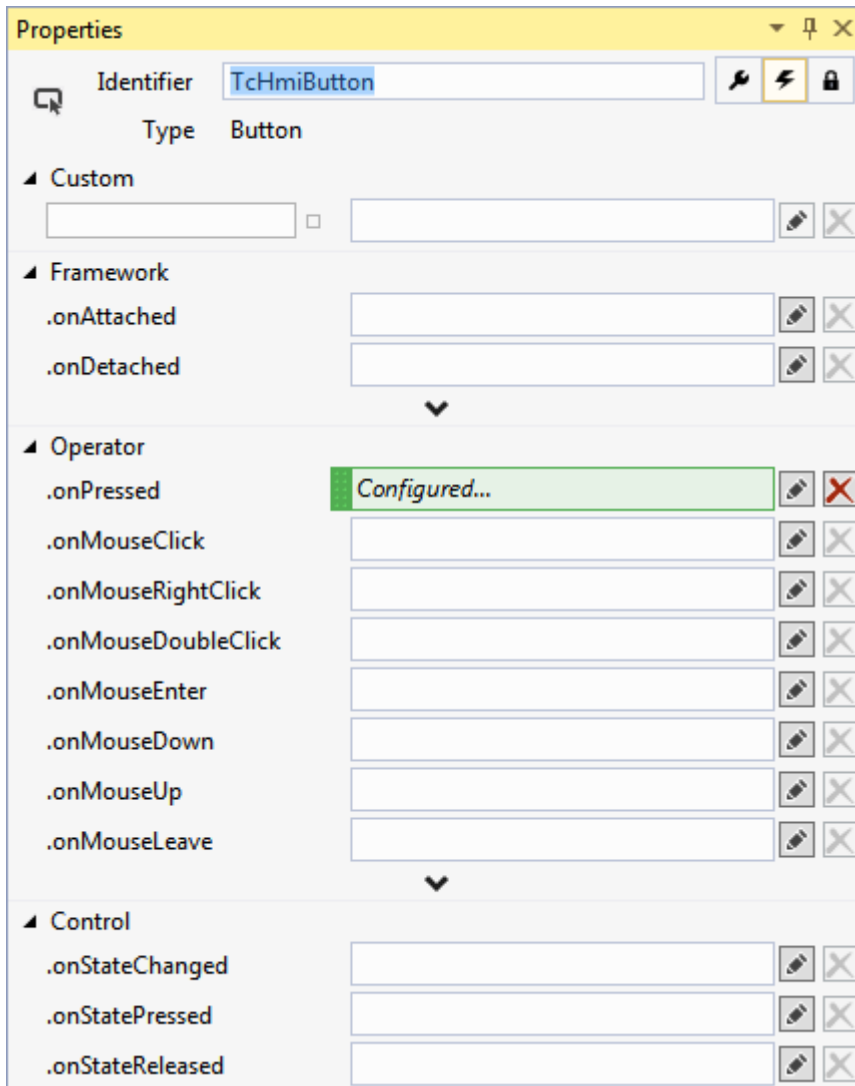
icon  .



## Events

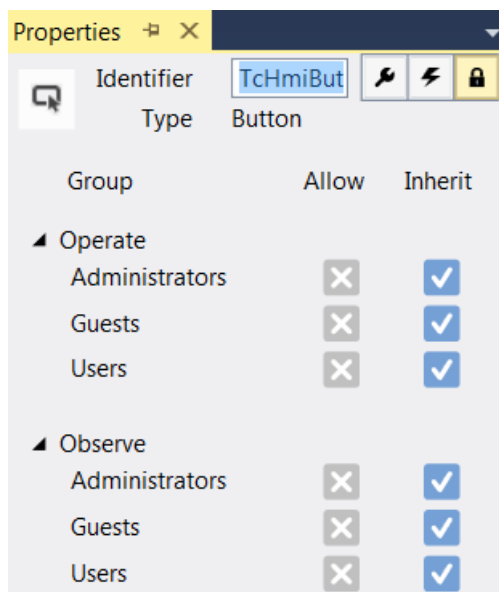
Each control can trigger different actions on the occurrence of various events. These actions are configured

in the **Properties** under the icon .



## Rights

The [rights management](#) [► 855] for each control can be found in the **Properties** under the icon .



### 5.10.1 General configuration

Various generally valid configurations or editors are described in this chapter.

#### 5.10.1.1 Positioning and calculation of the size of controls

The TwinCAT HMI offers various options for the positioning and calculation of the size of controls. In general, each control is always defined by its position inside its container. In the standard settings these are the values for [Left](#) [► 760] and [Top](#) [► 761] combined with [Width](#) [► 761] and [Height](#) [► 762]. These four values are specified in the unit pixel (px). If percent (%) is specified as the unit for these values, then the size of the parent control is used as a reference. A control with 50% width is thus half as wide as its parent control.

The influence of the different attributes on the size of the control is defined with the aid of the attributes [WidthMode](#) [► 762] or [HeightMode](#) [► 763]. All controls have the *Value* and *Parent* modes. Many controls additionally offer the *Content* mode. The attributes necessary for the modes are listed in the following tables. The various separators have the following meanings:

- „,“: both attributes can be used.
- „&“: both attributes must be used.
- „|“: one of the two attributes must be used.

Value (Standard)	Width, Height	Left, Right	Top, Bottom
Parent	-	Left & Right	Top & Bottom
Content	-	Left   Right	Top   Bottom

#### Value

The Value mode is configured as the default together with the aforementioned attributes Left, Top, Width and Height. However, an arbitrary combination of any two of the three possible attributes in the horizontal and vertical direction is possible in order to define the position and size of a control:

- [Left](#) [► 760] (including [LeftUnit](#) [► 760])
- [Width](#) [► 761] (including [WidthUnit](#) [► 762])
- [Right](#) [► 763] (including [RightUnit](#) [► 764])



and

- [Top](#) [[▶ 761](#)] (including [TopUnit](#) [[▶ 761](#)])
- [Height](#) [[▶ 762](#)] (including [HeightUnit](#) [[▶ 763](#)])
- [Bottom](#) [[▶ 764](#)] (including [BottomUnit](#) [[▶ 765](#)])

If values are configured for all three variables per direction, the last one in this list (i.e. Right or Bottom respectively) is discarded. If only one variable is configured per direction for a control, it **cannot** be displayed!

## Parent

The attributes Width and Height are ignored in the Parent mode. The size of the control depends on the size of the parent control. In addition, the distances to the edges of the parent control must be defined by the attribute pairs Left, Right and Top, Bottom. After changing the mode from Value to Parent, therefore, all four attributes must be configured so that the control is displayed.

## Content

Most container controls additionally have the Content mode. The attributes Width and Height are ignored here too. The size of the control depends on the size of the child control. In this mode, therefore, the control is just large enough so that every child control is fully visible. Here are some examples of this mode:

- If the only child control is configured with Left = 10 px and Width = 200 px, then the container control is given the width 210 px.
- If the only child control is configured with Right = 20 px and Width = 200 px, then the container control is given the width 220 px.
- If the only child control is configured with Left = 30 px and Right = 20 px and no Width, then the container control is given the width 50 px and the child control has no width.
- If the only child control has Left = 100 px and Width = 50%, then the parent element would only have a size of 100 px.
- If a child control itself is aligned exclusively to the parent control (e.g. it has Left = 10% and Width = 50%), then it is skipped in the size adjustment of the parent control. If there are otherwise no child controls, the container control has the width 0 px and thus **cannot be displayed!**

## Minimum / Maximum Width / Height

In addition, a minimum and maximum size can be defined for each control in the horizontal and vertical directions. The attributes [Minimum Width](#) [[▶ 774](#)] (including [Minimum Width Unit](#) [[▶ 774](#)]), [Maximum Width](#) [[▶ 773](#)] (including [Maximum Width Unit](#) [[▶ 774](#)]) or [Minimum Height](#) [[▶ 772](#)] (including [Minimum Height Unit](#) [[▶ 772](#)]) and [Maximum Height](#) [[▶ 773](#)] (including [Maximum Height Unit](#) [[▶ 773](#)]) respectively are responsible for this.

**Priority:** calculated size > calculated maximum value > calculated minimum value

A set maximum value thus overwrites the calculated size, but a set minimum value overwrites the maximum value.

For example, this allows the height of the [View](#) [[▶ 849](#)] to be adapted to the contents (WidthMode=Content), but at the same time the minimum height can be set to 100% so that, for example, no area is created without a background image.

## Overlapping

If two controls (partly) occupy the same area on the screen, then the order will be observed. This order can be changed by drag & drop within the [Document Outline](#) [[▶ 74](#)] or directly in the [HTML source code](#) [[▶ 58](#)].

The [Z-Index](#) [[▶ 776](#)] attribute offers additional options. This can assume negative numeric values and has the default value 0. A control with a higher numerical value in this attribute will be drawn "further forward", i.e. in case of doubt it conceals a control with a lower numerical value. It must be noted that the Z-index also has **no** global meaning, but is valid only inside a container.

## Overfilling

A container control [► 790] groups together any child controls. The container must be large enough to accept all child controls, because any overfilling will be cut off.

### 5.10.1.2 Color editor

You can define any desired color using the color editor embedded in the Properties window. To do this, first select the color to be modified from the **Colors** category and you can then choose between the four following definition options:

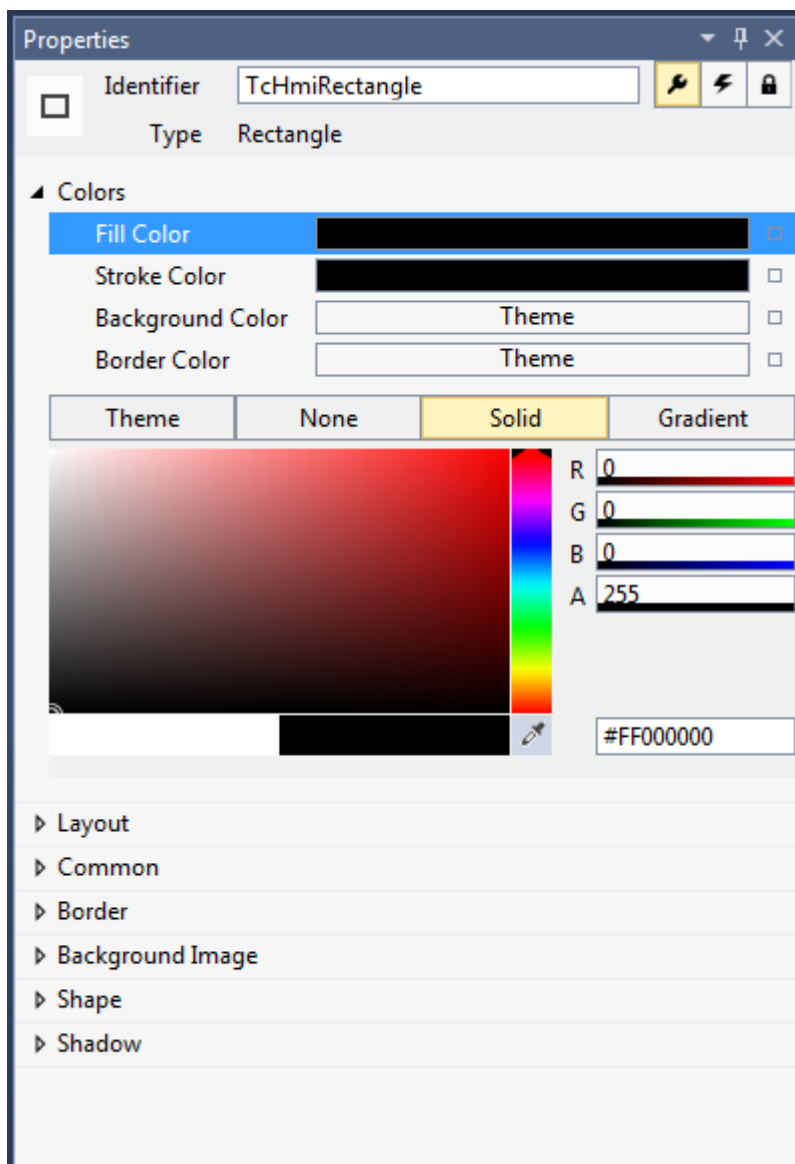
**Theme:** The color defined by the theme will be used.

**None:** No color will be used.

**Solid:** A uniform color will be used.

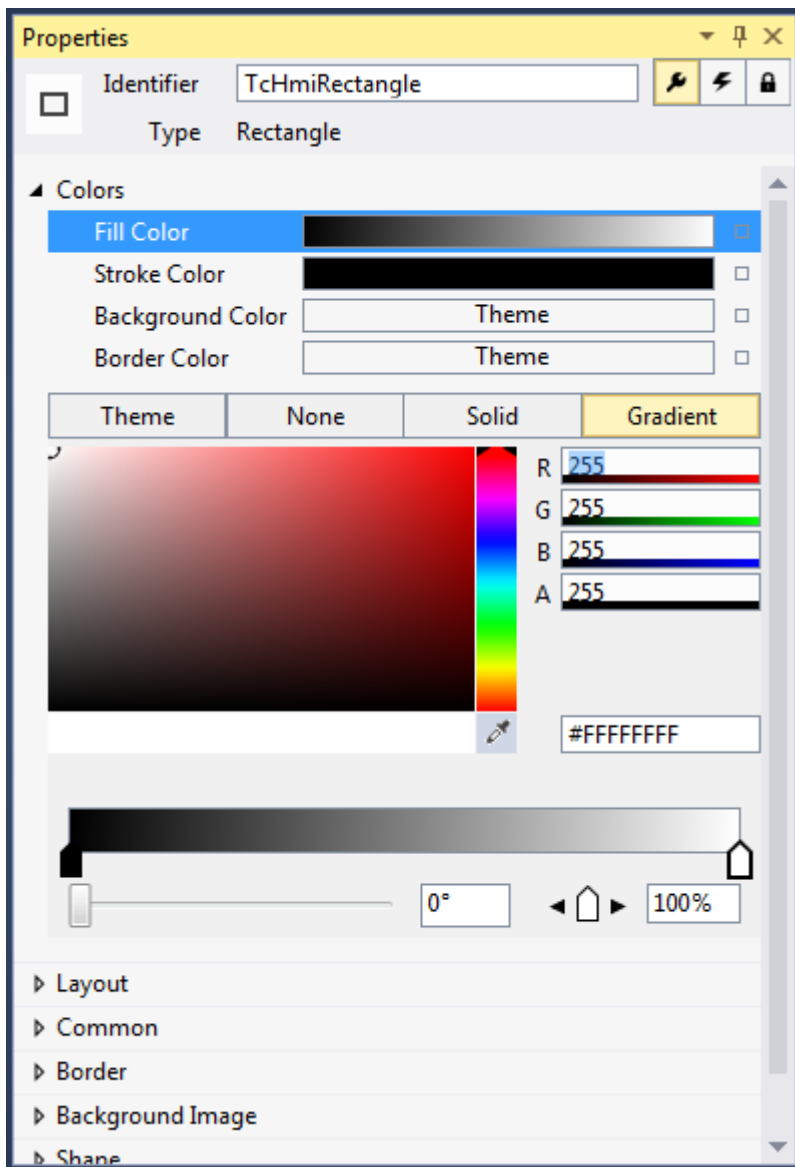
**Gradient:** A color with a color gradient will be used.

The color editor shown in the following picture is used to define a color as "solid". On the right-hand side you will find the entries **R** (Red), **G** (Green), **B** (Blue) and **A** (Alpha). Here you can directly enter the color via the color components and the Alpha factor, which specifies the transparency. Underneath that is a further box in which you can also define the color by means of its corresponding hexadecimal color code.



A color selection editor is offered on the left-hand side. In the right-hand part of this editor you can select a color to use as the basis. In the main part you can then adjust this color again. In addition it is possible using the pipette symbol to select a color, for example from an image opened in an external tool. Underneath the color selection editor there is a further bar in which the last-used color is offered on the left-hand side and the currently selected color on the right-hand side.

If the **Gradient** tab is selected, the editor described above is extended by the setting options for a color gradient. The color gradient is initially displayed in a bar. By selecting its left or right marker you can change the color with which the gradient starts or ends. The start and end of the color gradient can be adjusted via the position of the markers. This information can additionally be defined in percent in the right box underneath. In addition there is a slider on the left under the color gradient bar which can be used to change the angle with which the gradient is displayed.







### 5.10.1.3 Transformation editor

Six different types of transformation can be defined with this dialog:

- Translate: Translate in X-, Y-, Z-direction
- Rotate: Rotate by an angle around an axis defined by a vector (X, Y, Z) – the default value of the vector is (0, 0, 1). The vector thus points out of the screen in the Z-axis direction.
- Scale: Zoom in the X, Y, Z direction, in each case by a factor
- Skew: Skewed display of the horizontal and vertical sides, in each case by an angle
- Origin: Set the origin (X, Y, Z) of the transformation relative to the position of the control

- Perspective: Set the perspective of the transformations of all child elements

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

### Translate

Name	Description
X	Definition of the distance by which the control is to be shifted in the X direction
Y	Definition of the distance by which the control is to be shifted in the Y direction
Z	Definition of the distance by which the control is to be shifted in the Z direction

### Rotate

Name	Description
Angle	Definition of an angle by which the control is to be rotated
Angle Unit	Selection of the unit of the angle: <ul style="list-style-type: none"> <li>• Deg: Degrees (full circle = 360 deg)</li> <li>• Rad: Radians (full circle = <math>2\pi</math> Radians)</li> <li>• Turn: Number of turns (full circle = 1 turn)</li> <li>• Grad: Gon (full circle = 400 grad)</li> </ul>
Vector X	Definition of the X component of the vector
Vector Y	Definition of the Y component of the vector
Vector Z	Definition of the Z component of the vector

### Scale

Name	Description
X	Definition of the zoom factor in the X direction
Y	Definition of the zoom factor in the Y direction
Z	Definition of the zoom factor in the Z direction

### Skew

Name	Description
X Angle	Definition of the angle by which the vertical sides are to be skewed
X Angle Unit	Selection of the unit of the angle: <ul style="list-style-type: none"> <li>• Deg: Degrees (full circle = 360 deg)</li> <li>• Rad: Radians (full circle = <math>2\pi</math> Radians)</li> <li>• Turn: Number of turns (full circle = 1 turn)</li> <li>• Grad: Gon (full circle = 400 grad)</li> </ul>
Y Angle	Definition of the angle by which the horizontal sides are to be skewed
Y Angle Unit	Selection of the unit of the angle: <ul style="list-style-type: none"> <li>• Deg: Degrees (full circle = 360 deg)</li> <li>• Rad: Radians (full circle = <math>2\pi</math> Radians)</li> <li>• Turn: Number of turns (full circle = 1 turn)</li> <li>• Grad: Gon (full circle = 400 grad)</li> </ul>

### Origin



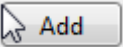
Name	Description
X	Definition of the X coordinate of the origin of the transformations
X Unit	Selection of the unit of the coordinate: <ul style="list-style-type: none"> <li>• Pixels for an absolute position</li> <li>• Percent for a relative position</li> </ul>
Y	Definition of the Y coordinate of the origin of the transformations
Y Unit	Selection of the unit of the coordinate: <ul style="list-style-type: none"> <li>• Pixels for an absolute position</li> <li>• Percent for a relative position</li> </ul>
Z	Definition of the Z coordinate of the origin of the transformations
Z Unit	Selection of the unit of the coordinate: <ul style="list-style-type: none"> <li>• Pixels for an absolute position</li> <li>• Percent for a relative position</li> </ul>

### Perspective

Name	Description
Distance	Definition of the distance of the perspective
Distance Unit	Selection of the unit of the coordinate: <ul style="list-style-type: none"> <li>• Pixels for an absolute position</li> <li>• Percent for a relative position</li> </ul>
Origin X	Definition of the X coordinate of the origin of the perspective
Origin X Unit	Selection of the unit of the coordinate: <ul style="list-style-type: none"> <li>• Pixels for an absolute position</li> <li>• Percent for a relative position</li> </ul>
Origin Y	Definition of the Y coordinate of the origin of the perspective
Origin Y Unit	Selection of the unit of the coordinate: <ul style="list-style-type: none"> <li>• Pixels for an absolute position</li> <li>• Percent for a relative position</li> </ul>

### 5.10.1.4 Box Shadow Editor

You can set a shadow for the control with this editor.

Items	List of all objects added
	Delete the selected object
	Change the object order (top = left)
	Add a new object

#### Category: Colors

Name	Description
Color	Definition of the color of the shadow

#### Category: General

Name	Description
blur	Definition of the blur
blur unit	Selecting the unit: <ul style="list-style-type: none"> <li>• Pixels for absolute blurring</li> </ul>
inset	Selection of whether the shadow should be drawn at the top left inside the control instead of at the bottom right outside the control
offsetX	Definition of the offset in the X direction
offsetX unit	Selecting the unit: <ul style="list-style-type: none"> <li>• Pixel for an absolute offset</li> </ul>
offsetY	Definition of the offset in the Y direction
offsetY unit	Selecting the unit: <ul style="list-style-type: none"> <li>• Pixel for an absolute offset</li> </ul>
spread	Definition of the spread of the shadow
spread unit	Selecting the unit: <ul style="list-style-type: none"> <li>• Pixel for an absolute spread</li> </ul>

**5.10.2     Beckhoff**

Name	Description
<a href="#">Audio [► 131]</a>	Audio files can be played with the Audio Control. The supported audio formats are defined by the browser used.
<a href="#">Bar Chart [► 143]</a>	A BarChart represents data with rectangular bars. It can be statically filled with data or dynamically supplied with data via an array.
<a href="#">Button [► 175]</a>	The button is a simple switching element that provides visual feedback when the background is switched.
<a href="#">Checkbox [► 188]</a>	A checkbox has a ToggleState parameter. This parameter has the value "Normal" if no checkmark is set and "Active" if the checkmark is set.
<a href="#">Combobox [► 199]</a>	A combo box is a drop-down menu for selecting an option from several options. Each option is defined by its ID and also has a text that is displayed in the dropdown menu, and an assigned value.
<a href="#">Datagrid [► 218]</a>	A data grid is a table. Data sets can be displayed in this table that have been defined via Engineering or dynamically via an array.
<a href="#">Date Time Display [► 250]</a>	A control for displaying the date and time.
<a href="#">Ellipse [► 279]</a>	An elliptical object.
<a href="#">Event Grid [► 285]</a>	The Event Grid is provided for the tabular display of alarms and messages.
<a href="#">IFrame [► 356]</a>	An IFrame is a nested browser context. It can be used to include another HTML page in the visualization or to display a PDF document.
<a href="#">Image [► 361]</a>	An image is an image display in which image files from the project path can be displayed. The supported image formats are defined by the browser used.
<a href="#">Input [► 369]</a>	A single-line text input element.
<a href="#">Keyboard [► 379]</a>	A keyboard is an on-screen keyboard that can be used for input without a hardware keyboard.
<a href="#">Line [► 396]</a>	A line object.
<a href="#">Line Chart [► 406]</a>	A LineChart is a diagram in which curves can be displayed.
<a href="#">Linear Gauge [► 432]</a>	A linear gauge is a linear display in which a value can be displayed by filling in a bar. A start and end value can be defined for this bar.
<a href="#">Localization Select [► 458]</a>	A combo box to select the localization.
<a href="#">Numeric Input [► 471]</a>	An input element for numeric values.
<a href="#">Password Input [► 490]</a>	An input element for passwords.
<a href="#">PDF Viewer [► 497]</a>	The PDF Viewer control enables embedded display of PDF files in TwinCAT HMI applications.
<a href="#">Polygon [► 518]</a>	Closed shape formed from a set of interconnected straight lines. The last point is automatically connected to the first point.
<a href="#">Radial Gauge [► 532]</a>	A radial gauge is a radial display in which a value can be displayed by filling in a bar. A start and end value can be defined for this bar.
<a href="#">Radio Button [► 556]</a>	A radio button has a RadioState parameter. This parameter has the value "Normal" if the radio button is not selected and "Active" if the radio button is selected.



Name	Description
	Only one radio button from a RadioGroup can be selected at a time.
<a href="#">Recipe Select [► 567]</a>	The Recipe Select control allows you to browse, select, activate and teach recipes from the Recipe Management Extension on the server.
<a href="#">Rectangle [► 574]</a>	A rectangular object.
<a href="#">Spinbox Input [► 596]</a>	An input element for numerical values with buttons for increasing and decreasing the value.
<a href="#">State Image [► 604]</a>	A state control is an image display in which different image files from the project path can be displayed depending on the state of an assigned variable.
<a href="#">Tachometer [► 610]</a>	A tachometer is a radial indicator that displays a value on a scale using a tachometer needle.
<a href="#">Textblock [► 629]</a>	A text block is a control in which text can be displayed.
<a href="#">Textbox [► 639]</a>	A text box is a control in which text can be displayed and entered.
<a href="#">Theme Select [► 650]</a>	A combo box to select the theme.
<a href="#">Toggle Button [► 682]</a>	The toggle button is a switching element that can be switched between two states.
<a href="#">Toggle switch [► 689]</a>	A toggle switch is a switching element that can be switched between two states. A ToggleSwitch has a ToggleState parameter, which can have the value "Normal" or "Active".
<a href="#">Trend Line Chart [► 695]</a>	A TrendLineChart is a trend element in which curves of historicized symbols can be displayed.
<a href="#">Video [► 739]</a>	Video can be played with the video control. The supported video formats are defined by the browser used.

### 5.10.2.1 ADS State

Shows the state of the defined TwinCAT Runtime.

#### Attributes

##### Category: Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">AdsRuntime [► 130]</a>	The ADS extension whose state is displayed.
<a href="#">ServerDomain [► 130]</a>	The domain of the ADS extension. The default domain is "ADS".
<a href="#">ServerInterval [► 130]</a>	Defines the interval for server subscriptions in milliseconds.
<a href="#">StateImages [► 131]</a>	A structure that defines an image for each state that an ADS extension may have and a fallback image.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

AdsState

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)

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NuGet packages are available from version 1.12.

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Available from version 1.12.748

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#### See also

API reference for this control

### 5.10.2.1.1 Attributes

#### 5.10.2.1.1.1 AdsRuntime

The ADS extension whose state is displayed.

**Schema:** tchmi:general#/definitions/String

**Origin:** [ADS State](#) [[▶](#) [125](#)]

#### See also

**Attribute getter:** getAdsRuntime

**Attribute setter:** setAdsRuntime

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Available from version 1.12.748

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#### 5.10.2.1.1.2 ServerInterval

Defines the interval for server subscriptions in milliseconds.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [ADS State](#) [[▶](#) [125](#)]

#### See also

**Attribute getter:** getServerInterval

**Attribute setter:** setServerInterval

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Available from version 1.12.748

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#### 5.10.2.1.1.3 ServerDomain

The domain of the ADS extension. The default domain is "ADS".

**Schema:** tchmi:general#/definitions/String

**Origin:** [ADS State \[► 125\]](#)

**See also**

**Attribute getter:** getServerDomain

**Attribute setter:** setServerDomain



Available from version 1.12.748

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#### 5.10.2.1.1.4 StateImages

A structure that defines an image for each state that an ADS extension may have and a fallback image.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiAdsState.StateImages

**Origin:** [ADS State \[► 125\]](#)

**See also**

**Attribute getter:** getStateImages

**Attribute setter:** setStateImages



Available from version 1.12.748

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#### 5.10.2.2 Audio

Audio files can be played with the Audio Control. The supported audio formats are defined by the browser used.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.



Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">SrcList [► 137]</a>	Definition of a list of audio files that can be played back
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Audio**

Name	Description
<a href="#">Volume [► 137]</a>	Definition of the volume of the audio file
<a href="#">Mute [► 137]</a>	Selecting whether the sound is to be switched off
<a href="#">Playback rate [► 138]</a>	Definition of a playback rate. The normal playback speed is multiplied by this value to obtain the current rate.
<a href="#">CurrentTime [► 139]</a>	Definition of the current playback time of the audio file
<a href="#">Duration [► 139]</a>	Plays the length of the audio file in seconds or 0 if it is not available.
<a href="#">IsEnded [► 138]</a>	Returns a Boolean value indicating whether playback has finished or not.
<a href="#">IsPlaying [► 138]</a>	Returns a Boolean value indicating whether the audio file is currently playing or not.

**Category: Player**

Name	Description
<a href="#">Controls [► 139]</a>	Selecting whether the integrated operating elements are to be displayed
<a href="#">Autoplay [► 140]</a>	Selecting whether the audio file should be started automatically
<a href="#">Loop [► 140]</a>	Selecting whether the audio file is to be repeated automatically on a permanent basis

**Events****Category: Control**

Name	Description
<a href="#">onLoadedData [► 140]</a>	The audio file was loaded successfully.
<a href="#">onError [► 140]</a>	The audio file was not loaded successfully.
<a href="#">onVolumeChange [► 141]</a>	The volume of the audio file has been changed.
<a href="#">onDurationChange [► 141]</a>	The duration of the audio file has changed.
<a href="#">onIsEndedChange [► 141]</a>	The audio file has been terminated.
<a href="#">onIsPlayingChange [► 141]</a>	The audio file has changed its playback status.
<a href="#">onTimeUpdate [► 141]</a>	The playback position has been changed.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

## Functions

Name	Origin	Description
play	TcHmiAudio	Start video
pause	TcHmiAudio	Pause video
stop	TcHmiAudio	End video
skipBackward	TcHmiAudio	Rewind video
skipForward	TcHmiAudio	Fast forward video

## Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

## Inheritance hierarchy

[Control \[► 753\]](#)

Audio

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.

---



Available from version 1.12.744

---

#### See also

API reference for this control

### 5.10.2.2.1 Attributes

#### 5.10.2.2.1.1 SrcList

A list of audio files that the browser should play back.

The audio files are **not played** one after the other, but the browser tries to play each audio file until it finds a format that it supports.

If the format type is not set, the browser tries to detect the code itself.

You can check the current status of browser support on the external website <http://caniuse.com/>.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiAudio.AudioSourceList

**Origin:** [Audio](#) [► 131]

#### See also

**Attribute getter:** getSrcList

**Attribute setter:** setSrcList

---



Available from version 1.12.744

---

#### 5.10.2.2.1.2 Volume

Volume of the audio file. The number 0 sets the audio file to mute, while 1 means full volume.

**Schema:** tchmi:framework#/definitions/Fraction

**Origin:** [Audio](#) [► 131]

#### See also

**Attribute getter:** getVolume

**Attribute setter:** setVolume

---



Available from version 1.12.744

---

#### 5.10.2.2.1.3 Mute

Specifies whether the sound is switched off.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Audio \[► 131\]](#)

**See also**

**Attribute getter:** getMute

**Attribute setter:** setMute

---



Available from version 1.12.744

---

#### 5.10.2.2.1.4 Playback rate

The normal playback speed is multiplied by this value to obtain the current rate. Thus, the value 1.0 represents the normal speed.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Audio \[► 131\]](#)

**See also**

**Attribute getter:** getPlaybackrate

**Attribute setter:** setPlaybackrate

---



Available from version 1.12.744

---

#### 5.10.2.2.1.5 IsEnded

Returns a Boolean value indicating whether playback has finished or not.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Audio \[► 131\]](#)

**See also**

**Attribute getter:** getIsEnded

The attribute can only be read and therefore has no setter.

---



Available from version 1.12.744

---

#### 5.10.2.2.1.6 IsPlaying

Returns a Boolean value indicating whether the audio file is currently playing or not.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Audio \[► 131\]](#)

**See also**

**Attribute getter:** getIsPlaying

The attribute can only be read and therefore has no setter.



Available from version 1.12.744

#### 5.10.2.2.1.7 CurrentTime

The current playback time of the audio file.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Audio](#) [► 131]

**See also**

**Attribute getter:** getCurrentTime

**Attribute setter:** setCurrentTime



Available from version 1.12.744

#### 5.10.2.2.1.8 Duration

Plays the length of the audio file in seconds or 0 if it is not available.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Audio](#) [► 131]

**See also**

**Attribute getter:** getDuration

The attribute can only be read and therefore has no setter.



Available from version 1.12.744

#### 5.10.2.2.1.9 Controls

Specifies whether operating elements are to be displayed. The user can control playback, adjust the volume and pause/resume the audio file.



Some browsers do not allow [automatic](#) [► 140] or application-based start of an audio file. You should therefore carry out intensive tests to determine whether it makes sense to deactivate the operating elements.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Audio](#) [► 131]

**See also**

**Attribute getter:** getControls

**Attribute setter:** setControls



Available from version 1.12.744

---

#### 5.10.2.2.1.10 Autoplay

Specifies whether the audio file is to be started directly.



In some browsers this is not allowed by default. In part this is possible again when the sound is switched off.

---

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Audio \[► 131\]](#)

**See also**

**Attribute getter:** getAutoplay

**Attribute setter:** setAutoplay

---



Available from version 1.12.744

---

#### 5.10.2.2.1.11 Loop

When the audio file is finished, it starts again from the beginning.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Audio \[► 131\]](#)

**See also**

**Attribute getter:** getLoop

**Attribute setter:** setLoop

---



Available from version 1.12.744

---

### 5.10.2.2.2 Events

#### 5.10.2.2.2.1 onError

The audio file was not loaded successfully.

**Origin:** [Audio \[► 131\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.2.2.2 onLoadedData

The audio file was loaded successfully.



Origin: [Audio \[► 131\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.2.2.3 onVolumeChange

The [volume \[► 747\]](#) of the audio file has been changed.

Origin: [Audio \[► 131\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.2.2.4 onDurationChange

The duration of the audio file has changed.

Origin: [Audio \[► 131\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.2.2.5 onIsEndedChange

The audio file has been [terminated \[► 748\]](#).

Origin: [Audio \[► 138\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.2.2.6 onIsPlayingChange

The audio file has changed its [playback status \[► 748\]](#).

Origin: [Audio \[► 138\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.2.2.7 onTimeUpdate

The [playback position \[► 139\]](#) has been changed.

Origin: [Audio \[► 131\]](#)

---



Available from version 1.12.744

---

### 5.10.2.2.3 Functions

#### 5.10.2.2.3.1 play

Starts playing the audio file.

**Return value:** null

**Origin:** [Audio \[► 131\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.2.3.2 pause

Pauses the play back of the audio file.

**Return value:** null

**Origin:** [Audio \[► 131\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.2.3.3 stop

Stops playing the audio file. The audio file is then played back from the beginning.

**Return value:** null

**Origin:** [Audio \[► 131\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.2.3.4 skipBackward

Rewinds the audio file with a specified timespan.

**Parameter:**

- valueNew: Timespan in seconds

**Return value:** null

**Origin:** [Audio \[► 131\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.2.3.5 skipForward

Fast forwards the audio file with a specified timespan.

**Parameter:**

- valueNew: Timespan in seconds

**Return value:** null

**Origin:** [Audio](#) [► 131]



Available from version 1.12.744

### 5.10.2.3 Bar Chart

A BarChart represents data with rectangular bars. It can be statically filled with data or dynamically supplied with data via an array.

A description of the configuration can be found in chapter [Configuration](#) [► 152].

#### Attributes

##### Category: Colors

Name	Description
<a href="#">GridBackgroundColor</a> [► 155]	Definition of the background color of the coordinate system
<a href="#">XAxisColor</a> [► 160]	Definition of the color of the X-axis
<a href="#">YAxisColor</a> [► 165]	Definition of the color of the Y-axis
<a href="#">GridLineColor</a> [► 155]	Definition of the color of the coordinate grid
<a href="#">SectionsBackgroundColor</a> [► 170]	Definition of the color of the sections
<a href="#">SubgridLineColor</a> [► 159]	Definition of the color of the coordinate subgrid
<a href="#">XLabelFontColor</a> [► 161]	Definition of the font color of the X-axis labels
<a href="#">XAxisNameFontColor</a> [► 171]	Definition of the font color of the Y-axis name
<a href="#">YLabelFontColor</a> [► 165]	Definition of the font color of the Y-axis labels
<a href="#">YAxisNameFontColor</a> [► 168]	Definition of the font color of the Y-axis name
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">BarGraphData [► 154]</a>	Definition of the data to be displayed as graph using the 'Bar Graph Data [► 153]' dialog
<a href="#">BarGraphDescription [► 171]</a>	Definition of the display mode of the configured bar graphs using the 'Bar Graph Description [► 153]' dialog
<a href="#">BarGraphColors [► 154]</a>	Definition of the colors of the configured bar graphs using the 'Bar Graph Color [► 152]' dialog
<a href="#">ShowLegend [► 171]</a>	Selecting whether the legend is to be displayed
<a href="#">BarGraphArrangement [► 172]</a>	Selection of the display mode of the bar chart: <ul style="list-style-type: none"> <li>• Overlapped: Bars are drawn on top of each other</li> <li>• Clustered: Bars are drawn next to each other</li> </ul>
<a href="#">BarGraphWidth [► 154]</a>	Definition of the width of the individual bars.
<a href="#">ReferenceLines [► 174]</a>	Definition of the reference lines.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage</a> [ <a href="#">▶ 770</a> ]	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight</a> [ <a href="#">▶ 771</a> ]	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit</a> [ <a href="#">▶ 771</a> ]	Selection of the unit of the height of the background image: <ul style="list-style-type: none"><li>• Pixels for an absolute height</li><li>• Percent for a relative height</li></ul>
<a href="#">BackgroundImageWidth</a> [ <a href="#">▶ 770</a> ]	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit</a> [ <a href="#">▶ 770</a> ]	Selection of the unit of the width of the background image: <ul style="list-style-type: none"><li>• Pixels for an absolute width</li><li>• Percent for a relative width</li></ul>
<a href="#">BackgroundImagePadding</a> [ <a href="#">▶ 771</a> ]	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment</a> [ <a href="#">▶ 772</a> ]	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment</a> [ <a href="#">▶ 771</a> ]	Definition of the horizontal alignment of the background image within the control

**Category: XAxis**

Name	Description
ShowXAxis [ <a href="#">▶ 157</a> ]	Selecting whether the X-axis is to be displayed
XShowLabels [ <a href="#">▶ 158</a> ]	Selecting whether the X-axis labels are to be displayed
XMainTickSteps [ <a href="#">▶ 163</a> ]	Definition of the step size of the X-axis main subdivision
XMainTickMinValue [ <a href="#">▶ 163</a> ]	Definition of the minimum value of the X-axis main subdivision
XMainTickMaxValue [ <a href="#">▶ 162</a> ]	Definition of the maximum value of the X-axis main subdivision
ShowXAxisName [ <a href="#">▶ 172</a> ]	Selecting whether the X-axis name is to be displayed
XAxisName [ <a href="#">▶ 172</a> ]	Definition of the X-axis name
XAxisAutoScaling [ <a href="#">▶ 160</a> ]	Selecting whether the X-axis should be automatically scaled according to the data sets. 'Maintick Min Value', 'Maintick Max Value' and 'X-Axis Maintick Steps' need not be set.
XAxisDecimalPlaces [ <a href="#">▶ 161</a> ]	Definition of the decimal places displayed for the X-axis
XAxisUnit [ <a href="#">▶ 172</a> ]	Definition of the X-axis unit
XAxisWidth [ <a href="#">▶ 164</a> ]	Definition of the X-axis width
XLabelFontFamily [ <a href="#">▶ 161</a> ]	Definition of the font using the name of the font family or the keyword
XLabelFontSize [ <a href="#">▶ 162</a> ]	Definition of the font size for the X-axis labels
XLabelFontSizeUnit [ <a href="#">▶ 162</a> ]	Selecting the font size unit for the X-axis labels: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
XLabelFontWeight [ <a href="#">▶ 162</a> ]	Selecting the font weight of the X-axis labels: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
XAxisFormat [ <a href="#">▶ 164</a> ]	Definition of the formatting of the X-axis labels
XNameFontFamily [ <a href="#">▶ 173</a> ]	Definition of the font using the name of the font family or the keyword
XNameFontSize [ <a href="#">▶ 173</a> ]	Definition of the font size of the X-axis name
XNameFontSizeUnit [ <a href="#">▶ 173</a> ]	Selecting the unit of the font size of the X axis name: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
XNameFontWeight [ <a href="#">▶ 174</a> ]	Selecting of the font weight of the X-axis name: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
ShowXSubTicks [ <a href="#">▶ 158</a> ]	Selecting whether the subcoordinate points are to be displayed on the X-axis
XSubTickSteps [ <a href="#">▶ 163</a> ]	Definition of the step size of the X-axis subdivision

**Category: YAxis**



Name	Description
<a href="#">ShowYAxis [► 158]</a>	Selecting whether the y-axis is to be displayed
<a href="#">YPosition [► 170]</a>	Selecting the position of the y-axis on the coordinate system <ul style="list-style-type: none"> <li>• Left: Y-axis is displayed on the left side of the coordinate system.</li> <li>• Right: Y-axis is displayed on the right side of the coordinate system.</li> </ul>
<a href="#">YAxisAutoScaling [► 165]</a>	Selecting whether the y-axis should be automatically scaled according to the data sets. 'Maintick Min Value', 'Maintick Max Value' and 'Y-Axis Maintick Steps' need not be set.
<a href="#">YAxisDecimalPlaces [► 165]</a>	Definition of the decimal places displayed for the y-axis
<a href="#">YAxisUnit [► 170]</a>	Definition of the unit of the y-axis
<a href="#">YAxisWidth [► 170]</a>	Definition of the y-axis width
<a href="#">ShowYAxisName [► 159]</a>	Selecting whether the y-axis name is to be displayed
<a href="#">YAxisName [► 168]</a>	Definition of the y-axis name
<a href="#">YAxisNameFontFamily [► 168]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">YAxisNameFontSize [► 168]</a>	Definition of the font size of the y-axis name
<a href="#">YAxisNameFontSizeUnit [► 169]</a>	Selecting the unit of the font size of the y-axis name: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">YAxisNameFontWeight [► 169]</a>	Selecting of the font weight of the y-axis name: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: Bold</li> </ul>
<a href="#">YShowLabels [► 159]</a>	Selecting whether the y-axis labels are to be displayed
<a href="#">YLabelFontFamily [► 166]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">YLabelFontSize [► 166]</a>	Definition of the font size for the y-axis labels
<a href="#">YLabelFontSizeUnit [► 166]</a>	Selecting the font size unit for the y-axis labels: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">YLabelFontWeight [► 167]</a>	Selecting the font weight of the y-axis labels: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: Bold</li> </ul>
<a href="#">YMainTickMinValue [► 167]</a>	Definition of the minimum value of the y-axis main subdivision
<a href="#">YMainTickMaxValue [► 167]</a>	Definition of the maximum value of the y-axis main subdivision
<a href="#">YMainTickSteps [► 167]</a>	Definition of the step size of the y-axis main subdivision
<a href="#">ShowYSubTicks [► 159]</a>	Selecting whether the subcoordinate points are to be displayed on the y-axis
<a href="#">YSubTickSteps [► 169]</a>	Definition of the step size of the y-axis subdivision

**Category: Grid**

Name	Description
ShowGrid [ <a href="#">► 156</a> ]	Selecting whether the coordinate grid is to be displayed.
GridShowHorizontalLines [ <a href="#">► 156</a> ]	Selecting whether the horizontal lines of the coordinate grid are to be displayed.
GridShowVerticalLines [ <a href="#">► 156</a> ]	Selecting whether the vertical lines of the coordinate grid are to be displayed.
GridLineStyle [ <a href="#">► 155</a> ]	Definition of the line style for the coordinate grid.
GridLineWidth [ <a href="#">► 156</a> ]	Definition of the line width of the coordinate grid.
SubgridShowHorizontalLines [ <a href="#">► 157</a> ]	Selecting whether the horizontal lines of the subgrid are to be displayed.
SubgridShowVerticalLines [ <a href="#">► 157</a> ]	Selecting whether the vertical lines of the subgrid are to be displayed.
SubgridLineStyle [ <a href="#">► 160</a> ]	Definition of the line style of the subgrid.
SubgridLineWidth [ <a href="#">► 160</a> ]	Definition of the line width of the subgrid.

## Events

### Category: Framework

Name	Description
onAttached [ <a href="#">► 778</a> ]	The control was added to the display.
onDetached [ <a href="#">► 778</a> ]	The control was removed from the display.
onInitialized [ <a href="#">► 778</a> ]	The control was initialized.
onDestroyed [ <a href="#">► 778</a> ]	The control was destroyed.
onMoved [ <a href="#">► 781</a> ]	The control was moved in relation to the browser window.
onResized [ <a href="#">► 782</a> ]	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Bar Chart

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.3.1 Configuration**

A bar chart can be configured in different ways:

- Via [Engineering](#) [► 152]
  - Array of numbers
  - Array of arrays of numbers
- Via an array from the [PLC](#) [► 152]
  - Array of numbers

```
aVaules : ARRAY [1..10] OF INT;
```

- Array of arrays of numbers

```
aValues : ARRAY [1..2, 1..10] OF INT;
```

Definition via Engineering:

1. Add a bar chart to the interface.
2. Define which type of object you want to use.

Array of numbers (Array<number>):

3. Define the number of members of the array and their values for the 'Bar Graph Data' attribute of the 'Common' category using the '[Bar Graph Data](#) [► 153]' dialog.

Array of arrays of numbers (Array<Array<number>>)

3. Define the number of data sets of the array for the 'Bar Graph Data' attribute of the 'Common' category using the '[Bar Graph Data](#) [► 153]' dialog.
4. Define the number of members of the array and their values using the '[Bar Graph Data](#) [► 153]' dialog.

Definition via an array from the PLC:

1. Add a bar chart to the interface.
2. Link the array to the 'Bar Graph Data' attribute of the 'Common' category.




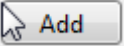
Advanced Settings:

1. Define the color of the individual data sets for the 'Bar Graph Colors' attribute of the 'Common' category using the '[Bar Graph Color](#) [► 152]' dialog.
2. Deactivate the 'X-Axis Autoscaling' attribute of the 'X-Axis' category.
3. Define the minimum and maximum value of the x-axis corresponding to your data set in the 'X-Axis Maintick Min Value' and 'X-Axis Maintick Max Value' attributes of the 'X-Axis' category.
4. Define the step size matching your data set for the 'X-Axis Maintick Steps' attribute of the 'X-Axis' category.

Example: [Barchart](#) [► 1580]

**5.10.2.3.2 Dialogs****5.10.2.3.2.1 Bar Graph Color Dialog**

Use this dialog you define the color of the bar graphs. The color objects are assigned to the arrays of the data sets sequentially in case of data structure 'Array<Array<number>>'.




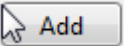
Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Category: Colors

Name	Description
Bar color	Definition of the color of the bar graph
Legend name	Definition of the legend name
Scale factor	Definition of the scale factor

#### 5.10.2.3.2.2 Bar Graph Data Dialog

You can use this dialog to statically define the data that the bar graph is to display in Engineering. To do this, you can first choose between the structure of the data as 'Array<Array<number>>' and 'Array<number>'. In the second step, you can then define the entries.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

If you have selected the data structure 'Array<Array<number>>', you can first define different arrays, each representing a bar graph.




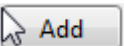
Name	Description
Array	Definition of an array of numbers representing a data set to be displayed as a bar graph

Each of these arrays has entries that you can define using the second version of the dialog. If you use the data structure 'Array<number>', this dialog is offered directly.

Name	Description
Number	Definition of a value from a data set to be displayed as a bar graph

#### 5.10.2.3.2.3 Bar Graph Description Dialog

Use this dialog you define the color of the bar graphs and their legend name. The objects are assigned to the arrays of the data sets sequentially in case of data structure 'Array<Array<number>>'.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Category: Colors

Name	Description
Bar color	Definition of the color of the bar graph
Legend name	Definition of the legend name
Scale factor	Definition of the scale factor

5.10.2.3.3      **Attributes**

5.10.2.3.3.1      **BarGraphColors**

Defines the colors of the graphs. Can be overwritten using the attribute BarGraphDescription.

**Schema** (version 1.8): tchmi:framework#/definitions/ChartBarGraphColorList

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiBarChart.ChartBarGraphColorList

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getBarGraphColors

**Attribute setter:** setBarGraphColors



Available from 1.8



Version 1.12



This attribute is considered obsolete. Please use the attribute BarGraphDescription instead.

5.10.2.3.3.2      **BarGraphData**

**Schema** (version 1.8): tchmi:framework#/definitions/ChartBarGraphDataDefinitionList

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiBarChart.ChartBarGraphDataDefinitionList

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getBarGraphData

**Attribute setter:** setBarGraphData



Available from 1.8

5.10.2.3.3.3      **BarGraphWidth**

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getBarGraphWidth

**Attribute setter:** setBarGraphWidth

---



Available from version 1.10

---

#### 5.10.2.3.3.4      **GridBackgroundColor**

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getGridBackgroundColor

**Attribute setter:** setGridBackgroundColor

---



Available from 1.8

---

#### 5.10.2.3.3.5      **GridLineColor**

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getGridLineColor

**Attribute setter:** setGridLineColor

---



Available from 1.8

---

#### 5.10.2.3.3.6      **GridLineStyle**

**Schema** (version 1.10): tchmi:framework#/definitions/ChartLineStyle

**Schema** (version 1.12): tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.ChartLineStyle

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** setGridLineStyle

**Attribute setter:** getGridLineStyle

---



Available from version 1.10

---

#### 5.10.2.3.3.7 GridLineWidth

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getGridLineWidth

**Attribute setter:** setGridLineWidth

---



Available from 1.8

---

#### 5.10.2.3.3.8 ShowGrid

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getShowGrid

**Attribute setter:** setShowGrid

---



Available from 1.8

---

#### 5.10.2.3.3.9 GridShowHorizontalLines

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getGridShowHorizontalLines

**Attribute setter:** setGridShowHorizontalLines

---



Available from 1.8

---

#### 5.10.2.3.3.10 GridShowVerticalLines

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getGridShowVerticalLines

**Attribute setter:** setGridShowVerticalLines





Available from 1.8

---

#### 5.10.2.3.3.11 SubgridShowHorizontalLines

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getSubgridShowHorizontalLines

**Attribute setter:** setSubgridShowHorizontalLines

---



Available from 1.8

---

#### 5.10.2.3.3.12 SubgridShowVerticalLines

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getSubgridShowVerticalLines

**Attribute setter:** setSubgridShowVerticalLines

---



Available from 1.8

---



From version 1.12

---



This attribute is no longer available.

---



Available from 1.8

---

#### 5.10.2.3.3.13 ShowXAxis

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getShowXAxis

**Attribute setter:** setShowXAxis

---



Available from 1.8

---

#### 5.10.2.3.3.14 XShowLabels

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getXShowLabels

**Attribute setter:** setXShowLabels

---



Available from 1.8

---

#### 5.10.2.3.3.15 ShowXSubTicks

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getShowXSubTicks

**Attribute setter:** setShowXSubTicks

---



Available from 1.8

---



This attribute is no longer available. Removed in version 1.12.744.2.

---



Available from 1.8

---

#### 5.10.2.3.3.16 ShowYAxis

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getShowYAxis

**Attribute setter:** setShowYAxis

---



Available from 1.8

---

#### 5.10.2.3.3.17 YShowLabels

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYShowLabels

**Attribute setter:** setYShowLabels

---



Available from 1.8

---

#### 5.10.2.3.3.18 ShowYAxisName

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getShowYAxisName

**Attribute setter:** setShowYAxisName

---



Available from 1.8

---

#### 5.10.2.3.3.19 ShowYSubTicks

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getShowYSubTicks

**Attribute setter:** setShowYSubTicks

---



Available from 1.8

---

#### 5.10.2.3.3.20 SubgridLineColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getSubgridLineColor

**Attribute setter:** setSubgridLineColor



Available from 1.8

---

#### 5.10.2.3.3.21 SubgridLineStyle

**Schema (Version 1.10):** tchmi:framework#/definitions/ChartLineStyle

**Schema (Version 1.12):** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.ChartLineStyle

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** setSubGridLineStyle

**Attribute setter:** getSubGridLineStyle

---



Available from version 1.10

---

#### 5.10.2.3.3.22 SubgridLineWidth

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getSubgridLineWidth

**Attribute setter:** setSubgridLineWidth

---



Available from 1.8

---

#### 5.10.2.3.3.23 XAxisAutoScaling

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getXAxisAutoScaling

**Attribute setter:** setXAxisAutoScaling

---



Available from 1.8

---

#### 5.10.2.3.3.24 XAxisColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Bar Chart](#) [► 143]

See also

**Attribute getter:** getXAxisColor

**Attribute setter:** setXAxisColor

---



Available from 1.8

---

#### 5.10.2.3.3.25 XAxisDecimalPlaces

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

See also

**Attribute getter:** getXAxisDecimalPlaces

**Attribute setter:** setXAxisDecimalPlaces

---



Available from 1.8

---

#### 5.10.2.3.3.26 XLabelFontColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Bar Chart](#) [► 143]

See also

**Attribute getter:** getXLabelFontColor

**Attribute setter:** setXLabelFontColor

---



Available from 1.8

---

#### 5.10.2.3.3.27 XLabelFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Bar Chart](#) [► 143]

See also

**Attribute getter:** getXLabelFontFamily

**Attribute setter:** setXLabelFontFamily

---



Available from 1.8

---

#### 5.10.2.3.3.28 XLabelFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getXLabelFontSize

**Attribute setter:** setXLabelFontSize

---



Available from 1.8

---

#### 5.10.2.3.3.29 XLabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getXLabelFontSizeUnit

**Attribute setter:** setXLabelFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.3.3.30 XLabelFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getXLabelFontWeight

**Attribute setter:** setXLabelFontWeight

---



Available from 1.8

---

#### 5.10.2.3.3.31 XMainTickMaxValue

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

See also

**Attribute getter:** getXMainTickMaxValue

**Attribute setter:** setXMainTickMaxValue

---



Available from 1.8

---

#### 5.10.2.3.3.32 XMainTickMinValue

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

See also

**Attribute getter:** getXMainTickMinValue

**Attribute setter:** setXMainTickMinValue

---



Available from 1.8

---

#### 5.10.2.3.3.33 XMainTickSteps

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

See also

**Attribute getter:** getXMainTickSteps

**Attribute setter:** setXMainTickSteps

---



Available from 1.8

---

#### 5.10.2.3.3.34 XSubTickSteps

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

See also

**Attribute getter:** getXSubTickSteps

**Attribute setter:** setXSubTickSteps

---



Available from 1.8

---



This attribute is no longer available. Removed in version 1.12.744.2.

---



Available from 1.8

### 5.10.2.3.3.35 XAxisWidth

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getXAxisWidth

**Attribute setter:** setXAxisWidth



Available from 1.8

### 5.10.2.3.3.36 XAxisFormat

**Schema:** tchmi:framework#/definitions/Function

Definition of the formatting of the X-axis labels.

The selected function defines the X-axis labels. It is called for each displayed value of the main X-axis subdivision. To do this, it receives the index of the [BarGraphData](#) [► 154] attribute.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
XAxisFormat(value: number): string;
```

#### Parameter

Name	Type	Description
value	number	The current index of the value on the X-axis.

#### Return value

Type	Description
string	The new value of the main X-axis subdivision. HTML is not allowed here.

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getXAxisWidth

**Attribute setter:** setXAxisWidth



Available from version 1.10



### 5.10.2.3.3.37 YAxisAutoScaling

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYAxisAutoScaling

**Attribute setter:** setYAxisAutoScaling

---



Available from 1.8

---

### 5.10.2.3.3.38 YAxisColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYAxisColor

**Attribute setter:** setYAxisColor

---



Available from 1.8

---

### 5.10.2.3.3.39 YAxisDecimalPlaces

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYAxisDecimalPlaces

**Attribute setter:** setYAxisDecimalPlaces

---



Available from 1.8

---

### 5.10.2.3.3.40 YLabelFontColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYLabelFontColor

**Attribute setter:** setYLabelFontColor



Available from 1.8

---

#### 5.10.2.3.3.41 YLabelFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYLabelFontFamily

**Attribute setter:** setYLabelFontFamily

---



Available from 1.8

---

#### 5.10.2.3.3.42 YLabelFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYLabelFontSize

**Attribute setter:** setYLabelFontSize

---



Available from 1.8

---

#### 5.10.2.3.3.43 YLabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYLabelFontSizeUnit

**Attribute setter:** setYLabelFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.3.3.44 YLabelFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYLabelFontWeight

**Attribute setter:** setYLabelFontWeight

---



Available from 1.8

---

#### 5.10.2.3.3.45 YLabelFontWeight

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYMainTickMaxValue

**Attribute setter:** setYMainTickMaxValue

---



Available from 1.8

---

#### 5.10.2.3.3.46 YMainTickMinValue

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYMainTickMinValue

**Attribute setter:** setYMainTickMinValue

---



Available from 1.8

---

#### 5.10.2.3.3.47 YMainTickSteps

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYMainTickSteps

**Attribute setter:** setYMainTickSteps



Available from 1.8

---

#### 5.10.2.3.3.48 YAxisName

**Schema:** tchmi:general#/definitions/String

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYAxisName

**Attribute setter:** setYAxisName

---



Available from 1.8

---

#### 5.10.2.3.3.49 YAxisNameFontColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYAxisNameFontColor

**Attribute setter:** setYAxisNameFontColor

---



Available from 1.8

---

#### 5.10.2.3.3.50 YAxisNameFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYAxisNameFontFamily

**Attribute setter:** setYAxisNameFontFamily

---



Available from 1.8

---

#### 5.10.2.3.3.51 YAxisNameFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYAxisNameFontSize

**Attribute setter:** setYAxisNameFontSize

---



Available from 1.8

---

#### 5.10.2.3.3.52 YAxisNameFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYAxisNameFontSizeUnit

**Attribute setter:** setYAxisNameFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.3.3.53 YAxisNameFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYAxisNameFontWeight

**Attribute setter:** setYAxisNameFontWeight

---



Available from 1.8

---

#### 5.10.2.3.3.54 YSubTickSteps

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYSubTickSteps

**Attribute setter:** setYSubTickSteps



Available from 1.8

---

#### 5.10.2.3.3.55 YAxisUnit

**Schema:** tchmi:general#/definitions/String

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYAxisUnit

**Attribute setter:** setYAxisUnit

---



Available from 1.8

---

#### 5.10.2.3.3.56 YAxisWidth

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYAxisWidth

**Attribute setter:** setYAxisWidth

---



Available from 1.8

---

#### 5.10.2.3.3.57 YPosition

**Schema** (version 1.8): tchmi:framework#/definitions/ChartBarGraphPosition

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiBarChart.ChartBarGraphPosition

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getYPosition

**Attribute setter:** setYPosition

---



Available from 1.8

---

#### 5.10.2.3.3.58 SectionsBackgroundColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Bar Chart](#) [► 143]

**See also****Attribute getter:** getSectionsBackgroundColor**Attribute setter:** setSectionsBackgroundColor

Available from version 1.12

**5.10.2.3.3.59 XAxisNameFontColor****Schema:** tchmi:framework#/definitions/SolidColor**Origin:** [Bar Chart](#) [► 143]**See also****Attribute getter:** getXAxisNameFontColor**Attribute setter:** setXAxisNameFontColor

Available from version 1.12

**5.10.2.3.3.60 BarGraphDescription**Defines the colors of the graphs. Replaces the attribute [BarGraphColors](#) [► 154].**Schema:** tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiBarChart.ChartBarGraphDescriptionDefinitionList**Origin:** [Bar Chart](#) [► 143]**See also****Attribute getter:** getBarGraphDescription**Attribute setter:** setBarGraphDescription

Available from version 1.12.746

This attribute replaces the attribute [BarGraphColors](#) [► 154].**5.10.2.3.3.61 ShowLegend****Schema:** tchmi:general#/definitions/Boolean**Origin:** [Bar Chart](#) [► 143]**See also****Attribute getter:** getShowLegend**Attribute setter:** setShowLegend



Available from version 1.12.746

---

### 5.10.2.3.3.62 BarGraphArrangement

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiBarChart.ChartBarGraphArrangement

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getBarGraphArrangement

**Attribute setter:** setBarGraphArrangement

---



Available from version 1.12.746

---

### 5.10.2.3.3.63 ShowXAxisName

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getShowXAxisName

**Attribute setter:** setShowXAxisName

---



Available from version 1.12

---

### 5.10.2.3.3.64 XAxisName

**Schema:** tchmi:general#/definitions/String

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getXAxisName

**Attribute setter:** setXAxisName

---



Available from version 1.12

---

### 5.10.2.3.3.65 XAxisUnit

**Schema:** tchmi:general#/definitions/String

**Origin:** [Bar Chart](#) [► 143]



See also

**Attribute getter:** getXAxisUnit

**Attribute setter:** setXAxisUnit

---



Available from version 1.12

---

#### 5.10.2.3.3.66 XAxisNameFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Bar Chart](#) [► 143]

See also

**Attribute getter:** getXAxisNameFontFamily

**Attribute setter:** setXAxisNameFontFamily

---



Available from version 1.12

---

#### 5.10.2.3.3.67 XAxisNameFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Bar Chart](#) [► 143]

See also

**Attribute getter:** getXAxisNameFontSize

**Attribute setter:** setXAxisNameFontSize

---



Available from version 1.12

---

#### 5.10.2.3.3.68 XAxisNameFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Bar Chart](#) [► 143]

See also

**Attribute getter:** getXAxisNameFontSizeUnit

**Attribute setter:** setXAxisNameFontSizeUnit



Available from version 1.12

---

#### 5.10.2.3.3.69 XAxisNameFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getXAxisNameFontWeight

**Attribute setter:** setXAxisNameFontWeight

---



Available from version 1.12

---

#### 5.10.2.3.3.70 ReferenceLines

**Schema:** tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiBarChart.ChartReferenceLineDefinitionList

**Origin:** [Bar Chart](#) [► 143]

**See also**

**Attribute getter:** getReferenceLines

**Attribute setter:** setReferenceLines

---



Available since version 1.12.760

---

#### 5.10.2.3.4 Themed Resources

These resources cannot be defined for each instance but only for several/all bar charts via the theme file. If you really want to change only one instance, you must create a class for it.

---



Available from version 1.10

---

#### 5.10.2.3.4.1 DefaultGraphColor

This is the default color used for graphs when nothing is defined in the [BarGraphColors](#) [► 154] attribute.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Bar Chart](#) [► 143]

---



Available from version 1.10

---

#### 5.10.2.4 Button

The button is a simple switching element that provides visual feedback when the background is switched.

##### Attributes

##### Category: Colors

Name	Description
<a href="#">BackgroundColor</a> [ <a href="#">► 769</a> ]	Definition of the background color
<a href="#">BorderColor</a> [ <a href="#">► 768</a> ]	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Text [► 185]</a>	Definition of the text displayed in the button
<a href="#">StateSymbol [► 187]</a>	<p>Reflects the pressed state of the button for the assigned symbol and vice versa.</p> <p>If the button is pressed, the symbol is set to true.</p> <p>If the button is released, the symbol is set to false.</p> <p>If the symbol is set to true independent of the button, the button is pressed.</p> <p>If the symbol is set to false independent of the button, the button is released.</p> <p>During an active user interaction, no value changes of the symbol are transferred to the button.</p>
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Icon**

Name	Description
<a href="#">Icon [► 184]</a>	Definition of an optional image in the button
<a href="#">IconWidth [► 186]</a>	Definition of the width of the icon
<a href="#">IconWidthUnit [► 186]</a>	<p>Definition of the unit of the width:</p> <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">IconHeight [► 183]</a>	Definition of the height of the icon
<a href="#">IconHeightUnit [► 183]</a>	<p>Definition of the unit of height:</p> <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">IconHorizontalAlignment [► 183]</a>	Selecting the horizontal alignment of the icon within the control
<a href="#">IconVerticalAlignment [► 185]</a>	Selecting the vertical alignment of the icon within the control
<a href="#">IconPadding [► 184]</a>	Definition of the distance of the icon to the border

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">TextColor [► 185]</a>	Definition of the text color
<a href="#">TextFontFamily [► 181]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">TextFontSize [► 181]</a>	Definition of the font size
<a href="#">TextFontSizeUnit [► 182]</a>	Definition of the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">TextFontStyle [► 182]</a>	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">TextFontWeight [► 182]</a>	Selecting the font weight of the text: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: Bold</li> </ul>
<a href="#">TextPadding [► 184]</a>	Definition of the distance of the text to the border
<a href="#">TextVerticalAlignment [► 185]</a>	Selecting the vertical alignment of the text
<a href="#">TextHorizontalAlignment [► 183]</a>	Selecting the horizontal alignment of the text
<a href="#">WordWrap [► 186]</a>	Selecting whether the text wraps if it is too long for one row

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onStateChanged [► 187]</a>	The pressed state has changed.
<a href="#">onStatePressed [► 187]</a>	The pressed state has changed from not pressed to pressed.
<a href="#">onStateReleased [► 187]</a>	The pressed state has changed from pressed to not pressed.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.



**Access rights**

Name	Description
<a href="#">observe</a> [► 783]	Determines whether the control is generally observable.
<a href="#">operate</a> [► 783]	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control](#) [► 753]

Button

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.4.1 Attributes****5.10.2.4.1.1 TextFontFamily**

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getTextFontFamily

**Attribute setter:** setTextFontFamily



Available from 1.8

**5.10.2.4.1.2 TextFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getTextFontSize

**Attribute setter:** setTextFontSize



Available from 1.8

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#### 5.10.2.4.1.3 TextFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getTextFontSizeUnit

**Attribute setter:** setTextFontSizeUnit

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Available from 1.8

---

#### 5.10.2.4.1.4 TextFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getTextFontStyle

**Attribute setter:** setTextFontStyle

---



Available from 1.8

---

#### 5.10.2.4.1.5 TextFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getTextFontWeight

**Attribute setter:** setTextFontWeight

---



Available from 1.8

---

#### 5.10.2.4.1.6 IconHeight

Numerical value of the image height of the icon.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getIconHeight

**Attribute setter:** setIconHeight

---



Available from 1.8

---

#### 5.10.2.4.1.7 IconHeightUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getIconHeightUnit

**Attribute setter:** setIconHeightUnit

---



Available from 1.8

---

#### 5.10.2.4.1.8 IconHorizontalAlignment

Horizontal alignment of the icon.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getIconHorizontalAlignment

**Attribute setter:** setIconHorizontalAlignment

---



Available from 1.8

---

#### 5.10.2.4.1.9 TextHorizontalAlignment

Horizontal alignment of the text.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Button](#) [► 175]

**See also****Attribute getter:** getTextHorizontalAlignment**Attribute setter:** setTextHorizontalAlignmentAvailable from 1.8

---

**5.10.2.4.1.10 Icon**

Defines an optional image in the button.

**Schema:** tchmi:framework#/definitions/Path**Origin:** [Button](#) [► 175]**See also****Attribute getter:** getIcon**Attribute setter:** setIconAvailable from 1.8

---

**5.10.2.4.1.11 IconPadding**

Defines the distance of the icon to the border.

**Schema:** tchmi:framework#/definitions/Padding**Origin:** [Button](#) [► 175]**See also****Attribute getter:** getIconPadding**Attribute setter:** setIconPaddingAvailable from 1.8

---

**5.10.2.4.1.12 TextPadding**

Defines the distance of the text to the border.

**Schema:** tchmi:framework#/definitions/Padding**Origin:** [Button](#) [► 175]**See also****Attribute getter:** getTextPadding**Attribute setter:** setTextPadding



Available from 1.8

---

#### 5.10.2.4.1.13 Text

**Schema:** tchmi:general#/definitions/String

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getText

**Attribute setter:** setText

---



Available from 1.8

---

#### 5.10.2.4.1.14 TextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getTextColor

**Attribute setter:** setTextColor

---



Available from 1.8

---

#### 5.10.2.4.1.15 IconVerticalAlignment

Vertical alignment of the icon.

**Schema:** tchmi:framework#/definitions/VerticalAlignment

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getIconVerticalAlignment

**Attribute setter:** setIconVerticalAlignment

---



Available from 1.8

---

#### 5.10.2.4.1.16 TextVerticalAlignment

Vertical alignment of the text.

**Schema:** tchmi:framework#/definitions/VerticalAlignment

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getTextVerticalAlignment

**Attribute setter:** setTextVerticalAlignment

---



Available from 1.8

---

#### 5.10.2.4.1.17 IconWidth

Numerical value of the image width of the icon.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getIconWidth

**Attribute setter:** setIconWidth

---



Available from 1.8

---

#### 5.10.2.4.1.18 IconWidthUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getIconWidthUnit

**Attribute setter:** setIconWidthUnit

---



Available from 1.8

---

#### 5.10.2.4.1.19 WordWrap

Text wrapping if the content is too long to fit in a single row.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getWordWrap

**Attribute setter:** setWordWrap



Available from 1.8

---

#### 5.10.2.4.1.20 StateSymbol

Reflects the pressed state of the button for the assigned symbol and vice versa.

If the button is pressed, the symbol is set to true.

If the button is released, the symbol is set to false.

If the symbol is set to true independent of the button, the button is pressed.

If the symbol is set to false independent of the button, the button is released.

During an active user interaction, no value changes of the symbol are transferred to the button.

**Schema** (version 1.10): tchmi:framework#/definitions/TcHmiButtonStateSymbol

**Schema** (version 1.12): tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiButton.StateSymbol

**Origin:** [Button](#) [► 175]

**See also**

**Attribute getter:** getStateSymbol

**Attribute setter:** setStateSymbol

---



Available from version 1.10

---

#### 5.10.2.4.2 Events

##### 5.10.2.4.2.1 onStateChanged

The pressed state has changed.

**Origin:** [Button](#) [► 682]

---



Available from version 1.10

---

##### 5.10.2.4.2.2 onStatePressed

The pressed state has changed from not pressed to pressed.

**Origin:** [Button](#) [► 682]

---



Available from version 1.10

---

##### 5.10.2.4.2.3 onStateReleased

The pressed state has changed from pressed to not pressed.

Origin: [Button](#) [► 682]



Available from version 1.10

### 5.10.2.5      **Checkbox**

A checkbox has a [ToggleState](#) [► 194] parameter. This parameter has the value "Normal" if no checkmark is set and "Active" if the checkmark is set.

The [.onToggleStateChanged](#) [► 198] event can be used to perform actions when the state of the checkbox changes.

#### **Attributes**

##### **Category: Colors**

Name	Description
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control
<a href="#">ToggleStateIconColor</a> [► 195]	Definition of the color of the toggle state icon.
<a href="#">TextColor</a> [► 198]	Definition of the text color.
<a href="#">TextBackgroundColor</a> [► 198]	Definition of the text background color.

##### **Category: Layout**



Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">StateSymbol [► 194]</a>	Reflects the state of the checkbox to the assigned symbol and vice versa.
<a href="#">ToggleState [► 194]</a>	Definition of the internal switching state of the control
<a href="#">ToggleGroup [► 194]</a>	User-defined name for a group. Only one control in this group can be active.
<a href="#">Text [► 195]</a>	The text to be displayed next to the checkbox.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">TextPosition [► 195]</a>	The text position.
<a href="#">TextHorizontalAlignment [► 196]</a>	The horizontal alignment of the text.
<a href="#">TextVerticalAlignment [► 196]</a>	The vertical alignment of the text.
<a href="#">TextFontFamily [► 196]</a>	Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.
<a href="#">TextFontSize [► 196]</a>	The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.
<a href="#">TextFontSizeUnit [► 197]</a>	Pixels, or percent for relative sizes.
<a href="#">TextFontStyle [► 197]</a>	Font style (normal, italic: oblique with special characters, oblique)
<a href="#">TextFontWeight [► 197]</a>	The font weight (normal, bold)

## Events

### Category: Control

Name	Description
<a href="#">onToggleStateChanged [► 198]</a>	The ToggleState value of the checkbox has changed.
<a href="#">onStateChanged [► 198]</a>	The status of the checkbox has changed.

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Checkbox

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.10

---

### See also

API reference for this control

## 5.10.2.5.1 Attributes

### 5.10.2.5.1.1 StateSymbol

Reflects the state of the checkbox to the assigned symbol and vice versa.

**Schema** (version 1.10): tchmi:framework#/definitions/TcHmiCheckboxStateSymbol

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiCheckbox.StateSymbol

**Origin:** [Checkbox](#) [► 188]

### See also

**Attribute getter:** getStateSymbol

**Attribute setter:** setStateSymbol

---



Available from version 1.10

---

### 5.10.2.5.1.2 ToggleState

Internal state of the control. This can be Normal or Active.

**Schema:** tchmi:framework#/definitions/ToggleState

**Origin:** [Checkbox](#) [► 188]

### See also

**Attribute getter:** getToggleState

**Attribute setter:** setToggleState

---



Available from 1.8

---

### 5.10.2.5.1.3 ToggleGroup

User-defined name for a group.

A ToggleGroup can consist of controls of the type [Toggle Button](#) [► 682] and [Checkbox](#) [► 188].

For a more detailed description of the functionality, see the documentation at the [ToggleGroup attribute of the ToggleButton](#) [► 688].

**Schema:** tchmi:general#/definitions/String

**Origin:** [Checkbox](#) [► 188]

---

**See also****Attribute getter:** getToggleGroup**Attribute setter:** setToggleGroupAvailable from version 1.10

---

**5.10.2.5.1.4    ToggleStateIconColor****Schema:** tchmi:framework#/definitions/SolidColor**Origin:** [Checkbox](#) [► 188]**See also****Attribute getter:** getToggleStateIconColor**Attribute setter:** setToggleStateIconColorAvailable from 1.8

---

**5.10.2.5.1.5    Text**

The text to be displayed next to the checkbox.

**Schema:** tchmi:general#/definitions/String**Origin:** [Checkbox](#) [► 188]**See also****Attribute getter:** getText**Attribute setter:** setTextAvailable from version 1.12

---

**5.10.2.5.1.6    TextPosition**

The text position.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiCheckbox.TextPosition**Origin:** [Checkbox](#) [► 188]**See also****Attribute getter:** getTextPosition**Attribute setter:** setTextPositionAvailable from version 1.12

---

#### 5.10.2.5.1.7 TextHorizontalAlignment

The horizontal alignment of the text.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Checkbox](#) [► 188]

**See also**

**Attribute getter:** getTextHorizontalAlignment

**Attribute setter:** setTextHorizontalAlignment

---



Available from version 1.12

---

#### 5.10.2.5.1.8 TextVerticalAlignment

The vertical alignment of the text.

**Schema:** tchmi:framework#/definitions/VerticalAlignment

**Origin:** [Checkbox](#) [► 188]

**See also**

**Attribute getter:** getTextVerticalAlignment

**Attribute setter:** setTextVerticalAlignment

---



Available from version 1.12

---

#### 5.10.2.5.1.9 TextFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Checkbox](#) [► 188]

**See also**

**Attribute getter:** getTextFontFamily

**Attribute setter:** setTextFontFamily

---



Available from version 1.12

---

#### 5.10.2.5.1.10 TextFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Checkbox](#) [► 188]



**See also****Attribute getter:** getTextFontSize**Attribute setter:** setTextFontSizeAvailable from version 1.12

---

**5.10.2.5.1.11    TextFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Checkbox](#) [[► 188](#)]**See also****Attribute getter:** getTextFontSizeUnit**Attribute setter:** setTextFontSizeUnitAvailable from version 1.12

---

**5.10.2.5.1.12    TextFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Checkbox](#) [[► 188](#)]**See also****Attribute getter:** getTextFontStyle**Attribute setter:** setTextFontStyleAvailable from version 1.12

---

**5.10.2.5.1.13    TextFontWeight**

The font weight (normal, bold)

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Checkbox](#) [[► 188](#)]**See also****Attribute getter:** getTextFontWeight**Attribute setter:** setTextFontWeight



Available from version 1.12

---

#### 5.10.2.5.1.14 TextColor

Definition of the text color.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Checkbox](#) [► 188]

**See also**

**Attribute getter:** getTextColor

**Attribute setter:** setTextColor

---



Available from version 1.12

---

#### 5.10.2.5.1.15 TextBackgroundColor

Definition of the text background color.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Checkbox](#) [► 188]

**See also**

**Attribute getter:** getTextBackgroundColor

**Attribute setter:** setTextBackgroundColor

---



Available from version 1.12

---

### 5.10.2.5.2 Events

#### 5.10.2.5.2.1 onToggleStateChanged

The [ToggleState](#) [► 194] value of the checkbox has changed.

**Origin:** [Checkbox](#) [► 188]

---



Available from 1.8

---

#### 5.10.2.5.2.2 onStateChanged

The state has changed.

**Origin:** [Checkbox](#) [► 188]



Available from version 1.10

### 5.10.2.6 Combobox

A combo box is a drop-down menu for selecting an option from several options. Each option is defined by its ID and also has a text that is displayed in the drop-down menu, and an assigned value.

Note that the dropdown menu for the size of the control will be added to this. This becomes relevant for the topic [Overfill \[► 116\]](#) with small containers.

A description of the configuration can be found in chapter [Configuration \[► 206\]](#).

#### Attributes

##### Category: Colors

Name	Description
<a href="#">TextColor [► 217]</a>	Definition of the text color
<a href="#">DropDownTextColor [► 210]</a>	Definition of the text color in the drop-down list
<a href="#">DropDownBackgroundColor [► 208]</a>	Definition of the background color of the drop-down list
<a href="#">DropDownHighlightColor [► 210]</a>	Definition of the highlight color of the background of a selected entry in the drop-down list
<a href="#">DropDownHighlightTextColor [► 210]</a>	Definition of the highlight color of the text of a selected entry in the drop-down list
<a href="#">DropDownToggleButtonBackgroundColor [► 211]</a>	Definition of the color of the button to expand the drop-down list
<a href="#">DropDownToggleButtonArrowColor [► 211]</a>	Definition of the color of the arrow of the button to expand the drop-down list
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Data**

Name	Description
<a href="#">SrcData [► 216]</a>	Definition of data for the list entries
<a href="#">EnumDataSymbol [► 217]</a>	Definition of the data for the list entries in the form of a symbol of the type of an enumeration.
<a href="#">Text [► 217]</a>	Definition of the text that is displayed if free text entry is allowed
<a href="#">AllowTextInput [► 218]</a>	Definition as to whether free text entry is to be allowed
<a href="#">ComboboxText [► 207]</a>	Definition of the text that is displayed if no entry is selected
<a href="#">SelectedIndex [► 215]</a>	Definition of the selected entry via its index. The first entry in a drop-down list starts at index 0.
<a href="#">ContentPadding [► 218]</a>	Defines the distance of the text to the border.

**Category: Text**

Name	Description
<a href="#">TextFontFamily [► 212]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">TextFontSize [► 212]</a>	Definition of the font size
<a href="#">TextFontSizeUnit [► 212]</a>	Selecting the font size unit <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">TextFontStyle [► 213]</a>	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">TextFontWeight [► 213]</a>	Selecting the font weight <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">TextHorizontalAlignment [► 213]</a>	Selecting the horizontal alignment of the text
<a href="#">TextVerticalAlignment [► 214]</a> (Only in product version 1.8)	Definition of the vertical alignment of the text

**Category: DropDown**

Name	Description
<a href="#">DropDownHorizontalAlignment [► 210]</a>	Selecting the horizontal alignment of the text in the drop-down list
<a href="#">DropDownVerticalAlignment [► 211]</a>	Selecting the vertical alignment of the text in the drop-down list
<a href="#">DataHeight [► 207]</a>	Definition of the height of the entries in the drop-down menu
<a href="#">DataHeightUnit [► 207]</a>	Selecting the unit of the height of the list items <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">List Height [► 214]</a>	Definition of the maximum height of the drop-down list
<a href="#">List Height Unit [► 214]</a>	Selecting the unit of the drop-down list height
<a href="#">DropDownFontFamily [► 208]</a>	Definition of the font of the list items via the name of the font family or the keyword
<a href="#">DropDownFontSize [► 208]</a>	Definition of the font size of the list items
<a href="#">DropDownFontSizeUnit [► 209]</a>	Selecting the font size unit <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">DropDownFontStyle [► 209]</a>	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">DropDownFontWeight [► 209]</a>	Selecting the font weight of the text entries: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: Bold</li> </ul>
<a href="#">DropDownVerticalAlignment [► 211]</a>	Selecting the vertical alignment of the text in the drop-down list
<a href="#">DropDownStyle [► 211]</a>	Defines the position of the drop-down menu

## Events

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator



Name	Description
<a href="#">onSelectionChanged [► 218]</a>	An entry has been selected.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Combo box

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.6.1 Configuration**

The combo box drop-down list can be configured in three different ways:

- Via [Engineering](#) [► 206]
- Via an [array from the PLC](#) [► 206]
  - Array of a structure representing the structure of a list entry



The structure elements must be named identically to the attributes defined on the TwinCAT HMI side. Upper and lower case is taken into account.

```
aComboboxEntries : ARRAY [1..5] OF ST_ComboboxEntry;
TYPE ST_ComboboxEntry:
STRUCT
id : INT;
text : STRING;
value : INT;
END_STRUCT
END_TYPE
```

- Array of a simple data type

```
aTexts : ARRAY [1..5] OF STRING;
aValues : ARRAY [1..5] OF INT;
```

The selected element of the drop-down list can be queried through various [Attributes](#) [► 206].

Definition via Engineering:

1. Add a combo box to the interface.
2. Change the drop-down list for the 'Src Data' attribute of the 'Data' category using the '[Combobox Src Data](#) [► 206]' dialog
  1. Define the required number of entries and their sequence.
  2. For each of the three entries, assign an ID, a text that is displayed in the drop-down list and the value behind this entry.

Definition via an array from the PLC:

1. Add a combo box to the interface.
2. Link the array to the 'Src Data' attribute of the 'Data' category





To display the information of the selected element in the drop-down list, you can perform the following steps:

1. Add three text blocks.
2. Link the first text block with the attribute 'TcHmiCombobox::SelectedIndex'.
3. Link the second text block with the attribute 'TcHmiCombobox::SelectedText'.
4. Link the third text block with the attribute 'TcHmiCombobox::SelectedValue'.

Sample project: [Combobox](#) [► 1580]

**5.10.2.6.2 Dialogs****5.10.2.6.2.1 ComboboxSrcData dialog**

This dialog can be used to define the entries of a combo box in the Engineering.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Category: General

Name	Description
ID	Definition of a freely selectable ID for the list entry. This ID must be unique within the defined entries.
Text	Definition of the text of the list entry
Value	Definition of the value of a list entry

### 5.10.2.6.3 Attributes

#### 5.10.2.6.3.1 DataHeight

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Combobox](#) [[► 199](#)]

**See also**

**Attribute getter:** getDataHeight

**Attribute setter:** setDataHeight



Available from 1.8

#### 5.10.2.6.3.2 DataHeightUnit

Only pixel is allowed here.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Combobox](#) [[► 199](#)]

**See also**

**Attribute getter:** getDataHeightUnit

**Attribute setter:** setDataHeightUnit



Available from 1.8

#### 5.10.2.6.3.3 ComboboxText

The text that is displayed if no entry is selected.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getComboboxText

**Attribute setter:** setComboboxText

---



Available from 1.8

---

#### 5.10.2.6.3.4 DropDownBackgroundColor

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getDropDownBackgroundColor

**Attribute setter:** setDropDownBackgroundColor

---



Available from 1.8

---

#### 5.10.2.6.3.5 DropDownFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getDropDownFontFamily

**Attribute setter:** setDropDownFontFamily

---



Available from 1.8

---

#### 5.10.2.6.3.6 DropDownFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getDropDownFontSize

**Attribute setter:** setDropDownFontSize

---



Available from 1.8

---

#### 5.10.2.6.3.7 DropDownFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Combobox](#) [[►](#) 199]

**See also**

**Attribute getter:** getDropDownFontSizeUnit

**Attribute setter:** setDropDownFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.6.3.8 DropDownFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Combobox](#) [[►](#) 199]

**See also**

**Attribute getter:** getDropDownFontStyle

**Attribute setter:** setDropDownFontStyle

---



Available from 1.8

---

#### 5.10.2.6.3.9 DropDownFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Combobox](#) [[►](#) 199]

**See also**

**Attribute getter:** getDropDownFontWeight

**Attribute setter:** setDropDownFontWeight

---



Available from 1.8

---

#### 5.10.2.6.3.10 DropDownHighlightColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getDropDownHighlightColor

**Attribute setter:** setDropDownHighlightColor

---



Available from 1.8

---

#### 5.10.2.6.3.11 DropDownHighlightTextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getDropDownHighlightTextColor

**Attribute setter:** setDropDownHighlightTextColor

---



Available from 1.8

---

#### 5.10.2.6.3.12 DropDownHorizontalAlignment

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getDropDownHorizontalAlignment

**Attribute setter:** setDropDownHorizontalAlignment

---



Available from 1.8

---

#### 5.10.2.6.3.13 DropDownTextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getDropDownTextColor

**Attribute setter:** setDropDownTextColor



Available from 1.8

---

#### 5.10.2.6.3.14 DropDownToggleButtonArrowColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getDropDownToggleButtonArrowColor

**Attribute setter:** setDropDownToggleButtonArrowColor

---



Available from 1.8

---

#### 5.10.2.6.3.15 DropDownToggleButtonBackgroundColor

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getDropDownToggleButtonBackgroundColor

**Attribute setter:** setDropDownToggleButtonBackgroundColor

---



Available from 1.8

---

#### 5.10.2.6.3.16 DropDownVerticalAlignment

**Schema:** tchmi:framework#/definitions/VerticalAlignment

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getDropDownVerticalAlignment

**Attribute setter:** setDropDownVerticalAlignment

---



Available from 1.8

---

#### 5.10.2.6.3.17 DropDownStyle

Defines the position of the drop-down menu.

- "Desktop" is the classic representation at the position of the control.
- "Mobile" is the representation in the middle of an overlay in the screen, which is separated from the background.

**Schema** (version 1.10): tchmi:framework#/definitions/DropDownStyle

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiCombobox.DropDownStyle

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getDropDownStyle

**Attribute setter:** setDropDownStyle

---



Available from version 1.10

---

#### 5.10.2.6.3.18    **TextFontFamily**

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getTextFontFamily

**Attribute setter:** setTextFontFamily

---



Available from 1.8

---

#### 5.10.2.6.3.19    **TextFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getTextFontSize

**Attribute setter:** setTextFontSize

---



Available from 1.8

---

#### 5.10.2.6.3.20    **TextFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Combobox](#) [► 199]



**See also****Attribute getter:** getTextFontSizeUnit**Attribute setter:** setTextFontSizeUnitAvailable from 1.8

---

**5.10.2.6.3.21    TextFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Combobox](#) [► 199]**See also****Attribute getter:** getTextFontStyle**Attribute setter:** setTextFontStyleAvailable from 1.8

---

**5.10.2.6.3.22    TextFontWeight**

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Combobox](#) [► 199]**See also****Attribute getter:** getTextFontWeight**Attribute setter:** setTextFontWeightAvailable from 1.8

---

**5.10.2.6.3.23    TextHorizontalAlignment**

Horizontal alignment of the text.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment**Origin:** [Combobox](#) [► 199]**See also****Attribute getter:** getTextHorizontalAlignment**Attribute setter:** setTextHorizontalAlignment



Available from 1.8

---

#### 5.10.2.6.3.24 TextVerticalAlignment

Vertical alignment of the text.

**Schema:** tchmi:framework#/definitions/VerticalAlignment

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getTextVerticalAlignment

**Attribute setter:** setTextVerticalAlignment

---



Available from 1.8

---



Removed in version 1.10

---

#### 5.10.2.6.3.25 MaxListHeight

Defines the height of the combo box.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getMaxListHeight

**Attribute setter:** setMaxListHeight

---



Available from version 1.10

---

#### 5.10.2.6.3.26 MaxListHeightUnit

Only pixel is allowed here.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getMaxListHeightUnit

**Attribute setter:** setMaxListHeightUnit



Available from version 1.10

---

#### 5.10.2.6.3.27 SelectedId

ID [► 216] of the currently selected entry. This ID must be unique within the defined entries.

**Schema:** tchmi:general#/definitions/UDINT

**Origin:** Combobox [► 199]

**See also**

**Attribute getter:** getSelectedId

**Attribute setter:** setSelectedId

---



Available from 1.8

---

#### 5.10.2.6.3.28 SelectedIndex

Index [► 216] of the currently selected entry. The first entry in a drop-down list starts at index 0.

**Schema:** tchmi:general#/definitions/UDINT

**Origin:** Combobox [► 199]

**See also**

**Attribute getter:** getSelectedIndex

**Attribute setter:** setSelectedIndex

---



Available from 1.8

---

#### 5.10.2.6.3.29 SelectedText

Display text [► 216] of the currently selected entry.

**Schema:** tchmi:general#/definitions/String

**Origin:** Combobox [► 199]

**See also**

**Attribute getter:** getSelectedText

The attribute can only be read and therefore has no setter.

---



Available from 1.8

---

### 5.10.2.6.3.30 SelectedValue

Value [[▶ 216](#)] of the currently selected entry.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Combobox](#) [[▶ 199](#)]

**See also**

**Attribute getter:** getSelectedValue

The attribute can only be read and therefore has no setter.



Available from 1.8

### 5.10.2.6.3.31 SrcData

Data for the options menu.

A simple list of options can be compiled in the Engineering. Each option consists of these components:

- [ID](#) [[▶ 215](#)]: Custom ID
- [Text](#) [[▶ 215](#)]: Display text
- [Value](#) [[▶ 216](#)]: Value that can be passed on later within the application.
- Category (version 1.12.744): An optional category of the value, which is displayed in the DropDown of the control.

Further, complex data are supported by using [Binding](#) [[▶ 108](#)] for this parameter.

- Arrays can be used directly. In this way, a string array or number array can also be linked.
- Objects are supported as a key-value list. The name of the property is interpreted as display text, the value is interpreted as a value.



The categories (and the display text independent of the value) can be used to easily group the values.

```
Category A
  Option 1 => valueA1
  Option 2 => valueA2
Category B
  Option 1 => valueB1
  Option 2 => valueB2
```

**Schema** (version 1.8): tchmi:framework#/definitions/ListItemList

**Schema** (version 1.12): tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiCombobox.ListItem

**Origin:** [Combobox](#) [[▶ 199](#)]

**See also**

**Attribute getter:** getSrcData

**Attribute setter:** setSrcData



Available from 1.8

### 5.10.2.6.3.32 EnumDataSymbol

Data for the options menu in the form of an enumeration type symbol. The fields of the enumeration are displayed in the combo box if they are described in the schema. The values correspond to the values in the enumeration. The current enumeration value of the symbol is selected automatically.

If a new value is selected in the combo box, this is also transferred to the symbol.

If the value of the symbol is changed, this value is also selected in the combo box.

If a valid value is assigned to this attribute, the [SrcData \[► 216\]](#) attribute is ignored as long as this value is assigned.

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiCombobox.EnumDataSymbol

**Origin:** [Combobox \[► 199\]](#)

**See also**

**Attribute getter:** getEnumDataSymbol

**Attribute setter:** setEnumDataSymbol



Available from version 1.12.744.2

---

### 5.10.2.6.3.33 TextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Combobox \[► 199\]](#)

**See also**

**Attribute getter:** getTextColor

**Attribute setter:** setTextColor



Available from 1.8

---

### 5.10.2.6.3.34 Text

The text that is displayed when text input is allowed.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Combobox \[► 199\]](#)

**See also**

**Attribute getter:** getText

**Attribute setter:** setText



Available from 1.8

---

### 5.10.2.6.3.35 AllowTextInput

Definition of whether free text entries are allowed.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getAllowTextInput

**Attribute setter:** setAllowTextInput

---



Available from 1.8

---

### 5.10.2.6.3.36 ContentPadding

Defines the distance of the text to the border.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Combobox](#) [► 199]

**See also**

**Attribute getter:** getContentPadding

**Attribute setter:** setContentPadding

---



Available from version 1.10

---

## 5.10.2.6.4 Events

### 5.10.2.6.4.1 onSelectionChanged

A new entry has been selected.

**Origin:** [Combobox](#) [► 199]

---



Available from 1.8

---

## 5.10.2.7 Datagrid

A data grid is a table. Data sets can be displayed in this table that have been defined via Engineering or dynamically via an array.

A description of the configuration can be found in chapter [Configuration](#) [► 226].

**Attributes**

**Category:** Colors

Name	Description
<a href="#">HeaderBackgroundColor [► 236]</a>	Definition of the background color of the header row
<a href="#">HeaderTextColor [► 239]</a>	Definition of the text color of the column headers
<a href="#">RowNumbersBackgroundColor [► 240]</a>	Definition of the background color of the column for row numbering
<a href="#">RowNumbersTextColor [► 242]</a>	Definition of the text color of the row numbering
<a href="#">TableBorderColor [► 246]</a>	Definition of the grid color
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.



Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control
<a href="#">DataSymbol [► 234]</a>	Defines a symbol as data source.

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Data**

Name	Description
<a href="#">SrcColumn</a> [► 245]	Definition of column options - the assignment of options to rows is based on the order in the <a href="#">Column Definitions dialog</a> [► 227]
<a href="#">SrcData</a> [► 245]	Definition of the data to be displayed in the DataGrid
<a href="#">SelectedColumnIndex</a> [► 244]	Definition of the selected column using the column index
<a href="#">SelectedRowIndex</a> [► 244]	Definition of the selected row using the row index
<a href="#">Sorting</a> [► 246]	Defines sorting rules for sorting the displayed data.
<a href="#">Filter</a> [► 247]	Defines filter rules that are applied to read access to the DataSymbol when using DataSymbol.

**Category: Grid**

Name	Description
<a href="#">RowHeight</a> [► 239]	Definition of the row height
<a href="#">RowHeightUnit</a> [► 239]	Definition of the unit of the row height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">TableBorderWidth</a> [► 247]	Definition of the line width of the grid
<a href="#">TableBorderWidthUnit</a> [► 236]	Selecting the unit of the line width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">TableBorderStyle</a> [► 246]	Selecting the style of the grid lines
<a href="#">CellContentPadding</a> [► 234]	Definition of the distance of the text to the edge of the cell
<a href="#">GridFontFamily</a> [► 234]	Definition of the font using the name of the font family or the keyword
<a href="#">GridFontSize</a> [► 235]	Definition of the font size of the table contents
<a href="#">GridFontSizeUnit</a> [► 235]	Definition of the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">GridFontStyle</a> [► 235]	Selecting the font style of the table contents: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">GridFontWeight</a> [► 236]	Selecting the font weight of the table contents: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>
<a href="#">SrcDataHasChanged</a> [► 245]	Indicates whether the user has changed the data.
<a href="#">SelectedRowValue</a> [► 244]	The value of the selected row.
<a href="#">SelectedCellValue</a> [► 243]	The value of the selected cell.

**Category: Header**

Name	Description

**Category: Row Numbers**

Name	Description
<a href="#">ShowRowNumbers [► 245]</a>	Selecting whether the row numbering is to be displayed
<a href="#">RowNumbersResizable [► 242]</a>	Selecting whether the width of the columns can be changed at runtime using the separators in the column header row
<a href="#">RowNumbersWidth [► 243]</a>	Definition of the width of the row numbering column
<a href="#">RowNumbersWidthUnit [► 243]</a>	Selecting the unit of column width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">RowNumbersCellPadding [► 240]</a>	Definition of the distance of the numbering to the edge of the cell
<a href="#">RowNumbersFontFamily [► 240]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">RowNumbersFontSize [► 241]</a>	Definition of the font size of the row numbering
<a href="#">RowNumbersFontSizeUnit [► 241]</a>	Definition of the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">RowNumbersFontStyle [► 241]</a>	Definition of the font style of the row numbering: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">RowNumbersFontWeight [► 242]</a>	Definition of the font weight of the row numbering: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">RowNumbersHorizontalAlignment [► 242]</a>	Definition of horizontal alignment of row numbering
<a href="#">RowNumbersVerticalAlignment [► 243]</a>	Definition of vertical alignment of row numbering
<a href="#">RowNumbersStartNumber [► 249]</a>	Start value of the series numbering.

**Category: Table Border**

Name	Description

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onDataChanged [► 250]</a>	The data has been changed.
<a href="#">onSelectedItemChanged [► 250]</a>	Another entry is now selected.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Datagrid

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

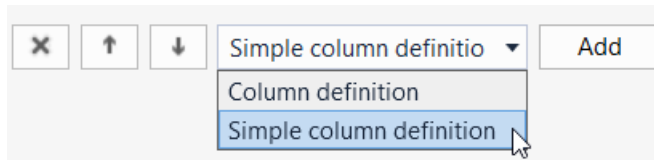
See also

API reference for this control

### 5.10.2.7.1 Configuration

The data grid can be configured as follows to display a one-dimensional array:

1. Add a data grid to the interface.
2. Link the one-dimensional array with the attribute "[SrcData \[▸ 245\]](#)" of the category "Data".
3. Change the column settings for the "[SrcColumns \[▸ 245\]](#)" attribute in the "Data" category using the [Column Definitions dialog \[▸ 227\]](#).
4. Remove the default columns.
5. Add a new column of type "SimpleColumnDefinition".



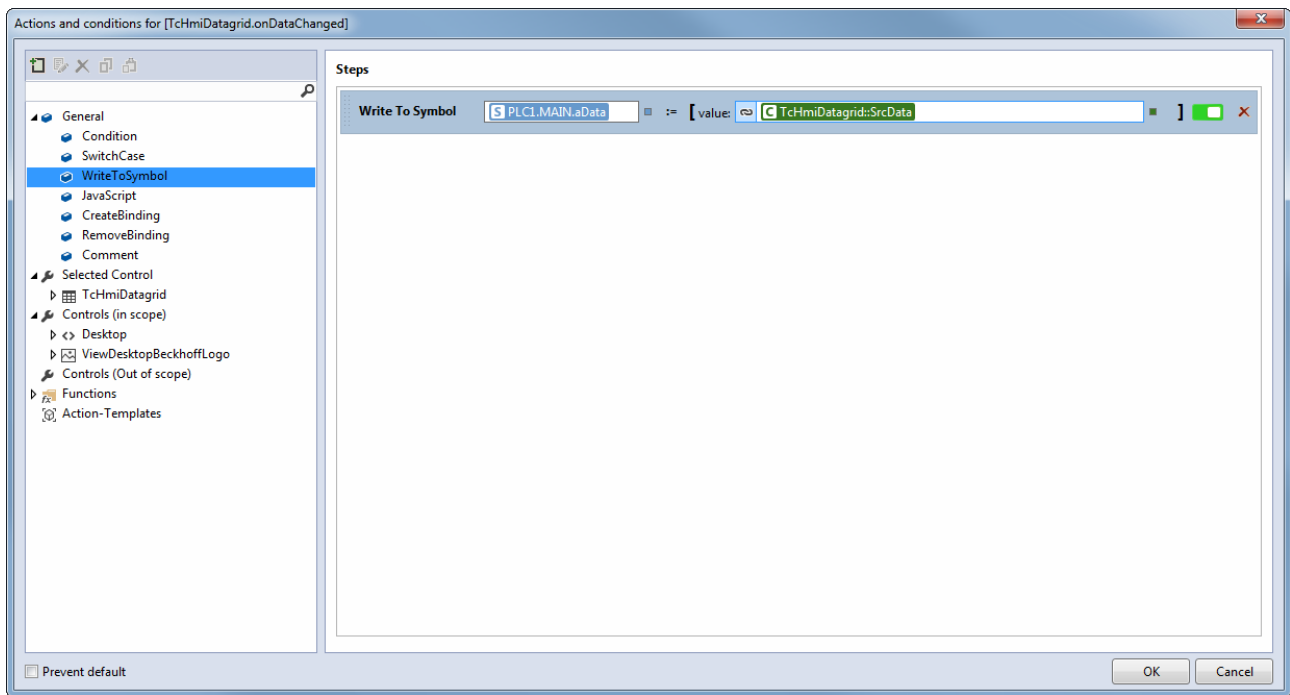
6. The column can then be configured.

For an array of a structure, you can proceed as follows:

1. Add a data grid to the interface.
2. Link the desired array with the attribute "[SrcData \[▸ 245\]](#)" of the category "Data".
3. Change the column settings for the "[SrcColumns \[▸ 245\]](#)" attribute in the "Data" category using the [Column Definitions dialog \[▸ 227\]](#).
4. Define the desired number of columns of type "ColumnDefinitnion" and their order.
5. Adjust the settings of each column; the "Name" attribute must correspond to the name of the structure element of the array that is to be displayed in this column.  
The definition of the "Name" attribute is case-sensitive.  
For nested structures, you can use "::" as a separator to access the sub-elements of the structure, for example, "myStruct::myStructMember".

In order for changes in the data grid to be written back to the controller, the following steps must be performed:

1. Go to the Events page of the Properties window.
2. Configure the "[.onDataChanged \[▸ 250\]](#)" event.
3. Add a "[WriteToSymbol \[▸ 65\]](#)" action.
4. Link the first parameter to your array.
5. Link the second parameter with the attribute "TcHmiDatagrid::SrcData".



Sample: [Datagrid \[► 1580\]](#)

## 5.10.2.7.2 Dialogs

### 5.10.2.7.2.1 Column Definitions dialog

This dialog can be used to customize the data grid column settings.

Data Definitions

✕

Elements

Name	Label	Control	Width	Unit
Test1	Column 1	TextBlock	70	px
Test2	Column 2	TextBlock	70	px
Test3	Column 3	CheckBox	70	px
Test4	Column 4	TextBox	100	px

✕

↑

↓

Column definition

Add

Properties

▲ Colors

Cell background

Theme

□

Text color

Theme

□

▲ General

Name

fx

Test1

□

Label

fx

Column 1

□

Control

TextBlock

□

Width

70

px

□

Resize

☒

□

Sortable

☐

□

Min width

100

px

□

Editable

☐

□

Horizontal alignment

□

Vertical alignment

□

Format

(Object)

...

□





OK

Cancel



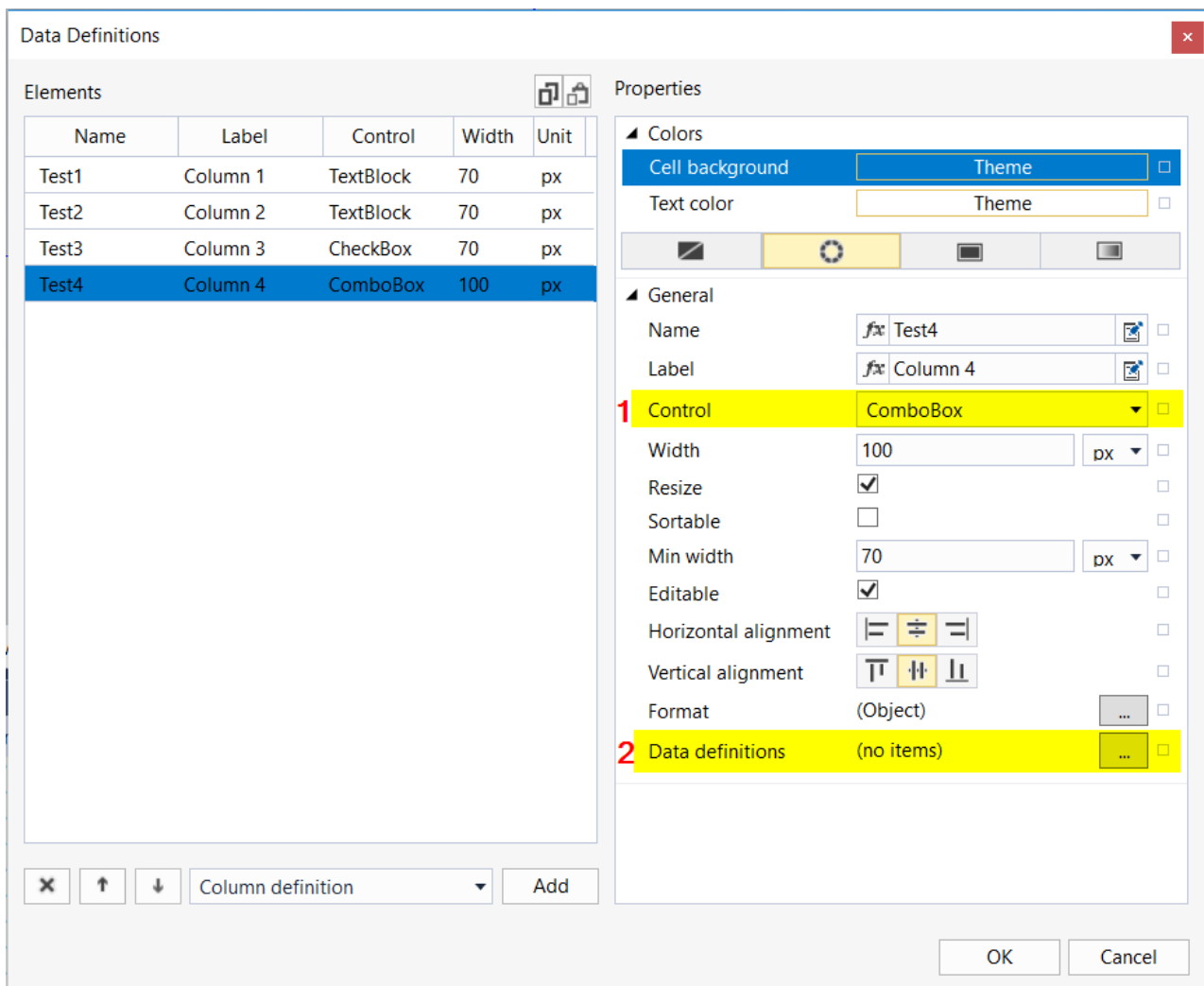
Properties	Settings of the column object selected under 'Elements'
Name	Definition of the name of the structure item to be displayed in this column. The value must match the name of the structure member. Upper and lower case is taken into account.
Label	Definition of the column header
Control	Selection of controls to be displayed for the cell: <ul style="list-style-type: none"> <li>• <a href="#">TextBlock [► 629]</a></li> <li>• <a href="#">TextBox [► 639]</a></li> <li>• <a href="#">CheckBox [► 188]</a></li> <li>• <a href="#">ComboBox [► 199]</a></li> <li>• <a href="#">Image [► 361]</a></li> </ul>
Width	Definition of the column width
Resize	Selecting whether the column width should be customizable by the user
Min width	Definition of the minimum column width
Editable	Defines whether the column can be edited. This option has no effect if control is 'TextBlock' or 'Image'.
Horizontal alignment	Selecting the horizontal alignment of the column contents
Vertical alignment	Selecting the vertical alignment of the column contents
Data definitions	Definition of the ComboBox / Image content; this attribute is available once the ComboBox or Image control type has been selected.
Format	<a href="#">Formatting function [► 924]</a> that can convert the displayed value.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

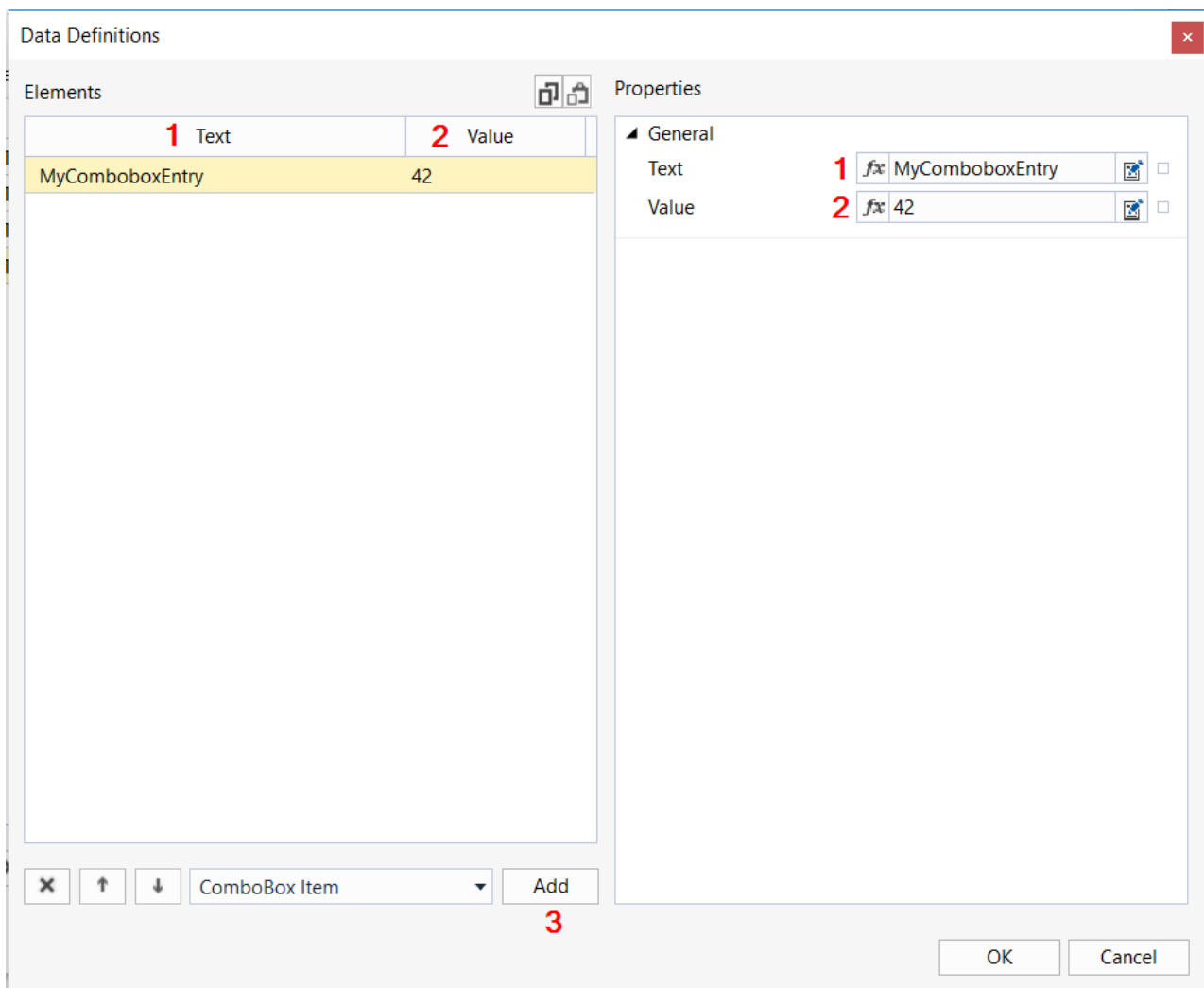
#### 5.10.2.7.2.1.1 Show combo box

The data grid offers the possibility to display a column as a combo box.



1. Select the **Combobox** control type.
2. Open the **Data definitions** dialog by clicking the ... button.

In the **Data definitions** dialog you can add as many entries as you like.



1. **Text:** Text that is displayed for the combo box entry.
2. **Value:** Value used to select the combo box entry.
3. **Add:** Adds a new combo box entry.

After configuration, the combobox automatically displays the text stored for the respective value. The data structure specifies from the outside the value used to select the entry in the combo box.

The following sample is based on the default configuration of the data grid. The code can be copied under the attribute `SrcData`: [\[► 245\]](#)

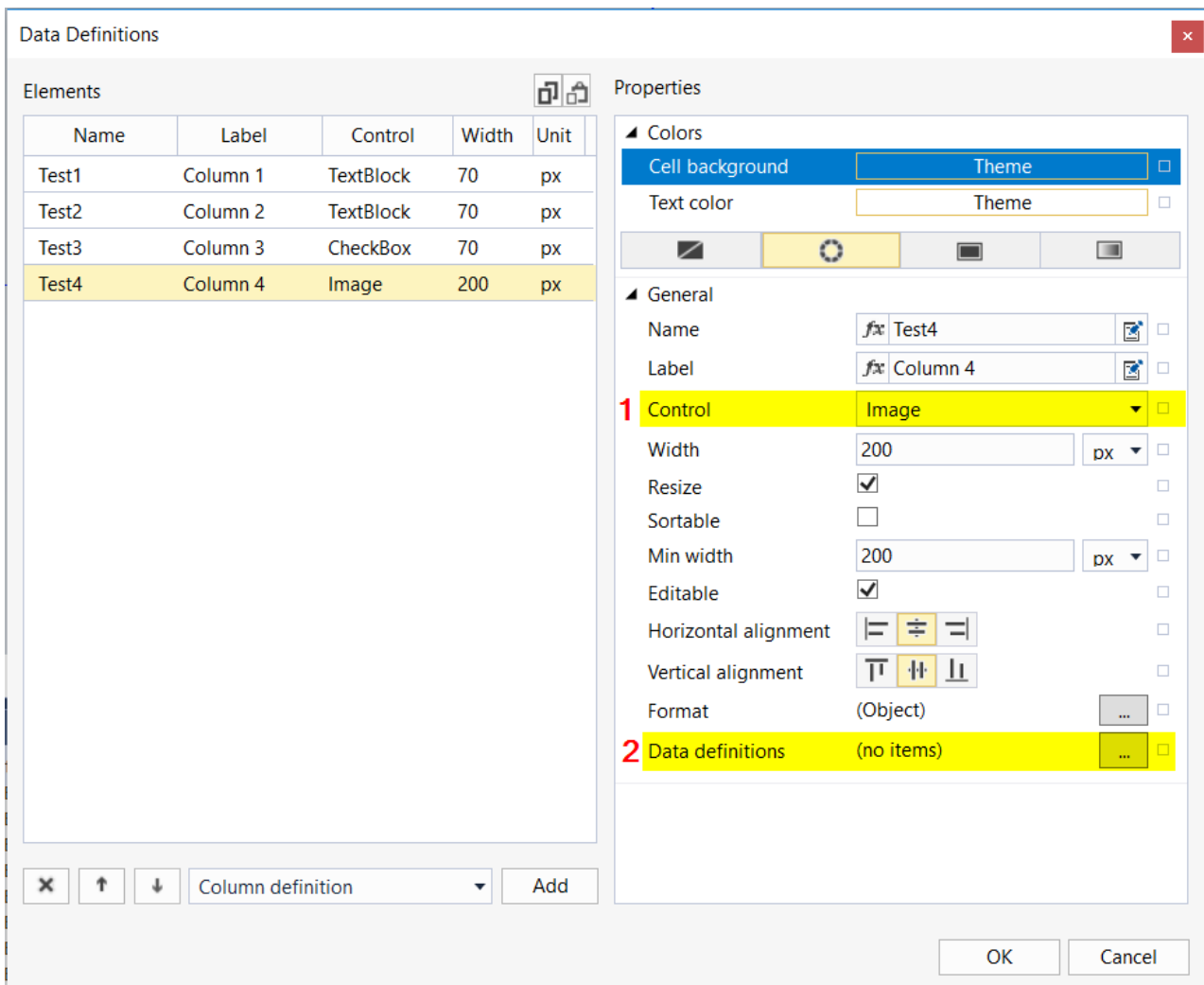
```
[
  {
    "Test1": "Example Data",
    "Test2": 42,
    "Test3": true,
    "Test4": "42"
  },
  {
    "Test1": "Example Data",
    "Test2": 3.1415,
    "Test3": false,
    "Test4": "43"
  }
]
```

This results in the following view:

	Column 1	Column 2 ↕	Column 3	Column 4
1	Example Data	42	✓	MyComboboxEntry ▼
2	Example Data	3.1415		MyComboboxEntry2 ▼

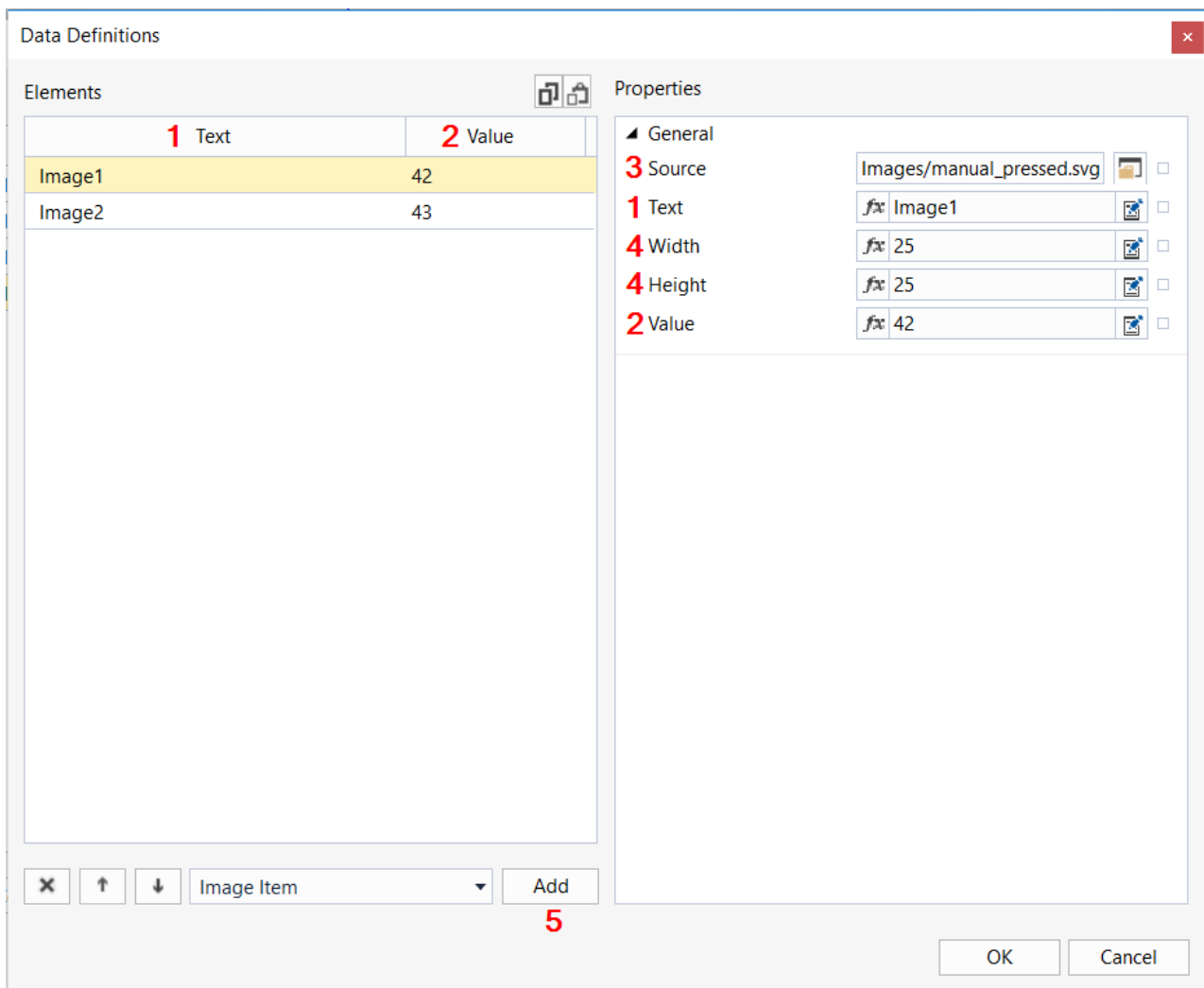
#### 5.10.2.7.2.1.2 Show image

The data grid offers the possibility to display a column as an image.



1. Select the "Image" control type.
2. Open the "Data definitions" dialog by clicking the "..." button.

In the "Data definitions" dialog you can add as many entries as you like.





1. **Text:** Name of the image. This property is used for clarity and is not displayed in the data grid.
2. **Value:** Value that controls which image is displayed.
3. **Source:** Path to the image to be displayed.
4. **Width / Height:** Width and height at which the image is to be displayed in the column.
5. **Add:** Adds a new image entry.

After configuration, the column automatically displays the image that is stored for the respective value. The data structure specifies from the outside the value used to load the different images.

The following sample is based on the default configuration of the data grid. The code can be copied under the attribute SrcData: [\[► 245\]](#)

```
[
  {
    "Test1": "Example Data",
    "Test2": 42,
    "Test3": true,
    "Test4": "42"
  },
  {
    "Test1": "Example Data",
    "Test2": 3.1415,
    "Test3": false,
    "Test4": "43"
  }
]
```

This results in the following view:

	Column 1	Column 2 ↕	Column 3	Column 4
1	Example Data	42	<input checked="" type="checkbox"/>	
2	Example Data	3.1415	<input type="checkbox"/>	

### 5.10.2.7.3 Attributes

#### 5.10.2.7.3.1 CellContentPadding

Defines the distance of the cells to the border.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getCellContentPadding

**Attribute setter:** setCellContentPadding



Available from 1.8

---

#### 5.10.2.7.3.2 DataSymbol

Defines a symbol as data source.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiDatagrid.DataSymbol

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getDataSymbol

**Attribute setter:** setDataSymbol



Available from version 1.12

---

#### 5.10.2.7.3.3 GridFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getGridFontFamily

**Attribute setter:** setGridFontFamily



Available from 1.8

---

#### 5.10.2.7.3.4 GridFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getGridFontSize

**Attribute setter:** setGridFontSize

---



Available from 1.8

---

#### 5.10.2.7.3.5 GridFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getGridFontSizeUnit

**Attribute setter:** setGridFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.7.3.6 GridFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getGridFontStyle

**Attribute setter:** setGridFontStyle

---



Available from 1.8

---

#### 5.10.2.7.3.7 GridFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getGridFontWeight

**Attribute setter:** setGridFontWeight

---



Available from 1.8

---

#### 5.10.2.7.3.8 GridWidthUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getGridWidthUnit

**Attribute setter:** setGridWidthUnit

---



Available from 1.8

---

#### 5.10.2.7.3.9 HeaderBackgroundColor

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getHeaderBackgroundColor

**Attribute setter:** setHeaderBackgroundColor

---



Available from 1.8

---

#### 5.10.2.7.3.10 HeaderCellPadding

Defines the distance between the header and the border.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Datagrid](#) [► 218]



**See also****Attribute getter:** getHeaderCellPadding**Attribute setter:** setHeaderCellPaddingAvailable from 1.8

---

**5.10.2.7.3.11 HeaderFontFamily**

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily**Origin:** [Datagrid](#) [► 218]**See also****Attribute getter:** getHeaderFontFamily**Attribute setter:** setHeaderFontFamilyAvailable from 1.8

---

**5.10.2.7.3.12 HeaderFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue**Origin:** [Datagrid](#) [► 218]**See also****Attribute getter:** getHeaderFontSize**Attribute setter:** setHeaderFontSizeAvailable from 1.8

---

**5.10.2.7.3.13 HeaderFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Datagrid](#) [► 218]**See also****Attribute getter:** getHeaderFontSizeUnit**Attribute setter:** setHeaderFontSizeUnit



Available from 1.8

---

#### 5.10.2.7.3.14 HeaderFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getHeaderFontStyle

**Attribute setter:** setHeaderFontStyle

---



Available from 1.8

---

#### 5.10.2.7.3.15 HeaderFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getHeaderFontWeight

**Attribute setter:** setHeaderFontWeight

---



Available from 1.8

---

#### 5.10.2.7.3.16 HeaderHeight

Definition of the height of the header.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getHeaderHeight

**Attribute setter:** setHeaderHeight

---



Available from 1.8

---

### 5.10.2.7.3.17 HeaderHeightUnit

Defines the unit of the height of the header:

- Pixels for an absolute size
- Percent for a relative size

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getHeaderHeightUnit

**Attribute setter:** setHeaderHeightUnit



Available from 1.8

---

### 5.10.2.7.3.18 HeaderTextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getHeaderTextColor

**Attribute setter:** setHeaderTextColor



Available from 1.8

---

### 5.10.2.7.3.19 RowHeight

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowHeight

**Attribute setter:** setRowHeight



Available from 1.8

---

### 5.10.2.7.3.20 RowHeightUnit

Pixel unit. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Datagrid](#) [► 218]

**See also****Attribute getter:** getRowHeightUnit

The attribute can only be read and therefore has no setter.

---



Available from 1.8

---

**5.10.2.7.3.21 RowNumbersBackgroundColor**

Background color of the number column.

**Schema:** tchmi:framework#/definitions/Color**Origin:** [Datagrid](#) [► 218]**See also****Attribute getter:** getRowNumbersBackgroundColor**Attribute setter:** setRowNumbersBackgroundColor

Available from 1.8

---

**5.10.2.7.3.22 RowNumbersCellPadding**

Defines the distance of the number column to the border.

**Schema:** tchmi:framework#/definitions/Padding**Origin:** [Datagrid](#) [► 218]**See also****Attribute getter:** getRowNumbersCellPadding**Attribute setter:** setRowNumbersCellPadding

Available from 1.8

---

**5.10.2.7.3.23 RowNumbersFontFamily**

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:general#/definitions/String**Origin:** [Datagrid](#) [► 218]**See also****Attribute getter:** getRowNumbersFontFamily**Attribute setter:** setRowNumbersFontFamily



Available from 1.8

---

#### 5.10.2.7.3.24 RowNumbersFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowNumbersFontSize

**Attribute setter:** setRowNumbersFontSize

---



Available from 1.8

---

#### 5.10.2.7.3.25 RowNumbersFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowNumbersFontSizeUnit

**Attribute setter:** setRowNumbersFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.7.3.26 RowNumbersFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowNumbersFontStyle

**Attribute setter:** setRowNumbersFontStyle

---



Available from 1.8

---

### 5.10.2.7.3.27 RowNumbersFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowNumbersFontWeight

**Attribute setter:** setRowNumbersFontWeight

---



Available from 1.8

---

### 5.10.2.7.3.28 RowNumbersHorizontalAlignment

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowNumbersHorizontalAlignment

**Attribute setter:** setRowNumbersHorizontalAlignment

---



Available from 1.8

---

### 5.10.2.7.3.29 RowNumbersResizable

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowNumbersResizable

**Attribute setter:** setRowNumbersResizable

---



Available from 1.8

---

### 5.10.2.7.3.30 RowNumbersTextColor

Text color of the number column.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowNumbersTextColor

**Attribute setter:** setRowNumbersTextColor

---



Available from 1.8

---

#### 5.10.2.7.3.31 RowNumbersVerticalAlignment

**Schema:** tchmi:framework#/definitions/VerticalAlignment

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowNumbersVerticalAlignment

**Attribute setter:** setRowNumbersVerticalAlignment

---



Available from 1.8

---

#### 5.10.2.7.3.32 RowNumbersWidth

Width of the number column.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowNumbersWidth

**Attribute setter:** setRowNumbersWidth

---



Available from 1.8

---

#### 5.10.2.7.3.33 RowNumbersWidthUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowNumbersWidthUnit

**Attribute setter:** setRowNumbersWidthUnit

---



Available from 1.8

---

#### 5.10.2.7.3.34 SelectedCellValue

**Schema:** tchmi:general#/definitions/Any

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** `getSelectedCellValue`

The attribute can only be read and therefore has no setter.



Available from version 1.10

---

#### 5.10.2.7.3.35 SelectedColumnIndex

The selected column is addressed by index.

**Schema:** `tchmi:general#/definitions/UDINT`

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** `getSelectedColumnIndex`

**Attribute setter:** `setSelectedColumnIndex`



Available from 1.8

---

#### 5.10.2.7.3.36 SelectedRowIndex

The selected row is addressed by index.

**Schema:** `tchmi:general#/definitions/UDINT`

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** `getSelectedRowIndex`

**Attribute setter:** `setSelectedRowIndex`



Available from 1.8

---

#### 5.10.2.7.3.37 SelectedRowValue

**Schema:** `tchmi:general#/definitions/Any`

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** `getSelectedRowValue`

The attribute can only be read and therefore has no setter.





Available from version 1.10

---

### 5.10.2.7.3.38 ShowRowNumbers

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getShowRowNumbers

**Attribute setter:** setShowRowNumbers

---



Available from 1.8

---

### 5.10.2.7.3.39 SrcColumn

**Schema** (version 1.8): tchmi:framework#/definitions/DGColumnDefinitionList

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiDatagrid.ColumnDefinitionList

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getSrcColumn

**Attribute setter:** setSrcColumn

---



Available from 1.8

---

### 5.10.2.7.3.40 SrcData

**Schema:** tchmi:general#/definitions/Array

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getSrcData

**Attribute setter:** setSrcData

---



Available from 1.8

---

### 5.10.2.7.3.41 SrcDataHasChanged

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getSrcDataHasChanged

The attribute can only be read and therefore has no setter.



Available from version 1.10

**5.10.2.7.3.42    Sorting**

Defines sorting rules for sorting the displayed data.

**Schema** (version 1.10): tchmi:framework#/definitions/DGSorting

**Schema** (version 1.12): tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiDatagrid.Sorting

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getSorting

**Attribute setter:** setSorting



Available from version 1.10

**5.10.2.7.3.43    TableBorderColor**

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getTableBorderColor

**Attribute setter:** setTableBorderColor



Available from 1.8

**5.10.2.7.3.44    TableBorderStyle**

**Schema:** tchmi:framework#/definitions/BorderStyle

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getGridStyle

**Attribute setter:** setGridStyle



Available from 1.8

#### 5.10.2.7.3.45 TableBorderWidth

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getTableBorderWidth

**Attribute setter:** setTableBorderWidth

---



Available from 1.8

---

#### 5.10.2.7.3.46 Filter

Defines filter rules that are applied to read access to the DataSymbol when using DataSymbol.

**Schema:** tchmi:server#/definitions/filter

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getFilter

**Attribute setter:** setFilter

---



Available from version 1.12

---

#### 5.10.2.7.3.47 RowClassesProvider

Can be used to change the display of table rows or cells depending on the data. To do this, the attribute is configured with a user-defined function that takes the contents of a single table row and returns an array of strings that are set as CSS classes on the respective row element. Using a custom CSS file or theme, these classes can be used to customize the look of the table.

**Schema:** tchmi:framework#/definitions/Function

**Origin:** [Datagrid](#) [► 218]

**See also**

**Attribute getter:** getRowClassesProvider

**Attribute setter:** setRowClassesProvider

---



Available from version 1.10

---

#### Sample

To use this attribute, a new function must first be added to the project. To do this, right-click on the desired folder in your project and select "Add" > "New Item...". In the "Add New Item" dialog, select the "Function (TypeScript)" template, name the new function, and click Add. In the Solution Explorer of your project you will

now find two new files, one with the extension ".ts" which contains the code of the function and below it one with the extension ".function.json" which defines the function parameters, the type of the return value and further metadata. Double-click it to open the dialog for configuring the function.

A function to be used as RowClassesProvider must return an array of strings and accept three parameters:

1. The value of the table row, i.e. the individual values contained in the array set as the value for the [SrcData \[► 245\]](#) attribute, or bound to the [DataSymbol \[► 234\]](#) attribute. If a data type for the row values exists, it can be used here, otherwise use the type "tchmi:general#/definitions/Any".
2. The 0-based index of the table row in the original array. This parameter is of type "Integer"
3. The row number of the row in the table. The row number is 0-based and is not affected by the [RowNumbersStartNumber \[► 249\]](#) attribute. However, it may differ from the index in the original array if the data in the data grid is sorted or filtered.

So configure the function as follows:

DisplayName	Internal Name	Description	Datatype	Default Value	Required	Bindable	Rest
rowValue	rowValue		Any	Select Type...	✓	Yes, pass value	<input type="checkbox"/>
dataIndex	dataIndex		Integer		✓	Yes, pass value	<input type="checkbox"/>
rowNumber	rowNumber		Integer		✓	Yes, pass value	<input type="checkbox"/>

Then you can program the function itself. For this sample, a data grid is used that still contains the default values for SrcData and Columns that were applied when the control was created. The goal is to color every second row light gray, as well as highlight every cell that contains an active checkbox in green. The following code is used for this purpose:

```
export function MyRowClassesProvider(
  rowValue: {
    Test1: string;
    Test2: number;
    Test3: boolean;
    Test4: string;
  },
  dataIndex: number,
  rowNumber: number
) {
  const classes: string[] = [];

  if (rowNumber % 2 === 1) {
    classes.push('odd');
  }

  if (rowValue.Test3) {
    classes.push('active');
  }

  return classes;
}
```

Since no TypeScript type exists for the default value of the data, the inline type is defined here. Of course, if there is an existing TypeScript type, that can be used as well. Otherwise, the code is simple. The conditions for which CSS classes are to be set are checked one after the other, the corresponding classes are added to an array and this is finally returned.

To use these CSS classes now, a new stylesheet file must be added to the project. In this the classes can be used as follows:

```
.TcHmi_Controls_Beckhoff_TcHmiDatagrid tr.odd td.TcHmi_Controls_Beckhoff_TcHmiDatagrid-template-cell
{
    background-color: #ededed;
}

.TcHmi_Controls_Beckhoff_TcHmiDatagrid tr.active td[data-column-name="Test3"] {
    background-color: green;
}
```

The class `.TcHmi_Controls_Beckhoff_TcHmiDatagrid` restricts the application of style rules to data grid controls. The CSS classes defined in the function are now addressed with `tr.odd` or `tr.active`. `td.TcHmi_Controls_Beckhoff_TcHmiDatagrid-template-cell` selects all cells. If the class were omitted and only `td` was used, the cells of the row numbers would also be addressed. `td[data-column-name="Test3"]` selects only the cells where the "Test3" field of the data is displayed.

The result then looks like this:

	Column 1	Column 2 ↕	Column 3	Column 4
1	Example Data	42	<input checked="" type="checkbox"/>	Editable Data
2	Example Data	3.1415	<input type="checkbox"/>	Editable Data
3	Example Data	42	<input checked="" type="checkbox"/>	Editable Data
4	Example Data	3.1415	<input type="checkbox"/>	Editable Data
5	Example Data	42	<input checked="" type="checkbox"/>	Editable Data
6	Example Data	3.1415	<input type="checkbox"/>	Editable Data

The RowClassesProvider function is automatically re-executed each time the data is changed. So if you check or uncheck a checkbox in this datagrid, the coloring of the cell will be updated immediately.

In this sample, only the background color of the cells is adjusted, but of course a whole range of other CSS properties can also be used to change the typeface or integrate background images, for example.

5.10.2.7.3.48 RowNumbersStartNumber

Start value of the series numbering.

Schema: tchmi:general#/definitions/Number

Origin: [Datagrid](#) [► 218]

See also

Attribute getter: `getRowNumbersStartNumber`

Attribute setter: `setRowNumbersStartNumber`



Available from version 1.12.748

5.10.2.7.4 Events

5.10.2.7.4.1 onDataChange

The [data \[► 245\]](#) has been changed.

Origin: [Datagrid \[► 218\]](#)



Available from 1.8

5.10.2.7.4.2 onSelectedItemChanged

Another entry is now selected.

Origin: [Datagrid \[► 218\]](#)



Available from 1.8

5.10.2.8 Date Time Display

A control for displaying the date and time.

Attributes

Category: Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>



**Category: Common**

Name	Description
<a href="#">TimeDisplayLayout [► 258]</a>	Defines the display of time and date. <ul style="list-style-type: none"> <li>• Time: Only the time is displayed.</li> <li>• Date: Only the date is displayed</li> <li>• TimeDateSingleLine: Time and date are displayed in a single line.</li> <li>• TimeDateMultiLine: Time and date are displayed one below the other.</li> <li>• DateTimeSingleLine: Date and time are displayed in a single line.</li> <li>• DateTimeMultiLine: Date and time are displayed one below the other.</li> </ul>
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

### Category: Text

Name	Description
<a href="#">TextColor [► 257]</a>	Definition of the text color
<a href="#">TextFontFamily [► 256]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">TextFontSize [► 256]</a>	Definition of the font size
<a href="#">TextFontSizeUnit [► 257]</a>	Definition of the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">TextFontStyle [► 257]</a>	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">TextFontWeight [► 257]</a>	Selecting the font weight of the text: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">TextVerticalAlignment [► 258]</a>	Selecting the vertical alignment of the text
<a href="#">TextHorizontalAlignment [► 258]</a>	Selecting the horizontal alignment of the text

### Events

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

## Inheritance hierarchy

[Control](#) [[► 753](#)]

DateTimeDisplay

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)

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NuGet packages are available from version 1.12.

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Available from version 1.12.744

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### See also

API reference for this control

## 5.10.2.8.1 Attribute

### 5.10.2.8.1.1 TextFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Date Time Display](#) [[► 250](#)]

### See also

**Attribute getter:** getTextFontFamily

**Attribute setter:** setTextFontFamily

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Available from version 1.12.744

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### 5.10.2.8.1.2 TextFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Date Time Display](#) [[► 250](#)]

### See also

**Attribute getter:** getTextFontSize

**Attribute setter:** setTextFontSize

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Available from version 1.12.744

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### 5.10.2.8.1.3 TextFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Date Time Display](#) [► 250]

**See also**

**Attribute getter:** getTextFontSizeUnit

**Attribute setter:** setTextFontSizeUnit

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Available from version 1.12.744

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### 5.10.2.8.1.4 TextFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Date Time Display](#) [► 250]

**See also**

**Attribute getter:** getTextFontStyle

**Attribute setter:** setTextFontStyle

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Available from version 1.12.744

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### 5.10.2.8.1.5 TextFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Date Time Display](#) [► 250]

**See also**

**Attribute getter:** getTextFontWeight

**Attribute setter:** setTextFontWeight

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Available from version 1.12.744

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### 5.10.2.8.1.6 TextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Date Time Display](#) [► 250]

**See also****Attribute getter:** getTextColor**Attribute setter:** setTextColorAvailable from version 1.12.744

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**5.10.2.8.1.7      TextHorizontalAlignment**

Horizontal alignment of the text.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment**Origin:** [Date Time Display \[► 250\]](#)**See also****Attribute getter:** getTextHorizontalAlignment**Attribute setter:** setTextHorizontalAlignmentAvailable from version 1.12.744

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**5.10.2.8.1.8      TextVerticalAlignment**

Vertical alignment of the text.

**Schema:** tchmi:framework#/definitions/VerticalAlignment**Origin:** [Date Time Display \[► 250\]](#)**See also****Attribute getter:** getTextVerticalAlignment**Attribute setter:** setTextVerticalAlignmentAvailable from version 1.12.744

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**5.10.2.8.1.9      TimeDisplayLayout**

Display of the date and time.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiDateTimeDisplay.TimeDisplayLayout**Origin:** [Date Time Display \[► 250\]](#)**See also****Attribute getter:** getTimeDisplayLayout**Attribute setter:** setTimeDisplayLayout



Available from version 1.12.744

**5.10.2.9      Date Time Input**

An input element for date and time.

**Attributes**

**Category: Colors**

Name	Description
<a href="#">ValueColor [► 265]</a>	Definition of the text color
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.



Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Value [► 265]</a>	Definition of the value
<a href="#">MinValue [► 269]</a>	Definition of the minimum value
<a href="#">MaxValue [► 270]</a>	Definition of the maximum value
<a href="#">AutoFocusOut [► 268]</a>	Specifies whether the control automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.
<a href="#">AutoSelectText [► 268]</a>	Specifies whether the Control automatically selects the entire text when it is focused.
<a href="#">ResetToLastValidValue [► 269]</a>	Specifies whether the value is reset to the last valid value when focus is lost.
<a href="#">ButtonPosition [► 269]</a>	The position of the button relative to the display.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Value**

Name	Description
<a href="#">ValueFontFamily [► 266]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">ValueFontSize [► 266]</a>	Definition of the font size
<a href="#">ValueFontSizeUnit [► 266]</a>	Definition of the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">ValueFontStyle [► 267]</a>	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">ValueFontWeight [► 267]</a>	Selecting the font weight of the text: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">ContentPadding [► 267]</a>	Definition of the distance of the text to the border
<a href="#">ValueHorizontalAlignment [► 267]</a>	Selecting the horizontal alignment of the text
<a href="#">Placeholder [► 268]</a>	Definition of the placeholder, which is displayed if no value is entered.

**Events****Category: Control**

Name	Description
<a href="#">onValueChanged [► 270]</a>	The value has been changed.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onUserInteractionFinished [► 270]</a>	The user has finished the interaction with the control.
<a href="#">onFocusIn [► 270]</a>	The control now has the focus.
<a href="#">onFocusOut [► 270]</a>	The control has lost focus.
<a href="#">onUserInteractionCanceled [► 271]</a>	The user has terminated the interaction with the control element.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally observable.
<a href="#">operate</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control](#) [[► 753](#)]

Date Time Input

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.750

**See also**

API reference for this control

**5.10.2.9.1 Attribute****5.10.2.9.1.1 ValueColor**

Color of the value.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Date Time Input](#) [[► 259](#)]

**See also**

**Attribute getter:** `getValueColor`

**Attribute setter:** `setValueColor`



Available from version 1.12.750

**5.10.2.9.1.2 Value**

Value of the control.

**Schema:** tchmi:general#/definitions/DateTime

**Origin:** [Date Time Input](#) [[► 259](#)]

**See also**

**Attribute getter:** `getValue`

**Attribute setter:** `setValue`



Available from version 1.12.750

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#### 5.10.2.9.1.3 ValueFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Date Time Input \[► 259\]](#)

**See also**

**Attribute getter:** getValueFontFamily

**Attribute setter:** setValueFontFamily

---



Available from version 1.12.750

---

#### 5.10.2.9.1.4 ValueFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Date Time Input \[► 259\]](#)

**See also**

**Attribute getter:** getValueFontSize

**Attribute setter:** setValueFontSize

---



Available from version 1.12.750

---

#### 5.10.2.9.1.5 ValueFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Date Time Input \[► 259\]](#)

**See also**

**Attribute getter:** getValueFontSizeUnit

**Attribute setter:** setValueFontSizeUnit

---



Available from version 1.12.750

---

#### 5.10.2.9.1.6 ValueFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Date Time Input](#) [► 259]

**See also**

**Attribute getter:** getValueFontStyle

**Attribute setter:** setValueFontStyle

---



Available from version 1.12.750

---

#### 5.10.2.9.1.7 ValueFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Date Time Input](#) [► 259]

**See also**

**Attribute getter:** getValueFontWeight

**Attribute setter:** setValueFontWeight

---



Available from version 1.12.750

---

#### 5.10.2.9.1.8 ValueHorizontalAlignment

Horizontal alignment of the text.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Date Time Input](#) [► 259]

**See also**

**Attribute getter:** getValueHorizontalAlignment

**Attribute setter:** setValueHorizontalAlignment

---



Available from version 1.12.750

---

#### 5.10.2.9.1.9 ContentPadding

Defines the distance of the text to the border.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Date Time Input](#) [► 259]

**See also****Attribute getter:** `getContentPadding`**Attribute setter:** `setContentPadding`Available from version 1.12.750

---

**5.10.2.9.1.10 Placeholder**

Placeholder which is displayed if no text is entered.

**Schema:** `tchmi:general#/definitions/String`**Origin:** [Date Time Input \[► 259\]](#)**See also****Attribute getter:** `getPlaceholder`**Attribute setter:** `setPlaceholder`Available from version 1.12.750

---

**5.10.2.9.1.11 AutoFocusOut**

Determines whether the control automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.

**Schema:** `tchmi:general#/definitions/Boolean`**Origin:** [Date Time Input \[► 259\]](#)**See also****Attribute getter:** `getAutoFocusOut`**Attribute setter:** `setAutoFocusOut`Available from version 1.12.750

---

**5.10.2.9.1.12 AutoSelectText**

Determines whether the Control automatically selects the entire text when it is focused.

**Schema:** `tchmi:general#/definitions/Boolean`**Origin:** [Date Time Input \[► 259\]](#)**See also****Attribute getter:** `getAutoSelectText`**Attribute setter:** `setAutoSelectText`





Available from version 1.12.750

---

#### 5.10.2.9.1.13    **ResetToLastValidValue**

Determines whether the value is reset to the last valid value when focus is lost.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Date Time Input \[► 259\]](#)

**See also**

**Attribute getter:** getResetToLastValidValue

**Attribute setter:** setResetToLastValidValue

---



Available from version 1.12.750

---

#### 5.10.2.9.1.14    **ButtonPosition**

The position of the button relative to the display.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiDateTimeInput.ButtonPosition

**Origin:** [Date Time Input \[► 259\]](#)

**See also**

**Attribute getter:** getButtonPosition

**Attribute setter:** setButtonPosition

---



Available from version 1.12.750

---

#### 5.10.2.9.1.15    **MinValue**

Minimum value of the control.

**Schema:** tchmi:general#/definitions/DateTime

**Origin:** [Date Time Input \[► 259\]](#)

**See also**

**Attribute getter:** getMinValue

**Attribute setter:** setMinValue

---



Available since version 1.12.760

---

### 5.10.2.9.1.16 MaxValue

Maximum value of the control.

**Schema:** tchmi:general#/definitions/DateTime

**Origin:** [Date Time Input](#) [► 259]

**See also**

**Attribute getter:** getMaxValue

**Attribute setter:** setMaxValue



Available since version 1.12.760

---

### 5.10.2.9.2 Events

#### 5.10.2.9.2.1 onFocusIn

The control now has the focus.

**Origin:** [Date Time Input](#) [► 259]



Available from version 1.12.750

---

#### 5.10.2.9.2.2 onFocusOut

The control has lost focus.

**Origin:** [Date Time Input](#) [► 259]



Available from version 1.12.750

---

#### 5.10.2.9.2.3 onValueChanged

The value has been changed.

**Origin:** [Date Time Input](#) [► 259]



Available from version 1.12.750

---

#### 5.10.2.9.2.4 onUserInteractionFinished

The user has finished the interaction with the control.

**Origin:** [Date Time Input](#) [► 259]



Available from version 1.12.750

---

5.10.2.9.2.5      **onUserInteractionCanceled**

The user has terminated the interaction with the control element.

**Origin:** [Date Time Input \[► 259\]](#)



Available from version 1.12.750

5.10.2.10      **Date Time Picker**

A control for selecting the date and time.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Value [► 276]</a>	Value of the control as ISO timestring.
<a href="#">MinValue [► 277]</a>	Minimum value of the control as ISO timestring.
<a href="#">MaxValue [► 277]</a>	Maximum value of the control as ISO timestring.
<a href="#">DirectDisplay [► 277]</a>	Specifies whether the control is displayed directly in the View or used as a pop-up. The pop-up opens by the function <a href="#">openDateTimePicker [► 278]</a> and closes by the function <a href="#">closeDateTimePicker [► 279]</a> .
<a href="#">ShowConfirmationButtons [► 277]</a>	Specifies whether the input into the control must be confirmed.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

## Events

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Category: Control

Name	Description
<a href="#">onCancel [► 278]</a>	The input was canceled.
<a href="#">onConfirmed [► 278]</a>	The input was confirmed.
<a href="#">onUserInteractionFinished [► 278]</a>	The user has finished the interaction with the control.
<a href="#">onValueChanged [► 278]</a>	The value has been changed.

## Functions

Name	Origin	Description
<a href="#">openDateTimePicker [► 278]</a>	TcHmiDateTimePicker	Opens the Date Time Picker
<a href="#">closeDateTimePicker [► 279]</a>	TcHmiDateTimePicker	Closes the Date Time Picker

## Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

## Inheritance hierarchy

[Control \[► 753\]](#)

Date Time Picker

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.750

## See also

API reference for this control

### 5.10.2.10.1 Attributes

#### 5.10.2.10.1.1 Value

Value of the control as ISO timestring.

**Schema:** tchmi:general#/definitions/DateTime

**Origin:** [Date Time Picker \[► 271\]](#)

## See also

**Attribute getter:** getValue

**Attribute setter:** setValue



Available from version 1.12.750



### 5.10.2.10.1.2 DirectDisplay

Determines whether the control is displayed directly in the View or used as a pop-up. The pop-up opens by the function [openDateTimePicker \[► 278\]](#) and closes by the function [closeDateTimePicker \[► 279\]](#).

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Date Time Picker \[► 271\]](#)

**See also**

**Attribute getter:** getDirectDisplay

**Attribute setter:** setDirectDisplay

---



Available from version 1.12.750

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### 5.10.2.10.1.3 ShowConfirmationButtons

Determines whether the input into the control must be confirmed.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Date Time Picker \[► 271\]](#)

**See also**

**Attribute getter:** getShowConfirmationButtons

**Attribute setter:** setShowConfirmationButtons

---



Available from version 1.12.750

---

### 5.10.2.10.1.4 MinValue

Minimum value of the control.

**Schema:** tchmi:general#/definitions/DateTime

**Origin:** [Date Time Picker \[► 271\]](#)

**See also**

**Attribute getter:** getMinValue

**Attribute setter:** setMinValue

---



Available since version 1.12.760

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### 5.10.2.10.1.5 MaxValue

Maximum value of the control.

**Schema:** tchmi:general#/definitions/DateTime

**Origin:** [Date Time Picker \[► 271\]](#)

**See also****Attribute getter:** getMaxValue**Attribute setter:** setMaxValueAvailable since version 1.12.760

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**5.10.2.10.2 Events****5.10.2.10.2.1 onValueChanged**

The value has been changed.

**Origin:** [Date Time Picker](#) [► 271]Available from version 1.12.750

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**5.10.2.10.2.2 onCancel**

The input was canceled.

**Origin:** [Date Time Picker](#) [► 271]Available from version 1.12.750

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**5.10.2.10.2.3 onConfirmed**

The input was confirmed.

**Origin:** [Date Time Picker](#) [► 271]Available from version 1.12.750

---

**5.10.2.10.2.4 onUserInteractionFinished**

The user has finished the interaction with the control.

**Origin:** [Date Time Picker](#) [► 271]Available from version 1.12.750

---

**5.10.2.10.3 Functions****5.10.2.10.3.1 openDateTimePicker**

Opens the Date Time Picker.

**Return value:** null

**Origin:** [Date Time Picker \[► 271\]](#)

---



Available from version 1.12.750

---

### 5.10.2.10.3.2 closeDateTimePicker

Closes the Date Time Picker.

**Return value:** null

**Origin:** [Date Time Picker \[► 271\]](#)

---



Available from version 1.12.750

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### 5.10.2.11 Ellipse

An elliptical object.

#### Attributes

**Category:** Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Appearance**

Name	Description
<a href="#">FillColor [► 284]</a>	Definition of the fill color of the control
<a href="#">StrokeColor [► 284]</a>	Definition of the line color of the control
<a href="#">StrokeStyle [► 285]</a>	Selecting the style of the ellipse line
<a href="#">StrokeThickness [► 285]</a>	Definition of the line width of the ellipse
<a href="#">StrokeThicknessUnit [► 285]</a>	Selecting the unit of the line width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> </ul>

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

## Inheritance hierarchy

[Control](#) [► 753]

Ellipse

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

### See also

API reference for this control

## 5.10.2.11.1 Attributes

### 5.10.2.11.1.1 FillColor

Defines the fill color of the control.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Ellipse](#) [► 279]

### See also

**Attribute getter:** getFillColor

**Attribute setter:** setFillColor



Available from 1.8

### 5.10.2.11.1.2 StrokeColor

Defines the stroke color of the control.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Ellipse](#) [► 279]

### See also

**Attribute getter:** getStrokeColor

**Attribute setter:** setStrokeColor



Available from 1.8



### 5.10.2.11.1.3 StrokeStyle

Definition of the stroke style.

Comma or space-separated list of numbers that specify the length of strokes and spaces.

If an odd number is specified, the list is repeated once. Example: "5, 3, 2" is equivalent to "5, 3, 2, 5, 3, 2".

**Schema:** tchmi:general#/definitions/String

**Origin:** [Ellipse](#) [► 279]

**See also**

**Attribute getter:** getStrokeStyle

**Attribute setter:** setStrokeStyle

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Available from 1.8

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### 5.10.2.11.1.4 StrokeThickness

Defines the stroke thickness of the control in pixels.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Ellipse](#) [► 279]

**See also**

**Attribute getter:** getStrokeThickness

**Attribute setter:** setStrokeThickness

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Available from 1.8

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### 5.10.2.11.1.5 StrokeThicknessUnit

Pixel unit. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Ellipse](#) [► 279]

**See also**

**Attribute getter:** getStrokeThicknessUnit

The attribute can only be read and therefore has no setter.

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Available from 1.8

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## 5.10.2.12 Event Grid

The Event Grid is provided for the tabular display of alarms and messages.

**Attributes****Category: Colors**

Name	Description
BackgroundColor [ <a href="#">▶ 769</a> ]	Definition of the background color
BorderColor [ <a href="#">▶ 768</a> ]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Filter [► 295]</a>	Defines which events are queried by the server
<a href="#">Sorting [► 296]</a>	Defines sorting rules for sorting the displayed data.
<a href="#">Columns [► 295]</a>	The columns to be displayed in the EventGrid
<a href="#">AllowDetailsPopup [► 296]</a>	Defines whether a dialog with detailed information is automatically displayed when interacting with an event entry.  Activated by default.  Can be disabled to implement a customized display of the detailed information.
<a href="#">SelectedEvent [► 297]</a>	Returns the selected event or zero if no event is selected.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Menu Bar**

Name	Description
<a href="#">MenuBarPosition [► 295]</a>	Defines the position of the menu bar.
<a href="#">ShowMenuBar [► 296]</a>	Defines whether the menu bar is displayed.
<a href="#">ButtonFontFamily [► 301]</a>	Defines the font of the button text.
<a href="#">ButtonFontSize [► 302]</a>	Defines the font size of the button text.
<a href="#">ButtonFontSizeUnit [► 302]</a>	Defines the unit of the button text font size.
<a href="#">ButtonFontStyle [► 302]</a>	Defines the font style of the button text.
<a href="#">ButtonFontWeight [► 302]</a>	Defines the font weight (normal, bold) of the button text.
<a href="#">ButtonHeight [► 303]</a>	Defines the height of the buttons.
<a href="#">ButtonHeightUnit [► 303]</a>	Defines the unit of button height.

**Category: Grid**

Name	Description
<a href="#">HeaderFontFamily [► 297]</a>	Defines the font of the text in the header bar.
<a href="#">HeaderFontSize [► 297]</a>	Defines the font size of the text in the header bar.
<a href="#">HeaderFontSizeUnit [► 298]</a>	Defines the font size unit of the text in the header bar.
<a href="#">HeaderFontStyle [► 298]</a>	Defines the font style of the text in the header bar.
<a href="#">HeaderFontWeight [► 298]</a>	Defines the font weight (normal, bold) of the text in the header bar.
<a href="#">GridFontFamily [► 299]</a>	Defines the font of the text in the table.
<a href="#">GridFontSize [► 299]</a>	Defines the font size of the text in the table.
<a href="#">GridFontSizeUnit [► 299]</a>	Defines the font size unit of the text in the table.
<a href="#">GridFontStyle [► 299]</a>	Defines the font style of the text in the table.
<a href="#">GridFontWeight [► 300]</a>	Defines the font weight (normal, bold) of the text in the table.
<a href="#">HeaderHeight [► 300]</a>	Defines the height of the header bar.
<a href="#">HeaderHeightUnit [► 300]</a>	Defines the height unit of the header bar.
<a href="#">RowHeight [► 301]</a>	Defines the height of the table rows.
<a href="#">RowHeightUnit [► 301]</a>	Defines the height unit of the table rows.

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.
<a href="#">configure [► 303]</a>	Determines whether the column configuration in the event grid is customizable.
<a href="#">viewDetails [► 304]</a>	Determines whether the display of event details can be enabled in the event grid.

### Functions

Name	Origin	Description
confirmSelectedAlarm	TcHmiEventGrid	Acknowledges all selected alarms
confirmAllAlarms	TcHmiEventGrid	Acknowledges all alarms

### Inheritance hierarchy

[Control \[► 753\]](#)

Event Grid

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.10

## See also

API reference for this control

### 5.10.2.12.1 Configuration

The TwinCAT 3 EventLogger can be used to send events. The display of the events can be defined via the [filters](#) [► 292]. The [columns](#) [► 293] can be configured via the Properties. Further information about the EventGrid can be found in the section [Event System](#) [► 1135].

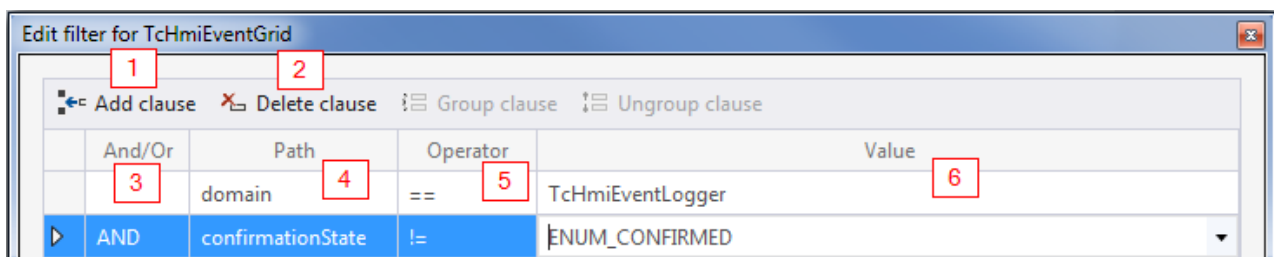
Sample: [Event Grid](#) [► 1580]

### 5.10.2.12.2 Dialogs

#### 5.10.2.12.2.1 Filter

You can configure which events are to be displayed via the filter editor. The filters are defined via the properties of the Event Grid.

#### Structure of the Filter Editor



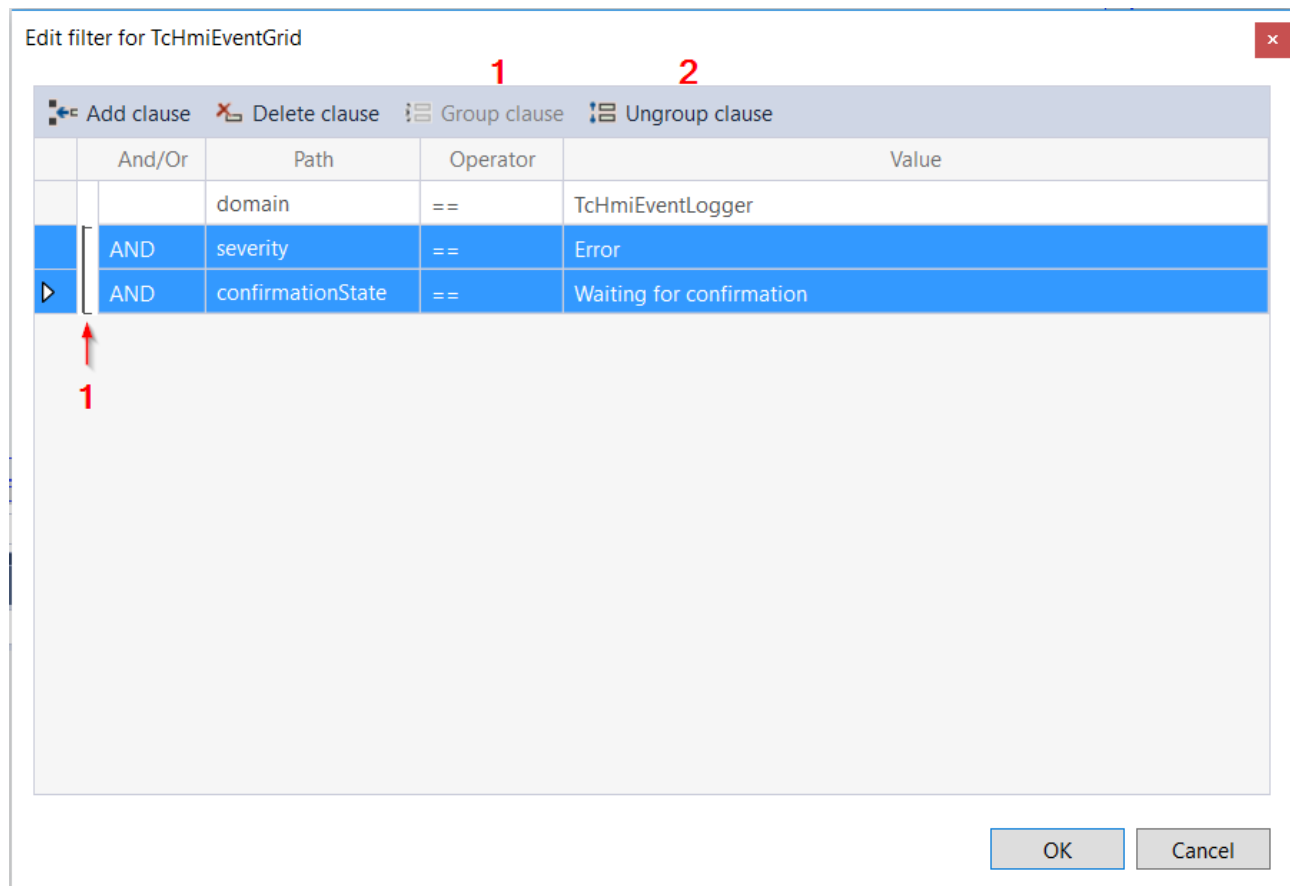
1. **Add clause:** add a clause
2. **Delete clause:** delete a clause
3. **And/Or:** logical combination of clauses
4. **Path:** filter options:
  - **domain:** server extension which delivered the alarm (e.g. TcHmiEventLogger).
  - **sourceDomain:** server extension that triggered the alarm. The sourceDomain may differ from the domain if a server extension forwards the alarms (e.g. TcHmiSqliteLogger).
  - **name:** name of the event.
  - **text:** text of the event.
  - **Id:** ID of the event.
  - **timeRaised:** time at which the event was triggered.
  - **timeCleared:** time at which an alarm was reset.
  - **timeConfirmed:** time at which the alarm was confirmed.
  - **type:** type of event (alarm or message).
  - **severity:** severity of the event (prohibitions, info, warning, error, critical error).



- **alarmState**: state of an alarm (triggered, confirmed, deleted, confirmed and deleted).
  - **confirmationState**: state of acknowledgement of an alarm (not required, not supported, waiting for acknowledgement, acknowledged, reset).
  - **„params::“**: the parameter object of an event can be accessed in the text field of the path via the keyword "params::" (without quotation marks). The parameter object contains optional parameters that can differ depending on the event source. For example, the TwinCAT Eventlogger provides additional information about the event origin in the PLC. The parameters are accessed in camelCase, e.g.: params::sourceName
5. **Operator**: comparison operator of the clause
  6. **Value**: value of the clause

### Grouping of conditions

Several conditions can be grouped and linked if more than one condition is selected. The conditions are selected by clicking the rows with the CTRL key pressed.



1. **Group clause**: grouping of several clauses. The brackets link them optically.
2. **Ungroup clause**: ungrouping.

### 5.10.2.12.2.2 Columns

The columns to be displayed in the Event Grid can be configured in the columns editor. The columns can also be configured in the client at runtime.

An entry is added for each column. The column name is specified via the combo box, where you can select a column from all [available columns](#) [► 295].

**Data Definitions**

**Elements**

Type	Column Name	Width
Column	type	
Column	severity	
Column	timeAndDateRaised	
Column	text	

**Properties**

**General**

ColumnName: type

Width:  px

Buttons: OK, Cancel

The Columns Editor consists of the following areas:

1. **Type:** The type of column indicates whether it is a normal "Column" or a "CustomColumn". The selection of the column type can be made via the lower combo box (1). The parameters of the parameter object of an event can be displayed in a custom column.
2. **ColumnName:** The name of the column to be displayed.  
 For a column of type "Column", the names can be selected via the combo box.  
 For a column of type "CustomColumn" the parameters are displayed with the keyword "params::" (without quotation marks) and the name of the parameter in camelCase.  
 Using the example of the EventLogger, the "SourceName" can be displayed in a column, for example:

**Data Definitions**

**Elements**

Type	Column Name	Width
Column	type	
Column	severity	
Column	timeAndDateRaised	
Column	text	
Custom Colur	params::sourceName	120

**Properties**

**General**





ColumnName: fx params::sourceName

Width: 120 px

Label: fx Source Name

The parameter object can differ for different event sources. If an event does not have the parameter in the parameter object configured in the column, an empty entry is displayed in the corresponding cell.

3. **Width:** The width of the column. If no value is specified, the width is set automatically.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

5.10.2.12.3      **Attributes**

5.10.2.12.3.1    **Filter**

Defines which events are queried by the server.

**Schema:** tchmi:server#/definitions/eventFilter

**Origin:** [Event Grid](#)  [285](#)

**See also**

**Attribute getter:** getFilter

**Attribute setter:** setFilter



Available from version 1.10

5.10.2.12.3.2    **Columns**

The columns to be displayed in the Event Grid.

**Schema** (version .1.10): tchmi:framework#/definitions/EventGridColumnList

**Schema** (version .1.12): tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiEventGrid.ColumnList

**Origin:** [Event Grid](#)  [285](#)

**See also**

**Attribute getter:** getColumns

**Attribute setter:** setColumns



Available from version 1.10

5.10.2.12.3.3    **MenuBarPosition**

Defines the position of the menu bar.

**Schema** (version 1.10): tchmi:framework#/definitions/EventGridMenuBarPosition

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiEventGrid.EventGridMenuBarPosition

**Origin:** [Event Grid](#)  [285](#)

**See also****Attribute getter:** getMenuBarPosition**Attribute setter:** setMenuBarPositionAvailable from version 1.10

---

**5.10.2.12.3.4 ShowMenuBar**

Defines whether the menu bar is displayed.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Event Grid](#) [► 285]**See also****Attribute getter:** getShowMenuBar**Attribute setter:** setShowMenuBarAvailable from version 1.10

---

**5.10.2.12.3.5 Sorting**

Defines sorting rules for sorting the displayed data.

**Schema** (version 1.10): tchmi:framework#/definitions/DGSorting**Schema** (version 1.12): tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiDatagrid.Sorting**Origin:** [Event Grid](#) [► 285]**See also****Attribute getter:** getSorting**Attribute setter:** setSortingAvailable from version 1.10

---

**5.10.2.12.3.6 AllowDetailsPopup**

Defines whether a dialog with detailed information is automatically displayed when interacting with an event entry.

Activated by default.

Can be disabled to implement a customized display of the detailed information.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getAllowDetailsPopup

**Attribute setter:** setAllowDetailsPopup

---



Available from version 1.10.1336.404

---

### 5.10.2.12.3.7 SelectedEvent

Returns the selected event or zero if no event is selected.

**Schema** (version 1.10): tchmi:framework#/definitions/ServerEvent

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiEventGrid.ServerEvent

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getSelectedEvent

The attribute can only be read and therefore has no setter.

---



Available from version 1.10

---

### 5.10.2.12.3.8 HeaderFontFamily

Defines the font of the text in the header bar.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getHeaderFontFamily

**Attribute setter:** setHeaderFontFamily

---



Available from version 1.10

---

### 5.10.2.12.3.9 HeaderFontSize

Defines the font size of the text in the header bar.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getHeaderFontSize

**Attribute setter:** setHeaderFontSize



Available from version 1.10

---

#### 5.10.2.12.3.10 HeaderFontSizeUnit

Defines the font size unit of the text in the header bar.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Event Grid](#) [[▶ 285](#)]

**See also**

**Attribute getter:** getHeaderFontSizeUnit

**Attribute setter:** setHeaderFontSizeUnit

---



Available from version 1.10

---

#### 5.10.2.12.3.11 HeaderFontStyle

Defines the font style of the text in the header bar.

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Event Grid](#) [[▶ 285](#)]

**See also**

**Attribute getter:** getHeaderFontStyle

**Attribute setter:** setHeaderFontStyle

---



Available from version 1.10

---

#### 5.10.2.12.3.12 HeaderFontWeight

Defines the font weight (normal, bold) of the text in the header bar.

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Event Grid](#) [[▶ 285](#)]

**See also**

**Attribute getter:** getHeaderFontWeight

**Attribute setter:** setHeaderFontWeight

---



Available from version 1.10

---

### 5.10.2.12.3.13 GridFontFamily

Defines the font of the text in the table.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getGridFontFamily

**Attribute setter:** setGridFontFamily

---



Available from version 1.10

---

### 5.10.2.12.3.14 GridFontSize

Defines the font size of the text in the table.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getGridFontSize

**Attribute setter:** setGridFontSize

---



Available from version 1.10

---

### 5.10.2.12.3.15 GridFontSizeUnit

Defines the font size unit of the text in the table.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getGridFontSizeUnit

**Attribute setter:** setGridFontSizeUnit

---



Available from version 1.10

---

### 5.10.2.12.3.16 GridFontStyle

Defines the font style of the text in the table.

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Event Grid](#) [► 285]

**See also****Attribute getter:** getGridFontStyle**Attribute setter:** setGridFontStyleAvailable from version 1.10

---

**5.10.2.12.3.17 GridFontWeight**

Defines the font weight (normal, bold) of the text in the table.

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Event Grid](#) [► 285]**See also****Attribute getter:** getGridFontWeight**Attribute setter:** setGridFontWeightAvailable from version 1.10

---

**5.10.2.12.3.18 HeaderHeight**

Defines the height of the header bar.

**Schema:** tchmi:framework#/definitions/MeasurementValue**Origin:** [Event Grid](#) [► 285]**See also****Attribute getter:** getHeaderHeight**Attribute setter:** setHeaderHeightAvailable from version 1.10

---

**5.10.2.12.3.19 HeaderHeightUnit**

Defines the height unit of the header bar.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Event Grid](#) [► 285]**See also****Attribute getter:** getHeaderHeightUnit**Attribute setter:** setHeaderHeightUnit





Available from version 1.10

---

#### 5.10.2.12.3.20 RowHeight

Defines the height of the table rows.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getRowHeight

**Attribute setter:** setRowHeight

---



Available from version 1.10

---

#### 5.10.2.12.3.21 RowHeightUnit

Defines the height unit of the table rows.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getRowHeightUnit

The attribute can only be read and therefore has no setter.

---



Available from version 1.10

---

#### 5.10.2.12.3.22 ButtonFontFamily

Defines the font of the button text.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getButtonFontFamily

**Attribute setter:** setButtonFontFamily

---



Available from version 1.10

---

### 5.10.2.12.3.23 ButtonFontSize

Defines the font size of the button text.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getButtonFontSize

**Attribute setter:** setButtonFontSize

---



Available from version 1.10

---

### 5.10.2.12.3.24 ButtonFontSizeUnit

Defines the unit of the button text font size.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getButtonFontSizeUnit

**Attribute setter:** setButtonFontSizeUnit

---



Available from version 1.10

---

### 5.10.2.12.3.25 ButtonFontStyle

Defines the font style of the button text.

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** getButtonFontStyle

**Attribute setter:** setButtonFontStyle

---



Available from version 1.10

---

### 5.10.2.12.3.26 ButtonFontWeight

Defines the font weight (normal, bold) of the button text.

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** `getButtonFontWeight`

**Attribute setter:** `setButtonFontWeight`

---



Available from version 1.10

---

### 5.10.2.12.3.27 ButtonHeight

Defines the height of the buttons.

**Schema:** `tchmi:framework#/definitions/MeasurementValue`

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** `getButtonHeight`

**Attribute setter:** `setButtonHeight`

---



Available from version 1.10

---

### 5.10.2.12.3.28 ButtonHeightUnit

Defines the unit of button height.

**Schema:** `tchmi:framework#/definitions/MeasurementUnit`

**Origin:** [Event Grid](#) [► 285]

**See also**

**Attribute getter:** `getButtonHeightUnit`

**Attribute setter:** `setButtonHeightUnit`

---



Available from version 1.10

---

## 5.10.2.12.4 Permissions

### 5.10.2.12.4.1 configure

Specifies whether the column configuration in the event grid is customizable.

**Origin:** [Event Grid](#) [► 285]

**See also**

See also [User management at control level](#) [► 969].



Available from version 1.10

#### 5.10.2.12.4.2 viewDetails

Specifies whether the display of event details can be enabled in the event grid.

**Origin:** [Event Grid](#) [► 285]

#### See also

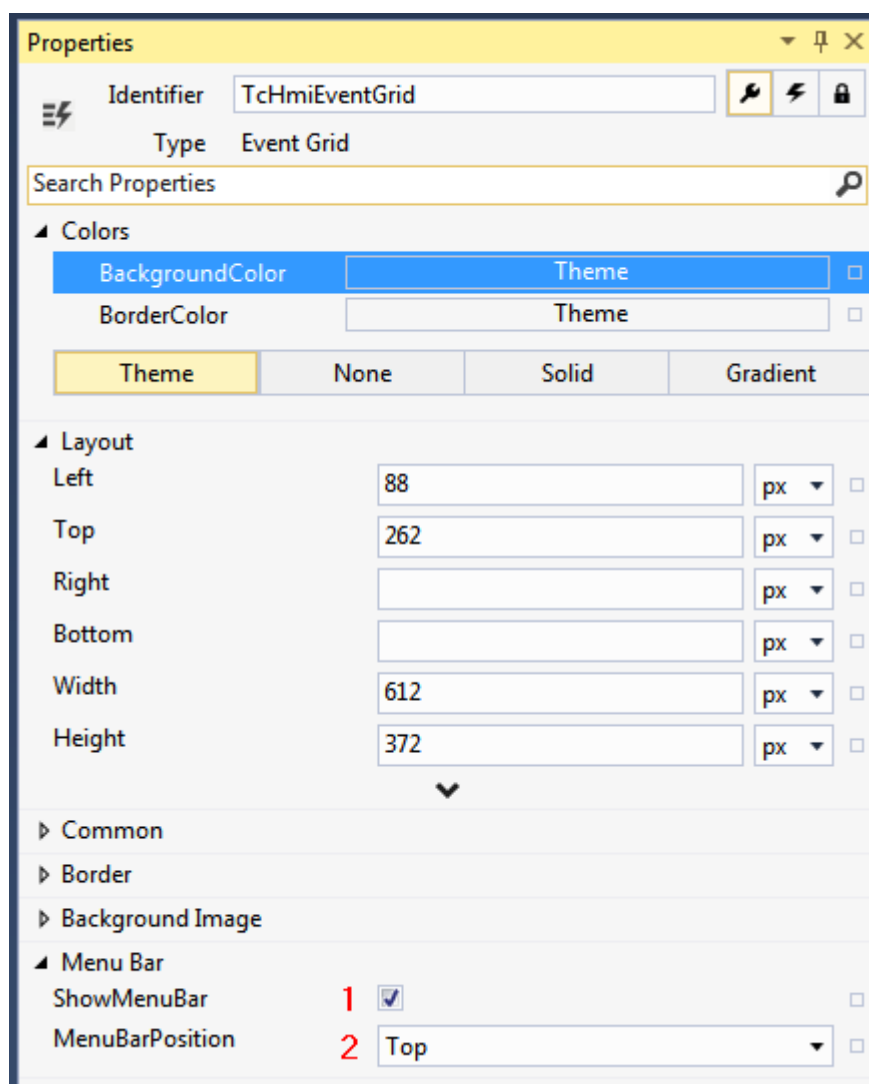
See also [User management at control level](#) [► 969].



Available from version 1.10

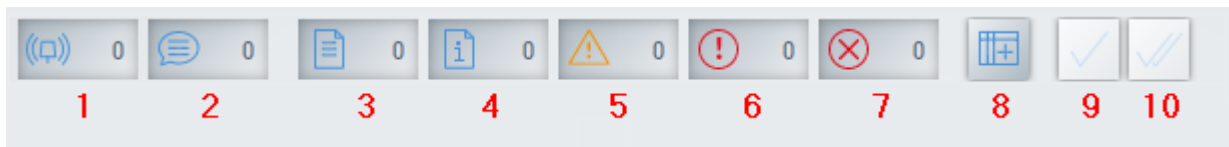
#### 5.10.2.12.5 Menu bar

The Event Grid has a menu bar that provides filter and configuration options at runtime in the client. The menu bar can be shown and hidden and placed at the edge of the Event Grid:



1. **ShowMenuBar**: Show or hide menu bar.
2. **MenuBarPosition**: Position of the menu bar.

The menu bar has the following buttons:



1. Show or hide all alarms.
2. Show or hide all messages.
3. Show or hide verbose events.
4. Show or hide information events.
5. Show or hide warnings.
6. Show or hide errors.
7. Show or hide critical errors.
8. Call the column configuration. The column configuration only applies to the client.
9. Confirm alarm.
10. Confirm all unconfirmed alarms.

### 5.10.2.13 Event Line

The Event Line is provided for the display of alarms and messages.

#### Attributes

##### Category: Colors

Name	Description
<a href="#">TextColor [► 313]</a>	Defines the font color of the control.
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Filter [► 312]</a>	Defines which events are queried by the server.
<a href="#">Sorting [► 313]</a>	Defines sorting rules for sorting the displayed data.
<a href="#">ServerInterval [► 315]</a>	Defines the interval for the server subscription in milliseconds.
<a href="#">TargetRegion [► 315]</a>	The TcHmiRegion control instance in which the content page defined in the TargetContent attribute is loaded when the control is clicked.
<a href="#">TargetContent [► 315]</a>	The content page that is loaded when the control is clicked in the defined TcHmiRegion.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Text**

Name	Description
<a href="#">TextFontFamily [► 313]</a>	Defines the font of the control.
<a href="#">TextFontSize [► 314]</a>	Defines the font size of the control.
<a href="#">TextFontSizeUnit [► 314]</a>	Defines the unit of the control's font size.
<a href="#">TextFontStyle [► 314]</a>	Defines the style of the control's font.
<a href="#">TextFontWeight [► 314]</a>	Defines the font weight (normal, bold) of the control's font.

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**



Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

## Events

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.
<a href="#">configure [► 303]</a>	Determines whether the column configuration in the event grid is customizable.
<a href="#">viewDetails [► 304]</a>	Determines whether the display of event details can be enabled in the event grid.

### Inheritance hierarchy

[Control \[► 753\]](#)

Event Line

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.748

## See also

API reference for this control

### 5.10.2.13.1 Configuration

The TwinCAT 3 EventLogger can be used to send events. The display of the events can be defined via the [filters](#) [► 311]. The columns can be configured via the Properties. Further information about the EventLine can be found in the section [Event System](#) [► 1135].

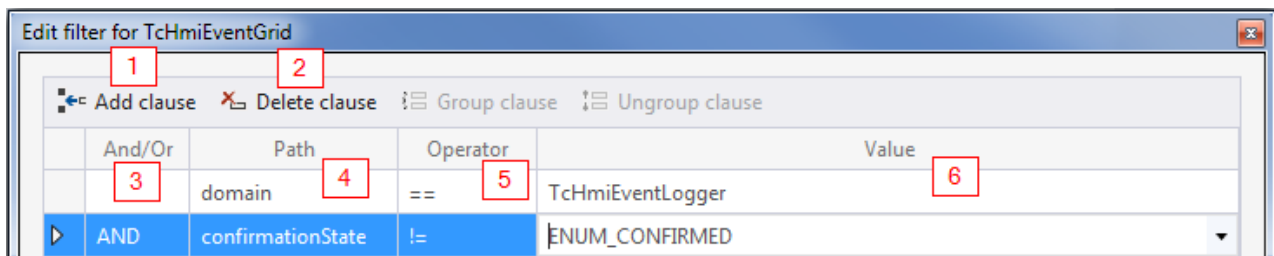
Example: [Event Grid](#) [► 1580]

### 5.10.2.13.2 Dialogs

#### 5.10.2.13.2.1 Filter

You can configure which events are to be displayed via the filter editor. The filters are defined via the properties of the Event Grid.

#### Structure of the Filter Editor

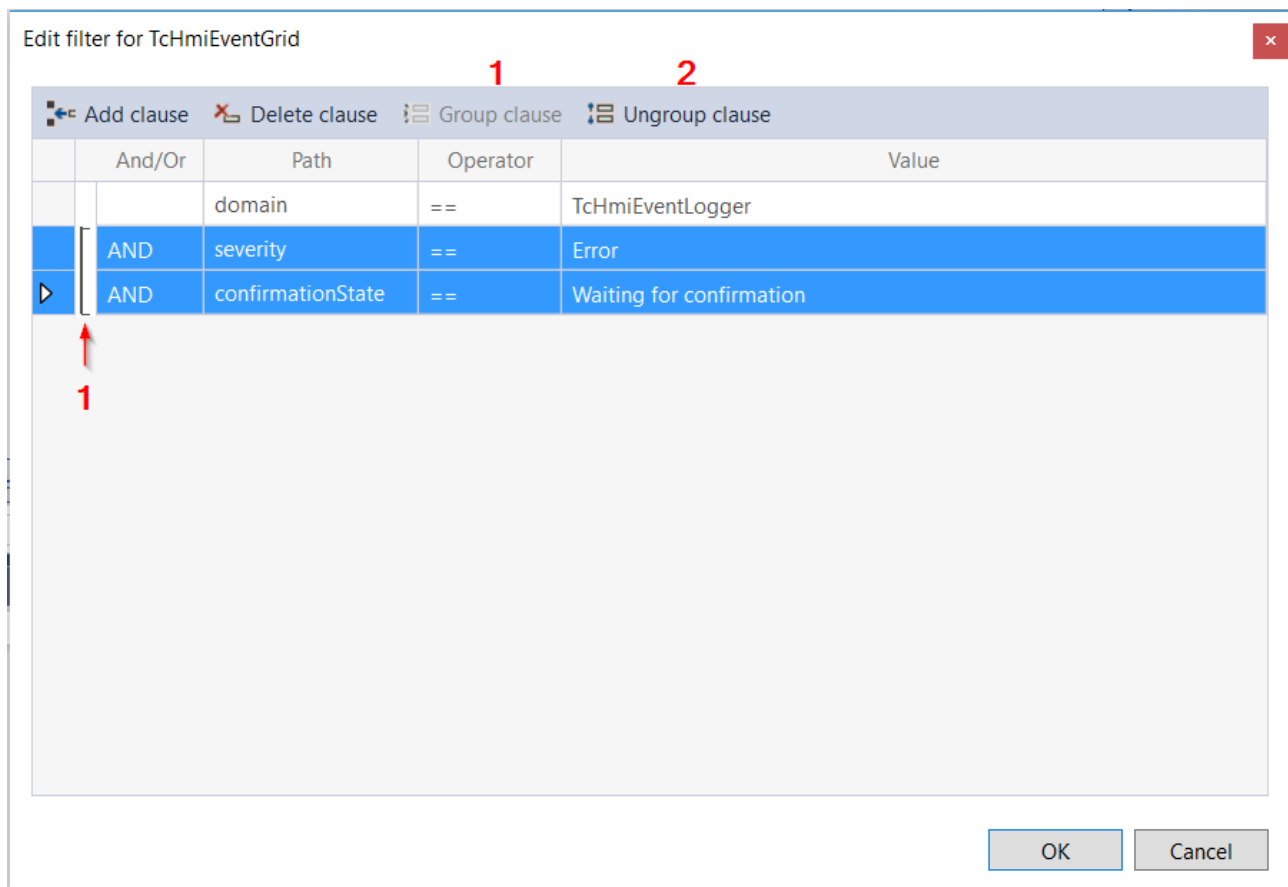


1. **Add clause:** add a clause
2. **Delete clause:** delete a clause
3. **And/Or:** logical combination of clauses
4. **Path:** filter options:
  - **domain:** server extension which delivered the alarm (e.g. TcHmiEventLogger).
  - **sourceDomain:** server extension that triggered the alarm. The sourceDomain may differ from the domain if a server extension forwards the alarms (e.g. TcHmiSqliteLogger).
  - **name:** name of the event.
  - **text:** text of the event.
  - **Id:** ID of the event.
  - **timeRaised:** time at which the event was triggered.
  - **timeCleared:** time at which an alarm was reset.
  - **timeConfirmed:** time at which the alarm was confirmed.
  - **type:** type of event (alarm or message).
  - **severity:** severity of the event (prohibitions, info, warning, error, critical error).
  - **alarmState:** state of an alarm (triggered, confirmed, deleted, confirmed and deleted).

- **confirmationState**: state of acknowledgement of an alarm (not required, not supported, waiting for acknowledgement, acknowledged, reset).
  - „**params::**“: the parameter object of an event can be accessed in the text field of the path via the keyword "params::" (without quotation marks). The parameter object contains optional parameters that can differ depending on the event source. For example, the TwinCAT Eventlogger provides additional information about the event origin in the PLC. The parameters are accessed in camelCase, e.g.: params::sourceName
5. **Operator**: comparison operator of the clause
  6. **Value**: value of the clause

### Grouping of conditions

Several conditions can be grouped and linked if more than one condition is selected. The conditions are selected by clicking the rows with the CTRL key pressed.



1. **Group clause**: grouping of several clauses. The brackets link them optically.
2. **Ungroup clause**: ungrouping.

### 5.10.2.13.3 Attributes

#### 5.10.2.13.3.1 Filter

Defines which events are queried by the server.

**Schema:** tchmi:server#/definitions/eventFilter

**Origin:** [Event Line \[► 305\]](#)

**See also**

**Attribute getter:** getFilter

**Attribute setter:** setFilter

---



Available from version 1.12.748

---

### 5.10.2.13.3.2    **Sorting**

Defines sorting rules for sorting the displayed data.

**Schema:** tchmi:framework#/definitions/Sorting

**Origin:** [Event Line](#) [[► 305](#)]

**See also**

**Attribute getter:** getSorting

**Attribute setter:** setSorting

---



Available from version 1.12.748

---

### 5.10.2.13.3.3    **TextColor**

Defines the color of the font.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Event Line](#) [[► 305](#)]

**See also**

**Attribute getter:** getTextColor

**Attribute setter:** setTextColor

---



Available from version 1.12.748

---

### 5.10.2.13.3.4    **TextFontFamily**

Defines the font.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Event Line](#) [[► 305](#)]

**See also**

**Attribute getter:** getTextFontFamily

**Attribute setter:** setTextFontFamily

---



Available from version 1.12.748

---

### 5.10.2.13.3.5 TextFontSize

Defines the font size.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Event Line](#) [► 305]

**See also**

**Attribute getter:** getTextFontSize

**Attribute setter:** setTextFontSize

---



Available from version 1.12.748

---

### 5.10.2.13.3.6 TextFontSizeUnit

Defines the unit of the font size.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Event Line](#) [► 305]

**See also**

**Attribute getter:** getTextFontSizeUnit

**Attribute setter:** setTextFontSizeUnit

---



Available from version 1.12.748

---

### 5.10.2.13.3.7 TextFontStyle

Defines the style of the font.

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Event Line](#) [► 305]

**See also**

**Attribute getter:** getTextFontStyle

**Attribute setter:** setTextFontStyle

---



Available from version 1.12.748

---

### 5.10.2.13.3.8 TextFontWeight

Defines the font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Event Line](#) [► 305]

**See also****Attribute getter:** getTextFontWeight**Attribute setter:** setTextFontWeightAvailable from version 1.12.748

---

**5.10.2.13.3.9 TargetRegion**

Defines the TcHmiRegion control which displays the defined [TargetContent](#) [► 315] after a click on the button of the control. The button is displayed only if the TargetRegion and TargetContent attributes are defined.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.System.TcHmiRegion**Origin:** [Event Line](#) [► 305]**See also****Attribute getter:** getTargetRegion**Attribute setter:** setTargetRegionAvailable from version 1.12.748

---

**5.10.2.13.3.10 TargetContent**

Defines the content page which is displayed in the defined [TargetRegion](#) [► 315] after a click on the button of the control. The button is displayed only if the TargetContent and TargetRegion attributes are defined.

**Schema:** tchmi:framework#/definitions/ContentPath**Origin:** [Event Line](#) [► 305]**See also****Attribute getter:** getTargetContent**Attribute setter:** setTargetContentAvailable from version 1.12.748

---

**5.10.2.13.3.11 ServerInterval**

Defines the interval for the server subscription in milliseconds.

**Schema:** tchmi:general#/definitions/Number**Origin:** [Event Line](#) [► 305]**See also****Attribute getter:** getServerInterval**Attribute setter:** setServerInterval



Available from version 1.12.748

### 5.10.2.14 File Explorer

The File Explorer control can be used to display and navigate through folders and files on the server. It allows uploading and downloading files, as well as moving and copying files and folders on the server.

#### Attributes

##### Category: Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control



Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

<a href="#">Root [► 324]</a>	Root folder of the control
<a href="#">Path [► 323]</a>	Currently displayed folder
<a href="#">FullPath [► 322]</a>	The full path of the current folder, including root
<a href="#">SelectedItems [► 324]</a>	The currently selected files and folders
<a href="#">ServerInterval [► 324]</a>	Interval time for server subscriptions

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Menu Bar**

Name	Description
<a href="#">MenuBarHeight [► 323]</a>	The height of the menu bar
<a href="#">MenuBarHeightUnit [► 323]</a>	The unit of the height of the menu bar
<a href="#">MenuBarPosition [► 323]</a>	The unit of the height of the menu bar

## Events

## Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

## Category: Operator

Name	Description

<a href="#">onPathChanged [► 325]</a>	The currently displayed path has changed.
<a href="#">onSelectionChanged [► 325]</a>	The currently selected files and folders have changed.

<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally observable.
<a href="#">operate</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally operable.
<a href="#">Create</a> [ <a href="#">► 325</a> ]	Specifies whether the current user is allowed to create folders and upload files.
<a href="#">Delete</a> [ <a href="#">► 325</a> ]	Specifies whether the current user is allowed to delete folders and files.
<a href="#">Download</a> [ <a href="#">► 326</a> ]	Specifies whether the current user is allowed to download files.
<a href="#">Rename</a> [ <a href="#">► 326</a> ]	Specifies whether the current user is allowed to rename folders and files.

**Inheritance hierarchy**

[Control](#) [[► 753](#)]

File Explorer

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.754

See also

API reference for this control

**5.10.2.14.1 Attributes****5.10.2.14.1.1 FullPath**

The full path to the currently displayed folder, i.e. the concatenation of root and path. This can be useful to display an image selected by the user in File Explorer, or to perform other operations on selected files, for example.

Paths are specified as strings with a forward leaning slash ("/") as a separator.

**Schema:** tchmi:general#/definitions/String

**Origin:** [File Explorer](#) [[► 316](#)]

See also

**Attribute getter:** getFullPath

The attribute can only be read and therefore has no setter.



Available from version 1.12.754

#### 5.10.2.14.1.2 MenuBarHeight

The height of the menu bar. The buttons in the menu bar automatically adjust to this height.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [File Explorer](#) [► 316]

**See also**

**Attribute getter:** getMenuBarHeight

**Attribute setter:** setMenuBarHeight

---



Available from version 1.12.754

---

#### 5.10.2.14.1.3 MenuBarHeightUnit

The unit of the menu bar height. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [File Explorer](#) [► 316]

**See also**

**Attribute getter:** getMenuBarHeightUnit

The attribute can only be read and therefore has no setter.

---



Available from version 1.12.754

---

#### 5.10.2.14.1.4 MenuBarPosition

The position of the menu bar. Either at the top or at the bottom of the control.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiFileExplorer.MenuBarPosition

**Origin:** [File Explorer](#) [► 316]

**See also**

**Attribute getter:** getMenuBarPosition

**Attribute setter:** setMenuBarPosition

---



Available from version 1.12.754

---

#### 5.10.2.14.1.5 Path

The path to the currently displayed folder. This path is relative to the root attribute, but cannot point to folders outside the root folder.

Paths are specified as strings with a forward leaning slash ("/") as a separator.

**Schema:** tchmi:general#/definitions/String

**Origin:** [File Explorer](#) [[► 316](#)]

**See also**

**Attribute getter:** getPath

**Attribute setter:** setPath



Available from version 1.12.754

---

#### 5.10.2.14.1.6 Root

The path to the folder to be used as the root folder. The control only allows navigation and display of files and folders located within the root folder.

Paths are specified as strings with a forward leaning slash ("/") as a separator.

**Schema:** tchmi:general#/definitions/String

**Origin:** [File Explorer](#) [[► 316](#)]

**See also**

**Attribute getter:** getRoot

**Attribute setter:** setRoot



Available from version 1.12.754

---

#### 5.10.2.14.1.7 SelectedItems

An array containing the names of the currently selected files and folders.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiFileExplorer.NameArray

**Origin:** [File Explorer](#) [[► 316](#)]

**See also**

**Attribute getter:** getSelectedItems

The attribute can only be read and therefore has no setter.



Available from version 1.12.754

---

#### 5.10.2.14.1.8 ServerInterval

Interval time in milliseconds to be used for server subscriptions. If no value is specified, the websocketIntervalTime defined in tchmiconfig.json is used.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [File Explorer](#) [[► 316](#)]



**See also****Attribute getter:** `getServerInterval`**Attribute setter:** `setServerInterval`Available from version 1.12.754

---

**5.10.2.14.2 Events****5.10.2.14.2.1 onPathChanged**

The currently displayed path has changed. This event is triggered when the attribute [Root \[▸ 324\]](#) or [Path \[▸ 323\]](#) has changed.

**Origin:** [File Explorer \[▸ 316\]](#)Available from version 1.12.754

---

**5.10.2.14.2.2 onSelectionChanged**

The currently selected files and folders have changed. This event is triggered when the user selects or deselects files or folders, or when navigation or changing the contents of the current folder changes the selection.

**Origin:** [File Explorer \[▸ 316\]](#)Available from version 1.12.754

---

**5.10.2.14.3 Permissions****5.10.2.14.3.1 Create**

Specifies whether the current user is allowed to create folders and upload files. If this right is missing, the buttons for creating folders and uploading files are disabled.

**Origin:** [File Explorer \[▸ 316\]](#)**See also**[User management at control level \[▸ 969\]](#)Available from version 1.12.754

---

**5.10.2.14.3.2 Delete**

Specifies whether the current user is allowed to delete folders and files. If this right is missing, the Delete button is disabled.

**Origin:** [File Explorer \[▸ 316\]](#)

**See also**

User management at control level [► 969]

---



Available from version 1.12.754

---

**5.10.2.14.3.3 Download**

Specifies whether the current user is allowed to download files.  
If this permission is missing, the Download button will be disabled.

**Origin:** [File Explorer](#) [► 316]

**See also**

User management at control level [► 969]

---



Available from version 1.12.754

---

**5.10.2.14.3.4 Rename**

Specifies whether the current user is allowed to rename folders and files.  
If this permission is missing, the Rename button is disabled.

**Origin:** [File Explorer](#) [► 316]

**See also**

User management at control level [► 969]

---



Available from version 1.12.754

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**5.10.2.15 Horizontal Bar Chart**

A HorizontalBarChart is a horizontal bar chart. It can be statically filled with data or dynamically supplied with data via an array.

A description of the configuration can be found in chapter [Configuration](#) [► 335].

**Attributes**

**Category:** Colors

Name	Description
<a href="#">XAxisColor [► 337]</a>	Definition of the color of the X-axis
<a href="#">YAxisColor [► 337]</a>	Definition of the color of the Y-axis
<a href="#">GridBackgroundColor [► 337]</a>	Definition of the background color of the coordinate system
<a href="#">GridLineColor [► 338]</a>	Definition of the color of the coordinate grid
<a href="#">SubgridLineColor [► 338]</a>	Definition of the color of the coordinate subgrid
<a href="#">SectionsBackgroundColor [► 338]</a>	Definition of the color of the sections
<a href="#">XLabelFontColor [► 338]</a>	Definition of the font color of the X-axis labels
<a href="#">XAxisNameFontColor [► 339]</a>	Definition of the font color of the Y-axis name
<a href="#">YLabelFontColor [► 339]</a>	Definition of the font color of the Y-axis labels
<a href="#">YAxisNameFontColor [► 339]</a>	Definition of the font color of the Y-axis name
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">BarGraphData [► 340]</a>	Definition of the data to be displayed as graph using the 'Bar Graph Data [► 336]' dialog.
<a href="#">BarGraphDescription [► 340]</a>	Definition of the display mode of the configured bar graphs using the dialog <a href="#">Bar Graph Description [► 336]</a> .
<a href="#">ShowLegend [► 340]</a>	Selecting whether the legend is to be displayed.
<a href="#">BarGraphArrangement [► 340]</a>	Selection of the display mode of the bar chart: <ul style="list-style-type: none"> <li>• Overlapped: Bars are drawn on top of each other</li> <li>• Clustered: Bars are drawn next to each other</li> </ul>
<a href="#">BarGraphWidth [► 341]</a>	Definition of the width of the individual bars.
<a href="#">ReferenceLines [► 355]</a>	Definition of the reference lines.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: XAxis**

Name	Description
<a href="#">ShowXAxis [► 341]</a>	Selecting whether the X-axis is to be displayed.
<a href="#">XPosition [► 341]</a>	Selecting the position of the X-axis on the coordinate system. <ul style="list-style-type: none"> <li>Left: X-axis is displayed on the left side of the coordinate system.</li> <li>Right: X-axis is displayed on the right side of the coordinate system.</li> </ul>
<a href="#">XShowLabels [► 341]</a>	Selecting whether the X-axis labels are to be displayed.
<a href="#">XMainTickMinValue [► 342]</a>	Definition of the minimum value of the X-axis main subdivision.
<a href="#">XMainTickMaxValue [► 342]</a>	Definition of the maximum value of the X-axis main subdivision.
<a href="#">XAxisAutoScaling [► 342]</a>	Selecting whether the X-axis should be automatically scaled according to the data sets. 'Maintick Min Value', 'Maintick Max Value' and 'X-Axis Maintick Steps' need not be set.
<a href="#">XMainTickSteps [► 342]</a>	Definition of the step size of the X-axis main subdivision.
<a href="#">ShowXAxisName [► 343]</a>	Selecting whether the X-axis name is to be displayed.
<a href="#">XAxisName [► 343]</a>	Definition of the X-axis name.
<a href="#">XAxisDecimalPlaces [► 343]</a>	Definition of the decimal places displayed for the X-axis.
<a href="#">XAxisUnit [► 344]</a>	Definition of the X-axis unit.
<a href="#">XLabelFontFamily [► 344]</a>	Definition of the font using the name of the font family or the keyword.
<a href="#">XLabelFontSize [► 344]</a>	Definition of the font size for the X-axis labels.
<a href="#">XLabelFontSizeUnit [► 344]</a>	Selecting the font size unit for the X-axis labels: <ul style="list-style-type: none"> <li>Pixels for an absolute size</li> <li>Percent for a relative size</li> </ul>
<a href="#">XLabelFontWeight [► 345]</a>	Selecting the font weight of the X-axis labels: <ul style="list-style-type: none"> <li>Normal</li> <li>Bold</li> </ul>
<a href="#">XAxisWidth [► 345]</a>	Definition of the X-axis width.
<a href="#">XNameFontFamily [► 345]</a>	Definition of the font using the name of the font family or the keyword.
<a href="#">XNameFontSize [► 346]</a>	Definition of the font size of the X axis name.
<a href="#">XNameFontSizeUnit [► 346]</a>	Selecting the unit of the font size of the X axis name: <ul style="list-style-type: none"> <li>Pixels for an absolute size</li> <li>Percent for a relative size</li> </ul>
<a href="#">XNameFontWeight [► 346]</a>	Selecting of the font weight of the X-axis name: <ul style="list-style-type: none"> <li>Normal</li> <li>Bold</li> </ul>
<a href="#">XAxisFormat [► 346]</a>	Definition of the formatting of the X-axis labels.

**Category: YAxis**

Name	Description
ShowYAxis [ <a href="#">▶ 347</a> ]	Selecting whether the Y-axis is to be displayed.
YShowLabels [ <a href="#">▶ 347</a> ]	Selecting whether the Y-axis labels are to be displayed.
YMainTickMinValue [ <a href="#">▶ 348</a> ]	Definition of the minimum value of the Y-axis main subdivision.
YMainTickMaxValue [ <a href="#">▶ 348</a> ]	Definition of the maximum value of the Y-axis main subdivision.
YAxisAutoScaling [ <a href="#">▶ 348</a> ]	Selecting whether the Y-axis should be automatically scaled according to the data sets. 'Maintick Min Value', 'Maintick Max Value' and 'Y-Axis Maintick Steps' need not be set.
YMainTickSteps [ <a href="#">▶ 348</a> ]	Definition of the step size of the Y-axis main subdivision.
ShowYSubTicks [ <a href="#">▶ 349</a> ]	Selecting whether the subcoordinate points are to be displayed on the Y-axis.
YSubTickSteps [ <a href="#">▶ 349</a> ]	Definition of the step size of the Y-axis subdivision.
ShowYAxisName [ <a href="#">▶ 349</a> ]	Selecting whether the Y-axis name is to be displayed.
YAxisName [ <a href="#">▶ 349</a> ]	Definition of the Y-axis name.
YAxisDecimalPlaces [ <a href="#">▶ 350</a> ]	Definition of the decimal places displayed for the Y-axis.
YAxisUnit [ <a href="#">▶ 350</a> ]	Definition of the unit of the Y-axis.
YLabelFontFamily [ <a href="#">▶ 350</a> ]	Definition of the font using the name of the font family or the keyword.
YLabelFontSize [ <a href="#">▶ 351</a> ]	Definition of the font size for the Y-axis labels.
YLabelFontSizeUnit [ <a href="#">▶ 351</a> ]	Selecting the font size unit for the Y-axis labels: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
YLabelFontWeight [ <a href="#">▶ 351</a> ]	Selecting the font weight of the Y-axis labels: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
YAxisWidth [ <a href="#">▶ 351</a> ]	Definition of the Y-axis width.
YAxisNameFontFamily [ <a href="#">▶ 352</a> ]	Definition of the font using the name of the font family or the keyword.
YAxisNameFontSize [ <a href="#">▶ 352</a> ]	Definition of the font size of the Y-axis name.
YAxisNameFontSizeUnit [ <a href="#">▶ 352</a> ]	Selecting the unit of the font size of the Y-axis name: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
YAxisNameFontWeight [ <a href="#">▶ 353</a> ]	Selecting of the font weight of the Y-axis name: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>

**Category: Grid**



Name	Description
ShowGrid [ <a href="#">► 353</a> ]	Selecting whether the coordinate grid is to be displayed.
GridShowHorizontalLines [ <a href="#">► 353</a> ]	Selecting whether the horizontal lines of the coordinate grid are to be displayed.
GridShowVerticalLines [ <a href="#">► 353</a> ]	Selecting whether the vertical lines of the coordinate grid are to be displayed.
GridLineStyle [ <a href="#">► 354</a> ]	Definition of the line style for the coordinate grid.
GridLineWidth [ <a href="#">► 354</a> ]	Definition of the line width of the coordinate grid.
SubgridShowVerticalLines [ <a href="#">► 354</a> ]	Selecting whether the vertical lines of the subgrid are to be displayed.
SubgridLineStyle [ <a href="#">► 355</a> ]	Definition of the line style of the subgrid.
SubgridLineWidth [ <a href="#">► 354</a> ]	Definition of the line width of the subgrid.

## Events

### Category: Framework

Name	Description
onAttached [ <a href="#">► 778</a> ]	The control was added to the display.
onDetached [ <a href="#">► 778</a> ]	The control was removed from the display.
onInitialized [ <a href="#">► 778</a> ]	The control was initialized.
onDestroyed [ <a href="#">► 778</a> ]	The control was destroyed.
onMoved [ <a href="#">► 781</a> ]	The control was moved in relation to the browser window.
onResized [ <a href="#">► 782</a> ]	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Horizontal Bar Chart

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.746

## See also

API reference for this control

### 5.10.2.15.1 Configuration

A bar chart can be configured in different ways:

- Via [Engineering](#) [► 335]
  - Array of numbers
  - Array of arrays of numbers
- Via an array from the [PLC](#) [► 335]
  - Array of numbers

```
aVaules : ARRAY [1..10] OF INT;
```

- Array of arrays of numbers

```
aValues : ARRAY [1..2, 1..10] OF INT;
```

Definition via Engineering:

1. Add a bar chart to the interface.
2. Define which type of object you want to use.

Array of numbers (Array<number>):

3. Define the number of members of the array and their values for the 'Bar Graph Data' attribute of the 'Common' category using the '[Bar Graph Data](#) [► 336]' dialog.

Array of arrays of numbers (Array<Array<number>>)

3. Define the number of data sets of the array for the 'Bar Graph Data' attribute of the 'Common' category using the '[Bar Graph Data](#) [► 336]' dialog.
4. Define the number of members of the array and their values using the '[Bar Graph Data](#) [► 336]' dialog.

Definition via an array from the PLC:

1. Add a bar chart to the interface.
2. Link the array to the 'Bar Graph Data' attribute of the 'Common' category.

Advanced Settings:





1. Define the color of the individual data sets for the 'Bar Graph Colors' attribute of the 'Common' category using the '[Bar Graph Color](#) [► 336]' dialog.
2. Deactivate the 'X-Axis Autoscaling' attribute of the 'X-Axis' category.
3. Define the minimum and maximum value of the x-axis corresponding to your data set in the 'X-Axis Maintick Min Value' and 'X-Axis Maintick Max Value' attributes of the 'X-Axis' category.
4. Define the step size matching your data set for the 'X-Axis Maintick Steps' attribute of the 'X-Axis' category.

Example: [Barchart](#) [► 1580]

### 5.10.2.15.2 Dialogs

#### 5.10.2.15.2.1 Bar Graph Color Dialog

Use this dialog you define the color of the bar graphs. The color objects are assigned to the arrays of the data sets sequentially in case of data structure 'Array<Array<number>>'





Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Category: Colors

Name	Description
Bar color	Definition of the color of the bar graph
Legend name	Definition of the legend name
Scale factor	Definition of the scale factor

#### 5.10.2.15.2.2 Bar Graph Data Dialog

You can use this dialog to statically define the data that the bar graph is to display in Engineering. To do this, you can first choose between the structure of the data as 'Array<Array<number>>' and 'Array<number>'. In the second step, you can then define the entries.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

If you have selected the data structure 'Array<Array<number>>', you can first define different arrays, each representing a bar graph.




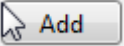
Name	Description
Array	Definition of an array of numbers representing a data set to be displayed as a bar graph

Each of these arrays has entries that you can define using the second version of the dialog. If you use the data structure 'Array<number>', this dialog is offered directly.

Name	Description
Number	Definition of a value from a data set to be displayed as a bar graph

### 5.10.2.15.2.3 Bar Graph Description Dialog

Use this dialog you define the color of the bar graphs and their legend name. The objects are assigned to the arrays of the data sets sequentially in case of data structure 'Array<Array<number>>'

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Category: Colors

Name	Description
Bar color	Definition of the color of the bar graph
Legend name	Definition of the legend name
Scale factor	Definition of the scale factor

5.10.2.15.3      **Attributes**

5.10.2.15.3.1    **XAxisColor**

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getXAxisColor

**Attribute setter:** setXAxisColor



Available from version 1.12.746

5.10.2.15.3.2    **YAxisColor**

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getYAxisColor

**Attribute setter:** setYAxisColor



Available from version 1.12.746

5.10.2.15.3.3    **GridBackgroundColor**

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also****Attribute getter:** getGridBackgroundColor**Attribute setter:** setGridBackgroundColorAvailable from version 1.12.746

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**5.10.2.15.3.4    GridLineColor****Schema:** tchmi:framework#/definitions/SolidColor**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getGridLineColor**Attribute setter:** setGridLineColorAvailable from version 1.12.746

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**5.10.2.15.3.5    SubgridLineColor****Schema:** tchmi:framework#/definitions/SolidColor**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getSubgridLineColor**Attribute setter:** setSubgridLineColorAvailable from version 1.12.746

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**5.10.2.15.3.6    SectionsBackgroundColor****Schema:** tchmi:framework#/definitions/SolidColor**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getSectionsBackgroundColor**Attribute setter:** setSectionsBackgroundColorAvailable from version 1.12.746

---

**5.10.2.15.3.7    XLabelFontColor****Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getXLabelFontColor

**Attribute setter:** setXLabelFontColor

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Available from version 1.12.746

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#### 5.10.2.15.3.8 XAxisNameFontColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getXAxisNameFontColor

**Attribute setter:** setXAxisNameFontColor

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Available from version 1.12.746

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#### 5.10.2.15.3.9 YLabelFontColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getYLabelFontColor

**Attribute setter:** setYLabelFontColor

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Available from version 1.12.746

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#### 5.10.2.15.3.10 YAxisNameFontColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getYAxisNameFontColor

**Attribute setter:** setYAxisNameFontColor

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Available from version 1.12.746

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### 5.10.2.15.3.11 BarGraphData

**Schema:** tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiBarChart.ChartBarGraphDataDefinitionList

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getBarGraphData

**Attribute setter:** setBarGraphData

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Available from version 1.12.746

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### 5.10.2.15.3.12 BarGraphDescription

**Schema:** tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiBarChart.ChartBarGraphDescriptionDefinitionList

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getBarGraphDescription

**Attribute setter:** setBarGraphDescription

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Available from version 1.12.746

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### 5.10.2.15.3.13 ShowLegend

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getShowLegend

**Attribute setter:** setShowLegend

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Available from version 1.12.746

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### 5.10.2.15.3.14 BarGraphArrangement

**Schema:** tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiBarChart.ChartBarGraphArrangement

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getBarGraphArrangement

**Attribute setter:** setBarGraphArrangement





Available from version 1.12.746

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#### 5.10.2.15.3.15 BarGraphWidth

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getBarGraphWidth

**Attribute setter:** setBarGraphWidth

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Available from version 1.12.746

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#### 5.10.2.15.3.16 ShowXAxis

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getShowXAxis

**Attribute setter:** setShowXAxis

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Available from version 1.12.746

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#### 5.10.2.15.3.17 XPosition

**Schema:** tchmi:framework#/definitions/  
Tchmi.Controls.Beckhoff.TchmiHorizontalBarChart.ChartBarGraphPosition

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getXPosition

**Attribute setter:** setXPosition

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Available from version 1.12.746

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#### 5.10.2.15.3.18 XShowLabels

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also****Attribute getter:** getXShowLabels**Attribute setter:** setXShowLabelsAvailable from version 1.12.746

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**5.10.2.15.3.19 XMainTickMinValue****Schema:** tchmi:general#/definitions/Number**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getXMainTickMinValue**Attribute setter:** setXMainTickMinValueAvailable from version 1.12.746

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**5.10.2.15.3.20 XMainTickMaxValue****Schema:** tchmi:general#/definitions/Number**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getXMainTickMaxValue**Attribute setter:** setXMainTickMaxValueAvailable from version 1.12.746

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**5.10.2.15.3.21 XAxisAutoScaling****Schema:** tchmi:general#/definitions/Boolean**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getXAxisAutoScaling**Attribute setter:** setXAxisAutoScalingAvailable from version 1.12.746

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**5.10.2.15.3.22 XMainTickSteps****Schema:** tchmi:general#/definitions/Number

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getXMainTickSteps

**Attribute setter:** setXMainTickSteps

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Available from version 1.12.746

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#### 5.10.2.15.3.23 ShowXAxisName

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getShowXAxisName

**Attribute setter:** setShowXAxisName

---



Available from version 1.12.746

---

#### 5.10.2.15.3.24 XAxisName

**Schema:** tchmi:general#/definitions/String

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getXAxisName

**Attribute setter:** setXAxisName

---



Available from version 1.12.746

---

#### 5.10.2.15.3.25 XAxisDecimalPlaces

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getXAxisDecimalPlaces

**Attribute setter:** setXAxisDecimalPlaces

---



Available from version 1.12.746

---

### 5.10.2.15.3.26 XAxisUnit

**Schema:** tchmi:general#/definitions/String

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getXAxisUnit

**Attribute setter:** setXAxisUnit

---



Available from version 1.12.746

---

### 5.10.2.15.3.27 XLabelFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getXLabelFontFamily

**Attribute setter:** setXLabelFontFamily

---



Available from version 1.12.746

---

### 5.10.2.15.3.28 XLabelFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getXLabelFontSize

**Attribute setter:** setXLabelFontSize

---



Available from version 1.12.746

---

### 5.10.2.15.3.29 XLabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Horizontal Bar Chart](#) [► 326]

See also

**Attribute getter:** getXLabelFontSizeUnit

**Attribute setter:** setXLabelFontSizeUnit

---



Available from version 1.12.746

---

### 5.10.2.15.3.30 XLabelFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Horizontal Bar Chart](#) [► 326]

See also

**Attribute getter:** getXLabelFontWeight

**Attribute setter:** setXLabelFontWeight

---



Available from version 1.12.746

---

### 5.10.2.15.3.31 XAxisWidth

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Horizontal Bar Chart](#) [► 326]

See also

**Attribute getter:** getXAxisWidth

**Attribute setter:** setXAxisWidth

---



Available from version 1.12.746

---

### 5.10.2.15.3.32 XAxisNameFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Horizontal Bar Chart](#) [► 326]

See also

**Attribute getter:** getXAxisNameFontFamily

**Attribute setter:** setXAxisNameFontFamily

---



Available from version 1.12.746

---

### 5.10.2.15.3.33 XAxisNameFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getXAxisNameFontSize

**Attribute setter:** setXAxisNameFontSize

---



Available from version 1.12.746

---

### 5.10.2.15.3.34 XAxisNameFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getXAxisNameFontSizeUnit

**Attribute setter:** setXAxisNameFontSizeUnit

---



Available from version 1.12.746

---

### 5.10.2.15.3.35 XAxisNameFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getXAxisNameFontWeight

**Attribute setter:** setXAxisNameFontWeight

---



Available from version 1.12.746

---

### 5.10.2.15.3.36 XAxisFormat

**Schema:** tchmi:framework#/definitions/Function

Definition of the formatting of the X-axis labels.

The selected function defines the X-axis labels. It is called for each displayed value of the main X-axis subdivision. To do this, it receives the index of the [BarGraphData](#) [► 340] attribute.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
XAxisFormat(value: number): string;
```

#### Parameter

Name	Type	Description
value	number	The current index of the value on the X-axis.

#### Return value

Type	Description
string	The new value of the main X-axis subdivision. HTML is not allowed here.

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

#### See also

**Attribute getter:** getXAxisFormat

**Attribute setter:** setXAxisFormat



Available from version 1.12.746

### 5.10.2.15.3.37 ShowYAxis

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

#### See also

**Attribute getter:** getShowYAxis

**Attribute setter:** setShowYAxis



Available from version 1.12.746

### 5.10.2.15.3.38 YShowLabels

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

#### See also

**Attribute getter:** getYShowLabels

**Attribute setter:** setYShowLabels



Available from version 1.12.746

---

#### 5.10.2.15.3.39 YMainTickMinValue

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Horizontal Bar Chart](#) [[▶ 326](#)]

**See also**

**Attribute getter:** getYMainTickMinValue

**Attribute setter:** setYMainTickMinValue

---



Available from version 1.12.746

---

#### 5.10.2.15.3.40 YMainTickMaxValue

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Horizontal Bar Chart](#) [[▶ 326](#)]

**See also**

**Attribute getter:** getYMainTickMaxValue

**Attribute setter:** setYMainTickMaxValue

---



Available from version 1.12.746

---

#### 5.10.2.15.3.41 YAxisAutoScaling

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart](#) [[▶ 326](#)]

**See also**

**Attribute getter:** getYAxisAutoScaling

**Attribute setter:** setYAxisAutoScaling

---



Available from version 1.12.746

---

#### 5.10.2.15.3.42 YMainTickSteps

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Horizontal Bar Chart](#) [[▶ 326](#)]



See also

**Attribute getter:** getYMainTickSteps

**Attribute setter:** setYMainTickSteps

---



Available from version 1.12.746

---

#### 5.10.2.15.3.43 ShowYSubTicks

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart](#) [► 326]

See also

**Attribute getter:** getShowYSubTicks

**Attribute setter:** setShowYSubTicks

---



Available from version 1.12.746

---

#### 5.10.2.15.3.44 YSubTickSteps

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Horizontal Bar Chart](#) [► 326]

See also

**Attribute getter:** getYSubTickSteps

**Attribute setter:** setYSubTickSteps

---



Available from version 1.12.746

---

#### 5.10.2.15.3.45 ShowYAxisName

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart](#) [► 326]

See also

**Attribute getter:** getShowYAxisName

**Attribute setter:** setShowYAxisName

---



Available from version 1.12.746

---

#### 5.10.2.15.3.46 YAxisName

**Schema:** tchmi:general#/definitions/String

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getYAxisName

**Attribute setter:** setYAxisName

---



Available from version 1.12.746

---

#### 5.10.2.15.3.47 YAxisDecimalPlaces

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getYAxisDecimalPlaces

**Attribute setter:** setYAxisDecimalPlaces

---



Available from version 1.12.746

---

#### 5.10.2.15.3.48 YAxisUnit

**Schema:** tchmi:general#/definitions/String

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getYAxisUnit

**Attribute setter:** setYAxisUnit

---



Available from version 1.12.746

---

#### 5.10.2.15.3.49 YLabelFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Horizontal Bar Chart \[► 326\]](#)

**See also**

**Attribute getter:** getYLabelFontFamily

**Attribute setter:** setYLabelFontFamily

---



Available from version 1.12.746

---

### 5.10.2.15.3.50 YLabelFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getYLabelFontSize

**Attribute setter:** setYLabelFontSize

---



Available from version 1.12.746

---

### 5.10.2.15.3.51 YLabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getYLabelFontSizeUnit

**Attribute setter:** setYLabelFontSizeUnit

---



Available from version 1.12.746

---

### 5.10.2.15.3.52 YLabelFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getYLabelFontWeight

**Attribute setter:** setYLabelFontWeight

---



Available from version 1.12.746

---

### 5.10.2.15.3.53 YAxisWidth

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also****Attribute getter:** getYAxisWidth**Attribute setter:** setYAxisWidthAvailable from version 1.12.746

---

**5.10.2.15.3.54 YAxisNameFontFamily**

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getYAxisNameFontFamily**Attribute setter:** setYAxisNameFontFamilyAvailable from version 1.12.746

---

**5.10.2.15.3.55 YAxisNameFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getYAxisNameFontSize**Attribute setter:** setYAxisNameFontSizeAvailable from version 1.12.746

---

**5.10.2.15.3.56 YAxisNameFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getYAxisNameFontSizeUnit**Attribute setter:** setYAxisNameFontSizeUnit



Available from version 1.12.746

---

### 5.10.2.15.3.57 YAxisNameFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getYAxisNameFontWeight

**Attribute setter:** setYAxisNameFontWeight

---



Available from version 1.12.746

---

### 5.10.2.15.3.58 ShowGrid

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getShowGrid

**Attribute setter:** setShowGrid

---



Available from version 1.12.746

---

### 5.10.2.15.3.59 GridShowHorizontalLines

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getGridShowHorizontalLines

**Attribute setter:** setGridShowHorizontalLines

---



Available from version 1.12.746

---

### 5.10.2.15.3.60 GridShowVerticalLines

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also****Attribute getter:** getGridShowVerticalLines**Attribute setter:** setGridShowVerticalLines

Available from version 1.12.746

**5.10.2.15.3.61 GridLineWidth****Schema:** tchmi:general#/definitions/Number**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getGridLineWidth**Attribute setter:** setGridLineWidth

Available from version 1.12.746

**5.10.2.15.3.62 GridLineStyle****Schema:** tchmi:framework#/definitions/TchMi.Controls.Beckhoff.ChartLineStyle**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getGridLineStyle**Attribute setter:** setGridLineStyle

Available from version 1.12.746

**5.10.2.15.3.63 SubgridShowVerticalLines****Schema:** tchmi:general#/definitions/Boolean**Origin:** [Horizontal Bar Chart](#) [► 326]**See also****Attribute getter:** getSubgridShowVerticalLines**Attribute setter:** setSubgridShowVerticalLines

Available from version 1.12.746

**5.10.2.15.3.64 SubgridLineWidth****Schema:** tchmi:general#/definitions/Number

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getSubgridLineWidth

**Attribute setter:** setSubgridLineWidth

---



Available from version 1.12.746

---

### 5.10.2.15.3.65 SubgridLineStyle

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.ChartLineStyle

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** setSubgridLineStyle

**Attribute setter:** getSubgridLineStyle

---



Available from version 1.12.746

---

### 5.10.2.15.3.66 ReferenceLines

**Schema:** tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiHorizontalBarChart.ChartReferenceLineDefinitionList

**Origin:** [Horizontal Bar Chart](#) [► 326]

**See also**

**Attribute getter:** getReferenceLines

**Attribute setter:** setReferenceLines

---



Available since version 1.12.760

---

## 5.10.2.15.4 Themed Resources

These resources cannot be defined for each instance but only for several/all bar charts via the theme file. If you want to change only one instance, you must create a class for it.

---



Available from version 1.10

---

### 5.10.2.15.4.1 DefaultGraphColor

This is the color that is used by default for graphs if no color is defined for the graphs in the [BarGraphDescription](#) [► 340] attribute.

**Schema:** tchmi:framework#/definitions/SolidColor

Origin: [Horizontal Bar Chart \[► 326\]](#)



Available from version 1.12.746

**5.10.2.16 IFrame**

An IFrame is a nested browser context. It can be used to implement another web page in the visualization.

**Attributes**

**Category: Colors**

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category: Layout**



Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Src [► 360]</a>	Definition of the URL of the web page to be embedded or the path of a PDF to be displayed  Example of URL: <a href="https://www.beckhoff.com">https://www.beckhoff.com</a> Example of PDF: <Path within the TC HMI project>/Test.pdf#page=10
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Control**

Name	Description
<a href="#">onLoad [► 361]</a>	The IFrame was loaded successfully.
<a href="#">onError [► 361]</a>	The IFrame was not loaded successfully.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Keyboard, mouse or touch screen interaction events are not available in this control because the content is displayed in a separate sandbox within the browsers.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

IFrame

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

### See also

API reference for this control

## 5.10.2.16.1 Attributes

### 5.10.2.16.1.1 Src

The URL of the website to embed.

**Schema:** tchmi:general#/definitions/String

**Origin:** [IFrame \[► 356\]](#)

### See also

**Attribute getter:** getSrc

**Attribute setter:** setSrc



Available from 1.8

## 5.10.2.16.2 Events

### 5.10.2.16.2.1 onError

The IFrame was not loaded successfully.

Origin: [IFrame](#) [► 356]



Available from 1.8

### 5.10.2.16.2.2 onLoad

The IFrame was loaded successfully.

Origin: [IFrame](#) [► 356]



Available from 1.8

## 5.10.2.17 Image

An image is an image display in which image files from the project path can be displayed. The supported image formats are defined by the browser used.

### Attributes

#### Category: Colors

Name	Description
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

#### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 367]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side. The 'Width' attribute is ignored in all calculations!</li> <li>• Content: The width is calculated from the height. The aspect ratio of the image is maintained. If 'Width Mode' and 'Height Mode' are set to Content, the image is drawn in its original size.</li> </ul>
<a href="#">HeightMode [► 367]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side. The 'Height' attribute is ignored in all calculations!</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>Content: The height is calculated from the width while maintaining the aspect ratio of the image. If 'Width Mode' and 'Height Mode' are set to Content, the image is drawn in its original size.</li> </ul>
<a href="#">OriginalWidth [► 368]</a>	Original width of the image file.
<a href="#">OriginalHeight [► 368]</a>	Original height of the image file.

**Category: Common**

Name	Description
<a href="#">Src [► 366]</a>	Definition of the image path within the TC HMI project
<a href="#">Alt [► 366]</a>	Definition of an alternative text that is displayed if the image cannot or should not be loaded
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control



**Events****Category: Control**

Name	Description
<a href="#">onLoad [► 368]</a>	The image was loaded successfully.
<a href="#">onError [► 368]</a>	The image was not loaded successfully.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe</a> [► 783]	Determines whether the control is generally observable.
<a href="#">operate</a> [► 783]	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control](#) [► 753]

Image

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.17.1 Attributes****5.10.2.17.1.1 Src**

The address of the image. Images on other servers are also possible.

**Schema:** tchmi:framework#/definitions/Path

**Origin:** [Image](#) [► 361]

**See also**

**Attribute getter:** getSrc

**Attribute setter:** setSrc



Available from 1.8

**5.10.2.17.1.2 Alt**

Alternative text that is displayed if the image cannot or should not be loaded.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Image](#) [► 361]

**See also**

**Attribute getter:** getAlt

**Attribute setter:** setAlt



Available from 1.8

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### 5.10.2.17.1.3 HeightMode

Selection of the method of calculating the height. The available options are:

- **Value:** The height is defined by the height entered.
- **Parent:** The height is defined by the distance to the top and bottom side. The *Height* attribute is ignored in all calculations!
- **Content:** The height is calculated from the width while maintaining the aspect ratio of the image. If *Width Mode* [\[► 367\]](#) and *Height Mode* are set to Content, the image is drawn in its original size.



Learn how [controls can be positioned and their size defined \[► 116\]](#).

---

**Schema:** tchmi:framework#/definitions/SizeModeWithContent

**Origin:** [Image \[► 361\]](#)

**See also**

**Attribute getter:** getHeightMode

**Attribute setter:** setHeightMode

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Available from 1.8

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### 5.10.2.17.1.4 WidthMode

Selection of the method of calculating the width. The available options are:

- **Value:** The width is defined by the width entered.
- **Parent:** The width is defined by the distance to the left and right side. The *Width* attribute is ignored in all calculations!
- **Content:** The width is calculated from the height while maintaining the aspect ratio of the image. If *Width Mode* and *Height Mode* [\[► 367\]](#) are set to Content, the image is drawn in its original size.



Learn how [controls can be positioned and their size defined \[► 116\]](#).

---

**Schema:** tchmi:framework#/definitions/SizeModeWithContent

**Origin:** [Image \[► 361\]](#)

**See also**

**Attribute getter:** getWidthMode

**Attribute setter:** setWidthMode

---



Available from 1.8

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### 5.10.2.17.1.5 OriginalHeight

Original height of the image file.

Returns 0 if no image is available.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Image](#) [► 361]

**See also**

**Attribute getter:** getOriginalHeight

The attribute can only be read and therefore has no setter.



Available from 1.8

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### 5.10.2.17.1.6 OriginalWidth

Original width of the image file.

Returns 0 if no image is available.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Image](#) [► 361]

**See also**

**Attribute getter:** getOriginalWidth

The attribute can only be read and therefore has no setter.



Available from 1.8

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## 5.10.2.17.2 Events

### 5.10.2.17.2.1 onError

The image was not loaded successfully.

**Origin:** [Image](#) [► 361]



Available from 1.8

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### 5.10.2.17.2.2 onLoad

The image was loaded successfully.

**Origin:** [Image](#) [► 361]



Available from 1.8

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### 5.10.2.18 Input

A single-line text input element.

#### Attributes

##### Category: Colors

Name	Description
BackgroundColor [ <a href="#">▶ 769</a> ]	Definition of the background color
BorderColor [ <a href="#">▶ 768</a> ]	Definition of the border color of the control
TextColor [ <a href="#">▶ 376</a> ]	Definition of the text color

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Text [► 378]</a>	Definition of the text
<a href="#">AutoFocusOut [► 377]</a>	Determines whether the control automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.
<a href="#">AutoSelectText [► 378]</a>	Determines whether the entire text is automatically selected when it is focused.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**



Name	Description
<a href="#">TextFontFamily</a> [ <a href="#">► 375</a> ]	Definition of the font using the name of the font family or the keyword
<a href="#">TextFontSize</a> [ <a href="#">► 375</a> ]	Definition of the font size
<a href="#">TextFontSizeUnit</a> [ <a href="#">► 375</a> ]	Definition of the font size unit: <ul style="list-style-type: none"><li>• Pixels for an absolute size</li><li>• Percent for a relative size</li></ul>
<a href="#">TextFontStyle</a> [ <a href="#">► 376</a> ]	Selecting the font style: <ul style="list-style-type: none"><li>• Normal</li><li>• Italic</li><li>• Oblique</li></ul>
<a href="#">TextFontWeight</a> [ <a href="#">► 376</a> ]	Selecting the font weight of the text: <ul style="list-style-type: none"><li>• Normal</li><li>• Bold</li></ul>
<a href="#">ContentPadding</a> [ <a href="#">► 377</a> ]	Definition of the distance of the text to the border
<a href="#">TextHorizontalAlignment</a> [ <a href="#">► 377</a> ]	Selecting the horizontal alignment of the text
<a href="#">Placeholder</a> [ <a href="#">► 377</a> ]	Definition of the placeholder, which is displayed if no text is entered.

## Events

### Category: Control

Name	Description
<a href="#">onTextChanged</a> [ <a href="#">► 379</a> ]	The text has been changed.

### Category: Framework

Name	Description
<a href="#">onAttached</a> [ <a href="#">► 778</a> ]	The control was added to the display.
<a href="#">onDetached</a> [ <a href="#">► 778</a> ]	The control was removed from the display.
<a href="#">onInitialized</a> [ <a href="#">► 778</a> ]	The control was initialized.
<a href="#">onDestroyed</a> [ <a href="#">► 778</a> ]	The control was destroyed.
<a href="#">onMoved</a> [ <a href="#">► 781</a> ]	The control was moved in relation to the browser window.
<a href="#">onResized</a> [ <a href="#">► 782</a> ]	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onUserInteractionFinished [► 379]</a>	The user has finished the interaction with the control.
<a href="#">onFocusIn [► 378]</a>	The control now has the focus.
<a href="#">onFocusOut [► 379]</a>	The control has lost focus.
<a href="#">onUserInteractionCanceled [► 379]</a>	The user has terminated the interaction with the control element.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Input

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.

---



Available from version 1.12.744

---

#### See also

API reference for this control

### 5.10.2.18.1      **Attribute**

#### 5.10.2.18.1.1    **TextFontFamily**

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Input](#) [► 369]

#### See also

**Attribute getter:** getTextFontFamily

**Attribute setter:** setTextFontFamily

---



Available from version 1.12.744

---

#### 5.10.2.18.1.2    **TextFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Input](#) [► 369]

#### See also

**Attribute getter:** getTextFontSize

**Attribute setter:** setTextFontSize

---



Available from version 1.12.744

---

#### 5.10.2.18.1.3    **TextFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Input](#) [► 369]

**See also****Attribute getter:** getTextFontSizeUnit**Attribute setter:** setTextFontSizeUnitAvailable from version 1.12.744

---

**5.10.2.18.1.4    TextFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Input](#) [▶ 369]**See also****Attribute getter:** getTextFontStyle**Attribute setter:** setTextFontStyleAvailable from version 1.12.744

---

**5.10.2.18.1.5    TextFontWeight**

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Input](#) [▶ 369]**See also****Attribute getter:** getTextFontWeight**Attribute setter:** setTextFontWeightAvailable from version 1.12.744

---

**5.10.2.18.1.6    TextColor****Schema:** tchmi:framework#/definitions/SolidColor**Origin:** [Input](#) [▶ 369]**See also****Attribute getter:** getTextColor**Attribute setter:** setTextColorAvailable from version 1.12.744

---

### 5.10.2.18.1.7 TextHorizontalAlignment

Horizontal alignment of the text.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Input](#) [[▶ 369](#)]

**See also**

**Attribute getter:** getTextHorizontalAlignment

**Attribute setter:** setTextHorizontalAlignment

---



Available from version 1.12.744

---

### 5.10.2.18.1.8 ContentPadding

Defines the distance of the text to the border.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Input](#) [[▶ 369](#)]

**See also**

**Attribute getter:** getContentPadding

**Attribute setter:** setContentPadding

---



Available from version 1.12.744

---

### 5.10.2.18.1.9 Placeholder

Placeholder which is displayed if no text is entered.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Input](#) [[▶ 369](#)]

**See also**

**Attribute getter:** getPlaceholder

**Attribute setter:** setPlaceholder

---



Available from version 1.12.744

---

### 5.10.2.18.1.10 AutoFocusOut

Determines whether the control automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Input](#) [[▶ 369](#)]

**See also****Attribute getter:** getAutoFocusOut**Attribute setter:** setAutoFocusOutAvailable from version 1.12.744

---

**5.10.2.18.1.11 AutoSelectText**

Determines whether the Control automatically selects the entire text when it is focused.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Input](#) [► 369]**See also****Attribute getter:** getAutoSelectText**Attribute setter:** setAutoSelectTextAvailable from version 1.12.744

---

**5.10.2.18.1.12 Text**

Content of the control.

**Schema:** tchmi:general#/definitions/String**Origin:** [Input](#) [► 369]**See also****Attribute getter:** getText**Attribute setter:** setTextAvailable from version 1.12.744

---

**5.10.2.18.2 Events****5.10.2.18.2.1 onFocusIn**

The control now has the focus.

**Origin:** [Input](#) [► 369]Available from version 1.12.744

---

#### 5.10.2.18.2.2 onFocusOut

The control has lost focus.

Origin: [Input \[► 369\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.18.2.3 onTextChanged

The text has been changed.

Origin: [Input \[► 369\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.18.2.4 onUserInteractionFinished

The user has finished the interaction with the control.

Origin: [Input \[► 369\]](#)

---



Available from version 1.12.744

---

#### 5.10.2.18.2.5 onUserInteractionCanceled

The user has terminated the interaction with the control element.

Origin: [Input \[► 369\]](#)

---



Available from version 1.12.744

---

### 5.10.2.19 Keyboard

A keyboard is an on-screen keyboard that can be used for input without a hardware keyboard.

The [Layout \[► 383\]](#) attribute can be used to select different layouts.

#### Version 1.12

From version 1.12 keyboard layouts are added to the TwinCAT HMI project via a wizard and can then be used via the attribute [LayoutFile \[► 391\]](#).

The attribute [Layout \[► 391\]](#) is considered obsolete and should no longer be used.

**See also:** [Configuration guide \[► 999\]](#)

#### Attributes

**Category:** Colors

Name	Description
<a href="#">LabelColor</a> [ <a href="#">► 390</a> ]	Definition of the text color of the keys
<a href="#">LabelStrokeColor</a> [ <a href="#">► 390</a> ]	Definition of the outline color of the graphic key characters
<a href="#">LabelFillColor</a> [ <a href="#">► 390</a> ]	Definition of the fill color of the graphic key characters
<a href="#">KeyBackgroundColor</a> [ <a href="#">► 389</a> ]	Definition of the background color of the keys
<a href="#">AdditionalKeyBackdropColor</a> [ <a href="#">► 386</a> ]	Definition of the background color of the window in which the additional characters for the compact layouts are displayed
<a href="#">BackgroundColor</a> [ <a href="#">► 769</a> ]	Definition of the background color
<a href="#">BorderColor</a> [ <a href="#">► 768</a> ]	Definition of the border color of the control

**Category:** Layout



Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit</a> [► 772]	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft</a> [► 765]	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop</a> [► 765]	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight</a> [► 766]	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom</a> [► 766]	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth</a> [► 766]	Calculated width of the control in pixels
<a href="#">RenderedHeight</a> [► 767]	Calculated height of the control in pixels
<a href="#">GridRowIndex</a> [► 768]	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex</a> [► 767]	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity</a> [► 775]	Definition of the transparency of the entire control
<a href="#">Visibility</a> [► 776]	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex</a> [► 776]	Definition of the position on the Z-axis
<a href="#">Transform</a> [► 775]	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow</a> [► 777]	Definition of a shadow
<a href="#">KeyboardPadding</a> [► 389]	Definition of the inner distance of the keypad to the outer sides of the keyboard
<a href="#">AdditionalKeyBackdropPadding</a> [► 386]	Definition of the inner distance of the additional keys to the outer sides of the window in which they are displayed
<a href="#">WidthMode</a> [► 762]	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode</a> [► 763]	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">LayoutFile [► 391]</a>	Activates a layout from the project.
<a href="#">Layout [► 391]</a>	Selection of the keyboard layout
<a href="#">ScaleMode [► 392]</a>	Selecting the scaling of the keys
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Behavior**

Name	Description
<a href="#">FixedTarget</a> [► 387]	Definition of a control using its name, to which all input is sent regardless of the focus  The name of the control must be entered as a simple string. The control must not be linked directly.
<a href="#">ReleaseStickyKeysManually</a> [► 392]	Selecting whether the Shift key must be deactivated manually after it has been used together with another key
<a href="#">LongpressDelay</a> [► 392]	Definition of the time in milliseconds that a key must be pressed for a long keystroke to be detected.
<a href="#">RepetitionDelay</a> [► 392]	Definition of the time in milliseconds that a key must be pressed for the input to be repeated.
<a href="#">PressedKeys</a> [► 393]	

**Category: Labels**

Name	Description
<a href="#">LabelStrokeThickness</a> [► 388]	Definition of the stroke thickness of the graphic key characters
<a href="#">LabelFontFamily</a> [► 387]	Definition of the font using the name of the font family or the keyword
<a href="#">LabelFontSize</a> [► 387]	Definition of the font size of the key text
<a href="#">LabelFontSizeUnit</a> [► 388]	Selecting the unit of the text size: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">LabelFontStyle</a> [► 388]	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">LabelFontWeight</a> [► 388]	Selecting the font weight: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>

**Category: Indirect Input**

Name	Description
<a href="#">IndirectInputHorizontalAlignment</a> [► 393]	Defines the horizontal alignment of the text in the preview field for indirect input.
<a href="#">IndirectInputFontSize</a> [► 394]	Defines the font size of the text in the preview field for indirect input.
<a href="#">IndirectInputFonzSizeUnit</a> [► 394]	Defines the font size unit of the text in the preview field for indirect input.
<a href="#">IndirectInputPadding</a> [► 394]	Defines the padding of the text in the preview field for indirect input.

**Events****Category: Control**

Name	Description
<a href="#">onKeyPressStarted [► 394]</a>	Interaction with a key was started.
<a href="#">onKeyPressFinished [► 395]</a>	Interaction with a key was finished.
<a href="#">onKeyPressCanceled [► 395]</a>	Interaction with a key was cancelled.
<a href="#">onKeyPressEnded [► 395]</a>	Interaction with a key was canceled or finished.
<a href="#">onIndirectInputAccepted [► 395]</a>	The user has confirmed the indirect entry.
<a href="#">onIndirectInputCanceled [► 395]</a>	The user has canceled the indirect input.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally observable.
<a href="#">operate</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control](#) [[► 753](#)]

Keyboard

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.19.1 Attributes****5.10.2.19.1.1 AdditionalKeyBackdropColor**

The background color of the additional characters.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Keyboard](#) [[► 379](#)]

**See also**

**Attribute getter:** `getAdditionalKeyBackdropColor`

**Attribute setter:** `setAdditionalKeyBackdropColor`



Available from 1.8

**5.10.2.19.1.2 AdditionalKeyBackdropPadding**

Padding of the additional keys.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Keyboard](#) [[► 379](#)]

**See also**

**Attribute getter:** `getAdditionalKeyBackdropPadding`

**Attribute setter:** `setAdditionalKeyBackdropPadding`



Available from 1.8

---

#### 5.10.2.19.1.3 FixedTarget

The name of the control to which the characters are sent, regardless of the focus.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Keyboard](#) [[▶](#) [379](#)]

**See also**

**Attribute getter:** getFixedTarget

**Attribute setter:** setFixedTarget

---



Available from 1.8

---

#### 5.10.2.19.1.4 LabelFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Keyboard](#) [[▶](#) [379](#)]

**See also**

**Attribute getter:** getLabelFontFamily

**Attribute setter:** setLabelFontFamily

---



Available from 1.8

---

#### 5.10.2.19.1.5 LabelFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Keyboard](#) [[▶](#) [379](#)]

**See also**

**Attribute getter:** getLabelFontSize

**Attribute setter:** setLabelFontSize

---



Available from 1.8

---

#### 5.10.2.19.1.6 LabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Keyboard](#) [[▶](#) [379](#)]

**See also**

**Attribute getter:** getLabelFontSizeUnit

**Attribute setter:** setLabelFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.19.1.7 LabelFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Keyboard](#) [[▶](#) [379](#)]

**See also**

**Attribute getter:** getLabelFontStyle

**Attribute setter:** setLabelFontStyle

---



Available from 1.8

---

#### 5.10.2.19.1.8 LabelFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Keyboard](#) [[▶](#) [379](#)]

**See also**

**Attribute getter:** getLabelFontWeight

**Attribute setter:** setLabelFontWeight

---



Available from 1.8

---

#### 5.10.2.19.1.9 LabelStrokeThickness

Definition of the stroke thickness of the graphic key characters

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Keyboard](#) [[▶](#) [379](#)]



**See also**

**Attribute getter:** getLabelStrokeThickness

**Attribute setter:** setLabelStrokeThickness

---



Available from 1.8

---

**5.10.2.19.1.10 KeyBackgroundColor**

The background color of the keys.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Keyboard](#) [► 379]

**See also**

**Attribute getter:** getKeyBackgroundColor

**Attribute setter:** setKeyBackgroundColor

---



Available from 1.8

---

**5.10.2.19.1.11 KeyPadding**

Padding in the individual keys.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Keyboard](#) [► 379]

**See also**

**Attribute getter:** getKeyPadding

**Attribute setter:** setKeyPadding

---



Available from 1.8

---

**5.10.2.19.1.12 KeyboardPadding**

Padding of the whole keyboard.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Keyboard](#) [► 379]

**See also**

**Attribute getter:** getKeyboardPadding

**Attribute setter:** setKeyboardPadding



Available from 1.8

---

#### 5.10.2.19.1.13 LabelColor

The color of the texts.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Keyboard](#) [[▶ 379](#)]

**See also**

**Attribute getter:** getLabelColor

**Attribute setter:** setLabelColor

---



Available from 1.8

---

#### 5.10.2.19.1.14 LabelFillColor

Definition of the fill color of the graphic key characters

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Keyboard](#) [[▶ 379](#)]

**See also**

**Attribute getter:** getLabelFillColor

**Attribute setter:** setLabelFillColor

---



Available from 1.8

---

#### 5.10.2.19.1.15 LabelStrokeColor

Definition of the outline color of the graphic key characters.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Keyboard](#) [[▶ 379](#)]

**See also**

**Attribute getter:** getLabelStrokeColor

**Attribute setter:** setLabelStrokeColor

---



Available from 1.8

---

### 5.10.2.19.1.16 LayoutFile

Activates a layout from the project. Overwrites the setting in the [Layout](#) [► 391] attribute.

**Schema** (version 1.10): tchmi:framework#/definitions/Path

**Schema** (version 1.12): tchmi:framework#/definitions/  
TchMi.Controls.Beckhoff.TchMiKeyboard.ProjectKeyboardLayouts

**Origin:** [Keyboard](#) [► 379]

**See also**

**Attribute getter:** getLayoutFile

**Attribute setter:** setLayoutFile



Available from version 1.10

---

### 5.10.2.19.1.17 Layout

Defines the layout of the keyboard. Can be overwritten using the [LayoutFile](#) [► 391] attribute.

- EN\_US-QWERTY\_standard: American layout
- EN\_US-QWERTY\_full: American layout with numpad
- EN\_US-QWERTY\_compact: compact American layout
- DE\_DE-QWERTZ\_standard: German layout
- DE\_DE-QWERTZ\_full: German layout with numpad
- DE\_DE-QWERTZ\_compact: compact german layout
- PINpad: Layout of a PIN entry
- Numpad: Layout of a numpad
- Calculator: Layout of a calculator

**Schema:** tchmi:framework#/definitions/ControlKeyboardLayouts



Available from version 1.10

---

**Origin:** [Keyboard](#) [► 379]

**See also**

**Attribute getter:** getLayout

**Attribute setter:** setLayout

**Version 1.10**

Replaces the LayoutPath attribute.

**Version 1.12**

This attribute is considered obsolete. Please use the attribute [LayoutFile](#) [► 391] instead.

### 5.10.2.19.1.18 LongpressDelay

Definition of the time in milliseconds that a key must be pressed in order for a long keystroke to be detected and a window with the additional keys to be displayed. This function is only available in the '\_compact' layouts and for certain keys.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Keyboard](#) [► 379]

**See also**

**Attribute getter:** getLongpressDelay

**Attribute setter:** setLongpressDelay



Available from 1.8

---

### 5.10.2.19.1.19 ReleaseStickyKeysManually

Selecting whether the Shift key must be deactivated manually after it has been used together with another key.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Keyboard](#) [► 379]

**See also**

**Attribute getter:** getReleaseStickyKeysManually

**Attribute setter:** setReleaseStickyKeysManually



Available from 1.8

---

### 5.10.2.19.1.20 RepetitionDelay

Definition of the time in milliseconds that a key must be pressed for the input to be repeated. This function is only available for certain keys, e.g. the Delete key.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Keyboard](#) [► 379]

**See also**

**Attribute getter:** getRepetitionDelay

**Attribute setter:** setRepetitionDelay



Available from 1.8

---

### 5.10.2.19.1.21 ScaleMode

Selecting the scaling of the keys:

- None: No scaling of the keys
- ScaleToFill: The entire control is completely filled in. The proportions of the keys are not taken into account.
- ScaleToFit: The keys are displayed as large as possible without exceeding the margins of the control. The proportions of the keys are maintained.
- ScaleToFitWidth: The keys are displayed across the entire width of the control, regardless of whether they exceed the limits of the control. The proportions of the keys are maintained.
- ScaleToFitHeight: The keys are displayed across the entire height of the control, regardless of whether they exceed the limits of the control. The proportions of the keys are maintained.

**Schema:** tchmi:framework#/definitions/ScaleMode

**Origin:** [Keyboard](#) [[▶ 379](#)]

**See also**

**Attribute getter:** getScaleMode

**Attribute setter:** setScaleMode



Available from 1.8

---

#### 5.10.2.19.1.22 PressedKeys

**Schema (version 1.8):** tchmi:framework#/definitions/KeyList

**Schema (version 1.12):** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiKeyboard.KeyList

**Origin:** [Keyboard](#) [[▶ 379](#)]

**See also**

**Attribute getter:** getPressedKeys



Available from 1.8

---

#### 5.10.2.19.1.23 IndirectInputHorizontalAlignment

Defines the horizontal alignment of the text in the preview field for indirect input.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Keyboard](#) [[▶ 379](#)]

**See also**

**Attribute getter:** getIndirectInputHorizontalAlignment

**Attribute setter:** setIndirectInputHorizontalAlignment



Available from version 1.12

---

#### 5.10.2.19.1.24 IndirectInputFontSize

Defines the font size of the text in the preview field for indirect input.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Keyboard](#) [[▶ 379](#)]

**See also**

**Attribute getter:** getIndirectInputFontSize

**Attribute setter:** setIndirectInputFontSize

---



Available from version 1.12

---

#### 5.10.2.19.1.25 IndirectInputFontSizeUnit

Defines the font size unit of the text in the preview field for indirect input.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Keyboard](#) [[▶ 379](#)]

**See also**

**Attribute getter:** getIndirectInputFontSizeUnit

**Attribute setter:** setIndirectInputFontSizeUnit

---



Available from version 1.12

---

#### 5.10.2.19.1.26 IndirectInputPadding

Defines the padding of the text in the preview field for indirect input.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Keyboard](#) [[▶ 379](#)]

**See also**

**Attribute getter:** getIndirectInputPadding

**Attribute setter:** setIndirectInputPadding

---



Available from version 1.12

---

### 5.10.2.19.2 Events

#### 5.10.2.19.2.1 onKeyPressStarted

The user has pressed any key on the keyboard.

**Origin:** [Keyboard](#) [[▶ 379](#)]



Available from 1.8

---

#### 5.10.2.19.2.2 onKeyPressCanceled

The user has canceled the interaction with any key on the keyboard. This can be triggered, for example, by moving to the side.

**Origin:** [Keyboard](#) [[▶ 379](#)]

---



Available from 1.8

---

#### 5.10.2.19.2.3 onKeyPressFinished

The user has completed the interaction with any key on the keyboard. In other words, the user has released a key that was previously pressed.

**Origin:** [Keyboard](#) [[▶ 379](#)]

---



Available from 1.8

---

#### 5.10.2.19.2.4 onKeyPressEnded

The user has canceled or finished the interaction with any key on the keyboard.

**Origin:** [Keyboard](#) [[▶ 379](#)]

---



Available from 1.8

---

#### 5.10.2.19.2.5 onIndirectInputAccepted

The user has confirmed the indirect entry.

**Origin:** [Keyboard](#) [[▶ 379](#)]

---



Available from version 1.12

---

#### 5.10.2.19.2.6 onIndirectInputCanceled

The user has canceled the indirect input.

**Origin:** [Keyboard](#) [[▶ 379](#)]

---



Available from version 1.12

---

### 5.10.2.20 Line

A line object.

#### Attributes

##### Category: Colors

Name	Description
<a href="#">BackgroundColor</a> [ <a href="#">► 769</a> ]	Definition of the background color
<a href="#">BorderColor</a> [ <a href="#">► 768</a> ]	Definition of the border color of the control

##### Category: Layout



Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">X1 [► 403]</a>	Definition of the x-axis coordinate of the starting point of the line
<a href="#">X1Unit [► 404]</a>	Selecting the unit of the x-axis coordinate of the starting point: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> </ul>
<a href="#">X2 [► 404]</a>	Definition of the x-axis coordinate of the end point of the line
<a href="#">X2Unit [► 404]</a>	Selecting the unit of the x-axis coordinate of the end point: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> </ul>
<a href="#">Y1 [► 405]</a>	Definition of the y-axis coordinate of the starting point of the line
<a href="#">Y1Unit [► 405]</a>	Selecting the unit of the y-axis coordinate of the starting point: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> </ul>
<a href="#">Y2 [► 405]</a>	Definition of the y-axis coordinate of the end point of the line
<a href="#">Y2Unit [► 405]</a>	Selecting the unit of the y-axis coordinate of the end point: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> </ul>
<a href="#">ScaleMode [► 402]</a>	Selecting the scaling of the line: <ul style="list-style-type: none"> <li>• None: No scaling of the line</li> <li>• ScaleToFill: The line is displayed on the entire size of the control. The proportions of the line are not taken into account.</li> <li>• ScaleToFit: The line is displayed as large as possible without exceeding the edges of the control. The proportions of the line are maintained.</li> <li>• ScaleToFitWidth: The line is displayed over the entire width of the control, regardless of whether it exceeds the limits of the control. The proportions of the line are maintained.</li> <li>• ScaleToFitHeight: The line is displayed over the entire height of the control, regardless of whether it exceeds the limits of the control. The proportions of the line are maintained.</li> </ul>
<a href="#">StrokeColor [► 402]</a>	Definition of the line color
<a href="#">StrokeStyle [► 402]</a>	Line style definition – comma and space separated list of numbers, which specify the length of the line and distances.  Example: 10, 5, 20, 30 corresponds to a sequence of line length 10, distance 5, line length 20, distance 30. This sequence is repeated over the entire length of the line.  If an odd number is specified, the list is repeated once.  Example: 20, 5, 10 becomes 20, 5, 10, 20, 5, 10
<a href="#">StrokeThickness [► 403]</a>	Definition of the line width
<a href="#">StrokeThicknessUnit [► 403]</a>	Selecting the unit of the line width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> </ul>
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated

Name	Description
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Shape**

Name	Description

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Line

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)

---



NuGet packages are available from version 1.12.

---



Available from 1.8

---

#### See also

API reference for this control

### 5.10.2.20.1 Attributes

#### 5.10.2.20.1.1 ScaleMode

Scales the content to the control size.

**Schema:** tchmi:framework#/definitions/ScaleMode

**Origin:** [Line](#) [▶ 396]

#### See also

**Attribute getter:** getScaleMode

**Attribute setter:** setScaleMode

---



Available from 1.8

---

#### 5.10.2.20.1.2 StrokeColor

Defines the stroke color of the control.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Line](#) [▶ 396]

#### See also

**Attribute getter:** getStrokeColor

**Attribute setter:** setStrokeColor

---



Available from 1.8

---

#### 5.10.2.20.1.3 StrokeStyle

Definition of the stroke style. Comma or space-separated list of numbers that specify the length of strokes and spaces. If an odd number is specified, the list is repeated once. Example: "5, 3, 2" is equivalent to "5, 3, 2, 5, 3, 2".

**Schema:** tchmi:general#/definitions/String

**Origin:** [Line \[▶ 396\]](#)

**See also**

**Attribute getter:** getStrokeStyle

**Attribute setter:** setStrokeStyle

---



Available from 1.8

---

#### 5.10.2.20.1.4    **StrokeThickness**

Defines the stroke thickness of the control in pixels.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Line \[▶ 396\]](#)

**See also**

**Attribute getter:** getStrokeThickness

**Attribute setter:** setStrokeThickness

---



Available from 1.8

---

#### 5.10.2.20.1.5    **StrokeThicknessUnit**

Pixel unit. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Line \[▶ 396\]](#)

**See also**

**Attribute getter:** getStrokeThicknessUnit

The attribute can only be read and therefore has no setter.

---



Available from 1.8

---

#### 5.10.2.20.1.6    **X1**

x-coordinate of the first point.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Line \[▶ 396\]](#)

**See also**

**Attribute getter:** getX1

**Attribute setter:** setX1

---



Available from 1.8

---

#### 5.10.2.20.1.7 X1Unit

Pixel unit. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Line \[► 396\]](#)

**See also**

**Attribute getter:** getX1Unit

The attribute can only be read and therefore has no setter.

---



Available from 1.8

---

#### 5.10.2.20.1.8 X2

x-coordinate of the second point.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Line \[► 396\]](#)

**See also**

**Attribute getter:** getX2

**Attribute setter:** setX2

---



Available from 1.8

---

#### 5.10.2.20.1.9 X2Unit

Pixel unit. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Line \[► 396\]](#)

**See also**

**Attribute getter:** getX2Unit

The attribute can only be read and therefore has no setter.

---



Available from 1.8

---



#### 5.10.2.20.1.10 Y1

y-coordinate of the first point.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Line](#) [[▶](#) [396](#)]

**See also**

**Attribute getter:** getY1

**Attribute setter:** setY1

---



Available from 1.8

---

#### 5.10.2.20.1.11 Y1Unit

Pixel unit. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Line](#) [[▶](#) [396](#)]

**See also**

**Attribute getter:** getY1Unit

The attribute can only be read and therefore has no setter.

---



Available from 1.8

---

#### 5.10.2.20.1.12 Y2

y-coordinate of the second point.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Line](#) [[▶](#) [396](#)]

**See also**

**Attribute getter:** getY2

**Attribute setter:** setY2

---



Available from 1.8

---

#### 5.10.2.20.1.13 Y2Unit

Pixel unit. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Line](#) [[▶](#) [396](#)]

**See also****Attribute getter:** getY2Unit

The attribute can only be read and therefore has no setter.



Available from 1.8

**5.10.2.21 Line Chart**

A LineChart is a diagram in which curves can be displayed.

A description of the configuration can be found in chapter [Configuration](#) [► 413].**Attributes****Category: Colors**

Name	Description
<a href="#">XAxisColor</a> [► 423]	Definition of the color of the x-axis
<a href="#">GridBackgroundColor</a> [► 415]	Definition of the background color of the coordinate system
<a href="#">GridLineColor</a> [► 415]	Definition of the color of the coordinate grid
<a href="#">SubgridLineColor</a> [► 419]	Definition of the color of the coordinate subgrid
<a href="#">SectionsBackgroundColor</a> [► 417]	Definition of the background color of the control
<a href="#">XLabelFontColor</a> [► 427]	Definition of the font color of the x-axis labels
<a href="#">XAxisNameFontColor</a> [► 425]	Definition of the font color of the x-axis name
<a href="#">TooltipFontColor</a> [► 421]	Definition of the font color of the tooltip
<a href="#">TooltipBackgroundColor</a> [► 420]	Definition of the background color of the tooltip
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">LineGraphData [► 417]</a>	Definition of the data to be displayed as graph(s)
<a href="#">LineGraphDescriptions [► 417]</a>	Definition of graph descriptions for each of the graphs defined by the array
<a href="#">ShowLegend [► 432]</a>	Selecting whether the legend is to be displayed
<a href="#">ReferenceLines [► 432]</a>	Definition of the reference lines.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: XAxis**

Name	Description
ShowXAxis [ <a href="#">▶ 418</a> ]	Selecting whether the x-axis is to be displayed
ShowXAxisLabels [ <a href="#">▶ 429</a> ]	Selecting whether the x-axis labels are to be displayed
ShowXAxisName [ <a href="#">▶ 418</a> ]	Selecting whether the x-axis name is to be displayed
ShowXSubTicks [ <a href="#">▶ 419</a> ]	Selecting whether the subcoordinate points are to be displayed on the x-axis
XAxisAutoScaling [ <a href="#">▶ 423</a> ]	Selecting whether the x-axis should be automatically scaled according to the data sets. 'Maintick Min Value', 'Maintick Max Value' and 'X-Axis Maintick Steps' need not be set.
XAxisDecimalPlaces [ <a href="#">▶ 424</a> ]	Definition of the decimal places displayed for the x-axis
XAxisName [ <a href="#">▶ 424</a> ]	Definition of the x-axis name
XAxisNameFontFamily [ <a href="#">▶ 425</a> ]	Definition of the font using the name of the font family or the keyword
XAxisNameFontSize [ <a href="#">▶ 425</a> ]	Definition of the font size of the x-axis name
XAxisNameFontSizeUnit [ <a href="#">▶ 426</a> ]	Selecting the unit of the font size of the x-axis name: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
XAxisNameFontWeight [ <a href="#">▶ 426</a> ]	Selecting of the font weight of the x-axis name: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>
XAxisUnit [ <a href="#">▶ 426</a> ]	Definition of the unit of the x-axis
XAxisWidth [ <a href="#">▶ 426</a> ]	Definition of the x-axis width
XLabelFontFamily [ <a href="#">▶ 427</a> ]	Definition of the font using the name of the font family or the keyword
XLabelFontSize [ <a href="#">▶ 427</a> ]	Definition of the font size for the x-axis labels
XLabelFontSizeUnit [ <a href="#">▶ 427</a> ]	Selecting the font size unit for the x-axis labels: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
XLabelFontWeight [ <a href="#">▶ 428</a> ]	Selecting the font weight of the x-axis labels: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>
XMainTickMaxValue [ <a href="#">▶ 428</a> ]	Definition of the maximum value of the x-axis main subdivision
XMainTickMinValue [ <a href="#">▶ 428</a> ]	Definition of the minimum value of the x-axis main subdivision
XMainTickSteps [ <a href="#">▶ 429</a> ]	Definition of the step size of the x-axis main subdivision
XSubTickSteps [ <a href="#">▶ 429</a> ]	Definition of the step size of the x-axis subdivision
XAxisFormat [ <a href="#">▶ 424</a> ]	Definition of the formatting of the x-axis labels

**Category: Grid**

Name	Description
ShowGrid [ <a href="#">► 417</a> ]	Selecting whether the coordinate grid is to be displayed
GridLineWidth [ <a href="#">► 416</a> ]	Definition of the line width of the coordinate grid
GridLineStyle [ <a href="#">► 416</a> ]	Definition of the line style of the coordinate grid
GridShowHorizontalLines [ <a href="#">► 416</a> ]	Selecting whether the horizontal lines of the coordinate grid are to be displayed
GridShowVerticalLines [ <a href="#">► 416</a> ]	Selecting whether the vertical lines of the coordinate grid are to be displayed

**Category: YAxis**

Name	Description
YAxis [ <a href="#">► 429</a> ]	Definition of one or more y-axes
ShowYSubTicks [ <a href="#">► 419</a> ]	Selecting whether the subcoordinate points are to be displayed on the y-axis
YAxisWidth [ <a href="#">► 430</a> ]	Definition of the y-axis width
YLabelFontFamily [ <a href="#">► 430</a> ]	Definition of the font using the name of the font family or the keyword
YLabelFontSize [ <a href="#">► 430</a> ]	Definition of the font size for the y-axis labels
YLabelFontSizeUnit [ <a href="#">► 431</a> ]	Selecting the font size unit for the y-axis labels: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
YLabelFontWeight [ <a href="#">► 431</a> ]	Selecting the font weight of the y-axis labels: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>
YMainTickSteps [ <a href="#">► 431</a> ]	Definition of the step size of the y-axis main subdivision
YSubTickSteps [ <a href="#">► 431</a> ]	Definition of the step size of the y-axis subdivision

**Category: Subgrid**

Name	Description
SubgridLineWidth [ <a href="#">► 419</a> ]	Definition of the line width of the coordinate subgrid
SubGridLineStyle [ <a href="#">► 420</a> ]	Definition of the line style of the subgrid
SubgridShowHorizontalLines [ <a href="#">► 420</a> ]	Selecting whether the horizontal lines of the coordinate subgrid are to be displayed
SubgridShowVerticalLines [ <a href="#">► 420</a> ]	Selecting whether the vertical lines of the coordinate subgrid are to be displayed
ShowTooltip [ <a href="#">► 713</a> ]	Selecting whether the tooltips are to be displayed
TooltipFormat [ <a href="#">► 718</a> ]	<ul style="list-style-type: none"> <li>• Definition of the formatting of the tooltips.</li> </ul>
TooltipFontFamily [ <a href="#">► 717</a> ]	Definition of the font using the name of the font family or the keyword
TooltipFontSize [ <a href="#">► 718</a> ]	Definition of the font size
TooltipFontWeight [ <a href="#">► 718</a> ]	Selecting the font weight: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: Bold</li> </ul>

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control \[► 753\]](#)



## Line Chart

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.21.1 Configuration**

A LineChart can be configured as follows:

1. Define the y-axes of the coordinate system using the "[YAxis Definitions \[► 414\]](#)" dialog
  - 1.1. Define the desired number of Y-axes and their sequence.
  - 1.2. Adjust the settings of the Y-axis/axes if necessary.
2. Link the array containing the data points to the attribute "Line Graph Data" of the category "Common".



The array must have two dimensions. This also applies if only one graph is stored in this array. In the latter case the array should be declared as array[1..1, 1..100] OF ST\_Point.

```
aPoints : ARRAY[1..2, 1..100] OF ST_Point;  
TYPE ST_Point :  
  STRUCT  
    x : INT;  
    y : INT;  
  END_STRUCT  
END_TYPE
```



The structure elements must be named identically to the attributes defined on the TwinCAT HMI side. Upper and lower case is taken into account.



Since version 1.12.760 it is also possible to configure the following data types:





- number[]
- number[][]

3. Add a graph description for each of the graphs contained in the array to the "Line Graph Descriptions" attribute of the "Common" category using the "[LineGraphDescription Definition \[► 413\]](#)" editor.

Example: [Line Chart \[► 1581\]](#)

**5.10.2.21.2 Dialogs****5.10.2.21.2.1 LineGraphDescription definition dialog**




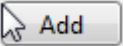
This dialog can be used to change the settings of the graphs for the individual subarrays to be displayed in the LineChart.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Properties	Settings for the Y-axis assignment selected under "Elements"
Y-axis Id	Selecting the Y-axis to which the data set is to be connected
Line width	Definition of the line width of the graph
Point dot	Selecting whether the individual data points are to be marked
Point dot radius	Definition of the radius of the data points
Point dot stroke width	Definition of the width of the dotted line
Legend name	Definition of the legend name.
X scale factor	Definition of the X scale factor.
Y scale factor	Definition of the Y scale factor.

#### 5.10.2.21.2.2 YAxis definition dialog

This dialog can be used to add and parameterize the different y-axes.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Properties	Settings of the y-axis definition selected under "Elements"
ID	Definition of a unique ID of the y-axis
Position	Position of the y-axis on the graph <ul style="list-style-type: none"> <li>• Left side of the graph</li> <li>• Right side of the graph</li> </ul>
Main-tick-min-value	Definition of the beginning of the displayed value range
Main-tick-max-value	Definition of the end of the displayed value range
Auto scaling	Selecting whether the value range should be automatically adjusted according to the values to be displayed in the array
Decimal places	Definition of decimal places
Show labels	Selecting whether the label of the y-axis is to be displayed
Show axis name	Selecting whether the axis name should be displayed next to the axis in the graph
Axis name	Definition of the axis name, which can optionally be displayed next to the axis
Axis name font-family	Definition of the font
Axis name font-size	Definition of the font size
Axis name font-weight	Selecting the font weight <ul style="list-style-type: none"> <li>• Bold</li> <li>• Normal</li> </ul>
Unit	Definition of the unit

### 5.10.2.21.3 Attributes

#### 5.10.2.21.3.1 GridBackgroundColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getGridBackgroundColor

**Attribute setter:** setGridBackgroundColor



Available from 1.8

#### 5.10.2.21.3.2 GridLineColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getGridLineColor

**Attribute setter:** setGridLineColor



Available from 1.8

---

### 5.10.2.21.3.3 GridLineWidth

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getGridLineWidth

**Attribute setter:** setGridLineWidth

---



Available from 1.8

---

### 5.10.2.21.3.4 GridLineStyle

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.ChartLineStyle

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getGridLineStyle

**Attribute setter:** setGridLineStyle

---



Available from version 1.10

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### 5.10.2.21.3.5 GridShowHorizontalLines

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getGridShowHorizontalLines

**Attribute setter:** setGridShowHorizontalLines

---



Available from 1.8

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### 5.10.2.21.3.6 GridShowVerticalLines

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

See also

**Attribute getter:** getGridShowVerticalLines

**Attribute setter:** setGridShowVerticalLines

---



Available from 1.8

---

#### 5.10.2.21.3.7 LineGraphData

**Schema:** tchmi:framework#/definitions/ChartLineGraphDataDefinitionList

**Origin:** [Line Chart](#) [► 406]

See also

**Attribute getter:** getLineGraphData

**Attribute setter:** setLineGraphData

---



Available from 1.8

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#### 5.10.2.21.3.8 LineGraphDescriptions

**Schema:** tchmi:framework#/definitions/ChartLineGraphDescriptionDefinitionList

**Origin:** [Line Chart](#) [► 406]

See also

**Attribute getter:** getLineGraphDescriptions

**Attribute setter:** setLineGraphDescriptions

---



Available from 1.8

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#### 5.10.2.21.3.9 SectionsBackgroundColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Line Chart](#) [► 406]

See also

**Attribute getter:** getGridBackgroundColor

**Attribute setter:** setGridBackgroundColor

---



Available from version 1.10

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#### 5.10.2.21.3.10 ShowGrid

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getShowGrid

**Attribute setter:** setShowGrid

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Available from 1.8

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#### 5.10.2.21.3.11 ShowTooltip

Selecting whether the tooltips should be displayed in stop mode.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getShowTooltip

**Attribute setter:** setShowTooltip

---



Available from version 1.10

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#### 5.10.2.21.3.12 ShowXAxis

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getShowXAxis

**Attribute setter:** setShowXAxis

---



Available from 1.8

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#### 5.10.2.21.3.13 ShowXAxisName

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getShowXAxisName

**Attribute setter:** setShowXAxisName

---



Available from 1.8

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#### 5.10.2.21.3.14 ShowXSubTicks

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getShowXSubTicks

**Attribute setter:** setShowXSubTicks

---



Available from 1.8

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#### 5.10.2.21.3.15 ShowYSubTicks

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getShowYSubTicks

**Attribute setter:** setShowYSubTicks

---



Available from 1.8

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#### 5.10.2.21.3.16 SubgridLineColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getSubgridLineColor

**Attribute setter:** setSubgridLineColor

---



Available from 1.8

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#### 5.10.2.21.3.17 SubgridLineWidth

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getSubgridLineWidth

**Attribute setter:** setSubgridLineWidth



Available from 1.8

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### 5.10.2.21.3.18 SubGridLineStyle

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.ChartLineStyle

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getSubGridLineStyle

**Attribute setter:** setSubGridLineStyle

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Available from version 1.10

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### 5.10.2.21.3.19 SubgridShowHorizontalLines

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getSubgridShowHorizontalLines

**Attribute setter:** setSubgridShowHorizontalLines

---



Available from 1.8

---

### 5.10.2.21.3.20 SubgridShowVerticalLines

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getSubgridShowVerticalLines

**Attribute setter:** setSubgridShowVerticalLines

---



Available from 1.8

---

### 5.10.2.21.3.21 TooltipBackgroundColor

Definition of the background color of the coordinate system.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Line Chart](#) [► 406]



**See also****Attribute getter:** getTooltipBackgroundColor**Attribute setter:** setTooltipBackgroundColorAvailable from 1.8

---

**5.10.2.21.3.22 TooltipFontColor**

Definition of the font color of the tooltip.

**Schema:** tchmi:framework#/definitions/SolidColor**Origin:** [Line Chart](#) [► 406]**See also****Attribute getter:** getTooltipFontColor**Attribute setter:** setTooltipFontColorAvailable from 1.8

---

**5.10.2.21.3.23 TooltipFontFamily**

Definition of the font using the name of the font family or the keyword.

**Schema:** tchmi:framework#/definitions/FontFamily**Origin:** [Line Chart](#) [► 406]**See also****Attribute getter:** getTooltipFontFamily**Attribute setter:** setTooltipFontFamilyAvailable from version 1.10

---

**5.10.2.21.3.24 TooltipFontSize**

Definition of the font size.

**Schema:** tchmi:framework#/definitions/MeasurementValue**Origin:** [Line Chart](#) [► 406]**See also****Attribute getter:** getTooltipFontSize**Attribute setter:** setTooltipFontSize



Available from version 1.10

---

#### 5.10.2.21.3.25 TooltipFontSizeUnit

Selecting the unit of the font size in the tooltips (pixel or percent).

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Line Chart](#) [[▶ 406](#)]

**See also**

**Attribute getter:** getTooltipFontSizeUnit

**Attribute setter:** setTooltipFontSizeUnit

---



Available from version 1.10

---

#### 5.10.2.21.3.26 TooltipFontWeight

Selecting the font weight for the tooltips (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Line Chart](#) [[▶ 406](#)]

**See also**

**Attribute getter:** getTooltipFontWeight

**Attribute setter:** setTooltipFontWeight

---



Available from version 1.10

---

#### 5.10.2.21.3.27 TooltipFormat

**Schema:** tchmi:framework#/definitions/Function

Definition of the formatting of the tooltips.

This is called when the tooltip is displayed.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
TooltipFormat(valueX: number, valueY: number): string;
```

**Parameter**

Name	Type	Description
valueX	number	The numerical value for the x-coordinate.
valueY	number	The numerical value for the y-coordinate.

**Return value**

Type	Description
string	The tooltip to be displayed. HTML is allowed here.

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** `getTooltipFormat`

**Attribute setter:** `setTooltipFormat`



Available from version 1.10

### 5.10.2.21.3.28 XAxisAutoScaling

**Schema:** `tchmi:general#/definitions/Boolean`

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** `getXAxisAutoScaling`

**Attribute setter:** `setXAxisAutoScaling`



Available from 1.8

### 5.10.2.21.3.29 XAxisColor

**Schema:** `tchmi:framework#/definitions/SolidColor`

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** `getXAxisColor`

**Attribute setter:** `setXAxisColor`



Available from 1.8

### 5.10.2.21.3.30 XAxisDecimalPlaces

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXAxisDecimalPlaces

**Attribute setter:** setXAxisDecimalPlaces



Available from 1.8

### 5.10.2.21.3.31 XAxisFormat

**Schema:** tchmi:framework#/definitions/Function

The formatting function for the labelling texts of the X-axis.

The selected function defines the X-axis labels. It is called for each displayed value of the main X-axis subdivision. It is assigned the respective numerical value.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
XAxisFormat(value: number): string;
```

#### Parameter

Name	Type	Description
value	number	The current numerical value of the x-axis.

#### Return value

Type	Description
string	The new value of the main X-axis subdivision. HTML is not allowed here.

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXAxisFormat

**Attribute setter:** setXAxisFormat



Available from version 1.10

### 5.10.2.21.3.32 XAxisName

**Schema:** tchmi:general#/definitions/String

**Origin:** [Line Chart](#) [► 406]

See also

**Attribute getter:** getXAxisName

**Attribute setter:** setXAxisName

---



Available from 1.8

---

### 5.10.2.21.3.33 XAxisNameFontColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Line Chart](#) [► 406]

See also

**Attribute getter:** getXAxisNameFontColor

**Attribute setter:** setXAxisNameFontColor

---



Available from 1.8

---

### 5.10.2.21.3.34 XAxisNameFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Line Chart](#) [► 406]

See also

**Attribute getter:** getXAxisNameFontFamily

**Attribute setter:** setXAxisNameFontFamily

---



Available from 1.8

---

### 5.10.2.21.3.35 XAxisNameFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Line Chart](#) [► 406]

See also

**Attribute getter:** getXAxisNameFontSize

**Attribute setter:** setXAxisNameFontSize

---



Available from 1.8

---

### 5.10.2.21.3.36 XAxisNameFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXAxisNameFontSizeUnit

**Attribute setter:** setXAxisNameFontSizeUnit

---



Available from 1.8

---

### 5.10.2.21.3.37 XAxisNameFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXAxisNameFontWeight

**Attribute setter:** setXAxisNameFontWeight

---



Available from 1.8

---

### 5.10.2.21.3.38 XAxisUnit

**Schema:** tchmi:general#/definitions/String

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXAxisUnit

**Attribute setter:** setXAxisUnit

---



Available from 1.8

---

### 5.10.2.21.3.39 XAxisWidth

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXAxisWidth

**Attribute setter:** setXAxisWidth

---



Available from 1.8

---

#### 5.10.2.21.3.40 XLabelFontColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXLabelFontColor

**Attribute setter:** setXLabelFontColor

---



Available from 1.8

---

#### 5.10.2.21.3.41 XLabelFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXLabelFontFamily

**Attribute setter:** setXLabelFontFamily

---



Available from 1.8

---

#### 5.10.2.21.3.42 XLabelFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXLabelFontSize

**Attribute setter:** setXLabelFontSize

---



Available from 1.8

---

#### 5.10.2.21.3.43 XLabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXLabelFontSizeUnit

**Attribute setter:** setXLabelFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.21.3.44 XLabelFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXLabelFontWeight

**Attribute setter:** setXLabelFontWeight

---



Available from 1.8

---

#### 5.10.2.21.3.45 XMainTickMaxValue

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXMainTickMaxValue

**Attribute setter:** setXMainTickMaxValue

---



Available from 1.8

---

#### 5.10.2.21.3.46 XMainTickMinValue

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXMainTickMinValue

**Attribute setter:** setXMainTickMinValue





Available from 1.8

---

#### 5.10.2.21.3.47 XMainTickSteps

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXMainTickSteps

**Attribute setter:** setXMainTickSteps

---



Available from 1.8

---

#### 5.10.2.21.3.48 XShowLabels

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXShowLabels

**Attribute setter:** setXShowLabels

---



Available from 1.8

---

#### 5.10.2.21.3.49 XSubTickSteps

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getXSubTickSteps

**Attribute setter:** setXSubTickSteps

---



Available from 1.8

---

#### 5.10.2.21.3.50 YAxis

**Schema:** tchmi:framework#/definitions/ChartYAxisDefinitionList

**Origin:** [Line Chart](#) [► 406]

**See also****Attribute getter:** getYAxis**Attribute setter:** setYAxisAvailable from 1.8

---

**5.10.2.21.3.51 YAxisWidth****Schema:** tchmi:general#/definitions/Number**Origin:** [Line Chart](#) [► 406]**See also****Attribute getter:** getYAxisWidth**Attribute setter:** setYAxisWidthAvailable from 1.8

---

**5.10.2.21.3.52 YLabelFontFamily**

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily**Origin:** [Line Chart](#) [► 406]**See also****Attribute getter:** getYLabelFontFamily**Attribute setter:** setYLabelFontFamilyAvailable from 1.8

---

**5.10.2.21.3.53 YLabelFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue**Origin:** [Line Chart](#) [► 406]**See also****Attribute getter:** getYLabelFontSize**Attribute setter:** setYLabelFontSizeAvailable from 1.8

---

#### 5.10.2.21.3.54 YLabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getYLabelFontSizeUnit

**Attribute setter:** setYLabelFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.21.3.55 YLabelFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getYLabelFontWeight

**Attribute setter:** setYLabelFontWeight

---



Available from 1.8

---

#### 5.10.2.21.3.56 YMainTickSteps

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getYMainTickSteps

**Attribute setter:** setYMainTickSteps

---



Available from 1.8

---

#### 5.10.2.21.3.57 YSubTickSteps

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getYSubTickSteps

**Attribute setter:** setYSubTickSteps

---



Available from 1.8

---

### 5.10.2.21.3.58 ShowLegend

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getShowLegend

**Attribute setter:** setShowLegend

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Available from version 1.12.746

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### 5.10.2.21.3.59 ReferenceLines

**Schema:** tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiLineChart.ChartReferenceLineDefinitionList

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getReferenceLines

**Attribute setter:** setReferenceLines

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Available since version 1.12.760

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## 5.10.2.22 Linear Gauge

A linear gauge is a linear display in which a value can be displayed by filling in a bar. A start and end value can be defined for this bar. The attribute '[Editable](#) [► 442]' can be used to display a slider through which the operator can change the linked value.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">ProgressBackgroundColor [► 447]</a>	Definition of the background color of the bar
<a href="#">ProgressForegroundColor [► 447]</a>	Definition of the bar color
<a href="#">ValueColor [► 452]</a>	Definition of the text color of the display of the current value
<a href="#">UnitColor [► 450]</a>	Definition of the unit color
<a href="#">TickColor [► 449]</a>	Definition of the color of the bar division
<a href="#">LabelColor [► 442]</a>	Definition of the text color of the scaling values
<a href="#">Knob Color [► 442]</a>	Definition of the fill color of the slider
<a href="#">KnobArrowsColor [► 442]</a>	Definition of the outline and arrow color of the slider
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Orientation</a> [► 446]	Selecting the orientation: <ul style="list-style-type: none"> <li>• Horizontal: The linear display with the scaling is aligned horizontally.</li> <li>• Vertical: The linear display with the scaling is aligned vertically.</li> </ul>
<a href="#">Padding</a> [► 447]	Definition of an additional distance between the control border and the bar for the four sides
<a href="#">Left</a> [► 760]	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit</a> [► 760]	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top</a> [► 761]	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit</a> [► 761]	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right</a> [► 763]	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit</a> [► 764]	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom</a> [► 764]	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit</a> [► 765]	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width</a> [► 761]	Definition of the external width of the control
<a href="#">WidthUnit</a> [► 762]	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height</a> [► 762]	Definition of the external height of the control
<a href="#">HeightUnit</a> [► 763]	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth</a> [► 773]	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit</a> [► 774]	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth</a> [► 774]	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit</a> [► 774]	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>

Name	Description
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Value [► 452]</a>	Definition of the value to be displayed
<a href="#">Editable [► 442]</a>	Selecting whether the slider should be displayed and therefore whether the linear gauge is editable
<a href="#">BaseAnimationTime [► 441]</a>	Definition of the base animation time in milliseconds. It describes the time of the animation from minimum to maximum value.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control



**Category: Value**

Name	Description
<a href="#">MinValue [► 446]</a>	Defines the smallest value that the control element should graphically display
<a href="#">MaxValue [► 445]</a>	Defines the largest value that the control element should graphically display
<a href="#">Step [► 449]</a>	Definition of the increment for changing the value via the slider
<a href="#">ShowValueText [► 448]</a>	Selecting whether the current value is to be displayed
<a href="#">Range [► 447]</a>	Definition of the value range of the color scales
<a href="#">StartFromZero [► 449]</a>	Selecting whether the minimum value should be zero regardless of the 'Minimum Value' attribute. This setting has no effect if the set minimum value is equal to or greater than zero.
<a href="#">ValueFontFamily [► 452]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">ValueFontSize [► 453]</a>	Definition of the font size
<a href="#">ValueFontSizeUnit [► 453]</a>	Selecting the font size unit: <ul style="list-style-type: none"><li>• Pixels for an absolute size</li><li>• Percent for a relative size</li></ul>
<a href="#">ValueFontStyle [► 453]</a>	Selecting the font style: <ul style="list-style-type: none"><li>• Normal</li><li>• Italic: italic</li><li>• Oblique: slanted</li></ul>
<a href="#">ValueFontWeight [► 453]</a>	Selecting the font weight: <ul style="list-style-type: none"><li>• Normal</li><li>• Bold: bold</li></ul>
<a href="#">ValueFormat [► 454]</a>	Definition of a formatting function for the value
<a href="#">ClickAnywheretoeEdit [► 441]</a>	Selecting whether the value can be changed by clicking anywhere in the control

**Category: Labels**

Name	Description
<a href="#">ShowLabels [► 448]</a>	Selecting whether the scaling values are to be displayed
<a href="#">Label Range [► 445]</a>	Definition of the jump distance between the individual scaling values
<a href="#">Label Position [► 445]</a>	<p>Selecting the position of the scaling to the bar:</p> <p>The following options are available for horizontal alignment:</p> <ul style="list-style-type: none"> <li>• Top</li> <li>• Bottom</li> </ul> <p>The following options are available for vertical alignment:</p> <ul style="list-style-type: none"> <li>• Left</li> <li>• Right</li> </ul>
<a href="#">LabelFontFamily [► 443]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">LabelFontSize [► 443]</a>	Definition of the font size of the scaling
<a href="#">LabelFontSizeUnit [► 443]</a>	<p>Selecting the font size unit:</p> <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">LabelFontStyle [► 444]</a>	<p>Selecting the font style of the scaling:</p> <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">LabelFontWeight [► 444]</a>	<p>Selecting the font weight of the scaling:</p> <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>
<a href="#">LabelFormat [► 444]</a>	Definition of a formatting function for the scaling

**Category: Ticks**

Name	Description
<a href="#">ShowTicks [► 448]</a>	Selecting whether the scaling subdivision is to be displayed
<a href="#">TickDefinition [► 450]</a>	Definition of scale division

**Category: Unit**

Name	Description
<a href="#">Unit [► 441]</a>	Definition of the unit or description of the value
<a href="#">UnitOrientation [► 446]</a>	Selecting the unit orientation: <ul style="list-style-type: none"> <li>• Theme</li> <li>• Horizontal</li> <li>• Vertical</li> </ul>
<a href="#">UnitFontSize [► 450]</a>	Definition of the font size of the unit
<a href="#">UnitFontSizeUnit [► 451]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">UnitFontStyle [► 451]</a>	Selecting the font style of the unit: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">UnitFontWeight [► 451]</a>	Selecting the font weight of the unit: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>

## Events

### Category: Control

Name	Description
<a href="#">onValueChanged [► 456]</a>	The value has been changed.

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onUserInteractionFinished</a> [► 456]	The user has finished the interaction with the control.
<a href="#">onPressed</a> [► 782]	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked</a> [► 778]	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick</a> [► 778]	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick</a> [► 780]	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown</a> [► 779]	A mouse button was pressed down over the control.
<a href="#">onMouseEnter</a> [► 779]	The mouse pointer was moved over the control.
<a href="#">onMouseLeave</a> [► 780]	The mouse pointer has left the control.
<a href="#">onMouseUp</a> [► 781]	A mouse button was released over the control.
<a href="#">onMouseDownLeft</a> [► 779]	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight</a> [► 779]	The right mouse button was pressed down over the control.
<a href="#">onMouseMove</a> [► 780]	The mouse was moved over the control.
<a href="#">onMouseOver</a> [► 780]	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut</a> [► 780]	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft</a> [► 781]	The left mouse button was released over the control.
<a href="#">onMouseUpRight</a> [► 781]	The right mouse button was released over the control.
<a href="#">onMouseWheel</a> [► 781]	The mouse wheel was moved over the control.
<a href="#">onTouchStart</a> [► 783]	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove</a> [► 782]	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd</a> [► 782]	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel</a> [► 782]	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe</a> [► 783]	Determines whether the control is generally observable.
<a href="#">operate</a> [► 783]	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control](#) [► 753]

Linear Gauge

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.22.1 Attributes****5.10.2.22.1.1 BaseAnimationTime**

The basic animation time in milliseconds. It describes the time of the animation from minimum to maximum value.

**Schema:** tchmi:general#/definitions/UDINT

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getBaseAnimationTime

**Attribute setter:** setBaseAnimationTime



Available from 1.8

---

**5.10.2.22.1.2 ClickAnywhereToEdit**

Click anywhere in the control to change the value.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getClickAnywhereToEdit

**Attribute setter:** setClickAnywhereToEdit



Available from 1.8

---

**5.10.2.22.1.3 Unit**

The unit or description of the display value.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getUnit

**Attribute setter:** setUnit



Available from 1.8

---

#### 5.10.2.22.1.4 Editable

Specifies whether the slider should be displayed.

The appearance of the slider can be changed via [Themed Resource \[► 456\]](#) of the control.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Linear Gauge \[► 432\]](#)

**See also**

**Attribute getter:** getEditable

**Attribute setter:** setEditable



Available from 1.8

---

#### 5.10.2.22.1.5 KnobArrowsColor

Outline and arrow color of the slider.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Linear Gauge \[► 432\]](#)

**See also**

**Attribute getter:** getKnobArrowsColor

**Attribute setter:** setKnobArrowsColor



Available from 1.8

---

#### 5.10.2.22.1.6 KnobColor

Fill color of the slider.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Linear Gauge \[► 432\]](#)

**See also**

**Attribute getter:** getKnobColor

**Attribute setter:** setKnobColor



Available from 1.8

---

#### 5.10.2.22.1.7 LabelColor

The color of the texts for the scale divisions.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getLabelColor

**Attribute setter:** setLabelColor



Available from 1.8

---

#### 5.10.2.22.1.8 LabelFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getLabelFontFamily

**Attribute setter:** setLabelFontFamily



Available from 1.8

---

#### 5.10.2.22.1.9 LabelFontSize

The font size.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getLabelFontSize

**Attribute setter:** setLabelFontSize



Available from 1.8

---

#### 5.10.2.22.1.10 LabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getLabelFontSizeUnit

**Attribute setter:** setLabelFontSizeUnit



Available from 1.8

#### 5.10.2.22.1.11 LabelFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getLabelFontStyle

**Attribute setter:** setLabelFontStyle



Available from 1.8

#### 5.10.2.22.1.12 LabelFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getLabelFontWeight

**Attribute setter:** setLabelFontWeight



Available from 1.8

#### 5.10.2.22.1.13 LabelFormat

**Schema:** tchmi:framework#/definitions/Function

The formatting function for the label texts.

It is called for each value in the label.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
LabelFormat(value: number): string;
```

##### Parameter

Name	Type	Description
value	number	The numerical value for the label.



**Return value**

Type	Description
string	The text to be displayed. HTML is not allowed here.

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getLabelFormat

**Attribute setter:** setLabelFormat



Available from 1.8

**5.10.2.22.1.14 LabelPosition**

The position of the label texts and scale division relative to the display.

**Schema:** tchmi:framework#/definitions/LinearGaugeLabelPosition

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getLabelPosition

**Attribute setter:** setLabelPosition



Available from 1.8

**5.10.2.22.1.15 LabelRange**

The value range between the label texts.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getLabelRange

**Attribute setter:** setLabelRange



Available from 1.8

**5.10.2.22.1.16 MaxValue**

The largest value that the control should display graphically.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Linear Gauge](#) [► 432]

**See also****Attribute getter:** getMaxValue**Attribute setter:** setMaxValueAvailable from 1.8

---

**5.10.2.22.1.17 MinValue**

The smallest value that the control should display graphically.

**Schema:** tchmi:general#/definitions/Number**Origin:** [Linear Gauge](#) [► 432]**See also****Attribute getter:** getMinValue**Attribute setter:** setMinValueAvailable from 1.8

---

**5.10.2.22.1.18 Orientation**

The orientation of the display. Horizontal and vertical orientation are supported.

**Schema:** tchmi:framework#/definitions/LinearGaugeOrientation**Origin:** [Linear Gauge](#) [► 432]**See also****Attribute getter:** getOrientation**Attribute setter:** setOrientationAvailable from 1.8

---

**5.10.2.22.1.19 UnitOrientatin**

The orientation of unit.

**Schema:** tchmi:framework#/definitions/LinearGaugeUnitOrientation**Origin:** [Linear Gauge](#) [► 432]**See also****Attribute getter:** getUnitOrientation**Attribute setter:** setUnitOrientation



Available from 1.8

---

#### 5.10.2.22.1.20 Padding

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getPadding

**Attribute setter:** setPadding

---



Available from 1.8

---

#### 5.10.2.22.1.21 ProgressBackgroundColor

The background color of the progress bar.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getProgressBackgroundColor

**Attribute setter:** setProgressBackgroundColor

---



Available from 1.8

---

#### 5.10.2.22.1.22 ProgressForegroundColor

The fill color of the progress bar.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getProgressForegroundColor

**Attribute setter:** setProgressForegroundColor

---



Available from 1.8

---

#### 5.10.2.22.1.23 Range

The value range of the color scales.

**Schema:** tchmi:framework#/definitions/GaugeRangeDefinitionList

**Origin:** [Linear Gauge](#) ► [432](#)

**See also**

**Attribute getter:** getRange

**Attribute setter:** setRange

---



Available from 1.8

---

#### 5.10.2.22.1.24 ShowLabels

Label texts are either displayed or not.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Linear Gauge](#) ► [432](#)

**See also**

**Attribute getter:** getShowLabels

**Attribute setter:** setShowLabels

---



Available from 1.8

---

#### 5.10.2.22.1.25 ShowTicks

Specifies whether main axis markers are to be drawn.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Linear Gauge](#) ► [432](#)

**See also**

**Attribute getter:** getShowTicks

**Attribute setter:** setShowTicks

---



Available from 1.8

---

#### 5.10.2.22.1.26 ShowValueText

Either displays the value or not.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Linear Gauge](#) ► [432](#)

**See also**

**Attribute getter:** getShowValueText

**Attribute setter:** setShowValueText

---



Available from 1.8

---

#### 5.10.2.22.1.27 StartFromZero

Starts from zero or at the minimum value. This has no effect if the minimum value is equal to or greater than zero.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Linear Gauge](#) ► [432](#)

**See also**

**Attribute getter:** getStartFromZero

**Attribute setter:** setStartFromZero

---



Available from 1.8

---

#### 5.10.2.22.1.28 Step

Defines the step size with which the value can be incremented/decremented.

**Schema:** tchmi:framework#/definitions/PositiveNumber

**Origin:** [Linear Gauge](#) ► [432](#)

**See also**

**Attribute getter:** getStep

**Attribute setter:** setStep

---



Available from 1.8

---

#### 5.10.2.22.1.29 TickColor

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Linear Gauge](#) ► [432](#)

**See also**

**Attribute getter:** getTickColor

**Attribute setter:** setTickColor

---



Available from 1.8

---

### 5.10.2.22.1.30 TickDefinition

Describes the scale divisions.

**Schema:** tchmi:framework#/definitions/GaugeTickDefinition

**Origin:** [Linear Gauge](#) ► [432](#)

**See also**

**Attribute getter:** getTickDefinition

**Attribute setter:** setTickDefinition



Available from 1.8

---

### 5.10.2.22.1.31 UnitColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Linear Gauge](#) ► [432](#)

**See also**

**Attribute getter:** getUnitColor

**Attribute setter:** setUnitColor



Available from 1.8

---

### 5.10.2.22.1.32 UnitFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Linear Gauge](#) ► [432](#)

**See also**

**Attribute getter:** getUnitFontFamily

**Attribute setter:** setUnitFontFamily



Available from 1.8

---

### 5.10.2.22.1.33 UnitFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Linear Gauge](#) ► [432](#)

**See also****Attribute getter:** getUnitFontSize**Attribute setter:** setUnitFontSizeAvailable from 1.8

---

**5.10.2.22.1.34 UnitFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Linear Gauge](#) [► 432]**See also****Attribute getter:** getUnitFontSizeUnit**Attribute setter:** setUnitFontSizeUnitAvailable from 1.8

---

**5.10.2.22.1.35 UnitFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Linear Gauge](#) [► 432]**See also****Attribute getter:** getUnitFontStyle**Attribute setter:** setUnitFontStyleAvailable from 1.8

---

**5.10.2.22.1.36 UnitFontWeight**

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Linear Gauge](#) [► 432]**See also****Attribute getter:** getUnitFontWeight**Attribute setter:** setUnitFontWeight



Available from 1.8

---

#### 5.10.2.22.1.37 Value

The value of the display.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getValue

**Attribute setter:** setValue

---



Available from 1.8

---

#### 5.10.2.22.1.38 ValueColor

The color of the display value.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getValueColor

**Attribute setter:** setValueColor

---



Available from 1.8

---

#### 5.10.2.22.1.39 ValueFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getValueFontFamily

**Attribute setter:** setValueFontFamily

---



Available from 1.8

---



#### 5.10.2.22.1.40 ValueFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Linear Gauge](#) ► 432]

**See also**

**Attribute getter:** getValueFontSize

**Attribute setter:** setValueFontSize

---



Available from 1.8

---

#### 5.10.2.22.1.41 ValueFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Linear Gauge](#) ► 432]

**See also**

**Attribute getter:** getValueFontSizeUnit

**Attribute setter:** setValueFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.22.1.42 ValueFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Linear Gauge](#) ► 432]

**See also**

**Attribute getter:** getValueFontStyle

**Attribute setter:** setValueFontStyle

---



Available from 1.8

---

#### 5.10.2.22.1.43 ValueFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Linear Gauge](#) ► 432]

**See also****Attribute getter:** getValueFontWeight**Attribute setter:** setValueFontWeight

Available from 1.8

**5.10.2.22.1.44 ValueFormat****Schema:** tchmi:framework#/definitions/Function

The formatting function for the display value.

It is called for each displayed value.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
ValueFormat(value: number): string;
```

**Parameter**

Name	Type	Description
value	number	The current numerical value.

**Return value**

Type	Description
string	The text to be displayed. HTML is not allowed here.

**Origin:** [Linear Gauge ▶ 432](#)**See also****Attribute getter:** getValueFormat**Attribute setter:** setValueFormat

Available from 1.8

**5.10.2.22.1.45 SetPoint**

The setpoint of the display.

**Schema:** tchmi:general#/definitions/Number**Origin:** [Linear Gauge ▶ 432](#)**See also****Attribute getter:** getSetPoint**Attribute setter:** setSetPoint



Available from version 1.12.744

---

#### 5.10.2.22.1.46 ValueSpace

The size of the displayed value.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getValueSpace

**Attribute setter:** setValueSpace

---



Available from version 1.12.744

---

#### 5.10.2.22.1.47 ValueSpaceUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getValueSpaceUnit

**Attribute setter:** setValueSpaceUnit

---



Available from version 1.12.744

---

#### 5.10.2.22.1.48 SetPointMarkerColor

Color of the setpoint marker.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getSetPointMarkerColor

**Attribute setter:** setSetPointMarkerColor

---



Available from version 1.12.744

---

## 5.10.2.22.2 Events

### 5.10.2.22.2.1 onUserInteractionFinished

The user has finished the [interaction](#) [► 442] with the control.

Origin: [Linear Gauge](#) [► 432]



Available from 1.8

---

### 5.10.2.22.2.2 onValueChanged

The [value](#) [► 452] has been changed.

Origin: [Linear Gauge](#) [► 432]



Available from 1.8

---

## 5.10.2.22.3 Themed Resources

These resources cannot be defined per instance but only for several/all linear gauges via the theme file. If you really want to change only one instance, you must create a class for it.



Available from version 1.10

---

### 5.10.2.22.3.1 KnobConfigHorizontal

A different graphic can be selected for the display of the slider.

This definition only applies to gauges that are horizontally aligned via the attribute [Orientation](#) [► 446]. If the control is positioned vertically, the resource [KnobConfigVertical](#) [► 457] is used.

The path of the image file and the display size of the image must be specified. Furthermore, the offset of the "anchor point" can be defined. This allows the image to be positioned correctly with respect to the value bar.

Note that an SVG file opens its own viewport and therefore the aspect ratio cannot normally be changed.

Partially transparent images in PNG and SVG format are also supported. For pixel graphics (PNG, JPG) please note that the attributes [KnobColor](#) [► 442] and [KnobArrowsColor](#) [► 442] have no effect. If an SVG is used, the color definition can take effect if the SVG is prepared accordingly.

When loading, the following character substitution is performed in the SVG:

- {KnobColorStroke} is replaced by "stroke:" followed by [KnobColor](#) [► 442] as CSS color if [KnobColor](#) [► 442] is set, otherwise removed
- {KnobColorFill} is replaced by "fill:" followed by [KnobColor](#) [► 442] as CSS color if [KnobColor](#) [► 442] is set, otherwise removed
- {KnobColorGradientDefinition} is replaced by a matching SVG <linearGradient> element as string if [KnobColor](#) [► 442] is a LinearGradientColor, otherwise removed
- {KnobArrowsColorStroke} is replaced by "stroke:" followed by [KnobArrowsColor](#) [► 442] as CSS color if [KnobArrowsColor](#) [► 442] is set, otherwise removed

- {KnobArrowsColorFill} is replaced by "fill:" followed by [KnobArrowsColor \[► 442\]](#) as CSS color if [KnobArrowsColor \[► 442\]](#) is set, otherwise removed
- {KnobArrowsColorGradientDefinition} is replaced by a matching SVG <linearGradient> element as string if [KnobArrowsColor \[► 442\]](#) is a LinearGradientColor, otherwise removed

### Example SVG

```
<svg xmlns="http://www.w3.org/2000/svg" version="1.1" width="40" height="40">
  <defs>{KnobColorGradientDefinition}</defs>
  <circle r="18px" cx="20px" cy="20px"
    style="stroke-width:3px; {KnobColorFill} {KnobArrowsColorStroke}"></circle>
  <path d="M 18 11 L 16 11 L 7 20 L 16 29 L 18 29 L 18 27 L 11 20 L 18 13 Z"
    style="stroke:none; {KnobArrowsColorFill}"></path>
  <path d="M 22 13 L 24 11 L 33 20 L 24 29 L 22 29 L 22 27 L 29 20 L 22 13 Z"
    style="stroke:none; {KnobArrowsColorFill}"></path>
</svg>
```

**Schema:** tchmi:framework#/definitions/KnobDefinition

**Origin:** [Linear Gauge \[► 432\]](#)



Available from version 1.10

## 5.10.2.22.3.2 KnobConfigVertical

A different graphic can be selected for the display of the slider.

This definition only applies to gauges that are vertically aligned via the attribute [Orientation \[► 446\]](#). If the control is positioned horizontally, the resource [KnobConfigHorizontal \[► 456\]](#) is used.

The path of the image file and the display size of the image must be specified. Furthermore, the offset of the "anchor point" can be defined. This allows the image to be positioned correctly with respect to the value bar.

Note that an SVG file opens its own viewport and therefore the aspect ratio cannot normally be changed.

Partially transparent images in PNG and SVG format are also supported. For pixel graphics (PNG, JPG) please note that the attributes [KnobColor \[► 442\]](#) and [KnobArrowsColor \[► 442\]](#) have no effect. If an SVG is used, the color definition can take effect if the SVG is prepared accordingly.

When loading, the following character substitution is performed in the SVG:

- {KnobColorStroke} is replaced by "stroke:" followed by [KnobColor \[► 442\]](#) as CSS color if [KnobColor \[► 442\]](#) is set, otherwise removed
- {KnobColorFill} is replaced by "fill:" followed by [KnobColor \[► 442\]](#) as CSS color if [KnobColor \[► 442\]](#) is set, otherwise removed
- {KnobColorGradientDefinition} is replaced by a matching SVG <linearGradient> element as string if [KnobColor \[► 442\]](#) is a LinearGradientColor, otherwise removed
- {KnobArrowsColorStroke} is replaced by "stroke:" followed by [KnobArrowsColor \[► 442\]](#) as CSS color if [KnobArrowsColor \[► 442\]](#) is set, otherwise removed
- {KnobArrowsColorFill} is replaced by "fill:" followed by [KnobArrowsColor \[► 442\]](#) as CSS color if [KnobArrowsColor \[► 442\]](#) is set, otherwise removed
- {KnobArrowsColorGradientDefinition} is replaced by a matching SVG <linearGradient> element as string if [KnobArrowsColor \[► 442\]](#) is a LinearGradientColor, otherwise removed

### Example SVG

```
<svg xmlns="http://www.w3.org/2000/svg" version="1.1" width="40" height="40">
  <defs>{KnobColorGradientDefinition}</defs>
  <circle r="18px" cx="20px" cy="20px"
    style="stroke-width:3px; {KnobColorFill} {KnobArrowsColorStroke}"></circle>
  <path d="M 18 11 L 16 11 L 7 20 L 16 29 L 18 29 L 18 27 L 11 20 L 18 13 Z"
    style="stroke:none; {KnobArrowsColorFill}"></path>
</svg>
```

```
        style="stroke:none;{KnobArrowsColorFill}"></path>
        <path d="M 22 13 L 24 11 L 33 20 L 24 29 L 22 29 L 22 27 L 29 20 L 22 13 z"
        style="stroke:none;{KnobArrowsColorFill}"></path>
    </svg>
```

**Schema:** tchmi:framework#/definitions/KnobDefinition

**Origin:** [Linear Gauge](#) [▶ 432](#)



Available from version 1.10

### 5.10.2.23      Localization Select

A combo box to select the localization.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">TextColor</a> <a href="#">▶ 470</a>	Definition of the text color
<a href="#">DropDownTextColor</a> <a href="#">▶ 467</a>	Definition of the text color in the drop-down list
<a href="#">DropDownBackgroundColor</a> <a href="#">▶ 464</a>	Definition of the background color of the drop-down list
<a href="#">DropDownHighlightColor</a> <a href="#">▶ 466</a>	Definition of the highlight color of the background of a selected entry in the drop-down list
<a href="#">DropDownHighlightTextColor</a> <a href="#">▶ 466</a>	Definition of the highlight color of the text of a selected entry in the drop-down list
<a href="#">DropDownToggleButtonBackgroundColor</a> <a href="#">▶ 467</a>	Definition of the color of the button to expand the drop-down list
<a href="#">DropDownToggleButtonArrowColor</a> <a href="#">▶ 467</a>	Definition of the color of the arrow of the button to expand the drop-down list
<a href="#">BackgroundColor</a> <a href="#">▶ 769</a>	Definition of the background color
<a href="#">BorderColor</a> <a href="#">▶ 768</a>	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**



Name	Description
<a href="#">LocalizationMapping [► 471]</a>	Changes the designation for each localization identifier.  A simple list of options can be compiled in the Engineering. Each option consists of these components: <ul style="list-style-type: none"> <li>▪ Code: Localization identifier (e.g.: de-DE)</li> <li>▪ Text: Display text</li> </ul>
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">TextFontFamily</a> [► 468]	Definition of the font using the name of the font family or the keyword
<a href="#">TextFontSize</a> [► 468]	Definition of the font size
<a href="#">TextFontSizeUnit</a> [► 469]	Selecting the font size unit <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">TextFontStyle</a> [► 469]	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">TextFontWeight</a> [► 469]	Selecting the font weight <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">TextHorizontalAlignment</a> [► 470]	Selecting the horizontal alignment of the text
<a href="#">ContentPadding</a> [► 470]	Definition of the distance of the text to the border

**Category: DropDown**

Name	Description
<a href="#">DropDownHorizontalAlignment</a> [► 466]	Selecting the horizontal alignment of the text in the drop-down list
<a href="#">DropDownVerticalAlignment</a> [► 467]	Selecting the vertical alignment of the text in the drop-down list
<a href="#">DataHeight</a> [► 464]	Definition of the height of the entries in the drop-down menu
<a href="#">MaxListHeight</a> [► 470]	Definition of the maximum height of the drop-down list
<a href="#">DropDownFontFamily</a> [► 464]	Definition of the font of the list items via the name of the font family or the keyword
<a href="#">DropDownFontSize</a> [► 465]	Definition of the font size of the list items
<a href="#">DropDownFontSizeUnit</a> [► 465]	Selecting the font size unit <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">DropDownFontStyle</a> [► 465]	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">DropDownFontWeight</a> [► 466]	Selecting the font weight of the text entries: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">DropDownStyle</a> [► 468]	Defines the position of the drop-down menu

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

LocalizationSelect

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)

---



NuGet packages are available from version 1.12.

---



Available from version 1.12.744

---

#### See also

API reference for this control

### 5.10.2.23.1 Attributes

#### 5.10.2.23.1.1 DataHeight

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Localization Select](#) [► 458]

#### See also

**Attribute getter:** getDataHeight

**Attribute setter:** setDataHeight

---



Available from version 1.12.744

---

#### 5.10.2.23.1.2 DropDownBackgroundColor

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Localization Select](#) [► 458]

#### See also

**Attribute getter:** getDropDownBackgroundColor

**Attribute setter:** setDropDownBackgroundColor

---



Available from version 1.12.744

---

#### 5.10.2.23.1.3 DropDownFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Localization Select](#) [► 458]

**See also****Attribute getter:** getDropDownFontFamily**Attribute setter:** setDropDownFontFamilyAvailable from version 1.12.744

---

**5.10.2.23.1.4 DropDownFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue**Origin:** [Localization Select](#) [► 458]**See also****Attribute getter:** getDropDownFontSize**Attribute setter:** setDropDownFontSizeAvailable from version 1.12.744

---

**5.10.2.23.1.5 DropDownFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Localization Select](#) [► 458]**See also****Attribute getter:** getDropDownFontSizeUnit**Attribute setter:** setDropDownFontSizeUnitAvailable from version 1.12.744

---

**5.10.2.23.1.6 DropDownFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Localization Select](#) [► 458]**See also****Attribute getter:** getDropDownFontStyle**Attribute setter:** setDropDownFontStyle



Available from version 1.12.744

---

#### 5.10.2.23.1.7 DropDownFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Localization Select](#) [► 458]

**See also**

**Attribute getter:** getDropDownFontWeight

**Attribute setter:** setDropDownFontWeight

---



Available from version 1.12.744

---

#### 5.10.2.23.1.8 DropDownHighlightColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Localization Select](#) [► 458]

**See also**

**Attribute getter:** getDropDownHighlightColor

**Attribute setter:** setDropDownHighlightColor

---



Available from version 1.12.744

---

#### 5.10.2.23.1.9 DropDownHighlightTextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Localization Select](#) [► 458]

**See also**

**Attribute getter:** getDropDownHighlightTextColor

**Attribute setter:** setDropDownHighlightTextColor

---



Available from version 1.12.744

---

#### 5.10.2.23.1.10 DropDownHorizontalAlignment

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Localization Select](#) [► 458]

See also

**Attribute getter:** getDropDownHorizontalAlignment

**Attribute setter:** setDropDownHorizontalAlignment

---



Available from version 1.12.744

---

#### 5.10.2.23.1.11 DropDownTextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Localization Select](#) [► 458]

See also

**Attribute getter:** getDropDownTextColor

**Attribute setter:** setDropDownTextColor

---



Available from version 1.12.744

---

#### 5.10.2.23.1.12 DropDownToggleButtonArrowColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Localization Select](#) [► 458]

See also

**Attribute getter:** getDropDownToggleButtonArrowColor

**Attribute setter:** setDropDownToggleButtonArrowColor

---



Available from version 1.12.744

---

#### 5.10.2.23.1.13 DropDownToggleButtonBackgroundColor

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Localization Select](#) [► 458]

See also

**Attribute getter:** getDropDownToggleButtonBackgroundColor

**Attribute setter:** setDropDownToggleButtonBackgroundColor

---



Available from version 1.12.744

---

#### 5.10.2.23.1.14 DropDownVerticalAlignment

**Schema:** tchmi:framework#/definitions/VerticalAlignment

**Origin:** [Localization Select](#) [► 458]

**See also**

**Attribute getter:** getDropDownVerticalAlignment

**Attribute setter:** setDropDownVerticalAlignment



Available from version 1.12.744

---

#### 5.10.2.23.1.15 DropDownStyle

Defines the position of the drop-down menu.

- "Desktop" is the classic representation at the position of the control.
- "Mobile" is the representation in the middle of an overlay in the screen, which is separated from the background.

**Schema** (version 1.10): tchmi:framework#/definitions/DropDownStyle

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiCombobox.DropDownStyle

**Origin:** [Localization Select](#) [► 458]

**See also**

**Attribute getter:** getDropDownStyle

**Attribute setter:** setDropDownStyle



Available from version 1.12.744

---

#### 5.10.2.23.1.16 TextFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Localization Select](#) [► 458]

**See also**

**Attribute getter:** getTextFontFamily

**Attribute setter:** setTextFontFamily



Available from version 1.12.744

---

#### 5.10.2.23.1.17 TextFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Localization Select](#) [► 458]



**See also****Attribute getter:** getTextFontSize**Attribute setter:** setTextFontSizeAvailable from version 1.12.744

---

**5.10.2.23.1.18 TextFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Localization Select](#) [► 458]**See also****Attribute getter:** getTextFontSizeUnit**Attribute setter:** setTextFontSizeUnitAvailable from version 1.12.744

---

**5.10.2.23.1.19 TextFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Localization Select](#) [► 458]**See also****Attribute getter:** getTextFontStyle**Attribute setter:** setTextFontStyleAvailable from version 1.12.744

---

**5.10.2.23.1.20 TextFontWeight**

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Localization Select](#) [► 458]**See also****Attribute getter:** getTextFontWeight**Attribute setter:** setTextFontWeight



Available from version 1.12.744

---

#### 5.10.2.23.1.21 TextHorizontalAlignment

Horizontal alignment of the text.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Localization Select](#) [► 458]

**See also**

**Attribute getter:** getTextHorizontalAlignment

**Attribute setter:** setTextHorizontalAlignment

---



Available from version 1.12.744

---

#### 5.10.2.23.1.22 MaxListHeight

Defines the height of the combo box.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Localization Select](#) [► 458]

**See also**

**Attribute getter:** getMaxListHeight

**Attribute setter:** setMaxListHeight

---



Available from version 1.12.744

---

#### 5.10.2.23.1.23 TextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Localization Select](#) [► 458]

**See also**

**Attribute getter:** getTextColor

**Attribute setter:** setTextColor

---



Available from version 1.12.744

---

#### 5.10.2.23.1.24 ContentPadding

Defines the distance of the text to the border.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Localization Select \[► 458\]](#)

**See also**

**Attribute getter:** getContentPadding

**Attribute setter:** setContentPadding



Available from version 1.12.744

---

### 5.10.2.23.1.25 LocalizationMapping

Changes the designation for each localization identifier.

A simple list of options can be compiled in the Engineering. Each option consists of these components:

- Code: Localization identifier (e.g.: de-DE)
- Text: Display text

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiLocalizationSelect.ListItem

**Origin:** [Localization Select \[► 458\]](#)

**See also**

**Attribute getter:** getLocalizationMapping

**Attribute setter:** setLocalizationMapping



Available from version 1.12.744

---

### 5.10.2.24 Numeric Input

An input element for numeric values.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control
<a href="#">ValueColor [► 477]</a>	Definition of the text color

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Value [► 477]</a>	Definition of the value
<a href="#">MinValue [► 478]</a>	Definition of the minimum value
<a href="#">MaxValue [► 478]</a>	Definition of the maximum value
<a href="#">DecimalDigits [► 478]</a>	Number of decimal places
<a href="#">AutoFocusOut [► 481]</a>	Determines whether the control automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.
<a href="#">AutoSelectText [► 481]</a>	Determines whether the entire text is automatically selected when it is focused.
<a href="#">ResetToLastValidValue [► 482]</a>	Determines whether the value is reset to the last valid value when focus is lost.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage</a> [► 770]	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight</a> [► 771]	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit</a> [► 771]	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth</a> [► 770]	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit</a> [► 770]	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding</a> [► 771]	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment</a> [► 772]	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment</a> [► 771]	Definition of the horizontal alignment of the background image within the control

**Category: Value**

Name	Description
<a href="#">ValueFontFamily</a> [► 479]	Definition of the font using the name of the font family or the keyword
<a href="#">ValueFontSize</a> [► 479]	Definition of the font size
<a href="#">ValueFontSizeUnit</a> [► 479]	Definition of the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">ValueFontStyle</a> [► 479]	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">ValueFontWeight</a> [► 480]	Selecting the font weight of the text: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">ContentPadding</a> [► 480]	Definition of the distance of the text to the border
<a href="#">ValueHorizontalAlignment</a> [► 480]	Selecting the horizontal alignment of the text
<a href="#">Placeholder</a> [► 481]	Definition of the placeholder, which is displayed if no value is entered.

**Events****Category: Control**

Name	Description
<a href="#">onValueChanged</a> [► 482]	The value has been changed.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onUserInteractionFinished [► 482]</a>	The user has finished the interaction with the control.
<a href="#">onFocusIn [► 482]</a>	The control now has the focus.
<a href="#">onFocusOut [► 482]</a>	The control has lost focus.
<a href="#">onUserInteractionCanceled [► 483]</a>	The user has terminated the interaction with the control element.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.



**Access rights**

Name	Description
<a href="#">observe</a> [► 783]	Determines whether the control is generally observable.
<a href="#">operate</a> [► 783]	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control](#) [► 753]

NumericInput

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.744

**See also**

API reference for this control

**5.10.2.24.1      Attribute****5.10.2.24.1.1    ValueColor**

Color of the value.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Numeric Input](#) [► 471]

**See also**

**Attribute getter:** `getValueColor`

**Attribute setter:** `setValueColor`



Available from version 1.12.744

**5.10.2.24.1.2    Value**

Value of the control.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Numeric Input](#) [► 471]

**See also**

**Attribute getter:** `getValue`

**Attribute setter:** `setValue`



Available from version 1.12.744

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#### 5.10.2.24.1.3 MinValue

Minimum value of the control.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Numeric Input](#) [► 471]

**See also**

**Attribute getter:** getMinValue

**Attribute setter:** setMinValue

---



Available from version 1.12.744

---

#### 5.10.2.24.1.4 MaxValue

Maximum value of the control.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Numeric Input](#) [► 471]

**See also**

**Attribute getter:** getMaxValue

**Attribute setter:** setMaxValue

---



Available from version 1.12.744

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#### 5.10.2.24.1.5 DecimalDigits

The decimal places of the value.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Numeric Input](#) [► 471]

**See also**

**Attribute getter:** getDecimalDigits

**Attribute setter:** setDecimalDigits

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Available from version 1.12.744

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#### 5.10.2.24.1.6 ValueFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Numeric Input](#) [► 471]

**See also**

**Attribute getter:** getValueFontFamily

**Attribute setter:** setValueFontFamily

---



Available from version 1.12.744

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#### 5.10.2.24.1.7 ValueFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Numeric Input](#) [► 471]

**See also**

**Attribute getter:** getValueFontSize

**Attribute setter:** setValueFontSize

---



Available from version 1.12.744

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#### 5.10.2.24.1.8 ValueFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Numeric Input](#) [► 471]

**See also**

**Attribute getter:** getValueFontSizeUnit

**Attribute setter:** setValueFontSizeUnit

---



Available from version 1.12.744

---

#### 5.10.2.24.1.9 ValueFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Numeric Input](#) [► 471]

**See also****Attribute getter:** getValueFontStyle**Attribute setter:** setValueFontStyleAvailable from version 1.12.744

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**5.10.2.24.1.10 ValueFontWeight**

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Numeric Input](#) [► 471]**See also****Attribute getter:** getValueFontWeight**Attribute setter:** setValueFontWeightAvailable from version 1.12.744

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**5.10.2.24.1.11 ValueHorizontalAlignment**

Horizontal alignment of the text.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment**Origin:** [Numeric Input](#) [► 471]**See also****Attribute getter:** getValueHorizontalAlignment**Attribute setter:** setValueHorizontalAlignmentAvailable from version 1.12.744

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**5.10.2.24.1.12 ContentPadding**

Defines the distance of the text to the border.

**Schema:** tchmi:framework#/definitions/Padding**Origin:** [Numeric Input](#) [► 471]**See also****Attribute getter:** getContentPadding**Attribute setter:** setContentPadding



Available from version 1.12.744

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#### 5.10.2.24.1.13 Placeholder

Placeholder which is displayed if no text is entered.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Numeric Input \[► 471\]](#)

**See also**

**Attribute getter:** getPlaceholder

**Attribute setter:** setPlaceholder

---



Available from version 1.12.744

---

#### 5.10.2.24.1.14 AutoFocusOut

Determines whether the control automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Numeric Input \[► 471\]](#)

**See also**

**Attribute getter:** getAutoFocusOut

**Attribute setter:** setAutoFocusOut

---



Available from version 1.12.744

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#### 5.10.2.24.1.15 AutoSelectText

Determines whether the Control automatically selects the entire text when it is focused.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Numeric Input \[► 471\]](#)

**See also**

**Attribute getter:** getAutoSelectText

**Attribute setter:** setAutoSelectText

---



Available from version 1.12.744

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### 5.10.2.24.1.16 ResetToLastValidValue

Determines whether the value is reset to the last valid value when focus is lost.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Numeric Input](#) [► 471]

**See also**

**Attribute getter:** getResetToLastValidValue

**Attribute setter:** setResetToLastValidValue



Available from version 1.12.744

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## 5.10.2.24.2 Events

### 5.10.2.24.2.1 onFocusIn

The control now has the focus.

**Origin:** [Numeric Input](#) [► 471]



Available from version 1.12.744

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### 5.10.2.24.2.2 onFocusOut

The control has lost focus.

**Origin:** [Numeric Input](#) [► 471]



Available from version 1.12.744

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### 5.10.2.24.2.3 onValueChanged

The value has been changed.

**Origin:** [Numeric Input](#) [► 471]



Available from version 1.12.744

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### 5.10.2.24.2.4 onUserInteractionFinished

The user has finished the interaction with the control.

**Origin:** [Numeric Input](#) [► 471]



Available from version 1.12.744

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5.10.2.24.2.5    **onUserInteractionCanceled**

The user has terminated the interaction with the control element.

**Origin:** [Numeric Input \[► 471\]](#)



Available from version 1.12.744

5.10.2.25        **Parameters and Functions**

This control enables manual control of PLC variables based on PLC attributes.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.



Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Runtime</a> [► 488]	The runtime during which parameters and functions are to be displayed. Use an identifier from the list stated in the server extension.
<a href="#">ShowSymbolMapping</a> [► 488]	Displays the path of the symbol.
<a href="#">ShowTreeView</a> [► 488]	Displays the TreeView control.
<a href="#">ShowBreadcrumb</a> [► 489]	Displays the breadcrumb control.
<a href="#">ShowNavigation</a> [► 489]	Displays the navigation.
<a href="#">RootPath</a> [► 490]	Establishes the top node of the symbol hierarchy and filters the navigation to this node and its sub-symbols.
<a href="#">InitPath</a> [► 489]	Specifies the absolute symbol path to be opened during initialization. This must contain the <a href="#">RootPath</a> [► 490] in order to be visible in the filtered navigation.
<a href="#">ImageBasePath</a> [► 490]	Path to the directory where the icons for the TreeView are saved.
<a href="#">UseValueAsDefaultPreparedValue</a> [► 490]	Transfers the current value of a symbol to the input editor when editing is started.
<a href="#">Id</a> [► 759]	Definition of the name of the control
<a href="#">Type</a> [► 776]	Type name of the control
<a href="#">ClassNames</a> [► 759]	Definition of control classes
<a href="#">IsAttached</a> [► 760]	If a control is logically assigned in the DOM.
<a href="#">Tooltip</a> [► 775]	Definition of the tooltip for the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage</a> [► 770]	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight</a> [► 771]	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit</a> [► 771]	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth</a> [► 770]	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit</a> [► 770]	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding</a> [► 771]	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment</a> [► 772]	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment</a> [► 771]	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

## Parameters and Functions

**See also**

API reference for this control

**5.10.2.25.1 Attributes****5.10.2.25.1.1 Runtime**

The runtime during which parameters and functions are to be displayed. Use an identifier from the list stated in the server extension.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Parameters and Functions \[► 483\]](#)

**See also**

**Attribute getter:** getRuntime

**Attribute setter:** setRuntime



Available since version 1.14.3

---

**5.10.2.25.1.2 ShowSymbolMapping**

Displays the path of the symbol.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Parameters and Functions \[► 483\]](#)

**See also**

**Attribute getter:** getShowSymbolMapping

**Attribute setter:** setShowSymbolMapping



Available since version 1.14.3

---

**5.10.2.25.1.3 ShowTreeView**

Displays the TreeView control.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Parameters and Functions \[► 483\]](#)

**See also**

**Attribute getter:** getShowTreeView

**Attribute setter:** setShowTreeView



Available since version 1.14.3

---

#### 5.10.2.25.1.4 ShowBreadcrumb

Displays the breadcrumb control.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Parameters and Functions](#) [[► 483](#)]

**See also**

**Attribute getter:** getShowBreadcrumb

**Attribute setter:** setShowBreadcrumb

---



Available since version 1.14.3

---

#### 5.10.2.25.1.5 ShowNavigation

Displays the navigation.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Parameters and Functions](#) [[► 483](#)]

**See also**

**Attribute getter:** getShowNavigation

**Attribute setter:** setShowNavigation

---



Available since version 1.14.3

---

#### 5.10.2.25.1.6 InitPath

Specifies the absolute symbol path to be opened during initialization. This must contain the [RootPath](#) [[► 490](#)] in order to be visible in the filtered navigation.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Parameters and Functions](#) [[► 483](#)]

**See also**

**Attribute getter:** getInitPath

**Attribute setter:** setInitPath

---



Available since version 1.14.3

---

#### 5.10.2.25.1.7 RootPath

Establishes the top node of the symbol hierarchy and filters the navigation to this node and its sub-symbols.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Parameters and Functions](#) [► 483]

**See also**

**Attribute getter:** getRootPath

**Attribute setter:** setRootPath

---



Available since version 1.14.3

---

#### 5.10.2.25.1.8 ImageBasePath

Path to the directory where the icons for the TreeView are saved.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Parameters and Functions](#) [► 483]

**See also**

**Attribute getter:** getImageBasePath

**Attribute setter:** setImageBasePath

---



Available since version 1.14.3

---

#### 5.10.2.25.1.9 UseValueAsDefaultPreparedValue

Transfers the current value of a symbol to the input editor when editing is started.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Parameters and Functions](#) [► 483]

**See also**

**Attribute getter:** getUseValueAsDefaultPreparedValue

**Attribute setter:** setUseValueAsDefaultPreparedValue

---



Available since version 1.14.3

---

#### 5.10.2.26 Password Input

An operating element for entering a password.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control
<a href="#">TextColor [► 376]</a>	Definition of the text color

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.



Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Text [► 378]</a>	Definition of the text
<a href="#">AutoFocusOut [► 377]</a>	Determines whether the control automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.
<a href="#">AutoSelectText [► 378]</a>	Determines whether the entire text is automatically selected when it is focused.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">TextFontFamily</a> [ <a href="#">► 375</a> ]	Definition of the font using the name of the font family or the keyword
<a href="#">TextFontSize</a> [ <a href="#">► 375</a> ]	Definition of the font size
<a href="#">TextFontSizeUnit</a> [ <a href="#">► 375</a> ]	Definition of the font size unit: <ul style="list-style-type: none"><li>• Pixels for an absolute size</li><li>• Percent for a relative size</li></ul>
<a href="#">TextFontStyle</a> [ <a href="#">► 376</a> ]	Selecting the font style: <ul style="list-style-type: none"><li>• Normal</li><li>• Italic</li><li>• Oblique</li></ul>
<a href="#">TextFontWeight</a> [ <a href="#">► 376</a> ]	Selecting the font weight of the text: <ul style="list-style-type: none"><li>• Normal</li><li>• Bold</li></ul>
<a href="#">ContentPadding</a> [ <a href="#">► 377</a> ]	Definition of the distance of the text to the border
<a href="#">TextHorizontalAlignment</a> [ <a href="#">► 377</a> ]	Selecting the horizontal alignment of the text
<a href="#">Placeholder</a> [ <a href="#">► 377</a> ]	Definition of the placeholder, which is displayed if no text is entered.

## Events

### Category: Control

Name	Description
<a href="#">onTextChanged</a> [ <a href="#">► 379</a> ]	The text has been changed.

### Category: Framework

Name	Description
<a href="#">onAttached</a> [ <a href="#">► 778</a> ]	The control was added to the display.
<a href="#">onDetached</a> [ <a href="#">► 778</a> ]	The control was removed from the display.
<a href="#">onInitialized</a> [ <a href="#">► 778</a> ]	The control was initialized.
<a href="#">onDestroyed</a> [ <a href="#">► 778</a> ]	The control was destroyed.
<a href="#">onMoved</a> [ <a href="#">► 781</a> ]	The control was moved in relation to the browser window.
<a href="#">onResized</a> [ <a href="#">► 782</a> ]	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onUserInteractionFinished [► 379]</a>	The user has finished the interaction with the control.
<a href="#">onFocusIn [► 378]</a>	The control now has the focus.
<a href="#">onFocusOut [► 379]</a>	The control has lost focus.
<a href="#">onUserInteractionCanceled [► 379]</a>	The user has terminated the interaction with the control element.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

[Input \[► 369\]](#)

PasswordInput

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.744

#### See also

API reference for this control

### 5.10.2.27 PDF Viewer

The PDF Viewer control enables embedded display of PDF files in TwinCAT HMI applications.

#### Attributes

##### Category: Colors

Name	Description
<a href="#">BackgroundColor</a> [ <a href="#">► 769</a> ]	Definition of the background color
<a href="#">BorderColor</a> [ <a href="#">► 768</a> ]	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow

**Category: Common**

Name	Description
<a href="#">File [► 502]</a>	The path to the PDF file to be displayed.
<a href="#">Page [► 502]</a>	The number of the page to be displayed initially.
<a href="#">NamedDestination [► 503]</a>	The label to be displayed initially.
<a href="#">Zoom [► 503]</a>	Zoom level to be used initially. Accepted formats: [zoom], [left offset], [top offset], page-width, page-height, page-fit, auto Example: zoom=200
<a href="#">PageMode [► 503]</a>	Page mode (state of the sidebar). Accepted values: none, thumbs, bookmarks, attachments Example: pagemode=none
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control



**Events****Category: Control**

Name	Description
<a href="#">onLoad [► 368]</a>	The image was loaded successfully.
<a href="#">onError [► 368]</a>	The image was not loaded successfully.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally observable.
<a href="#">operate</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control](#) [[► 753](#)]

PDF Viewer

**NuGet package:** [Beckhoff.TwinCAT.HMI.PDFViewer](#)



NuGet packages are available from version 1.12.



Available from version 1.12

**See also**

API reference for this control

**5.10.2.27.1 Attributes****5.10.2.27.1.1 File**

The path to the PDF file to be displayed.

**Schema:** tchmi:framework#/definitions/Path

**Origin:** [PDF Viewer](#) [[► 497](#)]

**See also**

**Attribute getter:** getFile

**Attribute setter:** setFile



Available from version 1.12

**5.10.2.27.1.2 Page**

The number of the page to be displayed initially.

**Schema:** tchmi:general#/definitions/Integer

**Origin:** [PDF Viewer](#) [[► 497](#)]

**See also**

**Attribute getter:** getPage

**Attribute setter:** setPage



Available from version 1.12

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#### 5.10.2.27.1.3 NamedDestination

The label to be displayed initially.

**Schema:** tchmi:general#/definitions/String

**Origin:** [PDF Viewer \[► 497\]](#)

**See also**

**Attribute getter:** getNamedDestination

**Attribute setter:** setNamedDestination

---



Available from version 1.12

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#### 5.10.2.27.1.4 Zoom

Zoom level to be used initially.

Accepted formats: [zoom], [left offset], [top offset], page-width, page-height, page-fit, auto\nExample: zoom=200

**Schema:** tchmi:framework#/definitions/Path

**Origin:** [PDF Viewer \[► 497\]](#)

**See also**

**Attribute getter:** getZoom

**Attribute setter:** setZoom

---



Available from version 1.12

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#### 5.10.2.27.1.5 PageMode

Page mode (state of the sidebar).

Accepted values: none, thumbs, bookmarks, attachments\nExample: pagemode=none

**Schema:** tchmi:framework#/definitions/Path

**Origin:** [PDF Viewer \[► 497\]](#)

**See also**

**Attribute getter:** getPageMode

**Attribute setter:** setPageMode



Available from version 1.12

### 5.10.2.28 Pie Chart

A PieChart can be statically filled with data or dynamically supplied with data via an array.

A description of the configuration can be found in chapter Configuration.

#### Attributes

##### Category: Colors

Name	Description
<a href="#">SectionsBackgroundColor [► 511]</a>	Definition of the color of the sections
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">PieGraphData [► 511]</a>	Definition of the data to be displayed as pie chart.
<a href="#">PieGraphDescription [► 512]</a>	Definition of the display mode of the configured pie graphs using the dialog 'Pie Graph Description'.
<a href="#">ShowLegend [► 512]</a>	Selecting whether the legend is to be displayed.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Label**

Name	Description
<a href="#">LabelUnit [► 512]</a>	Definition of the unit
<a href="#">LabelPosition [► 513]</a>	Definition of the position of the labeling: <ul style="list-style-type: none"> <li>• Inside: in the diagram</li> <li>• Outside: outside the diagram</li> </ul>
<a href="#">PercentLabelDecimalPlaces [► 513]</a>	Definition of the decimal places of the percentages.
<a href="#">ValueLabelDecimalPlaces [► 513]</a>	Definition of the decimal places of the value description.
<a href="#">LabelFontFamily [► 513]</a>	Definition of the font via the name of the font family or the keyword.
<a href="#">LabelFontSize [► 514]</a>	Definition of the font size.
<a href="#">LabelFontSizeUnit [► 514]</a>	Definition of the unit for the font size.
<a href="#">LabelFontWeight [► 514]</a>	Choice of font size: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> <li>• Auto: Inherited</li> </ul>

**Category: Legend**

Name	Description
<a href="#">LabelFontFamily [► 515]</a>	Definition of the font via the name of the font family or the keyword.
<a href="#">LabelFontSize [► 515]</a>	Definition of the font size.
<a href="#">LabelFontSizeUnit [► 515]</a>	Definition of the unit for the font size.
<a href="#">LegendFontStyle [► 515]</a>	Choice of font position <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">LabelFontWeight [► 516]</a>	Choice of font size: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> <li>• Auto: Inherited</li> </ul>

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**



Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Pie Chart

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.14.



Available from version 14

See also

API reference for this control

5.10.2.28.1 Configuration

A PieChart can be configured as follows:

- 1. Link the array containing the data points to the attribute "[Pie Graph Data \[► 511\]](#)" of the category "Common".



The array is a one-dimensional array that contains the values:  
number[]

- 2. Add a graph description for each of the graphs contained in the array to the "Pie Graph Descriptions" attribute of the "Common" category using the "[PieGraphDescription Definition \[► 510\]](#)" editor.

Example: [Pie Chart \[► 504\]](#)

5.10.2.28.2 Dialogs

5.10.2.28.2.1 Pie Graph Data Dialog

You can use this dialog to statically define the data to be displayed in the pie graph in Engineering.





Items	List of all objects added
	Delete the selected object
	Change the object order (top = left)
	Add a new object

Properties:

Name	Description
Value	The value of the slice.

5.10.2.28.2.2 Pie Graph Description Dialog

This dialog can be used to change the settings of the graphs for the individual values to be displayed in the PieChart.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Category: Colors

Name	Description

Pie color	Definition of the color of the slice.
Label color	Definition of the color of the label.

Category: General

Name	Description

Name	Definition of the name of the data set.
Show name	Selection of whether the name of the data set should be displayed.
Show percent label	Selection of whether the percentage labeling should be displayed.
Show value label	Selection of whether the value should be displayed.
Show unit	Selection of whether the unit should be displayed.

### 5.10.2.28.3 Attributes

#### 5.10.2.28.3.1 SectionsBackgroundColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Pie Chart](#) [► 504]

**See also**

**Attribute getter:** getSectionsBackgroundColor

**Attribute setter:** setSectionsBackgroundColor



Available from version 14

#### 5.10.2.28.3.2 PieGraphData

**Schema:** tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiBarChart.ChartBarGraphDataDefinitionList

**Origin:** [Pie Chart](#) [► 504]

**See also****Attribute getter:** getPieGraphData**Attribute setter:** setPieGraphDataAvailable from version 14

---

**5.10.2.28.3.3 PieGraphDescription****Schema:** tchmi:framework#/definitions/

TcHmi.Controls.Beckhoff.TcHmiBarChart.ChartBarGraphDescriptionDefinitionList

**Origin:** [Pie Chart](#) [► 504]**See also****Attribute getter:** getPieGraphDescription**Attribute setter:** setPieGraphDescriptionAvailable from version 14

---

**5.10.2.28.3.4 ShowLegend****Schema:** tchmi:general#/definitions/Boolean**Origin:** [Pie Chart](#) [► 504]**See also****Attribute getter:** getShowLegend**Attribute setter:** setShowLegendAvailable from version 14

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**5.10.2.28.3.5 LabelUnit****Schema:** tchmi:general#/definitions/String**Origin:** [Pie Chart](#) [► 504]**See also****Attribute getter:** getLabelUnit**Attribute setter:** setLabelUnitAvailable from version 14

---

### 5.10.2.28.3.6 LabelPosition

**Schema:** tchmi:framework#/definitions/

TcHmi.Controls.Beckhoff.TcHmiHorizontalBarChart.ChartBarGraphPosition

**Origin:** [Pie Chart](#) [► 504]

**See also**

**Attribute getter:** getLabelPosition

**Attribute setter:** setLabelPosition

---



Available from version 14

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### 5.10.2.28.3.7 PercentLabelDecimalPlaces

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Pie Chart](#) [► 504]

**See also**

**Attribute getter:** getPercentLabelDecimalPlaces

**Attribute setter:** setPercentLabelDecimalPlaces

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Available from version 14

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### 5.10.2.28.3.8 ValueLabelDecimalPlaces

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Pie Chart](#) [► 504]

**See also**

**Attribute getter:** getValueLabelDecimalPlaces

**Attribute setter:** setValueLabelDecimalPlaces

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Available from version 14

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### 5.10.2.28.3.9 LabelFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Pie Chart](#) [► 504]

**See also**

**Attribute getter:** getLabelFontFamily

**Attribute setter:** setLabelFontFamily



Available from version 14

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#### 5.10.2.28.3.10 LabelFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Pie Chart](#) [► 504]

**See also**

**Attribute getter:** getLabelFontSize

**Attribute setter:** setLabelFontSize

---



Available from version 14

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#### 5.10.2.28.3.11 LabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Pie Chart](#) [► 504]

**See also**

**Attribute getter:** getLabelFontSizeUnit

**Attribute setter:** setLabelFontSizeUnit

---



Available from version 14

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#### 5.10.2.28.3.12 LabelFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [PieChart](#) [► 504]

**See also**

**Attribute getter:** getLabelFontWeight

**Attribute setter:** setLabelFontWeight

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Available from version 14

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### 5.10.2.28.3.13 LegendFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Pie Chart](#) [► 504]

**See also**

**Attribute getter:** getLegendFontFamily

**Attribute setter:** setLegendFontFamily

---



Available from version 14

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### 5.10.2.28.3.14 LegendFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Pie Chart](#) [► 504]

**See also**

**Attribute getter:** getLegendFontSize

**Attribute setter:** setLegendFontSize

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Available from version 14

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### 5.10.2.28.3.15 LegendFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Pie Chart](#) [► 504]

**See also**

**Attribute getter:** getLegendFontSizeUnit

**Attribute setter:** setLegendFontSizeUnit

---



Available from version 14

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### 5.10.2.28.3.16 LegendFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Pie Chart](#) [► 504]

**See also****Attribute getter:** getLegendFontStyle**Attribute setter:** setLegendFontStyle

Available from version 14

**5.10.2.28.3.17 LegendFontWeight**

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Pie Chart](#) [► 504]**See also****Attribute getter:** getLegendFontWeight**Attribute setter:** setLegendFontWeight

Available from version 14

**5.10.2.28.4 Themed Resources**

These resources cannot be defined for each instance but only for several/all bar charts via the theme file. If you want to change only one instance, you must create a class for it.



Available from version 14

**5.10.2.28.4.1 DefaultGraphColor**

This is the color that is used by default for pie slices if no color is defined for the pie slice in attribute [PieGraphDescription](#) [► 512].

**Schema:** tchmi:framework#/definitions/SolidColor**Origin:** [Pie Chart](#) [► 504]

Available from version 14

**5.10.2.28.4.2 DefaultLabelColor**

This is the color that is used by default for labeling if no color is defined for the labeling in attribute [PieGraphDescription](#) [► 512].

**Schema:** tchmi:framework#/definitions/SolidColor**Herkunft:** [Pie Chart](#) [► 504]





Available from version 14

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#### 5.10.2.28.4.3 DefaultPieColor1

This is a default color used for a pie slice when the control is added in the Designer.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Pie Chart](#) [► 504]

---



Available from version 14

---

#### 5.10.2.28.4.4 DefaultPieColor2

This is a default color used for a pie slice when the control is added in the Designer.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Pie Chart](#) [► 504]

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Available from version 14

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#### 5.10.2.28.4.5 DefaultPieColor3

This is a default color used for a pie slice when the control is added in the Designer.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Pie Chart](#) [► 504]

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Available from version 14

---

#### 5.10.2.28.4.6 DefaultPieColor4

This is a default color used for a pie slice when the control is added in the Designer.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Pie Chart](#) [► 504]

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Available from version 14

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#### 5.10.2.28.4.7 DefaultPieLabelColor1

This is a default color that is used for the description of a pie slice when the control is added in the Designer.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Pie Chart](#) [► 504]

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Available from version 14

#### 5.10.2.28.4.8 DefaultPieLabelColor2

This is a default color that is used for the description of a pie slice when the control is added in the Designer.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Pie Chart](#) [► 504]



Available from version 14

#### 5.10.2.28.4.9 DefaultPieLabelColor3

This is a default color that is used for the description of a pie slice when the control is added in the Designer.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Pie Chart](#) [► 504]



Available from version 14

#### 5.10.2.28.4.10 DefaultPieLabelColor4

This is a default color that is used for the description of a pie slice when the control is added in the Designer.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Pie Chart](#) [► 504]



Available from version 14

### 5.10.2.29 Polygon

Closed shape formed from a set of interconnected points. The last point is automatically connected to the first point.

#### Attributes

**Category:** Colors

Name	Description
<a href="#">FillColor</a> [► 524]	Definition of the fill color of the control
<a href="#">StrokeColor</a> [► 525]	Definition of the line color of the control
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Points [► 524]</a>	Definition of the points that describe the polygon. Each point is defined by an x-coordinate and a y-coordinate.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Shape**

Name	Description
<a href="#">StrokeThickness [► 525]</a>	Definition of the line width
<a href="#">StrokeThicknessUnit [► 526]</a>	Selecting the unit of the line width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> </ul>
<a href="#">StrokeStyle [► 525]</a>	Definition of the line style
<a href="#">FillMode [► 524]</a>	Selecting the fill areas: <ul style="list-style-type: none"> <li>• NonZero: All areas that lie within the connecting lines are filled in.</li> <li>• EvenOdd: If a polygon is drawn so that the resulting surfaces overlap, this section is filled in for an odd number of overlapping surfaces and not filled in for an even number.</li> </ul>
<a href="#">ScaleMode [► 525]</a>	Selecting the polygon scaling: <ul style="list-style-type: none"> <li>• None: The polygon is not scaled. The points that do not lie within the control are truncated.</li> <li>• ScaleToFill: The polygon is displayed on the entire size of the control. The proportions of the polygon are not taken into account.</li> <li>• ScaleToFit: The polygon is displayed as large as possible without exceeding the edges of the control. The proportions of the polygon are maintained.</li> <li>• ScaleToFitWidth: The polygon is displayed over the entire width of the control, regardless of whether it exceeds the limits of the control. The proportions of the polygon are maintained.</li> <li>• ScaleToFitHeight: The polygon is displayed over the entire height of the control, regardless of whether it exceeds the limits of the control. The proportions of the polygon are maintained.</li> </ul>

## Events

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Polygon

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.29.1 Attributes****5.10.2.29.1.1 FillColor**

Defines the fill color of the control.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Polygon](#) [► 518]

**See also**

**Attribute getter:** getFillColor

**Attribute setter:** setFillColor



Available from 1.8

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**5.10.2.29.1.2 FillMode**

Defines which areas are inside or outside. This is only required for self-overlapping polygons.

**Schema:** tchmi:framework#/definitions/FillMode

**Origin:** [Polygon](#) [► 518]

**See also**

**Attribute getter:** getFillMode

**Attribute setter:** setFillMode



Available from 1.8

---

**5.10.2.29.1.3 Points**

Each point is defined by an x-coordinate and a y-coordinate.

It is common practice (but not necessary) to put a comma between the X and Y coordinates and a space between the points, as in this example: 100,10 250,150 200,110

**Schema:** tchmi:general#/definitions/String

**Origin:** [Polygon](#) [► 518]

**See also**

**Attribute getter:** getPoints

**Attribute setter:** setPoints



Available from 1.8

---



#### 5.10.2.29.1.4 ScaleMode

Scales the content to the control size.

**Schema:** tchmi:framework#/definitions/ScaleMode

**Origin:** [Polygon](#) [► 518]

**See also**

**Attribute getter:** getScaleMode

**Attribute setter:** setScaleMode

---



Available from 1.8

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#### 5.10.2.29.1.5 StrokeColor

Defines the stroke color of the control.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Polygon](#) [► 518]

**See also**

**Attribute getter:** getStrokeColor

**Attribute setter:** setStrokeColor

---



Available from 1.8

---

#### 5.10.2.29.1.6 StrokeStyle

Definition of the stroke style.

Comma or space-separated list of numbers that specify the length of strokes and spaces.

If an odd number is specified, the list is repeated once. Example: "5, 3, 2" is equivalent to "5, 3, 2, 5, 3, 2".

**Schema:** tchmi:general#/definitions/String

**Origin:** [Polygon](#) [► 518]

**See also**

**Attribute getter:** getStrokeStyle

**Attribute setter:** setStrokeStyle

---



Available from 1.8

---

#### 5.10.2.29.1.7 StrokeThickness

Defines the border width of the control in pixels.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Polygon](#) [► 518]

**See also**

**Attribute getter:** getStrokeThickness

**Attribute setter:** setStrokeThickness



Available from 1.8

**5.10.2.29.1.8     StrokeThicknessUnit**

Pixel unit. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Polygon](#) [► 518]

**See also**

**Attribute getter:** getStrokeThicknessUnit

The attribute can only be read and therefore has no setter.



Available from 1.8

**5.10.2.30     Polyline**

Open shape formed from a set of interconnected points.

**Attributes**

**Category: Colors**

Name	Description
<a href="#">FillColor</a> [► 524]	Definition of the fill color of the control
<a href="#">StrokeColor</a> [► 525]	Definition of the line color of the control
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Points [► 524]</a>	Definition of the points that describe the polygon. Each point is defined by an x-coordinate and a y-coordinate.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Shape**

Name	Description
<a href="#">StrokeThickness [► 525]</a>	Definition of the line width
<a href="#">StrokeThicknessUnit [► 526]</a>	Selecting the unit of the line width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> </ul>
<a href="#">StrokeStyle [► 525]</a>	Definition of the line style
<a href="#">FillMode [► 524]</a>	Selecting the fill areas: <ul style="list-style-type: none"> <li>• NonZero: All areas that lie within the connecting lines are filled in.</li> <li>• EvenOdd: If a polygon is drawn so that the resulting surfaces overlap, this section is filled in for an odd number of overlapping surfaces and not filled in for an even number.</li> </ul>
<a href="#">ScaleMode [► 525]</a>	Selecting the polygon scaling: <ul style="list-style-type: none"> <li>• None: The polygon is not scaled. The points that do not lie within the control are truncated.</li> <li>• ScaleToFill: The polygon is displayed on the entire size of the control. The proportions of the polygon are not taken into account.</li> <li>• ScaleToFit: The polygon is displayed as large as possible without exceeding the edges of the control. The proportions of the polygon are maintained.</li> <li>• ScaleToFitWidth: The polygon is displayed over the entire width of the control, regardless of whether it exceeds the limits of the control. The proportions of the polygon are maintained.</li> <li>• ScaleToFitHeight: The polygon is displayed over the entire height of the control, regardless of whether it exceeds the limits of the control. The proportions of the polygon are maintained.</li> </ul>

## Events

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

[Polygon \[► 518\]](#)

Polyline

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.748

### See also

API reference for this control

## 5.10.2.31 Radial Gauge

A radial gauge is a radial display in which a value can be displayed by filling in a bar. A start and end value can be defined for this bar. The attribute '[Editable \[► 541\]](#)' can be used to display a slider through which the operator can change the linked value.

### Attributes

#### Category: Colors

Name	Description
<a href="#">ProgressBackgroundColor [► 546]</a>	Definition of the background color of the bar
<a href="#">ProgressForegroundColor [► 546]</a>	Definition of the bar color
<a href="#">GaugeBackground [► 541]</a>	Definition of the color of the round background
<a href="#">ValueColor [► 551]</a>	Definition of the text color of the display of the current value
<a href="#">LabelColor [► 542]</a>	Definition of the text color of the scaling values
<a href="#">UnitColor [► 549]</a>	Definition of the unit color
<a href="#">TickColor [► 549]</a>	Definition of the scaling color
<a href="#">KnobColor [► 542]</a>	Definition of the fill color of the slider
<a href="#">KnobArrowsColor [► 541]</a>	Definition of the outline and arrow color of the slider
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

#### Category: Layout



Name	Description
<a href="#">StartPosition [► 547]</a>	Definition of the start angle of the display
<a href="#">EndPosition [► 541]</a>	Definition of the end angle of the display
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>

Name	Description
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Value [► 551]</a>	Definition of the value to be displayed
<a href="#">Editable [► 541]</a>	Selecting whether the slider should be displayed and therefore whether the linear gauge is editable
<a href="#">BaseAnimationTime [► 540]</a>	Definition of the base animation time in milliseconds. It describes the time of the animation from minimum to maximum value.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Value**

Name	Description
<a href="#">MinValue [► 545]</a>	Defines the smallest value that the control element should graphically display
<a href="#">MaxValue [► 545]</a>	Defines the largest value that the control element should graphically display
<a href="#">Step [► 548]</a>	Definition of the increment for changing the value via the slider
<a href="#">Range [► 546]</a>	Definition of the value range of the color scales
<a href="#">ShowValueText [► 547]</a>	Selecting whether the current value is to be displayed
<a href="#">StartFromZero [► 548]</a>	Selecting whether the minimum value is to be zero irrespective of the 'Minimum Value' attribute.
<a href="#">ValueFontFamily [► 552]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">ValueFontSize [► 552]</a>	Definition of the font size
<a href="#">ValueFontSizeUnit [► 552]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">ValueFontStyle [► 552]</a>	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">ValueFontWeight [► 553]</a>	Selecting the font weight: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>
<a href="#">ValueFormat [► 553]</a>	Definition of a formatting function for the value
<a href="#">ClickAnywhereToEdit [► 540]</a>	Selecting whether the value can be changed by clicking anywhere in the control

**Category: Labels**

Name	Description
<a href="#">ShowLabels [► 547]</a>	Selecting whether the scaling values are to be displayed
<a href="#">LabelPosition [► 544]</a>	Selecting the position of the scaling to the bar: <ul style="list-style-type: none"> <li>• Inside</li> <li>• Outside</li> </ul>
<a href="#">LabelRange [► 545]</a>	Definition of the jump distance between the individual scaling values
<a href="#">LabelFormat [► 544]</a>	Definition of a formatting function for the scaling
<a href="#">LabelFontFamily [► 542]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">LabelFontSize [► 543]</a>	Definition of the font size of the scaling
<a href="#">LabelFontSizeUnit [► 543]</a>	Selecting the unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">LabelFontStyle [► 543]</a>	Selecting the font style of the scaling: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">LabelFontWeight [► 544]</a>	Selecting the font weight of the scaling: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>

**Category: Ticks**

Name	Description
<a href="#">ShowTicks [► 547]</a>	Selecting whether the scaling subdivision is to be displayed
<a href="#">TickDefinition [► 549]</a>	Definition of scale divisions
<a href="#">SubTickPosition [► 548]</a>	Selecting the position of the auxiliary scaling to the bar: <ul style="list-style-type: none"> <li>• Inside</li> <li>• Outside</li> </ul>

**Category: Unit**

Name	Description
<a href="#">Unit [► 540]</a>	Definition of the unit or description of the value
<a href="#">UnitFontFamily [► 549]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">UnitFontSize [► 550]</a>	Definition of the font size of the unit
<a href="#">UnitFontSizeUnit [► 550]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">UnitFontStyle [► 550]</a>	Selecting the font style of the label: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">UnitFontWeight [► 551]</a>	Selecting the font weight: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>

## Events

### Category: Control

Name	Description
<a href="#">onValueChanged [► 555]</a>	The value has been changed.

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onUserInteractionFinished [► 555]</a>	The user has finished the interaction with the control.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Radial Gauge

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.31.1 Attributes****5.10.2.31.1.1 BaseAnimationTime**

The basic animation time in milliseconds. It describes the time of the animation from minimum to maximum value.

**Schema:** tchmi:general#/definitions/UDINT

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getBaseAnimationTime

**Attribute setter:** setBaseAnimationTime



Available from 1.8

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**5.10.2.31.1.2 ClickAnywhereToEdit**

Click anywhere in the control to change the value.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getClickAnywhereToEdit

**Attribute setter:** setClickAnywhereToEdit



Available from 1.8

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**5.10.2.31.1.3 Unit**

The unit or description of the display value.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getUnit

**Attribute setter:** setUnit



Available from 1.8

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#### 5.10.2.31.1.4 Editable

Specifies whether the slider should be displayed.

The appearance of the slider can be changed via Themed Resource of the control.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getEditable

**Attribute setter:** setEditable



Available from 1.8

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#### 5.10.2.31.1.5 EndPosition

The end angle of the display. The value 0 points to the right and 90 points upwards.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getEndPosition

**Attribute setter:** setEndPosition



Available from 1.8

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Also observe the corresponding attribute [StartPosition](#) [► 547].

#### 5.10.2.31.1.6 GaugeBackgroundColor

The color of the round background.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getGaugeBackgroundColor

**Attribute setter:** setGaugeBackgroundColor



Available from 1.8

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#### 5.10.2.31.1.7 KnobArrowsColor

Outline and arrow color of the slider.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getKnobArrowsColor

**Attribute setter:** setKnobArrowsColor

---



Available from 1.8

---

#### 5.10.2.31.1.8 KnobColor

Fill color of the slider.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getKnobColor

**Attribute setter:** setKnobColor

---



Available from 1.8

---

#### 5.10.2.31.1.9 LabelColor

The color of the texts for the scale divisions.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getLabelColor

**Attribute setter:** setLabelColor

---



Available from 1.8

---

#### 5.10.2.31.1.10 LabelFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getLabelFontFamily

**Attribute setter:** setLabelFontFamily



Available from 1.8

---

#### 5.10.2.31.1.11 LabelFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getLabelFontSize

**Attribute setter:** setLabelFontSize

---



Available from 1.8

---

#### 5.10.2.31.1.12 LabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getLabelFontSizeUnit

**Attribute setter:** setLabelFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.31.1.13 LabelFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getLabelFontStyle

**Attribute setter:** setLabelFontStyle

---



Available from 1.8

---

### 5.10.2.31.1.14 LabelFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Radial Gauge](#) ► [532](#)

**See also**

**Attribute getter:** getLabelFontWeight

**Attribute setter:** setLabelFontWeight



Available from 1.8

### 5.10.2.31.1.15 LabelFormat

**Schema:** tchmi:framework#/definitions/Function

The formatting function for the label texts.

It is called for each value in the label.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
LabelFormat(value: number): string;
```

#### Parameter

Name	Type	Description
value	number	The numerical value for the label.

#### Return value

Type	Description
string	The text to be displayed. HTML is not allowed here.

**Origin:** [Radial Gauge](#) ► [532](#)

**See also**

**Attribute getter:** getLabelFormat

**Attribute setter:** setLabelFormat



Available from 1.8

### 5.10.2.31.1.16 LabelPosition

The position of the label texts (inside or outside).

**Schema:** tchmi:framework#/definitions/RadialGaugeLabelPosition

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getLabelPosition

**Attribute setter:** setLabelPosition

---



Available from 1.8

---

#### 5.10.2.31.1.17 LabelRange

The value range between the label texts.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getLabelRange

**Attribute setter:** setLabelRange

---



Available from 1.8

---

#### 5.10.2.31.1.18 MaxValue

The largest value that the control should display graphically.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getMaxValue

**Attribute setter:** setMaxValue

---



Available from 1.8

---

#### 5.10.2.31.1.19 MinValue

The smallest value that the control should display graphically.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getMinValue

**Attribute setter:** setMinValue



Available from 1.8

---

#### 5.10.2.31.1.20 ProgressBackgroundColor

The color to the right of the value.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getProgressBackgroundColor

**Attribute setter:** setProgressBackgroundColor

---



Available from 1.8

---

#### 5.10.2.31.1.21 ProgressForegroundColor

The color to the left of the value.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getProgressForegroundColor

**Attribute setter:** setProgressForegroundColor

---



Available from 1.8

---

#### 5.10.2.31.1.22 Range

The value range of the color scales.

**Schema:** tchmi:framework#/definitions/GaugeRangeDefinitionList

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getRange

**Attribute setter:** setRange

---



Available from 1.8

---

### 5.10.2.31.1.23 ShowLabels

Label texts are either displayed or not.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Radial Gauge](#) ► [532](#)

**See also**

**Attribute getter:** getShowLabels

**Attribute setter:** setShowLabels

---



Available from 1.8

---

### 5.10.2.31.1.24 ShowTicks

Specifies whether main axis markers are to be drawn.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Radial Gauge](#) ► [532](#)

**See also**

**Attribute getter:** getShowTicks

**Attribute setter:** setShowTicks

---



Available from 1.8

---

### 5.10.2.31.1.25 ShowValueText

Either displays the number value or not.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Radial Gauge](#) ► [532](#)

**See also**

**Attribute getter:** getShowValueText

**Attribute setter:** setShowValueText

---



Available from 1.8

---

### 5.10.2.31.1.26 StartPosition

The start angle of the display. The value 0 points to the right and 90 points upwards.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Radial Gauge](#) ► [532](#)

**See also****Attribute getter:** `getStartPosition`**Attribute setter:** `setStartPosition`Available from 1.8

---

Also observe the corresponding attribute [EndPosition](#) [[► 541](#)].

**5.10.2.31.1.27 StartFromZero**

Starts from zero or at the minimum value. This has no effect if the minimum value is equal to or greater than zero.

**Schema:** `tchmi:general#/definitions/Boolean`**Origin:** [Radial Gauge](#) [[► 532](#)]**See also****Attribute getter:** `getStartFromZero`**Attribute setter:** `setStartFromZero`Available from 1.8

---

**5.10.2.31.1.28 Step**

Defines the increment with which the value can be incremented/decremented.

**Schema:** `tchmi:framework#/definitions/PositiveNumber`**Origin:** [Radial Gauge](#) [[► 532](#)]**See also****Attribute getter:** `getStep`**Attribute setter:** `setStep`Available from 1.8

---

**5.10.2.31.1.29 SubTickPosition**

The position (inside or outside) of the secondary to the primary scale divisions.

**Schema:** `tchmi:framework#/definitions/RadialGaugeLabelPosition`**Origin:** [Radial Gauge](#) [[► 532](#)]**See also****Attribute getter:** `getSubTickPosition`**Attribute setter:** `setSubTickPosition`





Available from 1.8

---

### 5.10.2.31.1.30 TickColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Radial Gauge](#) ► [532](#)

**See also**

**Attribute getter:** getTickColor

**Attribute setter:** setTickColor

---



Available from 1.8

---

### 5.10.2.31.1.31 TickDefinition

Describes the scale divisions.

**Schema:** tchmi:framework#/definitions/GaugeTickDefinition

**Origin:** [Radial Gauge](#) ► [532](#)

**See also**

**Attribute getter:** getTickDefinition

**Attribute setter:** setTickDefinition

---



Available from 1.8

---

### 5.10.2.31.1.32 UnitColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Radial Gauge](#) ► [532](#)

**See also**

**Attribute getter:** getUnitColor

**Attribute setter:** setUnitColor

---



Available from 1.8

---

### 5.10.2.31.1.33 UnitFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getUnitFontFamily

**Attribute setter:** setUnitFontFamily

---



Available from 1.8

---

#### 5.10.2.31.1.34 UnitFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getUnitFontSize

**Attribute setter:** setUnitFontSize

---



Available from 1.8

---

#### 5.10.2.31.1.35 UnitFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Radial Gauge](#) [► 532]

**See also**

Attribute getter: getUnitFontSizeUnit

**Attribute setter:** setUnitFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.31.1.36 UnitFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getUnitFontStyle

**Attribute setter:** setUnitFontStyle



Available from 1.8

---

### 5.10.2.31.1.37 UnitFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getUnitFontWeight

**Attribute setter:** setUnitFontWeight

---



Available from 1.8

---

### 5.10.2.31.1.38 Value

The value of the display.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getValue

**Attribute setter:** setValue

---



Available from 1.8

---

### 5.10.2.31.1.39 ValueColor

The color of the display value.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getValueColor

**Attribute setter:** setValueColor

---



Available from 1.8

---

#### 5.10.2.31.1.40 ValueFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Radial Gauge](#) ► [532](#)

**See also**

**Attribute getter:** getValueFontFamily

**Attribute setter:** setValueFontFamily

---



Available from 1.8

---

#### 5.10.2.31.1.41 ValueFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Radial Gauge](#) ► [532](#)

**See also**

**Attribute getter:** getValueFontSize

**Attribute setter:** setValueFontSize

---



Available from 1.8

---

#### 5.10.2.31.1.42 ValueFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Radial Gauge](#) ► [532](#)

**See also**

**Attribute getter:** getValueFontSizeUnit

**Attribute setter:** setValueFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.31.1.43 ValueFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Radial Gauge](#) ► [532](#)

**See also****Attribute getter:** getValueFontStyle**Attribute setter:** setValueFontStyle

Available from 1.8

**5.10.2.31.1.44 ValueFontWeight**

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Radial Gauge ▶ 532](#)**See also****Attribute getter:** getValueFontWeight**Attribute setter:** setValueFontWeight

Available from 1.8

**5.10.2.31.1.45 ValueFormat****Schema:** tchmi:framework#/definitions/Function

The formatting function for the display value.

It is called for each displayed value.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
ValueFormat(value: number): string;
```

**Parameter**

Name	Type	Description
value	number	The current numerical value.

**Return value**

Type	Description
string	The text to be displayed. HTML is not allowed here.

**Origin:** [Radial Gauge ▶ 532](#)**See also****Attribute getter:** getValueFormat**Attribute setter:** setValueFormat



Available from 1.8

---

#### 5.10.2.31.1.46 SetPoint

The setpoint of the display.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getSetPoint

**Attribute setter:** setSetPoint

---



Available from version 1.12.744

---

#### 5.10.2.31.1.47 SetPointMarkerColor

Color of the setpoint marker.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Linear Gauge](#) [► 432]

**See also**

**Attribute getter:** getSetPointMarkerColor

**Attribute setter:** setSetPointMarkerColor

---



Available from version 1.12.744

---

#### 5.10.2.31.1.48 GaugeAlignment

The position of the control.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiRadialGauge.GaugeAlignment

**Origin:** [Radial Gauge](#) [► 532]

**See also**

**Attribute getter:** getGaugeAlignment

**Attribute setter:** setGaugeAlignment

---



Available from version 1.12.744

---

## 5.10.2.31.2 Events

### 5.10.2.31.2.1 onUserInteractionFinished

The user has finished the [interaction \[► 541\]](#) with the control.

Origin: [Radial Gauge \[► 532\]](#)



Available from 1.8

---

### 5.10.2.31.2.2 onValueChanged

The [value \[► 551\]](#) has been changed.

Origin: [Radial Gauge \[► 532\]](#)



Available from 1.8

---

## 5.10.2.31.3 Themed Resources

These resources cannot be defined per instance but only for several/all radial gauges via the theme file. If you really want to change only one instance, you must create a class for it.



Available from version 1.10

---

### 5.10.2.31.3.1 KnobConfig

A different graphic can be selected for the display of the slider.

The path of the image file and the display size of the image must be specified. Furthermore, the offset of the "anchor point" can be defined. This allows the image to be positioned correctly with respect to the value bar.

Note that an SVG file opens its own viewport and therefore the aspect ratio cannot normally be changed.

Partially transparent images in PNG and SVG format are also supported. For pixel graphics (PNG, JPG) please note that the attributes [KnobColor \[► 542\]](#) and [KnobArrowsColor \[► 541\]](#) have no effect. If an SVG is used, the color definition can take effect if the SVG is prepared accordingly.

When loading, the following character substitution is performed in the SVG:

- {KnobColorStroke} is replaced by "stroke:" followed by [KnobColor \[► 542\]](#) as CSS color if [KnobColor \[► 542\]](#) is set, otherwise removed
- {KnobColorFill} is replaced by "fill:" followed by [KnobColor \[► 542\]](#) as CSS color if [KnobColor \[► 542\]](#) is set, otherwise removed
- {KnobColorGradientDefinition} is replaced by a matching SVG `<linearGradient>` element as string if [KnobColor \[► 542\]](#) is a `LinearGradientColor`, otherwise removed
- {KnobArrowsColorStroke} is replaced by "stroke:" followed by [KnobArrowsColor \[► 442\]](#) as CSS color if [KnobArrowsColor \[► 541\]](#) is set, otherwise removed
- {KnobArrowsColorFill} is replaced by "fill:" followed by [KnobArrowsColor \[► 442\]](#) as CSS color if [KnobArrowsColor \[► 541\]](#) is set, otherwise removed

- {KnobArrowsColorGradientDefinition} is replaced by a matching SVG <linearGradient> element as string if [KnobArrowsColor](#) [► 541] is a LinearGradientColor, otherwise removed

### Example SVG

```
<svg xmlns="http://www.w3.org/2000/svg" version="1.1" width="40" height="40">
  <defs>{KnobColorGradientDefinition}</defs>
  <circle r="18px" cx="20px" cy="20px"
    style="stroke-width:3px; {KnobColorFill} {KnobArrowsColorStroke}"></circle>
  <path d="M 18 11 L 16 11 L 7 20 L 16 29 L 18 29 L 18 27 L 11 20 L 18 13 Z"
    style="stroke:none; {KnobArrowsColorFill}"></path>
  <path d="M 22 13 L 24 11 L 33 20 L 24 29 L 22 29 L 22 27 L 29 20 L 22 13 Z"
    style="stroke:none; {KnobArrowsColorFill}"></path>
</svg>
```

**Schema:** tchmi:framework#/definitions/KnobDefinition

**Origin:** [Radial Gauge](#) [► 532]



Available from version 1.10

### 5.10.2.32 Radio button

A radio button has a [RadioState](#) [► 562] parameter. This parameter has the value "Normal" if the radio button is not selected and "Active" if the radio button is selected.

Only one radio button from a [RadioGroup](#) [► 562] can be selected at a time. If you select another radio button from [RadioGroup](#) [► 562], the last button that was selected will be deselected.

The [.onRadioStateChanged](#) [► 566] event can be used to perform actions when the state of the radio button changes.

#### Attributes

**Category:** Colors

Name	Description
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control
<a href="#">RadioStateIconColor</a> [► 563]	Definition of the color of the state marker.
<a href="#">TextColor</a> [► 566]	Definition of the text color.
<a href="#">TextBackgroundColor</a> [► 566]	Definition of the text background color.

**Category:** Layout



Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">StateSymbol [► 562]</a>	Reflects the state of the RadioButton for the assigned symbol and vice versa.
<a href="#">RadioState [► 562]</a>	Definition of the internal switching state of the control
<a href="#">RadioGroup [► 562]</a>	User-defined name for a group. Only one radio button in this group can be active.
<a href="#">Text [► 563]</a>	The text to be displayed next to the radio button.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">TextPosition [► 563]</a>	The text position.
<a href="#">TextHorizontalAlignment [► 563]</a>	The horizontal alignment of the text.
<a href="#">TextVerticalAlignment [► 564]</a>	The vertical alignment of the text.
<a href="#">TextFontFamily [► 564]</a>	Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.
<a href="#">TextFontSize [► 564]</a>	The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.
<a href="#">TextFontSizeUnit [► 565]</a>	Pixels, or percent for relative sizes.
<a href="#">TextFontStyle [► 565]</a>	Font style (normal, italic: oblique with special characters, oblique)
<a href="#">TextFontWeight [► 565]</a>	The font weight (normal, bold)

## Events

### Category: Control

Name	Description
<a href="#">onToggleStateChanged [► 198]</a>	The ToggleState value of the checkbox has changed.
<a href="#">onStateChanged [► 198]</a>	The status of the checkbox has changed.

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Radio Button

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12

**See also**

API reference for this control

**5.10.2.32.1 Attributes****5.10.2.32.1.1 StateSymbol**

Reflects the state of the radio button for the assigned symbol and vice versa.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiRadioButton.StateSymbol

**Origin:** [Radio Button](#) [► 556]

**See also**

**Attribute getter:** getStateSymbol

**Attribute setter:** setStateSymbol



Available from version 1.12

---

**5.10.2.32.1.2 RadioState**

Internal state of the control. This can be Normal or Active.

**Schema:** tchmi:framework#/definitions/ToggleState

**Origin:** [Radio Button](#) [► 556]

**See also**

**Attribute getter:** getRadioState

**Attribute setter:** setRadioState



Available from version 1.12

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**5.10.2.32.1.3 RadioGroup**

User-defined name for a group. Only one control in this group can be active.

A RadioGroup can only consist of controls of type [Radio Button](#) [► 556].

**Schema:** tchmi:general#/definitions/String

**Origin:** [Radio Button](#) [► 556]

**See also**

**Attribute getter:** getRadioGroup

**Attribute setter:** setRadioGroup



Available from version 1.12

---

#### 5.10.2.32.1.4 RadioStatelconColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Radio Button](#) [► 556]

**See also**

**Attribute getter:** getRadioStatelconColor

**Attribute setter:** setRadioStatelconColor

---



Available from version 1.12

---

#### 5.10.2.32.1.5 Text

The text to be displayed next to the radio button.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Radio Button](#) [► 556]

**See also**

**Attribute getter:** getText

**Attribute setter:** setText

---



Available from version 1.12

---

#### 5.10.2.32.1.6 TextPosition

The text position.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiRadioButton.TextPosition

**Origin:** [Radio Button](#) [► 556]

**See also**

**Attribute getter:** getTextPosition

**Attribute setter:** setTextPosition

---



Available from version 1.12

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#### 5.10.2.32.1.7 TextHorizontalAlignment

The horizontal alignment of the text.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Radio Button](#) [► 556]

**See also****Attribute getter:** getTextHorizontalAlignment**Attribute setter:** setTextHorizontalAlignmentAvailable from version 1.12

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**5.10.2.32.1.8 TextVerticalAlignment**

The vertical alignment of the text.

**Schema:** tchmi:framework#/definitions/VerticalAlignment**Origin:** [Radio Button](#) [► 556]**See also****Attribute getter:** getTextVerticalAlignment**Attribute setter:** setTextVerticalAlignmentAvailable from version 1.12

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**5.10.2.32.1.9 TextFontFamily**

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily**Origin:** [Radio Button](#) [► 556]**See also****Attribute getter:** getTextFontFamily**Attribute setter:** setTextFontFamilyAvailable from version 1.12

---

**5.10.2.32.1.10 TextFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue**Origin:** [Radio Button](#) [► 556]**See also****Attribute getter:** getTextFontSize**Attribute setter:** setTextFontSize





Available from version 1.12

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#### 5.10.2.32.1.11 TextFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Radio Button](#) [► 556]

**See also**

**Attribute getter:** getTextFontSizeUnit

**Attribute setter:** setTextFontSizeUnit

---



Available from version 1.12

---

#### 5.10.2.32.1.12 TextFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Radio Button](#) [► 556]

**See also**

**Attribute getter:** getTextFontStyle

**Attribute setter:** setTextFontStyle

---



Available from version 1.12

---

#### 5.10.2.32.1.13 TextFontWeight

The font weight (normal, bold)

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Radio Button](#) [► 556]

**See also**

**Attribute getter:** getTextFontWeight

**Attribute setter:** setTextFontWeight

---



Available from version 1.12

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#### 5.10.2.32.1.14 TextColor

Definition of the text color.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Radio Button](#) [► 556]

**See also**

**Attribute getter:** getTextColor

**Attribute setter:** setTextColor

---



Available from version 1.12

---

#### 5.10.2.32.1.15 TextBackgroundColor

Definition of the text background color.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Radio Button](#) [► 556]

**See also**

**Attribute getter:** getTextBackgroundColor

**Attribute setter:** setTextBackgroundColor

---



Available from version 1.12

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### 5.10.2.32.2 Events

#### 5.10.2.32.2.1 onRadioStateChanged

The [RadioState](#) [► 562] value of the radio button has changed.

**Origin:** [Radio Button](#) [► 556]

---



Available from version 1.12

---

#### 5.10.2.32.2.2 onStateChanged

The state has changed.

**Origin:** [Radio Button](#) [► 556]

---



Available from version 1.12

---

### 5.10.2.33 Recipe Select

The Recipe Select control allows you to browse, select, activate and teach recipes from the Recipe Management Extension on the server.

#### Attributes

##### Category: Colors

Name	Description
BackgroundColor [ <a href="#">▶ 769</a> ]	Definition of the background color
BorderColor [ <a href="#">▶ 768</a> ]	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow

**Category: Common**

Name	Description
<a href="#">ServerDomain [► 572]</a>	The domain of the recipe management extension on the server. Default setting: TcHmiRecipeManagement
<a href="#">ServerInterval [► 572]</a>	Interval time to be used for server subscriptions. Default setting: 1000
<a href="#">SelectedRecipeFullName [► 573]</a>	The complete name including the path of the currently selected recipe.
<a href="#">SelectedRecipeName [► 573]</a>	The name of the currently selected recipe.
<a href="#">SelectedRecipePath [► 573]</a>	The path of the currently selected recipe.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Control**

Name	Description
<a href="#">onLoad [► 368]</a>	The image was loaded successfully.
<a href="#">onError [► 368]</a>	The image was not loaded successfully.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally observable.
<a href="#">operate</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally operable.
<a href="#">activateRecipe</a> [ <a href="#">► 574</a> ]	Specifies whether the current user can activate a selected recipe.
<a href="#">teachRecipe</a> [ <a href="#">► 574</a> ]	Specifies whether the current user can teach a selected recipe.

**Inheritance hierarchy**Control [[► 753](#)]

Recipe Select

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)

NuGet packages are available from version 1.12.



Available from version 1.12

**See also**

API reference for this control

**5.10.2.33.1 Attributes****5.10.2.33.1.1 ServerDomain**

The domain of the recipe management extension on the server.

Default setting: TcHmiRecipeManagement

**Schema:** tchmi:general#/definitions/String**Origin:** [Recipe Select](#) [[► 567](#)]**See also****Attribute getter:** getServerDomain**Attribute setter:** setServerDomain

Available from version 1.12

**5.10.2.33.1.2 ServerInterval**

Interval time to be used for server subscriptions.

Default setting: 1000

**Schema:** tchmi:general#/definitions/Number



**Origin:** [Recipe Select](#) [► 567]

**See also**

**Attribute getter:** getServerInterval

**Attribute setter:** setServerInterval



Available from version 1.12

---

#### 5.10.2.33.1.3 SelectedRecipeFullName

The complete name including the path of the currently selected recipe.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Recipe Select](#) [► 567]

**See also**

**Attribute getter:** getSelectedRecipeFullName

This attribute is read-only, so it has no setter.



Available from version 1.12

---

#### 5.10.2.33.1.4 SelectedRecipeName

The name of the currently selected recipe.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Recipe Select](#) [► 567]

**See also**

**Attribute getter:** getSelectedRecipeName

This attribute is read-only, so it has no setter.



Available from version 1.12

---

#### 5.10.2.33.1.5 SelectedRecipePath

The path of the currently selected recipe.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Recipe Select](#) [► 567]

**See also**

**Attribute getter:** getSelectedRecipePath

This attribute is read-only, so it has no setter.



Available from version 1.12

## 5.10.2.33.2 Permissions

### 5.10.2.33.2.1 activateRecipe

Specifies whether the current user can activate a selected recipe.

If this right is missing, the Activate button is disabled.

**Origin:** [Recipe Select](#) [► 567]

#### See also

See also [User management at control level](#) [► 969].



Available from version 1.12

### 5.10.2.33.2.2 teachRecipe

Specifies whether the current user can teach a selected recipe.

If this right is missing, the Teach button is disabled.

**Origin:** [Recipe Select](#) [► 567]

#### See also

See also [User management at control level](#) [► 969].



Available from version 1.12

## 5.10.2.34 Rectangle

A rectangular object.

#### Attributes

##### Category: Colors

Name	Description
<a href="#">FillColor</a> [► 581]	Definition of the fill color of the control
<a href="#">StrokeColor</a> [► 581]	Definition of the line color
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Shape**

Name	Description
<a href="#">StrokeThickness [► 582]</a>	Definition of the line width
<a href="#">StrokeThicknessUnit [► 582]</a>	Selecting the unit of the line width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> </ul>
<a href="#">StrokeStyle [► 582]</a>	Definition of the line style
<a href="#">RadiusX [► 580]</a>	Definition of the x-axis radius of the ellipse used to round the corners of the rectangle
<a href="#">RadiusXUnit [► 580]</a>	Selecting the unit of the x-axis radius: <ul style="list-style-type: none"> <li>• Pixel for an absolute radius</li> </ul>
<a href="#">RadiusY [► 580]</a>	Definition of the y-axis radius of the ellipse used to round the corners of the rectangle
<a href="#">RadiusYUnit [► 581]</a>	Selecting the unit of the y-axis radius: <ul style="list-style-type: none"> <li>• Pixel for an absolute radius</li> </ul>

## Events

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Rectangle

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.34.1 Attributes****5.10.2.34.1.1 RadiusX**

Definition of the x-axis radius of the ellipse used to round the corners of the rectangle.

If a value is given for radius X but not for radius Y (or vice versa), this value applies to radius X and radius Y.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Rectangle](#) [► 574]

**See also**

**Attribute getter:** getRadiusX

**Attribute setter:** setRadiusX



Available from 1.8

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**5.10.2.34.1.2 RadiusXUnit**

Pixel unit. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Rectangle](#) [► 574]

**See also**

**Attribute getter:** getRadiusXUnit

The attribute can only be read and therefore has no setter.



Available from 1.8

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**5.10.2.34.1.3 RadiusY**

Definition of the y-axis radius of the ellipse used to round the corners of the rectangle.

If a value is given for radius X but not for radius Y (or vice versa), this value applies to radius X and radius Y.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Rectangle](#) [► 574]

**See also**

**Attribute getter:** getRadiusY

**Attribute setter:** setRadiusY





Available from 1.8

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#### 5.10.2.34.1.4 RadiusYUnit

Pixel unit. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Rectangle](#) [[► 574](#)]

**See also**

**Attribute getter:** getRadiusYUnit

The attribute can only be read and therefore has no setter.

---



Available from 1.8

---

#### 5.10.2.34.1.5 FillColor

Defines the fill color of the control.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Rectangle](#) [[► 574](#)]

**See also**

**Attribute getter:** getFillColor

**Attribute setter:** setFillColor

---



Available from 1.8

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#### 5.10.2.34.1.6 StrokeColor

Defines the stroke color of the control.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Rectangle](#) [[► 574](#)]

**See also**

**Attribute getter:** getStrokeColor

**Attribute setter:** setStrokeColor

---



Available from 1.8

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### 5.10.2.34.1.7 StrokeStyle

Definition of the stroke style. Comma or space-separated list of numbers that specify the length of strokes and spaces. If an odd number is specified, the list is repeated once. Example: "5, 3, 2" is equivalent to "5, 3, 2, 5, 3, 2".

**Schema:** tchmi:general#/definitions/String

**Origin:** [Rectangle](#) [► 574]

**See also**

**Attribute getter:** getStrokeStyle

**Attribute setter:** setStrokeStyle



Available from 1.8

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### 5.10.2.34.1.8 StrokeThickness

Defines the stroke thickness of the control in pixels.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Rectangle](#) [► 574]

**See also**

**Attribute getter:** getStrokeThickness

**Attribute setter:** setStrokeThickness



Available from 1.8

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### 5.10.2.34.1.9 StrokeThicknessUnit

Pixel unit. At this point, only pixels can be used as a unit.

**Schema:** tchmi:framework#/definitions/PixelUnit

**Origin:** [Rectangle](#) [► 574]

**See also**

**Attribute getter:** getStrokeThicknessUnit

The attribute can only be read and therefore has no setter.



Available from 1.8

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## 5.10.2.35 ScopeControl

Scope recordings can be started, stopped and analyzed with the Scope control.

**Attributes**

**Category: Colors**

Name	Description
BackgroundColor [ <a href="#">▶ 769</a> ]	Definition of the background color
BorderColor [ <a href="#">▶ 768</a> ]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">ScopeConfig</a> [► 590]	Definition of the Scopeconfig with the config name and the chart name.
<a href="#">ServerInterval</a> [► 590]	Definition of the update rate of the data from the scope extension.
<a href="#">EnabledRecordControls</a> [► 590]	Selecting whether the start/stop record buttons should be displayed.
<a href="#">ChartColorSource</a> [► 591]	Selection of the display mode of the scope diagram: <ul style="list-style-type: none"> <li>• ScopeConfig: Uses the colors from the scope config.</li> <li>• Theme: uses the theme colors.</li> </ul>
<a href="#">ServerDomain</a> [► 590]	Definition of the server extension name.
<a href="#">ShowTriggerWindow</a>	Definition of whether the trigger window should be displayed.
<a href="#">TriggerWindowPosition</a> [► 591]	Definition of where the trigger window should be displayed. <ul style="list-style-type: none"> <li>• Top</li> <li>• Bottom</li> <li>• Right</li> <li>• Left</li> </ul>
<a href="#">IsEnabled</a> [► 759]	Selection of whether a control should be activated
<a href="#">Id</a> [► 759]	Definition of the name of the control
<a href="#">Type</a> [► 776]	Type name of the control
<a href="#">ClassNames</a> [► 759]	Definition of control classes
<a href="#">IsAttached</a> [► 760]	If a control is logically assigned in the DOM.
<a href="#">Tooltip</a> [► 775]	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius</a> [► 769]	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle</a> [► 769]	Selection of the border style of the four sides of the control
<a href="#">BorderWidth</a> [► 768]	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

## Events

### Category: Control

Name	Description
<a href="#">onLoadedData [► 140]</a>	The audio file was loaded successfully.
<a href="#">onError [► 140]</a>	The audio file was not loaded successfully.
<a href="#">onVolumeChange [► 141]</a>	The volume of the audio file has been changed.
<a href="#">onDurationChange [► 141]</a>	The duration of the audio file has changed.
<a href="#">onIsEndedChange [► 141]</a>	The audio file has been terminated.
<a href="#">onIsPlayingChange [► 141]</a>	The audio file has changed its playback status.
<a href="#">onTimeUpdate [► 141]</a>	The playback position has been changed.

### Category: Framework

<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.



## Functions

Name	Origin	Description
<a href="#">startRecord [► 592]</a>	TcHmiScopeControl	Starting a scope recording
<a href="#">stopRecord [► 592]</a>	TcHmiScopeControl	Stopping a scope recording
<a href="#">startDisplay [► 592]</a>	TcHmiScopeControl	Starts calling up the live data from the scope recording.
<a href="#">stopDisplay [► 592]</a>	TcHmiScopeControl	Stops calling up the live data from the scope recording.
<a href="#">zoomToDefault [► 592]</a>	TcHmiScopeControl	Sets the image region to the default value.
<a href="#">zoomOutMax [► 593]</a>	TcHmiScopeControl	Sets the image region to the largest possible.
<a href="#">goTo [► 593]</a>	TcHmiScopeControl	Sets the image region start time to the selected timespan from the recording start time.
<a href="#">setDisplayWidth [► 593]</a>	TcHmiScopeControl	Sets the image region to the desired section.
<a href="#">scroll [► 593]</a>	TcHmiScopeControl	Scrolls the image region forward or backward.
<a href="#">scrollBig [► 594]</a>	TcHmiScopeControl	Scrolls the image region forward or backward by one full page.
<a href="#">undo [► 594]</a>	TcHmiScopeControl	Undoes the last action.
<a href="#">redo [► 594]</a>	TcHmiScopeControl	Restores the last action.
<a href="#">setOverviewMode [► 594]</a>	TcHmiScopeControl	Switches the overview on/off.
<a href="#">setMouseMode [► 595]</a>	TcHmiScopeControl	Sets the mouse mode for the interactions.
<a href="#">getMouseMode [► 594]</a>	TcHmiScopeControl	Queries the mouse mode.

## Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

## Inheritance hierarchy

[Control \[► 753\]](#)

Scope Control

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.748

## See also

API reference for this control

### 5.10.2.35.1 Attributes

#### 5.10.2.35.1.1 ScopeConfig

Defines the chart in a configuration that is displayed and for which a recording is to be started.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiScopeControl.Config

**Origin:** [ScopeControl](#) [► 582]

**See also**

**Attribute getter:** getScopeConfig

**Attribute setter:** setScopeConfig



Available from version 1.12.748

---

#### 5.10.2.35.1.2 ServerInterval

Definition of the interval at which the data is updated with the scope extension.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [ScopeControl](#) [► 582]

**See also**

**Attribute getter:** getServerInterval

**Attribute setter:** setServerInterval



Available from version 1.12.748

---

#### 5.10.2.35.1.3 ServerDomain

Definition of the server extension name.

**Schema:** tchmi:general#/definitions/String

**Origin:** [ScopeControl](#) [► 582]

**See also**

**Attribute getter:** getServerDomain

**Attribute setter:** setServerDomain



Available from version 1.12.748

---

#### 5.10.2.35.1.4 EnabledRecordControls

Selecting whether the Start/StopRecord buttons should be displayed.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [ScopeControl](#) [► 582]

**See also**

**Attribute getter:** getEnableRecordControls

**Attribute setter:** setEnableRecordControls



Available from version 1.12.748

---

#### 5.10.2.35.1.5 ChartColorSource

Defines whether the colors from ScopeConfig or the theme colors are to be used.

- ScopeConfig: Uses the specified colors from the ScopeConfig.
- Theme: Uses the theme colors.

**Schema:** tchmi:framework#/TcHmi.Controls.Beckhoff.TcHmiScopeControl.ChartColorSource

**Origin:** [ScopeControl](#) [► 582]

**See also**

**Attribute getter:** getChartColorSource

**Attribute setter:** setChartColorSource



Available from version 1.12.748

---

#### 5.10.2.35.1.6 TriggerWindowPosition

Defines where the trigger window should be displayed.

- Top
- Bottom
- Right
- Left

**Schema:** tchmi:framework#/TcHmi.Controls.Beckhoff.TcHmiScopeControl.TriggerWindowPosition

**Origin:** [ScopeControl](#) [► 582]

**See also**

**Attribute getter:** getTriggerWindowPosition

**Attribute setter:** setTriggerWindowPosition



Available from version 1.12.754

---

## 5.10.2.35.2 Functions

### 5.10.2.35.2.1 startRecord

Starts a scope recording.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.748

---

### 5.10.2.35.2.2 stopRecord

Stops a scope recording.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.748

---

### 5.10.2.35.2.3 startDisplay

Starts calling up the live data from the scope recording.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.748

---

### 5.10.2.35.2.4 stopDisplay

Stops calling up the live data from the scope recording.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.748

---

### 5.10.2.35.2.5 zoomToDefault

Sets the image region to the default value.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]



Available from version 1.12.748

---

#### 5.10.2.35.2.6 zoomOutMax

Sets the image region to the largest possible.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.748

---

#### 5.10.2.35.2.7 goTo

Sets the image region start time to the selected timespan from the recording start time.

**Parameter:**

- valueNew: Timespan in scope format.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.744

---

#### 5.10.2.35.2.8 setDisplayWidth

Sets the image region to the desired section.

**Parameter:**

- valueNew: Timespan in scope format.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.744

---

#### 5.10.2.35.2.9 scroll

Scrolls the image region forward or backward.

**Parameter:**

- valueNew: Direction (Forward, Reserve) as string.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.744

---

#### 5.10.2.35.2.10 scrollBig

Scrolls the image region forward or backward by one full page.

**Parameter:**

- valueNew: Direction (Forward, Reserve) as string.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.744

---

#### 5.10.2.35.2.11 undo

Undoes the last action.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.748

---

#### 5.10.2.35.2.12 redo

Restores the last action.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.748

---

#### 5.10.2.35.2.13 setOverviewMode

Switches the overview on/off.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.748

---

#### 5.10.2.35.2.14 getMouseMode

Sets the mouse mode for the interactions.

**Return value:** MouseMode (ZoomX, ZoomXY, PanX, PanXY) as string

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.744

---

#### 5.10.2.35.2.15 setMouseMode

Sets the mouse mode for the interactions.

**Parameter:**

- valueNew: Mousemode (ZoomX, ZoomXY, PanX, PanXY) as string.

**Return value:** null

**Origin:** [ScopeControl](#) [► 582]

---



Available from version 1.12.744

---

#### 5.10.2.35.3 Themed Resources

These resources cannot be defined per instance, but only for several/all scope controls via the [theme file](#) [► 1011]. If you really want to change only one instance, you must create a [class](#) [► 1008] for it.

---



Available from version 1.12.748

---

#### 5.10.2.35.3.1 ChartBackgroundColor

This is the color used for the chart background if theme is defined in the attribute [ChartColorSource](#) [► 591].

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Scope Control](#) [► 582]

---



Available from version 1.12.748

---

#### 5.10.2.35.3.2 ChartForegroundColor

This is the color used for the chart foreground (e.g. the chart heading) if theme is defined in the attribute [ChartColorSource](#) [► 591].

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Scope Control](#) [► 582]

---

#### 5.10.2.35.3.3 OverviewBackgroundColor

This is the color used for the overview background if theme is defined in the attribute [ChartColorSource](#) [► 591].

**Schema:** tchmi:framework#/definitions/Color

---

**Origin:** [Scope Control](#) [► 582]

---



Available from version 1.12.748

---

#### 5.10.2.35.3.4 OverviewForegroundColor

This is the color used for the overview foreground (lines, font color, etc.) if theme is defined in the attribute [ChartColorSource](#) [► 591].

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Scope Control](#) [► 582]

---



Available from version 1.12.748

---

#### 5.10.2.35.3.5 CanvasBackgroundColor

This is the color used for the canvas background if theme is defined in the attribute [ChartColorSource](#) [► 591].

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Scope Control](#) [► 582]

---



Available from version 1.12.748

---

#### 5.10.2.35.3.6 AxisColor

This is the color used for the axes including the axis labels and axis name if theme is defined in the attribute [ChartColorSource](#) [► 591].

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Scope Control](#) [► 582]

---



Available from version 1.12.748

---

#### 5.10.2.35.3.7 GridColor

This is the color used for the gridlines if theme is defined in the attribute [ChartColorSource](#) [► 591].

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Scope Control](#) [► 582]

---



Available from version 1.12.748

---

### 5.10.2.36 Spinbox Input

An input element for numerical values with buttons for increasing and decreasing the value.



**Attributes****Category: Colors**

Name	Description
<a href="#">BackColor</a> [ <a href="#">► 769</a> ]	Definition of the background color
<a href="#">BorderColor</a> [ <a href="#">► 768</a> ]	Definition of the border color of the control
<a href="#">ValueColor</a> [ <a href="#">► 477</a> ]	Definition of the text color

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Value [► 477]</a>	Definition of the value
<a href="#">MinValue [► 478]</a>	Definition of the minimum value
<a href="#">MaxValue [► 478]</a>	Definition of the maximum value
<a href="#">DecimalDigits [► 478]</a>	Number of decimal places
<a href="#">AutoFocusOut [► 481]</a>	Determines whether the control automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.
<a href="#">AutoSelectText [► 481]</a>	Determines whether the entire text is automatically selected when it is focused.
<a href="#">ResetToLastValidValue [► 482]</a>	Determines whether the value is reset to the last valid value when focus is lost.
<a href="#">Step [► 603]</a>	Defines the increment with which the value can be incremented/decremented.
<a href="#">ButtonPosition [► 603]</a>	The position of the spinbox buttons relative to the display.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage</a> [► 770]	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight</a> [► 771]	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit</a> [► 771]	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth</a> [► 770]	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit</a> [► 770]	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding</a> [► 771]	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment</a> [► 772]	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment</a> [► 771]	Definition of the horizontal alignment of the background image within the control

**Category: Value**

Name	Description
<a href="#">ValueFontFamily</a> [► 479]	Definition of the font using the name of the font family or the keyword
<a href="#">ValueFontSize</a> [► 479]	Definition of the font size
<a href="#">ValueFontSizeUnit</a> [► 479]	Definition of the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">ValueFontStyle</a> [► 479]	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">ValueFontWeight</a> [► 480]	Selecting the font weight of the text: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">ContentPadding</a> [► 480]	Definition of the distance of the text to the border
<a href="#">ValueHorizontalAlignment</a> [► 480]	Selecting the horizontal alignment of the text
<a href="#">Placeholder</a> [► 481]	Definition of the placeholder, which is displayed if no value is entered.

**Events****Category: Control**

Name	Description
<a href="#">onValueChanged</a> [► 482]	The value has been changed.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onUserInteractionFinished [► 482]</a>	The user has finished the interaction with the control.
<a href="#">onFocusIn [► 482]</a>	The control now has the focus.
<a href="#">onFocusOut [► 482]</a>	The control has lost focus.
<a href="#">onUserInteractionCanceled [► 483]</a>	The user has terminated the interaction with the control element.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally observable.
<a href="#">operate</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control](#) [[► 753](#)]

[NumericInput](#) [[► 471](#)]

SpinboxInput

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.744

**See also**

API reference for this control

**5.10.2.36.1 Attribute****5.10.2.36.1.1 Step**

Defines the increment with which the value can be incremented/decremented.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Spinbox Input](#) [[► 596](#)]

**See also**

**Attribute getter:** getStep

**Attribute setter:** setStep



Available from version 1.12.744

**5.10.2.36.1.2 ButtonPosition**

The position of the spinbox buttons relative to the display.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiSpinboxInput.ButtonPosition

**Origin:** [Spinbox Input](#) [[► 596](#)]

**See also**

**Attribute getter:** getButtonPosition

**Attribute setter:** setButtonPosition



Available from version 1.12.744

### 5.10.2.37 State Image

A state control is an image display in which different image files from the project path can be displayed depending on the state of an assigned variable.

The supported image formats are defined by the browser used.

#### Attributes

##### Category: Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

##### Category: Layout



Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">State [► 609]</a>	Definition of the symbol that is queried
<a href="#">StateList [► 609]</a>	List of assignments of images to values of the state symbol
<a href="#">FallbackImage [► 610]</a>	Image that is accessed if the state is not defined in the StateList or if no image is assigned to the current value of the state symbol in the StateList
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control \[► 753\]](#)

StateImage

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)

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NuGet packages are available from version 1.12.

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Available from version 1.12.744

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#### See also

API reference for this control

### 5.10.2.37.1 Attributes

#### 5.10.2.37.1.1 State

Definition of the state symbol that is queried.

**Schema:** tchmi:general#/definitions/Any

**Origin:** [State Image](#) [► 604]

#### See also

**Attribute getter:** getState

**Attribute setter:** setState

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Available from version 1.12.744

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#### 5.10.2.37.1.2 StateList

List of assignments of images to values of the state symbol.

By engineering, a list of assignments can be created so that a certain image is displayed for a certain value of the state symbol.

Each element of the StateList consists of these components:

- **Value:** Value that the state symbol can assume.
- **Icon:** The address of the image displayed in the StateImage control. Images on other servers are also possible.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiStateImage.StateList

**Origin:** [State Image](#) [► 604]

#### See also

**Attribute getter:** getStateList

**Attribute setter:** setStateList



Available from version 1.12.744

### 5.10.2.37.1.3 FallbackImage

Image that is accessed if the state is not defined in the StateList or if no image is assigned to the current value of the state symbol in the StateList.

**Schema:** tchmi:framework#/definitions/Path

**Origin:** [State Image](#) [► 604]

**See also**

**Attribute getter:** getFallbackImage

**Attribute setter:** setFallbackImage



Available from version 1.12.744

### 5.10.2.38 Tachometer

A tachometer is a radial indicator that displays a value on a scale using a tachometer needle.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">GaugeBackgroundColor</a> [► 618]	Definition of the color of the round background
<a href="#">ValueColor</a> [► 627]	Definition of the text color of the display of the current value
<a href="#">LabelColor</a> [► 619]	Definition of the text color of the scaling values
<a href="#">UnitColor</a> [► 624]	Definition of the unit color
<a href="#">TickColor</a> [► 624]	Definition of the scaling color
<a href="#">NeedleColor</a> [► 618]	Definition of the color of the tachometer needle
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">StartPosition [► 623]</a>	Definition of the start angle of the display
<a href="#">EndPosition [► 617]</a>	Definition of the end angle of the display
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>

Name	Description
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**



Name	Description
<a href="#">Value [► 626]</a>	Definition of the value to be displayed
<a href="#">MinValue [► 622]</a>	Defines the smallest value that the control element should graphically display
<a href="#">MaxValue [► 622]</a>	Defines the largest value that the control element should graphically display
<a href="#">NeedleLength [► 618]</a>	The length of the tachometer needle as a percentage of the radius of the control.
<a href="#">BaseAnimationTime [► 617]</a>	Definition of the basic animation time in milliseconds. It describes the time of the animation from minimum to maximum value.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Value**

Name	Description
<a href="#">Range [► 622]</a>	Definition of the value range of the color scales
<a href="#">ShowValueText [► 623]</a>	Selecting whether the current value is to be displayed
<a href="#">ValueFontFamily [► 627]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">ValueFontSize [► 627]</a>	Definition of the font size
<a href="#">ValueFontSizeUnit [► 627]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">ValueFontStyle [► 628]</a>	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">ValueFontWeight [► 628]</a>	Selecting the font weight: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">ValueFormat [► 628]</a>	Definition of a formatting function for the value

**Category: Labels**

Name	Description
<a href="#">ShowLabels [► 622]</a>	Selecting whether the scaling values are to be displayed
<a href="#">LabelPosition [► 621]</a>	Selecting the position of the scaling to the bar: <ul style="list-style-type: none"> <li>• Inside</li> <li>• Outside</li> </ul>
<a href="#">LabelRange [► 621]</a>	Definition of the jump distance between the individual scaling values
<a href="#">LabelFormat [► 620]</a>	Definition of a formatting function for the scaling
<a href="#">LabelFontFamily [► 619]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">LabelFontSize [► 619]</a>	Definition of the font size of the scaling
<a href="#">LabelFontSizeUnit [► 619]</a>	Selecting the unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">LabelFontStyle [► 620]</a>	Selecting the font style of the scaling: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">LabelFontWeight [► 620]</a>	Selecting the font weight of the scaling: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>

**Category: Ticks**

Name	Description
ShowTicks [ <a href="#">▶ 623</a> ]	Selecting whether the scaling subdivision is to be displayed
TickDefinition [ <a href="#">▶ 624</a> ]	Definition of scale divisions
SubTickPosition [ <a href="#">▶ 624</a> ]	Selecting the position of the auxiliary scaling to the bar: <ul style="list-style-type: none"> <li>• Inside</li> <li>• Outside</li> </ul>

**Category: Unit**

Name	Description
Unit [ <a href="#">▶ 617</a> ]	Definition of the unit or description of the value
UnitFontFamily [ <a href="#">▶ 625</a> ]	Definition of the font using the name of the font family or the keyword
UnitFontSize [ <a href="#">▶ 625</a> ]	Definition of the font size of the unit
UnitFontSizeUnit [ <a href="#">▶ 625</a> ]	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
UnitFontStyle [ <a href="#">▶ 626</a> ]	Selecting the font style of the label: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
UnitFontWeight [ <a href="#">▶ 626</a> ]	Selecting the font weight: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>

**Events****Category: Control**

Name	Description
onValueChanged [ <a href="#">▶ 629</a> ]	The value has been changed.

**Category: Framework**

Name	Description
onAttached [ <a href="#">▶ 778</a> ]	The control was added to the display.
onDetached [ <a href="#">▶ 778</a> ]	The control was removed from the display.
onInitialized [ <a href="#">▶ 778</a> ]	The control was initialized.
onDestroyed [ <a href="#">▶ 778</a> ]	The control was destroyed.
onMoved [ <a href="#">▶ 781</a> ]	The control was moved in relation to the browser window.
onResized [ <a href="#">▶ 782</a> ]	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onUserInteractionFinished [► 555]</a>	The user has finished the interaction with the control.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Tachometer

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.744

**See also**

API reference for this control

**5.10.2.38.1 Attributes****5.10.2.38.1.1 BaseAnimationTime**

The basic animation time in milliseconds. It describes the time of the animation from minimum to maximum value.

**Schema:** tchmi:general#/definitions/UDINT

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getBaseAnimationTime

**Attribute setter:** setBaseAnimationTime



Available from version 1.12.744

---

**5.10.2.38.1.2 Unit**

The unit or description of the display value.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getUnit

**Attribute setter:** setUnit



Available from version 1.12.744

---

**5.10.2.38.1.3 EndPosition**

The end angle of the display. The value 0 points to the right and 90 points upwards.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getEndPosition

**Attribute setter:** setEndPosition

Also observe the corresponding attribute [StartPosition](#) [► 623].



Available from version 1.12.744

---

#### 5.10.2.38.1.4 GaugeBackgroundColor

The color of the round background.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getGaugeBackgroundColor

**Attribute setter:** setGaugeBackgroundColor

---



Available from version 1.12.744

---

#### 5.10.2.38.1.5 NeedleColor

Color of the tachometer needle.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getNeedleColor

**Attribute setter:** setNeedleColor

---



Available from version 1.12.744

---

#### 5.10.2.38.1.6 NeedleLength

The length of the tachometer needle as a percentage of the radius of the control.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getNeedleLength

**Attribute setter:** setNeedleLength

---



Available from version 1.12.744

---

#### 5.10.2.38.1.7 LabelColor

The color of the texts for the scale divisions.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getLabelColor

**Attribute setter:** setLabelColor

---



Available from version 1.12.744

---

#### 5.10.2.38.1.8 LabelFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getLabelFontFamily

**Attribute setter:** setLabelFontFamily

---



Available from version 1.12.744

---

#### 5.10.2.38.1.9 LabelFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getLabelFontSize

**Attribute setter:** setLabelFontSize

---



Available from version 1.12.744

---

#### 5.10.2.38.1.10 LabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Tachometer](#) [► 610]

**See also****Attribute getter:** getLabelFontSizeUnit**Attribute setter:** setLabelFontSizeUnitAvailable from version 1.12.744

---

**5.10.2.38.1.11 LabelFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Tachometer](#) [► 610]**See also****Attribute getter:** getLabelFontStyle**Attribute setter:** setLabelFontStyleAvailable from version 1.12.744

---

**5.10.2.38.1.12 LabelFontWeight**

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Tachometer](#) [► 610]**See also****Attribute getter:** getLabelFontWeight**Attribute setter:** setLabelFontWeightAvailable from version 1.12.744

---

**5.10.2.38.1.13 LabelFormat****Schema:** tchmi:framework#/definitions/Function

The formatting function for the label texts.

It is called for each value in the label.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
LabelFormat(value: number): string;
```



**Parameter**

Name	Type	Description
value	number	The numerical value for the label.

**Return value**

Type	Description
string	The text to be displayed. HTML is not allowed here.

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getLabelFormat

**Attribute setter:** setLabelFormat



Available from version 1.12.744

**5.10.2.38.1.14 LabelPosition**

The position of the label texts (inside or outside).

**Schema:** tchmi:framework#/definitions/RadialGaugeLabelPosition

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getLabelPosition

**Attribute setter:** setLabelPosition



Available from version 1.12.744

**5.10.2.38.1.15 LabelRange**

The value range between the label texts.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getLabelRange

**Attribute setter:** setLabelRange



Available from version 1.12.744

### 5.10.2.38.1.16 MaxValue

The largest value that the control should display graphically.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getMaxValue

**Attribute setter:** setMaxValue

---



Available from version 1.12.744

---

### 5.10.2.38.1.17 MinValue

The smallest value that the control should display graphically.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getMinValue

**Attribute setter:** setMinValue

---



Available from version 1.12.744

---

### 5.10.2.38.1.18 Range

The value range of the color scales.

**Schema:** tchmi:framework#/definitions/GaugeRangeDefinitionList

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getRange

**Attribute setter:** setRange

---



Available from version 1.12.744

---

### 5.10.2.38.1.19 ShowLabels

Label texts are either displayed or not.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Tachometer](#) [► 610]

**See also****Attribute getter:** getShowLabels**Attribute setter:** setShowLabelsAvailable from version 1.12.744

---

**5.10.2.38.1.20 ShowTicks**

Defines whether main axis markers are to be drawn.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Tachometer](#) [► 610]**See also****Attribute getter:** getShowTicks**Attribute setter:** setShowTicksAvailable from version 1.12.744

---

**5.10.2.38.1.21 ShowValueText**

Either displays the number value or not.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Tachometer](#) [► 610]**See also****Attribute getter:** getShowValueText**Attribute setter:** setShowValueTextAvailable from version 1.12.744

---

**5.10.2.38.1.22 StartPosition**

The start angle of the display. The value 0 points to the right and 90 points upwards.

**Schema:** tchmi:general#/definitions/Number**Origin:** [Tachometer](#) [► 610]**See also****Attribute getter:** getStartPosition**Attribute setter:** setStartPositionAlso observe the corresponding attribute [EndPosition](#) [► 617].



Available from version 1.12.744

---

#### 5.10.2.38.1.23 SubTickPosition

The position (inside or outside) of the secondary to the primary scale divisions.

**Schema:** tchmi:framework#/definitions/RadialGaugeLabelPosition

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getSubTickPosition

**Attribute setter:** setSubTickPosition

---



Available from version 1.12.744

---

#### 5.10.2.38.1.24 TickColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getTickColor

**Attribute setter:** setTickColor

---



Available from version 1.12.744

---

#### 5.10.2.38.1.25 TickDefinition

Describes the scale divisions.

**Schema:** tchmi:framework#/definitions/GaugeTickDefinition

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getTickDefinition

**Attribute setter:** setTickDefinition

---



Available from version 1.12.744

---

#### 5.10.2.38.1.26 UnitColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getUnitColor

**Attribute setter:** setUnitColor

---



Available from version 1.12.744

---

### 5.10.2.38.1.27 UnitFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getUnitFontFamily

**Attribute setter:** setUnitFontFamily

---



Available from version 1.12.744

---

### 5.10.2.38.1.28 UnitFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getUnitFontSize

**Attribute setter:** setUnitFontSize

---



Available from version 1.12.744

---

### 5.10.2.38.1.29 UnitFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getUnitFontSizeUnit

**Attribute setter:** setUnitFontSizeUnit



Available from version 1.12.744

---

### 5.10.2.38.1.30 UnitFontStyle

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getUnitFontStyle

**Attribute setter:** setUnitFontStyle

---



Available from version 1.12.744

---

### 5.10.2.38.1.31 UnitFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getUnitFontWeight

**Attribute setter:** setUnitFontWeight

---



Available from version 1.12.744

---

### 5.10.2.38.1.32 Value

The value of the display.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getValue

**Attribute setter:** setValue

---



Available from version 1.12.744

---

### 5.10.2.38.1.33 ValueColor

The color of the display value.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getValueColor

**Attribute setter:** setValueColor

---



Available from version 1.12.744

---

### 5.10.2.38.1.34 ValueFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getValueFontFamily

**Attribute setter:** setValueFontFamily

---



Available from version 1.12.744

---

### 5.10.2.38.1.35 ValueFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** getValueFontSize

**Attribute setter:** setValueFontSize

---



Available from version 1.12.744

---

### 5.10.2.38.1.36 ValueFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Tachometer](#) [► 610]

**See also****Attribute getter:** getValueFontSizeUnit**Attribute setter:** setValueFontSizeUnitAvailable from version 1.12.744

---

**5.10.2.38.1.37 ValueFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Tachometer](#) [► 610]**See also****Attribute getter:** getValueFontStyle**Attribute setter:** setValueFontStyleAvailable from version 1.12.744

---

**5.10.2.38.1.38 ValueFontWeight**

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Tachometer](#) [► 610]**See also****Attribute getter:** getValueFontWeight**Attribute setter:** setValueFontWeightAvailable from version 1.12.744

---

**5.10.2.38.1.39 ValueFormat****Schema:** tchmi:framework#/definitions/Function

The formatting function for the display value.

It is called for each displayed value.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
ValueFormat(value: number): string;
```



**Parameter**

Name	Type	Description
value	number	The current numerical value.

**Return value**

Type	Description
string	The text to be displayed. HTML is not allowed here.

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** `getValueFormat`

**Attribute setter:** `setValueFormat`



Available from version 1.12.744

### 5.10.2.38.1.40 GaugeAlignment

The position of the control.

**Schema:** `tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiRadialGauge.GaugeAlignment`

**Origin:** [Tachometer](#) [► 610]

**See also**

**Attribute getter:** `getGaugeAlignment`

**Attribute setter:** `setGaugeAlignment`



Available from version 1.12.744

## 5.10.2.38.2 Events

### 5.10.2.38.2.1 onValueChanged

The [value](#) [► 626] has been changed.

**Origin:** [Tachometer](#) [► 610]



Available from version 1.12.744

## 5.10.2.39 Textblock

A text block is a control in which text can be displayed.

**Attributes****Category: Colors**

Name	Description
<a href="#">TextColor</a> [ <a href="#">► 639</a> ]	Definition of the text color
<a href="#">BackgroundColor</a> [ <a href="#">► 769</a> ]	Definition of the background color
<a href="#">BorderColor</a> [ <a href="#">► 768</a> ]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The 'Width' attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 637]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the upper and lower side of the parent element. The 'Height' attribute is ignored in all calculations!</li> <li>• Content: The height is defined by the length of the text. The 'Height' attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Text [► 638]</a>	Definition of the text
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">TextHorizontalAlignment</a> [► 638]	Selecting the horizontal alignment of the text
<a href="#">TextVerticalAlignment</a> [► 638]	Selecting the vertical alignment of the text
<a href="#">ContentPadding</a> [► 636]	Definition of the distance between the text and the control border
<a href="#">WordWrap</a> [► 639]	Selecting whether the text should be wrapped if it is too long to fit in one row
<a href="#">TextFontFamily</a> [► 636]	Definition of the font using the name of the font family or the keyword
<a href="#">TextFontSize</a> [► 636]	Definition of the font size
<a href="#">TextFontSizeUnit</a> [► 637]	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">TextFontStyle</a> [► 637]	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">TextFontWeight</a> [► 637]	Selecting the font weight: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>

## Events

### Category: Framework

Name	Description
<a href="#">onAttached</a> [► 778]	The control was added to the display.
<a href="#">onDetached</a> [► 778]	The control was removed from the display.
<a href="#">onInitialized</a> [► 778]	The control was initialized.
<a href="#">onDestroyed</a> [► 778]	The control was destroyed.
<a href="#">onMoved</a> [► 781]	The control was moved in relation to the browser window.
<a href="#">onResized</a> [► 782]	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Text block

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.39.1 Attributes****5.10.2.39.1.1 ContentPadding**

Defines the distance of the text to the border.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getContentPadding

**Attribute setter:** setContentPadding



Available from 1.8

---

**5.10.2.39.1.2 TextFontFamily**

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getTextFontFamily

**Attribute setter:** setTextFontFamily



Available from 1.8

---

**5.10.2.39.1.3 TextFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getTextFontSize

**Attribute setter:** setTextFontSize



Available from 1.8

---



#### 5.10.2.39.1.4 TextFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getTextFontSizeUnit

**Attribute setter:** setTextFontSizeUnit

---



Available from 1.8

---

#### 5.10.2.39.1.5 TextFontStyle

Font style (normal, italic: oblique with special characters, oblique).

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getTextFontStyle

**Attribute setter:** setTextFontStyle

---



Available from 1.8

---

#### 5.10.2.39.1.6 TextFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getTextFontWeight

**Attribute setter:** setTextFontWeight

---



Available from 1.8

---

#### 5.10.2.39.1.7 HeightMode

Selection of the method of calculating the height. The available options are:

- **Value:** The height is defined by the height entered.
- **Parent:** The height is defined by the distance to the top and bottom side. The *Height* attribute is ignored in all calculations!
- **Content:** The height is defined by the text length of the control.



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/SizeModeWithContent

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getHeightMode

**Attribute setter:** setHeightMode

---



Available from 1.8

---

### 5.10.2.39.1.8 TextHorizontalAlignment

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getTextHorizontalAlignment

**Attribute setter:** setTextHorizontalAlignment

---



Available from 1.8

---

### 5.10.2.39.1.9 TextVerticalAlignment

**Schema:** tchmi:framework#/definitions/VerticalAlignment

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getTextVerticalAlignment

**Attribute setter:** setTextVerticalAlignment

---



Available from 1.8

---

### 5.10.2.39.1.10 Text

Contents of the text block.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getText

**Attribute setter:** setText

---



Available from 1.8

---

### 5.10.2.39.1.11 TextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getTextColor

**Attribute setter:** setTextColor

---



Available from 1.8

---

### 5.10.2.39.1.12 WordWrap

Text wrapping if the content is too long to fit in a single row.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Textblock](#) [► 629]

**See also**

**Attribute getter:** getWordWrap

**Attribute setter:** setWordWrap

---



Available from 1.8

---

## 5.10.2.40 Textbox

A text box is a control in which text can be displayed and entered. If only single-line texts are to be used, the [Input](#) [► 369] control is preferable.

### Attributes

**Category:** Colors

Name	Description
<a href="#">TextColor</a> [► 648]	Definition of the text color
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Text [► 648]</a>	Definition of the text
<a href="#">AutoFocusOut [► 649]</a>	Specifies whether the control element automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.
<a href="#">AutoSelectText [► 649]</a>	Specifies whether the entire text should be selected automatically when the control receives focus.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">TextHorizontalAlignment [► 647]</a>	Selecting the alignment of the text
<a href="#">TextVerticalAlignment [► 647]</a>	Selecting the vertical alignment of the text
<a href="#">TextFontFamily [► 645]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">TextFontSize [► 645]</a>	Definition of the font size
<a href="#">TextFontSizeUnit [► 646]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">TextFontStyle [► 646]</a>	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">TextFontWeight [► 646]</a>	Selecting the font weight: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>
<a href="#">WordWrap [► 648]</a>	Selecting whether the text should wrap if it is too long to fit in one row
<a href="#">ContentPadding [► 645]</a>	Definition of the distance between the text and the control border
<a href="#">Multiline [► 647]</a>	Selecting whether a multi-line text should be allowed
<a href="#">Placeholder [► 648]</a>	Definition of a placeholder, which is displayed if no text is entered

## Events

### Category: Control

Name	Description
<a href="#">onTextChanged [► 650]</a>	The text has been changed.

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onUserInteractionFinished [► 650]</a>	The user has finished the interaction with the control.
<a href="#">onFocusIn [► 649]</a>	The control now has the focus.
<a href="#">onFocusOut [► 650]</a>	The control has lost focus.
<a href="#">onUserInteractionCanceled [► 650]</a>	The user has terminated the interaction with the control element.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Textbox

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)





NuGet packages are available from version 1.12.

---



Available from 1.8

---

#### See also

API reference for this control

### 5.10.2.40.1 Attributes

#### 5.10.2.40.1.1 ContentPadding

Defines the distance of the text to the border.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Textbox](#) [► 639]

#### See also

**Attribute getter:** getContentPadding

**Attribute setter:** setContentPadding

---



Available from 1.8

---

#### 5.10.2.40.1.2 TextFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Textbox](#) [► 639]

#### See also

**Attribute getter:** getTextFontFamily

**Attribute setter:** setTextFontFamily

---



Available from 1.8

---

#### 5.10.2.40.1.3 TextFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Textbox](#) [► 639]

**See also****Attribute getter:** getTextFontSize**Attribute setter:** setTextFontSizeAvailable from 1.8

---

**5.10.2.40.1.4    TextFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Textbox](#) [► 639]**See also****Attribute getter:** getTextFontSizeUnit**Attribute setter:** setTextFontSizeUnitAvailable from 1.8

---

**5.10.2.40.1.5    TextFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Textbox](#) [► 639]**See also****Attribute getter:** getTextFontStyle**Attribute setter:** setTextFontStyleAvailable from 1.8

---

**5.10.2.40.1.6    TextFontWeight**

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Textbox](#) [► 639]**See also****Attribute getter:** getTextFontWeight**Attribute setter:** setTextFontWeight



Available from 1.8

---

#### 5.10.2.40.1.7 TextHorizontalAlignment

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Textbox](#) [► 639]

**See also**

**Attribute getter:** getTextHorizontalAlignment

**Attribute setter:** setTextHorizontalAlignment

---



Available from 1.8

---

#### 5.10.2.40.1.8 TextVerticalAlignment

**Schema:** tchmi:framework#/definitions/VerticalAlignment

**Origin:** [Textbox](#) [► 639]

**See also**

**Attribute getter:** getTextVerticalAlignment

**Attribute setter:** setTextVerticalAlignment

---



Available from 1.8

---



Not applicable from version 1.10.1018.48

---

#### 5.10.2.40.1.9 Multiline

Specifies whether multi-line text should be allowed.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Textbox](#) [► 639]

**See also**

**Attribute getter:** getMultiline

**Attribute setter:** setMultiline

---



Available from 1.8

---

#### 5.10.2.40.1.10 Placeholder

Placeholder which is displayed if no text is entered.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Textbox](#) [► 639]

**See also**

**Attribute getter:** getPlaceholder

**Attribute setter:** setPlaceholder

---



Available from 1.8

---

#### 5.10.2.40.1.11 Text

Contents of the text box.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Textbox](#) [► 639]

**See also**

**Attribute getter:** getText

**Attribute setter:** setText

---



Available from 1.8

---

#### 5.10.2.40.1.12 TextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Textbox](#) [► 639]

**See also**

**Attribute getter:** getTextColor

**Attribute setter:** setTextColor

---



Available from 1.8

---

#### 5.10.2.40.1.13 WordWrap

Text wrapping if the content is too long to fit in a single row.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Textbox](#) [► 639]

**See also****Attribute getter:** getWordWrap**Attribute setter:** setWordWrapAvailable from 1.8

---

**5.10.2.40.1.14 AutoFocusOut**

Specifies whether the control automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Textbox](#) [► 639]**See also****Attribute getter:** getAutoFocusOut**Attribute setter:** setAutoFocusOutAvailable from version 1.10

---

**5.10.2.40.1.15 AutoSelectText**

Specifies whether the entire text should be selected automatically when the control receives focus.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Textbox](#) [► 639]**See also****Attribute getter:** getAutoSelectText**Attribute setter:** setAutoSelectTextAvailable from version 1.12.744.2

---

**5.10.2.40.2 Events****5.10.2.40.2.1 onFocusIn**

The control now has the focus.

**Origin:** [Textbox](#) [► 639]Available from 1.8

---

#### 5.10.2.40.2.2 onFocusOut

The control has lost focus.

Origin: [Textbox](#) [► 639]

---



Available from 1.8

---

#### 5.10.2.40.2.3 onTextChanged

The text has been changed.

Origin: [Textbox](#) [► 639]

---



Available from 1.8

---

#### 5.10.2.40.2.4 onUserInteractionFinished

The user has finished the interaction with the control.

Origin: [Textbox](#) [► 639]

---



Available from 1.8

---

#### 5.10.2.40.2.5 onUserInteractionCanceled

The user has terminated the interaction with the control element.

Origin: [Textbox](#) [► 639]

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Available from version 1.10

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#### 5.10.2.41 Theme Select

A combo box to select the theme.

**Attributes**

**Category: Colors**

Name	Description
<a href="#">TextColor</a> [ <a href="#">► 663</a> ]	Definition of the text color
<a href="#">DropDownTextColor</a> [ <a href="#">► 660</a> ]	Definition of the text color in the drop-down list
<a href="#">DropDownBackgroundColor</a> [ <a href="#">► 657</a> ]	Definition of the background color of the drop-down list
<a href="#">DropDownHighlightColor</a> [ <a href="#">► 659</a> ]	Definition of the highlight color of the background of a selected entry in the drop-down list
<a href="#">DropDownHighlightTextColor</a> [ <a href="#">► 659</a> ]	Definition of the highlight color of the text of a selected entry in the drop-down list
<a href="#">DropDownToggleButtonBackgroundColor</a> [ <a href="#">► 660</a> ]	Definition of the color of the button to expand the drop-down list
<a href="#">DropDownToggleButtonArrowColor</a> [ <a href="#">► 660</a> ]	Definition of the color of the arrow of the button to expand the drop-down list
<a href="#">BackgroundColor</a> [ <a href="#">► 769</a> ]	Definition of the background color
<a href="#">BorderColor</a> [ <a href="#">► 768</a> ]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.



Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">TextFontFamily</a> [► 661]	Definition of the font using the name of the font family or the keyword
<a href="#">TextFontSize</a> [► 661]	Definition of the font size
<a href="#">TextFontSizeUnit</a> [► 662]	Selecting the font size unit <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">TextFontStyle</a> [► 662]	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">TextFontWeight</a> [► 662]	Selecting the font weight <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">TextHorizontalAlignment</a> [► 663]	Selecting the horizontal alignment of the text
<a href="#">ContentPadding</a> [► 663]	Definition of the distance of the text to the border

**Category: DropDown**

Name	Description
<a href="#">DropDownHorizontalAlignment</a> [► 659]	Selecting the horizontal alignment of the text in the drop-down list
<a href="#">DropDownVerticalAlignment</a> [► 660]	Selecting the vertical alignment of the text in the drop-down list
<a href="#">DataHeight</a> [► 657]	Definition of the height of the entries in the drop-down menu
<a href="#">MaxListHeight</a> [► 663]	Definition of the maximum height of the drop-down list
<a href="#">DropDownFontFamily</a> [► 657]	Definition of the font of the list items via the name of the font family or the keyword
<a href="#">DropDownFontSize</a> [► 658]	Definition of the font size of the list items
<a href="#">DropDownFontSizeUnit</a> [► 658]	Selecting the font size unit <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">DropDownFontStyle</a> [► 658]	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">DropDownFontWeight</a> [► 659]	Selecting the font weight of the text entries: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">DropDownStyle</a> [► 661]	Defines the position of the drop-down menu

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control \[► 753\]](#)

ThemeSelect

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)

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NuGet packages are available from version 1.12.

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Available from version 1.12.744

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#### See also

API reference for this control

### 5.10.2.41.1 Attributes

#### 5.10.2.41.1.1 DataHeight

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Theme Select](#) [► 650]

#### See also

**Attribute getter:** getDataHeight

**Attribute setter:** setDataHeight

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Available from version 1.12.744

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#### 5.10.2.41.1.2 DropDownBackgroundColor

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Theme Select](#) [► 650]

#### See also

**Attribute getter:** getDropDownBackgroundColor

**Attribute setter:** setDropDownBackgroundColor

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Available from version 1.12.744

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#### 5.10.2.41.1.3 DropDownFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Theme Select](#) [► 650]

**See also****Attribute getter:** getDropDownFontFamily**Attribute setter:** setDropDownFontFamilyAvailable from version 1.12.744

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**5.10.2.41.1.4 DropDownFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue**Origin:** [Theme Select](#) [► 650]**See also****Attribute getter:** getDropDownFontSize**Attribute setter:** setDropDownFontSizeAvailable from version 1.12.744

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**5.10.2.41.1.5 DropDownFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Theme Select](#) [► 650]**See also****Attribute getter:** getDropDownFontSizeUnit**Attribute setter:** setDropDownFontSizeUnitAvailable from version 1.12.744

---

**5.10.2.41.1.6 DropDownFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Theme Select](#) [► 650]**See also****Attribute getter:** getDropDownFontStyle**Attribute setter:** setDropDownFontStyle



Available from version 1.12.744

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#### 5.10.2.41.1.7 DropDownFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Theme Select](#) [[► 650](#)]

**See also**

**Attribute getter:** getDropDownFontWeight

**Attribute setter:** setDropDownFontWeight

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Available from version 1.12.744

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#### 5.10.2.41.1.8 DropDownHighlightColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Theme Select](#) [[► 650](#)]

**See also**

**Attribute getter:** getDropDownHighlightColor

**Attribute setter:** setDropDownHighlightColor

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Available from version 1.12.744

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#### 5.10.2.41.1.9 DropDownHighlightTextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Theme Select](#) [[► 650](#)]

**See also**

**Attribute getter:** getDropDownHighlightTextColor

**Attribute setter:** setDropDownHighlightTextColor

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Available from version 1.12.744

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#### 5.10.2.41.1.10 DropDownHorizontalAlignment

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Theme Select](#) [[► 650](#)]

**See also****Attribute getter:** getDropDownHorizontalAlignment**Attribute setter:** setDropDownHorizontalAlignmentAvailable from version 1.12.744

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**5.10.2.41.1.11 DropDownTextColor****Schema:** tchmi:framework#/definitions/SolidColor**Origin:** [Theme Select](#) [► 650]**See also****Attribute getter:** getDropDownTextColor**Attribute setter:** setDropDownTextColorAvailable from version 1.12.744

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**5.10.2.41.1.12 DropDownToggleButtonArrowColor****Schema:** tchmi:framework#/definitions/SolidColor**Origin:** [Theme Select](#) [► 650]**See also****Attribute getter:** getDropDownToggleButtonArrowColor**Attribute setter:** setDropDownToggleButtonArrowColorAvailable from version 1.12.744

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**5.10.2.41.1.13 DropDownToggleButtonBackgroundColor****Schema:** tchmi:framework#/definitions/Color**Origin:** [Theme Select](#) [► 650]**See also****Attribute getter:** getDropDownToggleButtonBackgroundColor**Attribute setter:** setDropDownToggleButtonBackgroundColorAvailable from version 1.12.744

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**5.10.2.41.1.14 DropDownVerticalAlignment****Schema:** tchmi:framework#/definitions/VerticalAlignment



**Origin:** [Theme Select](#) [► 650]

**See also**

**Attribute getter:** getDropDownVerticalAlignment

**Attribute setter:** setDropDownVerticalAlignment

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Available from version 1.12.744

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#### 5.10.2.41.1.15 DropDownStyle

Defines the position of the drop-down menu.

- "Desktop" is the classic representation at the position of the control.
- "Mobile" is the representation in the middle of an overlay in the screen, which is separated from the background.

**Schema** (version 1.10): tchmi:framework#/definitions/DropDownStyle

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiCombobox.DropDownStyle

**Origin:** [Theme Select](#) [► 650]

**See also**

**Attribute getter:** getDropDownStyle

**Attribute setter:** setDropDownStyle

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Available from version 1.12.744

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#### 5.10.2.41.1.16 TextFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Theme Select](#) [► 650]

**See also**

**Attribute getter:** getTextFontFamily

**Attribute setter:** setTextFontFamily

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Available from version 1.12.744

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#### 5.10.2.41.1.17 TextFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Theme Select](#) [► 650]

**See also****Attribute getter:** getTextFontSize**Attribute setter:** setTextFontSizeAvailable from version 1.12.744

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**5.10.2.41.1.18 TextFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Theme Select](#) [► 650]**See also****Attribute getter:** getTextFontSizeUnit**Attribute setter:** setTextFontSizeUnitAvailable from version 1.12.744

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**5.10.2.41.1.19 TextFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Theme Select](#) [► 650]**See also****Attribute getter:** getTextFontStyle**Attribute setter:** setTextFontStyleAvailable from version 1.12.744

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**5.10.2.41.1.20 TextFontWeight**

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight**Origin:** [Theme Select](#) [► 650]**See also****Attribute getter:** getTextFontWeight**Attribute setter:** setTextFontWeight



Available from version 1.12.744

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#### 5.10.2.41.1.21 TextHorizontalAlignment

Horizontal alignment of the text.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Theme Select](#) [► 650]

**See also**

**Attribute getter:** getTextHorizontalAlignment

**Attribute setter:** setTextHorizontalAlignment

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Available from version 1.12.744

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#### 5.10.2.41.1.22 MaxListHeight

Defines the height of the combo box.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Theme Select](#) [► 650]

**See also**

**Attribute getter:** getMaxListHeight

**Attribute setter:** setMaxListHeight

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Available from version 1.12.744

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#### 5.10.2.41.1.23 TextColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Theme Select](#) [► 650]

**See also**

**Attribute getter:** getTextColor

**Attribute setter:** setTextColor

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Available from version 1.12.744

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#### 5.10.2.41.1.24 ContentPadding

Defines the distance of the text to the border.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Theme Select](#) [► 650]

**See also**

**Attribute getter:** getContentPadding

**Attribute setter:** setContentPadding



Available from version 1.12.744

### 5.10.2.42      Timespan Input

An input element for a timespan.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">ValueColor</a> [► 670]	Definition of the text color
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Value [► 670]</a>	Definition of the value
<a href="#">AutoFocusOut [► 673]</a>	Determines whether the control automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.
<a href="#">AutoSelectText [► 673]</a>	Determines whether the Control automatically selects the entire text when it is focused.
<a href="#">ResetToLastValidValue [► 673]</a>	Determines whether the value is reset to the last valid value when focus is lost.
<a href="#">ButtonPosition [► 674]</a>	The position of the button relative to the display.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Value**

Name	Description
<a href="#">ValueFontFamily</a> [► 670]	Definition of the font using the name of the font family or the keyword
<a href="#">ValueFontSize</a> [► 671]	Definition of the font size
<a href="#">ValueFontSizeUnit</a> [► 671]	Definition of the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">ValueFontStyle</a> [► 671]	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic</li> <li>• Oblique</li> </ul>
<a href="#">ValueFontWeight</a> [► 672]	Selecting the font weight of the text: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
<a href="#">ContentPadding</a> [► 672]	Definition of the distance of the text to the border
<a href="#">ValueHorizontalAlignment</a> [► 672]	Selecting the horizontal alignment of the text
<a href="#">Placeholder</a> [► 673]	Definition of the placeholder, which is displayed if no value is entered.

**Events****Category: Control**

Name	Description
<a href="#">onValueChanged</a> [► 674]	The value has been changed.

**Category: Framework**

Name	Description
<a href="#">onAttached</a> [► 778]	The control was added to the display.
<a href="#">onDetached</a> [► 778]	The control was removed from the display.
<a href="#">onInitialized</a> [► 778]	The control was initialized.
<a href="#">onDestroyed</a> [► 778]	The control was destroyed.
<a href="#">onMoved</a> [► 781]	The control was moved in relation to the browser window.
<a href="#">onResized</a> [► 782]	The size of the control was changed.

**Category: Operator**



Name	Description
<a href="#">onUserInteractionFinished [► 675]</a>	The user has finished the interaction with the control.
<a href="#">onFocusIn [► 674]</a>	The control now has the focus.
<a href="#">onFocusOut [► 674]</a>	The control has lost focus.
<a href="#">onUserInteractionCanceled [► 675]</a>	The user has terminated the interaction with the control element.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Timespan Input

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.

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Available from version 1.12.750

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#### See also

API reference for this control

### 5.10.2.42.1 Attribute

#### 5.10.2.42.1.1 ValueColor

Color of the value.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Timespan Input](#) [► 664]

#### See also

**Attribute getter:** getValueColor

**Attribute setter:** setValueColor

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Available from version 1.12.750

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#### 5.10.2.42.1.2 Value

Value of the control.

**Schema:** tchmi:general#/definitions/Timespan

**Origin:** [Timespan Input](#) [► 664]

#### See also

**Attribute getter:** getValue

**Attribute setter:** setValue

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Available from version 1.12.750

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#### 5.10.2.42.1.3 ValueFontFamily

Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Timespan Input](#) [► 664]

**See also****Attribute getter:** getValueFontFamily**Attribute setter:** setValueFontFamilyAvailable from version 1.12.750

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**5.10.2.42.1.4 ValueFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue**Origin:** [Timespan Input \[► 664\]](#)**See also****Attribute getter:** getValueFontSize**Attribute setter:** setValueFontSizeAvailable from version 1.12.750

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**5.10.2.42.1.5 ValueFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Timespan Input \[► 664\]](#)**See also****Attribute getter:** getValueFontSizeUnit**Attribute setter:** setValueFontSizeUnitAvailable from version 1.12.750

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**5.10.2.42.1.6 ValueFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle**Origin:** [Timespan Input \[► 664\]](#)**See also****Attribute getter:** getValueFontStyle**Attribute setter:** setValueFontStyle



Available from version 1.12.750

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#### 5.10.2.42.1.7 ValueFontWeight

Font weight (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Timespan Input \[► 664\]](#)

**See also**

**Attribute getter:** getValueFontWeight

**Attribute setter:** setValueFontWeight

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Available from version 1.12.750

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#### 5.10.2.42.1.8 ValueHorizontalAlignment

Horizontal alignment of the text.

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Timespan Input \[► 664\]](#)

**See also**

**Attribute getter:** getValueHorizontalAlignment

**Attribute setter:** setValueHorizontalAlignment

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Available from version 1.12.750

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#### 5.10.2.42.1.9 ContentPadding

Defines the distance of the text to the border.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Timespan Input \[► 664\]](#)

**See also**

**Attribute getter:** getContentPadding

**Attribute setter:** setContentPadding

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Available from version 1.12.750

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#### 5.10.2.42.1.10 Placeholder

Placeholder which is displayed if no text is entered.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Timespan Input \[► 664\]](#)

**See also**

**Attribute getter:** getPlaceholder

**Attribute setter:** setPlaceholder

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Available from version 1.12.750

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#### 5.10.2.42.1.11 AutoFocusOut

Determines whether the control automatically loses focus when the user confirms or ends his input by pressing Enter or Escape.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Timespan Input \[► 664\]](#)

**See also**

**Attribute getter:** getAutoFocusOut

**Attribute setter:** setAutoFocusOut

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Available from version 1.12.750

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#### 5.10.2.42.1.12 AutoSelectText

Determines whether the Control automatically selects the entire text when it is focused.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Timespan Input \[► 664\]](#)

**See also**

**Attribute getter:** getAutoSelectText

**Attribute setter:** setAutoSelectText

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Available from version 1.12.750

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#### 5.10.2.42.1.13 ResetToLastValidValue

Determines whether the value is reset to the last valid value when focus is lost.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Timespan Input \[► 664\]](#)

**See also****Attribute getter:** getResetToLastValidValue**Attribute setter:** setResetToLastValidValue

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Available from version 1.12.750

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**5.10.2.42.1.14 ButtonPosition**

The position of the button relative to the display.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiTimespanInput.ButtonPosition**Origin:** [Timespan Input \[► 664\]](#)**See also****Attribute getter:** getButtonPosition**Attribute setter:** setButtonPosition

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Available from version 1.12.750

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**5.10.2.42.2 Events****5.10.2.42.2.1 onFocusIn**

The control now has the focus.

**Origin:** [Timespan Input \[► 664\]](#)

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Available from version 1.12.750

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**5.10.2.42.2.2 onFocusOut**

The control has lost focus.

**Origin:** [Timespan Input \[► 664\]](#)

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Available from version 1.12.750

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**5.10.2.42.2.3 onValueChanged**

The value has been changed.

**Origin:** [Timespan Input \[► 664\]](#)

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Available from version 1.12.750

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5.10.2.42.2.4    **onUserInteractionFinished**

The user has finished the interaction with the control.

**Origin:** [Timespan Input \[► 664\]](#)

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Available from version 1.12.750

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5.10.2.42.2.5    **onUserInteractionCanceled**

The user has terminated the interaction with the control element.

**Origin:** [Timespan Input \[► 664\]](#)

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Available from version 1.12.750

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5.10.2.43        **Timespan Picker**

A control for selecting a timespan.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.



Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Value [► 680]</a>	Value of the control defined as ISO timespan.
<a href="#">DirectDisplay [► 680]</a>	Determines whether the control is displayed directly in the View or used as a pop-up. The pop-up opens by the function <a href="#">openTimespanPicker [► 682]</a> and closes by the function <a href="#">closeTimespanPicker [► 682]</a> .
<a href="#">ShowConfirmationButtons [► 681]</a>	Determines whether the input into the control must be confirmed.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Category: Control**

Name	Description
<a href="#">onCancel [► 681]</a>	The input was canceled.
<a href="#">onConfirmed [► 681]</a>	The input was confirmed.
<a href="#">onUserInteractionFinished [► 682]</a>	The user has finished the interaction with the control.
<a href="#">onValueChanged [► 681]</a>	The value has been changed.

**Functions**

Name	Origin	Description
<a href="#">openTimespanPicker</a> [► 682]	TcHmiTimespanPicker	Opens the Timespan Picker
<a href="#">closeTimespanPicker</a> [► 682]	TcHmiTimespanPicker	Closes the Timespan Picker

**Access rights**

Name	Description
<a href="#">observe</a> [► 783]	Determines whether the control is generally observable.
<a href="#">operate</a> [► 783]	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control](#) [► 753]

Timespan Picker

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.750

**See also**

API reference for this control

**5.10.2.43.1 Attributes****5.10.2.43.1.1 Value**

Value of the control defined as ISO timespan.

**Schema:** tchmi:general#/definitions/TimeSpan

**Origin:** [Timespan Picker](#) [► 675]

**See also**

**Attribute getter:** getValue

**Attribute setter:** setValue



Available from version 1.12.750

**5.10.2.43.1.2 DirectDisplay**

Determines whether the control is displayed directly in the View or used as a pop-up. The pop-up opens by the function [openTimespanPicker](#) [► 682] and closes by the function [closeTimespanPicker](#) [► 682].

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Timespan Picker \[► 675\]](#)

**See also**

**Attribute getter:** getDirectDisplay

**Attribute setter:** setDirectDisplay



Available from version 1.12.750

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### 5.10.2.43.1.3 ShowConfirmationButtons

Determines whether the input into the control must be confirmed.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Timespan Picker \[► 675\]](#)

**See also**

**Attribute getter:** getShowConfirmationButtons

**Attribute setter:** setShowConfirmationButtons



Available from version 1.12.750

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## 5.10.2.43.2 Events

### 5.10.2.43.2.1 onValueChanged

The value has been changed.

**Origin:** [Timespan Picker \[► 675\]](#)



Available from version 1.12.750

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### 5.10.2.43.2.2 onCancel

The input was canceled.

**Origin:** [Timespan Picker \[► 675\]](#)



Available from version 1.12.750

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### 5.10.2.43.2.3 onConfirmed

The input was confirmed.

**Origin:** [Timespan Picker \[► 675\]](#)



Available from version 1.12.750

### 5.10.2.43.2.4 onUserInteractionFinished

The user has finished the interaction with the control.

Origin: [Timespan Picker](#) [► 675]



Available from version 1.12.750

## 5.10.2.43.3 Functions

### 5.10.2.43.3.1 openTimespanPicker

Opens the Timespan Picker.

Return value: null

Origin: [Timespan Picker](#) [► 675]



Available from version 1.12.750

### 5.10.2.43.3.2 closeTimespanPicker

Closes the Timespan Picker.

Return value: null

Origin: [Timespan Picker](#) [► 675]



Available from version 1.12.750

## 5.10.2.44 Toggle Button

The toggle button is a switching element that can be switched between two states. The 'Toggle Group' attribute can be used to interconnect different toggle buttons. When a new toggle button is activated, the previously activated button is automatically deactivated.

### Attributes

Category: Colors

Name	Description
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**



Name	Description
<a href="#">Text [► 185]</a>	Definition of the text displayed in the button
<a href="#">StateSymbol [► 187]</a>	<p>Reflects the pressed state of the button for the assigned symbol and vice versa.</p> <p>If the button is pressed, the symbol is set to true.</p> <p>If the button is released, the symbol is set to false.</p> <p>If the symbol is set to true independent of the button, the button is pressed.</p> <p>If the symbol is set to false independent of the button, the button is released.</p> <p>During an active user interaction, no value changes of the symbol are transferred to the button.</p>
<a href="#">ToggleGroup [► 688]</a>	User-defined name for a group. Only one control in this group can be active.
<a href="#">ToggleState [► 689]</a>	Internal state of the control. This can be Normal or Active.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Icon**

Name	Description
<a href="#">Icon [► 184]</a>	Definition of an optional image in the button
<a href="#">IconWidth [► 186]</a>	Definition of the width of the icon
<a href="#">IconWidthUnit [► 186]</a>	<p>Definition of the unit of the width:</p> <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">IconHeight [► 183]</a>	Definition of the height of the icon
<a href="#">IconHeightUnit [► 183]</a>	<p>Definition of the unit of height:</p> <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">IconHorizontalAlignment [► 183]</a>	Selecting the horizontal alignment of the icon within the control
<a href="#">IconVerticalAlignment [► 185]</a>	Selecting the vertical alignment of the icon within the control
<a href="#">IconPadding [► 184]</a>	Definition of the distance of the icon to the border

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">TextColor [► 185]</a>	Definition of the text color
<a href="#">TextFontFamily [► 181]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">TextFontSize [► 181]</a>	Definition of the font size
<a href="#">TextFontSizeUnit [► 182]</a>	Definition of the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">TextFontStyle [► 182]</a>	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
<a href="#">TextFontWeight [► 182]</a>	Selecting the font weight of the text: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: Bold</li> </ul>
<a href="#">TextPadding [► 184]</a>	Definition of the distance of the text to the border
<a href="#">TextVerticalAlignment [► 185]</a>	Selecting the vertical alignment of the text
<a href="#">TextHorizontalAlignment [► 183]</a>	Selecting the horizontal alignment of the text
<a href="#">WordWrap [► 186]</a>	Selecting whether the text wraps if it is too long for one row

**Events****Category: Control**

Name	Description
<a href="#">onToggleStateChanged [► 689]</a>	The ToggleState value of the button has changed.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onToggleStateChanged [► 689]</a>	The ToggleState value of the button has changed.
<a href="#">onStateChanged [► 187]</a>	The pressed state has changed.
<a href="#">onStatePressed [► 187]</a>	The pressed state has changed from not pressed to pressed.
<a href="#">onStateReleased [► 187]</a>	The pressed state has changed from pressed to not pressed.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe</a> [► 783]	Determines whether the control is generally observable.
<a href="#">operate</a> [► 783]	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control](#) [► 753]

[Button](#) [► 175]

Toggle Button

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.2.44.1 Attributes****5.10.2.44.1.1 ToggleGroup**

User-defined name for a group. Only one control in this group can be active. If another button is pressed with this ToggleGroup, all other buttons are deactivated.

A ToggleGroup can consist of controls of type [Toggle Button](#) [► 682] and [Checkbox](#) [► 188] from version 1.10.

Please note that this ToggleGroup is global. So if several ToggleButtons are used in one [UserControl](#) [► 854] and this UserControl is used several times, only one ToggleButton is active. If one ToggleButton should be active per UserControl in this constellation, the attribute of the buttons can be set via one [UserControlParameter](#) [► 46] per instance of the UserControl. A binding from the UserControlParameter to all ToggleButtons must then be set manually within the UserControl.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Toggle Button](#) [► 682]

**See also**

**Attribute getter:** getToggleGroup

**Attribute setter:** setToggleGroup



Available from 1.8

### 5.10.2.44.1.2 ToggleState

Internal state of the control. This can be Normal or Active.

**Schema:** tchmi:framework#/definitions/ToggleState

**Origin:** [Toggle Button](#) [► 682]

**See also**

**Attribute getter:** getToggleState

**Attribute setter:** setToggleState



Available from version 1.10

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## 5.10.2.44.2 Events

### 5.10.2.44.2.1 onToggleStateChanged

The [ToggleState](#) [► 689] value of the button has changed.

**Origin:** [Toggle Button](#) [► 682]



Available from 1.8

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## 5.10.2.45 Toggle switch

A toggle switch is a switching element that can be switched between two states. A ToggleSwitch has a ToggleState parameter, which can have the value "Normal" or "Active".

The .onToggleStateChanged event can be used to perform actions when the state of the checkbox changes.

### Attributes

**Category:** Colors

Name	Description
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control
<a href="#">ToggleStateIconColor</a> [► 195]	Definition of the color of the toggle state icon.
<a href="#">TextColor</a> [► 198]	Definition of the text color.
<a href="#">TextBackgroundColor</a> [► 198]	Definition of the text background color.

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">StateSymbol [► 194]</a>	Reflects the state of the checkbox to the assigned symbol and vice versa.
<a href="#">ToggleState [► 194]</a>	Definition of the internal switching state of the control
<a href="#">ToggleGroup [► 194]</a>	User-defined name for a group. Only one control in this group can be active.
<a href="#">Text [► 195]</a>	The text to be displayed next to the checkbox.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**



Name	Description
<a href="#">TextPosition</a> [► 195]	The text position.
<a href="#">TextHorizontalAlignment</a> [► 196]	The horizontal alignment of the text.
<a href="#">TextVerticalAlignment</a> [► 196]	The vertical alignment of the text.
<a href="#">TextFontFamily</a> [► 196]	Comma-separated list of fonts as font family or keyword: 'serif', 'sans-serif', 'monospace'.
<a href="#">TextFontSize</a> [► 196]	The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.
<a href="#">TextFontSizeUnit</a> [► 197]	Pixels, or percent for relative sizes.
<a href="#">TextFontStyle</a> [► 197]	Font style (normal, italic: oblique with special characters, oblique)
<a href="#">TextFontWeight</a> [► 197]	The font weight (normal, bold)

## Events

### Category: Control

Name	Description
<a href="#">onToggleStateChanged</a> [► 198]	The ToggleState value of the checkbox has changed.
<a href="#">onStateChanged</a> [► 198]	The status of the checkbox has changed.

### Category: Framework

Name	Description
<a href="#">onAttached</a> [► 778]	The control was added to the display.
<a href="#">onDetached</a> [► 778]	The control was removed from the display.
<a href="#">onInitialized</a> [► 778]	The control was initialized.
<a href="#">onDestroyed</a> [► 778]	The control was destroyed.
<a href="#">onMoved</a> [► 781]	The control was moved in relation to the browser window.
<a href="#">onResized</a> [► 782]	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

[Checkbox \[► 188\]](#)

ToggleSwitch

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.744

### See also

API reference for this control

## 5.10.2.46 Trend Line Chart

A TrendLineChart is a trend element in which curves of historicized symbols can be displayed.

A description of the configuration can be found in chapter [Configuration](#) [► 704].

### Attributes

#### Category: Colors

Name	Description
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control
<a href="#">GridBackgroundColor</a> [► 707]	Definition of the background color of the coordinate system
<a href="#">GridLineColor</a> [► 707]	Definition of the color of the coordinate grid
<a href="#">SubgridLineColor</a> [► 715]	Definition of the color of the coordinate subgrid
<a href="#">XLabelFontColor</a> [► 722]	Definition of the font color of the x-axis labels
<a href="#">XAxisColor</a> [► 719]	Definition of the color of the x-axis
<a href="#">XAxisNameFontColor</a> [► 720]	Definition of the font color of the X-axis name
<a href="#">MenuBarLabelFontColor</a> [► 710]	Definition of the font color of the menu bar
<a href="#">SectionsBackgroundColor</a> [► 712]	Definition of the background color of the control
<a href="#">TooltipFontColor</a> [► 717]	Definition of the color of the tooltip
<a href="#">TooltipBackgroundColor</a> [► 717]	Definition of the background color of the tooltip

#### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Start [► 715]</a>	Definition of the start time at which the display should begin
<a href="#">End [► 707]</a>	Definition of the end time at which the display should end
<a href="#">LineGraphDescriptions [► 709]</a>	Definition of the historicized variables to be displayed in the graph and their method of display
<a href="#">ShowLegend [► 727]</a>	Selecting whether the legend is to be displayed
<a href="#">Interval [► 709]</a>	Definition of the interval at which the data are updated
<a href="#">MouseMode [► 712]</a>	Selection of the mouse mode that is active after stopping: <ul style="list-style-type: none"> <li>• ZoomX: By drawing a rectangle, an area can be defined in the X direction which is to be zoomed in on.</li> <li>• ZoomXY: By drawing a rectangle, an area can be defined in the X and Y direction which is to be zoomed in on.</li> <li>• PanX: The observed area can be shifted in the X direction in the display area of the graph by drag-and-drop.</li> <li>• PanXY: The observed area can be shifted in the X and Y direction in the display area of the graph by drag-and-drop.</li> </ul>
<a href="#">ServerDomain [► 727]</a>	Definition of the server extension name.
<a href="#">ReferenceLines [► 728]</a>	Definition of the reference lines.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"><li>• Pixels for an absolute height</li><li>• Percent for a relative height</li></ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"><li>• Pixels for an absolute width</li><li>• Percent for a relative width</li></ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: XAxis**

Name	Description
ShowXAxis [ <a href="#">► 713</a> ]	Selecting whether the X-axis is to be displayed
XShowLabels [ <a href="#">► 724</a> ]	Selecting whether the X-axis labels are to be displayed
XMainTickSteps [ <a href="#">► 724</a> ]	Definition of the number of main X-axis subdivisions
ShowXSubTicks [ <a href="#">► 714</a> ]	Selecting whether the auxiliary X-axis subdivisions are to be displayed
XSubTickSteps [ <a href="#">► 724</a> ]	Definition of the number of auxiliary X-axis subdivisions
ShowXAxisName [ <a href="#">► 714</a> ]	Selecting whether the X-axis name is to be displayed
XAxisName [ <a href="#">► 720</a> ]	Definition of the X-axis name
XLabelFontFamily [ <a href="#">► 723</a> ]	Definition of the font using the name of the font family or the keyword
XLabelFontSize [ <a href="#">► 723</a> ]	Definition of the font size for the X-axis labels
XLabelFontSizeUnit [ <a href="#">► 723</a> ]	Selecting the font size unit for the X-axis labels: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>Percent for a relative size</li> </ul>
XLabelFontWeight [ <a href="#">► 723</a> ]	Selecting the font weight of the X-axis labels: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
XAxisWidth [ <a href="#">► 722</a> ]	Definition of the X-axis width
XAxisNameFontFamily [ <a href="#">► 721</a> ]	Definition of the font using the name of the font family or the keyword
XAxisNameFontSize [ <a href="#">► 721</a> ]	Definition of the font size of the X-axis name
XAxisNameFontSizeUnit [ <a href="#">► 721</a> ]	Selecting the font size unit for the X-axis labels: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>Percent for a relative size</li> </ul>
XAxisNameFontWeight [ <a href="#">► 722</a> ]	Selecting of the font weight of the X-axis name: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold</li> </ul>
XAxisFormat [ <a href="#">► 720</a> ]	Definition of the formatting of the X-axis labels

**Category: YAxis**



Name	Description
<a href="#">YAxis [► 725]</a>	Definition of one or more Y-axes
<a href="#">ShowYSubTicks [► 714]</a>	Selecting whether the auxiliary subdivisions on the Y-axis are to be displayed
<a href="#">YAxisWidth [► 725]</a>	Definition of the Y-axis width
<a href="#">YLabelFontFamily [► 725]</a>	Definition of the font using the name of the font family or the keyword
<a href="#">YLabelFontSize [► 726]</a>	Definition of the font size for the Y-axis labels
<a href="#">YLabelFontSizeUnit [► 726]</a>	Selecting the font size unit for the Y-axis labels: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">YLabelFontWeight [► 726]</a>	Selecting the font weight of the Y-axis labels: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: bold</li> </ul>
<a href="#">YMainTickSteps [► 726]</a>	Definition of the number of main Y-axis subdivisions
<a href="#">YSubTickSteps [► 727]</a>	Definition of the number of auxiliary Y-axis subdivisions

**Category: Grid**

Name	Description
<a href="#">ShowGrid [► 712]</a>	Selecting whether the coordinate grid is to be displayed.
<a href="#">GridLineStyle [► 708]</a>	Definition of the line style for the coordinate grid.
<a href="#">GridLineWidth [► 708]</a>	Definition of the line width of the coordinate grid.
<a href="#">GridShowHorizontalLines [► 708]</a>	Selecting whether the horizontal lines of the coordinate grid are to be displayed.
<a href="#">GridShowVerticalLines [► 709]</a>	Selecting whether the vertical lines of the coordinate grid are to be displayed.

**Category: Subgrid**

Name	Description
<a href="#">SubgridLineStyle [► 715]</a>	Definition of the line style for the subgrid.
<a href="#">SubgridLineWidth [► 716]</a>	Definition of the line width of the subgrid.
<a href="#">SubgridShowHorizontalLines [► 716]</a>	Selecting whether the horizontal lines of the subgrid are to be displayed.
<a href="#">SubgridShowVerticalLines [► 716]</a>	Selecting whether the vertical lines of the subgrid are to be displayed.

**Category: Menubar**

Name	Description
ShowMenuBar [ <a href="#">▶ 713</a> ]	Selection of whether the menu bar is to be displayed
MenuBarPosition [ <a href="#">▶ 711</a> ]	Selection of the position of the menu bar: <ul style="list-style-type: none"> <li>• Bottom: Underside</li> <li>• Top: Top side</li> </ul>
MenuBarLabelFontFamily [ <a href="#">▶ 710</a> ]	Definition of the font using the name of the font family or the keyword
MenuBarLabelFontSize [ <a href="#">▶ 710</a> ]	Definition of the font size
MenuBarLabelFontStyle [ <a href="#">▶ 711</a> ]	Selecting the font style: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Italic: italic</li> <li>• Oblique: slanted</li> </ul>
MenuBarLabelFontWeight [ <a href="#">▶ 711</a> ]	Selecting the font weight: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: Bold</li> </ul>

**Category: Tooltip**

Name	Description
ShowTooltip [ <a href="#">▶ 713</a> ]	Selecting whether the tooltips should be displayed in stop mode
TooltipFormat [ <a href="#">▶ 718</a> ]	<ul style="list-style-type: none"> <li>• Definition of the formatting of the tooltips.</li> </ul>
TooltipFontFamily [ <a href="#">▶ 717</a> ]	Definition of the font using the name of the font family or the keyword
TooltipFontSize [ <a href="#">▶ 718</a> ]	Definition of the font size
TooltipFontWeight [ <a href="#">▶ 718</a> ]	Selecting the font weight: <ul style="list-style-type: none"> <li>• Normal</li> <li>• Bold: Bold</li> </ul>

**Events****Category: Framework**

Name	Description
onAttached [ <a href="#">▶ 778</a> ]	The control was added to the display.
onDetached [ <a href="#">▶ 778</a> ]	The control was removed from the display.
onInitialized [ <a href="#">▶ 778</a> ]	The control was initialized.
onDestroyed [ <a href="#">▶ 778</a> ]	The control was destroyed.
onMoved [ <a href="#">▶ 781</a> ]	The control was moved in relation to the browser window.
onResized [ <a href="#">▶ 782</a> ]	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

## Functions

Name	Type	Description
<a href="#">pause [► 728]</a>	TcHmiTrendLineChart	Stops the view.
<a href="#">resetZoom [► 729]</a>	TcHmiTrendLineChart	Resets all interactions.
<a href="#">play [► 729]</a>	TcHmiTrendLineChart	Resets the zoom and displays live data again.
stop	TcHmiTrendLineChart	Fixes the view.
resetZoom	TcHmiTrendLineChart	Resets zooming and panning.
reset	TcHmiTrendLineChart	Starts the view.

## Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

## Inheritance hierarchy

[Control \[► 753\]](#)

## Trend Line Chart

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)

---



NuGet packages are available from version 1.12.

---



Available from version 1.10

---

### See also

API reference for this control

## 5.10.2.46.1 Configuration

A TrendLineChart can be configured as follows:

1. Define the Y-axes of the coordinate system with the help of the dialog "YAxis Definitions" of the attribute "YAxis [[▶ 725](#)]".

1.1. Define the desired number of Y-axes to which the symbols in the following are to be assigned.

1.2. Adjust the settings of the Y-axis/axes if necessary.

2. Define the variables to be displayed in the trend element using the attribute "[LineGraphDescriptions](#) [[▶ 709](#)]" from the "Common" category.

2.1. Add a Line Graph Description for each of the variables.

2.2. Select the appropriate variable in each description under "Symbol".

---



It is only possible to select variables for which historization has been activated beforehand.

---

2.3. Under "Y-Axis ID", select the Y-axis to which the symbol is to be assigned. If you don't select a Y-axis, an automatically scaling Y-axis bearing the name of the symbol will be generated.

3. Adapt the [start](#) [[▶ 715](#)] and [end](#) [[▶ 707](#)] point of the period to be observed.

Example: Last ten minutes in the past:

3.1. Set the value of the attribute "[Start](#) [[▶ 715](#)]" of the category "Common" to "PT10M".

4. Adapt the X-axis scaling by setting the attribute "[XMainTickSteps](#) [[▶ 724](#)]" of the category "X-Axis" to "5".




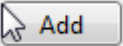
5. Activate the attribute "[ShowMenubar](#) [[▶ 713](#)]" of the category "Menubar".

Example: [Trend Line Chart](#) [[▶ 1581](#)]

## 5.10.2.46.2 Dialogs

### 5.10.2.46.2.1 LineGraphDescription dialog




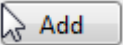
The settings of the graphs and their assignment to the individual symbols that are to be displayed in the TrendLineChart can be changed with this dialog.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Properties	Settings for the Y-axis assignment selected under "Elements"
Symbol	Selection of the historicized symbol
Y-axis Id	Selection of the Y-axis with which the symbol is to be connected
Line width	Definition of the line width of the graph
Point dot	Selecting whether the individual data points are to be marked
Point dot radius	Definition of the radius of the data points
Point dot stroke width	Definition of the width of the dotted line
Point dot in stopmode	Selection of whether the individual data points are to be drawn when the display is stopped in the trend element.
Legend name	Definition of the legend name.
Scale factor	Definition of the scale factor.

#### 5.10.2.46.2.2 YAxis Definition Dialog

This dialog can be used to add and parameterize the different Y-axes.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Properties	Settings of the Y-axis definition selected under "Elements"
Id	Definition of a unique ID of the Y-axis
Position	Position of the Y-axis on the graph <ul style="list-style-type: none"> <li>• Left side of the graph</li> <li>• Right side of the graph</li> </ul>
Main-tick-min-value	Definition of the beginning of the displayed value range
Main-tick-max-value	Definition of the end of the displayed value range
Auto scaling	Selecting whether the value range should be automatically adjusted according to the values to be displayed in the array
Decimal places	Definition of decimal places
Show labels	Selecting whether the label of the Y-axis is to be displayed
Show axis name	Selecting whether the axis name should be displayed next to the axis in the graph
Axis name	Definition of the axis name, which can optionally be displayed next to the axis
Axis name font family	Definition of the font
Axis name font size	Definition of the font size
Axis name font weight	Selecting the font weight <ul style="list-style-type: none"> <li>• Bold</li> <li>• Normal</li> </ul>
Unit	Definition of the unit

### 5.10.2.46.3 Attributes

#### 5.10.2.46.3.1 ActualEndTime

Actual end time (read-only).

**Schema:** tchmi:general#/definitions/DateTime

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getActualEndTime



Available from version 1.10

#### 5.10.2.46.3.2 ActualStartTime

Actual start point (read-only).

**Schema:** tchmi:general#/definitions/DateTime

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getActualStartTime



Available from version 1.10

---

### 5.10.2.46.3.3 End

Definition of the end time at which the display should end.

Several options are available as values:

- The keyword `Latest`: The last available value is used as the end value of the display.
- An ISO8601 timespan such as `PT1H1M` (one hour and one minute). The corresponding specification is: `P[JY][MM][WW][TD][T[hH][mM][s[.f]S]]`. Values that are not set (e.g. year) do not have to be entered. Example: `PT1M0.5S` refers to one minute and half a second. This timespan describes the "distance" at the [Start](#) [[▶ 715](#)] time of the control. Therefore only one of the two attributes should be configured with a timespan.
- An ISO8601 time. Please note that the time must be specified in UTC. In the control itself the time is displayed in the time zone of the current user and can be manipulated. On a system with the time zone Europe/Berlin `2019-08-21T11:35:21.576` is displayed, for example, but the control uses the UTC specification `2019-08-21T09:35:21.576Z` (the letter `z` indicates this).

**Schema** (version 1.10): `tchmi:framework#/definitions/TrendLineChartEnd`

**Schema** (version 1.12): `tchmi:framework#/definitions/TchMi.Controls.Beckhoff.TchMiTrendLineChart.ChartEnd`

**Origin:** [Trend Line Chart](#) [[▶ 695](#)]

**See also**

**Attribute getter:** `getEnd`

**Attribute setter:** `setEnd`



Available from version 1.10

---

### 5.10.2.46.3.4 GridBackgroundColor

Definition of the background color of the coordinate system.

**Schema:** `tchmi:framework#/definitions/Color`

**Origin:** [Trend Line Chart](#) [[▶ 695](#)]

**See also**

**Attribute getter:** `getGridBackgroundColor`

**Attribute setter:** `setGridBackgroundColor`



Available from version 1.10

---

### 5.10.2.46.3.5 GridLineColor

Definition of the color of the coordinate grid.

**Schema:** `tchmi:framework#/definitions/SolidColor`

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getGridLineColor

**Attribute setter:** setGridLineColor



Available from version 1.10

---

#### 5.10.2.46.3.6 GridLineStyle

**Schema** (version 1.10): tchmi:framework#/definitions/ChartLineStyle

**Schema** (version 1.12): tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.ChartLineStyle

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getGridLineStyle

**Attribute setter:** setGridLineStyle



Available from version 1.10

---

#### 5.10.2.46.3.7 GridLineWidth

Definition of the line width of the coordinate grid.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getGridLineWidth

**Attribute setter:** setGridLineWidth



Available from version 1.10

---

#### 5.10.2.46.3.8 GridShowHorizontalLines

Selecting whether the horizontal lines of the coordinate grid are to be displayed. The number of horizontal grid lines is defined by the attribute [YMainTickSteps \[► 726\]](#).

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getGridShowHorizontalLines

**Attribute setter:** setGridShowHorizontalLines





Available from version 1.10

---

### 5.10.2.46.3.9 GridShowVerticalLines

Selecting whether the vertical lines of the coordinate grid are to be displayed. The number of vertical grid lines is defined by the attribute `XMainTickSteps` [► 724].

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Trend Line Chart](#) [► 695]

**See also**

**Attribute getter:** `getGridShowVerticalLines`

**Attribute setter:** `setGridShowVerticalLines`

---



Available from version 1.10

---

### 5.10.2.46.3.10 Interval

Definition of the interval at which the data are updated.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Trend Line Chart](#) [► 695]

**See also**

**Attribute getter:** `getInterval`

**Attribute setter:** `setInterval`

---



Available from version 1.10

---

### 5.10.2.46.3.11 LineGraphDescription

Definition of the historicized variables to be displayed in the graph and their method of display.

**Schema** (version 1.10): tchmi:framework#/definitions/TrendLineChartLineGraphDescriptionDefinitionList

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiTrendLineChart.ChartLineGraphDescriptionDefinitionList

**Origin:** [Trend Line Chart](#) [► 695]

**See also**

**Attribute getter:** `getLineGraphDescription`

**Attribute setter:** `setLineGraphDescription`

---



Available from version 1.10

---

### 5.10.2.46.3.12 MenuBarLabelFontColor

Definition of the font color of the menu bar.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getMenuBarLabelFontColor

**Attribute setter:** setMenuBarLabelFontColor

---



Available from version 1.10

---

### 5.10.2.46.3.13 MenuBarLabelFontFamily

Definition of the font using the name of the font family or the keyword.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getMenuBarLabelFontFamily

**Attribute setter:** setMenuBarLabelFontFamily

---



Available from version 1.10

---

### 5.10.2.46.3.14 MenuBarLabelFontSize

Definition of the font size.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getMenuBarLabelFontSize

**Attribute setter:** setMenuBarLabelFontSize

---



Available from version 1.10

---

### 5.10.2.46.3.15 MenuBarLabelFontSizeUnit

Selection of the unit of the font size in the menu bar (pixel or percent).

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getMenuBarLabelFontSizeUnit

**Attribute setter:** setMenuBarLabelFontSizeUnit

---



Available from version 1.10

---

**5.10.2.46.3.16 MenuBarLabelFontStyle**

Font style (normal, italic: oblique with special characters, oblique)

**Schema:** tchmi:framework#/definitions/FontStyle

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getMenuBarLabelFontStyle

**Attribute setter:** setMenuBarLabelFontStyle

---



Available from version 1.10

---

**5.10.2.46.3.17 MenuBarLabelFontWeight**

Selection of the font weight for the menu bar (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getMenuBarLabelFontWeight

**Attribute setter:** setMenuBarLabelFontWeight

---



Available from version 1.10

---

**5.10.2.46.3.18 MenuBarPosition**

Selection of the position of the menu bar (Bottom, Top).

**Schema** (version 1.10): tchmi:framework#/definitions/ChartMenuBarPosition

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiTrendLineChart.ChartMenuBarPosition

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getMenuBarPosition

**Attribute setter:** setMenuBarPosition



Available from version 1.10

---

#### 5.10.2.46.3.19 MouseMode

Selection of the mouse mode that is active after stopping.

- ZoomX: By drawing a rectangle, an area can be defined in the X direction which is to be zoomed in on.
- ZoomXY: By drawing a rectangle, an area can be defined in the X and Y direction which is to be zoomed in on.
- PanX: The observed area can be shifted in the X direction in the display area of the graph by drag-and-drop.
- PanXY: The observed area can be shifted in the X and Y direction in the display area of the graph by drag-and-drop.

**Schema** (version 1.10): tchmi:framework#/definitions/ChartMouseMode

**Schema** (version 1.12): tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiTrendLineChart.ChartMouseMode

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getMouseMode

**Attribute setter:** setMouseMode

---



Available from version 1.10

---

#### 5.10.2.46.3.20 SectionsBackgroundColor

Definition of the background color of the control.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getSectionsBackgroundColor

**Attribute setter:** setSectionsBackgroundColor

---



Available from version 1.10

---

#### 5.10.2.46.3.21 ShowGrid

Selecting whether the coordinate grid is to be displayed.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also****Attribute getter:** getShowGrid**Attribute setter:** setShowGridAvailable from version 1.10

---

**5.10.2.46.3.22 ShowMenubar**

Selection of whether the menu bar is to be displayed.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getShowMenubar**Attribute setter:** setShowMenubarAvailable from version 1.10

---

**5.10.2.46.3.23 ShowTooltip**

Selecting whether the tooltips should be displayed in stop mode.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getShowTooltip**Attribute setter:** setShowTooltipAvailable from version 1.10

---

**5.10.2.46.3.24 ShowXAxis**

Selecting whether the X-axis is to be displayed.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getShowXAxis**Attribute setter:** setShowXAxis



Available from version 1.10

---

#### 5.10.2.46.3.25 ShowXAxisName

Selecting whether the X-axis name is to be displayed.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getShowXAxisName

**Attribute setter:** setShowXAxisName

---



Available from version 1.10

---

#### 5.10.2.46.3.26 ShowXSubTicks

Selecting whether the auxiliary X-axis subdivisions are to be displayed.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getShowXSubTicks

**Attribute setter:** setShowXSubTicks

---



Available from version 1.10

---

#### 5.10.2.46.3.27 ShowYSubTicks

Selecting whether the auxiliary subdivisions on the Y-axis are to be displayed.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getShowYSubTicks

**Attribute setter:** setShowYSubTicks

---



Available from version 1.10

---

### 5.10.2.46.3.28 Start

Definition of the start time at which the display should begin.

Several options are available as values:

- The keyword `First`: The first available value is used as the start value of the display.
- An ISO8601 timespan such as `PT1H1M` (one hour and one minute). The corresponding specification is: `P[JY][MM][WW][TD][T[hH][mM][s[.f]S]]`. Values that are not set (e.g. year) do not have to be entered. Example: `PT1M0.5S` refers to one minute and half a second. This timespan describes the "distance" at the [End](#) [▶ 707](#) time of the control. Therefore only one of the two attributes should be configured with a timespan.
- An ISO8601 time. Please note that the time must be specified in UTC. In the control itself the time is displayed in the time zone of the current user and can be manipulated. On a system with the time zone Europe/Berlin `2019-08-21T11:35:21.576` is displayed, for example, but the control uses the UTC specification `2019-08-21T09:35:21.576Z` (the letter `Z` indicates this).

**Schema** (version 1.10): `tchmi:framework#/definitions/TrendLineChartStart`

**Schema** (version 1.12): `tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiTrendLineChart.ChartStart`

**Origin:** [Trend Line Chart](#) [▶ 695](#)

**See also**

**Attribute getter:** `getStart`

**Attribute setter:** `setStart`



Available from version 1.10

---

### 5.10.2.46.3.29 SubgridLineColor

Definition of the color of the coordinate subgrid.

**Schema:** `tchmi:framework#/definitions/SolidColor`

**Origin:** [Trend Line Chart](#) [▶ 695](#)

**See also**

**Attribute getter:** `getSubgridLineColor`

**Attribute setter:** `setSubgridlineColor`



Available from version 1.10

---

### 5.10.2.46.3.30 SubgridLineStyle

**Schema** (version 1.10): `tchmi:framework#/definitions/ChartLineStyle`

**Schema** (version 1.12): `tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.ChartLineStyle`

**Origin:** [Trend Line Chart](#) [▶ 695](#)

**See also****Attribute getter:** getSubgridLineStyle**Attribute setter:** setSubgridLineStyleAvailable from version 1.10

---

**5.10.2.46.3.31 SubgridLineWidth**

Definition of the line width of the subgrid.

**Schema:** tchmi:general#/definitions/Number**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getSubgridLineWidth**Attribute setter:** setSubgridLineWidthAvailable from version 1.10

---

**5.10.2.46.3.32 SubgridShowHorizontalLines**

Selecting whether the horizontal lines of the subgrid are to be displayed. The number of horizontal auxiliary coordinate lines is defined by the attribute YSubTickSteps.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getSubgridShowHorizontalLines**Attribute setter:** setSubgridShowHorizontalLinesAvailable from version 1.10

---

**5.10.2.46.3.33 SubgridShowVerticalLines**Selecting whether the vertical lines of the subgrid are to be displayed. The number of vertical auxiliary coordinate lines is defined by the attribute XSubTickSteps [\[► 724\]](#).**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getSubgridShowVerticalLines**Attribute setter:** setSubgridShowVerticalLines





Available from version 1.10

---

#### 5.10.2.46.3.34 TooltipBackgroundColor

Definition of the background color of the coordinate system.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getTooltipBackgroundColor

**Attribute setter:** setTooltipBackgroundColor

---



Available from version 1.10

---

#### 5.10.2.46.3.35 TooltipFontColor

Definition of the font color of the tooltip.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getTooltipFontColor

**Attribute setter:** setTooltipFontColor

---



Available from version 1.10

---

#### 5.10.2.46.3.36 TooltipFontFamily

Definition of the font using the name of the font family or the keyword.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getTooltipFontFamily

**Attribute setter:** setTooltipFontFamily

---



Available from version 1.10

---

### 5.10.2.46.3.37 TooltipFontSize

Definition of the font size.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Trend Line Chart](#) [► 695]

**See also**

**Attribute getter:** getTooltipFontSize

**Attribute setter:** setTooltipFontSize

---



Available from version 1.10

---

### 5.10.2.46.3.38 TooltipFontSizeUnit

Selecting the unit of the font size in the tooltips (pixel or percent).

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Trend Line Chart](#) [► 695]

**See also**

**Attribute getter:** getTooltipFontSizeUnit

**Attribute setter:** setTooltipFontSizeUnit

---



Available from version 1.10

---

### 5.10.2.46.3.39 TooltipFontWeight

Selecting the font weight for the tooltips (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Trend Line Chart](#) [► 695]

**See also**

**Attribute getter:** getTooltipFontWeight

**Attribute setter:** setTooltipFontWeight

---



Available from version 1.10

---

### 5.10.2.46.3.40 TooltipFormat

Definition of the formatting of the tooltips.

**Schema:** tchmi:framework#/definitions/Function

The selected function defines the tooltip display. It is called as soon as the mouse cursor is positioned on a point and/or an error. In addition, it contains the current timestamp of the mouse, which is specified in milliseconds, a list of points and a list of errors. The respective list is empty if there are no points or errors at this position.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
TooltipFormat(actTime: number, points: TcHmiTrendLineChart.TooltipInformationObject[], errors: TcHmiTrendLineChart.TooltipErrorInformationObject[]): string;
```

#### Parameter

Name	Type	Description
actTime	number	The current timestamp of the mouse position in milliseconds since 1.1.1970.
points	TcHmiTrendLineChart.TooltipInformationObject[]	The recorded points locate (as array) at the mouse position (within the point radius).
errors	TcHmiTrendLineChart.TooltipErrorInformationObject[]	The recorded errors located (as array) at the mouse position.

#### Return value

Type	Description
string	The tooltip to be displayed. HTML is allowed here.

**Origin:** [Trend Line Chart \[► 695\]](#)

#### See also

**Attribute getter:** `getTooltipFormat`

**Attribute setter:** `setTooltipFormat`



Available from version 1.10

### 5.10.2.46.3.41 XAxisColor

Definition of the color of the X-axis.

**Schema:** `tchmi:framework#/definitions/SolidColor`

**Origin:** [Trend Line Chart \[► 695\]](#)

#### See also

**Attribute getter:** `getXAxisColor`

**Attribute setter:** `setXAxisColor`



Available from version 1.10

### 5.10.2.46.3.42 XAxisFormat

**Schema:** tchmi:framework#/definitions/Function

Definition of the formatting of the X-axis labels.

The selected function defines the X-axis labels. It is called for each displayed value of the main X-axis subdivision. In addition it contains the respective timestamp, which is specified in milliseconds.

A function must fulfill the following signature in order to be offered in the engineering. The parameters mentioned here are set by the control. Further parameters are possible and can be specified per instance in the engineering.

[ Function ]

```
XAxisFormat(value: number): string;
```

#### Parameter

Name	Type	Description
value	number	The current numerical value of the X-axis in milliseconds since 1.1.1970.

#### Return value

Type	Description
string	The new value of the main X-axis subdivision. HTML is not allowed here.

**Origin:** [Trend Line Chart \[► 695\]](#)

#### See also

**Attribute getter:** getXAxisFormat

**Attribute setter:** setXAxisFormat



Available from version 1.10

### 5.10.2.46.3.43 XAxisName

Definition of the X-axis name.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Trend Line Chart \[► 695\]](#)

#### See also

**Attribute getter:** getXAxisName

**Attribute setter:** setXAxisName



Available from version 1.10

### 5.10.2.46.3.44 XAxisNameFontColor

Definition of the font color of the X-axis name.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getXAxisNameFontColor

**Attribute setter:** setXAxisNameFontColor

---



Available from version 1.10

---

### 5.10.2.46.3.45 XAxisNameFontFamily

Definition of the font using the name of the font family or the keyword.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getXAxisNameFontFamily

**Attribute setter:** setXAxisNameFontFamily

---



Available from version 1.10

---

### 5.10.2.46.3.46 XAxisNameFontSize

Definition of the font size of the X-axis name.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getXAxisNameFontSize

**Attribute setter:** setXAxisNameFontSize

---



Available from version 1.10

---

### 5.10.2.46.3.47 XAxisNameFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getXAxisNameFontSizeUnit

**Attribute setter:** setXAxisNameFontSizeUnit

---



Available from version 1.10

---

### 5.10.2.46.3.48 XAxisNameFontWeight

Selection of the font weight of the X-axis name (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Trend Line Chart](#) [[► 695](#)]

**See also**

**Attribute getter:** getXAxisNameFontWeight

**Attribute setter:** setXAxisNameFontWeight

---



Available from version 1.10

---

### 5.10.2.46.3.49 XAxisWidth

Definition of the axis width.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Trend Line Chart](#) [[► 695](#)]

**See also**

**Attribute getter:** getXAxisWidth

**Attribute setter:** setXAxisWidth

---



Available from version 1.10

---

### 5.10.2.46.3.50 XLabelFontColor

Definition of the color of the X-axis labels.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Trend Line Chart](#) [[► 695](#)]

**See also**

**Attribute getter:** getXLabelFontColor

**Attribute setter:** setXLabelFontColor

---



Available from version 1.10

---

### 5.10.2.46.3.51 XLabelFontFamily

Definition of the font using the name of the font family or the keyword.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getXLabelFontFamily

**Attribute setter:** setXLabelFontFamily

---



Available from version 1.10

---

### 5.10.2.46.3.52 XLabelFontSize

Definition of the font size for the X-axis labels.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getXLabelFontSize

**Attribute setter:** setXLabelFontSize

---



Available from version 1.10

---

### 5.10.2.46.3.53 XLabelFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getXLabelFontSizeUnit

**Attribute setter:** setXLabelFontSizeUnit

---



Available from version 1.10

---

### 5.10.2.46.3.54 XLabelFontWeight

Selection of the font weight of the X-axis labels (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also****Attribute getter:** getXLabelFontWeight**Attribute setter:** setXLabelFontWeightAvailable from version 1.10

---

**5.10.2.46.3.55 XMainTickSteps**

Definition of the number of main X-axis subdivisions.

**Schema:** tchmi:general#/definitions/Number**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getXMainTickSteps**Attribute setter:** setXMainTickStepsAvailable from version 1.10

---

**5.10.2.46.3.56 XShowLabels**

Selecting whether the X-axis labels are to be displayed

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getXShowLabels**Attribute setter:** setXShowLabelsAvailable from version 1.10

---

**5.10.2.46.3.57 XSubTickSteps**

Definition of the number of auxiliary X-axis subdivisions.

**Schema:** tchmi:general#/definitions/Number**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getXSubTickSteps**Attribute setter:** setXSubTickSteps





Available from version 1.10

---

### 5.10.2.46.3.58 YAxis

Definition of one or more Y-axes.

**Schema** (version 1.10): tchmi:framework#/definitions/ChartYAxisDefinitionList

**Schema** (version 1.12): tchmi:framework#/definitions/  
TcHmi.Controls.Beckhoff.TcHmiTrendLineChart.ChartYAxisDefinitionList

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getYAxis

**Attribute setter:** setYAxis

---



Available from version 1.10

---

### 5.10.2.46.3.59 YAxisWidth

Definition of the Y-axis width.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getYAxisWidth

**Attribute setter:** setYAxisWidth

---



Available from version 1.10

---

### 5.10.2.46.3.60 YLabelFontFamily

Definition of the font using the name of the font family or the keyword.

**Schema:** tchmi:framework#/definitions/FontFamily

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getYLabelFontFamily

**Attribute setter:** setYLabelFontFamily

---



Available from version 1.10

---

### 5.10.2.46.3.61 YLabelFontSize

Definition of the font size for the Y-axis labels.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getYLabelFontSize

**Attribute setter:** setYLabelFontSize

---



Available from version 1.10

---

### 5.10.2.46.3.62 YLabelFontSizeUnit

Selection of the unit of the font size of the Y-axis labels (pixel or percent).

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getYLabelFontSizeUnit

**Attribute setter:** setYLabelFontSizeUnit

---



Available from version 1.10

---

### 5.10.2.46.3.63 YLabelFontWeight

Selection of the font weight of the Y-axis labels (normal, bold).

**Schema:** tchmi:framework#/definitions/FontWeight

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also**

**Attribute getter:** getYLabelFontWeight

**Attribute setter:** setYLabelFontWeight

---



Available from version 1.10

---

### 5.10.2.46.3.64 YMainTickSteps

Definition of the number of main Y-axis subdivisions.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Trend Line Chart \[► 695\]](#)

**See also****Attribute getter:** getYMainTickSteps**Attribute setter:** setYMainTickStepsAvailable from version 1.10

---

**5.10.2.46.3.65 YSubTickSteps**

Definition of the number of auxiliary Y-axis subdivisions.

**Schema:** tchmi:general#/definitions/Number**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getYSubTickSteps**Attribute setter:** setYSubTickStepsAvailable from version 1.10

---

**5.10.2.46.3.66 ShowLegend**

Selecting whether the legend is to be displayed.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getShowLegend**Attribute setter:** setShowLegendAvailable from version 1.12.746

---

**5.10.2.46.3.67 ServerDomain**

Definition of the server extension name.

**Schema:** tchmi:framework#/definitions/FontFamily**Origin:** [Trend Line Chart \[► 695\]](#)**See also****Attribute getter:** getServerDomain**Attribute setter:** setServerDomain



Available from version 1.12

---

#### 5.10.2.46.3.68 ReferenceLines

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.Beckhoff.TcHmiLineChart.ChartReferenceLineDefinitionList

**Origin:** [Line Chart](#) [► 406]

**See also**

**Attribute getter:** getReferenceLines

**Attribute setter:** setReferenceLines

---



Available since version 1.12.760

---

#### 5.10.2.46.4 Themed Resources

These resources cannot be defined per instance, but only for several/all trend line charts via the [theme file](#) [► 1011]. If you really want to change only one instance, you must create a [class](#) [► 1008] for it.

---



Available from version 1.10

---

#### 5.10.2.46.4.1 YAxisGenerated

This is the axis definition that is used for Y-axes if nothing is defined in the attribute [YAxis](#) [► 725].

**Schema:** tchmi:framework#/definitions/ChartYAxisDefinition

**Origin:** [Trend Line Chart](#) [► 695]

---



Available from version 1.10

---

#### 5.10.2.46.5 Functions

##### 5.10.2.46.5.1 pause

Stops the view.

**Return value:** null

**Origin:** [TcHmiTrendLineChart](#) [► 695]

---



Available from version 1.12

---

### 5.10.2.46.5.2 resetZoom

Resets all interactions.

**Return value:** null

**Origin:** [TcHmiTrendLineChart](#) [► 695]



Available from version 1.12

### 5.10.2.46.5.3 play

Resets the zoom and displays live data again.

**Return value:** null

**Origin:** [TcHmiTrendLineChart](#) [► 695]



Available from version 1.12

## 5.10.2.47 User Management

A control for managing users.

### Attributes

**Category:** Colors

Name	Description
<a href="#">TextColor</a> [► 735]	Definition the text color of the control
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">AllowLogout [► 738]</a>	Activates the logout button in the drop-down menu of the control.
<a href="#">AllowSwitchUser [► 738]</a>	Activates the switch user button in the drop-down menu of the control.
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**



Name	Description
<a href="#">TextFontSize [► 735]</a>	Definition of the font size
<a href="#">TextFontSizeUnit [► 735]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">UserNameFontSize [► 736]</a>	Definition of the font size
<a href="#">UserNameFontSizeUnit [► 736]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">DropDownFontSize [► 736]</a>	Definition of the font size
<a href="#">DropDownFontSizeUnit [► 737]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">HeadlineFontSize [► 737]</a>	Definition of the font size
<a href="#">HeadlineFontSizeUnit [► 737]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">SubHeadlineFontSize [► 737]</a>	Definition of the font size
<a href="#">SubHeadlineFontSizeUnit [► 738]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>

## Events

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

UserManagement

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from version 1.12.748

---

#### See also

API reference for this control

### 5.10.2.47.1 Attributes

#### 5.10.2.47.1.1 TextColor

Defines the color of the font.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [User Management](#) [► 729]

#### See also

**Attribute getter:** getTextColor

**Attribute setter:** setTextColor

---



Available from version 1.12.748

---

#### 5.10.2.47.1.2 TextFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [User Management](#) [► 729]

#### See also

**Attribute getter:** getTextFontSize

**Attribute setter:** setTextFontSize

---



Available from version 1.12.748

---

#### 5.10.2.47.1.3 TextFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [User Management](#) [► 729]

#### See also

**Attribute getter:** getTextFontSizeUnit

**Attribute setter:** setTextFontSizeUnit



Available from version 1.12.748

---

#### 5.10.2.47.1.4    **UserNameFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [User Management](#) [► 729]

**See also**

**Attribute getter:** getUsernameFontSize

**Attribute setter:** setUsernameFontSize

---



Available from version 1.12.748

---

#### 5.10.2.47.1.5    **UserNameFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [User Management](#) [► 729]

**See also**

**Attribute getter:** getUsernameFontSizeUnit

**Attribute setter:** setUsernameFontSizeUnit

---



Available from version 1.12.748

---

#### 5.10.2.47.1.6    **DropDownFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [User Management](#) [► 729]

**See also**

**Attribute getter:** getDropDownFontSize

**Attribute setter:** setDropDownFontSize

---



Available from version 1.12.748

---

### 5.10.2.47.1.7 DropDownFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [User Management](#) [► 729]

**See also**

**Attribute getter:** getDropDownFontSizeUnit

**Attribute setter:** setDropDownFontSizeUnit

---



Available from version 1.12.748

---

### 5.10.2.47.1.8 HeadlineFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [User Management](#) [► 729]

**See also**

**Attribute getter:** getHeadlineFontSize

**Attribute setter:** setHeadlineFontSize

---



Available from version 1.12.748

---

### 5.10.2.47.1.9 HeadlineFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [User Management](#) [► 729]

**See also**

**Attribute getter:** getHeadlineFontSizeUnit

**Attribute setter:** setHeadlineFontSizeUnit

---



Available from version 1.12.748

---

### 5.10.2.47.1.10 SubHeadlineFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [User Management](#) [► 729]

**See also****Attribute getter:** getSubHeadlineFontSize**Attribute setter:** setSubHeadlineFontSizeAvailable from version 1.12.748

---

**5.10.2.47.1.11 SubHeadlineFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [User Management](#) [► 729]**See also****Attribute getter:** getSubHeadlineFontSizeUnit**Attribute setter:** setSubHeadlineFontSizeUnitAvailable from version 1.12.748

---

**5.10.2.47.1.12 AllowLogout**

Activates the logout button in the drop-down menu of the control.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [User Management](#) [► 729]**See also****Attribute getter:** getAllowLogout**Attribute setter:** setAllowLogoutAvailable from version 1.12.752

---

**5.10.2.47.1.13 AllowSwitchUser**

Activates the switch user button in the drop-down menu of the control.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [User Management](#) [► 729]**See also****Attribute getter:** getAllowSwitchUser**Attribute setter:** setAllowSwitchUser



Available from version 1.12.752

5.10.2.48      **Video**

Video can be played with the video control. The supported video formats are defined by the browser used.

**Attributes**

**Category: Colors**

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.



Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 746]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the upper and lower sides of the parent element. The 'Width' attribute is ignored in all calculations!</li> <li>• Content: The width is calculated from the height while maintaining the aspect ratio of the video. If the attributes 'Width Mode' and 'Height Mode' are set to Content, the video is drawn in its original size. The 'Width' attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 746]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the upper and lower side of the parent element. The 'Height' attribute is ignored in all calculations!</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>Content: The height is calculated from the width while maintaining the aspect ratio of the video. If the attributes 'Width Mode [► 741]' and 'Height Mode' are set to Content, the video is drawn in its original size. The 'Height' attribute is ignored in all calculations!</li> </ul>
<a href="#">OriginalWidth [► 749]</a>	Plays back the original width of the video or 0 if it is not available.
<a href="#">OriginalHeight [► 750]</a>	Plays back the original height of the video or 0 if it is not available.

**Category: Common**

Name	Description
<a href="#">SrcList [► 747]</a>	Definition of a list of videos that can be played back
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Video**

Name	Description
<a href="#">Volume [► 747]</a>	Definition of the volume of the video
<a href="#">Mute [► 747]</a>	Selecting whether the sound is to be switched off
<a href="#">Playbackrate [► 748]</a>	Definition of a playback rate. The normal playback speed is multiplied by this value to obtain the current rate.
<a href="#">CurrentTime [► 749]</a>	Definition of the current playback time of the video
<a href="#">Duration [► 749]</a>	Plays the length of the video in seconds or 0 if it is not available.
<a href="#">isEnded [► 748]</a>	Returns a Boolean value indicating whether playback has finished or not.
<a href="#">isPlaying [► 748]</a>	Returns a Boolean value indicating whether the video is currently playing or not.

**Category: Player**

Name	Description
<a href="#">Controls [► 750]</a>	Selecting whether the integrated control elements are to be displayed
<a href="#">Autoplay [► 750]</a>	Selecting whether the video should be started automatically
<a href="#">Loop [► 751]</a>	Selecting whether the video is to be repeated automatically on a permanent basis
<a href="#">Poster [► 751]</a>	Definition of a startup image to be displayed until the operator starts or rewinds the video. If nothing is specified here, nothing is displayed until the first image of the video has been loaded.

**Events****Category: Control**

Name	Description
<a href="#">onLoadedData [► 751]</a>	The video was loaded successfully.
<a href="#">onError [► 751]</a>	The video was not loaded successfully.
<a href="#">onVolumeChange [► 752]</a>	The volume of the video has been changed.
<a href="#">onDurationChange [► 752]</a>	The duration of the video has changed.
<a href="#">onIsEndedChange [► 752]</a>	The video was terminated.
<a href="#">onIsPlayingChange [► 752]</a>	The video has changed its playback status.
<a href="#">onTimeUpdate [► 752]</a>	The playback position has been changed.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Functions

Name	Origin	Description
play	TcHmiVideo	Start video
pause	TcHmiVideo	Pause video
stop	TcHmiVideo	End video
skipBackward	TcHmiVideo	Rewind video
skipForward	TcHmiVideo	Fast forward video

### Inheritance hierarchy

[Control \[► 753\]](#)

Video

**NuGet package:** [Beckhoff.TwinCAT.HMI.Controls](#)



NuGet packages are available from version 1.12.



Available from 1.8

#### See also

API reference for this control

### 5.10.2.48.1 Attributes

#### 5.10.2.48.1.1 HeightMode

Selection of the method of calculating the height. The available options are:

- **Value:** The height is defined by the height entered.
- **Parent:** The height is defined by the distance to the top and bottom side. The Height attribute is ignored in all calculations!
- **Content:** The height is calculated from the width while maintaining the aspect ratio of the video. If *Width Mode* [► 746] and *Height Mode* are set to Content, the video is drawn in its original size.



Learn how [controls can be positioned and their size defined](#) [► 116].

**Schema:** tchmi:framework#/definitions/SizeModeWithContent

**Origin:** [Video](#) [► 739]

#### See also

**Attribute getter:** getHeightMode

**Attribute setter:** setHeightMode



Available from 1.8

#### 5.10.2.48.1.2 WidthMode

Selection of the method of calculating the width. The available options are:

- **Value:** The width is defined by the width entered.
- **Parent:** The width is defined by the distance to the left and right side. The *Width* attribute is ignored in all calculations!
- **Content:** The width is calculated from the height while maintaining the aspect ratio of the video. If *Width Mode* and *Height Mode* [► 746] are set to Content, the video is drawn in its original size.



Learn how [controls can be positioned and their size defined](#) [► 116].

**Schema:** tchmi:framework#/definitions/SizeModeWithContent

**Origin:** [Video](#) [► 739]

**See also****Attribute getter:** getWidthMode**Attribute setter:** setWidthModeAvailable from 1.8

---

**5.10.2.48.1.3 SrcList**

A list of videos that the browser should play.

The videos are **not** played one after the other, but the browser tries to play each video until it finds a format that it supports.

If the format type is not set, the browser tries to detect the code itself.

You can check the current status of browser support on the external website <http://caniuse.com/>.

**Schema:** tchmi:framework#/definitions/VideoSourceList**Origin:** [Video](#) [► 739]**See also****Attribute getter:** getSrcList**Attribute setter:** setSrcListAvailable from 1.8

---

**5.10.2.48.1.4 Volume**

Volume of the video. The number 0 sets the video to mute while 1 means full volume.

**Schema:** tchmi:framework#/definitions/Fraction**Origin:** [Video](#) [► 739]**See also****Attribute getter:** getVolume**Attribute setter:** setVolumeAvailable from 1.8

---

**5.10.2.48.1.5 Mute**

Specifies whether the sound is switched off.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Video](#) [► 739]

**See also****Attribute getter:** getMute**Attribute setter:** setMuteAvailable from 1.8

---

**5.10.2.48.1.6 Playbackrate**

The normal playback speed is multiplied by this value to obtain the current rate. Thus, the value 1.0 represents the normal speed.

**Schema:** tchmi:general#/definitions/Number**Origin:** [Video \[► 739\]](#)**See also****Attribute getter:** getPlaybackrate**Attribute setter:** setPlaybackrateAvailable from 1.8

---

**5.10.2.48.1.7 IsEnded**

Returns a Boolean value indicating whether playback has finished or not.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Video \[► 739\]](#)**See also****Attribute getter:** getIsEnded

The attribute can only be read and therefore has no setter.

Available from 1.8

---

**5.10.2.48.1.8 IsPlaying**

Returns a Boolean value indicating whether the video is currently playing or not.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Video \[► 739\]](#)**See also****Attribute getter:** getIsPlaying

The attribute can only be read and therefore has no setter.





Available from 1.8

---

#### 5.10.2.48.1.9 CurrentTime

The current playback time of the video.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Video \[► 739\]](#)

**See also**

**Attribute getter:** getCurrentTime

**Attribute setter:** setCurrentTime

---



Available from 1.8

---

#### 5.10.2.48.1.10 Duration

Plays the length of the video in seconds or 0 if it is not available.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Video \[► 739\]](#)

**See also**

**Attribute getter:** getDuration

The attribute can only be read and therefore has no setter.

---



Available from 1.8

---

#### 5.10.2.48.1.11 OriginalWidth

Plays back the original width of the video or 0 if it is not available.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Video \[► 739\]](#)

**See also**

**Attribute getter:** getOriginalWidth

The attribute can only be read and therefore has no setter.

---



Available from 1.8

---

### 5.10.2.48.1.12 OriginalHeight

Plays back the original height of the video or 0 if it is not available.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Video](#) [► 739]

**See also**

**Attribute getter:** getOriginalHeight

The attribute can only be read and therefore has no setter.



Available from 1.8

---

### 5.10.2.48.1.13 Controls

Specifies whether operating elements are to be displayed. The user can control playback, adjust the volume and pause/resume the video.



Some browsers do not allow [automatic](#) [► 750] or application-based start of a video. You should therefore carry out intensive tests to determine whether it makes sense to deactivate the controls.

---

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Video](#) [► 739]

**See also**

**Attribute getter:** getControls

**Attribute setter:** setControls



Available from 1.8

---

### 5.10.2.48.1.14 Autoplay

Specifies whether the video is to be started directly.



In some browsers this is not allowed by default. In part this is possible again when the sound is [switched off](#) [► 747].

---

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Video](#) [► 739]

**See also**

**Attribute getter:** getAutoplay

**Attribute setter:** setAutoplay



Available from 1.8

---

### 5.10.2.48.1.15 Loop

When the video is finished, it starts again from the beginning.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Video](#) [► 739]

**See also**

**Attribute getter:** getLoop

**Attribute setter:** setLoop

---



Available from 1.8

---

### 5.10.2.48.1.16 Poster

A URL representing an individual image that is displayed until the user plays or winds the video.

If this attribute is not set, nothing is displayed until the first video frame is available. From this point in time, this first frame is used.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Video](#) [► 739]

**See also**

**Attribute getter:** getPoster

**Attribute setter:** setPoster

---



Available from 1.8

---

## 5.10.2.48.2 Events

### 5.10.2.48.2.1 onError

The video was not loaded successfully.

**Origin:** [Video](#) [► 739]

---



Available from 1.8

---

### 5.10.2.48.2.2 onLoadedData

The video was loaded successfully.

**Origin:** [Video](#) [► 739]

---



Available from 1.8

---

### 5.10.2.48.2.3 onVolumeChange

The volume [▶ 747] of the video has been changed.

Origin: Video [▶ 739]

---



Available from 1.8

---

### 5.10.2.48.2.4 onDurationChange

The duration of the video [▶ 749] has changed.

Origin: Video [▶ 739]

---



Available from 1.8

---

### 5.10.2.48.2.5 onIsEndedChange

The video was terminated [▶ 748].

Origin: Video [▶ 739]

---



Available from 1.8

---

### 5.10.2.48.2.6 onIsPlayingChange

The video has changed its playback status [▶ 748].

Origin: Video [▶ 739]

---



Available from 1.8

---

### 5.10.2.48.2.7 onTimeUpdate

The playback position [▶ 749] has been changed.

Origin: Video [▶ 739]

---



Available from 1.8

---

### 5.10.3 System

Name	Description
<a href="#">Control</a> [ <a href="#">► 753</a> ]	No instance of this class can be created. This page serves only as a list of the attributes that this class provides. Base class of all controls.
<a href="#">Container Control</a> [ <a href="#">► 783</a> ]	No instance of this class can be created. This page serves only as a list of the attributes that this class provides. Base class for all controls that can contain further controls.
<a href="#">Container</a> [ <a href="#">► 790</a> ]	The container offers the option of grouping other child controls. All child controls that are added to a container are defined relative to the position of the container and are shifted automatically with the container.
<a href="#">Content</a> [ <a href="#">► 795</a> ]	No instance of this class can be created. This page serves only as a list of the attributes that this class provides. A content is an independent container object that can be loaded in a <a href="#">region</a> [ <a href="#">► 829</a> ].
<a href="#">Grid</a> [ <a href="#">► 800</a> ]	Layout grid for controls that can react fluidly and responsively.
<a href="#">HTML Host</a> [ <a href="#">► 813</a> ]	Container for HTML content. Can be edited in the HTML editor of the Designer.
<a href="#">Partial</a> [ <a href="#">► 824</a> ]	No instance of this class can be created. This page serves only as a list of the attributes that this class provides.
<a href="#">Region</a> [ <a href="#">► 829</a> ]	The region allows you to display a Content control (and thus a subpage of any complexity).
<a href="#">User Control</a> [ <a href="#">► 837</a> ]	No instance of this class can be created. This page serves only as a list of the attributes that this class provides. A reusable collection of controls.
<a href="#">User Control Host</a> [ <a href="#">► 842</a> ]	No instance of this class can be created. This page serves only as a list of the attributes that this class provides. The user control host is an administration container for user controls.
<a href="#">View</a> [ <a href="#">► 849</a> ]	No instance of this class can be created. This page serves only as a list of the attributes that this class provides. Top-level control for a TcHmi visualization.

#### 5.10.3.1 Control

No instance of this class can be created. This page serves only as a list of the attributes that this class provides. It is the base class of all controls.

##### Attributes

**Category:** Colors

Name	Description
BackgroundColor [ <a href="#">▶ 769</a> ]	Definition of the background color
BorderColor [ <a href="#">▶ 768</a> ]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**



Name	Description
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

**Inheritance hierarchy**

Control

**NuGet package:** [Beckhoff.TwinCAT.HMI.Framework](#)

NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.3.1.1 Attributes****5.10.3.1.1.1 Id**

Name of the control.

**Schema:** tchmi:framework#/definitions/Id

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getId

The attribute can only be read and therefore has no setter.



Available from 1.8

---

**5.10.3.1.1.2 IsEnabled**

Activation status of a control. Only active controls respond to mouse and touch.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getIsEnabled

**Attribute setter:** setIsEnabled



Available from 1.8

---

**5.10.3.1.1.3 ClassNames**

Definition of the class(es) of the control. These classes can be addressed within the theme.

**Schema:** tchmi:framework#/definitions/ClassNameList

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getClassNames

**Attribute setter:** setClassNames



Available from version 1.10

---

#### 5.10.3.1.1.4 IsAttached

Indicates the status regarding whether the control is currently logically integrated inside the DOM.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getIsAttached

The attribute can only be read and therefore has no setter.



Available from 1.8

---

#### 5.10.3.1.1.5 Left

Definition of the distance from the left side to the left side of the surrounding control. This value may be empty if [Width](#) [► 761] and [Right](#) [► 763] are filled out.



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getLeft

**Attribute setter:** setLeft



Available from 1.8

---

#### 5.10.3.1.1.6 LeftUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getLeftUnit

**Attribute setter:** setLeftUnit



Available from 1.8

---

### 5.10.3.1.1.7 Top

Definition of the distance from the top side to the top side of the surrounding control. This value may be empty if [Height](#) [► 762] and [Bottom](#) [► 764] are filled out.



Learn how [controls can be positioned and their size defined](#) [► 116].

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getTop

**Attribute setter:** setTop



Available from 1.8

### 5.10.3.1.1.8 TopUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getTopUnit

**Attribute setter:** setTopUnit



Available from 1.8

### 5.10.3.1.1.9 Width

External width of the control. [Left](#) [► 760] and [Right](#) [► 763] are used to calculate the size if this value is empty. This value is only interpreted if the attribute [Width Mode](#) [► 762] has the value Value.



Learn how [controls can be positioned and their size defined](#) [► 116].

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getWidth

**Attribute setter:** setWidth



Available from 1.8

#### 5.10.3.1.1.10 WidthUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getWidthUnit

**Attribute setter:** setWidthUnit



Available from 1.8

#### 5.10.3.1.1.11 WidthMode

Selection of the method of calculating the width. The available options are:

- **Value:** The width is defined by the width entered.
- **Parent:** The width is defined by the distance to the left and right side. The *Width* attribute is ignored in all calculations!



Learn how [controls can be positioned and their size defined](#) [► 116].

**Schema:** tchmi:framework#/definitions/SizeMode

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getWidthMode

**Attribute setter:** setWidthMode



Available from 1.8

#### 5.10.3.1.1.12 Height

External height of the control. [Top](#) [► 761] and [Bottom](#) [► 764] attributes are used to calculate the size if this value is empty. This value is only interpreted if the attribute [Height Mode](#) [► 763] has the value Value.



Learn how [controls can be positioned and their size defined](#) [► 116].

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

See also

**Attribute getter:** getHeight

**Attribute setter:** setHeight

---



Available from 1.8

---

#### 5.10.3.1.1.13 HeightUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Control](#) [► 753]

See also

**Attribute getter:** getHeightUnit

**Attribute setter:** setHeightUnit

---



Available from 1.8

---

#### 5.10.3.1.1.14 HeightMode

Selection of the method of calculating the height. The available options are:

- **Value:** The height is defined by the height entered.
  - **Parent:** The height is defined by the distance to the top and bottom side. The *Height* attribute is ignored in all calculations!
- 



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/SizeMode

**Origin:** [Control](#) [► 753]

See also

**Attribute getter:** getHeightMode

**Attribute setter:** setHeightMode

---



Available from 1.8

---

#### 5.10.3.1.1.15 Right

Definition of the distance from the right side to the right side of the surrounding control. This value is only used if one of the two attributes [Left](#) [► 760] and [Width](#) [► 761] is not used.



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getRight

**Attribute setter:** setRight

---



Available from 1.8

---

### 5.10.3.1.1.16 RightUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getRightUnit

**Attribute setter:** setRightUnit

---



Available from 1.8

---

### 5.10.3.1.1.17 Bottom

Definition of the distance from the bottom side to the bottom side of the surrounding control. This value is only used if one of the two attributes [Top](#) [► 761] and [Height](#) [► 762] is not used.

---



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getBottom

**Attribute setter:** setBottom

---



Available from 1.8

---



#### 5.10.3.1.1.18 BottomUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Control](#) [[► 753](#)]

**See also**

**Attribute getter:** getBottomUnit

**Attribute setter:** setBottomUnit

---



Available from 1.8

---

#### 5.10.3.1.1.19 RenderedLeft

Returns the calculated distance in pixels between the left side and the left side of the higher-level control. This value always returns a value, irrespective of the positioning of a control.

This value very probably has rounding inaccuracies.

---



Learn how [controls can be positioned and their size defined](#) [[► 116](#)].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [[► 753](#)]

**See also**

**Attribute getter:** getRenderedLeft

The attribute can only be read and therefore has no setter.

---



Available from version 1.10

---

#### 5.10.3.1.1.20 RenderedTop

Returns the calculated distance in pixels between the top side and the top side of the higher-level control. This value always returns a value, irrespective of the positioning of a control.

This value very probably has rounding inaccuracies.

---



Learn how [controls can be positioned and their size defined](#) [[► 116](#)].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [[► 753](#)]

**See also**

**Attribute getter:** getRenderedTop

The attribute can only be read and therefore has no setter.

---



Available from version 1.10

---

#### 5.10.3.1.1.21 RenderedBottom

Returns the calculated distance in pixels between the bottom side and the bottom side of the higher-level control. This value always returns a value, irrespective of the positioning of a control.

This value very probably has rounding inaccuracies.

---



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getRenderedBottom

The attribute can only be read and therefore has no setter.

---



Available from version 1.10

---

#### 5.10.3.1.1.22 RenderedRight

Returns the calculated distance in pixels between the right side and the right side of the higher-level control. This value always returns a value, irrespective of the positioning of a control.

This value very probably has rounding inaccuracies.

---



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getRenderedRight

The attribute can only be read and therefore has no setter.

---



Available from version 1.10

---

#### 5.10.3.1.1.23 RenderedWidth

Returns the calculated width of the control in pixels. This value always returns a value, irrespective of the positioning of a control.

This value very probably has rounding inaccuracies.



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getRenderedWidth

The attribute can only be read and therefore has no setter.

---



Available from version 1.10

---

#### 5.10.3.1.1.24    **RenderedHeight**

Returns the calculated height of the control in pixels. This value always returns a value, irrespective of the positioning of a control.

This value very probably has rounding inaccuracies.

---



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getRenderedHeight

The attribute can only be read and therefore has no setter.

---



Available from version 1.10

---

#### 5.10.3.1.1.25    **GridColumnIndex**

Definition of the column of a [grid](#) [► 800] in which the control is to be displayed.

The attribute has no effect if the control is not in such a container.

**Schema:** tchmi:general#/definitions/UDINT

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getGridColumnIndex

**Attribute setter:** setGridColumnIndex



Available from 1.8

---

#### 5.10.3.1.1.26 GridRowIndex

Definition of the row of a [grid](#) [► 800] in which the control is to be displayed.

The attribute has no effect if the control is not in such a container.

**Schema:** tchmi:general#/definitions/UDINT

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getGridRowIndex

**Attribute setter:** setGridRowIndex

---



Available from 1.8

---

#### 5.10.3.1.1.27 BorderColor

Border color

A border is only displayed if Border Color, [Border Width](#) [► 768] and [Border Style](#) [► 769] have been set.

**Schema:** tchmi:framework#/definitions/Color

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getBorderColor

**Attribute setter:** setBorderColor

---



Only SolidColor is possible before TcHmi version 1.10.

---



Available from 1.8

---

#### 5.10.3.1.1.28 BorderWidth

Definition of the border width of the four sides of the control.

A border is only displayed if [Border Color](#) [► 768], [Border Width](#) and [Border Style](#) [► 769] have been set.

---



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/BorderWidth

**Origin:** [Control](#) [► 753]

---

**See also****Attribute getter:** getBorderWidth**Attribute setter:** setBorderWidthAvailable from 1.8

---

**5.10.3.1.1.29 BorderStyle**

Selection of the border style of the four sides of the control. The possible settings are none, solid line, dotted line or dashed line

A border is only displayed if Border Color, [Border Width \[► 768\]](#) and Border Style have been set.

**Schema:** tchmi:framework#/definitions/BorderStyle**Origin:** [Control \[► 753\]](#)**See also****Attribute getter:** getBorderStyle**Attribute setter:** setBorderStyleAvailable from 1.8

---

**5.10.3.1.1.30 BorderRadius**

Definition of the radius of the four corners of a border to round them off.

**Schema:** tchmi:framework#/definitions/BorderRadius**Origin:** [Control \[► 753\]](#)**See also****Attribute getter:** getBorderRadius**Attribute setter:** setBorderRadiusAvailable from 1.8

---

**5.10.3.1.1.31 BackgroundColor**

Definition of the background color. This is displayed if no background image or a transparent background image is set.

**Schema:** tchmi:framework#/definitions/Color**Origin:** [Control \[► 753\]](#)**See also****Attribute getter:** getBackgroundColor

**Attribute setter:** setBackgroundColor

---



Available from 1.8

---

#### 5.10.3.1.1.32 BackgroundImage

An image that is above the background color.

**Schema:** tchmi:framework#/definitions/Path

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getBackgroundImage

**Attribute setter:** setBackgroundImage

---



Available from 1.8

---

#### 5.10.3.1.1.33 BackgroundImageWidth

Numerical value of the width of the background image.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getBackgroundImageWidth

**Attribute setter:** setBackgroundImageWidth

---



Available from 1.8

---

#### 5.10.3.1.1.34 BackgroundImageWidthUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getBackgroundImageWidthUnit

**Attribute setter:** setBackgroundImageWidthUnit

---



Available from 1.8

---

### 5.10.3.1.1.35 BackgroundImageHeight

Numerical value of the height of the background image.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getBackgroundImageHeight

**Attribute setter:** setBackgroundImageHeight

---



Available from 1.8

---

### 5.10.3.1.1.36 BackgroundImageHeightUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getBackgroundImageHeightUnit

**Attribute setter:** setBackgroundImageHeightUnit

---



Available from 1.8

---

### 5.10.3.1.1.37 BackgroundImagePadding

Definition of an additional distance between the border of the control and background image for the four sides.

**Schema:** tchmi:framework#/definitions/Padding

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getBackgroundImagePadding

**Attribute setter:** setBackgroundImagePadding

---



Available from 1.8

---

### 5.10.3.1.1.38 BackgroundImageHorizontalAlignment

Definition of the alignment of the background image within the control

**Schema:** tchmi:framework#/definitions/HorizontalAlignment

**Origin:** [Control](#) [► 753]

**See also****Attribute getter:** `getBackgroundImageHorizontalAlignment`**Attribute setter:** `setBackgroundImageHorizontalAlignment`Available from 1.8

---

**5.10.3.1.1.39 BackgroundImageVerticalAlignment**

Definition of the alignment of the background image within the control

**Schema:** `tchmi:framework#/definitions/VerticalAlignment`**Origin:** [Control](#) [► 753]**See also****Attribute getter:** `getBackgroundImageVerticalAlignment`**Attribute setter:** `setBackgroundImageVerticalAlignment`Available from 1.8

---

**5.10.3.1.1.40 MinHeight**

Definition of the minimum height if the control size is defined as dynamic.

[Maximum Height](#) [► 773] overwrites the calculated height, but *Minimum Height* overwrites *Maximum Height*.Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** `tchmi:framework#/definitions/MeasurementValue`**Origin:** [Control](#) [► 753]**See also****Attribute getter:** `getMinHeight`**Attribute setter:** `setMinHeight`Available from 1.8

---

**5.10.3.1.1.41 MinHeightUnit**

Pixels, or percent for relative positioning.

**Schema:** `tchmi:framework#/definitions/MeasurementUnit`**Origin:** [Control](#) [► 753]



**See also****Attribute getter:** getMinHeightUnit**Attribute setter:** setMinHeightUnitAvailable from 1.8

---

**5.10.3.1.1.42    MaxHeight**

Definition of the maximum height if the control size is defined as dynamic.

*Maximum Height* overwrites the calculated height, but *Minimum Height* [► 772] overwrites *Maximum Height*.Learn how controls can be positioned and their size defined [► 116].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue**Origin:** Control [► 753]**See also****Attribute getter:** getMaxHeight**Attribute setter:** setMaxHeightAvailable from 1.8

---

**5.10.3.1.1.43    MaxHeightUnit**

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** Control [► 753]**See also****Attribute getter:** getMaxHeightUnit**Attribute setter:** setMaxHeightUnitAvailable from 1.8

---

**5.10.3.1.1.44    MaxWidth**

Definition of the maximum width if the control size is defined as dynamic.

*Maximum Width* overwrites the calculated width, but *Minimum Width* [► 774] overwrites *Maximum Width*.Learn how controls can be positioned and their size defined [► 116].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getMaxWidth

**Attribute setter:** setMaxWidth

---



Available from 1.8

---

#### 5.10.3.1.1.45    **MaxWidthUnit**

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getMaxWidthUnit

**Attribute setter:** setMaxWidthUnit

---



Available from 1.8

---

#### 5.10.3.1.1.46    **MinWidth**

Definition of the minimum width if the control size is defined as dynamic.

Maximum Width overwrites the calculated width, but Minimum Width overwrites [Maximum Width](#) [► 773].

---



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getMinWidth

**Attribute setter:** setMinWidth

---



Available from 1.8

---

#### 5.10.3.1.1.47    **MinWidthUnit**

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getMinWidthUnit

**Attribute setter:** setMinWidthUnit

---



Available from 1.8

---

#### 5.10.3.1.1.48 Opacity

Transparency of the entire control.

The number 0 sets the control to fully transparent, while 1 means fully visible.

**Schema:** tchmi:framework#/definitions/Fraction

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getOpacity

**Attribute setter:** setOpacity

---



Available from 1.8

---

#### 5.10.3.1.1.49 Tooltip

Tooltip for the control.

This is displayed for a short time when the mouse is held above a control.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Control](#) [► 753]

**See also**

**Attribute getter:** getTooltip

**Attribute setter:** setTooltip

---



Available from 1.8

---

#### 5.10.3.1.1.50 Transform

Transforms a control.

The control can be rotated, scaled, translated or skewed.

Furthermore, the origin of the transformation and the perspective can be set once.

**Schema:** tchmi:framework#/definitions/TransformList

**Origin:** [Control](#) [► 753]

**See also****Attribute getter:** getTransform**Attribute setter:** setTransform

Available from 1.8

**5.10.3.1.1.51 Type**

Type name of the control.



In version 1.8 and 1.10 a standard button returned `tchmi-button` as result whereas from version 1.12 on the full qualified name `TcHmi.Controls.Beckhoff.TcHmiButton` is returned. If you check for the type in your own source code, you may have to adapt it to the new format.

**Schema:** tchmi:framework#/definitions/ControlType**Origin:** [Control](#) [► 753]**See also****Attribute getter:** getType

The attribute can only be read and therefore has no setter.



Available from 1.8

**5.10.3.1.1.52 Visibility**

Visibility of a control.

- The default value **Visible** displays the control directly.
- If **Hide** is set, the control continues to respond to the mouse or touch. It is also involved in the size calculations with fluid designs.
- If **Collapsed** is used, the control neither takes up space nor does it receive mouse interaction or touch.

**Schema:** tchmi:framework#/definitions/Visibility**Origin:** [Control](#) [► 753]**See also****Attribute getter:** getVisibility**Attribute setter:** setVisibility

Available from 1.8

**5.10.3.1.1.53 ZIndex**

Definition of the position on the Z axis.

The higher the entry, the more the control is in the foreground. A control with a larger `ZIndex` hides a control with a smaller one.

**NOTICE**

`ZIndex` is not easy to understand because the index is not global but in a so-called stacking context. Each container control [► 783] creates its own stacking context.



Learn how controls can be positioned and their size defined [► 116].

**Schema:** tchmi:general#/definitions/UDINT

**Origin:** Control [► 753]

**See also**

**Attribute getter:** `getZIndex`

**Attribute setter:** `setZIndex`



Available from 1.8

#### 5.10.3.1.1.54 **BoxShadow**

Definition of a box shadow.

**Schema:** tchmi:framework#/definitions/BoxShadowList

**Origin:** Control [► 753]

**See also**

**Attribute getter:** `getBoxShadow`

**Attribute setter:** `setBoxShadow`



Available from 1.8

#### 5.10.3.1.1.55 **AccessConfig**

Access rights for the Control. For details see also Authorization System/Control Level [► 969].

**Schema:** tchmi:framework#/definitions/AccessConfig

**Origin:** Control [► 753]

**See also**

**Attribute getter:** `getAccessConfig`

**Attribute setter:** `setAccessConfig`



Available from 1.8

### 5.10.3.1.2 Events

#### 5.10.3.1.2.1 onAttached

The control was added to the display.

Origin: [Control \[► 753\]](#)

---



Available from 1.8

---

#### 5.10.3.1.2.2 onDetached

The control was removed from the display.

Origin: [Control \[► 753\]](#)

---



Available from 1.8

---

#### 5.10.3.1.2.3 onInitialized

The control was initialized. Not all of the values of the binding are available yet.

Origin: [Control \[► 753\]](#)

---



Available from 1.8

---

#### 5.10.3.1.2.4 onDestroyed

The control was destroyed.

Origin: [Control \[► 753\]](#)

---



Available from version 1.10

---

#### 5.10.3.1.2.5 onMouseClick

The left mouse button was clicked over the control and released.

This event is also triggered by interaction with a touch screen. This can be prevented by enabling '[preventDefault](#)' [[► 61](#)] on the corresponding touch event.

Origin: [Control \[► 753\]](#)

---



Available from 1.8

---

#### 5.10.3.1.2.6 onMouseDoubleClick

The left mouse button was clicked twice over the control and released.

**Origin:** [Control](#) [[▶ 753](#)]

---



Available from 1.8

---

#### 5.10.3.1.2.7     **onMouseDown**

A mouse button was depressed over the control.

This event is also triggered by interaction with a touch screen. This can be prevented by enabling '[preventDefault](#)' [[▶ 61](#)] on the corresponding touch event.

**Origin:** [Control](#) [[▶ 753](#)]

---



Available from 1.8

---

#### 5.10.3.1.2.8     **onMouseDownLeft**

The left mouse button was depressed over the control.

This event is also triggered by interaction with a touch screen. This can be prevented by enabling '[preventDefault](#)' [[▶ 61](#)] on the corresponding touch event.

**Origin:** [Control](#) [[▶ 753](#)]

---



Available from 1.8

---

#### 5.10.3.1.2.9     **onMouseDownRight**

The right mouse button was depressed over the control.

**Origin:** [Control](#) [[▶ 753](#)]

---



Available from 1.8

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#### 5.10.3.1.2.10    **onMouseEnter**

The mouse pointer was moved over the control.

`onMouseLeave` becomes active on leaving the control.

As opposed to [onMouseOver](#) [[▶ 780](#)], this event is called only once on reaching the control, regardless of the child control.

**Origin:** [Control](#) [[▶ 753](#)]

---



Available from 1.8

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#### 5.10.3.1.2.11 onMouseLeave

The mouse pointer has left the control.

[onMouseEnter \[► 779\]](#) is called on reaching the control.

As opposed to [onMouseOut \[► 780\]](#), this event is called only once on leaving the control, regardless of the child control.

**Origin:** [Control \[► 753\]](#)

---



Available from 1.8

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#### 5.10.3.1.2.12 onMouseMove

The mouse was moved over the control.

**Origin:** [Control \[► 753\]](#)

---



Available from 1.8

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#### 5.10.3.1.2.13 onMouseOut

The mouse pointer has left the control or one of its child controls.

The event [onMouseLeave \[► 780\]](#) observes only the control itself.

[onMouseOver \[► 780\]](#) becomes active on reaching the control or one of its children.

**Origin:** [Control \[► 753\]](#)

---



Available from 1.8

---

#### 5.10.3.1.2.14 onMouseOver

The mouse pointer was moved over the control or one of its children. The event [onMouseEnter \[► 779\]](#) observes only the control itself.

[onMouseOut \[► 780\]](#) becomes active on leaving the control or one of its children.

**Origin:** [Control \[► 753\]](#)

---



Available from 1.8

---

#### 5.10.3.1.2.15 onMouseRightClick

The right mouse button was clicked over the control and released.

**Origin:** [Control \[► 753\]](#)

---





Available from 1.8

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#### 5.10.3.1.2.16 onMouseUp

A mouse button was released over the control.

This event is also triggered by interaction with a touch screen. This can be prevented by enabling 'preventDefault' [► 61] on the corresponding touch event.

**Origin:** [Control](#) [► 753]

---



Available from 1.8

---

#### 5.10.3.1.2.17 onMouseUpLeft

The left mouse button was released over the control.

This event is also triggered by interaction with a touch screen. This can be prevented by enabling 'preventDefault' [► 61] on the corresponding touch event.

**Origin:** [Control](#) [► 753]

---



Available from 1.8

---

#### 5.10.3.1.2.18 onMouseUpRight

The right mouse button was released over the control.

**Origin:** [Control](#) [► 753]

---



Available from 1.8

---

#### 5.10.3.1.2.19 onMouseWheel

The mouse wheel was moved over the control.

**Origin:** [Control](#) [► 753]

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Available from 1.8

---

#### 5.10.3.1.2.20 onMoved

The control was moved in relation to the browser window.



Learn how [controls can be positioned](#) [► 116].

---

**Origin:** [Control](#) [[► 753](#)]

---



Available from 1.8

---

#### 5.10.3.1.2.21 onPressed

A mouse click was executed or a touch screen was briefly touched.

**Origin:** [Control](#) [[► 753](#)]

---



Available from 1.8

---

#### 5.10.3.1.2.22 onResized

The size of the control was changed.



Learn how the [size of controls can be defined](#) [[► 116](#)].

---

**Origin:** [Control](#) [[► 753](#)]

---



Available from 1.8

---

#### 5.10.3.1.2.23 onTouchCancel

An interaction with a touch screen was aborted.

**Origin:** [Control](#) [[► 753](#)]

---



Available from 1.8

---

#### 5.10.3.1.2.24 onTouchEnd

A finger/stylus was lifted off a touch screen.

**Origin:** [Control](#) [[► 753](#)]

---



Available from 1.8

---

#### 5.10.3.1.2.25 onTouchMove

A finger/stylus was moved on a touch screen.

**Origin:** [Control](#) [[► 753](#)]



Available from 1.8

---

#### 5.10.3.1.2.26 onTouchStart

A finger/stylus was placed against a touch screen.

**Origin:** [Control](#) [► 753]

---



Available from 1.8

---

### 5.10.3.1.3 Permissions

#### 5.10.3.1.3.1 observe

Determines whether the control is generally observable.

If this right is missing, the control is not displayed.

**Origin:** [Control](#) [► 753]

#### See also

See also [User management at control level](#) [► 969].

---



Available from 1.8

---

#### 5.10.3.1.3.2 operate

Determines whether the control is generally operable.

If the main function of a control is the interaction (e.g. [button](#) [► 175]), a light-colored overlay is drawn if the right is missing.

**Origin:** [Control](#) [► 753]

#### See also

See also [User management at control level](#) [► 969].

---



Available from 1.8

---

### 5.10.3.2 Container Control

No instance of this class can be created. This page serves only as a list of the attributes that this class provides. It is the base class for all controls that can contain further controls.

#### Attributes

**Category:** Colors

Name	Description
BackgroundColor [ <a href="#">▶ 769</a> ]	Definition of the background color
BorderColor [ <a href="#">▶ 768</a> ]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 790]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> <li>• Content: The height is defined by the width of the content. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 789]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>Content: The height is defined by the height of the content. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control
<a href="#">IsEnabled [► 789]</a>	Selection of whether the control is enabled.

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control \[► 753\]](#)



Container Control

**NuGet package:** [Beckhoff.TwinCAT.HMI.Framework](#)

---



NuGet packages are available from version 1.12.

---



Available from 1.8

---

#### See also

API reference for this control

### 5.10.3.2.1 Attributes

#### 5.10.3.2.1.1 HeightMode

Selection of the method of calculating the height. The available options are:

- **Value:** The height is defined by the height entered.
  - **Parent:** The height is defined by the distance to the top and bottom side. The *Height* attribute is ignored in all calculations!
  - **Content:** The width is defined by the children of the control.
- 



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/SizeModeWithContent

**Origin:** [Container Control](#) [► 783]

#### See also

**Attribute getter:** getHeightMode

**Attribute setter:** setHeightMode

---



Available from 1.8

---

#### 5.10.3.2.1.2 IsEnabled

Activation status of a control. This overwrites the status of the child control. Only active controls respond to mouse and touch

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Container Control](#) [► 783]

#### See also

**Attribute getter:** getIsEnabled

**Attribute setter:** setIsEnabled



Available from 1.8

### 5.10.3.2.1.3 WidthMode

Selection of the method of calculating the width. The available options are:

- **Value:** The width is defined by the width entered.
- **Parent:** The width is defined by the distance to the left and right side. The *Width* attribute is ignored in all calculations!
- **Content:** The width is defined by the children of the control.



Learn how [controls can be positioned and their size defined](#) [► 116].

**Schema:** tchmi:framework#/definitions/SizeModeWithContent

**Origin:** [Container Control](#) [► 783]

**See also**

**Attribute getter:** getWidthMode

**Attribute setter:** setWidthMode



Available from 1.8

### 5.10.3.3 Container

The container offers the option of grouping other child controls. All child controls that are added to a container are defined relative to the position of the container and are shifted automatically with the container. The container can also be used for the subdivision and arrangement, for example a view or a content.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 790]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> <li>• Content: The height is defined by the width of the content. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 789]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>Content: The height is defined by the height of the content. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 789]</a>	Selection of whether the control is enabled.
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control \[► 753\]](#)

[Container Control \[► 783\]](#)

Container

**NuGet package:** [Beckhoff.TwinCAT.HMI.Framework](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.3.4 Content**

A content is an independent container object that can be loaded in a [region \[► 829\]](#). A content can be used, for example, to subdivide operating concepts into various contents. It is created under the TcHmi project tree with the context menu **Add new Item...**

**Attributes**

**Category:** Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.



Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 790]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> <li>• Content: The height is defined by the width of the content. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 789]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>Content: The height is defined by the height of the content. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 789]</a>	Selection of whether the control is enabled.
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

## Behavior in the life cycle

A view control can behave differently during its life cycle. If you select the view file in the project tree, you can select the following settings:

**Preload:** Defines whether the file should be loaded and compiled during initialization to speed up later use. The default value `False` increases the speed of the initial loading process of the HMI, but can lead to a reduction in the loading speed of individual HMI pages on which many controls are instantiated. Memory consumption is also reduced because the pages are no longer in memory when they are not active.

**KeepAlive:** Defines whether the compilation result should be saved temporarily after the first use in order to speed up subsequent use. The default value is `False`. If this option is enabled, the controls are kept in the browser cache. This increases the loading speed of a single HMI page if it is called several times. The controls of a page are created when the page is accessed for the first time. They are retained when the page is exited. This only slightly increases memory consumption, since only those pages remain in memory that were enabled once.

Pages with KeepAlive are therefore kept in memory similar to Preload when they are no longer needed. In contrast, these pages are not loaded initially. This ensures fast loading of the entire application.

**LoadSync:** Defines whether the content should be loaded synchronously. The default value is `False`.

**PreloadBindings:** Defines whether bindings to controls in this file should be preloaded before the content is displayed in order to have correct values when displaying the content. Requires that Preload is enabled. The default value is `False`.

Please also note the background information on the [life cycle](#) [► 1552] for control development.

## Inheritance hierarchy

[Control](#) [► 753]

[Container Control](#) [► 783]

[Partial](#) [► 824]

            Content

**NuGet package:** [Beckhoff.TwinCAT.HMI.Framework](#)



NuGet packages are available from version 1.12.



Available from version 1.10

## See also

API reference for this control

## Also see about this

[Control life cycle](#) [► 1552]

### 5.10.3.5 Grid

The grid is a layout grid that can be used for the development of fluid and responsive designs. With the help of the grid, parts of the page or the entire page can be divided into various cells. On the basis of the cells you can then design the page by adding controls to the various cells and defining the behavior of the cells when changing the browser size. The grid offers a great many different configuration options. You can find the description of an example configuration in the chapter [Configuration](#) [► 806].

**Attributes**

**Category: Colors**

Name	Description
BackgroundColor [ <a href="#">▶ 769</a> ]	Definition of the background color
BorderColor [ <a href="#">▶ 768</a> ]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 812]</a>	Selection of the method of calculating the width
<a href="#">HeightMode [► 811]</a>	Selection of the method of calculating the height

**Category: Common**

Name	Description
<a href="#">ColumnOptions [► 811]</a>	Definition of the columns
<a href="#">RowOptions [► 812]</a>	Definition of the rows
<a href="#">CellOptions [► 810]</a>	Definition of the cells
<a href="#">CellWrap [► 810]</a>	Selection of whether the cells should wrap within the row
<a href="#">IsEnabled [► 789]</a>	Selection of whether the control is enabled.
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**



Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

[Container Control \[► 783\]](#)

Grid

**NuGet package:** [Beckhoff.TwinCAT.HMI.Framework](#)



NuGet packages are available from version 1.12.

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Available from version 1.10

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### See also

API reference for this control

#### 5.10.3.5.1 Configuration

A grid control can be configured in different ways. An example configuration of the Desktop.view together with a grid control is explained below. Prior to this you should read the chapter on [Positioning and calculation of the size of controls \[► 116\]](#) as the basis for this example.

1. Create a new project.
2. Open the Desktop.view.

The Desktop.view has a fixed size as a default setting. If the browser size changes, therefore, the Desktop.view and its contents do not adapt themselves. In the following steps the view will be adjusted so that it changes its size dynamically with the browser size.

3. Select the view.
4. Change the "Width" attribute to 100 %.

With this setting the size of the view adapts itself automatically to the size of the browser. The viewport of the graphic editor can now be used to simulate a desired browser size and test the effect on the visualization.

5. Add a grid control to the interface.
6. Change the following attributes: Left = 20 px, Top = 100 px, Right = 20 px.
7. Select the "Parent" mode for the "Width Mode" attribute.

With these settings the size of the grid control adapts itself to the size of the parent element accordingly. In this case the parent element is the Desktop.view.

8. Insert a second column with the help of the "[Column Options \[► 809\]](#)" dialog.
9. Insert a text block in each column by drag and drop.
10. Change the position of both controls to: Left = 120, Top = 140

With these settings the right-hand cell will be shifted automatically to the row below if there is insufficient space in the browser to display both side by side. You can test this function by changing the width of the integrated [LiveView \[► 74\]](#) window or the browser instance. So far the grid has not adapted itself automatically in height. The consequence of this is that only half of each of the two text blocks is displayed if the right-hand cell is displayed in the second row.

11. Select the "Content" mode in the "Height Mode" attribute of the grid control.
12. Also select the "Content" mode in the "Height Mode" attribute of the view.

With these settings not only will the grid be enlarged according to its contents, but also the view. In this way you can ensure that all contents are displayed so as to be reachable if the right-hand cell jumps to the row below. In order to be able to distinguish better between the two cells, their background colors will be set in the following.

13. Insert two cells with the help of the "[Cell Options](#) [► 807]" dialog.
14. Change the first cell option to: Background Color = #FFCA0000, Column Index = 0, Row Index = 0
15. Change the second cell option to: Background Color = #FFFFFF00, Column Index = 1, Row Index = 0

At the moment, both cells close and thus the entire row are bordering the lowermost control. In the row settings, for example, a minimum row height can be specified.

16. Change the "Row Min Height" attribute of the row option to 300 px with the help of the "[Row Options](#) [► 809]" dialog.

If the browser height is larger than the grid, a white border will be displayed at the moment. To make sure that the visu completely fills the browser with each browser size, the following step must be carried out.

17. Change the "Minimum Height" attribute of the view to 100 %.




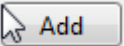
In summary, you have created your first visualization with the help of the grid control according to the responsive design approach. This visualization fills the entire browser regardless of the browser size. If insufficient width is available, the content of the second column is automatically displayed in the row below. If on the other hand the height is insufficient, it will be expanded automatically according to the content to be displayed.

Sample project: [Grid](#) [► 1581]

### 5.10.3.5.2 Dialogs

#### 5.10.3.5.2.1 Cell Options Dialog

You can change the cell settings with this dialog.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Category: Colors

Name	Description
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control
<a href="#">BorderRadius</a> [► 769]	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle</a> [► 769]	Selection of the border style of the four sides of the control
<a href="#">BorderWidth</a> [► 768]	Definition of the border width of the four sides of the control

Category: Background Image

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides

## Category: Border




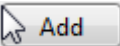
Name	Description
Border Width	Definition of the border width of the four sides of the cell
Border Style	Selection of the border style of the four sides of the cell

## Category: Layout

Name	Description
Grid Column Index	Definition of the column of a grid that is to be defined by the cell option
Grid Row Index	Definition of the row of a grid that is to be defined by the cell option
Padding	Definition of an additional distance between the cell border and the controls added to the cell for the four sides

### 5.10.3.5.2.2 Column Options Dialog

You can change the number of columns and their settings with this dialog.




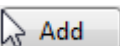
Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Category: Layout

Name	Description
Column Width	Definition of the column width
WidthMode [ <a href="#">▶ 812</a> ]	Selection of the method of calculating the width
HeightMode [ <a href="#">▶ 811</a> ]	Selection of the method of calculating the height
Column Max Width	Definition of the maximum column width
Column Min Width	Definition of the minimum column width
Overflow	Selection of whether controls that have been added to the row but placed outside the row area should be displayed

### 5.10.3.5.2.3 Row Options Dialog

You can change the number of rows and their settings with this dialog.

Items	List of all objects added
	Delete the selected object
 	Change the object order (top = left)
	Add a new object

Category: Layout

Name	Description
Row Height	Definition of the row height
HeightMode [► 811]	Selection of the method of calculating the height
Row Max Height	Definition of the maximum row height
Row Min Height	Definition of the minimum row height
Overflow	Selection of whether controls that have been added to the row but placed outside the row area should be displayed

### 5.10.3.5.3 Attributes

#### 5.10.3.5.3.1 CellOptions

Definition for the cells.

Here you can define a specific feature for each cell. In each definition a row and column index defines which cell is to be addressed.

You can define:

- Background color (identical to [Control Background Color \[► 769\]](#))
- Border color (identical to [Control Border Color \[► 768\]](#))
- Background image (identical to [Control Background Image \[► 770\]](#))
- Width of the background image (identical to [Control Background Image Width \[► 770\]](#))
- Height of the background image (identical to [Control Background Image Height \[► 771\]](#))
- Horizontal alignment of the background image (identical to [Control Background Image \[► 771\]](#))
- Vertical alignment of the background image (identical to [Control Background Image \[► 772\]](#))
- Border width (identical to [Control Border Width \[► 768\]](#))
- Border style (identical to [Control Border Style \[► 769\]](#))
- Padding (identical to [Control Background Image Padding \[► 771\]](#)) If a percentage value is specified here for the "top" and "bottom" value, the width of the cell is used as the basis (and not the height).

**Schema (version 1.8):** tchmi:framework#/definitions/CellOptions

**Schema (version 1.12):** tchmi:framework#/definitions/TcHmi.Controls.System.TcHmiGrid.CellOptions

**Origin:** [Grid \[► 800\]](#)

**See also**

**Attribute getter:** getCellOptions

**Attribute setter:** setCellOptions



Available from 1.8

#### 5.10.3.5.3.2 CellWrap

Specifies whether the cells should wrap within the row.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Grid \[► 800\]](#)

**See also****Attribute getter:** getCellWrap**Attribute setter:** setCellWrapAvailable from 1.8

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**5.10.3.5.3.3 ColumnOptions**

Definition for the columns and thus their number.

You can define:

- Width (similar to [Control Width \[► 761\]](#))
  - Width Mode (similar to [Control Width Mode \[► 762\]](#))
  - Minimum Width (identical to [Control Minimum Width \[► 774\]](#))
  - Maximum Width (identical to [Control Maximum Width \[► 773\]](#))
  - Overflow determines whether a child control is truncated if it is larger than the cell.
- 

Learn how [controls can be positioned and their size defined \[► 116\]](#).

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**Schema (version 1.8):** tchmi:framework#/definitions/ColumnOptions**Schema (version 1.12):** tchmi:framework#/definitions/TcHmi.Controls.System.TcHmiGrid.ColumnOptions**Origin:** [Grid \[► 800\]](#)**See also****Attribute getter:** getColumnOptions**Attribute setter:** setColumnOptionsAvailable from 1.8

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**5.10.3.5.3.4 HeightMode**

Selection of the method of calculating the height. The available options are:

- **Value:** The height is defined by the height entered.
  - **Parent:** The height is defined by the distance to the top and bottom side. The *Height* attribute is ignored in all calculations!
  - **Content:** The width is defined by the children of the control.
- 

Learn how [controls can be positioned and their size defined \[► 116\]](#).

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**Schema:** tchmi:framework#/definitions/SizeModeWithContent**Origin:** [Grid \[► 800\]](#)

**See also****Attribute getter:** getHeightMode**Attribute setter:** setHeightMode

Available from 1.8

**5.10.3.5.3.5 RowOptions**

Definition for the rows and thus their number.

You can define:

- Height (similar to [Control Height \[► 762\]](#))
- Height Mode (similar to [Control Height Mode \[► 763\]](#))
- Minimum Height (identical to [Control Minimum Height \[► 772\]](#))
- Maximum Height (identical to [Control Maximum Height \[► 773\]](#))
- Overflow determines whether a child control is truncated if it is larger than the cell.

Learn how [controls can be positioned and their size defined \[► 116\]](#).**Schema (version 1.8):** tchmi:framework#/definitions/RowOptions**Schema (version 1.12):** tchmi:framework#/definitions/TcHmi.Controls.System.TcHmiGrid.RowOptions**Origin:** [Grid \[► 800\]](#)**See also****Attribute getter:** getRowOptions**Attribute setter:** setRowOptions

Available from 1.8

**5.10.3.5.3.6 WidthMode**

Selection of the method of calculating the width. The available options are:

- **Value:** The width is defined by the width entered.
- **Parent:** The width is defined by the distance to the left and right side. The *Width* attribute is ignored in all calculations!
- **Content:** The width is defined by the children of the control.

Learn how [controls can be positioned and their size defined \[► 116\]](#).**Schema:** tchmi:framework#/definitions/SizeModeWithContent**Origin:** [Grid \[► 800\]](#)



**See also****Attribute getter:** getWidthMode**Attribute setter:** setWidthModeAvailable from 1.8

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**5.10.3.6 HTML host**

The HTML Host offers the possibility to use pure HTML content on the user interface. This control can be filled with content and modified in the HTML editor of the designer.

**Attributes****Category: Colors**

Name	Description
BackgroundColor [ <a href="#">▶ 769</a> ]	Definition of the background color
BorderColor [ <a href="#">▶ 768</a> ]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

**Inheritance hierarchy**Control [\[► 753\]](#)

HTML Host

**NuGet package:** [Beckhoff.TwinCAT.HMI.Framework](#)

NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.3.7      Popup**

The PopUpControl makes it possible to display Contents or UserControls in a separate window or as a dialog. You can find the description of an example configuration in the chapter [Configuration](#) [► 822].

**Attributes**

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 789]</a>	Selection of whether the control is enabled.
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Events****Category: Framework**



Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Events****Category: Control**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### 5.10.3.7.1 Configuration

The popup opens as a dialog and is centered when the Modal property is set. The background is grayed out and cannot be operated directly. Alternatively, the popup can be displayed in a window and the position can be freely selected. In this mode, several instances of the popup can be open at the same time and instances can optionally be moved.

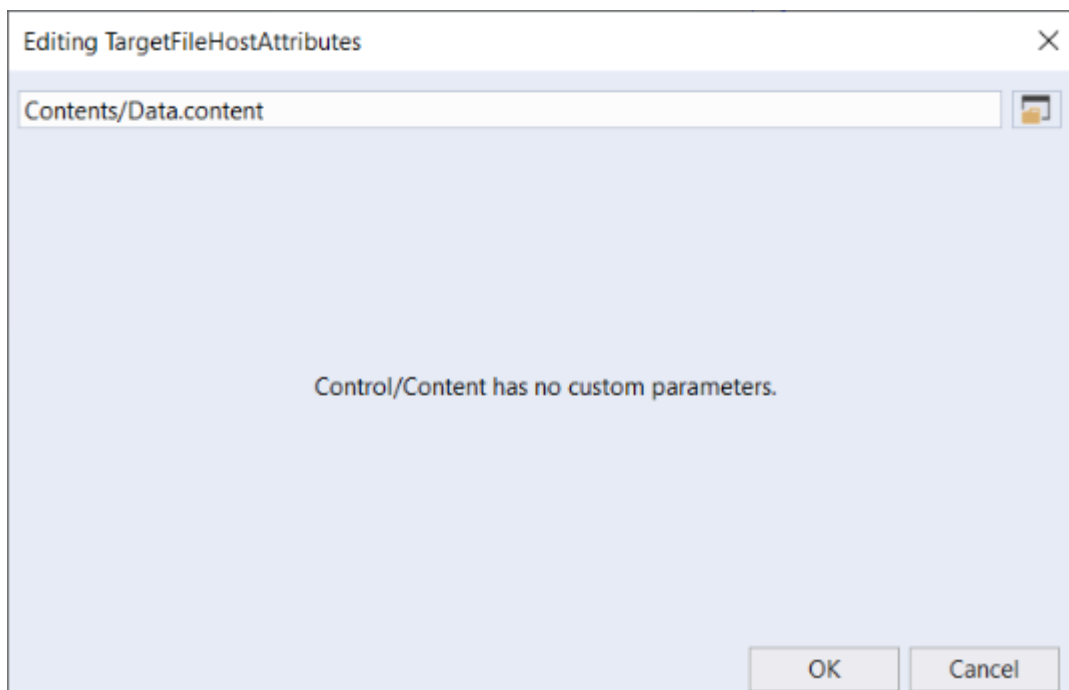
#### Configuration

Open the **System** category in the toolbox.

1. Add the PopUp Control to the interface.
2. In the "TargetFile" property, select which Content or UserControl is to be displayed.

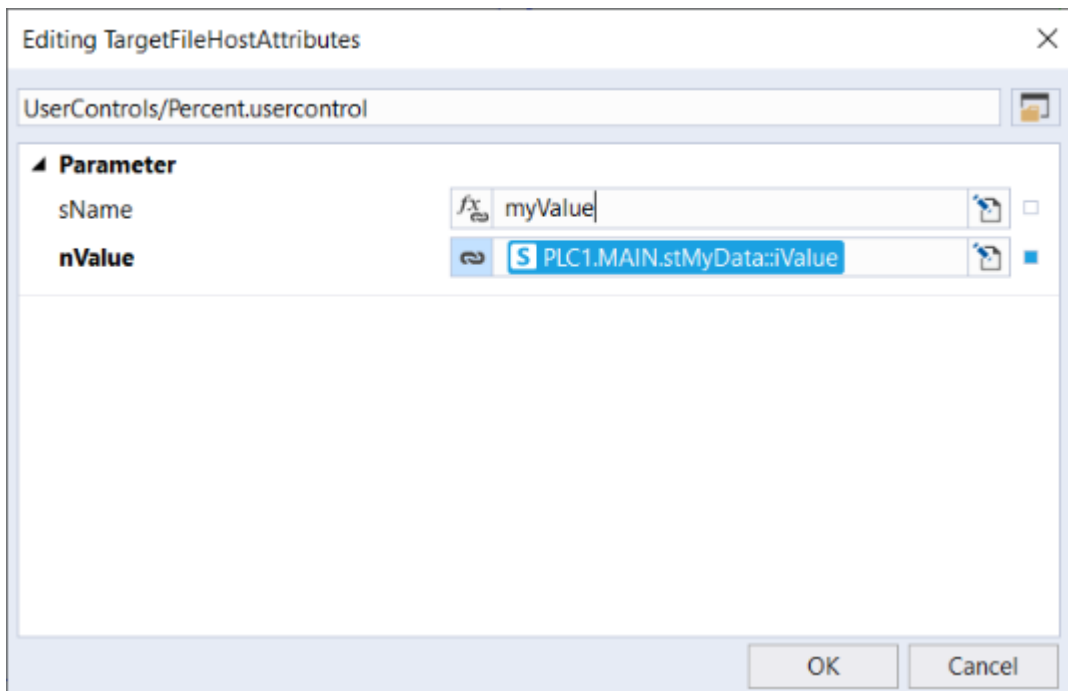
#### Content

No further settings are required for Content. Confirm directly with the **OK** button.



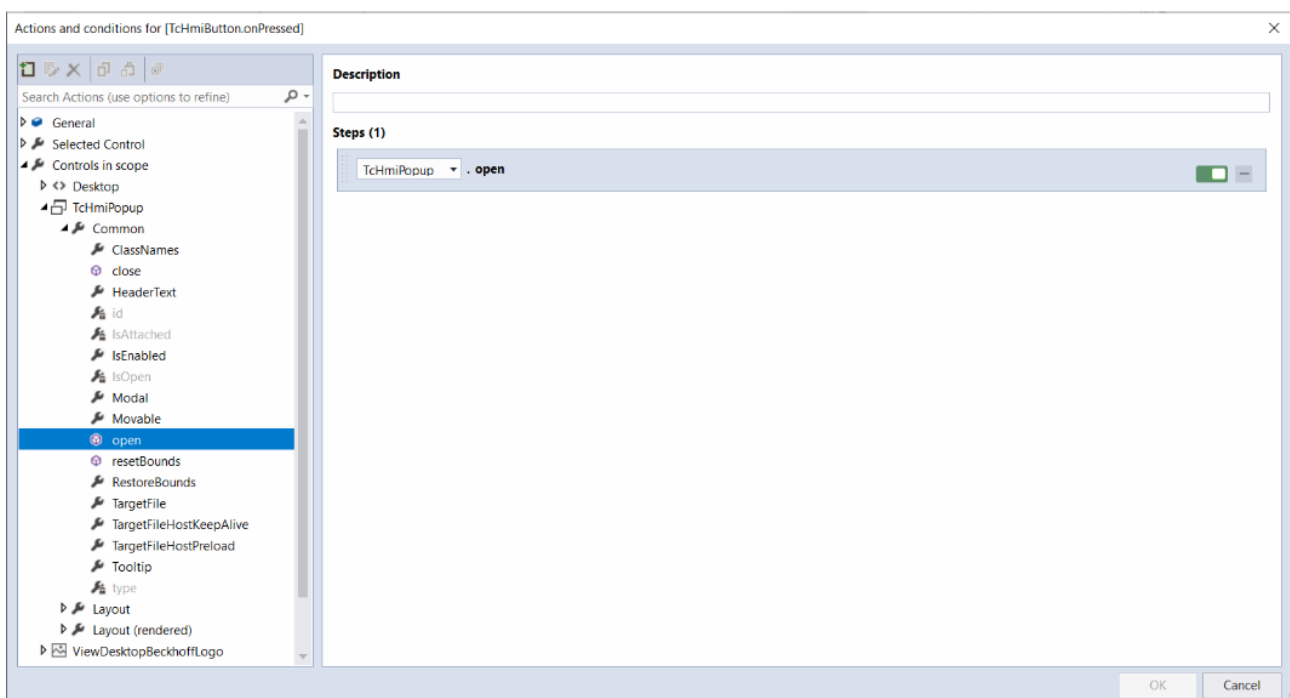
#### UserControl

Also define or link the parameters.



The popup is not visible by default. To display this, proceed as follows:

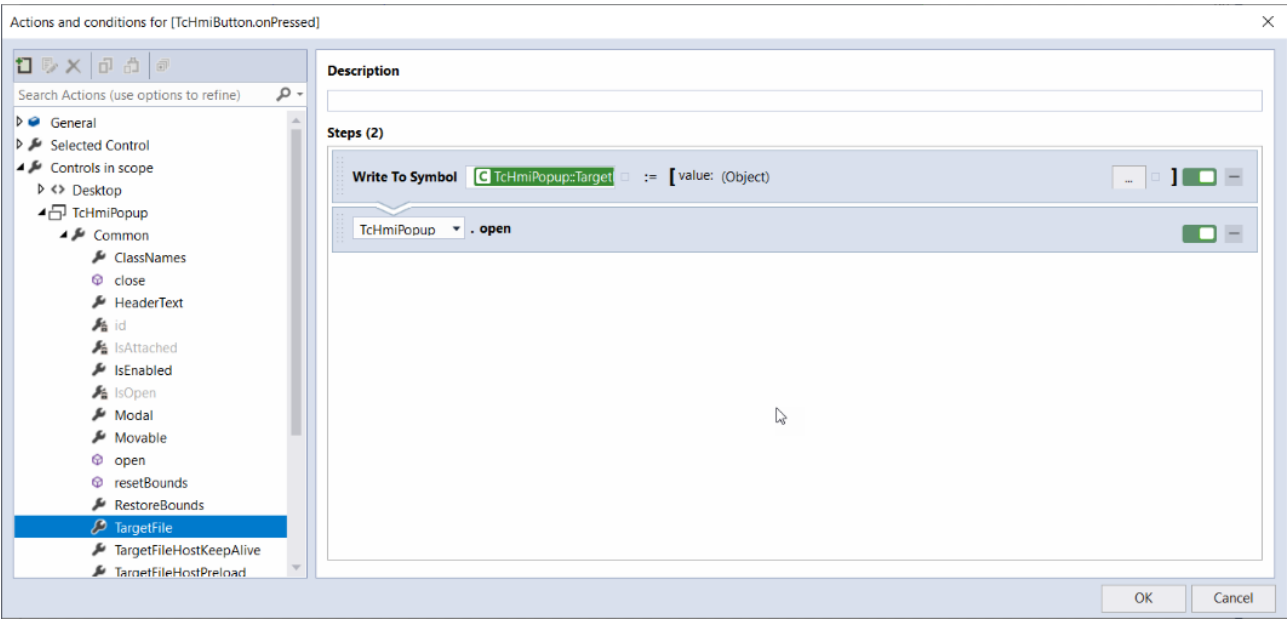
1. Call the "open" function via an event. For example, a button can be inserted and the popup opened via its onPressed event.
2. Select the PopUp Control in the left-hand menu in the Event dialog.
3. Navigate to the Common parameter.
4. Drag the "open" function into the Event definition.



5. Start LiveView to test the configuration.
6. Use the "Modal" property in the **Common** category of the popup properties to select whether the popup should be displayed as a dialog or in a window.

If the "Modal" property is inactive, the "Movable" property can be used to define whether the popup window should be movable.

All properties including the "TargetFile" can be overwritten at runtime via events.



**Closing popup**

To close the popup, click the close button [x] in the top right-hand corner of the popup. Via an event that calls the "close" function or when the "Modal" property is clicked outside the popup.

**5.10.3.8 Partial**

No instance of this class can be created. This page serves only as a list of the attributes that this class provides. It is the base class for some system controls.

**Attributes**

**Category: Colors**

Name	Description
BackgroundColor [ <a href="#">▶ 769</a> ]	Definition of the background color
BorderColor [ <a href="#">▶ 768</a> ]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 790]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> <li>• Content: The height is defined by the width of the content. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 789]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>Content: The height is defined by the height of the content. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 789]</a>	Selection of whether the control is enabled.
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control \[► 753\]](#)



[Container Control \[► 783\]](#)

Partial

**NuGet package:** [Beckhoff.TwinCAT.HMI.Framework](#)



NuGet packages are available from version 1.12.



Available from 1.8

#### See also

API reference for this control

### 5.10.3.9 Region

The region allows to display a [Content \[► 795\]](#) (and thus a subpage of any complexity). The content to be displayed can be defined using the Target Content attribute. Thus, the displayed subpage can be changed at runtime.

#### Attributes

##### Category: Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 835]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side. The "Width" attribute is ignored in all calculations!</li> <li>• Content: The width is defined by the children of the content control. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 835]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>Content: The height is defined by the children of the content control. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control
<a href="#">TargetContent [► 836]</a>	Definition of the path to the content control that is to be displayed
<a href="#">CurrentContent [► 836]</a>	Current content control object for this region.
<a href="#">ScaleMode [► 836]</a>	<p>Selection of the scaling of the content that is displayed in the region:</p> <ul style="list-style-type: none"> <li>None: No scaling of the content</li> <li>ScaleToFill: The content is displayed over the entire size of the control. The proportions are thereby ignored.</li> <li>ScaleToFit: The content is displayed as large as possible without extending beyond the edges of the control. The proportions are retained.</li> <li>ScaleToFitWidth: The content is displayed over the entire width of the control. The proportions are retained.</li> <li>ScaleToFitHeight: The content is displayed over the entire height of the control. The proportions are retained.</li> </ul>
<a href="#">Scrolling [► 837]</a>	<p>Selection of the scrolling behavior of the content:</p> <ul style="list-style-type: none"> <li>No</li> <li>Yes</li> <li>Auto</li> </ul> <p>A browser has to be used to test the scrolling.</p>

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage</a> [► 770]	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight</a> [► 771]	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit</a> [► 771]	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth</a> [► 770]	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit</a> [► 770]	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding</a> [► 771]	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment</a> [► 772]	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment</a> [► 771]	Definition of the horizontal alignment of the background image within the control

## Events

### Category: Control

Name	Description
<a href="#">onTargetContentReplaced</a> [► 837]	The content control was replaced.

### Category: Framework

Name	Description
<a href="#">onAttached</a> [► 778]	The control was added to the display.
<a href="#">onDetached</a> [► 778]	The control was removed from the display.
<a href="#">onInitialized</a> [► 778]	The control was initialized.
<a href="#">onDestroyed</a> [► 778]	The control was destroyed.
<a href="#">onMoved</a> [► 781]	The control was moved in relation to the browser window.
<a href="#">onResized</a> [► 782]	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Region

**NuGet package:** [Beckhoff.TwinCAT.HMI.Framework](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.3.9.1 Attributes****5.10.3.9.1.1 WidthMode**

Selection of the method of calculating the width. The available options are:

- **Value:** The width is defined by the width entered.
- **Parent:** The width is defined by the distance to the left and right side. The *Width* attribute is ignored in all calculations!
- **Content:** The width is defined by the children of the Content control.



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/SizeModeWithContent

**Origin:** [Region](#) [► 829]

**See also**

**Attribute getter:** getWidthMode

**Attribute setter:** setWidthMode



Available from 1.8

---

**5.10.3.9.1.2 HeightMode**

Selection of the method of calculating the height. The available options are:

- **Value:** The height is defined by the height entered.
- **Parent:** The height is defined by the distance to the top and bottom side. The *Height* attribute is ignored in all calculations!
- **Content:** The height is defined by the children of the Content control.



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/SizeModeWithContent

**Origin:** [Region](#) [► 829]

**See also**

**Attribute getter:** getHeightMode

**Attribute setter:** setHeightMode



Available from 1.8

---

### 5.10.3.9.1.3 TargetContent

Path to the [Content](#) [► 795] control.

**Schema:** tchmi:framework#/definitions/ContentPath

**Origin:** [Region](#) [► 829]

**See also**

**Attribute getter:** getTargetContent

**Attribute setter:** setTargetContent

---



Available from 1.8

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### 5.10.3.9.1.4 CurrentContent

Current [Content](#) [► 795] control object for this region. This is not the [path](#) [► 836] to the control, but the control itself.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.System.TcHmiContent

**Origin:** [Region](#) [► 829]

**See also**

**Attribute getter:** getCurrentContent

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Available from version 1.12

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### 5.10.3.9.1.5 ScaleMode

Defines the scaling of the control.

Possible values:

- None (Standard)
- ScaleToFit
- ScaleToFitWidth
- ScaleToFitHeight
- ScaleToFill

**Schema:** tchmi:framework#/definitions/ScaleMode

**Origin:** [Region](#) [► 829]

**See also**

**Attribute getter:** getScaleMode

**Attribute setter:** setScaleMode

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Available from 1.8

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### 5.10.3.9.1.6 Scrolling

Determines whether the content can be scrolled.

Possible values:

- No (Standard)
- Yes
- Auto

**Schema:** tchmi:framework#/definitions/ScrollMode

**Origin:** [Region](#) [► 829]

**See also**

**Attribute getter:** getScrolling

**Attribute setter:** setScrolling



Available from 1.8

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### 5.10.3.9.2 Events

#### 5.10.3.9.2.1 onTargetContentReplaced

The Content control was replaced. The new control is not yet displayed at this point in time.

**Origin:** [Region](#) [► 829]



Available from 1.8

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### 5.10.3.10 User Control

A user control is a reusable collection of controls which, after creation, is available in the toolbox like a standard control. The context menu option **Add new Item...** can be used to create a user control within the project tree.



When a User Control is added, a User Control Host is created that points to the User Control. Therefore, every change to an attribute (for example the background color) acts from the outside on the user control host and from the inside on the user control.

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#### Attributes

**Category:** Colors

Name	Description
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 790]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> <li>• Content: The height is defined by the width of the content. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 789]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>Content: The height is defined by the height of the content. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 789]</a>	Selection of whether the control is enabled.
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

[Container Control](#) [[▶ 783](#)]

[Partial](#) [[▶ 824](#)]

User Control

**NuGet package:** [Beckhoff.TwinCAT.HMI.Framework](#)



NuGet packages are available from version 1.12.



Available from version 1.10

### See also

API reference for this control

### 5.10.3.11 User Control Host

The user control host is an administration container for [user controls](#) [[▶ 842](#)]. It is created automatically when using a user control.

#### Version 1.10

From version 1.10, the attribute `TargetUserControl` is mandatory at the time of compilation and can no longer be changed at runtime.

A missing attribute `TargetUserControl` and errors in the configuration of the `UserControl` defined in `TargetUserControl` now lead to compilation errors that can indicate an error in the configuration.

### Attributes

#### Category: Colors

Name	Description
<a href="#">BackgroundColor</a> [ <a href="#">▶ 769</a> ]	Definition of the background color
<a href="#">BorderColor</a> [ <a href="#">▶ 768</a> ]	Definition of the border color of the control

#### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 847]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side. The "Width" attribute is ignored in all calculations!</li> <li>• Content: The width is defined by the user control that is displayed in the user control host. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 847]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>



Name	Description
	<ul style="list-style-type: none"> <li>Content: The height is defined by the user control that is displayed in the user control host. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">TargetUserControl [► 848]</a>	Definition of the path to the user control that is to be displayed
<a href="#">IsEnabled [► 848]</a>	Selection of whether the control should be enabled
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Control**

Name	Description
<a href="#">onTargetUserControlReplaced [► 849]</a>	Version 1.8 only: The user control was replaced.

**Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe</a> [► 783]	Determines whether the control is generally observable.
<a href="#">operate</a> [► 783]	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control](#) [► 753]

User Control Host

**NuGet package:** [Beckhoff.TwinCAT.HMI.Framework](#)



NuGet packages are available from version 1.12.



Available from 1.8

**See also**

API reference for this control

**5.10.3.11.1 Attributes****5.10.3.11.1.1 HeightMode**

Selection of the method of calculating the height. The available options are:

- **Value:** The height is defined by the height entered.
- **Parent:** The height is defined by the distance to the top and bottom side. The *Height* attribute is ignored in all calculations.
- **Content:** The width is defined by the children of the user control.



Learn how [controls can be positioned and their size defined](#) [► 116].

**Schema:** `tchmi:framework#/definitions/SizeModeWithContent`

**Origin:** [User Control Host](#) [► 842]

**See also**

**Attribute getter:** `getHeightMode`

**Attribute setter:** `setHeightMode`



Available from 1.8

**5.10.3.11.1.2 WidthMode**

Selection of the method of calculating the width. The available options are:

- **Value:** The width is defined by the width entered.
- **Parent:** The width is defined by the distance to the left and right side. The *Width* attribute is ignored in all calculations.
- **Content:** The width is defined by the children of the user control.



Learn how [controls can be positioned and their size defined](#) [► 116].

---

**Schema:** tchmi:framework#/definitions/SizeModeWithContent

**Origin:** [User Control Host](#) [► 842]

**See also**

**Attribute getter:** getWidthMode

**Attribute setter:** setWidthMode

---



Available from 1.8

---

#### 5.10.3.11.1.3 IsEnabled

Activation status of a control. This overwrites the status of the [user control](#) [► 837]. Only active controls respond to mouse and touch.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [User Control Host](#) [► 842]

**See also**

**Attribute getter:** getIsEnabled

**Attribute setter:** setIsEnabled

---



Available from 1.8

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#### 5.10.3.11.1.4 TargetUserControl

Path to the [user control](#) [► 837].

**Schema:** tchmi:framework#/definitions/UserControlPath

**Origin:** [User Control Host](#) [► 842]

**See also**

**Attribute getter:** getTargetUserControl

**Attribute setter:** setTargetUserControl

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Available from 1.8

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*ReadOnly from Version 1.10*

### 5.10.3.11.2 Events

#### 5.10.3.11.2.1 onTargetUserControlReplaced

Since version 1.10 the UserControlHost and the UserControl form a firmer unit. This is established when the UserControlHost is created and can no longer be separated. The event is therefore no longer used.

##### In version 1.8:

The user control was replaced. The new control is not yet displayed at this point in time.

**Origin:** [User Control Host \[► 842\]](#)



Available from version 1.8, not applicable from version 1.10.

### 5.10.3.12 View

A view is the top-level control of a visualization. The control is created under the TC HMI project tree with the context menu **Add new Item...**

#### Attributes

##### Category: Colors

Name	Description
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 790]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> <li>• Content: The height is defined by the width of the content. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 789]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>Content: The height is defined by the height of the content. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 789]</a>	Selection of whether the control is enabled.
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**



Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

## Behavior in the life cycle

A view control can behave differently during its life cycle. If you select the view file in the project tree, you can select the following settings:

**Preload:** Defines whether the file should be loaded and compiled during initialization to speed up later use. The default value `False` increases the speed of the initial loading process of the HMI, but can lead to a reduction in the loading speed of individual HMI pages on which many controls are instantiated. Memory consumption is also reduced because the pages are no longer in memory when they are not active.

**KeepAlive:** Defines whether the compilation result should be saved temporarily after the first use in order to speed up subsequent use. The default value is `False`. If this option is enabled, the controls are kept in the browser cache. This increases the loading speed of a single HMI page if it is called several times. The controls of a page are created when the page is accessed for the first time. They are retained when the page is exited. This only slightly increases memory consumption, since only those pages remain in memory that were enabled once.

Pages with KeepAlive are therefore kept in memory similar to Preload when they are no longer needed. In contrast, these pages are not loaded initially. This ensures fast loading of the entire application.

**PreloadBindings:** Defines whether bindings to controls in this file should be preloaded before the content is displayed in order to have correct values when displaying the content. Requires that Preload is enabled. The default value is `False`.

Please also note the background information on the [life cycle](#) [► 1552] for control development.

## Inheritance hierarchy

[Control](#) [► 753]

[Container Control](#) [► 783]

[Partial](#) [► 824]

            View

**NuGet package:** [Beckhoff.TwinCAT.HMI.Framework](#)



NuGet packages are available from version 1.12.




Available from version 1.10

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## See also

API reference for this control

## Also see about this

 [Control life cycle](#) [► 1552]

## 5.10.4 User controls

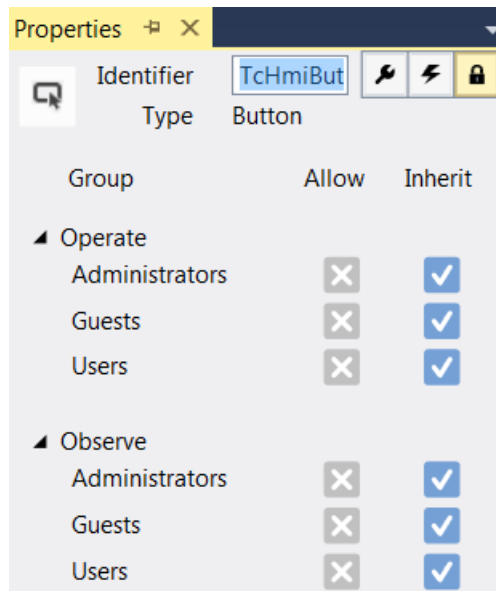
A user control enables the re-use of existing controls in a separate control. Existing controls include the system controls, the Beckhoff controls and the framework controls. The controls can be placed in the user control by drag & drop.

Further information on the controls can be found in the chapter [Creating a user control](#) [► 46].

## 5.10.5 Framework controls

User-specific controls [► 1476] can be developed in JavaScript in order to integrate controls or libraries from third-party suppliers or to map applicative requirements.

## 5.10.6 Control rights



Enables or prevents the editing or viewing of the respective control by the user groups configured. For more information, see the chapter [User Management](#) [► 963].

## 5.10.7 BaseTemplate

Name	Description
<a href="#">Breadcrumb</a> [► 855]	The breadcrumb control in combination with the navigation control can display the path of the navigation and navigate back to already visited pages.
<a href="#">Burger Menu</a> [► 862]	The Burger Menu control can be used to show and hide controls.
<a href="#">Header</a> [► 868]	The Header control can responsively display and prioritize elements that are typically displayed in headers of an application.
<a href="#">Navigation</a> [► 873]	With the Navigation control the user can navigate between different pages of an application.
Responsive Behaviour	A function that implements the responsive behavior of the Project Generator.

### 5.10.7.1 Breadcrumb

The breadcrumb control in combination with the navigation control can display the path of the navigation and navigate back to already visited pages.

#### Attributes

**Category:** Colors

Name	Description
<a href="#">TextColor</a> [ <a href="#">► 861</a> ]	Definition the text color of the control
<a href="#">BackgroundColor</a> [ <a href="#">► 769</a> ]	Definition of the background color
<a href="#">BorderColor</a> [ <a href="#">► 768</a> ]	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit</a> [ <a href="#">▶ 772</a> ]	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft</a> [ <a href="#">▶ 765</a> ]	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop</a> [ <a href="#">▶ 765</a> ]	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight</a> [ <a href="#">▶ 766</a> ]	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom</a> [ <a href="#">▶ 766</a> ]	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth</a> [ <a href="#">▶ 766</a> ]	Calculated width of the control in pixels
<a href="#">RenderedHeight</a> [ <a href="#">▶ 767</a> ]	Calculated height of the control in pixels
<a href="#">GridRowIndex</a> [ <a href="#">▶ 768</a> ]	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex</a> [ <a href="#">▶ 767</a> ]	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity</a> [ <a href="#">▶ 775</a> ]	Definition of the transparency of the entire control
<a href="#">Visibility</a> [ <a href="#">▶ 776</a> ]	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex</a> [ <a href="#">▶ 776</a> ]	Definition of the position on the Z-axis
<a href="#">Transform</a> [ <a href="#">▶ 775</a> ]	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow</a> [ <a href="#">▶ 777</a> ]	Definition of a shadow
<a href="#">WidthMode</a> [ <a href="#">▶ 762</a> ]	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode</a> [ <a href="#">▶ 763</a> ]	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">TextFontSize [► 861]</a>	Definition of the font size
<a href="#">TextFontSizeUnit [► 861]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>Percent for a relative size</li> </ul>

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control \[► 753\]](#)



Breadcrumb

**NuGet package:** [Beckhoff.TwinCAT.HMI.BaseTemplate](#)

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NuGet packages are available from version 1.12.

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Available from version 1.12.750

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#### See also

API reference for this control

### 5.10.7.1.1 Attributes

#### 5.10.7.1.1.1 TextFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Breadcrumb](#) [► 855]

#### See also

**Attribute getter:** getTextFontSize

**Attribute setter:** setTextFontSize

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Available from version 1.12.750

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#### 5.10.7.1.1.2 TextFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Breadcrumb](#) [► 855]

#### See also

**Attribute getter:** getTextFontSizeUnit

**Attribute setter:** setTextFontSizeUnit

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Available from version 1.12.750

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#### 5.10.7.1.1.3 TextColor

Defines the color of the font.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Breadcrumb](#) [► [855](#)]

**See also**

**Attribute getter:** `getTextColor`

**Attribute setter:** `setTextColor`



Available from version 1.12.750

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**5.10.7.2      Burger Menu**

The Burger Menu can be used to show and hide controls.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">BackgroundColor</a> [► <a href="#">769</a> ]	Definition of the background color
<a href="#">BorderColor</a> [► <a href="#">768</a> ]	Definition of the border color of the control

**Category:** Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">TargetControl [► 867]</a>	Definition of the target control of the control
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onStateChanged [► 187]</a>	The pressed state has changed.
<a href="#">onStatePressed [► 187]</a>	The pressed state has changed from not pressed to pressed.
<a href="#">onStateReleased [► 187]</a>	The pressed state has changed from pressed to not pressed.
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Functions****Category: Menu**

Name	Origin	Description
<a href="#">closeMenu</a> [ <a href="#">► 867</a> ]	TcHmiBurgerMenu	Resets the currently displayed path

#### Access rights

Name	Description
<a href="#">observe</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally observable.
<a href="#">operate</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally operable.

#### Inheritance hierarchy

[Control](#) [[► 753](#)]

Burger Menu

**NuGet package:** [Beckhoff.TwinCAT.HMI.BaseTemplate](#)



NuGet packages are available from version 1.12.



Available from version 1.12.750

#### See also

API reference for this control

### 5.10.7.2.1 Attributes

#### 5.10.7.2.1.1 TargetControl

Definition of the target control of the control.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.System.TcHmiControl

**Origin:** [Burger Menu](#) [[► 862](#)]

#### See also

**Attribute getter:** getTargetControl

**Attribute setter:** setTargetControl



Available from version 1.12.750

### 5.10.7.2.2 Functions

#### 5.10.7.2.2.1 closeMenu

Closes the menu.

**Return value:** null

**Origin:** [Burger Menu](#) [► 862]



Available from version 1.12.754

### 5.10.7.3      Header

The Header Control can responsively and prioritize elements that are typically displayed in the header of an application.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

**Category:** Layout



Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">Expandable [► 873]</a>	Defines whether the button for expanding the control is displayed
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Items**

Name	Description
<a href="#">HeaderItems [► 873]</a>	Definition of the header elements of the control

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control \[► 753\]](#)

Header

**NuGet package:** [Beckhoff.TwinCAT.HMI.BaseTemplate](#)

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NuGet packages are available from version 1.12.

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Available from version 1.12.750

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#### See also

API reference for this control

### 5.10.7.3.1 Attributes

#### 5.10.7.3.1.1 Expandable

Defines whether the button for expanding the control is displayed.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Header](#) [► 868]

#### See also

**Attribute getter:** getExpandable

**Attribute setter:** setExpandable

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Available from version 1.12.750

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#### 5.10.7.3.1.2 HeaderItems

Definition of the header elements of the control.

**Schema:** tchmi:framework#/definitions/TcHmi.Control.BaseTemplate.TcHmiHeader.HeaderItems

**Origin:** [Header](#) [► 868]

#### See also

**Attribute getter:** getHeaderItems

**Attribute setter:** setHeaderItems

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Available from version 1.12.750

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### 5.10.7.4 Navigation

The Navigation Control allows the user to navigate between the different pages of an application.

**Attributes****Category: Colors**

Name	Description
<a href="#">TextColor</a> [ <a href="#">► 881</a> ]	Definition the text color of the control
<a href="#">BackgroundColor</a> [ <a href="#">► 769</a> ]	Definition of the background color
<a href="#">BorderColor</a> [ <a href="#">► 768</a> ]	Definition of the border color of the control

**Category: Layout**

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**



Name	Description
<a href="#">NavigationStructure [► 882]</a>	Definition of the navigation hierarchy
<a href="#">TargetRegion [► 882]</a>	Definition of the target region
<a href="#">BreadcrumbControl [► 882]</a>	Definition of the Breadcrumb control
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: navigation**

Name	Description
<a href="#">KeepLowestLevel [► 884]</a>	Defines whether the last navigation level should be preserved in the context menu if the selected page has no elements defined for the context menu.
<a href="#">NavigationOrientation [► 883]</a>	Definition of the orientation of the control
<a href="#">StaticMenuHeight [► 883]</a>	Definition of the height of the static menu
<a href="#">StaticMenuHeightUnit [► 883]</a>	Selection of the unit of the height of the static menu: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>

**Category: Text**

Name	Description
<a href="#">TextFontSize [► 880]</a>	Definition of the font size
<a href="#">TextFontSizeUnit [► 880]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>

**Category: Icon**

Name	Description
<a href="#">IconHeight [► 880]</a>	Icon height definition
<a href="#">IconHeightUnit [► 881]</a>	Selection of the unit of the icon height: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">IconWidth [► 881]</a>	Icon width definition
<a href="#">IconWidthUnit [► 881]</a>	Selection of the unit of the icon width: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

### Inheritance hierarchy

[Control \[► 753\]](#)

Navigation

**NuGet package:** [Beckhoff.TwinCAT.HMI.BaseTemplate](#)



NuGet packages are available from version 1.12.



Available from version 1.12.750

**See also**

API reference for this control

**5.10.7.4.1 Attributes****5.10.7.4.1.1 TextFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation](#) [► 873]

**See also**

**Attribute getter:** getTextFontSize

**Attribute setter:** setTextFontSize



Available from version 1.12.750

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**5.10.7.4.1.2 TextFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation](#) [► 873]

**See also**

**Attribute getter:** getTextFontSizeUnit

**Attribute setter:** setTextFontSizeUnit



Available from version 1.12.750

---

**5.10.7.4.1.3 IconHeight**

Numerical value of the image height of the icon.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation](#) [► 873]

**See also**

**Attribute getter:** getIconHeight

**Attribute setter:** setIconHeight



Available from version 1.12.750

---

#### 5.10.7.4.1.4 IconHeightUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation](#) [[▶ 873](#)]

**See also**

**Attribute getter:** getIconHeightUnit

**Attribute setter:** setIconHeightUnit

---



Available from version 1.12.750

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#### 5.10.7.4.1.5 IconWidth

Numerical value of the image width of the icon.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation](#) [[▶ 873](#)]

**See also**

**Attribute getter:** getIconWidth

**Attribute setter:** setIconWidth

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Available from version 1.12.750

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#### 5.10.7.4.1.6 IconWidthUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation](#) [[▶ 873](#)]

**See also**

**Attribute getter:** getIconWidthUnit

**Attribute setter:** setIconWidthUnit

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Available from version 1.12.750

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#### 5.10.7.4.1.7 TextColor

Defines the color of the font.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Navigation](#) [[▶ 873](#)]

**See also****Attribute getter:** getTextColor**Attribute setter:** setTextColorAvailable from version 1.12.750

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**5.10.7.4.1.8      NavigationStructure**

The structure of the navigation. A list of navigation elements, each of which represents a page of the application and each of which may have subpages.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.BaseTemplate.TcHmiNavigation.ListItemList**Origin:** [Navigation](#) [► 873]**See also****Attribute getter:** getNavigationStructure**Attribute setter:** setNavigationStructureAvailable from version 1.12.750

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**5.10.7.4.1.9      TargetRegion**

Definition of the target region.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.System.TcHmiRegion**Origin:** [Navigation](#) [► 873]**See also****Attribute getter:** getTargetRegion**Attribute setter:** setTargetRegionAvailable from version 1.12.750

---

**5.10.7.4.1.10    BreadcrumbControl**

Definition of the Breadcrumb control.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.BaseTemplate.TcHmiBreadcrumb**Origin:** [Navigation](#) [► 873]**See also****Attribute getter:** getBreadcrumb**Attribute setter:** setBreadcrumb



Available from version 1.12.750

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#### 5.10.7.4.1.11 StaticMenuHeight

Height of the static part of the menu. The dynamic part of the menu takes up the rest of the available space.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation](#) [► 873]

**See also**

**Attribute getter:** getStaticMenuHeight

**Attribute setter:** setStaticMenuHeight

---



Available from version 1.12.750

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#### 5.10.7.4.1.12 StaticMenuHeightUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation](#) [► 873]

**See also**

**Attribute getter:** getStaticMenuHeightUnit

**Attribute setter:** setStaticMenuHeightUnit

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Available from version 1.12.750

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#### 5.10.7.4.1.13 NavigationOrientation

The orientation of the entire control.

**Schema:** tchmi:framework#/definitions/  
TcHmi.Controls.BaseTemplate.TcHmiNavigation.NavigationOrientation

**Origin:** [Navigation](#) [► 873]

**See also**

**Attribute getter:** getNavigationOrientation

**Attribute setter:** setNavigationOrientation

---



Available from version 1.12.750

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#### 5.10.7.4.1.14 KeepLowestLevel

Defines whether the last navigation level should be preserved in the context menu if the selected page has no elements defined for the context menu.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Navigation](#) [► 873]

**See also**

**Attribute getter:** getKeepLowestLevel

**Attribute setter:** setKeepLowestLevel



Available from version 1.12.750

### 5.10.8 Responsive navigation

Name	Description
Breadcrumb	The breadcrumb control in combination with the navigation control can display the path of the navigation and navigate back to already visited pages.
Navigation Bar	The Navigation Bar control in combination with the Navigation Content control allows the user to navigate between different pages of an application.
Navigation Content	The Navigation Content control in combination with the Navigation Bar control allows the user to navigate between different pages of an application.

#### 5.10.8.1 Breadcrumb

The Breadcrumb control in combination with the Navigation control can display the path of the navigation and navigate back to already visited pages.

**Attributes**

**Category:** Colors

Name	Description
<a href="#">FontColor</a> [► 893]	Definition the text color of the control
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

**Category:** Layout



Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">StartPage [► 890]</a>	Definition of the start page
<a href="#">LastPageClickable [► 890]</a>	Defines whether interaction with the last page displayed is possible.
<a href="#">Path [► 893]</a>	Defines the displayed path
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">TextVerticalAlignment [► 892]</a>	Selecting the vertical alignment of the text
<a href="#">FontSize [► 893]</a>	Definition of the font size
<a href="#">FontSizeUnit [► 893]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>

**Category: Start Page**

Name	Description
<a href="#">StartPageVisible [► 890]</a>	Defines whether the start page is displayed
<a href="#">ShowStartPageOnStartPage [► 891]</a>	Defines whether the start page is displayed on the start page
<a href="#">StartPageText [► 891]</a>	Defines the text that will be displayed for the start page
<a href="#">StartPageImage [► 891]</a>	Defines the image that will be displayed for the start page
<a href="#">ShowDefaultStartPage [► 892]</a>	Defines whether the default icon for the start page should be displayed if no other image is defined.
<a href="#">SpacerImage [► 892]</a>	Defines the image between the Breadcrumb elements

**Events****Category: Framework**

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

**Category: Operator**

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

## Functions

### Category: Close Menu

Name	Origin	Description
clearDisplay	TcHmiBreadcrumb	Resets the currently displayed path

### Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

## Inheritance hierarchy

[Control \[► 753\]](#)

Breadcrumb

**NuGet package:** [Beckhoff.TwinCAT.HMI.ResponsiveNavigation](#)



NuGet packages are available from version 1.12.

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Available from version 1.12

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#### See also

API reference for this control

### 5.10.8.1.1 Attributes

#### 5.10.8.1.1.1 StartPage

Definition of the start page.

**Schema:** tchmi:framework#/definitions/ContentPath

**Origin:** [Breadcrumb](#) [► 884]

#### See also

**Attribute getter:** getStartPage

**Attribute setter:** setStartPage

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Available from version 1.12

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#### 5.10.8.1.1.2 LastPageClickable

Defines whether interaction with the last page displayed is possible.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Breadcrumb](#) [► 884]

#### See also

**Attribute getter:** getLastPageClickable

**Attribute setter:** setLastPageClickable

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Available from version 1.12

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#### 5.10.8.1.1.3 StartPageVisible

Defines whether the start page is displayed.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Breadcrumb](#) [► 884]

**See also****Attribute getter:** getStartPageVisible**Attribute setter:** setStartPageVisibleAvailable from version 1.12

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**5.10.8.1.1.4 ShowStartPageOnStartPage**

Defines whether the start page is displayed on the start page.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Breadcrumb](#) [► 884]**See also****Attribute getter:** getShowStartPageOnStartPage**Attribute setter:** setShowStartPageOnStartPageAvailable from version 1.12

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**5.10.8.1.1.5 StartPageText**

Defines the text that will be displayed for the start page.

**Schema:** tchmi:general#/definitions/String**Origin:** [Breadcrumb](#) [► 884]**See also****Attribute getter:** getStartPageText**Attribute setter:** setStartPageTextAvailable from version 1.12

---

**5.10.8.1.1.6 StartPageImage**

Defines the image that will be displayed for the start page.

**Schema:** tchmi:framework#/definitions/Path**Origin:** [Breadcrumb](#) [► 884]**See also****Attribute getter:** getStartPageImage**Attribute setter:** setStartPageImage



Available from version 1.12

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#### 5.10.8.1.1.7 ShowDefaultStartPage

Defines whether the default icon for the start page should be displayed if no other image is defined.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Breadcrumb](#) [► 884]

**See also**

**Attribute getter:** getShowDefaultStartPage

**Attribute setter:** setShowDefaultStartPage

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Available from version 1.12

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#### 5.10.8.1.1.8 SpacerImage

Defines the image between the Breadcrumb elements.

**Schema:** tchmi:framework#/definitions/Path

**Origin:** [Breadcrumb](#) [► 884]

**See also**

**Attribute getter:** getSpacerImage

**Attribute setter:** setSpacerImage

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Available from version 1.12

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#### 5.10.8.1.1.9 TextVerticalAlignment

Selecting the vertical alignment of the text.

**Schema:** tchmi:framework#/definitions/VerticalAlignment

**Origin:** [Breadcrumb](#) [► 884]

**See also**

**Attribute getter:** getTextVerticalAlignment

**Attribute setter:** setTextVerticalAlignment

---



Available from version 1.12

---



#### 5.10.8.1.1.10    **FontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Breadcrumb](#) [► 884]

**See also**

**Attribute getter:** getFontSize

**Attribute setter:** setFontSize

---



Available from version 1.12

---

#### 5.10.8.1.1.11    **FontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Breadcrumb](#) [► 884]

**See also**

**Attribute getter:** getFontSizeUnit

**Attribute setter:** setFontSizeUnit

---



Available from version 1.12

---

#### 5.10.8.1.1.12    **FontColor**

Definition the text color of the control.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Breadcrumb](#) [► 884]

**See also**

**Attribute getter:** getFontColor

**Attribute setter:** setFontColor

---



Available from version 1.12

---

#### 5.10.8.1.1.13    **Path**

Defines the displayed path.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.ResponsiveNavigation.TcHmiBreadcrumb.Path

**Origin:** [Breadcrumb](#) [► 884]

See also

Attribute getter: getPath

Attribute setter: setPath



Available from version 1.12

5.10.8.1.2 Functions

5.10.8.1.2.1 clearDisplay

Resets the currently displayed path.

Return value: null

Origin: [Breadcrumb](#) [► 884]



Available from version 1.12

5.10.8.2 Navigation Bar

The Navigation Bar control, in combination with the Navigation Content control, allows the user to navigate between the different pages of an application.

Attributes

Category: Colors

Name	Description
<a href="#">FontColor</a> [► 901]	Definition the text color of the control
<a href="#">HightlightColor</a> [► 901]	Definition of the highlight color of the control
<a href="#">TriangleColor</a> [► 901]	Definition of the color of the triangle
<a href="#">BackgroundColor</a> [► 769]	Definition of the background color
<a href="#">BorderColor</a> [► 768]	Definition of the border color of the control

Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>

**Category: Common**

Name	Description
<a href="#">MenuSourceData [► 903]</a>	Definition of the menu structure
<a href="#">SwitchBreakpoint [► 903]</a>	Defines the width in pixels at which the control switches from the desktop view to the mobile view
<a href="#">EnableMobileSwitch [► 903]</a>	Defines whether the control can switch to the mobile view
<a href="#">LastEventParameter [► 908]</a>	The parameter of the last selected menu item
<a href="#">LastPage [► 908]</a>	The page of the last selected menu item
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Appearance**

Name	Description
<a href="#">Alignment</a> [► 906]	Definition of the alignment of the control.
<a href="#">PaddingLeftRight</a> [► 902]	Definition of the vertical spacing of the menu items.
<a href="#">PaddingLeftRightUnit</a> [► 902]	Selection of the unit of the distance: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>

**Category: Behavior**

Name	Description
<a href="#">ListenToWindowResize</a> [► 908]	Defines whether the control responds to resizing the control or the window.
<a href="#">MouseOverShow</a> [► 908]	Defines whether menu items are opened when the mouse pointer stays over the item for a while.

**Category: Mobile Icon**

Name	Description
<a href="#">MobileMenuImage</a> [► 904]	The image that is displayed in the mobile view.
<a href="#">MobileIconHeight</a> [► 907]	The height of the icon in the mobile view
<a href="#">MobileIconHeightUnit</a> [► 907]	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">MobileIconWidth</a> [► 906]	The width of the icon in the mobile view
<a href="#">MobileIconWidthUnit</a> [► 907]	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>

**Category: Slave Controls**

Name	Description
<a href="#">BreadcrumbControl</a> [► 905]	The TcHmiBreadcrumb control instance which represents the navigation path (obsolete).
<a href="#">BreadcrumbControlSymbol</a> [► 905]	The icon of the TcHmiBreadcrumb control instance, which represents the navigation path.
<a href="#">NavContentControl</a> [► 905]	The TcHmiNavigationContent control instance which represents the menu (obsolete).
<a href="#">NavContentControlSymbol</a> [► 904]	The icon of the TcHmiNavigationContent control instance which represents the menu.
<a href="#">TargetRegionControl</a> [► 906]	The TcHmiRegion control instance representing the selected page (obsolete).
<a href="#">TargetRegionControlSymbol</a> [► 906]	The icon of the TcHmiRegion control instance representing the selected page.

**Category: Source Data**

Name	Description
<a href="#">DesktopView</a> [► 904]	Defines whether the control is in the desktop view

**Category: Text**

Name	Description
FontSize [ <a href="#">▶ 902</a> ]	Definition of the font size
FontSizeUnit [ <a href="#">▶ 902</a> ]	Selecting the font size unit: <ul style="list-style-type: none"><li>• Pixels for an absolute size</li><li>• Percent for a relative size</li></ul>

## Events

### Category: Control

Name	Description
onMenuClosed [ <a href="#">▶ 909</a> ]	The menu has been closed.
onMenuOpened [ <a href="#">▶ 909</a> ]	The menu has been opened.
onPageCalled [ <a href="#">▶ 909</a> ]	A menu item has been selected.
onViewSwitched [ <a href="#">▶ 909</a> ]	The view has switched between desktop view and mobile view

### Category: Framework

Name	Description
onAttached [ <a href="#">▶ 778</a> ]	The control was added to the display.
onDetached [ <a href="#">▶ 778</a> ]	The control was removed from the display.
onInitialized [ <a href="#">▶ 778</a> ]	The control was initialized.
onDestroyed [ <a href="#">▶ 778</a> ]	The control was destroyed.
onMoved [ <a href="#">▶ 781</a> ]	The control was moved in relation to the browser window.
onResized [ <a href="#">▶ 782</a> ]	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

## Functions

### Category: Close Menu

Name	Origin	Description
<a href="#">closeMenu [► 910]</a>	TcHmiNavigationBar	Closes the menu

## Access rights

Name	Description
<a href="#">observe [► 783]</a>	Determines whether the control is generally observable.
<a href="#">operate [► 783]</a>	Determines whether the control is generally operable.

## Inheritance hierarchy

[Control \[► 753\]](#)

Navigation Bar

**NuGet package:** [Beckhoff.TwinCAT.HMI.ResponsiveNavigation](#)





NuGet packages are available from version 1.12.

---



Available from version 1.12

---

#### See also

API reference for this control

### 5.10.8.2.1 Attributes

#### 5.10.8.2.1.1 HighlightColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Navigation Bar](#) [► 894]

#### See also

**Attribute getter:** getHighlightColor

**Attribute setter:** setHighlightColor

---



Available from version 1.12

---

#### 5.10.8.2.1.2 FontColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Breadcrumb](#) [► 884]

#### See also

**Attribute getter:** getFontColor

**Attribute setter:** setFontColor

---



Available from version 1.12

---

#### 5.10.8.2.1.3 TriangleColor

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Breadcrumb](#) [► 884]

#### See also

**Attribute getter:** getTriangleColor

**Attribute setter:** setTriangleColor



Available from version 1.12

---

#### 5.10.8.2.1.4     **PaddingLeftRight**

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getPaddingLeftRight

**Attribute setter:** setPaddingLeftRight

---



Available from version 1.12

---

#### 5.10.8.2.1.5     **PaddingLeftRightUnit**

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getPaddingLeftRightUnit

**Attribute setter:** setPaddingLeftRightUnit

---



Available from version 1.12

---

#### 5.10.8.2.1.6     **FontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getFontSize

**Attribute setter:** setFontSize

---



Available from version 1.12

---

#### 5.10.8.2.1.7     **FontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getFontSizeUnit

**Attribute setter:** setFontSizeUnit

---



Available from version 1.12

---

#### 5.10.8.2.1.8 MenuSourceData

**Schema:** tchmi:framework#/definitions/  
Tchmi.Controls.ResponsiveNavigation.TchmiNavigationBar.MenuItemList

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getMenuSourceData

**Attribute setter:** setMenuSourceData

---



Available from version 1.12

---

#### 5.10.8.2.1.9 SwitchBreakpoint

The width in pixels at which the control switches from desktop view to mobile view.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getSwitchBreakpoint

**Attribute setter:** setSwitchBreakpoint

---



Available from version 1.12

---

#### 5.10.8.2.1.10 EnableMobileSwitch

Defines whether the control can switch to the mobile view.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getEnableMobileSwitch

**Attribute setter:** setEnableMobileSwitch



Available from version 1.12

---

#### 5.10.8.2.1.11 DesktopView

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getDesktopView

The attribute can only be read and therefore has no setter.

---



Available from version 1.12

---

#### 5.10.8.2.1.12 MobileMenuImage

The address of the image that will be displayed when the control is in mobile view. Images on other servers are also possible.

**Schema:** tchmi:framework#/definitions/Path

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getMobileMenuImage

**Attribute setter:** setMobileMenuImage

---



Available from version 1.12

---

#### 5.10.8.2.1.13 NavContentControlSymbol

The icon of the TcHmiNavigationContent control in which subelements of the navigation are displayed.

**Schema:** tchmi:framework#/definitions/  
TcHmiControls.ResponsiveNavigation.TcHmiNavigationBar.NavigationContentControlSymbol

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getNavContentControlSymbol

**Attribute setter:** setNavContentControlSymbol

---



Available from version 1.12

---

#### 5.10.8.2.1.14 NavContentControl

The TcHmiNavigationContent control instance which represents the menu.



This attribute is obsolete. Please use this attribute [NavContentControlSymbol](#) [► 904]

**Schema:** tchmi:framework#/definitions/Tchmi.Controls.ResponsiveNavigation.TcHmiNavigationContent

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getNavContentControl

**Attribute setter:** setNavContentControl



Available from version 1.12

#### 5.10.8.2.1.15 BreadcrumbControlSymbol

The TcHmiBreadcrumb control instance which represents the navigation path.

**Schema:** tchmi:framework#/definitions/  
Tchmi.Controls.ResponsiveNavigation.TcHmiNavigationBar.BreadCrumbControlSymbol

**Origin:** [BreadcrumbControlSymbol](#) [► 905]

**See also**

**Attribute getter:** getBreadcrumbControlSymbol

**Attribute setter:** setBreadcrumbControlSymbol



Available from version 1.12

#### 5.10.8.2.1.16 BreadcrumbControl

The TcHmiBreadcrumb control instance which represents the navigation path.



This attribute is obsolete. Please use this attribute [BreadcrumbControlSymbol](#) [► 905]

**Schema:** tchmi:framework#/definitions/Tchmi.Controls.ResponsiveNavigation.TcHmiBreadcrumb

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getBreadcrumbControl

**Attribute setter:** setBreadcrumbControl



Available from version 1.12

#### 5.10.8.2.1.17 TargetRegionControlSymbol

The TcHmiRegion control instance that represents the selected page.

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.ResponsiveNavigation.TcHmiNavigationBar.TargetRegionControlSymbol

**Origin:** [TargetRegionControlSymbol](#) [► 906]

**See also**

**Attribute getter:** getTargetRegionControlSymbol

**Attribute setter:** setTargetRegionControlSymbol



Available from version 1.12

---

#### 5.10.8.2.1.18 TargetRegionControl

The TcHmiRegion control instance that represents the selected page.



This attribute is obsolete. Please use this attribute [TargetRegionControlSymbol](#) [► 906]

---

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.System.TcHmiRegion

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getTargetRegionControl

**Attribute setter:** setTargetRegionControl



Available from version 1.12

---

#### 5.10.8.2.1.19 Alignment

**Schema:** tchmi:framework#/definitions/TcHmi.Controls.ResponsiveNavigation.TcHmiNavigationBar.Alignment

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getAlignment

**Attribute setter:** setAlignment



Available from version 1.12

---

#### 5.10.8.2.1.20 MobileIconWidth

Numerical value of the image width of the icon.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getMobileIconWidth

**Attribute setter:** setMobileIconWidth

---



Available from version 1.12

---

#### 5.10.8.2.1.21 MobileIconWidthUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getMobileIconWidthUnit

**Attribute setter:** setMobileIconWidthUnit

---



Available from version 1.12

---

#### 5.10.8.2.1.22 MobileIconHeight

Numerical value of the image width of the icon.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getMobileIconHeight

**Attribute setter:** setMobileIconHeight

---



Available from version 1.12

---

#### 5.10.8.2.1.23 MobileIconHeightUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getMobileIconHeightUnit

**Attribute setter:** setMobileIconHeightUnit

---



Available from version 1.12

---

#### 5.10.8.2.1.24 LastEventParameter

The parameter of the last selected menu item.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getLastEventParameter

The attribute can only be read and therefore has no setter.

---



Available from version 1.12

---

#### 5.10.8.2.1.25 LastPage

The page of the last selected menu item.

**Schema:** tchmi:general#/definitions/String

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getLastPage

The attribute can only be read and therefore has no setter.

---



Available from version 1.12

---

#### 5.10.8.2.1.26 ListenToWindowResize

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Navigation Bar](#) [► 894]

**See also**

**Attribute getter:** getListenToWindowResize

**Attribute setter:** setListenToWindowResize

---



Available from version 1.12

---

#### 5.10.8.2.1.27 MouseOverShow

**Schema:** tchmi:general#/definitions/Boolean



**Origin:** [Navigation Bar \[► 894\]](#)

**See also**

**Attribute getter:** getMouseOverShow

**Attribute setter:** setMouseOverShow



Available from version 1.12

---

## 5.10.8.2.2 Events

### 5.10.8.2.2.1 onViewSwitched

The view has been changed between mobile and desktop.

**Origin:** [Navigation Bar \[► 894\]](#)



Available from version 1.12

---

### 5.10.8.2.2.2 onPageCalled

A navigation element that defined a page was selected.

**Origin:** [Navigation Bar \[► 894\]](#)



Available from version 1.12

---

### 5.10.8.2.2.3 onMenuOpened

The menu has been opened.

**Origin:** [Navigation Bar \[► 894\]](#)



Available from version 1.12

---

### 5.10.8.2.2.4 onMenuClosed

The menu has been closed.

**Origin:** [Navigation Bar \[► 894\]](#)



Available from version 1.12

---

### 5.10.8.2.3 Functions

#### 5.10.8.2.3.1 closeMenu

Closes the menu.

**Return value:** null

**Origin:** [Navigation Bar \[► 894\]](#)

---



Available from version 1.12

---

### 5.10.8.3 Navigation Content

The Navigation Content control, in combination with the Navigation Bar control, allows the user to navigate between the different pages of an application.

#### Attributes

##### Category: Colors

Name	Description
<a href="#">FontColor [► 916]</a>	Definition the text color of the control
<a href="#">MenuBackgroundColor [► 923]</a>	Definition of the background color of the menu
<a href="#">BackgroundColor [► 769]</a>	Definition of the background color
<a href="#">BorderColor [► 768]</a>	Definition of the border color of the control

##### Category: Layout

Name	Description
<a href="#">Left [► 760]</a>	Definition of the distance from the left side to the left side of the surrounding control
<a href="#">LeftUnit [► 760]</a>	Definition of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Top [► 761]</a>	Definition of the distance from the top side to the top side of the surrounding control
<a href="#">TopUnit [► 761]</a>	Selection of the unit of the distance to the top side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Right [► 763]</a>	Definition of the distance from the right side to the right side of the surrounding control
<a href="#">RightUnit [► 764]</a>	Selection of the unit of the distance to the right side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Bottom [► 764]</a>	Definition of the distance from the bottom side to the bottom side of the surrounding control
<a href="#">BottomUnit [► 765]</a>	Selection of the unit of the distance to the bottom side of the surrounding control: <ul style="list-style-type: none"> <li>• Pixels for absolute positioning</li> <li>• Percent for relative positioning</li> </ul>
<a href="#">Width [► 761]</a>	Definition of the external width of the control
<a href="#">WidthUnit [► 762]</a>	Selection of the unit of the width: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">Height [► 762]</a>	Definition of the external height of the control
<a href="#">HeightUnit [► 763]</a>	Selection of the unit of the height: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">MaxWidth [► 773]</a>	Definition of the maximum width if the control size is defined as dynamic.
<a href="#">MaxWidthUnit [► 774]</a>	Selection of the unit of the maximum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinWidth [► 774]</a>	Definition of the minimum width if the control size is defined as dynamic.
<a href="#">MinWidthUnit [► 774]</a>	Selection of the unit of the minimum width: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MaxHeight [► 773]</a>	Definition of the maximum height if the control size is defined as dynamic.
<a href="#">MaxHeightUnit [► 773]</a>	Selection of the unit of the maximum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">MinHeight [► 772]</a>	Definition of the minimum height if the control size is defined as dynamic.

Name	Description
<a href="#">MinHeightUnit [► 772]</a>	Selection of the unit of the minimum height: <ul style="list-style-type: none"> <li>• Pixels for an absolute value</li> <li>• Percent for a relative value</li> </ul>
<a href="#">RenderedLeft [► 765]</a>	Calculated distance in pixels from the left side to the left side of the surrounding control
<a href="#">RenderedTop [► 765]</a>	Calculated distance in pixels from the top side to the top side of the surrounding control
<a href="#">RenderedRight [► 766]</a>	Calculated distance in pixels from the right side to the right side of the surrounding control
<a href="#">RenderedBottom [► 766]</a>	Calculated distance in pixels from the bottom side to the bottom side of the surrounding control
<a href="#">RenderedWidth [► 766]</a>	Calculated width of the control in pixels
<a href="#">RenderedHeight [► 767]</a>	Calculated height of the control in pixels
<a href="#">GridRowIndex [► 768]</a>	Definition of the row of a grid in which the control is to be displayed.
<a href="#">GridColumnIndex [► 767]</a>	Definition of the column of a grid in which the control is to be displayed.
<a href="#">Opacity [► 775]</a>	Definition of the transparency of the entire control
<a href="#">Visibility [► 776]</a>	Selection of the visibility of a control: <ul style="list-style-type: none"> <li>• Visible: Control is visible.</li> <li>• Hidden: Control is invisible, but is drawn – controls behind it cannot be operated.</li> <li>• Collapsed: Control is invisible and is not drawn – controls behind it can be operated.</li> </ul>
<a href="#">ZIndex [► 776]</a>	Definition of the position on the Z-axis
<a href="#">Transform [► 775]</a>	Definition of a transformation of a control: <ul style="list-style-type: none"> <li>• Translate: Translate in X-, Y-, Z-direction</li> <li>• Rotate: Rotate by an angle</li> <li>• Scale: Zoom by a factor</li> <li>• Skew: Sides shown skewed by an angle</li> <li>• Origin: Set the origin of the transformation relative to the position of the control</li> <li>• Perspective: Set the perspective of the transformations of all child elements</li> </ul>
<a href="#">BoxShadow [► 777]</a>	Definition of a shadow
<a href="#">WidthMode [► 762]</a>	Selection of the method of calculating the width: <ul style="list-style-type: none"> <li>• Value: The width is defined by the width entered.</li> <li>• Parent: The width is defined by the distance to the left and right side of the parent element. The "Width" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 763]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: The height is defined by the height entered.</li> <li>• Parent: The height is defined by the distance to the top and bottom side of the parent element. The "Height" attribute is ignored in all calculations!</li> </ul>
<a href="#">HeightMode [► 923]</a>	Selection of the method of calculating the height: <ul style="list-style-type: none"> <li>• Value: the height is defined by the height entered.</li> <li>• Parent: the height is defined by the distance to the upper and lower side of the parent element. The 'Height' attribute is ignored in all calculations!</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>Content: the height is defined by the content of the control.</li> </ul>

**Category: Common**

Name	Description
<a href="#">CloseText [► 922]</a>	The text of the close button
<a href="#">CloseImage [► 922]</a>	The image of the close button
<a href="#">SubMenuImage [► 923]</a>	The image that is displayed in front of subelements of the navigation
<a href="#">IsEnabled [► 759]</a>	Selection of whether a control should be activated
<a href="#">Id [► 759]</a>	Definition of the name of the control
<a href="#">Type [► 776]</a>	Type name of the control
<a href="#">ClassNames [► 759]</a>	Definition of control classes
<a href="#">IsAttached [► 760]</a>	If a control is logically assigned in the DOM.
<a href="#">Tooltip [► 775]</a>	Definition of the tooltip for the control

**Category: Border**

Name	Description
<a href="#">BorderRadius [► 769]</a>	Definition of the radius of the four corners to round them off
<a href="#">BorderStyle [► 769]</a>	Selection of the border style of the four sides of the control
<a href="#">BorderWidth [► 768]</a>	Definition of the border width of the four sides of the control

**Category: Background Image**

Name	Description
<a href="#">BackgroundImage [► 770]</a>	Definition of an image that is located above the background color
<a href="#">BackgroundImageHeight [► 771]</a>	Definition of the height of the background image
<a href="#">BackgroundImageHeightUnit [► 771]</a>	Selection of the unit of the height of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute height</li> <li>• Percent for a relative height</li> </ul>
<a href="#">BackgroundImageWidth [► 770]</a>	Definition of the width of the background image
<a href="#">BackgroundImageWidthUnit [► 770]</a>	Selection of the unit of the width of the background image: <ul style="list-style-type: none"> <li>• Pixels for an absolute width</li> <li>• Percent for a relative width</li> </ul>
<a href="#">BackgroundImagePadding [► 771]</a>	Definition of an additional distance between the border of the control and background image for the four sides
<a href="#">BackgroundImageVerticalAlignment [► 772]</a>	Definition of the vertical alignment of the background image within the control
<a href="#">BackgroundImageHorizontalAlignment [► 771]</a>	Definition of the horizontal alignment of the background image within the control

**Category: Text**

Name	Description
<a href="#">CloseFontSize [► 920]</a>	Definition of the font size of the close button
<a href="#">CloseFontSizeUnit [► 921]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">ColumnElementFontSize [► 920]</a>	Definition of the font size of a column element
<a href="#">ColumnElementFontSizeUnit [► 920]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">ColumnTitleFontSize [► 919]</a>	Definition of the font size of a column title
<a href="#">ColumnTitleFontSizeUnit [► 919]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">SubtitleFontSize [► 918]</a>	Definition of the font size of a subtitle
<a href="#">SubtitleFontSizeUnit [► 919]</a>	Selecting the font size unit: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>

**Category: Behavior**

Name	Description
<a href="#">AnimationTime [► 918]</a>	The animation time in milliseconds.
<a href="#">AutoCloseMenu [► 922]</a>	Defines whether the menu is closed when the user interacts with controls outside the menu.
<a href="#">AutoCollapseElement [► 921]</a>	Defines whether menu items are closed when another menu item is selected.
<a href="#">AutoExpandElements [► 921]</a>	Defines whether all elements are expanded after opening the menu.

**Category: Appearance**

Name	Description
<a href="#">ColumnElementMarginTop [► 917]</a>	Top margin of a column element
<a href="#">ColumnElementMarginTopUnit [► 917]</a>	Selection of the unit of the distance: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">MobileElementMarginTop [► 918]</a>	Top margin of an element in mobile view
<a href="#">MobileElementMarginTopUnit [► 918]</a>	Selection of the unit of the distance: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">PaddingLeftRight [► 916]</a>	Definition of the vertical spacing of the menu items.
<a href="#">PaddingLeftRightUnit [► 917]</a>	Selection of the unit of the distance: <ul style="list-style-type: none"> <li>• Pixels for an absolute size</li> <li>• Percent for a relative size</li> </ul>
<a href="#">ShowIconsMobile [► 921]</a>	Defines whether the icons are displayed in the mobile view.

## Events

### Category: Framework

Name	Description
<a href="#">onAttached [► 778]</a>	The control was added to the display.
<a href="#">onDetached [► 778]</a>	The control was removed from the display.
<a href="#">onInitialized [► 778]</a>	The control was initialized.
<a href="#">onDestroyed [► 778]</a>	The control was destroyed.
<a href="#">onMoved [► 781]</a>	The control was moved in relation to the browser window.
<a href="#">onResized [► 782]</a>	The size of the control was changed.

### Category: Operator

Name	Description
<a href="#">onPressed [► 782]</a>	A mouse click was executed or a touch screen was briefly touched.
<a href="#">onMouseClicked [► 778]</a>	The left mouse button was clicked over the control and released.
<a href="#">onMouseDoubleClick [► 778]</a>	The left mouse button was clicked twice over the control and released.
<a href="#">onMouseRightClick [► 780]</a>	The right mouse button was clicked over the control and released.
<a href="#">onMouseDown [► 779]</a>	A mouse button was pressed down over the control.
<a href="#">onMouseEnter [► 779]</a>	The mouse pointer was moved over the control.
<a href="#">onMouseLeave [► 780]</a>	The mouse pointer has left the control.
<a href="#">onMouseUp [► 781]</a>	A mouse button was released over the control.
<a href="#">onMouseDownLeft [► 779]</a>	The left mouse button was pressed down over the control.
<a href="#">onMouseDownRight [► 779]</a>	The right mouse button was pressed down over the control.
<a href="#">onMouseMove [► 780]</a>	The mouse was moved over the control.
<a href="#">onMouseOver [► 780]</a>	The mouse pointer was moved over the control or one of its children.
<a href="#">onMouseOut [► 780]</a>	The mouse pointer has left the control or one of its child controls.
<a href="#">onMouseUpLeft [► 781]</a>	The left mouse button was released over the control.
<a href="#">onMouseUpRight [► 781]</a>	The right mouse button was released over the control.
<a href="#">onMouseWheel [► 781]</a>	The mouse wheel was moved over the control.
<a href="#">onTouchStart [► 783]</a>	A finger/stylus was placed against a touch screen.
<a href="#">onTouchMove [► 782]</a>	A finger/stylus was moved on a touch screen.
<a href="#">onTouchEnd [► 782]</a>	A finger/stylus was lifted off a touch screen.
<a href="#">onTouchCancel [► 782]</a>	An interaction with a touch screen was aborted.

**Access rights**

Name	Description
<a href="#">observe</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally observable.
<a href="#">operate</a> [ <a href="#">► 783</a> ]	Determines whether the control is generally operable.

**Inheritance hierarchy**

[Control](#) [[► 753](#)]

Navigation Content

**NuGet package:** [Beckhoff.TwinCAT.HMI.ResponsiveNavigation](#)



NuGet packages are available from version 1.12.



Available from version 1.12

**See also**

API reference for this control

**5.10.8.3.1      Attributes****5.10.8.3.1.1      FontColor**

Definition the text color of the control.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Navigation Content](#) [[► 910](#)]

**See also**

**Attribute getter:** getFontColor

**Attribute setter:** setFontColor



Available from version 1.12

**5.10.8.3.1.2      PaddingLeftRight**

Definition of the vertical spacing of the menu items.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation Content](#) [[► 910](#)]

**See also**

**Attribute getter:** getPaddingLeftRight



**Attribute setter:** setPaddingLeftRight

---



Available from version 1.12

---

#### 5.10.8.3.1.3      **PaddingLeftRightUnit**

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation Content](#) [► 910]

**See also**

**Attribute getter:** getPaddingLeftRightUnit

**Attribute setter:** setPaddingLeftRightUnit

---



Available from version 1.12

---

#### 5.10.8.3.1.4      **ColumnElementMarginTop**

The top margin of a column element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation Content](#) [► 910]

**See also**

**Attribute getter:** getColumnElementMarginTop

**Attribute setter:** setColumnElementMarginTop

---



Available from version 1.12

---

#### 5.10.8.3.1.5      **ColumnElementMarginTopUnit**

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation Content](#) [► 910]

**See also**

**Attribute getter:** getColumnElementMarginTopUnit

**Attribute setter:** setColumnElementMarginTopUnit

---



Available from version 1.12

---

#### 5.10.8.3.1.6 MobileElementMarginTop

The top margin of an element in mobile view.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation Content](#) [► 910]

**See also**

**Attribute getter:** getMobileElementMarginTop

**Attribute setter:** setMobileElementMarginTop

---



Available from version 1.12

---

#### 5.10.8.3.1.7 MobileElementMarginTopUnit

Pixels, or percent for relative positioning.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation Content](#) [► 910]

**See also**

**Attribute getter:** getMobileElementMarginTopUnit

**Attribute setter:** setMobileElementMarginTopUnit

---



Available from version 1.12

---

#### 5.10.8.3.1.8 AnimationTime

Animation time in milliseconds.

**Schema:** tchmi:general#/definitions/Number

**Origin:** [Navigation Content](#) [► 910]

**See also**

**Attribute getter:** getAnimationTime

**Attribute setter:** setAnimationTime

---



Available from version 1.12

---

#### 5.10.8.3.1.9 SubtitleFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation Content](#) [► 910]

**See also****Attribute getter:** getSubtitleFontSize**Attribute setter:** setSubtitleFontSizeAvailable from version 1.12

---

**5.10.8.3.1.10 SubtitleFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Navigation Content](#) [► 910]**See also****Attribute getter:** getSubtitleFontSizeUnit**Attribute setter:** setSubtitleFontSizeUnitAvailable from version 1.12

---

**5.10.8.3.1.11 ColumnTitleFontSize**

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue**Origin:** [Navigation Content](#) [► 910]**See also****Attribute getter:** getColumnTitleFontSize**Attribute setter:** setColumnTitleFontSizeAvailable from version 1.12

---

**5.10.8.3.1.12 ColumnTitleFontSizeUnit**

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit**Origin:** [Navigation Content](#) [► 910]**See also****Attribute getter:** getColumnTitleFontSizeUnit**Attribute setter:** setColumnTitleFontSizeUnit



Available from version 1.12

---

#### 5.10.8.3.1.13 ColumnElementFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation Content \[► 910\]](#)

**See also**

**Attribute getter:** getColumnElementFontSize

**Attribute setter:** setColumnElementFontSize

---



Available from version 1.12

---

#### 5.10.8.3.1.14 ColumnElementFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation Content \[► 910\]](#)

**See also**

**Attribute getter:** getColumnElementFontSizeUnit

**Attribute setter:** setColumnElementFontSizeUnit

---



Available from version 1.12

---

#### 5.10.8.3.1.15 CloseFontSize

The font size. If the percent is specified as the unit, this is relative to the font size of the parent element.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation Content \[► 910\]](#)

**See also**

**Attribute getter:** getCloseFontSize

**Attribute setter:** setCloseFontSize

---



Available from version 1.12

---

#### 5.10.8.3.1.16 CloseFontSizeUnit

Pixels, or percent for relative sizes.

**Schema:** tchmi:framework#/definitions/MeasurementUnit

**Origin:** [Navigation Content](#) [► 910]

**See also**

**Attribute getter:** getCloseFontSizeUnit

**Attribute setter:** setCloseFontSizeUnit

---



Available from version 1.12

---

#### 5.10.8.3.1.17 ShowIconsMobile

Defines whether the icons are displayed in the mobile view.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Navigation Content](#) [► 910]

**See also**

**Attribute getter:** getShowIconsMobile

**Attribute setter:** setShowIconsMobile

---



Available from version 1.12

---

#### 5.10.8.3.1.18 AutoCollapseElement

Defines whether menu items are closed when another menu item is selected.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Navigation Content](#) [► 910]

**See also**

**Attribute getter:** getAutoCollapseElements

**Attribute setter:** setAutoCollapseElements

---



Available from version 1.12

---

#### 5.10.8.3.1.19 AutoExpandElements

Defines whether all elements are expanded after opening the menu.

**Schema:** tchmi:general#/definitions/Boolean

**Origin:** [Navigation Content](#) [► 910]

**See also****Attribute getter:** getAutoExpandElements**Attribute setter:** setAutoExpandElementsAvailable from version 1.12

---

**5.10.8.3.1.20    AutoCloseMenu**

Defines whether the menu is closed when the user interacts with controls outside the menu.

**Schema:** tchmi:general#/definitions/Boolean**Origin:** [Navigation Content \[► 910\]](#)**See also****Attribute getter:** getAutoCloseMenu**Attribute setter:** setAutoCloseMenuAvailable from version 1.12

---

**5.10.8.3.1.21    CloseText**

The text of the close button.

**Schema:** tchmi:general#/definitions/String**Origin:** [Navigation Content \[► 910\]](#)**See also****Attribute getter:** getCloseText**Attribute setter:** setCloseTextAvailable from version 1.12

---

**5.10.8.3.1.22    ClosedImage**

The address of the image. Images on other servers are also possible.

**Schema:** tchmi:framework#/definitions/Path**Origin:** [Navigation Content \[► 910\]](#)**See also****Attribute getter:** getClosedImage**Attribute setter:** setClosedImage



Available from version 1.12

---

#### 5.10.8.3.1.23 SubMenuImage

The address of the image. Images on other servers are also possible.

**Schema:** tchmi:framework#/definitions/Path

**Origin:** [Navigation Content \[► 910\]](#)

**See also**

**Attribute getter:** getSubMenuImage

**Attribute setter:** setSubMenuImage

---



Available from version 1.12

---

#### 5.10.8.3.1.24 MenuBackgroundColor

Definition of the background color of the menu.

**Schema:** tchmi:framework#/definitions/SolidColor

**Origin:** [Navigation Content \[► 910\]](#)

**See also**

**Attribute getter:** getMenuBackgroundColor

**Attribute setter:** setMenuBackgroundColor

---



Available from version 1.12

---

#### 5.10.8.3.1.25 HeightMode

Selection of the method of calculating the height.

**Schema:** tchmi:framework#/definitions/MeasurementValue

**Origin:** [Navigation Content \[► 910\]](#)

**See also**

**Attribute getter:** getHeightMode

**Attribute setter:** setHeightMode

---



Available from version 1.12

---

## 5.11 Functions

Functions enable various logical operations to be executed on the client side. The functions can be used in the [Properties window \[► 60\]](#), in the [Actions and Conditions Editor \[► 61\]](#) or in the [Code Behind \[► 1462\]](#).

To use a function in Code Behind, a reference to the function must be obtained via the API function `TcHmi.Functions.getFunction`. This reference can then be called up directly.

In addition to the functions supplied, it is possible to [implement your own logical operations in JavaScript \[► 1466\]](#).

### 5.11.1 Binding

#### 5.11.1.1 CheckBinding

```
function CheckBinding(control: TcHmi.Controls.System.baseTcHmiControl, propertyName: string):
boolean
```

The `CheckBinding` function checks whether a binding to a control property exists. Refer also to the description page for the corresponding API function.

##### Parameter

Name	Type	Description
control	TcHmi.Controls.System.baseTcHmiControl	The control containing the property to be checked.
propertyName	string	The name of the control property to be checked.

##### Return value

Type	Description
boolean	<b>Values:</b> <ul style="list-style-type: none"> <li>• true: A binding to the control property exists.</li> <li>• false: A binding to the control property does not exist.</li> </ul>

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

#### 5.11.1.2 CheckBindingEx

```
function CheckBindingEx(control: TcHmi.Controls.System.baseTcHmiControl, propertyName: string,
symbol: TcHmi.Symbol | null): boolean
```

The `CheckBindingEx` function checks whether a binding of a certain symbol to a control property exists.



**Parameter**

Name	Type	Description
control	TcHmi.Controls.System.baseTcHmiControl	The control containing the property to be checked.
propertyName	string	The name of the control property to be checked.
symbol	Symbol	The symbol for which the binding to a control property is to be checked.

**Return value**

Type	Description
boolean	<b>Values:</b> <ul style="list-style-type: none"><li>• true: A binding of the symbol to the control property exists.</li><li>• false: A binding of the symbol to the control property does not exist.</li></ul>

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

### 5.11.1.3 CreateBinding

```
function CreateBinding(control: TcHmi.Controls.System.baseTcHmiControl, propertyName: string, symbol: TcHmi.Symbol | null): void
```

The CreateBinding function creates a binding on a control property. Refer also to the description page for the corresponding API function.

**Parameter**

Name	Type	Description
control	TcHmi.Controls.System.baseTcHmiControl	The control that is to be linked.
propertyName	string	The name of the property on the control.
symbol	Symbol	Binding source

**Return value**

Type	Description
void	no return value

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

#### 5.11.1.4 RemoveBinding

```
function RemoveBinding(control: TcHmi.Controls.System.baseTcHmiControl, propertyName: string): void
```

The RemoveBinding function deletes a binding on a control property. Refer also to the description page for the corresponding API function.

##### Parameter

Name	Type	Description
control	TcHmi.Controls.System.baseTcHmiControl	The control that is to be changed.
propertyName	string	The name of the property on the control.

##### Return value

Type	Description
void	no return value

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

### 5.11.2 Data Conversion

#### 5.11.2.1 Concatenate

```
function Concatenate(...strings: string[])
```

The Concatenate function links several strings together.

##### Parameter

Name	Type	Description
...strings [ Rest Parameter ]	string[]	Any number of strings that are to be linked.

##### Return value

Type	Description
string	A string linked from the transfer parameters.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.2.2 ConvertBooleanToEnum

```
function ConvertBooleanToEnum<T = any>(value: boolean, trueValue: T, falseValue: T)
```

The function ConvertBooleanToEnum converts a Boolean value to the value of an enumerator.

#### Parameter

Name	Type	Description
value	boolean	The Boolean value to be converted. Only a <a href="#">binding [► 108]</a> makes sense at this point.
trueValue	T	The value to be returned if the Boolean value is TRUE.
falseValue	T	The value to be returned if the Boolean value is FALSE.

#### Return value

Type	Description
T	The value specified as trueValue or falseValue depending on the transferred Boolean value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.2.3 ConvertBooleanToVisibility

```
function ConvertBooleanToVisibility(value: boolean, falseValue: 'Hidden' | 'Collapsed' = 'Hidden'): Visibility
```

The function ConvertBooleanToVisibility converts a Boolean value to a value of the enumerator "[Visibility \[► 776\]](#)".

#### Parameter

Name	Type	Description
value	boolean	The Boolean value to be converted. Only a <a href="#">binding [► 108]</a> makes sense at this point.
falseValue	<a href="#">Visibility [► 776]</a>	The value specified as falseValue depending on the transferred Boolean value.

#### Return value

Type	Description
<a href="#">Visibility [► 776]</a>	The visibility depending on the Boolean value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.2.4 Decrement

#### Version 1.8

```
function Decrement(symbol: Symbol, minValue?: number): void
```

#### Version 1.10

```
function Decrement(ctx: TcHmi.SelectableRequired<TcHmi.Context, 'success' | 'error'>, symbol: TcHmi.Symbol | null, minValue?: number | null, stepWidth?: number | null): void
```

The Decrement function counts a numerical value in a binding downward in steps of a specified step size.

#### Parameter

Name	Type	Description
ctx <b>Available from version 1.10</b>	TcHmi.SelectableRequired<TcHmi.Context>	Context object  Does not need to be specified by the user when it is used in a trigger or function expression. In this case the transfer and the evaluation is done by the corresponding parser.  Is used by the caller to indicate success or failure to the framework during execution.  If the function is used directly in JavaScript/TypeScript, the context object must be passed in the call and evaluated if necessary.
value	Symbol	The value to be decremented. The value must be specified as a <a href="#">binding [► 108]</a> to a symbol.
minValue	number	A minimum value that may not be undershot.
stepWidth	number	The step size with which the value is to be decremented.

#### Return value

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.2.5 GetElementByIndex

#### Version 1.8

```
function GetElementByIndex<T>(array: T[] | string | null, arrayIndex: number | null): T | any
```

#### Version 1.10

```
function GetElementByIndex(TcHmi.SelectableRequired<TcHmi.Context, 'success' | 'error'>,
arraySymbol: TcHmi.Symbol | null, arrayIndex: number | null): void
```

The function `GetElementByIndex` returns the value of a certain array index of a binding.

#### Parameter

Name	Type	Description
ctx <b>Available from version 1.10</b>	TcHmi.SelectableRequired<TcHmi.Context>	Context object  Does not need to be specified by the user when it is used in a trigger or function expression. In this case the transfer and the evaluation is done by the corresponding parser.  Is used by the caller to indicate success or failure to the framework during execution.  If the function is used directly in JavaScript/TypeScript, the context object must be passed in the call and evaluated if necessary.
arraySymbol	<b>Version 1.8</b> T[]   string   null <b>Version 1.10</b> Symbol	A binding to the symbol of an array.
index	number   null	The index of the array for which the value is to be returned.

#### Return value

Type	Description
<b>Version 1.8</b> any	<b>Version 1.8</b> The value that is stored in the position of the index in the array.
<b>Version 1.10</b> void	<b>Version 1.10</b> No return value.  The result or error information is communicated via corresponding callback functions in the context object.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.2.6 Increment

#### Version 1.8

```
function Increment(symbol: Symbol | undefined | null, maxValue?: number | null): void
```

#### Version 1.10

```
function Increment(ctx: TcHmi.SelectableRequired<TcHmi.Context, 'success' | 'error'>, symbol:
TcHmi.Symbol<number> | null, maxValue?: number | null, stepWidth?: number | null): void
```

The `Increment` function counts a numerical value in a binding upward in steps of a specified step size.

**Parameter**

Name	Type	Description
ctx <b>Available from version 1.10</b>	TcHmi.SelectableRequired<TcHmi.Context>	Context object  Does not need to be specified by the user when it is used in a trigger or function expression. In this case the transfer and the evaluation is done by the corresponding parser.  Is used by the caller to indicate success or failure to the framework during execution.  If the function is used directly in JavaScript/TypeScript, the context object must be passed in the call and evaluated if necessary.
symbol	Symbol	The value to be incremented. The value must be specified as a <a href="#">binding [► 108]</a> to a symbol.
maxValue	number	A maximum value that may not be exceeded.
stepWidth	number	The step size with which the value is to be incremented.

**Return value**

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.2.7 SetElementByIndex

```
function SetElementByIndex(ctx: TcHmi.SelectableRequired<TcHmi.Context, 'success' | 'error'>,
arraySymbol: TcHmi.Symbol<any[]> | null, arrayIndex: number | null, value: any): void
```

The function SetElementByIndex sets the value of a certain array index in a binding.

**Parameter**

Name	Type	Description
ctx	TcHmi.SelectableRequired<TcHmi.Context>	Context object  Does not need to be specified by the user when it is used in a trigger or function expression. In this case the transfer and the evaluation is done by the corresponding parser.  Is used by the caller to indicate success or failure to the framework during execution.  If the function is used directly in JavaScript/TypeScript, the context object must be passed in the call and evaluated if necessary.
arraySymbol	Symbol	A binding to the symbol of an array.
index	number	The index of the array for which the value is to be set.
value	any	The value to be written in the position of the array.

**Return value**

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.2.8 ToDateString

```
function ToDateString(date: Date | any, timeFormatLocale?: string | null): string
```

The function ToDateString converts a date in accordance with a transferred localization into a string containing the date.

**Parameter**

Name	Type	Description
date	any	Text, numbers (milliseconds since 1/1/1970) or JavaScript date object.
timeFormatLocale	string	The localization variable as a string. If this is not specified, the currently active language [► 999] is used for times.

**Return value**

Type	Description
string	The date of the input value according to the localization in the form of a string.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

### 5.11.2.9 ToDateTimeString

```
function ToDateTimeString(date: Date | any, timeFormatLocale?: string | null): string
```

The function ToDateTimeString converts a date in accordance with a transferred localization into a string containing the date including the time.

**Parameter**

Name	Type	Description
date	any	Text, numbers (milliseconds since 1/1/1970) or JavaScript date object.
timeFormatLocale	string	The localization variable as a string. If this is not specified, the <u>currently active language</u> [► 999] is used for times.

**Return value**

Type	Description
string	The date with time of the input value according to the localization in the form of a string.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

**5.11.2.10 ToLowerCase**

```
function ToLowerCase(value: string | null): string | null
```

The function ToLowerCase converts all the letters in a string to lower-case letters.

**Parameter**

Name	Type	Description
value	string	Any string.

**Return value**

Type	Description
string   null	Input string in lower case or null if no string was passed.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

**5.11.2.11 ToTimeString**

```
function ToTimeString(date: Date | any, timeFormatLocale?: string | null): string
```

The function ToTimeString converts a date in accordance with a transferred localization into a string containing the time.



**Parameter**

Name	Type	Description
date	any	Text, numbers (milliseconds since 1/1/1970) or JavaScript date object.
timeFormatLocale	string	The localization variable as a string. If this is not specified, the <u>currently active language</u> [► 999] is used for times.

**Return value**

Type	Description
string	The time of the input value according to the localization in the form of a string.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

### 5.11.2.12 ToUpperCase

```
function ToUpperCase(value: string): string | null
```

The function ToUpperCase converts all the letters in a string to upper-case letters.

**Parameter**

Name	Type	Description
value	string	Any string or null if no string was passed.

**Return value**

Type	Description
string   null	Input string in upper-case letters.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.2.13 TrimToLength

```
function TrimToLength(value: string | null, trimToLength: number | string | null): string | null
```

The function TrimToLength shortens a string to a specified number of characters from left or right.

**Parameter**

Name	Type	Description
value	string	String to be trimmed.
trimToLength	number	Number of characters to which the string is to be trimmed. Positive values trim the string from the left, negative values from the right.

**Return value**

Type	Description
string   null	The trimmed string or null if anything other than string was passed.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

## 5.11.3 Diagnostics

### 5.11.3.1 Log

```
function Log(level: string, message: string, ...optionalParameters: any[]): void
```

The Log function writes a message to the browser console.

**Parameter**

Name	Type	Description
level	string	<b>Values:</b> <ul style="list-style-type: none"> <li>• Error</li> <li>• Warning</li> <li>• Info</li> <li>• Debug</li> </ul>
message	string	Message text
optionalParameters [ Optional, Rest Parameter ]	...any[]	Additional parameters can be passed, which are displayed in the browser console in the context of the message.

**Return value**

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.12

## 5.11.4 Formatting

### 5.11.4.1 FormatString

```
function FormatString(formatString: string, ...args: any[]): string | null
```

The function `FormatString` formats a given string by replacing placeholders in the string by the values of the symbols.

#### Parameter

Name	Type	Description
<code>formatString</code>	<code>string</code>	A string with placeholders.
<code>...args [ Rest Parameter ]</code>	<code>any[]</code>	Any value used in a placeholder.

#### Return value

Type	Description
<code>string   null</code>	String in which the placeholders are replaced by values of the symbols or null if anything other than string is passed as <code>formatString</code> .

#### Placeholder

Example: `{0|.1f}`

Placeholder	Description
<code>{</code>	Placeholder is initiated.
<code>0</code>	Index of the parameter (optional: without an index iteration takes place in sequence).
<code> </code>	Separator.
<code>+</code>	If a <code>+</code> is specified here, the string is always assigned a sign. For example <code>" +42"</code> for the positive number 42. Negative numbers of course always get a sign.
<code>.X</code>	Number of digits.
<code>f</code>	Type description.
<code>}</code>	End of the placeholder.

## Type description

Character	Description
d	Signed decimal integer
i	Signed decimal integer
u	Unsigned decimal integer
o	Unsigned octal
x	Unsigned hexadecimal integer
X	Unsigned hexadecimal integer (uppercase)
f	Decimal floating point
e	Scientific notation (mantissa/exponent), lowercase
g	Use the shortest representation: e or f
s	String of characters
b	Binary number
t	true or false
T	Type of the argument ('number', 'string', 'null' ...)
v	Primitive value of the specified argument
j	JavaScript object or array as a JSON encoded string

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

## Sample

### Input:

```
FormatString('Hello {1|.5s}. This is a floating point number - {0|.2f}. Two zeros are attached - {03i} (3 digits in total).', 2, 'World123', 3);
```

### Output:

"Hello World. This is a floating point number – 2.00. Two zeros are attached – 003 (3 digits in total)."

## 5.11.4.2 GaugeValueFormatter

```
function GaugeValueFormatter(value: number, maxDecimals = Infinity): string
```

The function GaugeValueFormatter rounds up a numerical value to a transferred number of decimal places.

### Parameter

Name	Type	Description
value	number	Value to be rounded up.
maxDecimals	number	Number of decimal places to which the value is to be rounded.

### Return value

Type	Description
string	The rounded value in the form of a string.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

## 5.11.5 Locale

### 5.11.5.1 GetLocale

```
function GetLocale(): string | undefined
```

The function GetLocale returns the currently active language of the client (with region, if available). Refer also to the description page for the corresponding API function.

#### Parameter

Name	Type	Description
-	-	-

#### Return value

Type	Description
string   undefined	Currently active language (e.g. "de-DE").

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.5.2 GetRegisteredLocales

```
function GetRegisteredLocales(): string[]
```

The function GetRegisteredLocales returns all registered languages (with region if available) of the project. Refer also to the description page for the corresponding API function.

#### Parameter

Name	Type	Description
-	-	-

#### Return value

Type	Description
string[]	An array with all registered languages of the project in the form of a string.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.5.3 SetLocale

```
function SetLocale(locale: string): void
```

The function SetLocale sets the active language in the client. Refer also to the description page for the corresponding API function.

#### Parameter

Name	Type	Description
locale	string	A language registered in the project.

#### Return value

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.5.4 SetLocaleEx

```
function SetLocaleEx(ctx: TcHmi.SelectableRequired<TcHmi.Context, 'success' | 'error'>, locale: string): void
```

The function SetLocaleEx sets the active language in the client. The function SetLocaleEx provides a context parameter of type TcHmi.Context, which allows the framework to wait for the asynchronous signaling of the end of the action when executing within triggers or function expressions.

Refer also to the description page for the corresponding API function.

#### Parameter

Name	Type	Description
ctx	TcHmi.SelectableRequired<TcHmi.Context>	<p>Context object</p> <p>Does not need to be specified by the user when it is used in a trigger or function expression. In this case the transfer and the evaluation is done by the corresponding parser.</p> <p>Is used by the caller to indicate success or failure to the framework during execution.</p> <p>If the function is used directly in JavaScript/TypeScript, the context object must be passed in the call and evaluated if necessary.</p>
locale	string	A language registered in the project.

**Return value**

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.12

### 5.11.5.5 GetLocalizedText

```
function GetLocalizedText(key: string): string
```

The GetLocalizedText function returns the text for a language key in the current language.

**Parameter**

Name	Type	Description
-	-	-

**Return value**

Type	Description
string	The text to the given language key in the current language.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.12.756.1

## 5.11.6 Recipe

### 5.11.6.1 ActivateRecipe

```
function ActivateRecipe(ctx: TcHmi.SelectableRequired<TcHmi.Context, 'success' | 'error',  
recipeReference: string): void
```

The ActivateRecipe function activates the recipe defined in the parameter when the function is executed.

**Parameter**

Name	Type	Description
ctx <b>Available from version 1.10</b>	TcHmi.SelectableRequired<TcHmi.Context>	Context object  Does not need to be specified by the user when used in a trigger or function expression. In this case the transfer and the evaluation is done by the corresponding parser.  Is used by the caller to indicate success or failure to the framework during execution.  If the function is used directly in JavaScript/TypeScript, the context object must be passed in the call and evaluated if necessary.
recipeReference	String	The reference or the recipe (path plus name) that is to be activated.

**Return value**

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10.1171.142

### 5.11.6.2 TeachRecipe

```
function TeachRecipe(ctx: TcHmi.SelectableRequired<TcHmi.Context, 'success' | 'error'>,
  recipeReference: string): void
```

The Teach function reads the current values of the symbols of a recipe from the target and stores them in this recipe.



**Parameter**

Name	Type	Description
ctx <b>Available from version 1.10</b>	TcHmi.SelectableRequired<TcHmi.Context>	Context object  Does not need to be specified by the user when used in a trigger or function expression. In this case the transfer and the evaluation is done by the corresponding parser.  Is used by the caller to indicate success or failure to the framework during execution.  If the function is used directly in JavaScript/TypeScript, the context object must be passed in the call and evaluated if necessary.
recipeReference	string	The reference of the recipe (path plus name) in which the current values of the target are to be read and stored.

**Return value**

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10.1171.142

### 5.11.6.3 TeachAsNewRecipe

```
function TeachAsNewRecipe(ctx: TcHmi.SelectableRequired<TcHmi.Context, 'success' | 'error'>,
recipeReference: string, newRecipeName: string, newRecipePath: string)
```

The TeachAsNew function reads the current values of the symbols of a defined recipe from the target and stores them in a new recipe.

**Parameter**

Name	Type	Description
ctx <b>Available from version 1.10</b>	TcHmi.SelectableRequired<TcHmi.Context>	Context object  Does not need to be specified by the user when used in a trigger or function expression. In this case the transfer and the evaluation is done by the corresponding parser.  Is used by the caller to indicate success or failure to the framework during execution.  If the function is used directly in JavaScript/TypeScript, the context object must be passed in the call and evaluated if necessary.
recipeReference	string	The reference of the recipe (path plus name) whose current symbol values are to be read from the target.  <b>Examples:</b> 'MyRecipe1' 'MyFolder::MyRecipe2'
newRecipeName	string	The name of the new recipe that is to be created and in which the values are to be stored.  If required, this name can already contain the folder structure in which the recipe is to be stored. Otherwise the folder structure can be specified under newRecipePath.
newRecipePath	string	The path under which the new recipe is to be stored.  If this parameter is empty, the recipe is created at the highest folder level.  <b>Example:</b> 'MyFolder' 'MyFolder1::MyFolder2'

**Return value**

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10.1171.142

## 5.11.7 Theme

### 5.11.7.1 GetTheme

```
function GetTheme(): string
```

The function GetTheme returns the name of the active theme. Refer also to the description page for the corresponding API function.

#### Parameter

Name	Type	Description
-	-	-

#### Return value

Type	Description
String	Name of the active theme.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

### 5.11.7.2 SetAttributeToThemeValue

```
function SetAttributeToThemeValue(control: TcHmi.Controls.System.baseTcHmiControl, propertyName: string): void
```

The function SetAttributeToThemeValue sets an attribute of a control to the value of the active theme. In the case of a change of theme, the value of the attribute is changed in accordance with the new active theme. Refer also to the description page for the corresponding API function.

#### Parameter

Name	Type	Description
control	TcHmi.Controls.System.baseTcHmiControl	The control for which the attribute is to be set.
propertyName	string	Name of the attribute that is to be set to the value of the active theme.

#### Return value

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

### 5.11.7.3 SetTheme

```
function SetTheme(themeName: string): void
```

The function SetTheme sets the active theme. Refer also to the description page for the corresponding API function.

#### Parameter

Name	Type	Description
newTheme	string	Available theme that is to be set to active.

#### Return value

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

## 5.11.8 UserManagement

### 5.11.8.1 CheckAccess

```
function CheckAccess(tco: TcHmi.Controls.System.baseTcHmiControl, AccessRightToCheck: string): boolean
```

The function CheckAccess checks whether the logged-in user has the right to access a control. Refer also to the description page for the corresponding API function.

#### Parameter

Name	Type	Description
tco	TcHmi.Controls.System.baseTcHmiControl	The control for which the right is to be checked.
AccessRightToCheck	string	The right that is to be checked.

#### Return value

Type	Description
boolean	<b>Values:</b> <ul style="list-style-type: none"> <li>true: The user has the right in question.</li> <li>FALSE: The user does not have the right in question.</li> </ul>

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.8.2 ForceLogout

```
function ForceLogout(username: string | null | undefined): boolean
```

The ForceLogout function logs out a specific user or all users on all client instances connected to the server.

Refer also to the description page for the corresponding API function.

#### Parameter

Name	Type	Description
username [ optional ]	string   null   undefined	The user name to be logged out on all client instances connected to the server. If the parameter is not specified, all users will be logged out.

#### Return value

Type	Description
boolean	Returns FALSE in case of error.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10

### 5.11.8.3 ForceLogoutEx

```
function ForceLogoutEx(ctx: TcHmi.SelectableRequired<TcHmi.Context, 'success' | 'error'>, username:  
string | null | undefined)
```

The ForceLogoutEx function logs out a specific user or all users on all client instances connected to the server. The function ForceLogoutEx provides a context parameter of type TcHmi.Context, which allows the framework to wait for the asynchronous signaling of the end of the action when executing within triggers or function expressions.

Refer also to the description page for the corresponding API function.

**Parameter**

Name	Type	Description
ctx	TcHmi.SelectableRequired<TcHmi.Context>	Context object Does not need to be specified by the user when it is used in a trigger or function expression. In this case the transfer and the evaluation is done by the corresponding parser. Is used by the caller to indicate success or failure to the framework during execution. If the function is used directly in JavaScript/TypeScript, the context object must be passed in the call and evaluated if necessary.
username [ optional ]	string   null   undefined	The user name to be logged out on all client instances connected to the server. If the parameter is not specified, all users are logged out.

**Return value**

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.12

### 5.11.8.4 GoToLoginPage

```
function GoToLoginPage(): boolean
```

The GoToLoginPage function calls the login page of the server without logging out the currently logged in user. This makes it possible to change users.

**Parameter**

Name	Type	Description
-	-	-

**Return value**

Type	Description
boolean	Returns FALSE if it is not possible to switch to the login page.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.10.1171.142

### 5.11.8.5 Login

```
function Login(username: string | null, password: string | null, persistent: boolean = true, reload: boolean = true): boolean
```

The Login function logs a user into the server.

Refer also to the description page for the corresponding API function.

#### Parameter

Name	Type	Description
username	string	User name
password	string	User password
persistent [ optional ]	boolean	Defines whether the login should be persistent. The default value is true.
reload [ optional ]	boolean	Defines whether a reload should take place after the logout. The default value is true.

**Available from version 1.12**

#### Return value

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.8.6 LoginEx

```
function LoginEx(ctx: TcHmi.SelectableRequired<TcHmi.Context, 'success' | 'error'>, username: string | null, password: string | null, persistent: boolean = true, reload: boolean = true)
```

The LoginEx function logs a user into the server. The function LoginEx provides a context parameter of type TcHmi.Context, which allows the framework to wait for the asynchronous signaling of the end of the action when executing within triggers or function expressions.

Refer also to the description page for the corresponding API function.

**Parameter**

Name	Type	Description
ctx	TcHmi.SelectableRequired<TcHmi.Context>	Context object Does not need to be specified by the user when it is used in a trigger or function expression. In this case the transfer and the evaluation is done by the corresponding parser. Is used by the caller to indicate success or failure to the framework during execution. If the function is used directly in JavaScript/TypeScript, the context object must be passed in the call and evaluated if necessary.
username	string	User name
password	string	User password
persistent [ optional ]	boolean	Defines whether the login should be persistent. The default value is true.
reload [ optional ] <b>Available from version 1.12</b>	boolean	Defines whether a reload should take place after the logout. The default value is true.

**Return value**

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.



Available from version 1.12

### 5.11.8.7 Logout

```
function Logout(reload: boolean = true): boolean
```

The function Logout logs the current user out of the server.

Refer also to the description page for the corresponding API function.

**Parameter**

Name	Type	Description
reload [ optional ] <b>Available from version 1.12</b>	boolean	Defines whether a reload should take place after the logout. The default value is true.

**Return value**

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)





NuGet packages are available from version 1.12.



Available from 1.8

### 5.11.8.8 LogoutEx

```
function LogoutEx(ctx: TcHmi.SelectableRequired<TcHmi.Context, 'success' | 'error'>, reload: boolean = true)
```

The function LogoutEx logs the current user out of the server. The function LogoutEx provides a context parameter of type TcHmi.Context, which allows the framework to wait for the asynchronous signaling of the end of the action when executing within triggers or function expressions.

Refer also to the description page for the corresponding API function.

#### Parameter

Name	Type	Description
ctx	TcHmi.SelectableRequired<TcHmi.Context>	Context object Does not need to be specified by the user when it is used in a trigger or function expression. In this case the transfer and the evaluation is done by the corresponding parser. Is used by the caller to indicate success or failure to the framework during execution. If the function is used directly in JavaScript/TypeScript, the context object must be passed in the call and evaluated if necessary.
reload [ optional ]	boolean	Defines whether a reload should take place after the logout. The default value is true.

#### Return value

Type	Description
void	No return value.

**NuGet package:** [Beckhoff.TwinCAT.HMI.Functions](#)



NuGet packages are available from version 1.12.

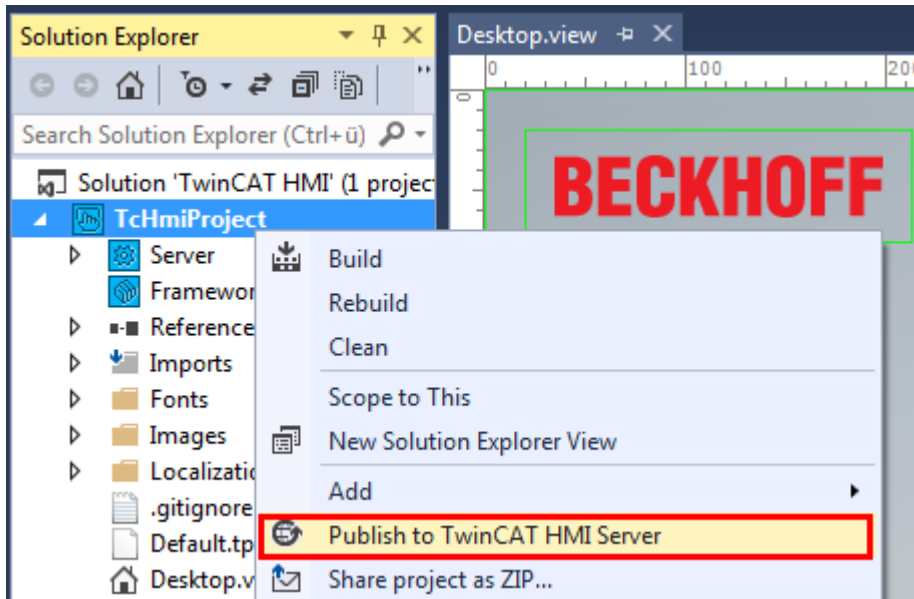


Available from version 1.12

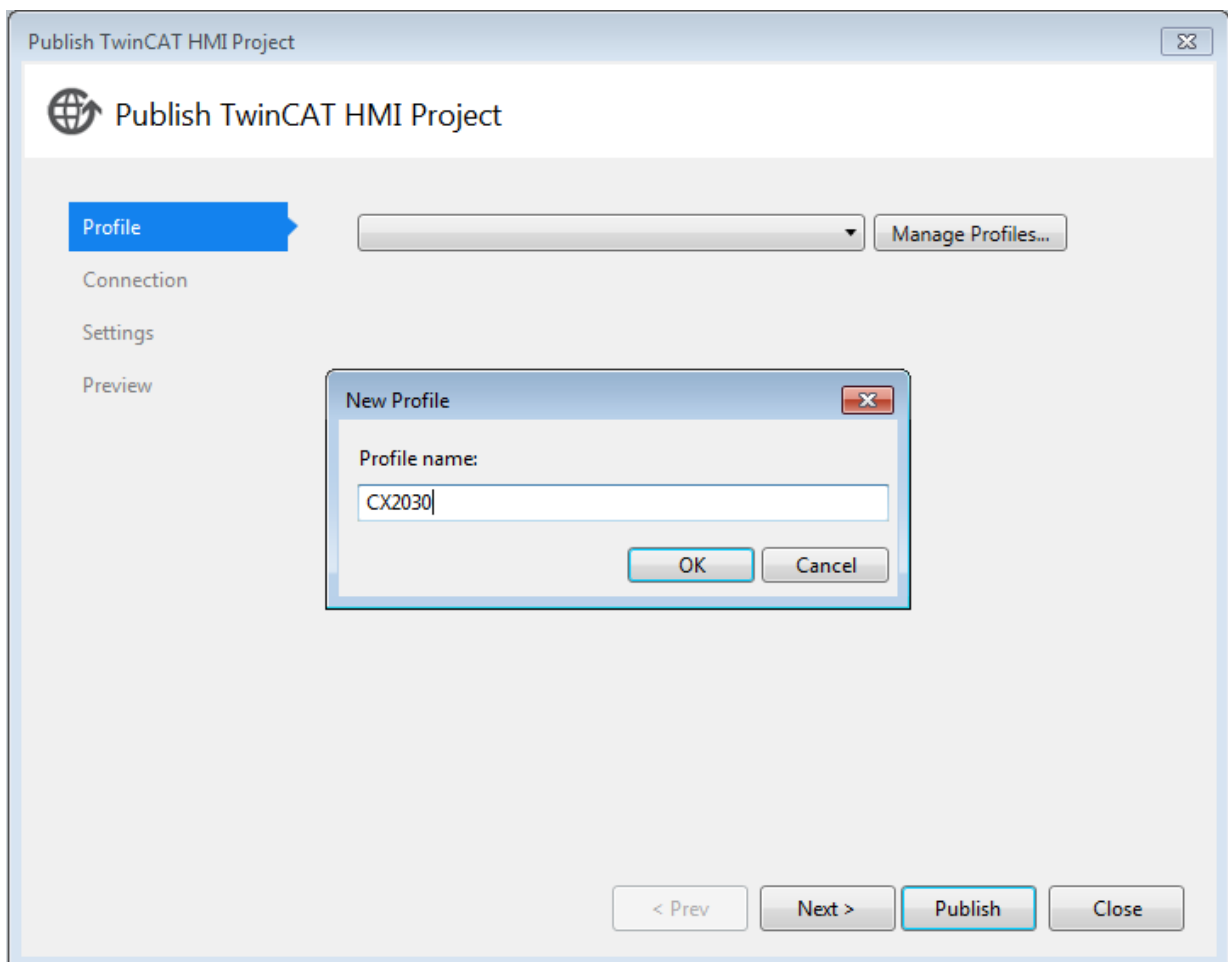
## 5.12 Publishing

So that a TwinCAT HMI project can be requested from a TE2000 HMI server, it must be transferred to the server.


1. Open the Publish dialog via the context menu or the Visual Studio menu (TwinCAT HMI / Publish to TwinCAT HMI Server).

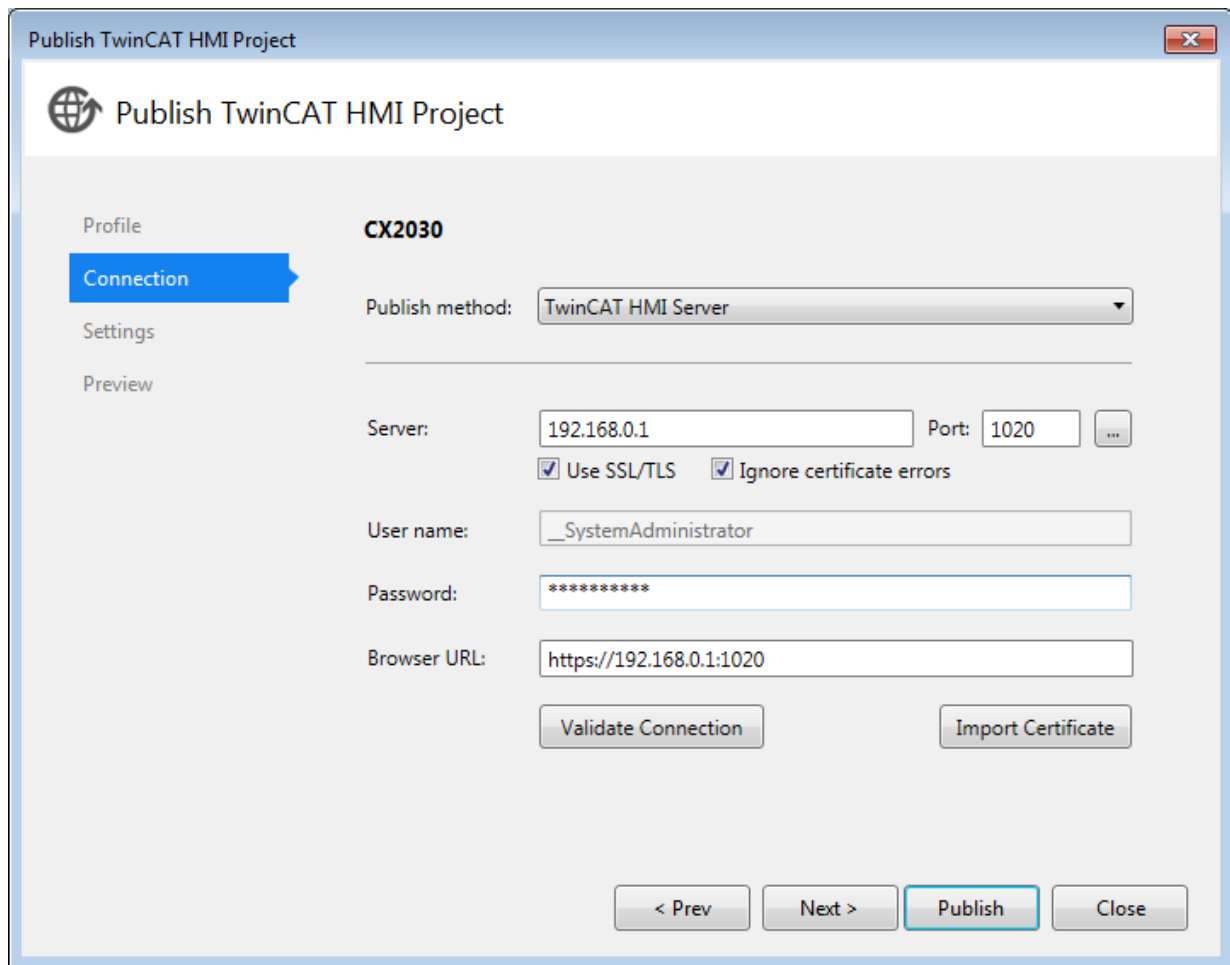


2. When executing for the first time, create a Publish profile that you can use again later.



3. Enter the IP address or the host name as well as the port of the TwinCAT HMI server. Alternatively you

can perform a broadcast search using the  button and find all available HMI servers in the local network (the administrator password must be set on the server via the Config page). The project can be transferred by HTTP (default setting: port 1010) and HTTPS (default setting: 1020).



**Publish TwinCAT HMI Project**

Profile **CX2030**

**Connection**

Settings

Preview

Publish method: TwinCAT HMI Server

Server: 192.168.0.1 Port: 1020

☒ Use SSL/TLS ☒ Ignore certificate errors

User name: \_SystemAdministrator

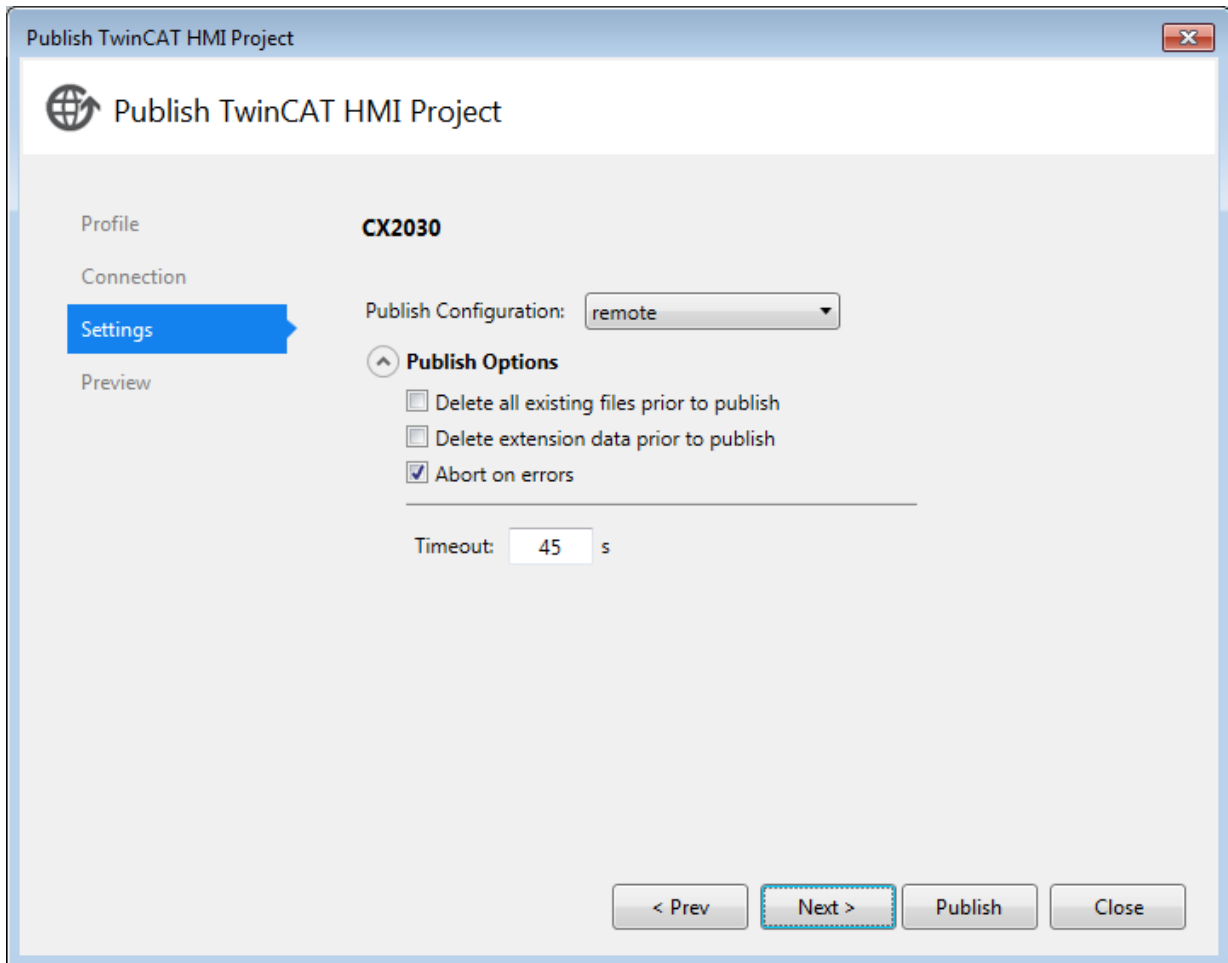
Password: \*\*\*\*\*

Browser URL: https://192.168.0.1:1020

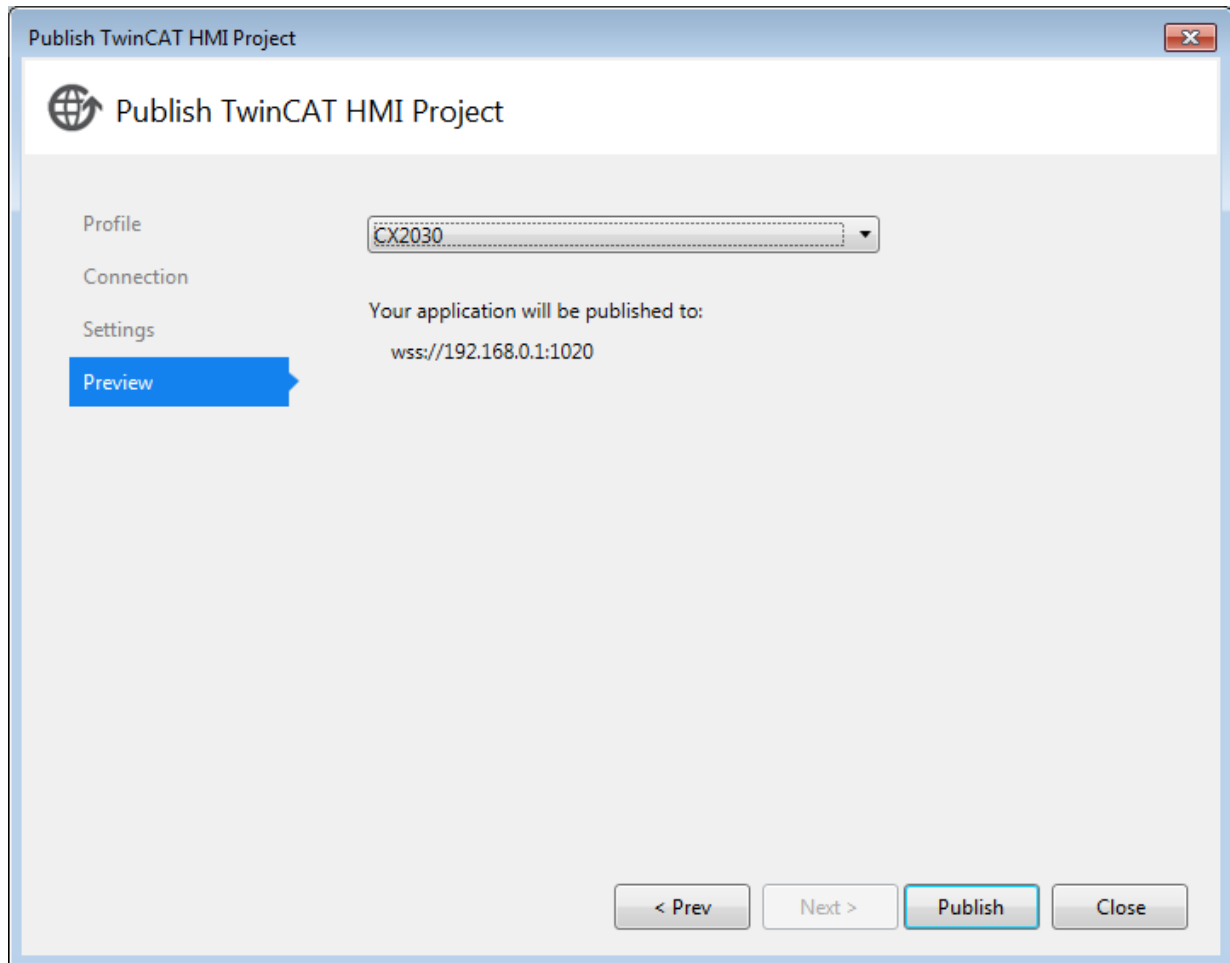
Validate Connection Import Certificate

< Prev Next > Publish Close

4. Select the server configuration that you wish to transfer to the target system.



5. Conclude the procedure by clicking on **Publish**.



⇒ The Visual Studio output window informs you about the course of the procedure.

### 5.12.1 Autostart Server

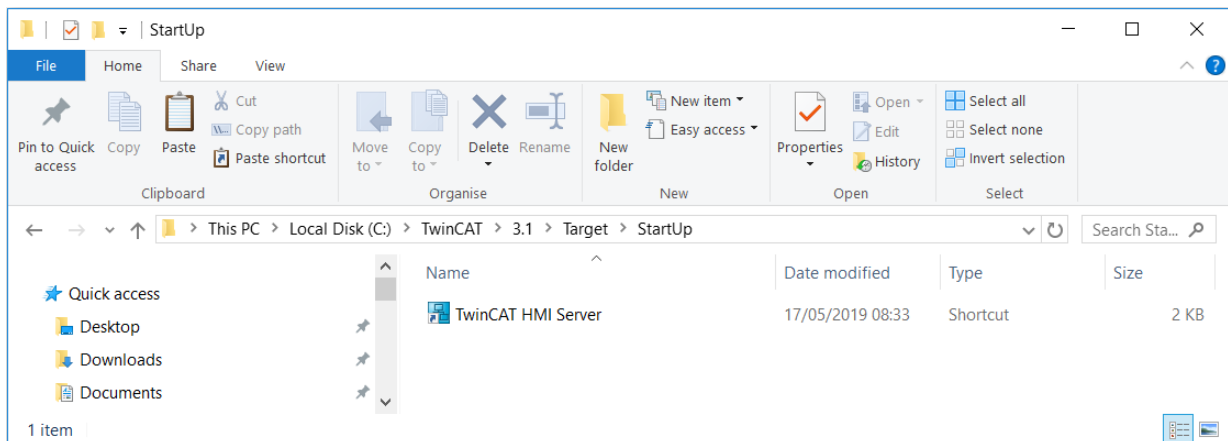
The TwinCAT HMI Server can optionally be started automatically when the operating system is started.

#### Server as process

In versions 1.8 and 1.10 [► 22], the TF2000 HMI Server starts as a process on the operating system.

1. Open the Start menu and copy the link from the following folder:  
*C:\ProgramData\Microsoft\Windows\Start Menu\Programs\Beckhoff\TF2000 HMI Server*

- Open the TwinCAT Autostart folder and place the link there:  
`C:\TwinCAT\3.1\Target\StartUp`



⇒ The server starts automatically with the next system startup.



In version  $\geq 1.12$ , the TF2000 HMI Server starts as a service directly in the background during startup. In this case, no extra configuration is required.

## 5.12.2 Autostart Client

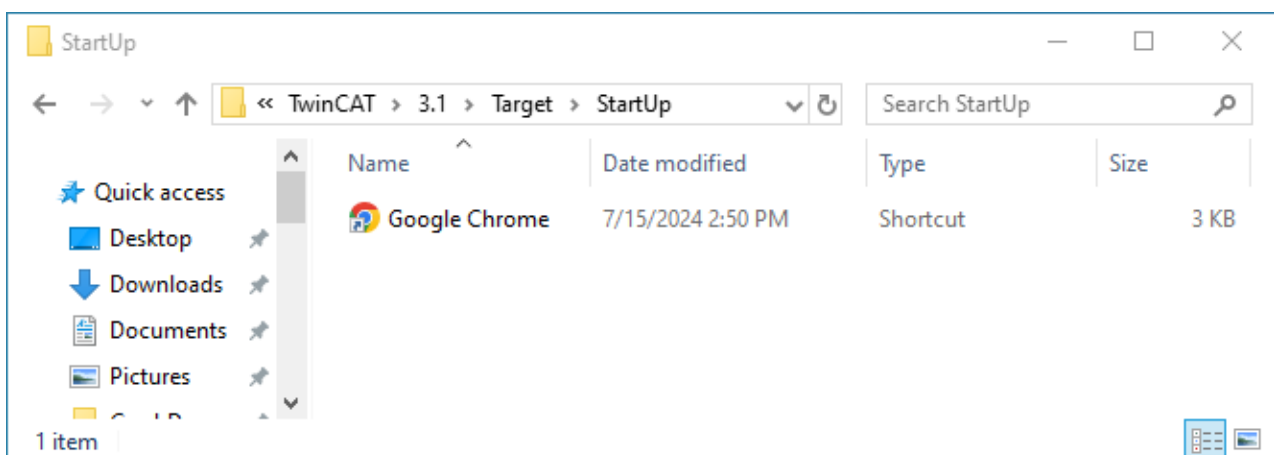
The client is any HTML5-capable web browser. An overview of the supported versions can be found in the [system requirements](#) [► 20]. The browsers can be started automatically when the operating system is started. Various options are available for this:

### Systems with TwinCAT:

If the browser is located on a system on which TwinCAT is installed, the browser can be started via the TwinCAT Autostart folder. To do this, open the TwinCAT Autostart folder:

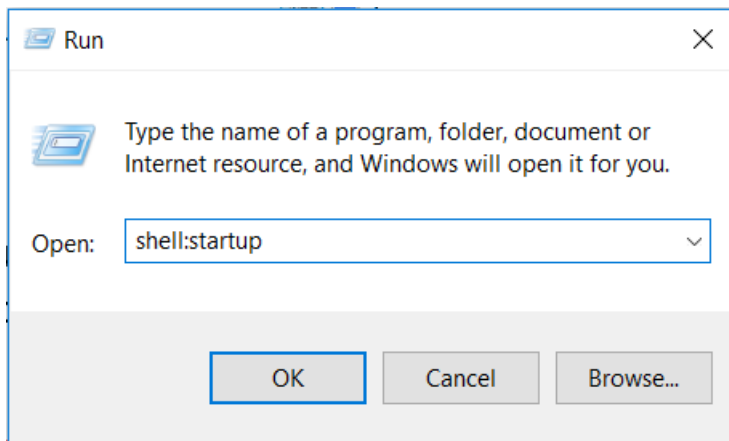
`C:\TwinCAT\3.1\Target\StartUp`

You can then place the link of your browser there:

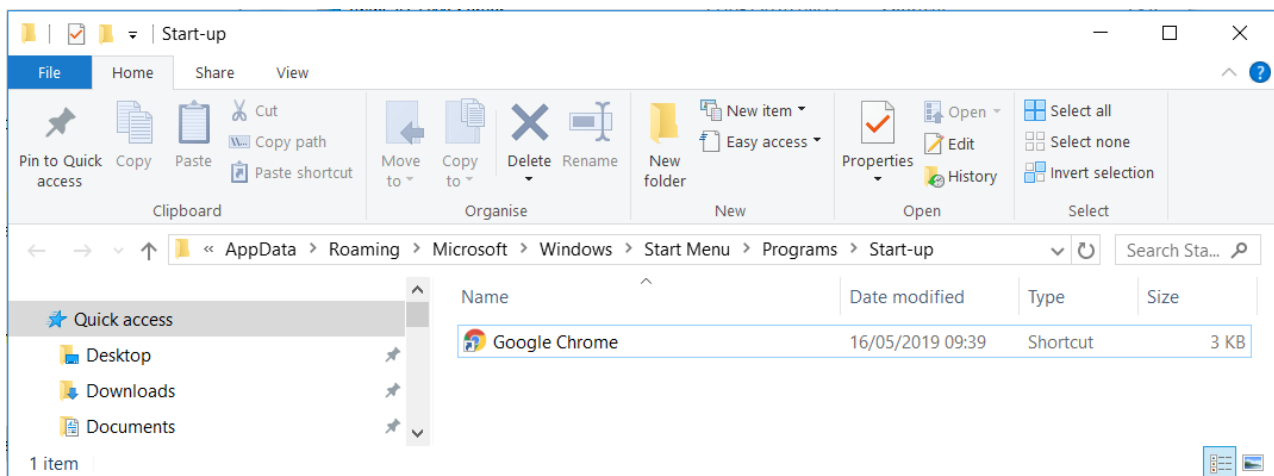


### Systems without TwinCAT

If the browser is located on a system which only functions as a client and on which TwinCAT is not installed, you can use the startup folder of the Windows user. To do this, copy the link of your browser into this folder. You open the startup folder by entering the command **shell:startup** under **Run**:



You can then place the link of your browser there:



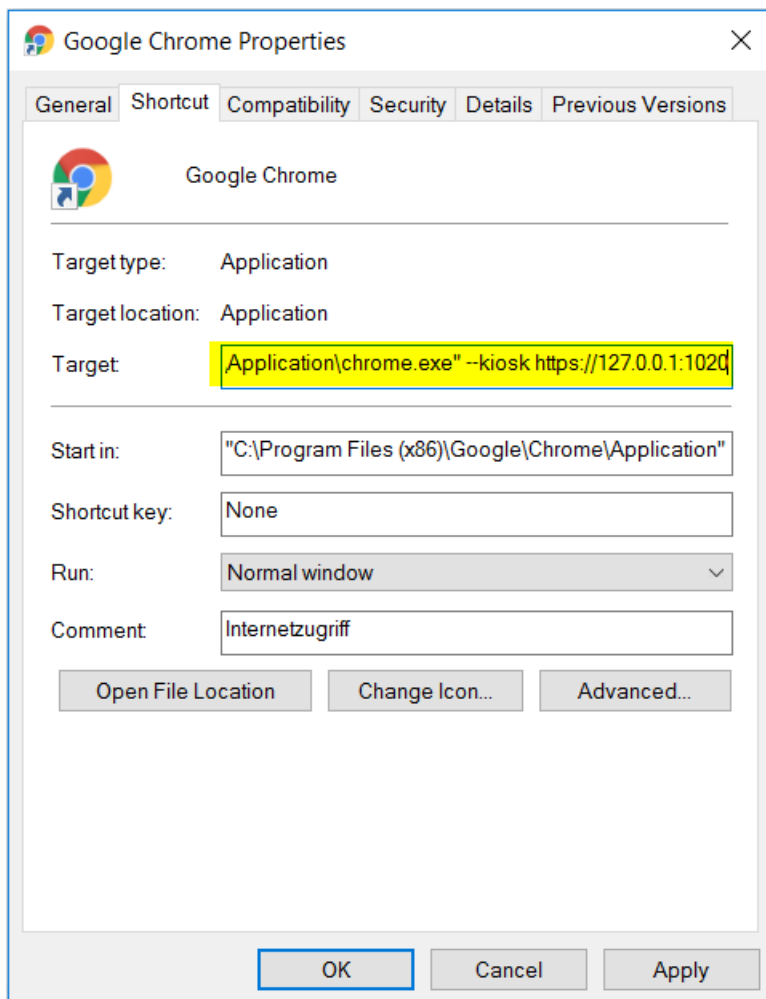
### Set up full screen mode

Some browsers support starting in full screen mode (kiosk mode), which makes it possible to hide the underlying operating system. The kiosk mode is set differently depending on the browser.

In the following, the configuration of the kiosk mode is explained using the "Google Chrome" browser as an example. With this browser, the kiosk mode can be set via startup parameters.

1. Open the link properties.

2. In the **Target** line you can add optional parameters at the end:



⇒ In addition to the kiosk mode, further parameters can be set that load different configurations in the browser.

For the browser "Google Chrome" there are the following relevant parameters:

Parameter	Description
--kiosk https://ip-of-hmi-server:1020	Start kiosk mode. The URL can load any page (in this case the HMI).
--disable-pinch	Disable zoom in browser.
--overscroll-history-navigation=0	Disable wipe navigation of the browser.
--incognito	Start incognito mode of the browser.

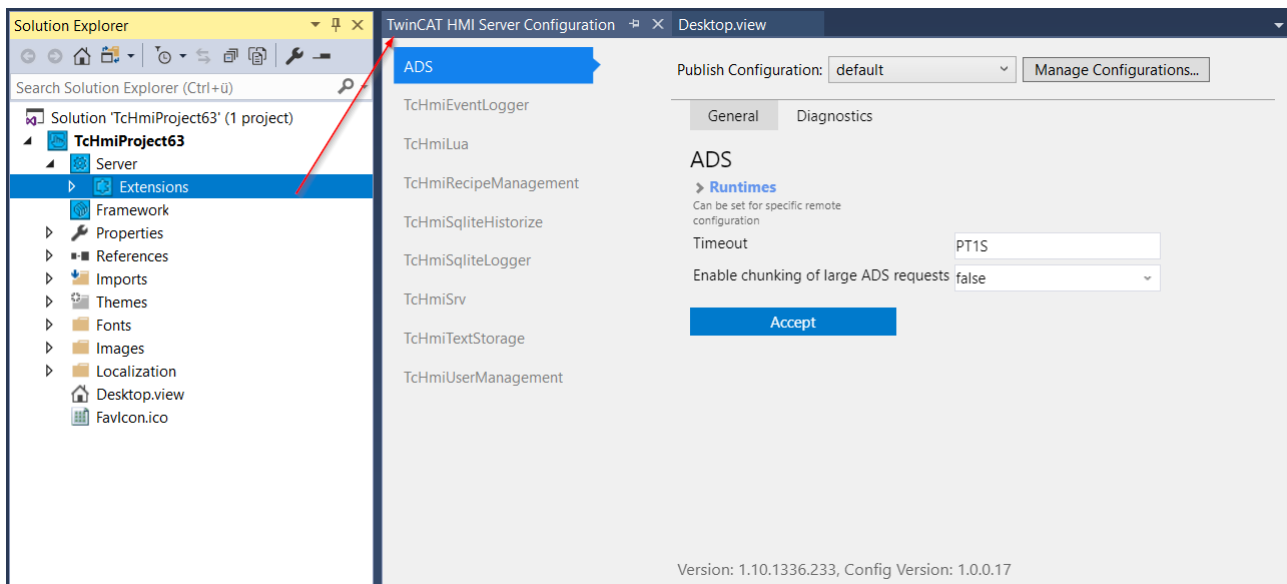
The parameters can be combined with each other, for example:

```
chrome.exe --kiosk https://ip-of-hmi-server:1020 --incognito --disable-pinch --overscroll-history-navigation=0
```

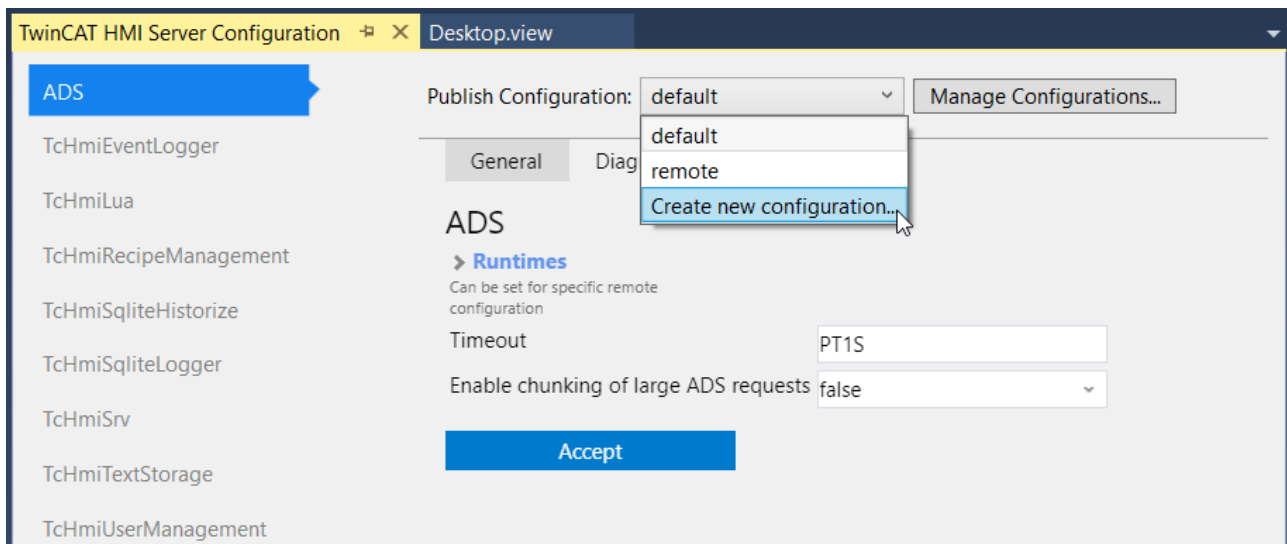
## 5.13 Server configuration

The configuration of the server and the configuration of the extensions can be managed on the configuration page of the TwinCAT HMI Server. The configuration page of the TwinCAT HMI Server can be opened by double-clicking the extension node in the Solution Explorer. Alternatively you can carry out the configuration directly on the configuration page of the server. Open it via the systray icon of the TwinCAT HMI Server by right-clicking on the "Config" entry.





The server can manage several configurations in order, for example, to configure different controllers. You can add new configurations via "Create new configuration".

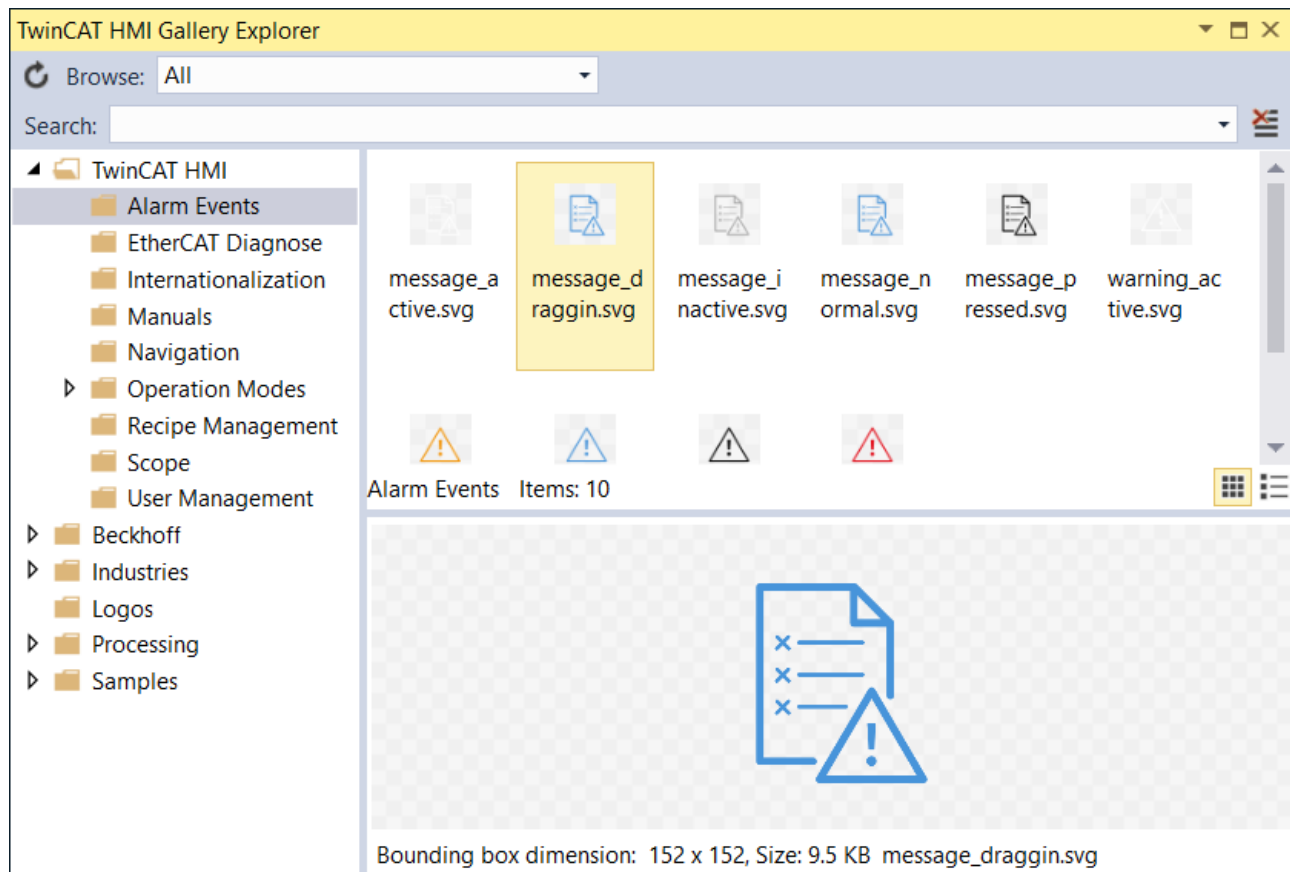


The configuration, which is transferred to the remote server, can be selected during the publish process.  
 [► 949] Two configurations are supplied by default:

- Default Configuration: Local configuration that is loaded from the Engineering Server (valid in LiveView [► 74] and when transferred to the Engineering Server).
- Remote configuration: Configuration that is transferred to the remote server when publishing.

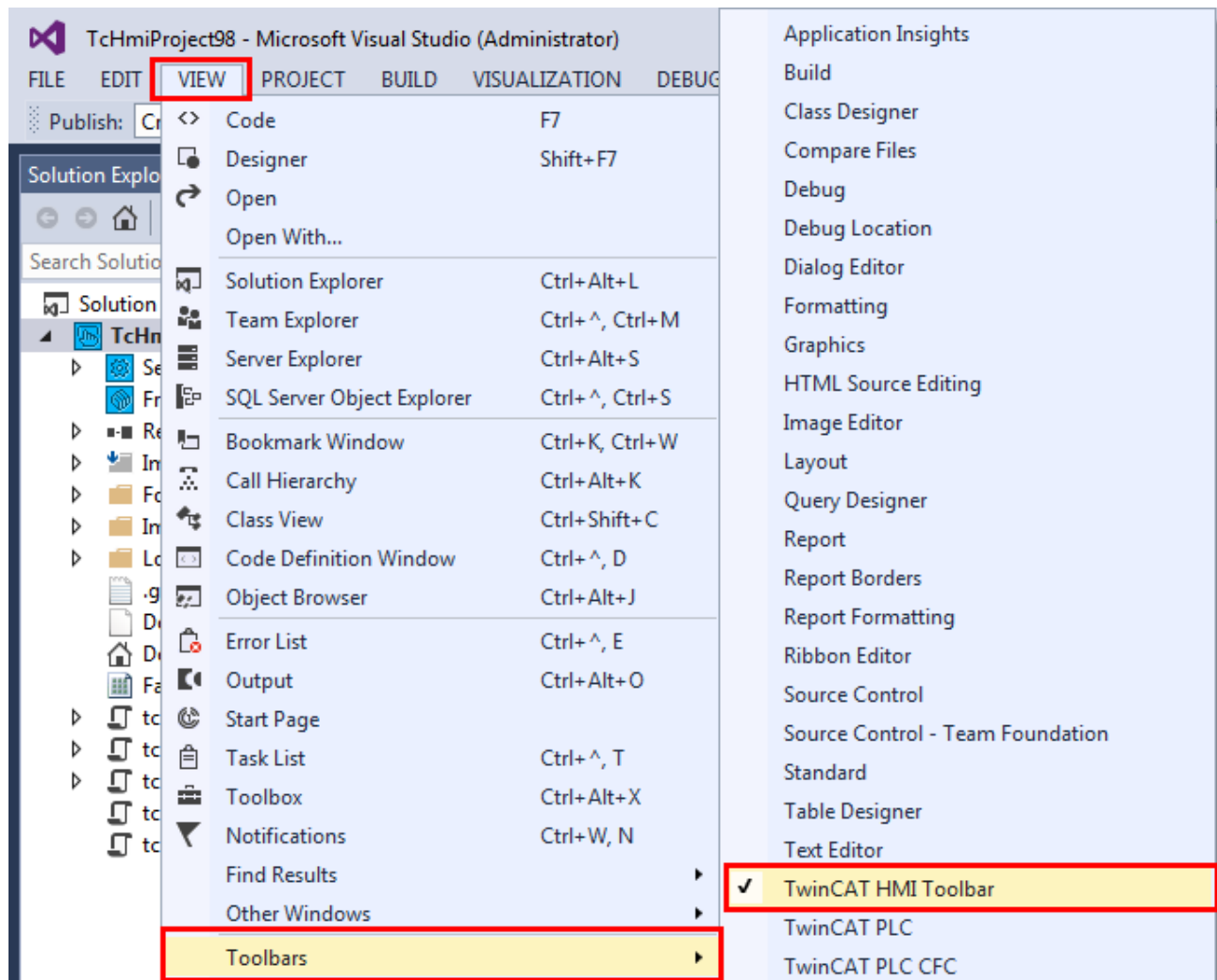
## 5.14 Gallery Explorer

In the Galley Explorer you can find predefined graphics that are supplied with the TwinCAT HMI. You can add them directly to the graphic editor or to the project tree by drag-and-drop.

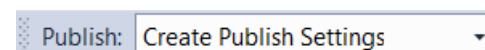









## 5.15 TwinCAT HMI Toolbar

The TwinCAT HMI Engineering supplies its own toolbar for Visual Studio that offers fast access to important functions. You can activate the toolbar in Visual Studio under View\Toolbars.



The toolbar provides the following options:



-  Publish to HMI server
-  Edit publishing profile
-  Cancel publishing
-  Bring to front
-  Send to back
-  Bring one level forward
-  Send one level backward



Same height



Same width



Insert horizontal intermediate space



Insert vertical intermediate space



Swap



Align left



Align horizontally central



Align right



Align top



Align vertically central



Align bottom



Show developer tools



Manage TwinCAT HMI packages



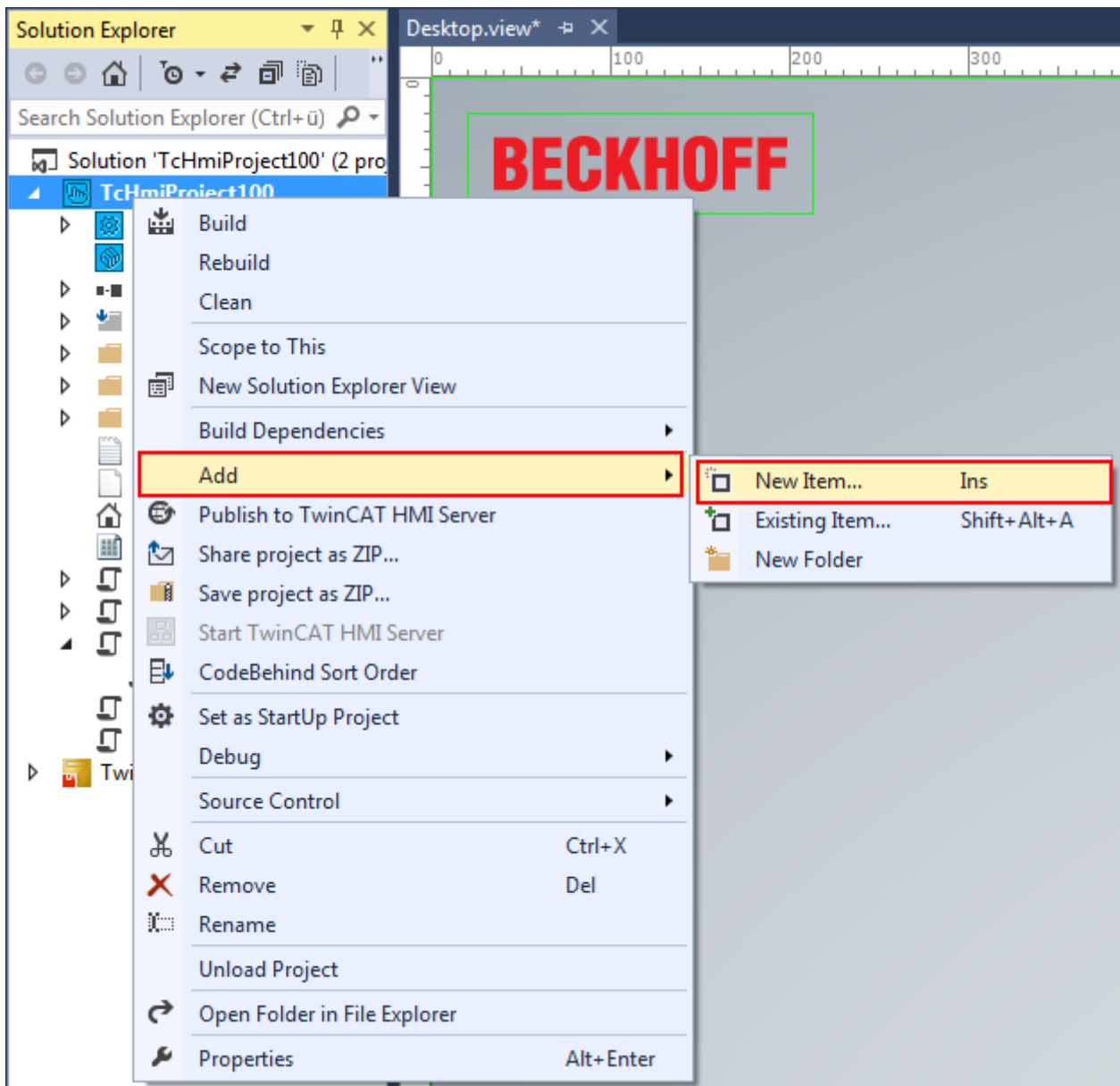
Toggle Highlight Container visibility



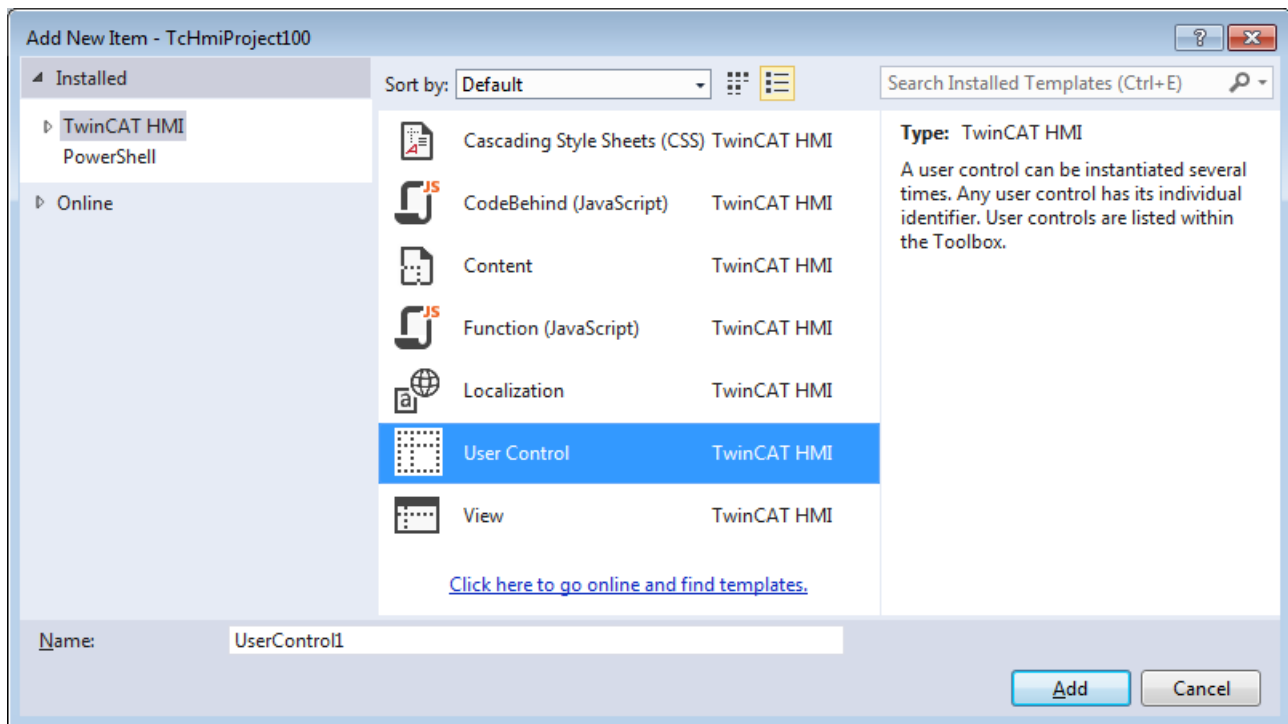
Toggle LiveView's mode

## 5.16 TwinCAT HMI Items

Further elements can be added to a TwinCAT HMI project via the context menu in the Solution Explorer.



The following elements can be chosen:



Cascading Style Sheets (CSS)

Start point for creating individual cascading style sheets.



CodeBehind (JavaScript)

CodeBehind scripts (JavaScript).



Content

Content [► 795], a page that can be used and switched within regions [► 829].



Function (JavaScript)

Reusable functions that are usable in the client.



Localization

A localization file for a further language.



User Control

A User Control [► 837] can be instanced multiple times and each has a unique ID. All User Controls are listed in the Toolbox.



View

A view [► 849] can be used as an entry page, e.g. configured as a start page and a further view.

## 6 User management

User management in TwinCAT HMI is an authorization system for controlling user group-specific access at control, symbol or file level.

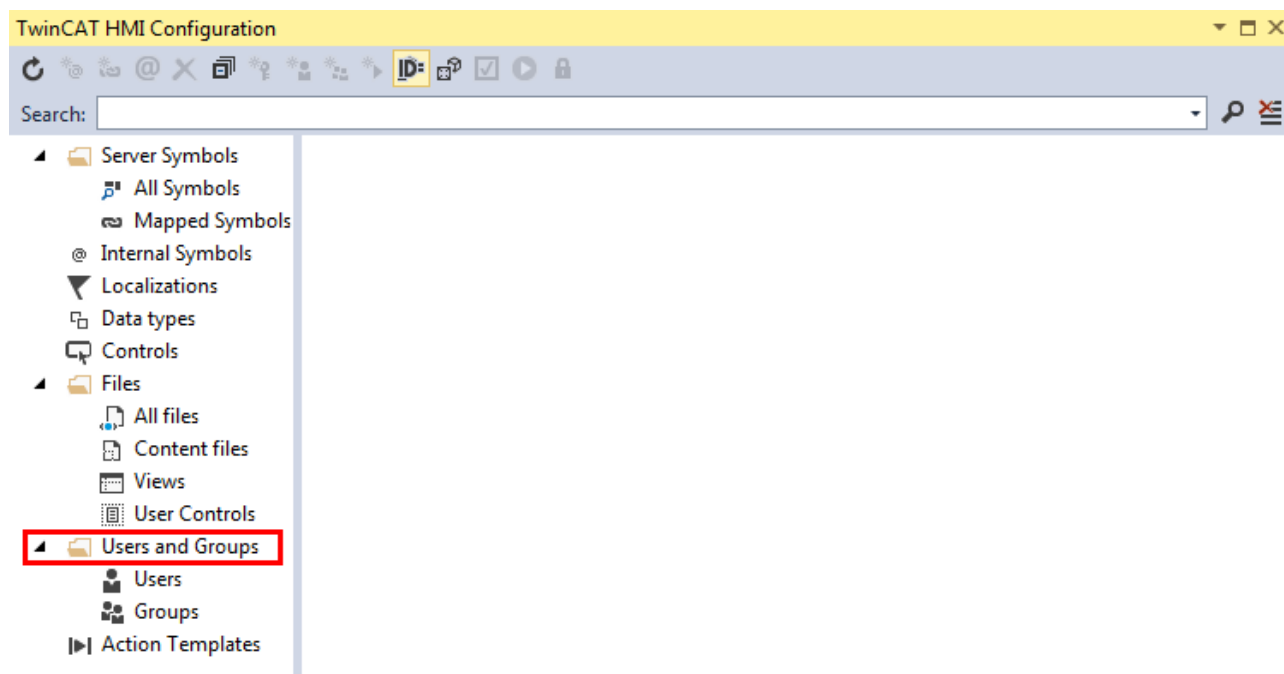
The use of the user management is optional and only works with active authentication.



Since user management only works when authentication is active, the configured functions are not available in live view.

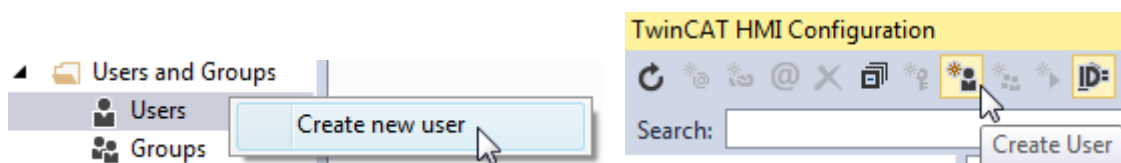
### 6.1 Users and user groups

The TwinCAT HMI User Management is based on a user group concept. The user groups are managed centrally in the TwinCAT HMI Server (TcHmiSrv). The actual users, who may be members of one or more user groups, are made available as a data source by the server extension TcHmiUsermanagement. The creation and editing of users and user groups takes place within the development environment via the TwinCAT HMI Configuration window under the category **Users and Groups**, within which the individual **Users** and **Groups** are listed.



#### 6.1.1 Create new user

1. Select **Create new user** with a right mouse click on **Users**, or the **Create User** function with a left mouse click.



2. Configure the user via the following properties in the **Create / edit user** dialog.

- **User name:** Unique name of the user.
- **Password:** Password of the new user for the login. Empty passwords are not allowed.
- **Confirm Password:** Confirm password.
- **Authenticate by client certificate:** Selection of a client certificate, [► 986] if available, which is assigned to the user. This makes it possible for a user to log on using a client certificate.
- **Auth Extension:** Server extension that manages the authentication of the user. By default, the TcHmiUserManagement extension is selected. The developer can develop his own authentication extension to provide his own user management.
- **Member of the following groups:** Group membership of the user. A selection from the existing groups is possible. A user can be a member of several groups. By default, the user is a member of the system group "\_\_SystemUsers".
- **Language:** Language of the user. The language can be taken from the project properties or the browser default or can be defined individually.



- **Time zone:** Time zone in which the user is located. By assigning the time zone, it is possible to localize the times displayed on the HMI. The time zone can be taken from the project properties or the browser default or can be defined individually.
- **Time format locale:** Time format to be displayed to the user. By assigning the time format, it is possible to format the times displayed on the HMI. The time format can be taken from the project properties or the browser default or can be defined individually.
- **Auto-Logout Time:** Time of inactivity of the user after which the user is automatically logged out on the HMI (client side) without any user interaction.

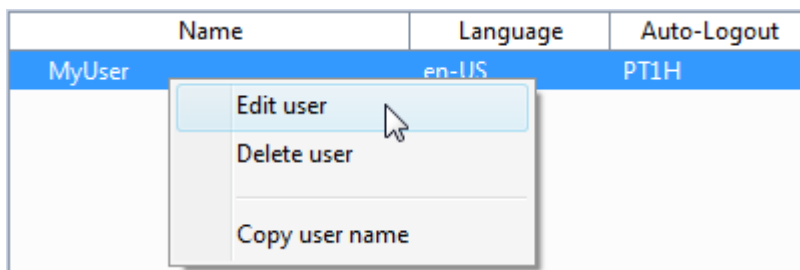
Confirm your settings with **OK**.



The settings "Authenticate by client certificate", "Auth Extension", "Time zone" and "Time format local" are available as of version 1.10.1336.0

## 6.1.2 Changing user properties

1. Double-click on the user whose properties you wish to change or right-click on **Edit user**.

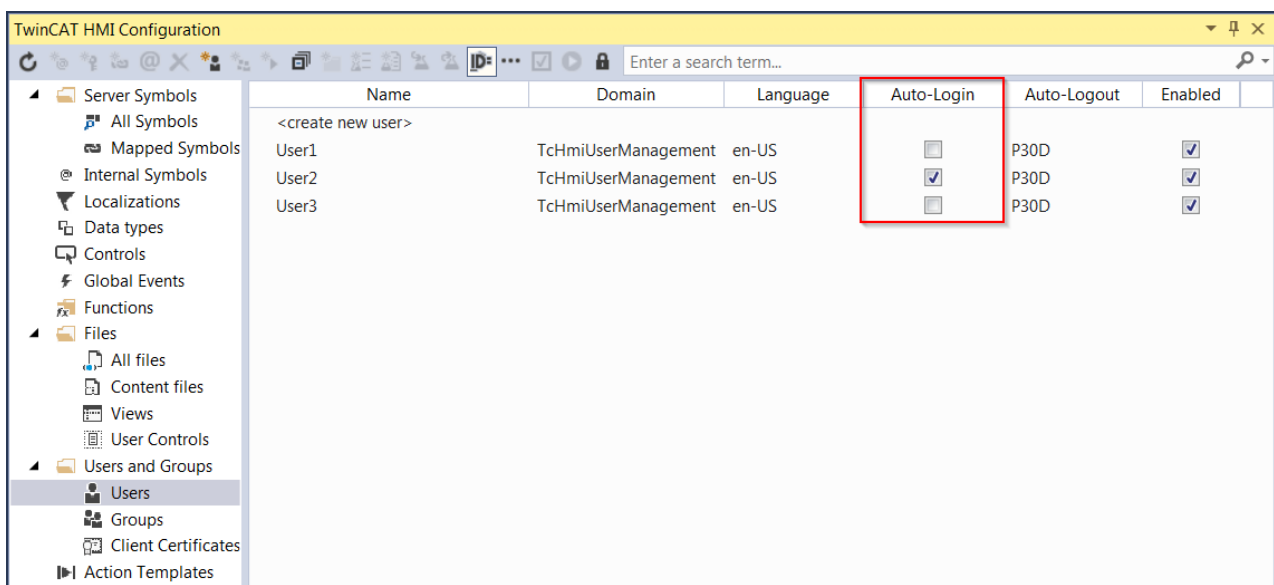


2. Make the desired changes (see [Create new user](#) [► 963]).

## 6.1.3 Activate auto-login user

Enabling the auto-login function allows a specific user to log in automatically without authentication. This skips the login page and logs in a user with preconfigured rights. If the auto-login function is activated, the auto-login user cannot be logged out. As soon as another user is logged out, the auto-login user is logged in automatically.

The Auto Login function is activated in the TwinCAT HMI Configuration window under the **Users** item. To do this, the checkbox for a user must be set. The auto login function can only be activated for one user and not for several users at the same time.





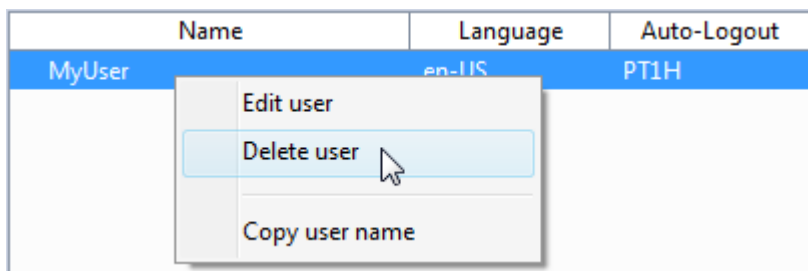
Available since version 1.10.1171.142

### See also

[GoToLoginPage](#) [► 946]

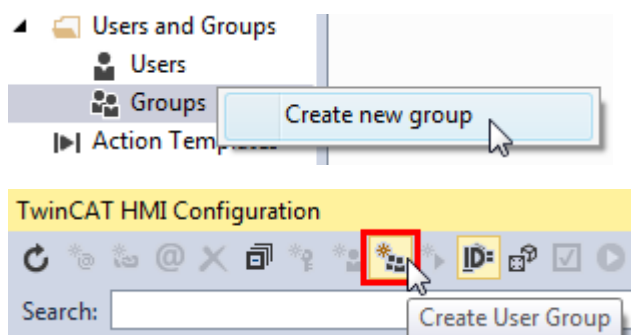
## 6.1.4 Deleting a user

1. Select **Delete User** by right-clicking on the user to be deleted.



## 6.1.5 Creating a new user group

1. Select **Add new group** by right-clicking on **Groups**, or the **Create new group** function with a left mouse click.



2. Configure the user group with the following properties in the associated dialog:

**Create / edit group**

Group name:

Symbol Access:  File Access:  Status:

Members:

✓	User	Extension
<input type="checkbox"/>	User1	TcHmiUserManagement
<input type="checkbox"/>	User2	TcHmiUserManagement
<input type="checkbox"/>	User3	TcHmiUserManagement

- **Group name:** Unique name of the group.
- **Symbol Access:** Standard access (None, Read, Write, Read/Write) to symbols.
- **File Access:** Standard access (None, Read, Write, Read/Write) to files.
- **Status:** Group availability (Enabled, Disabled).
- **Members:** Group members (selection of the existing users).

Confirm your settings with **OK**.

### 6.1.6 Changing user group properties

1. Call the dialog by double-clicking on the user group whose properties you wish to change, or by a right mouse click on it via **Edit group**.

Name	Symbol Access	File Access	Enabled
MyGroup	Read/Write	Read/Write	False

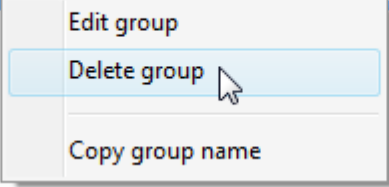
Edit group  
Delete group  
Copy group name

2. Make the desired changes (see [Creating a new user group](#) [► 966]).

### 6.1.7 Deleting a user group

1. Select **Delete Group** by right-clicking on the user group to be deleted.

Name	Symbol Access	File Access	Enabled
MyGroup	Read/Write	Read/Write	False



### 6.1.8 System users and system user groups

The following users and user groups exist as standard in the system and cannot be deleted:

#### System user

**\_\_SystemAdministrator:** System administrator and member of the group "**\_\_Systemadministrators**".

**\_\_SystemGuest:** Guest who is automatically active if no user is logged in and is a member of the group "**\_\_SystemGuests**".

#### System user groups

**\_\_SystemAdministrators:** System administrator group with unrestricted rights and the following default settings:

- Symbol Access: Read/Write
- File Access: Read/Write
- Enabled: True
- Members: **\_\_SystemAdministrator**

**\_\_SystemGuests:** Guest group with restricted rights, which allow only the login function, and the following default settings:

- Symbol Access: None
- File Access: None
- Enabled: True
- Members: **\_\_SystemGuest**

**\_\_SystemUsers:** User group with restricted rights that allow access to all system server symbols required at runtime. The user group has the following default settings:

- Symbol Access: None
- File Access: Read/Write
- Enabled: True
- Members: Every user except **\_\_SystemAdministrator** or **\_\_SystemGuest**

By default, all new users are members of the group **\_\_SystemUsers** as a minimum. This behavior can be changed on the server configuration page under "**TcHmiSrv/Security**" under the name "**Default Usergroup**".



The system users and system user groups are visible and configurable only in Advanced Mode. Do not change any settings in the system user groups.

## 6.2 Permissions system

You can issue user group-specific permissions at three levels in the permissions system of the TwinCAT HMI User Management.

1. The control level [► 969] represents the client-side permissions system of the TwinCAT HMI Framework. This is a manipulation of the user interface through the hiding of controls or the deactivation of their functions, depending on which group(s) the logged-in user belongs to.
2. The symbol level [► 973] controls the user group-specific access to server symbols (mapped symbols).
3. The file level [► 975] enables the user group-specific access to the files made available by the TwinCAT HMI Server.



While level one is purely a manipulation of the user interface on the client side, the second and third levels offer real data security on the server side.



In order to be able to configure the rights of the system user groups at the individual levels, you have to activate Advanced Mode in the TwinCAT HMI Configuration window.

### 6.2.1 Control level

The control level represents the client-side permissions system. A control has defined access methods that can be permitted or not permitted for the different user groups. Each control has at least the default access methods "Observe" and "Operate".

"Observe" describes the general observability of the control and thus its visibility to the user. If this access method is not permitted for the user group of the logged-in user, the control is not visible. This also applies to all child controls of the control, if there are any.

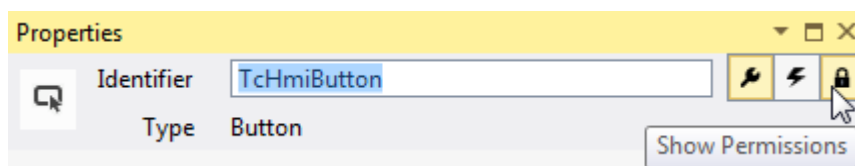
"Operate" represents the general operability of the control. If this access method is not permitted for the user group of the logged-in user, then the control is displayed as deactivated and no control events that could be initiated by the user (operator events) are initiated.

The access methods are configured in the Properties window ([Configuring control access](#) [► 969]).

The access methods of a user control can be extended via special access methods, so-called virtual permissions ([Defining and using virtual permissions of a user control](#) [► 972]).

#### 6.2.1.1 Configuring control access

1. Select the control in the designer.
2. Open the **Show Permissions** tab in the Properties.



3. Configure the desired permissions of the individual user groups; the following options are available for this:

**Allow:** The access method is permitted for the user group.

Group	Allow	Inherit
operate		
Group1	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Disallow:** The access method is not permitted for the user group.

Group	Allow	Inherit
operate		
Group1	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Inherit:** The permission of the user group is derived from the higher-level parent control (container control: View, Content, User Control, Container, Region or User Control Host).

Group	Allow	Inherit
operate		
Group1	<input type="checkbox"/>	<input checked="" type="checkbox"/>

## Special cases

### Access methods of a view

**Operate** and **Observe** are permitted for a view as standard (default = Allow). Since the view –as the entry point to the HMI application –is always the highest container control, the **Inherit** option is not available.

Group	Allow	Default
operate		
Group1	<input type="checkbox"/>	<input checked="" type="checkbox"/>
observe		
Group1	<input type="checkbox"/>	<input checked="" type="checkbox"/>

### User is a member of several user groups

The following rules apply if the user is a member of several user groups:

- If **Allow** is configured for at least one user group, the access method is permitted for the user (**Allow**).

Group	Allow	Inherit
operate		
Group1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Group2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Group3	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- If **Disallow** is configured for at least one user group and **Allow** is not configured for any user group, the access method is not permitted for the user (**Disallow**).

Group	Allow	Inherit
operate		
Group1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Group2	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Group3	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- If **Inherit** is configured for all user groups, the permission is derived from the higher-level container control (**Inherit**).

Group	Allow	Inherit
▲ operate		
Group1	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Group2	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Group3	<input type="checkbox"/>	<input checked="" type="checkbox"/>

### Inherit with other access rights

Apart from **Operate** and **Observe**, a control can define other access rights [► 1546] (for example, "viewDetails [► 304]" with EventGrid). Here too, the rights setting of the respective level is checked starting from the respective control. If a control has defined **Allow** or **Disallow** here, then the user (as described above) has the configured right. If **Inherit** is defined here, the higher-level parent control is queried for an explicit setting.

It can also be the case that this higher-level parent control does not know the access right. For example, a fictitious right "configure" is discussed here that is not known to the View. It is assumed that a ControlTypeA exists that knows "configure" and has set defaultValueInternal [► 1546] to true/**Allow**. ControlTypeB also knows "configure", but has set defaultValueInternal [► 1546] to zero.

#### Sample 1:

- Desktop (TcHmiView) contains:
- MainContainer (TcHmiContainer) contains:
- myControlA (ControlTypeA) "configure" to **Allow**. Contains:
- myControlB (ControlTypeB) "configure" to **Disallow**.

**Disallow** acts on myControlB as its own configuration is checked first.

#### Sample 2:

- Desktop (TcHmiView) contains:
- MainContainer (TcHmiContainer) contains:
- myControlA (ControlTypeA) "configure" to **Allow**. Contains:
- myControlB (ControlTypeB) "configure" to **Inherit**.

**Allow** acts on myControlB as its own configuration has no definition and the parent control has a direct configuration.

#### Sample 3:

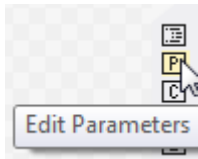
- Desktop (TcHmiView) contains:
- MainContainer (TcHmiContainer) contains:
- myControlA (ControlTypeA) "configure" to **Inherit**. Contains:
- myControlB (ControlTypeB) "configure" to **Inherit**.

myControlB and the parent control have no configuration of their own and neither TcHmiContainer nor TcHmiView know "configure". Therefore the defaultValueInternal [► 1546] of the ControlTypeA is used as it is the last control in the parent-child relationship to which "configure" is known and which defines a value (true/false or **Allow/Disallow**).

## 6.2.1.2 Defining and using virtual permissions of a user control

### Defining virtual permissions

1. Open the parameter editor of the user control.



2. Under **Virtual Permissions**, add the desired additional user control access methods. The following properties can be configured here:

**Name:** Unique name of the virtual permission

**Description:** Description used as a tooltip

**Virtual Permissions:**

Name	Description
SpecialPermission	This is my special Permission

New

Edit

Remove

Up

Down

☐ Details

OK Cancel

Additional properties are displayed if you activate the **Details** checkbox:

**Internal Name:** Internal name used in HTML code (corresponds by default to "Display Name").

**Display Name:** Name displayed to the user in the engineering (corresponds by default to "Name").

**Visible:** Visibility of the virtual permission for the user in the engineering.

**Default Value (Internal):** Default return value of the virtual permission if the query of the current permissions situation does not produce a return value.

**Virtual Permissions:**

Internal Name	Display Name	Description	Visible	Default Value (Internal)
SpecialPermission	SpecialPermission	This is my special Permission	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

New

Edit

Remove

Up

Down

☒ Details

OK Cancel

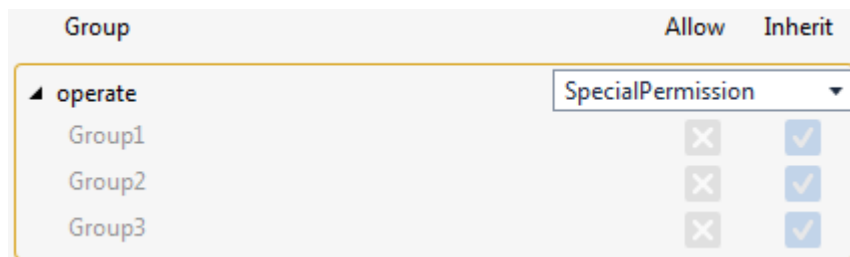
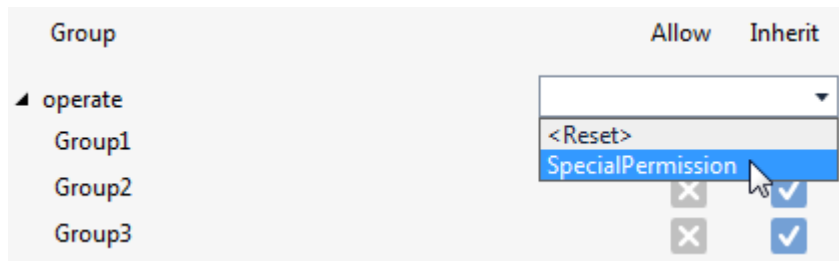
3. Confirm your input with **OK**.

### Using virtual permissions

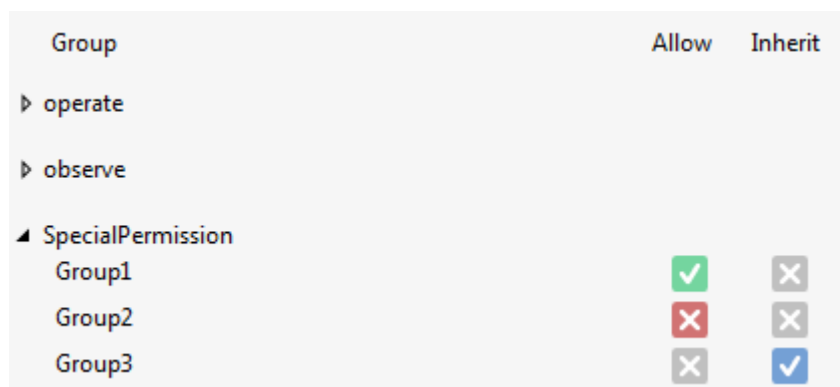
4. Select a control inside the user control in the designer.



5. Assign a virtual permission for the desired access method to the selected control, which is to represent a special access method of the user control to the outside.



The desired access method is now no longer configurable inside the user control. However, it is available for configuration through the assignment of the virtual permissions as an additional access method of the user control host when using the user control in the designer.



For the purpose of reusability of the user control, direct configuration of the access methods inside a user control should be dispensed with. The independence of project-specific user groups is achieved with this approach. Accordingly, the default access methods "Observe" and "Operate" should be configured either with "Inherit" or as special access methods via the use of virtual permissions. Special access methods of controls within a user control should always be fed to the outside via the use of virtual permissions because the user control host only has the default access methods "Observe" and "Operate" as standard.

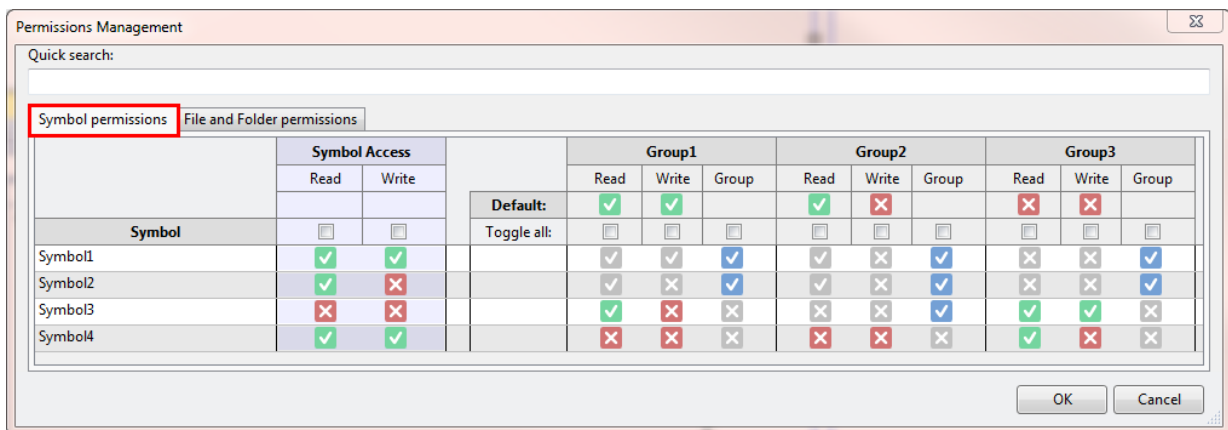
## 6.2.2 Symbol level

The symbol level represents the first part of the server-side permissions system. General and user group-specific access methods, which apply when authentication is active, can be configured for every mapped server symbol (Mapped Symbols). The configuration is done via the Permissions Management editor, which can be called via the TwinCAT HMI Configuration window (Configuring symbol access [► 974]).



### 6.2.2.1 Configuring symbol access

1. Select the **Symbol Permissions** tab in the Permission Management editor.



2. Configure the following access methods for a mapped server symbol:

**Symbol Access:** Generally permitted symbol access method that is valid for each user group (default value: Read/Write).

	Symbol Access			Group1		
	Read	Write		Read	Write	Group
			<b>Default:</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			<b>Toggle all:</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Symbol</b>	<input type="checkbox"/>	<input type="checkbox"/>				
Symbol1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Group Symbol Access:** Permitted default access method of a user group for all symbols (see also [Creating a new user group](#) [► 966]).

	Symbol Access			Group1		
	Read	Write		Read	Write	Group
			<b>Default:</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			<b>Toggle all:</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Symbol</b>	<input type="checkbox"/>	<input type="checkbox"/>				
Symbol1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Specific Group Symbol Access:** Permitted user group-specific access method for the symbol that is initially specified by the combination of **Symbol Access** and **Group Symbol Access**, whose configurations mutually restrict each other.

	Symbol Access			Group1		
	Read	Write		Read	Write	Group
			<b>Default:</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			<b>Toggle all:</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Symbol</b>	<input type="checkbox"/>	<input type="checkbox"/>				
Symbol1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

However, it is also possible to overwrite this combination so that **Symbol Access** and **Group Symbol Access** are invalid for this symbol for this user group.

	Symbol Access			Group1		
	Read	Write		Read	Write	Group
			<b>Default:</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			<b>Toggle all:</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Symbol</b>	<input type="checkbox"/>	<input type="checkbox"/>				
Symbol1	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

3. Confirm your configuration with **OK**

## Special cases

### User is a member of several user groups

If a user is a member of several user groups, the combination of permitted access methods of the user groups applies, which in this case mutually expand one another.



The permitted access methods for system server symbols can be configured in Advanced Mode.

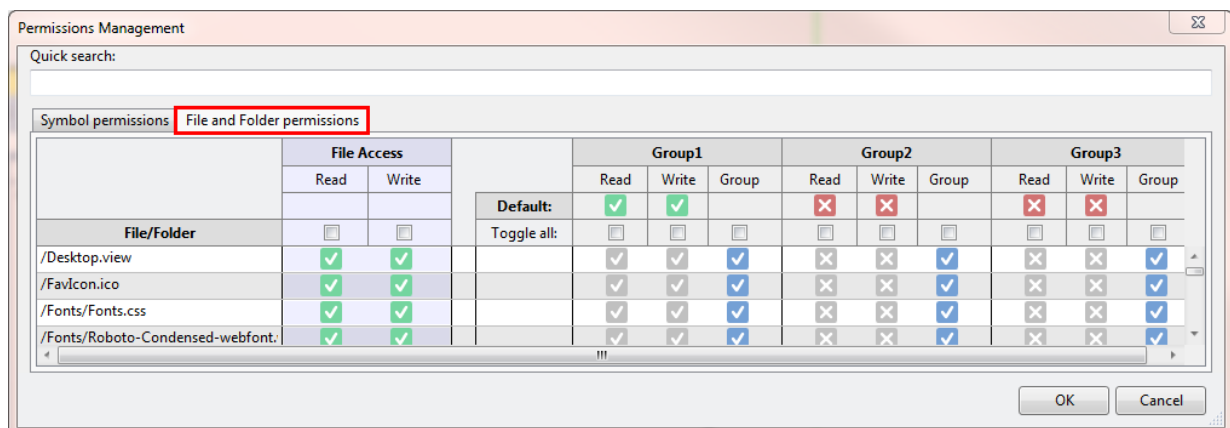
## 6.2.3 File level

The file level represents the second part of the server-side permissions system. General and user group-specific access methods, which apply when authentication is active, can be configured for every file and every folder added to the TwinCAT HMI Server via the publishing. The configuration is done via the Permissions Management editor, which can be called via the TwinCAT HMI Configuration ([Configuring file access](#) [► 975]).



### 6.2.3.1 Configuring file access

1. Select the **File and Folder Permissions** tab in the Permission Management editor.



2. Configure the following access methods for a file (or a folder):

**File Access:** Generally permitted file access method that is valid for each user group (default value: Read/Write).

File/Folder	File Access		Default:	Group1		
	Read	Write		Read	Write	Group
/MyImage.png	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**Group File Access:** Permitted default access method of a user group for all files (see also [Creating a new user group](#) [► 966]).

	File Access			Group1		
	Read	Write		Read	Write	Group
	<input type="checkbox"/>	<input type="checkbox"/>	Default:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	Toggle all:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
File/Folder	<input type="checkbox"/>	<input type="checkbox"/>				
/MyImage.png	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**Specific Group File Access:** Permitted user group-specific access method for the file that is initially specified by the combination of **FileAccess** and **Group File Access**, whose configurations mutually restrict each other.

	File Access			Group1		
	Read	Write		Read	Write	Group
	<input type="checkbox"/>	<input type="checkbox"/>	Default:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	Toggle all:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
File/Folder	<input type="checkbox"/>	<input type="checkbox"/>				
/MyImage.png	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

However, it is also possible to overwrite this combination so that **File Access** and **Group File Access** are invalid for this file for this user group.

	File Access			Group1		
	Read	Write		Read	Write	Group
	<input type="checkbox"/>	<input type="checkbox"/>	Default:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	Toggle all:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
File/Folder	<input type="checkbox"/>	<input type="checkbox"/>				
/MyImage.png	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

3. Confirm your configuration with **OK**

### Special cases

#### User is a member of several user groups

If a user is a member of several user groups, the combination of permitted access methods of the user groups applies, which in this case mutually expand one another.

## 6.3 Access management in the client

The system provides [functions \[► 924\]](#) for managing access in the client. The functions can be used to log out a user and to check the user's current access. The functions are available in the development environment in the [Actions and Conditions Editor \[► 61\]](#).

### Check Access

[Function \[► 944\]](#) for querying whether a certain control access method is permitted for the logged-in user or not.

### GoToLoginPage

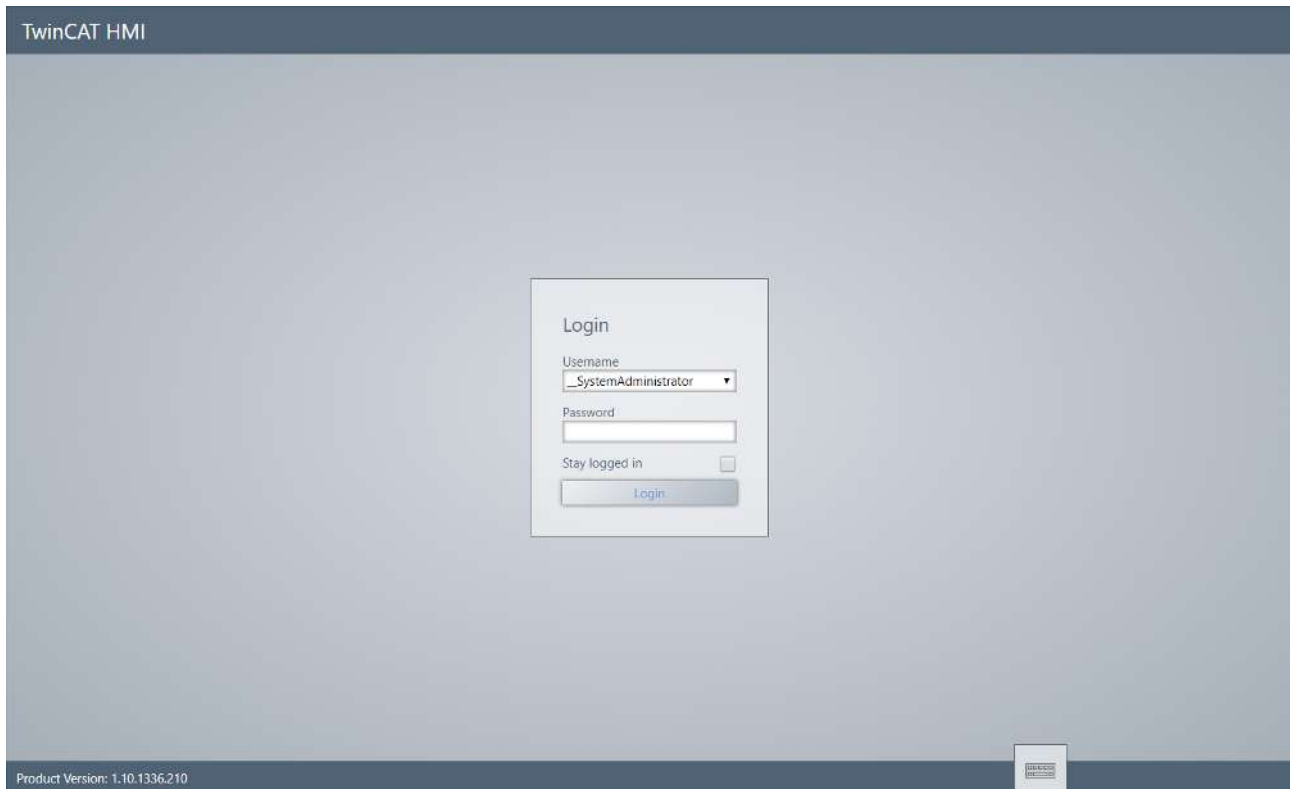
[Function \[► 946\]](#) to open the login page without logging out the currently logged in user. This allows a user change to be performed without a previous logout of the user.

### Logout

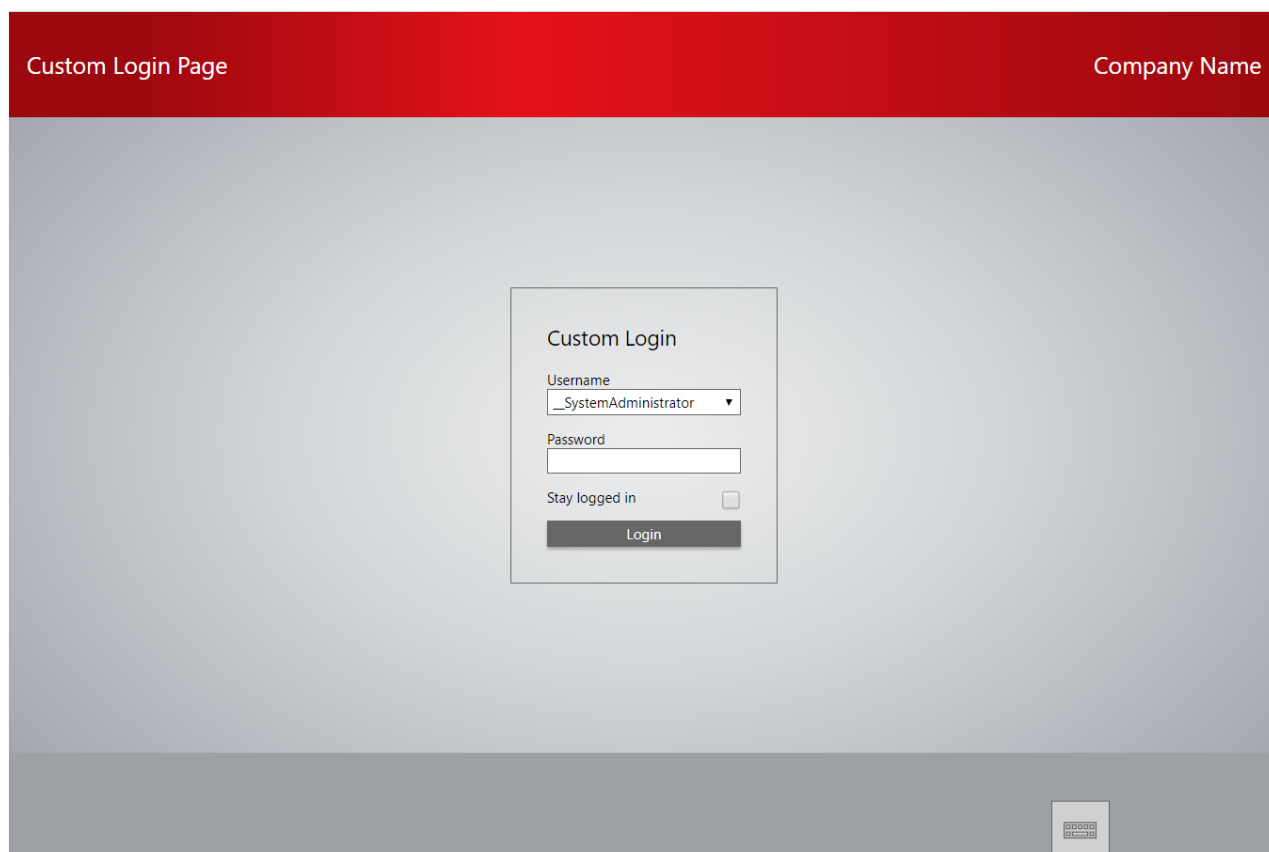
[Function \[► 948\]](#) for logging out the logged in user from the TwinCAT HMI server. The function loads the login page after the logout.

## 6.4 Login page

If authentication is active, the login page (login dialog) is displayed before the start page is opened and allows users to log in. Start page of the HMI loads only after successful authentication.



The login page can be replaced by a user-specific login dialog. This can be added to any TwinCAT HMI project if required. The login page is edited in HTML, CSS and JavaScript. It is not possible to edit a login page via the TwinCAT HMI Designer, as the framework is not yet loaded at the time of user login.



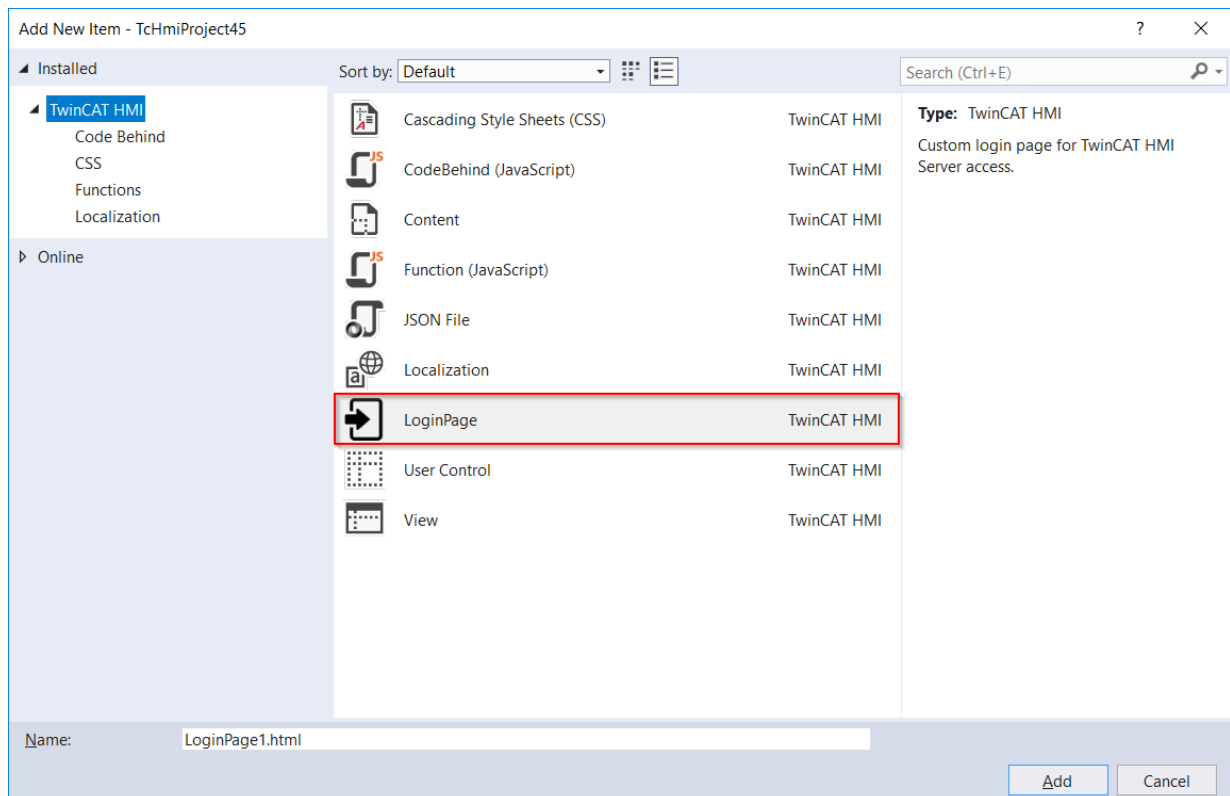
Available from version 1.10.1336.0

### 6.4.1 Add login page

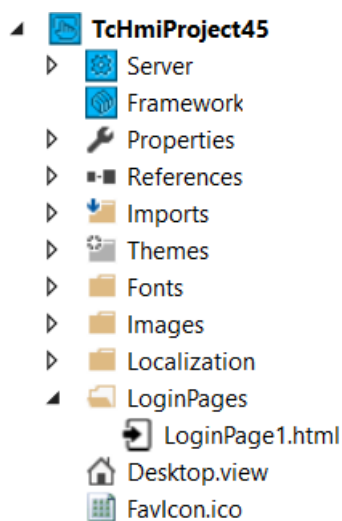
A TwinCAT HMI project can contain several login pages. Only one login page can be active [► 979] per project.

1. Right-click **Add** anywhere in the project, and then click **New Item**.

2. Select the **LoginPage** type and assign a name.



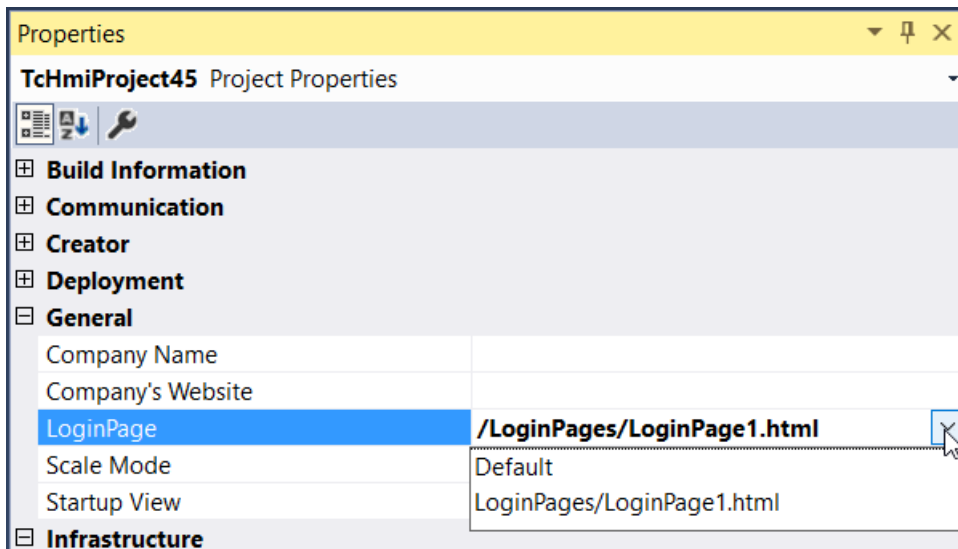
⇒ The login page can now be used in the project.



## 6.4.2 Switch login page

Several login pages can be managed within one project. Only one login page can be active per project. The switching of the active login page takes place in the project properties.

To do this, select the project node in the Solution Explorer and open the Properties window [► 53]:



The "Default" entry displays the standard login page of the TwinCAT HMI.

### 6.4.3 Edit login page

The creation of a login page takes place within an HTML file with HTML, CSS and JavaScript. The template contained in the TwinCAT HMI represents an exemplary login page and can be adapted and modified as required. The comments in the template serve as support.

A login page is an HTML page with the following structure:

- **Head tag:** Here you can specify the title of the login page, which is displayed in the browser window.
- **Style tags:** Here the appearance of the login page in CSS is described.
- **Body tag:** The structure of the login page in HTML is described here.
- **Script tags:** Here the logic of the login page is implemented in JavaScript.

#### 6.4.3.1 Login

The login command enables a user to log in to the TwinCAT HMI server and is sent to the server as a WebSocket request in JSON format. If the authentication data is valid, the server allows the login and calls the start page of the HMI.

The WebSocket request must be structured as follows:

```
var message = {
  "requestType": "ReadWrite",
  "commands": [
    {
      "commandOptions": ["SendErrorMessage", "SendWriteValue"],
      "symbol": "Login",
      "writeValue": {
        "userName": username,
        "password": password,
        "persistent": stayLoggedIn
      }
    }
  ]
};
```

In the template you will find this WebSocket request in the function "Login" in line 350.

The base functionality of the requests to the server contained in the template should not be changed in order to ensure proper functioning of the login page.



### 6.4.3.2 Include graphics

Graphics such as a company logo can also be used within a user-specific login page. The use of inline graphics in Base64 format in the HTML file is recommended. The use of graphic resources outside the HTML file is also possible, but requires additional configuration in the server.

#### inline graphics

Within an HTML file, graphics can be integrated as Base64 strings. The Base64 string can be used directly in HTML code or CSS code. With the user-specific login page, this has the advantage that no user rights have to be configured for the "\_\_SystemGuests [**968**]" group in the server.

An HTML image tag with a Base64 string as source is structured as follows:

```

```

The "MIME-Type" specifies the original file format, the "Charset" the character encoding and "base64" the data encoding. As an example of an SVG graphic:

```

```

The graphics can be encoded into a Base64 string via a Base64 Image Encoder. Encoding can be performed using an online tool, for example.

A favicon can also be integrated into the HTML page as an inline graphic.

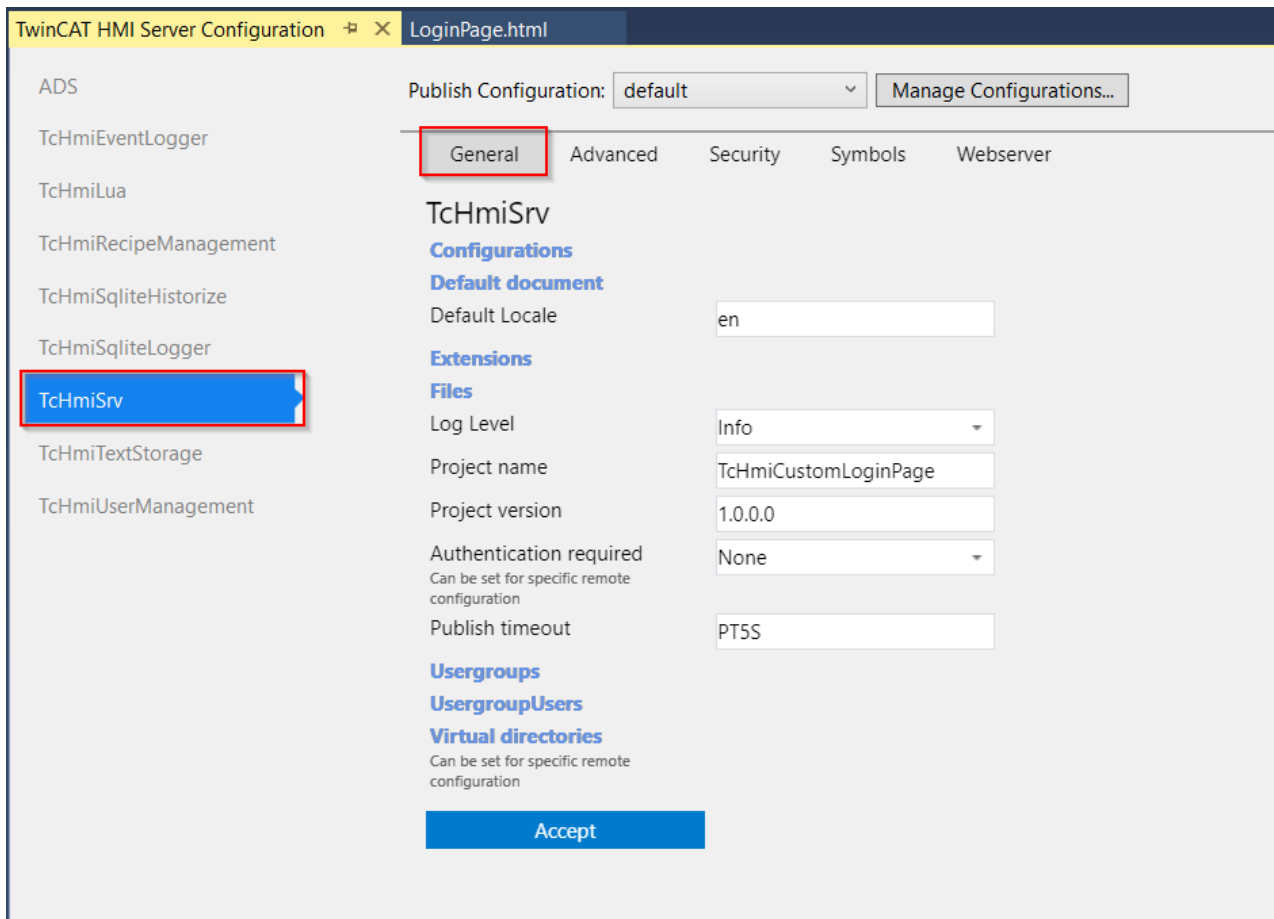
#### External resources

The integration of external graphics into the user-specific login page is possible if they are located within the HMI project. First the graphic must be added to the project. The graphic can then be referenced within the HTML file, for example within an HTML image tag:

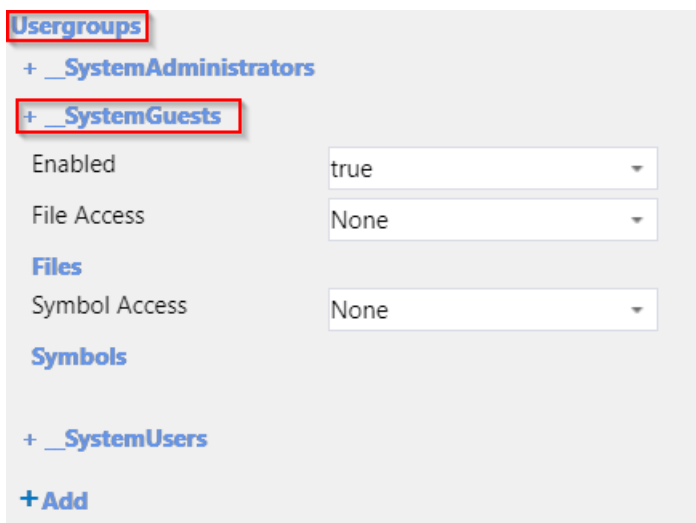
```

```

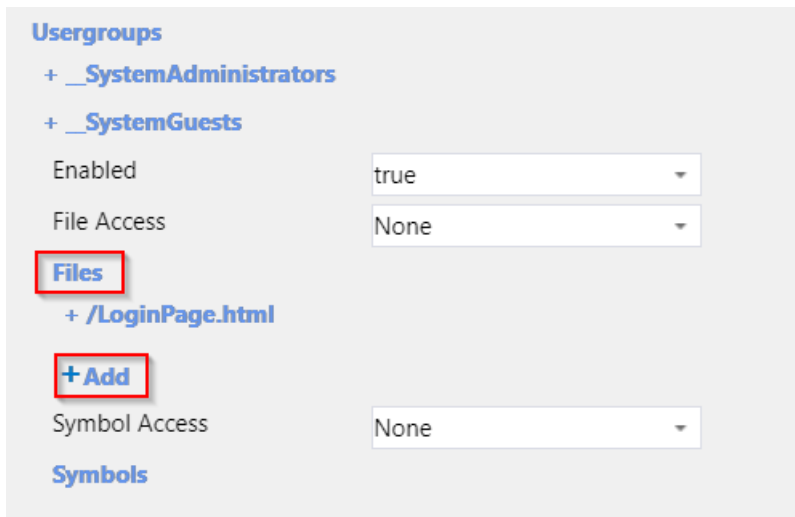
Since no user is logged in to the HMI server at the time the login page is loaded, the rights of the "\_\_SystemGuests" group apply at this point in time. Therefore, this group must be granted explicit access to the graphics to be used within the login page. Open the configuration page of the HMI server in the category "General".



Open the configuration of the rights of the "\_SystemGuests" group under "Usergroups".



Click "Add" under "Files".



**Usergroups**

- + **\_\_SystemAdministrators**
- + **\_\_SystemGuests**

Enabled: true

File Access: None

**Files**

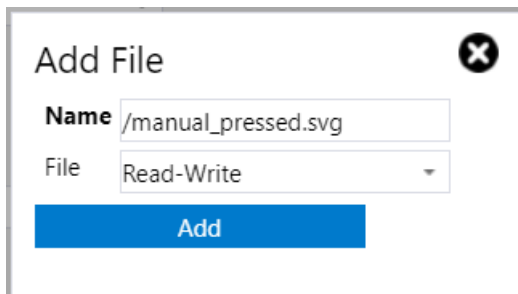
- + /LoginPage.html

**+ Add**

Symbol Access: None

**Symbols**

Add the graphic with read/write permissions.



**Add File**

Name: /manual\_pressed.svg

File: Read-Write

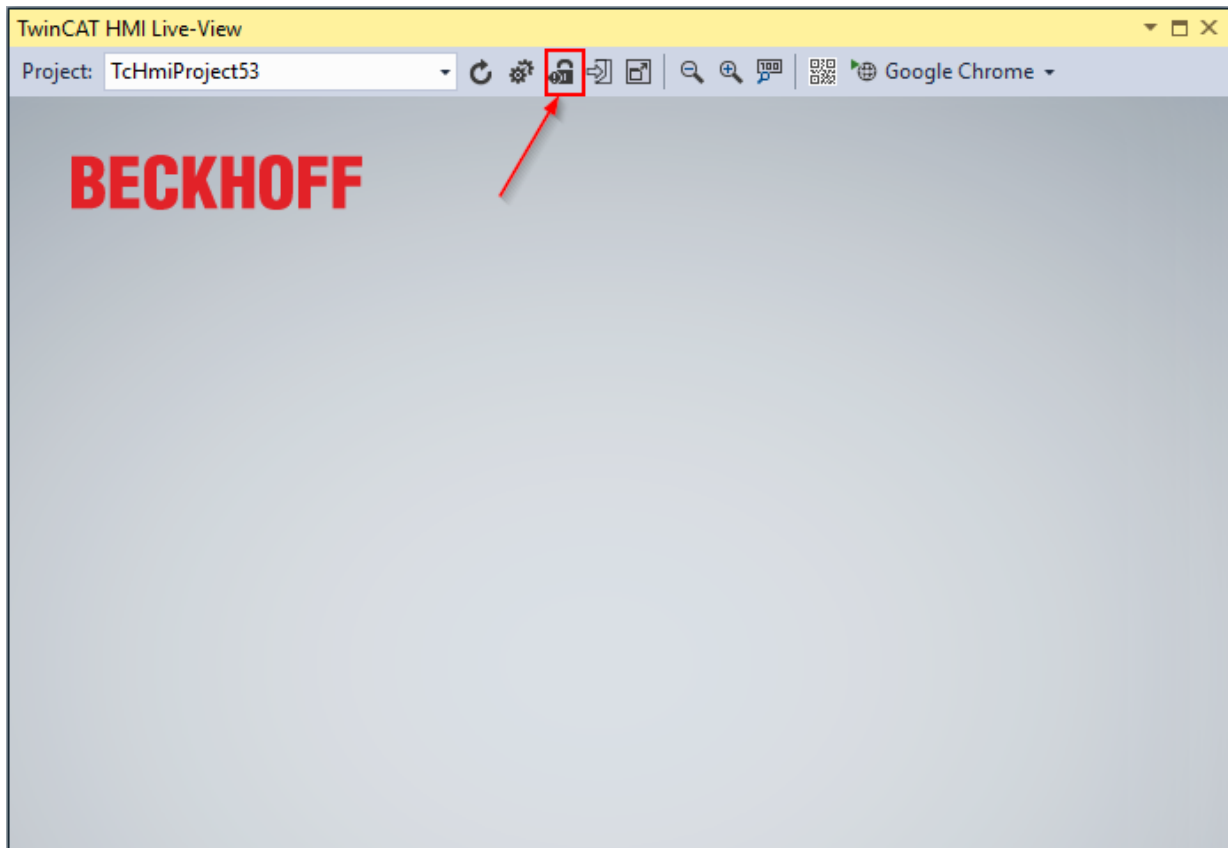
**Add**

You can then use the graphic on the login page.

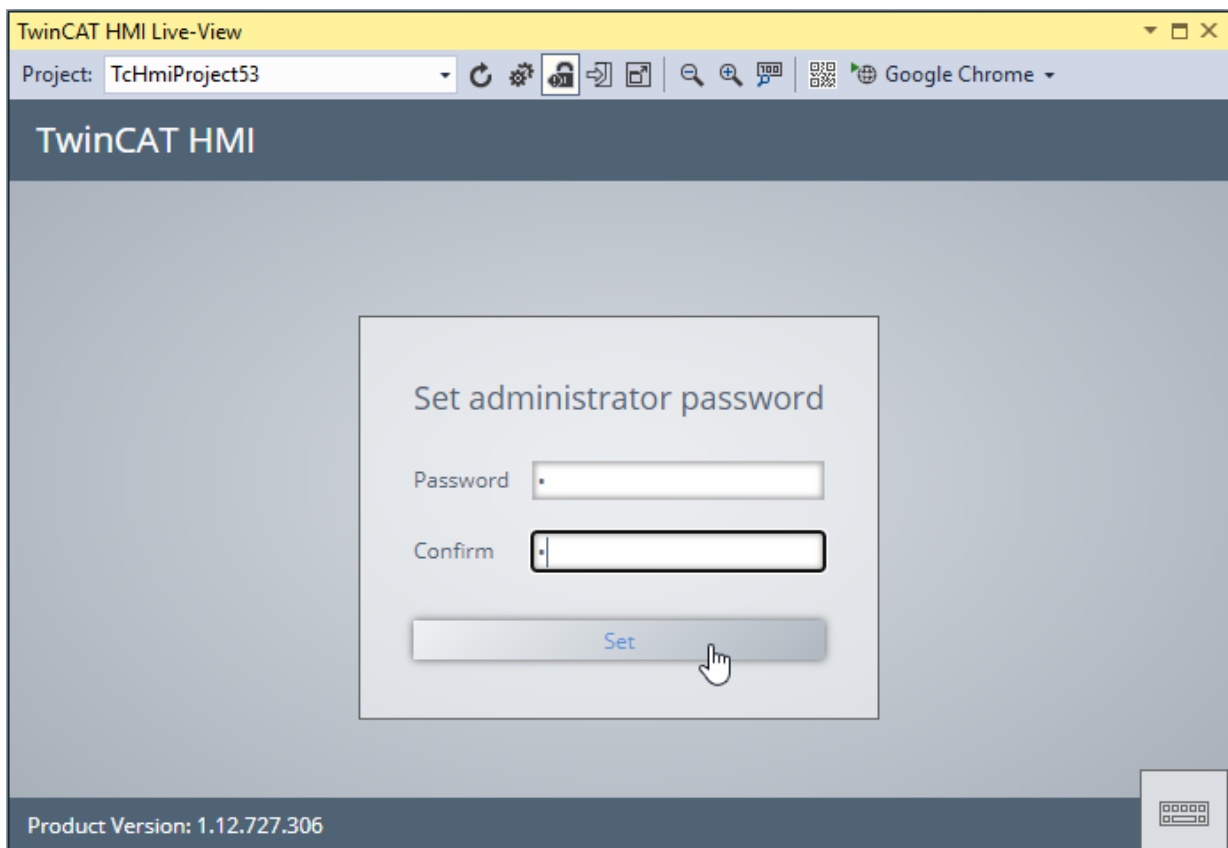
## 6.5 User administration in LiveView

User administration only works with active authentication. Authentication can only be enabled for a standalone server to which the [Publishing](#) [► 949]. In [LiveView](#) [► 74] there is an option to simulate the user administration. This allows all configured permissions to be tested in LiveView before the project is transferred to a standalone server.

1. Open **LiveView** and click the lock icon in the header bar.



2. Initialize the engineering server with a password for the user **\_\_SystemAdministrator**.



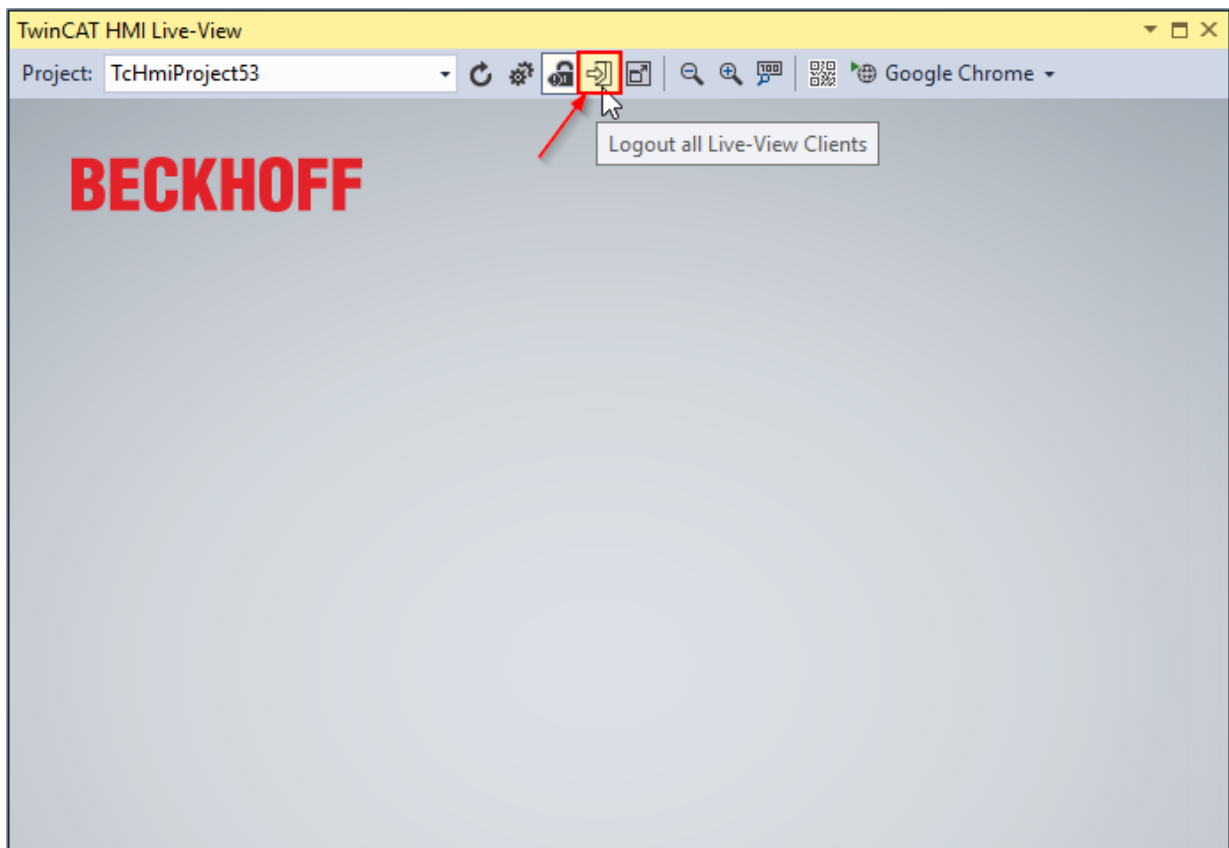
⇒ The user administration can now be used in LiveView.

You can also open the LiveView user administration simulation in a browser.

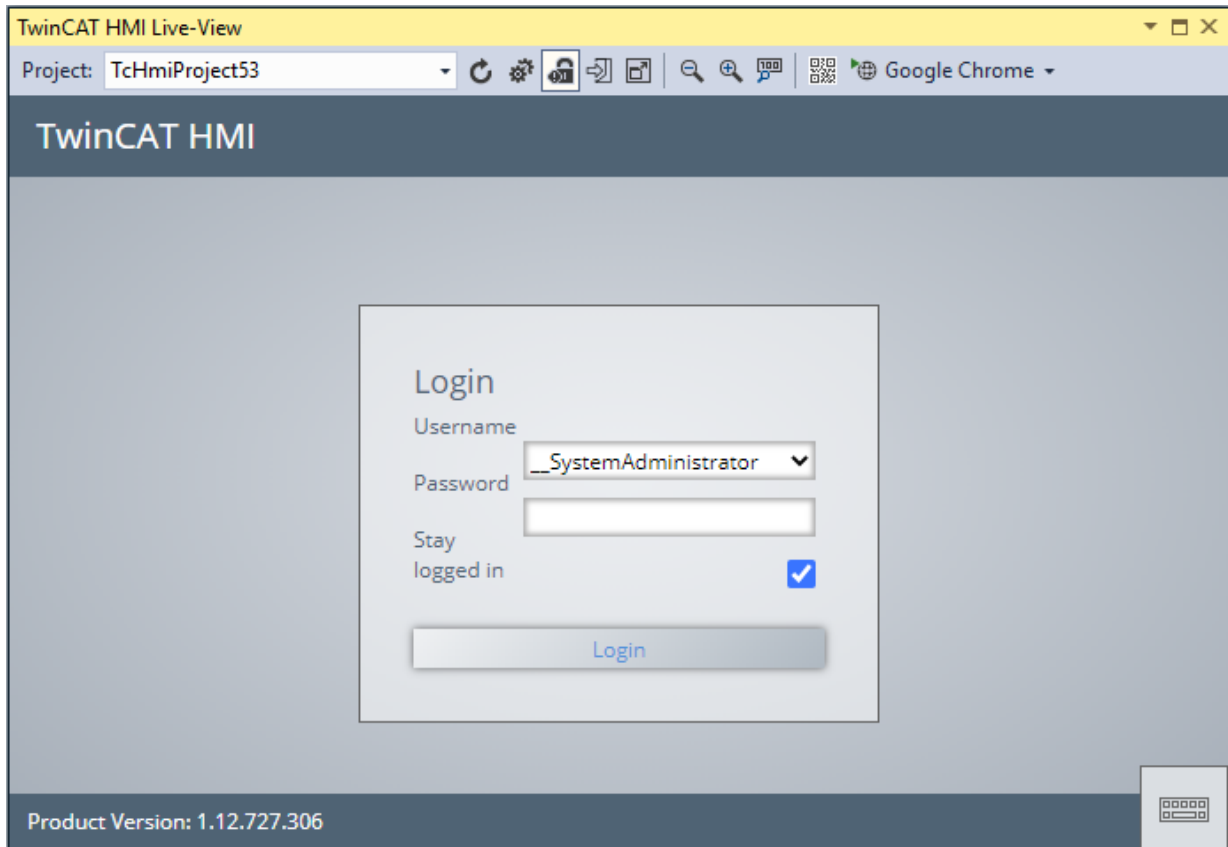
1. To do this, click on the corresponding entry in the dropdown list when selecting the browser:



2. A user can be logged out of the LiveView via a button in the HMI or the Logout button in the LiveView header bar. This button logs out all users from all LiveView instances (if additional instances are open in a browser window).



- After a user logs out, the login page of the server is displayed. There you can then log in any user to test the permission configuration.



⇒ The user administration can now be used in LiveView.

## 6.6 User management in the client

In addition to the configuration in the TwinCAT HMI Configuration window, the management (dynamic creation) of users is also possible during runtime in the client. For example, it is possible to add new users to the server at runtime, edit existing users (change password, change group membership) or remove them.

It is not possible to manage (dynamically create) groups at runtime. The groups must first be created in engineering and the rights to the corresponding controls configured. If the rights of a user are to be changed, the group membership of the user can be changed.

The administration at runtime in the client is made possible by the Framework API. This can be used in the JavaScript code.



Available since version 1.10.1018.48

## 6.7 Client certificates

The client certificates allow the authentication to be restricted so that only certain clients that have the certificate can access the server and thus the HMI. All other clients that do not have the certificate will not have access to the server. A so-called client certificate, which can be generated and signed by TwinCAT HMI in the engineering department, must be installed in the respective client. The server-side part of the certificate is automatically stored as the remote terminal in the TwinCAT HMI server during generation. A client certificate can optionally be assigned to a user so that the user is automatically logged in via the client certificate.

The use of client certificates is optional.



The use of authentication via client certificates requires encrypted communication via HTTPS.

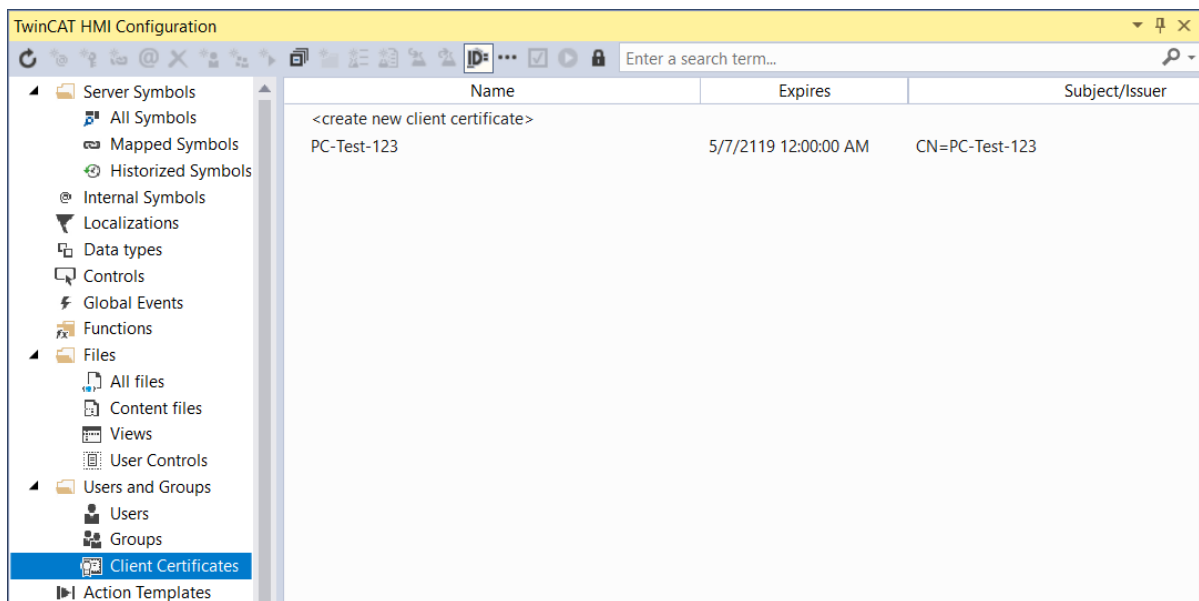


Available since version 1.10.1336.0

### 6.7.1 Creating a Client Certificate

The client certificates can be created and managed in the TwinCAT HMI Configuration window. [► 77]

1. Open the TwinCAT HMI Configuration window and select the "Client certificates" tab.



2. Double-click on the **<create new client certificate>** entry or right-click on the "Client certificates" tab and select **"Create new client certificate..."**.

3. In the dialog that appears, you can define the properties of the client certificate.

The dialog box is titled "Create a new self-signed client certificate" and contains the following fields and options:

- Subject / Issuer Information:**
  - Common name: \* (required field)
  - eMail:
  - Organization:
  - Organizational Unit:
  - Locality (City):
  - State:
  - Country:
- Signature Algorithm:** RSA-SHA256 (dropdown menu)
- Valid from:** 07/05/2019 (calendar icon)
- Valid thru:** 07/05/2119 (calendar icon)

\* indicates a required field

Buttons: OK, Cancel

4. The name of the client certificate is required. All other parameters can be optionally specified for signing the certificate.

## 6.7.2 Assigning a Client Certificate

A client certificate can optionally be assigned to one or more users. This enables a user to log in automatically using the client certificate.

1. [Create \[► 963\]](#) a new user or edit an existing user.
2. In the following dialog, the client certificate is selected for the user.

The dialog box is titled "Create / edit user" and contains the following fields and options:

- User name:** User1
- Password:** \*
- Confirm Password:** \*
- Authenticate by client certificate:** - (dropdown menu)
- Auth Extension:** - (dropdown menu)
- Member of the following groups:** Certificate1, CertificateN (list box)

A client certificate can be assigned to multiple users. A maximum of one client certificate can be assigned to a user.



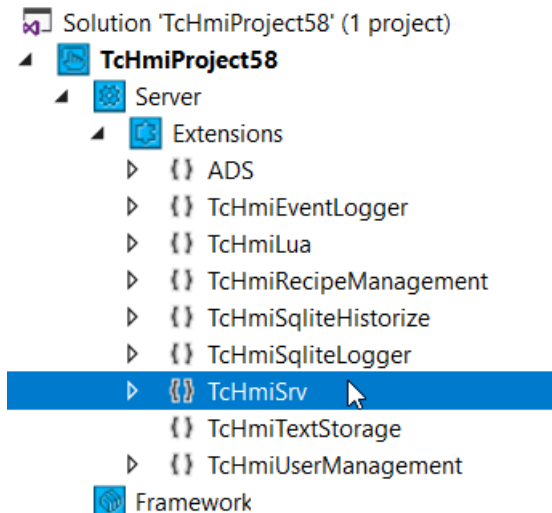
### 6.7.3 Activating Client Certificates

Authentication via client certificates must be enabled in the TwinCAT HMI Server. You can make this setting directly in the configuration of the engineering server and use a [project publish](#) [► 949] to transfer it to a server on the target system. Alternatively, you can make the setting as required directly on the target system at a server.

1. Open the configuration page of the TwinCAT HMI Server.

#### Engineering Server:

Open the "Server" node within the TwinCAT HMI project in Visual Studio. Then open the "Extensions" node and double-click on the "TcHmiSrv" entry:

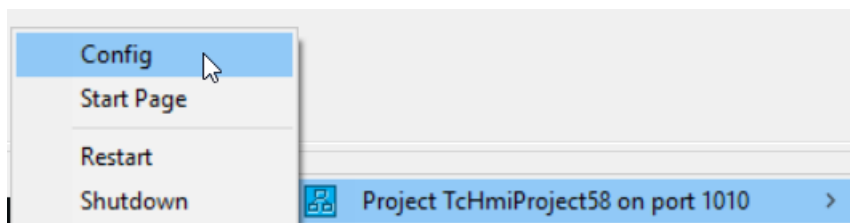


#### Server on the target system (TF2000 HMI Server):

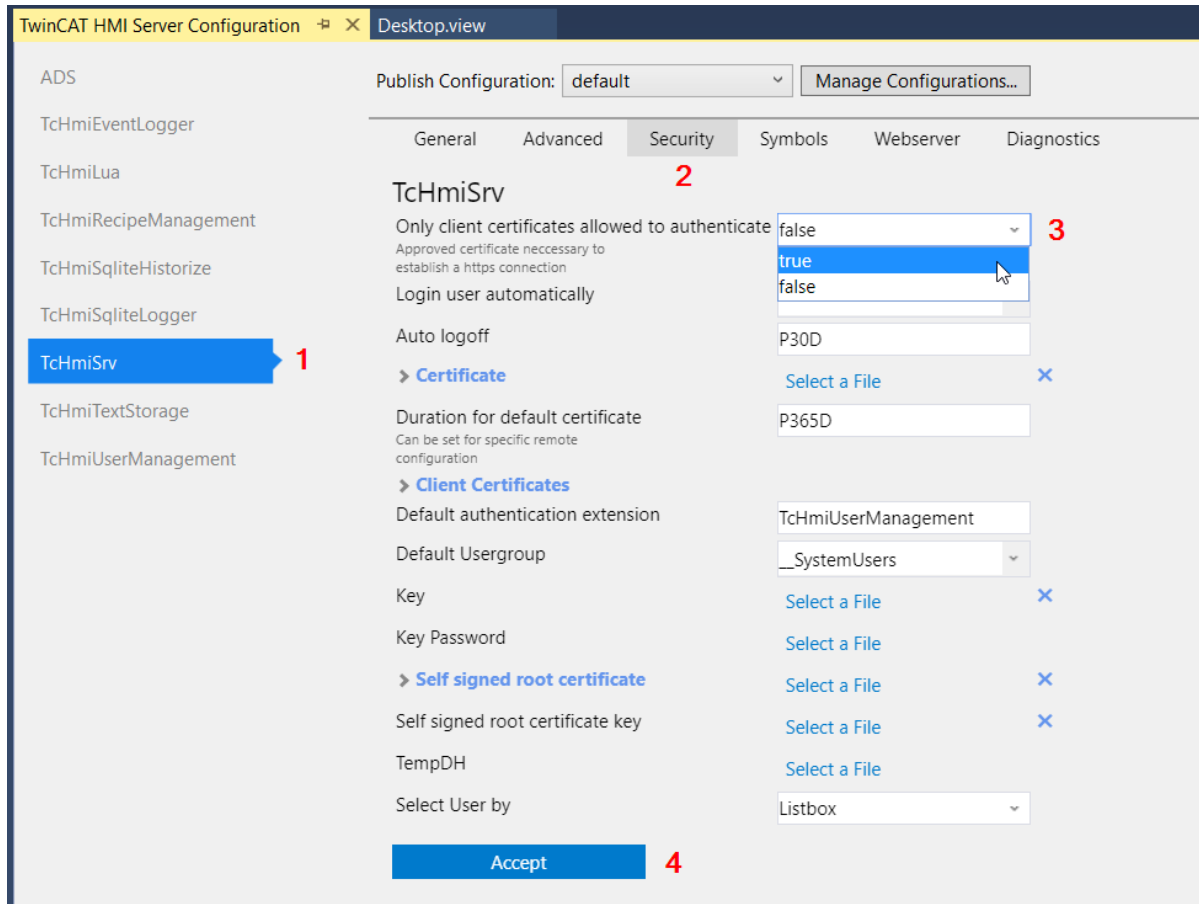
Right-click on the SysTray icon of the TwinCAT HMI Server:



Open via the context menu the configuration page by clicking on the "Config" entry:



- On the configuration page, click on the entry "TcHmiSrv" (1) and then go to the "Security" tab (2). There you will find the entry "Only client certificates allowed to authenticate" (3).



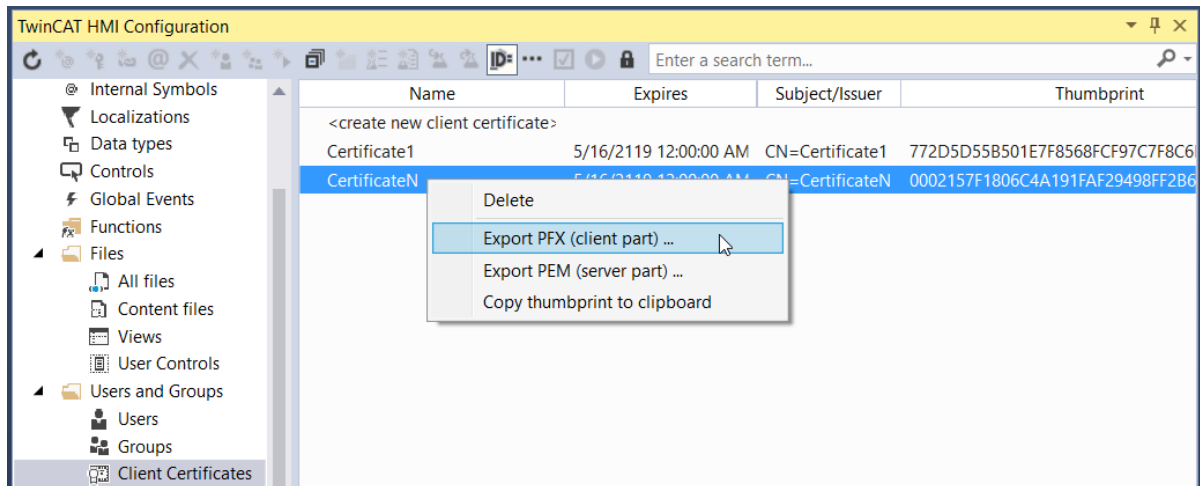
- Enable authentication using client certificates by setting the option to "true" (3). Confirm the action with the button "Accept" (4).
- Authentication using client certificates is active. If you have made the setting on the Engineering Server, you can [transfer](#) [► 949] the project to a server on the target system.
- The client certificates must [be installed](#) [► 990] in the clients that are to access the system.

## 6.7.4 Installing the Client certificate

The client certificates can be installed in the clients that are to gain access to the system. First, the certificate must be exported as a PFX file.

- Open the [TwinCAT HMI Configuration window](#) [► 77] and select the category **Client certificates**.

2. Right-click on the desired certificate and select the entry **Export PFX (client part) ...**:

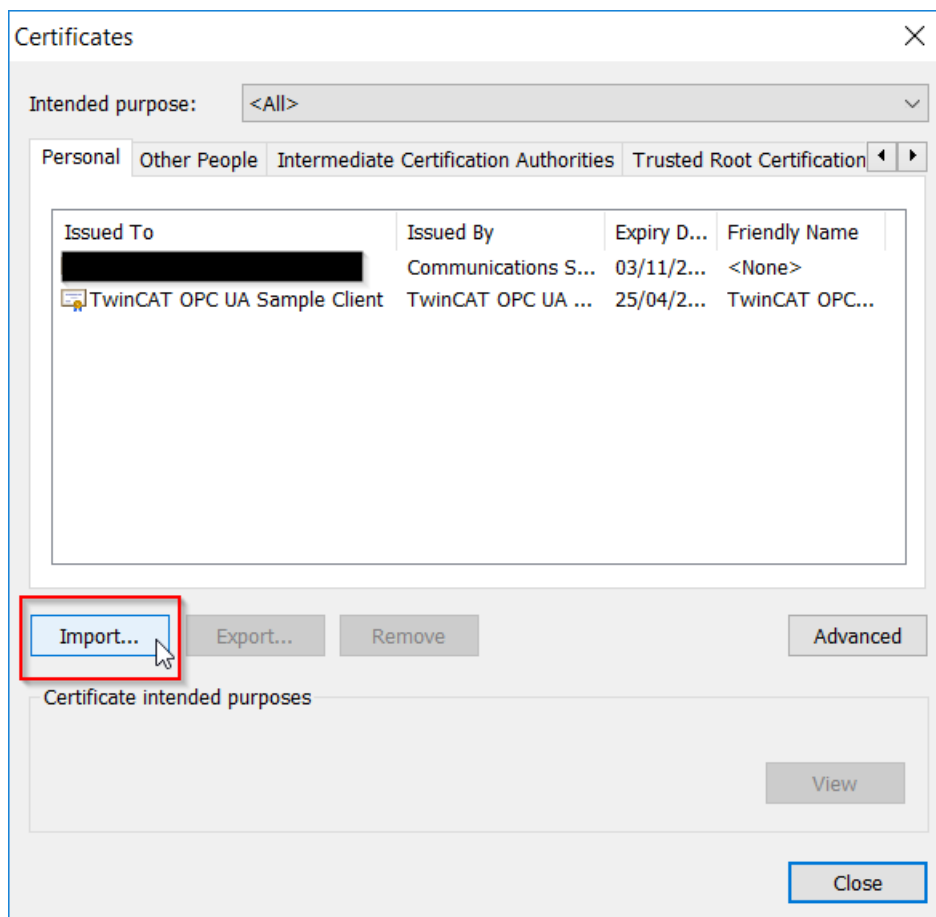


The exported certificate can then be installed on the target systems that are to authenticate themselves using the certificate.

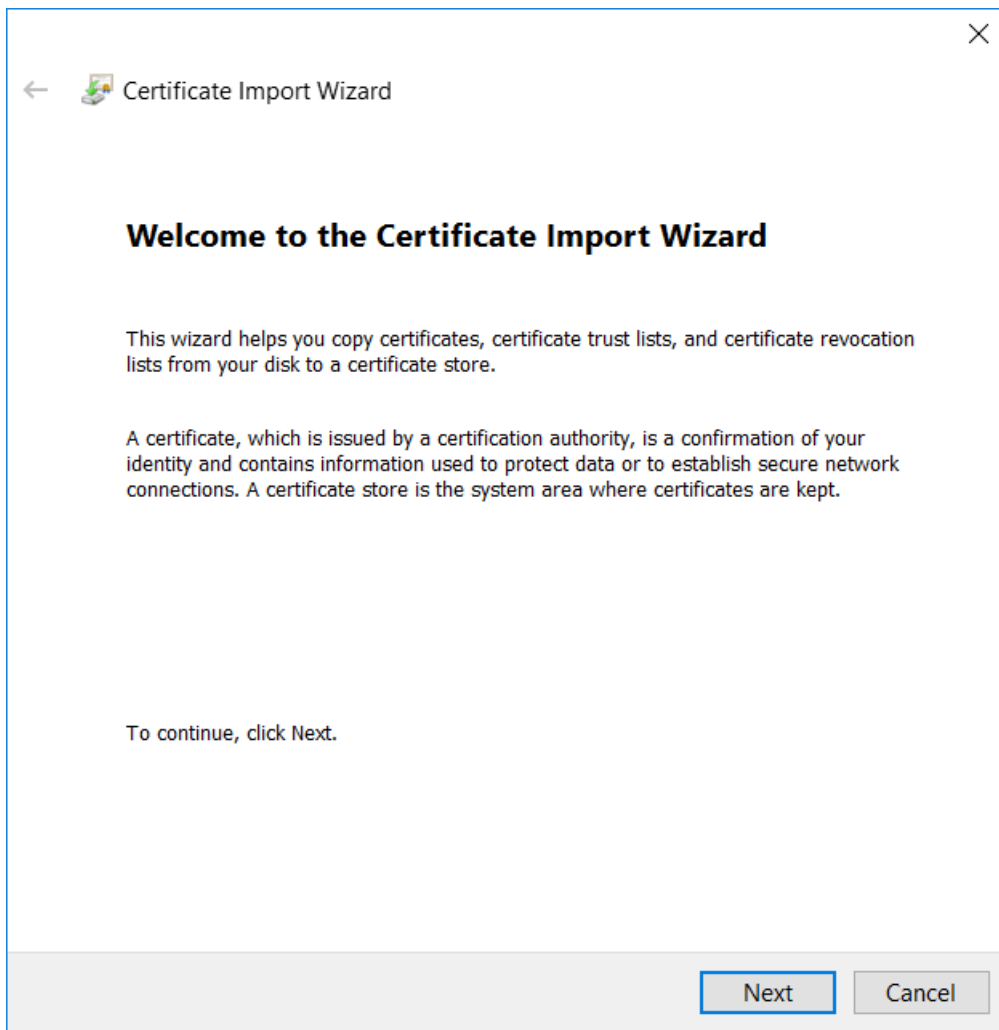
### Installing the Client Certificate in a Browser

The following steps show the integration of a client certificate into a browser using the example of the "Google Chrome" browser. Integration is performed in the same way with other browsers.

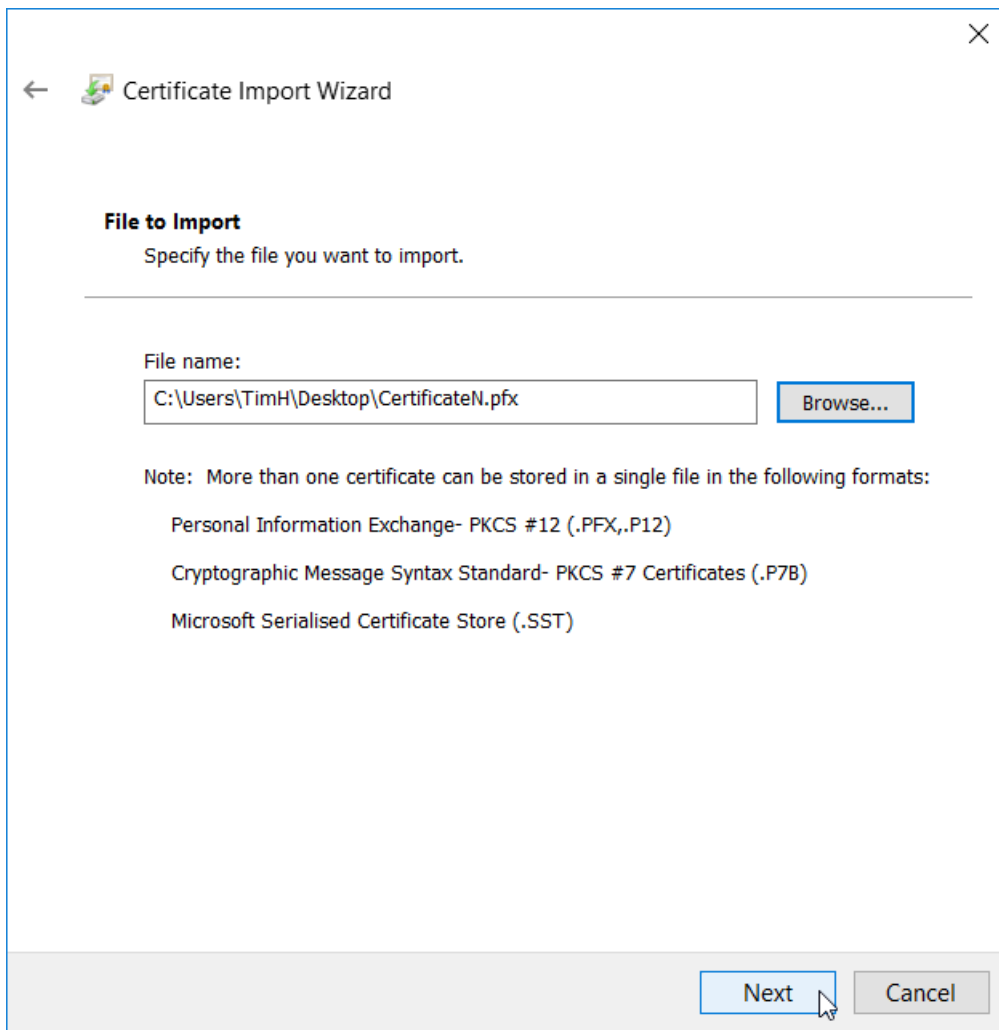
1. Copy the exported certificate to the target system.
2. Open the browser on the target system.
3. Open the settings of your browser.
4. Open the advanced settings and select **Manage certificates**.
5. Select the **Import** item:



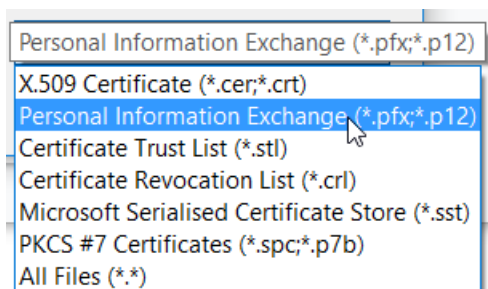
6. Click **Next** in the following wizard:



7. Then click on **Browse** and select the certificate:

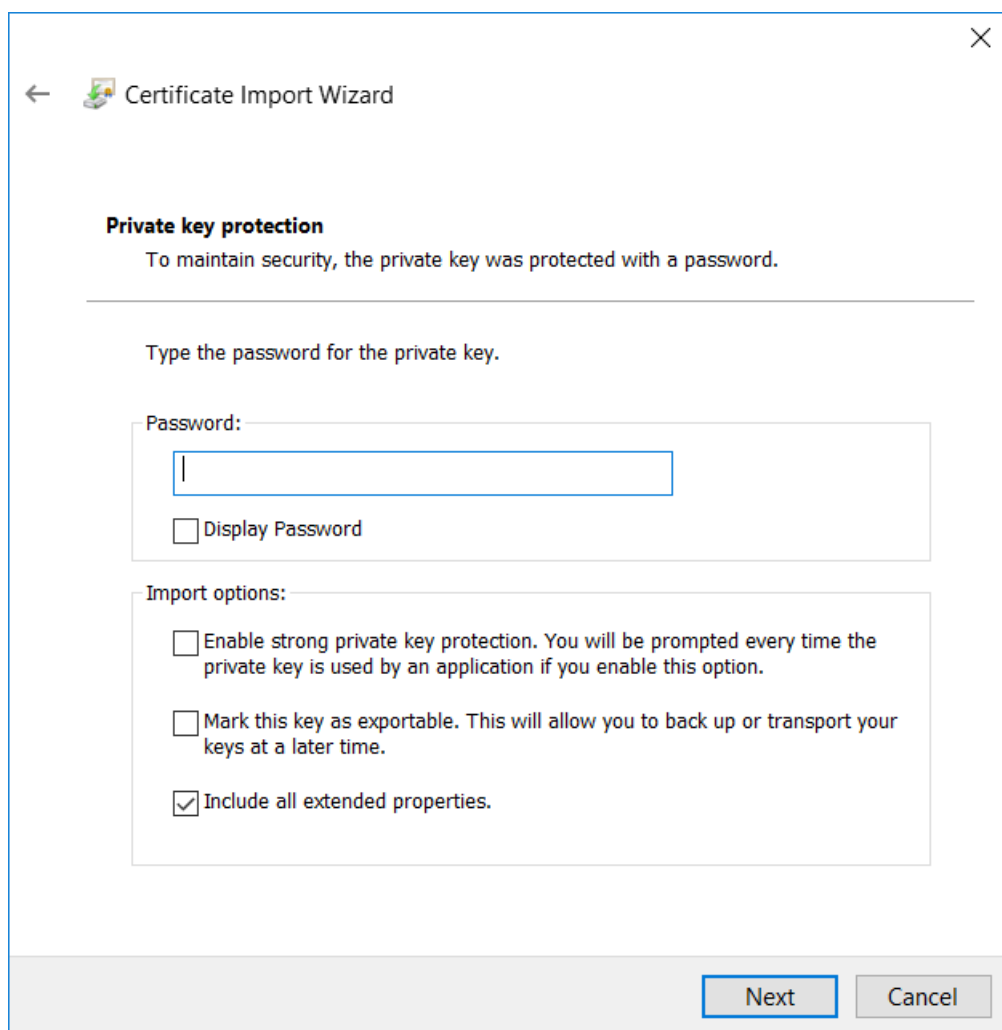


You may have to switch to the PFX format in the **Browse** dialog:



8. After selecting the certificate, click **Next**.

9. The following dialog can be confirmed without entering a password with the default settings by clicking on **Next**:



The image shows a Windows-style dialog box titled "Certificate Import Wizard". It has a back arrow icon on the left and a close 'X' icon on the right. The main content area is divided into sections. The first section is titled "Private key protection" and contains the text "To maintain security, the private key was protected with a password." followed by a horizontal line. Below this is the instruction "Type the password for the private key." and a "Password:" label next to a text input field. Under the input field is a checkbox labeled "Display Password". The second section is titled "Import options:" and contains three checkboxes with descriptive text: "Enable strong private key protection. You will be prompted every time the private key is used by an application if you enable this option.", "Mark this key as exportable. This will allow you to back up or transport your keys at a later time.", and "Include all extended properties." which is checked. At the bottom right of the dialog are two buttons: "Next" and "Cancel".

← Certificate Import Wizard

**Private key protection**

To maintain security, the private key was protected with a password.

Type the password for the private key.

Password:

☐ Display Password

Import options:

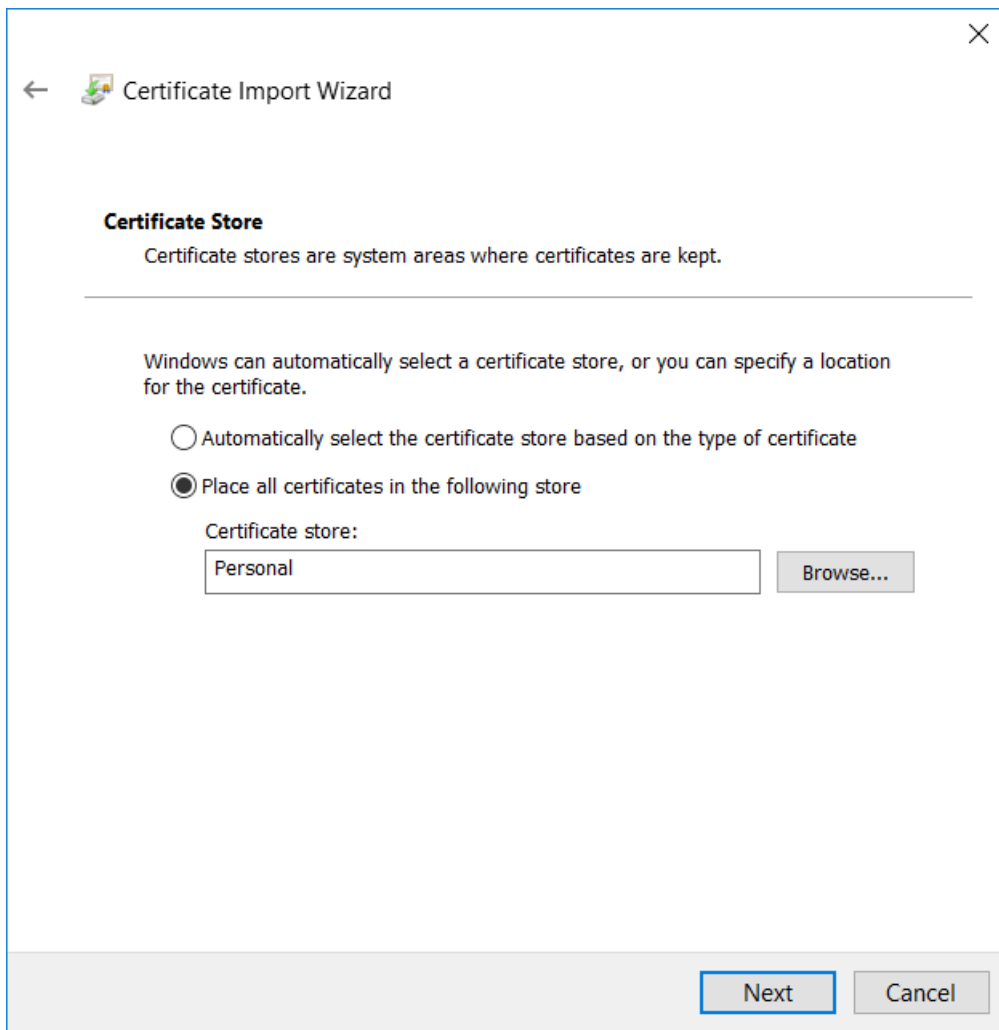
☐ Enable strong private key protection. You will be prompted every time the private key is used by an application if you enable this option.

☐ Mark this key as exportable. This will allow you to back up or transport your keys at a later time.

☒ Include all extended properties.

Next Cancel

10. Select the area **Personal** and click on **Next**:



The image shows a Windows-style dialog box titled "Certificate Import Wizard". It has a back arrow icon and a close "X" button in the top-left corner. The main content area is titled "Certificate Store" and contains the text "Certificate stores are system areas where certificates are kept." Below this, a horizontal line separates the header from the instructions: "Windows can automatically select a certificate store, or you can specify a location for the certificate." There are two radio button options: "Automatically select the certificate store based on the type of certificate" (which is unselected) and "Place all certificates in the following store" (which is selected). Under the selected option, there is a text box labeled "Certificate store:" containing the word "Personal". To the right of the text box is a "Browse..." button. At the bottom right of the dialog, there are two buttons: "Next" and "Cancel". The "Next" button is highlighted with a blue border.

← Certificate Import Wizard

**Certificate Store**  
Certificate stores are system areas where certificates are kept.

Windows can automatically select a certificate store, or you can specify a location for the certificate.

☐ Automatically select the certificate store based on the type of certificate

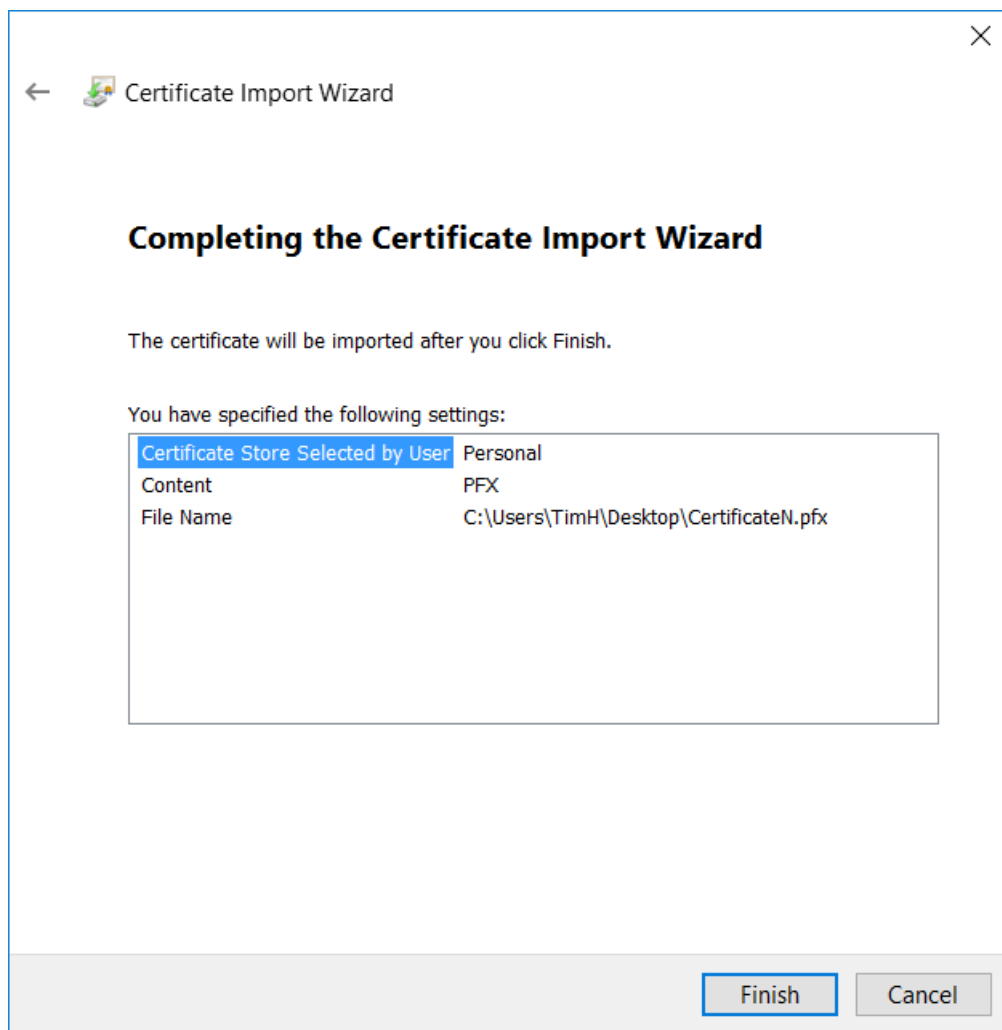
☒ Place all certificates in the following store

Certificate store:  
Personal

Browse...

Next Cancel

11. Confirm the import by clicking on **Finish**:

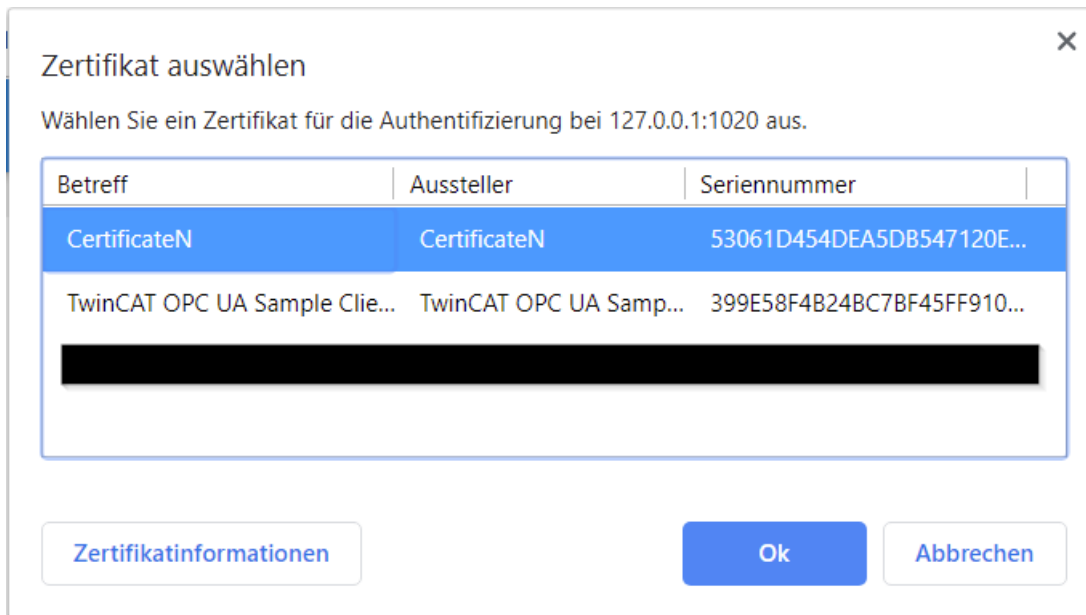


⇒ This concludes the installation.

### Open Client

Start the browser and open the HMI via the IP address of the server. When you access the server using a client certificate for the first time, the dialog that offers the selection of a client certificate is opened in the browser. Select your certificate there:





Access to the HMI is then granted. If the client certificate has been assigned to [► 988] a user, this user is logged in automatically and the HMI is loaded. Otherwise you have to authenticate yourself with username and password.



Communication with the server must be encrypted using HTTPS if you are using a client certificate.

### Error handling

If you have already worked with client certificates before, it may happen that the browser skips the query for a client certificate and access to the HMI is not granted. In this case, you can clear the browser cache and restart the browser. The browser should then query the client certificate and access the HMI.

## 7 Internationalization

Internationalization in TwinCAT HMI enables the management of languages and units and their switching in the client. Furthermore, the administration of different time zones and time formats is supported.

### 7.1 Change the language

Language switching in TwinCAT HMI is implemented with keys, which are managed in language tables (localization files). Any texts in different languages can be stored in the language table for a key.

In the [Designer](#) [► 56], the keys are linked directly to the respective [control properties](#) [► 60]. The texts behind the respective keys are resolved in the Designer directly in the currently active language.



Please note that the language changeover setting is different to the texts for the [time display](#) [► 999] ("time format locale").

#### Set active language

The active language can be set in engineering as follows:

- **Project properties:** The default language for the project can be set in the [Project properties](#) [► 53].
- **User configuration:** The language can be set per user in the [User configuration](#) [► 963]. This setting overrides the default language set in the project properties.

#### Manage language tables

The language tables (localization files) of a TwinCAT HMI project are managed in the [Localization editor](#) [► 107]. Language tables can be added to the project as a new [TwinCAT HMI item](#) [► 960].

#### Switch language in client

The active language can be switched at runtime in the client, regardless of which language settings have been specified in the project properties and for the logged in user.

Switching during runtime is easy to implement with the control [Localization Select](#) [► 458]. In the [Actions & Conditions Editor](#) [► 61], the switch can be made using the "[SetLocale](#) [► 938]" function. It can also be changed by programming via the API `TcHmi.Locale.load`.

### 7.2 Unit conversion

Unit switching in TwinCAT HMI enables the switching of the displayed units and the conversion of the corresponding values depending on the language or a specific event.

#### Conversion of values

The conversion of the units is solved by [functions](#) [► 924]. A function is linked to the [Control property](#) in [► 111] the properties window and returns the converted value. As a parameter value, the function receives the output value that is present in a certain unit.

Within the function, the developer can [convert](#) [► 1471] the corresponding value (e.g. from a symbol in the PLC) into the desired unit. The respective unit can be added to the converted value directly within the function as a string or alternatively stored as a language key.

## Switching units

The units can be switched depending on the language or any other event. To do this, another parameter is passed to the function that contains the unit into which the value is to be converted. As soon as this parameter changes, the function is automatically called again and the value is converted and returned accordingly.

For example, pass an [internal symbol](#) [► 87] to the function that contains the unit into which the value is to be converted. The unit can be written anywhere in the internal symbol. Possible scenarios are e.g:

- "onLocaleChanged [► 102]": This global event is triggered as soon as a language is loaded. At this event the unit can be written into the internal symbol according to the [active language](#) [► 937].
- Events: Depending on [any event](#), [► 39] a unit can be written into the internal symbol. The event can be triggered, for example, if a value in the PLC changes or the user has pressed a button on the user interface.

## 7.3 Localization

Localization in TwinCAT HMI enables the management of different time zones and time formats. The server is based on the UTC time. Some controls (for example, the Event Grid and the Trend Line Chart) require a timestamp. To display the times on the client according to their region (with time offset), the time zone and time format can be specified in the project properties or per user.



Please note that the setting for the time display ("time format locale") is different to the texts for [language switching](#) [► 998].

### Setting in the project properties

The setting of the time zone and time format can be set for the project in the [project properties](#) [► 53].

### Setting in the user properties

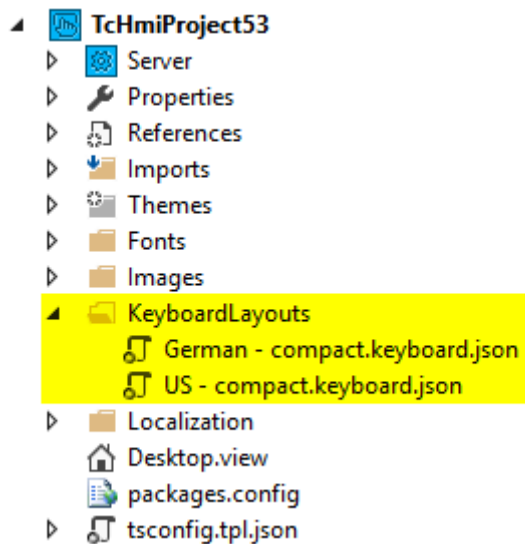
The time zone and time format settings can be set [per user](#) [► 963]. This setting overrides the setting in the project properties when user authentication is active.



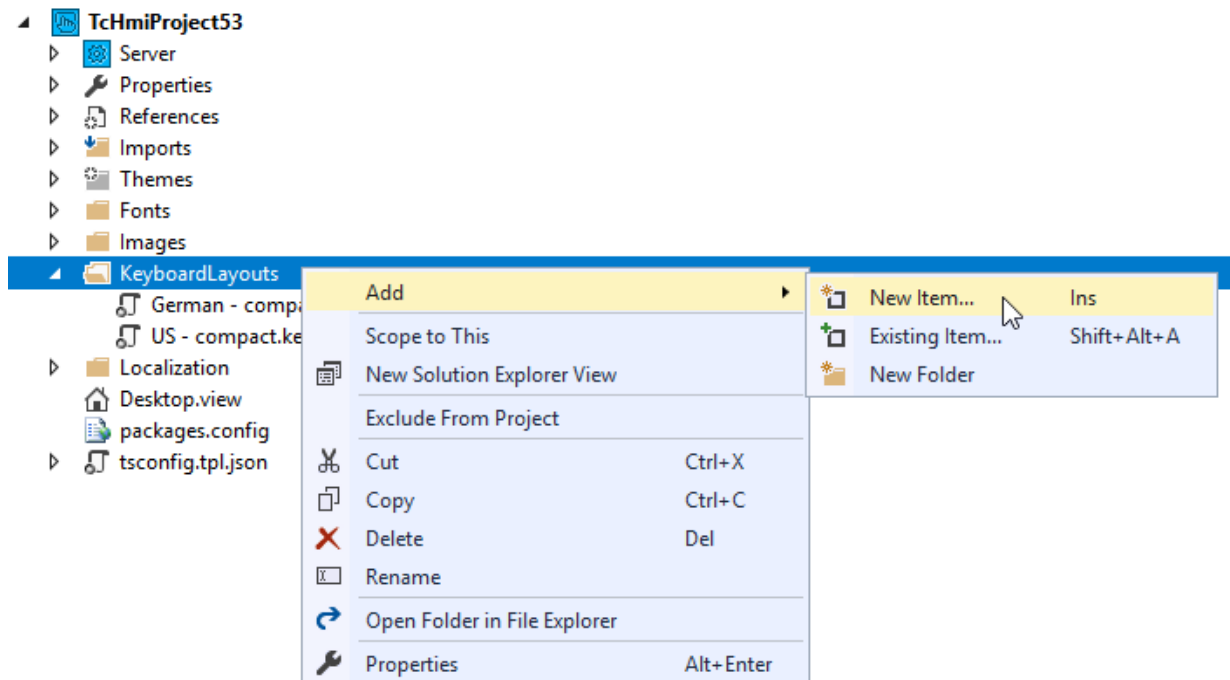
Available from version 1.10.1336.0

## 7.4 Keyboard layouts

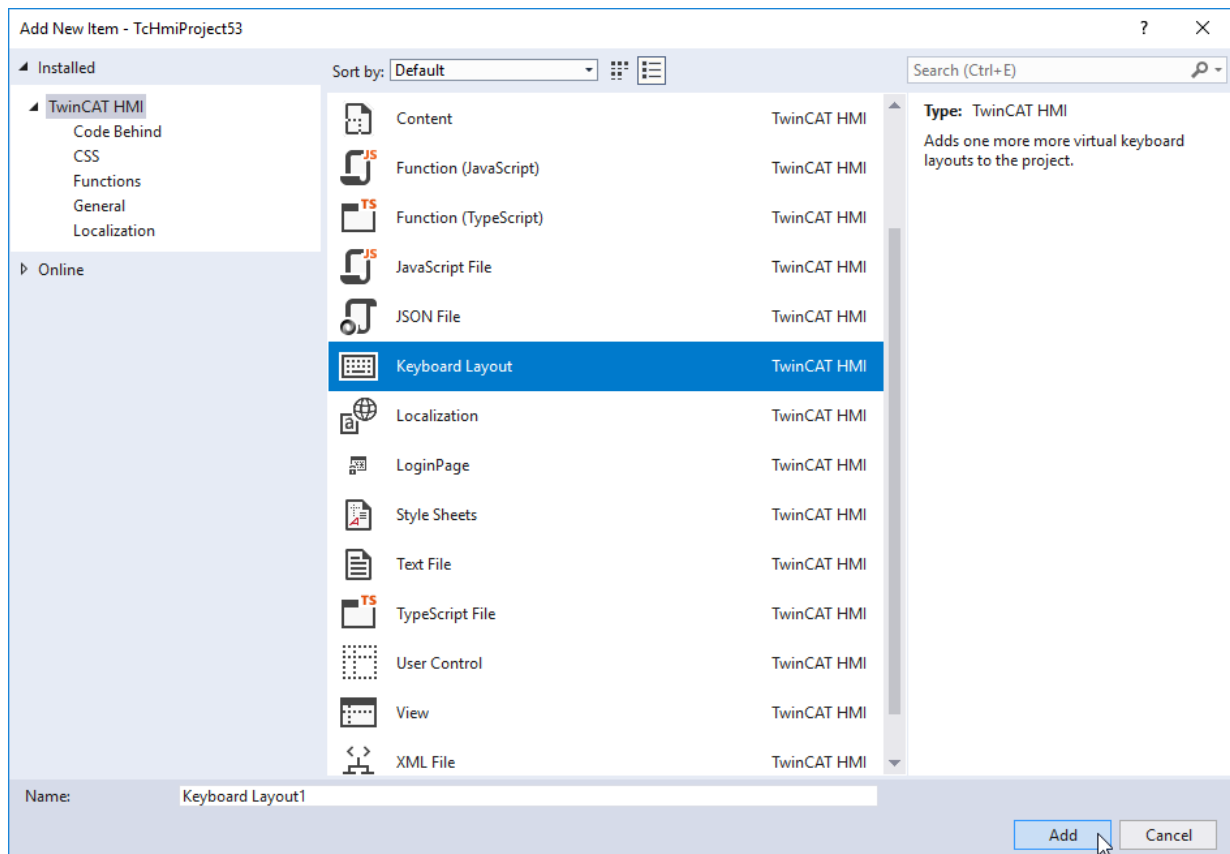
The TwinCAT HMI offers different keyboard layouts for different countries and regions. Each layout is available with or without numpad and with or without indirect input field. The compact versions of the German and American keyboards are integrated as standard. These can be found in the project under the folder **KeyboardLayouts**:



1. To add more layouts to the project, right-click the **KeyboardLayouts** folder and click **Add, New item**

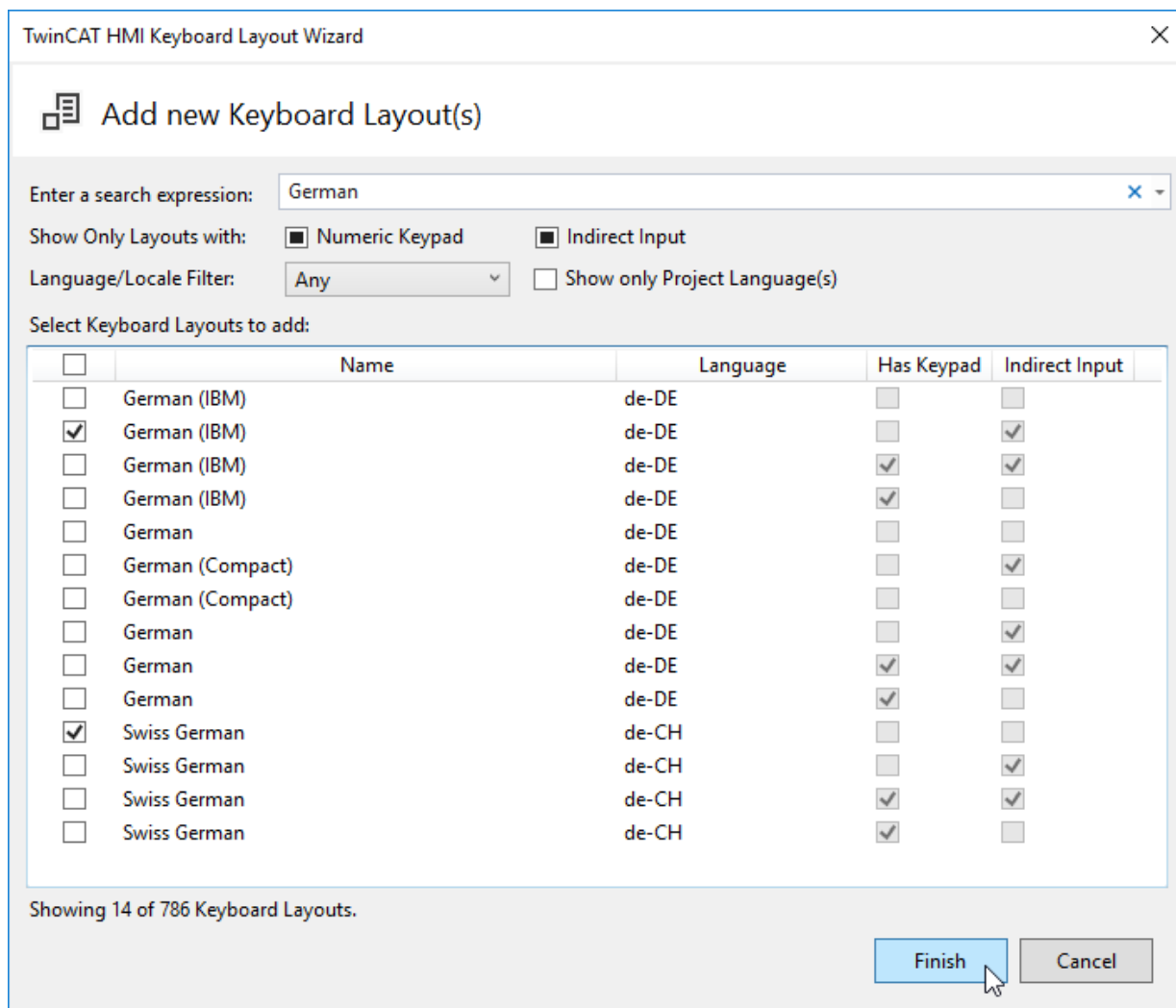


2. In the following dialog, select **Keyboard Layout** and confirm with **OK**:



The wizard for selecting a keyboard layout then opens. Here you can filter or search according to your criteria. The wizard includes a tabular listing of the keyboard layouts shows the differences between them.

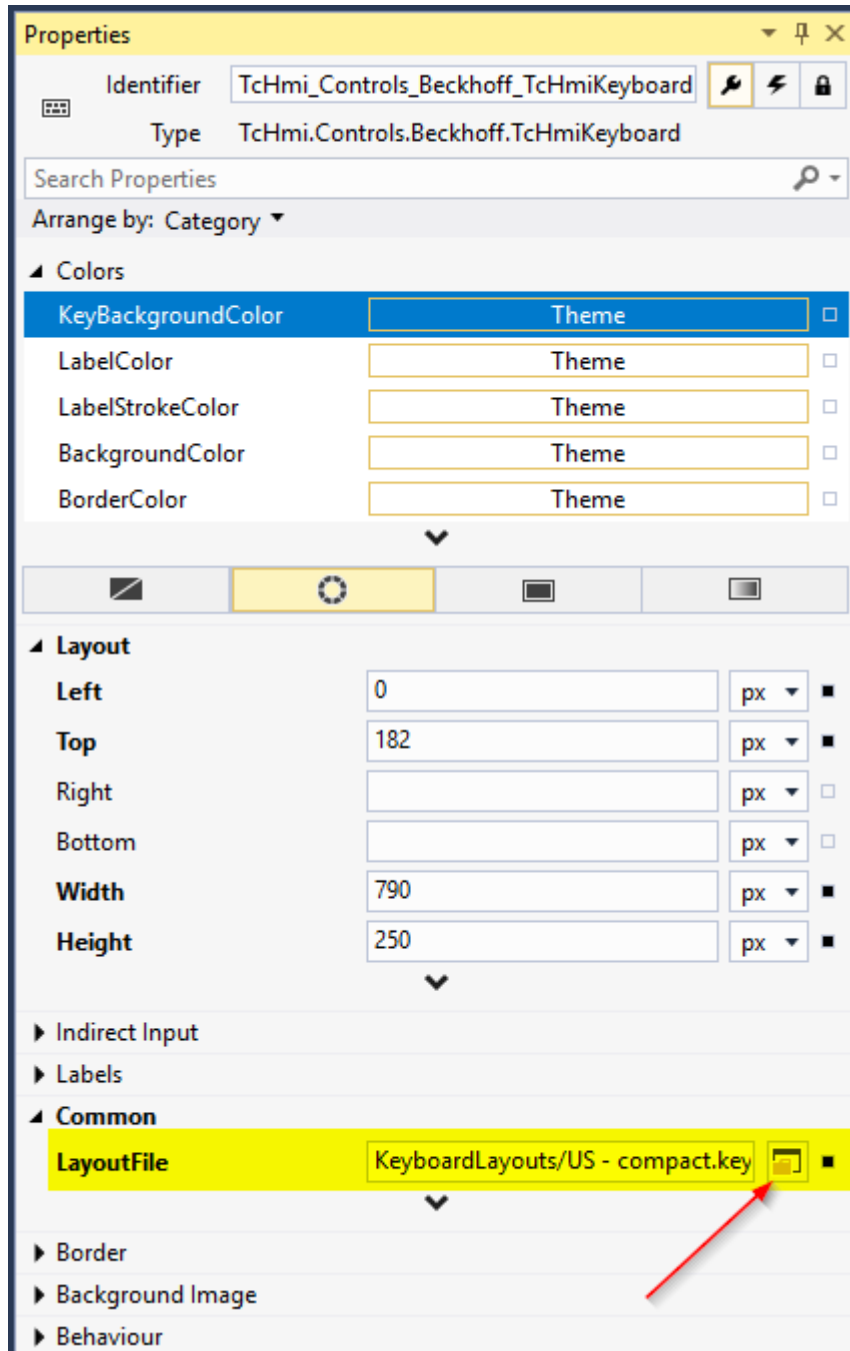
3. You can select multiple layouts in the wizard using the checkbox. When you have made your selection, confirm and exit the wizard by clicking **Finish**.




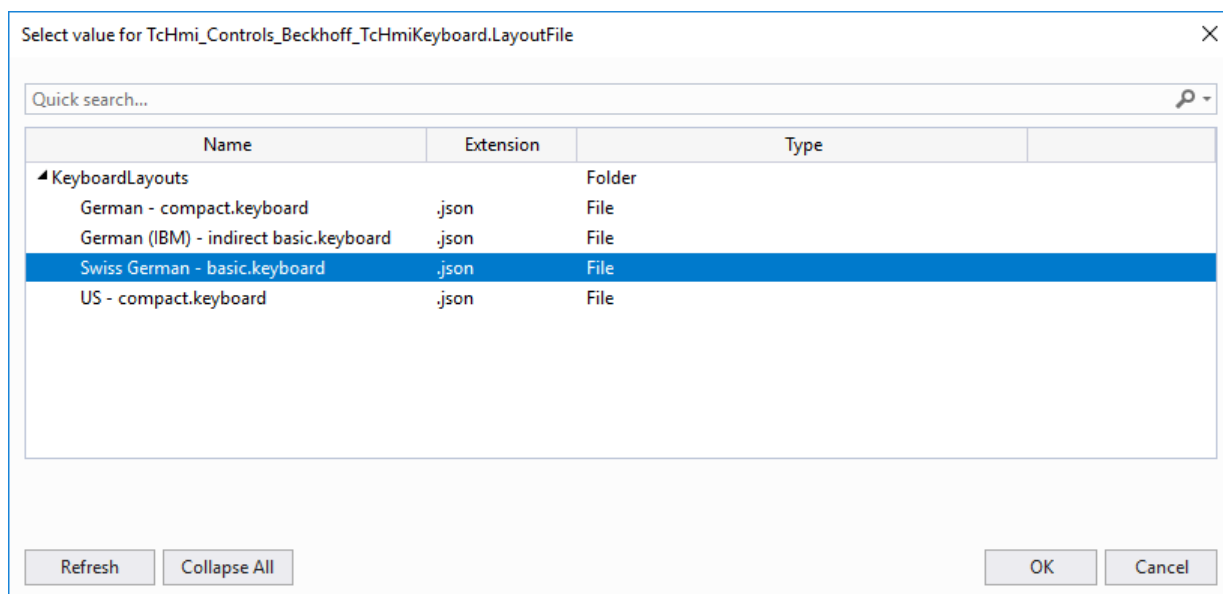
⇒ The keyboard layouts are then added to your project.

- KeyboardLayouts
  - German - compact.keyboard.json
  - German (IBM) - indirect basic.keyboard.json
  - Swiss German - basic.keyboard.json
  - US - compact.keyboard.json

4. To display the corresponding layout in the keyboard, open the Designer, select the **keyboard** and then open the **Properties** window. There you will find the property **Layout File**:



5. Click the  button to open the following dialog. It contains a selection of all layout files available in the project. Select the desired layout and click **OK**.



⇒ The keyboard now displays the selected layout.

The keyboard layout can also be switched dynamically at runtime using the [Actions and Conditions Editor](#) [► 61].



Available from version 1.12.742.0



## 8 Themes

The theme system allows you to switch the design of all elements. The theme can be switched during runtime per client or globally in the project properties. Only one theme can be active at a time (similar to language switching [► 998]). A theme can change the appearance of a control (e.g. [Top](#) [► 761], [Left](#) [► 760], [Width](#) [► 761], [Height](#) [► 762], [BackgroundColor](#) [► 769] etc.). Besides the appearance of the control, all control attributes [► 113] can be changed.

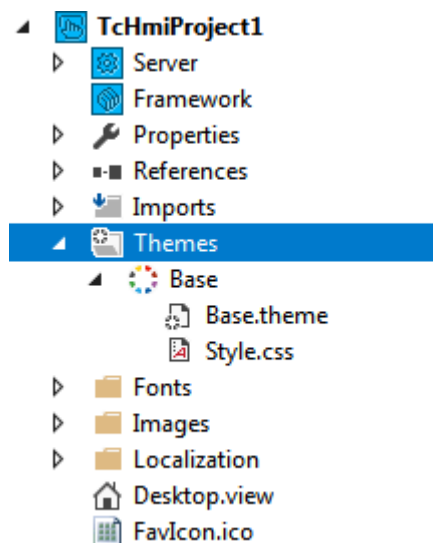
A theme can be created via the integrated theme editor or directly as a CSS file.



Available since version 1.10

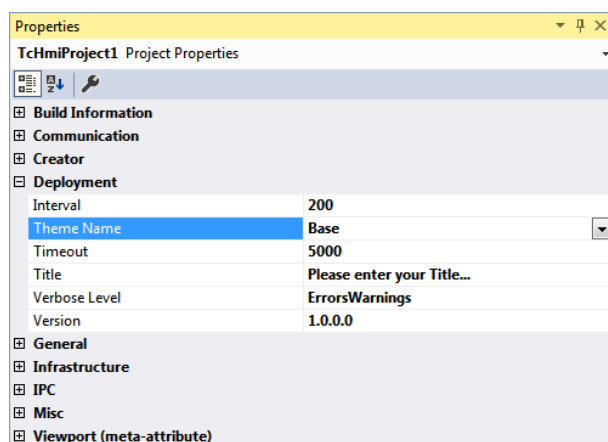
### 8.1 Introduction

In a TwinCAT HMI project, the various themes are located under the "Themes" project node:



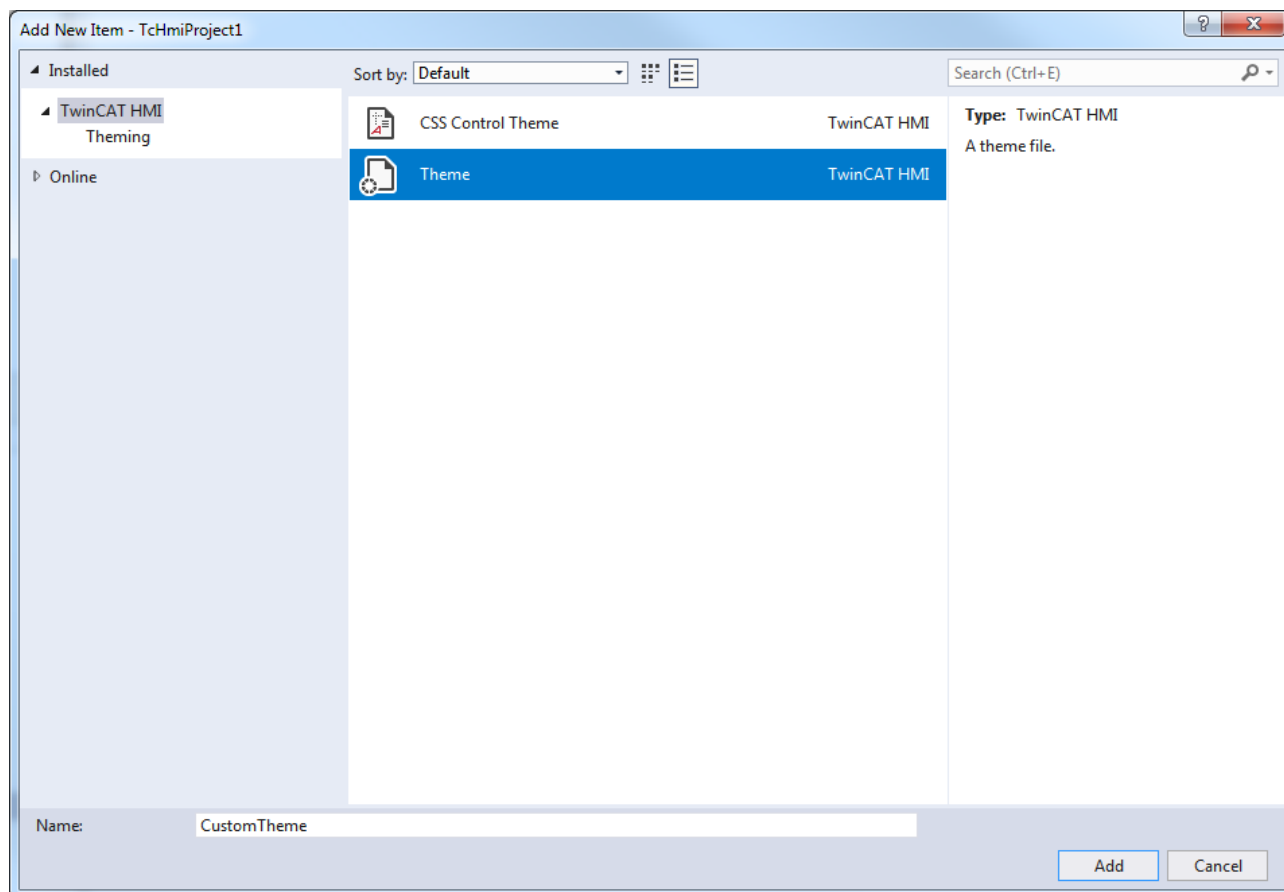
The theme node contains all themes defined for the project. For each theme there is a ".theme" file, which contains the JSON definition of a theme and can be opened with the theme editor.

The default theme can be viewed and switched under the general project properties (click on the project node and open the Properties window).

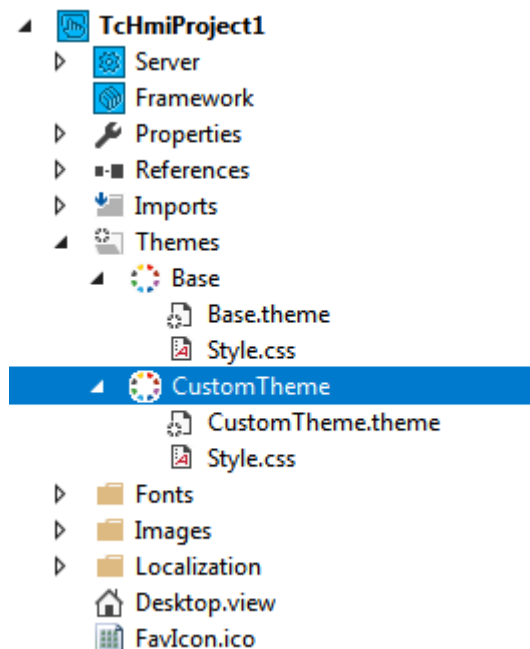


For a new project, the base theme is included in the project and set as the default theme. The base theme includes the font setting, which is included at project level regardless of the theme (see Fonts). In addition, each TwinCAT HMI Control has a base theme, which describes the design of the control if this is not explicitly overwritten by the developer in Engineering or by another theme.

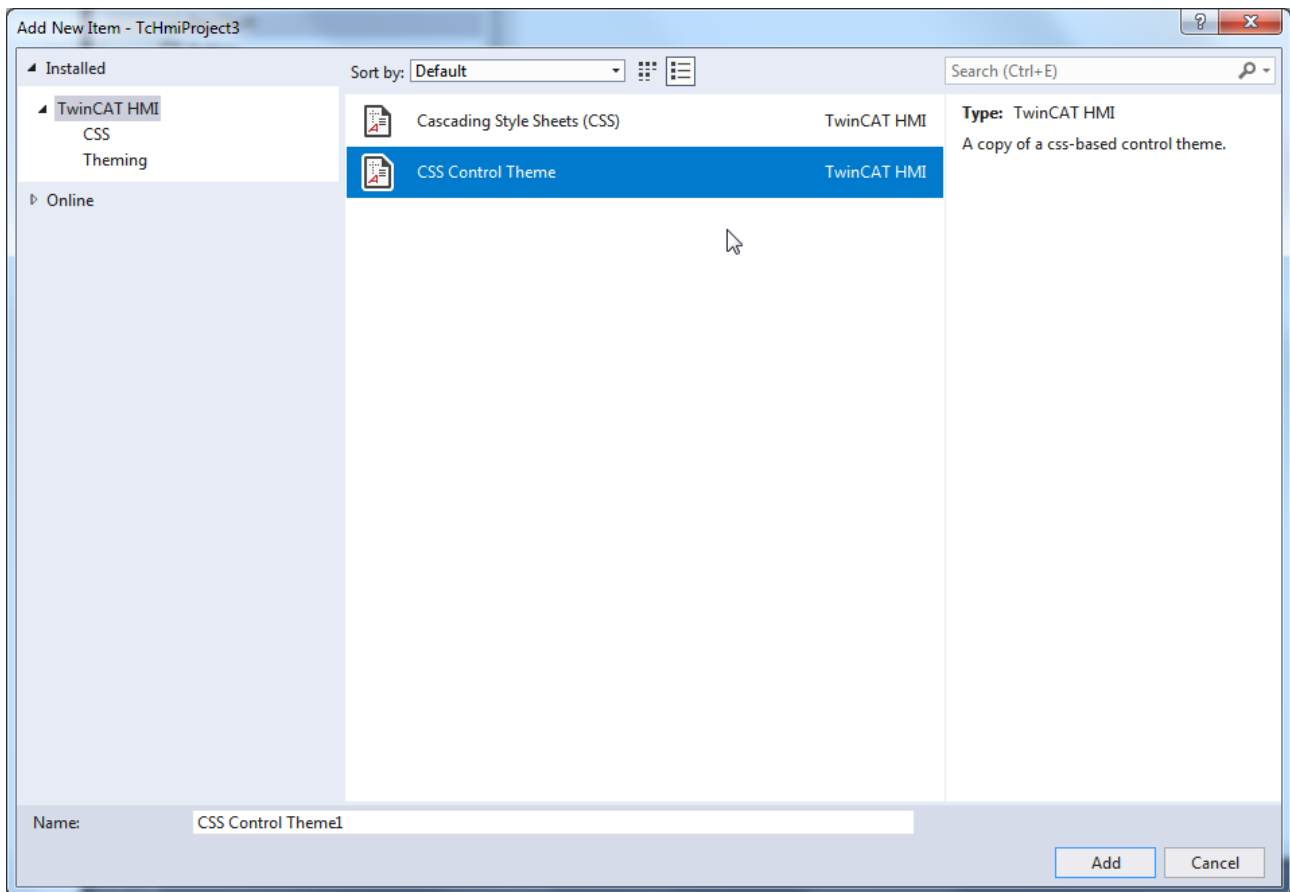
Add a new theme by right-clicking on the **Themes** project node under **New\Add New Item**. In the dialog select the type **Theme** and click **Add**.



The new theme contains the ".theme" file, which can be opened via the [theme editor](#) [►\_1007].



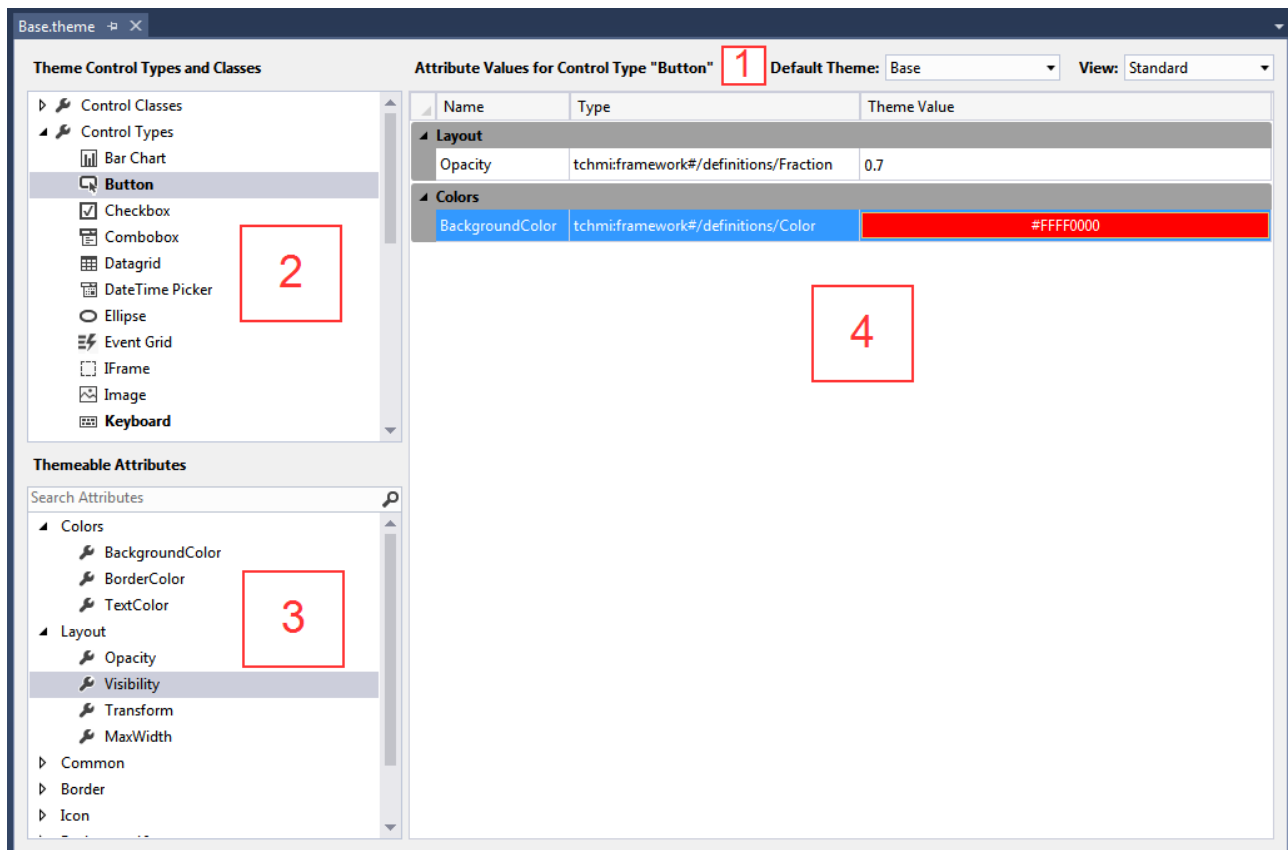
Under a theme, right-click **Add Item** to add more items.



You have a choice between a Cascading Style Sheets file and a CSS Control Theme file (see [CSS theme](#) [► 1012]).

## 8.2 Theme editor

Open the theme editor by double-clicking on a theme file in a theme. The following graphic shows the theme editor, which is open for the base theme as an example.



The theme editor is divided into the following areas:

#### 1 Status information (Attribute Values for Control Type Button):

- **Default theme:** Here you can set the default theme (as in the project properties).
- **View:** Determines which attributes are displayed. In the standard view, only those attributes and controls are displayed that are usually changed by the user. The Advanced view displays all controls that can be changed and their attributes.

**2 Theme Control Types and Classes:** In this area you can select whether a Class theme [► 1008] or a Control theme [► 1011] should be edited.

**3 Themeable Attributes:** In this area you select for which attribute a property is to be defined, depending on the respective theme.

Only those attributes are displayed that can be changed via the theme.

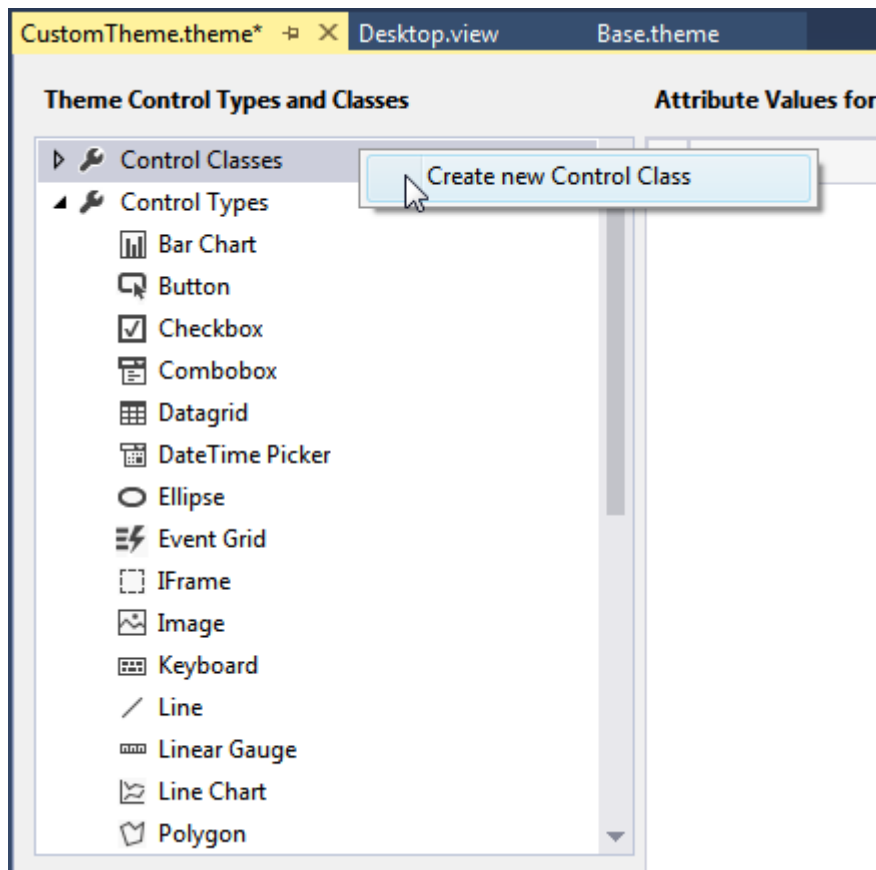
**4 Attribute Properties:** In this area, the property for the respective attribute is set. Any number of properties can be set for each Class theme and each Control theme.

## 8.2.1 Class theme

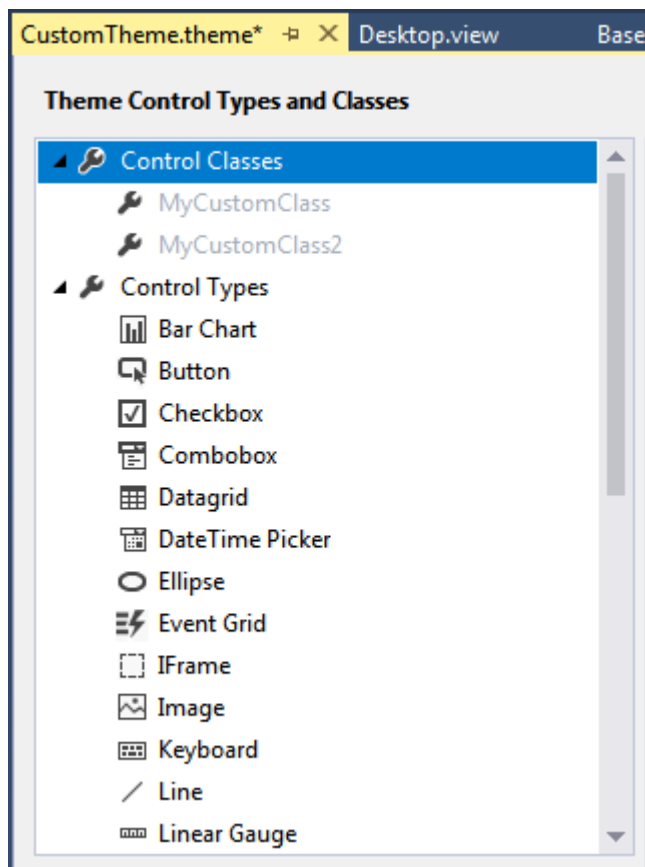
A class theme defines properties that apply to all controls assigned to this class, regardless of the control type. A control class is defined at project level for each theme in the theme editor.

The following steps are required to create a class theme:

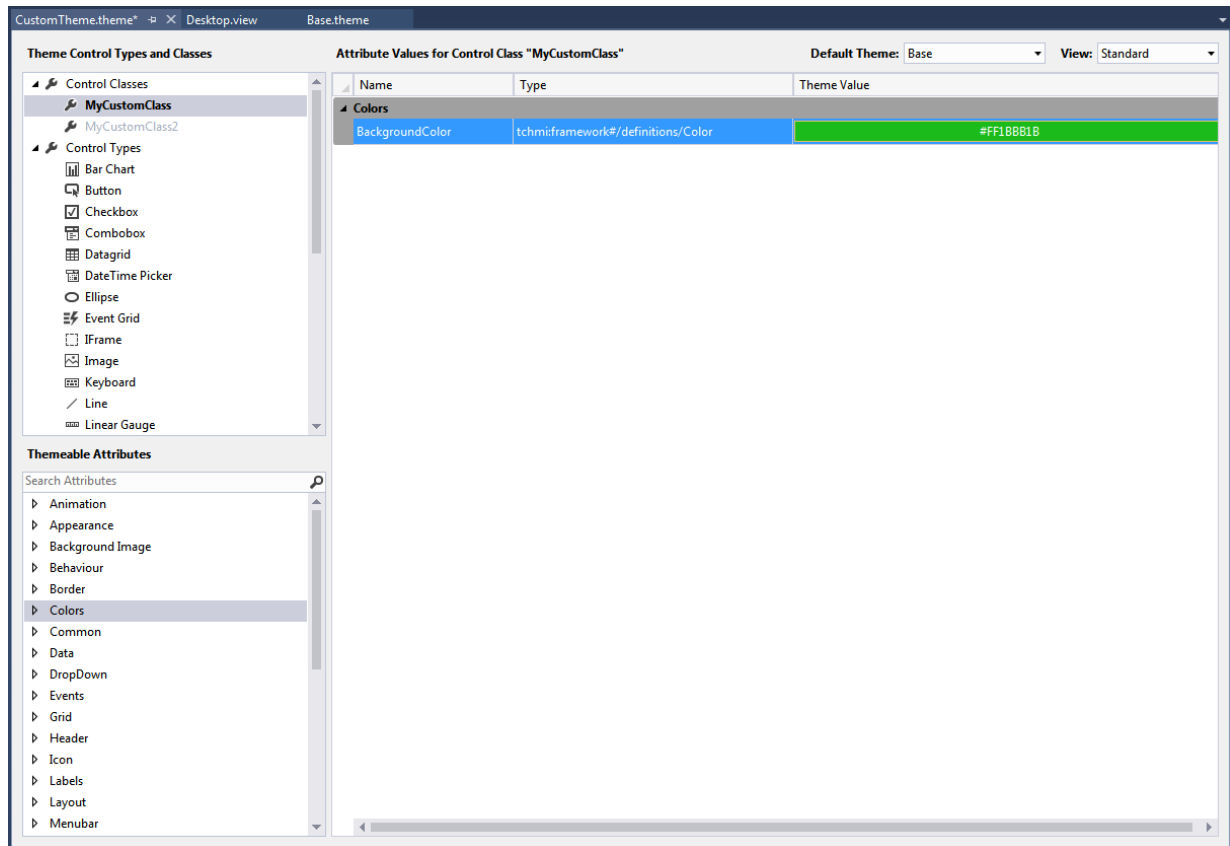
1. Open a theme in the theme editor, right-click on **Control Classes** and select **Create new Control Class**:



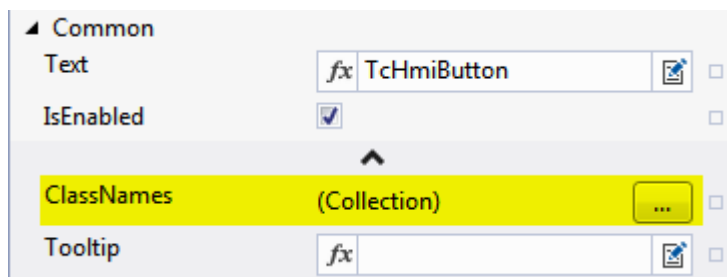
2. Added control classes that do not yet contain definitions are initially grayed out in all themes:



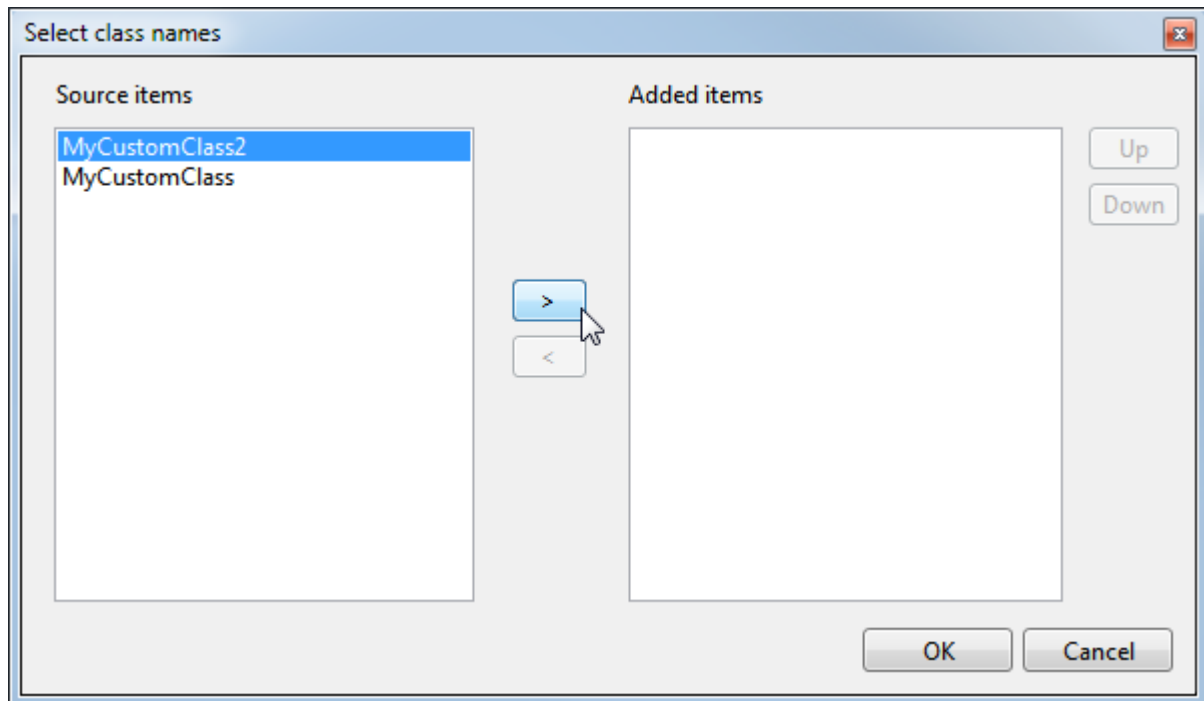
3. You can define any number of attribute properties for a control class. All control attributes are available:



4. The control class must be assigned to a control for the properties to apply to the control. Open the Properties window for a control and select the entry **ClassNames** under **Common**:



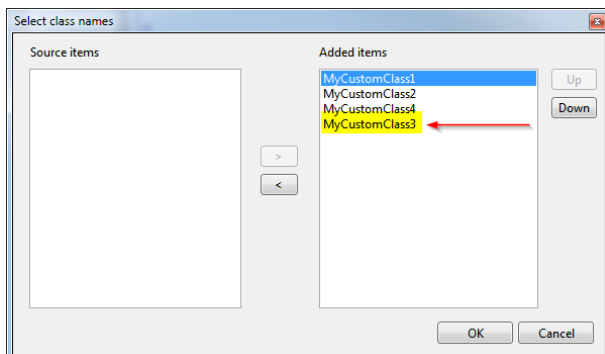
5. In the dialog, select the control classes that you want to add to the control. To do this, select the required control class and press the arrow. Confirm the dialog with **OK**:



⇒ The control class is now assigned to the control, and the properties of the control class are used.



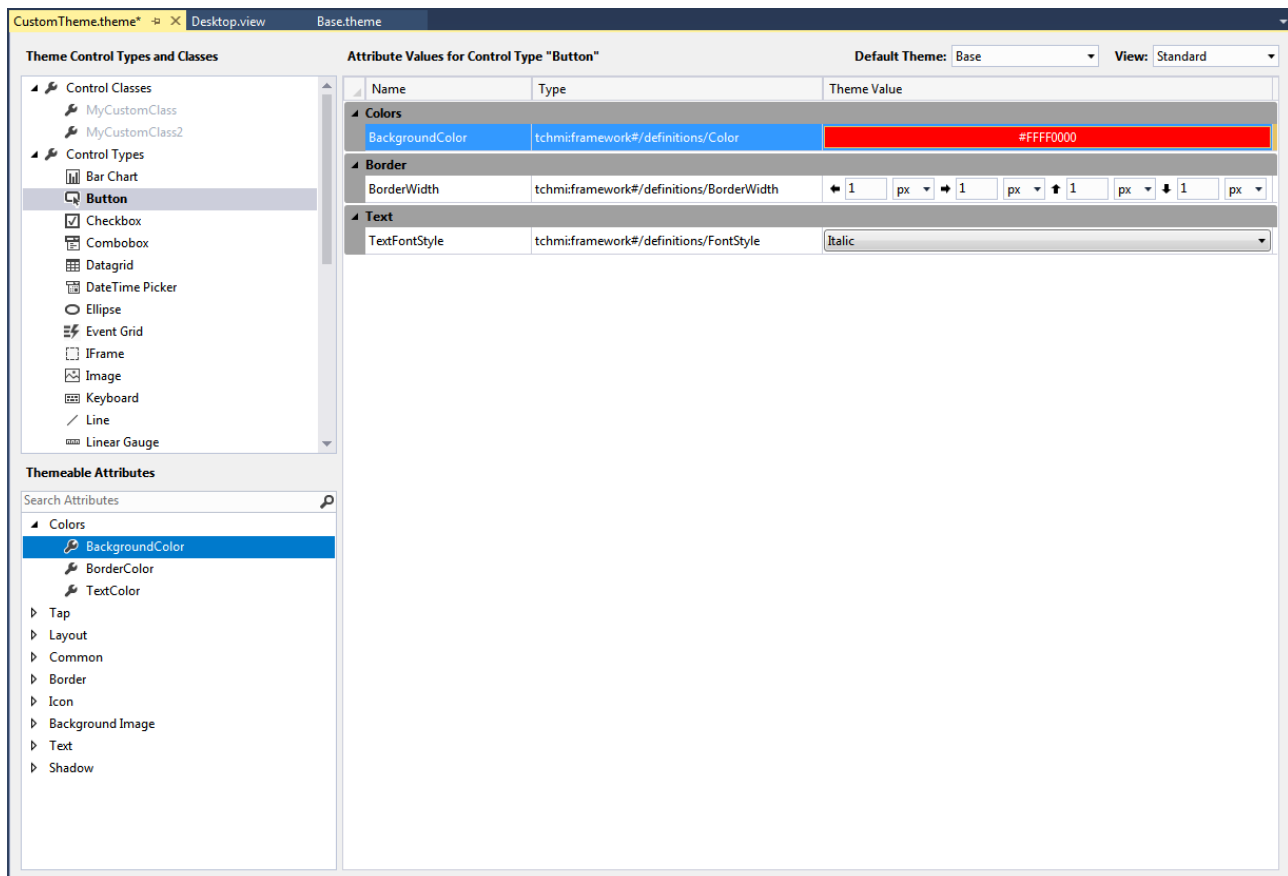
If you add several classes to a control and each class describes the same attributes, the properties of the last class in the list apply (analogous to the class selectors in CSS).



To display the attribute properties of the class theme, the attribute must not be explicitly set at the control. The control colors must be set to Theme.

## 8.2.2 Control theme

A control theme defines the properties for all instances of a control. The control theme is defined for each theme in the [theme editor](#) [► 1007] at project level.



The following steps are required to create a Control theme:

1. First, the control type must be selected in the theme editor. In the upper screenshot the control type **Button** was selected.
2. After selecting the control type, select the attribute from the respective changeable attributes.
3. Drag and drop the attribute onto the large area for the attribute properties in the center of the editor.
4. You can define any number of additional attributes for the control type.

Control types that contains defined attribute properties are shown in **bold** font. To change the attribute properties for a control type at a later stage, select the respective control type again. The existing configurations are then automatically displayed in the center of the theme editor. A property that has already been configured can be deleted by selecting it and then pressing the Delete key.



To display the attribute properties of the Control theme, the attribute must not be explicitly set at the control. The control colors must be set to Theme.

## 8.2.3 CSS theme

Beside the control theme and the class theme there is the possibility to [add \[► 1005\]](#) any number of Cascading Style Sheets files to a theme. A distinction is made between a normal CSS file and a CSS control theme file.

CSS files can also be added at project level, independent of a theme. These files define general properties such as the inclusion of fonts.

### Cascading Style Sheets file

A Cascading Style Sheets file allows the definition of any CSS properties for all elements contained in the project (standard controls, framework controls etc.). In addition, specific CSS classes can be overwritten by a control. All CSS selectors and CSS properties are available within a CSS file.



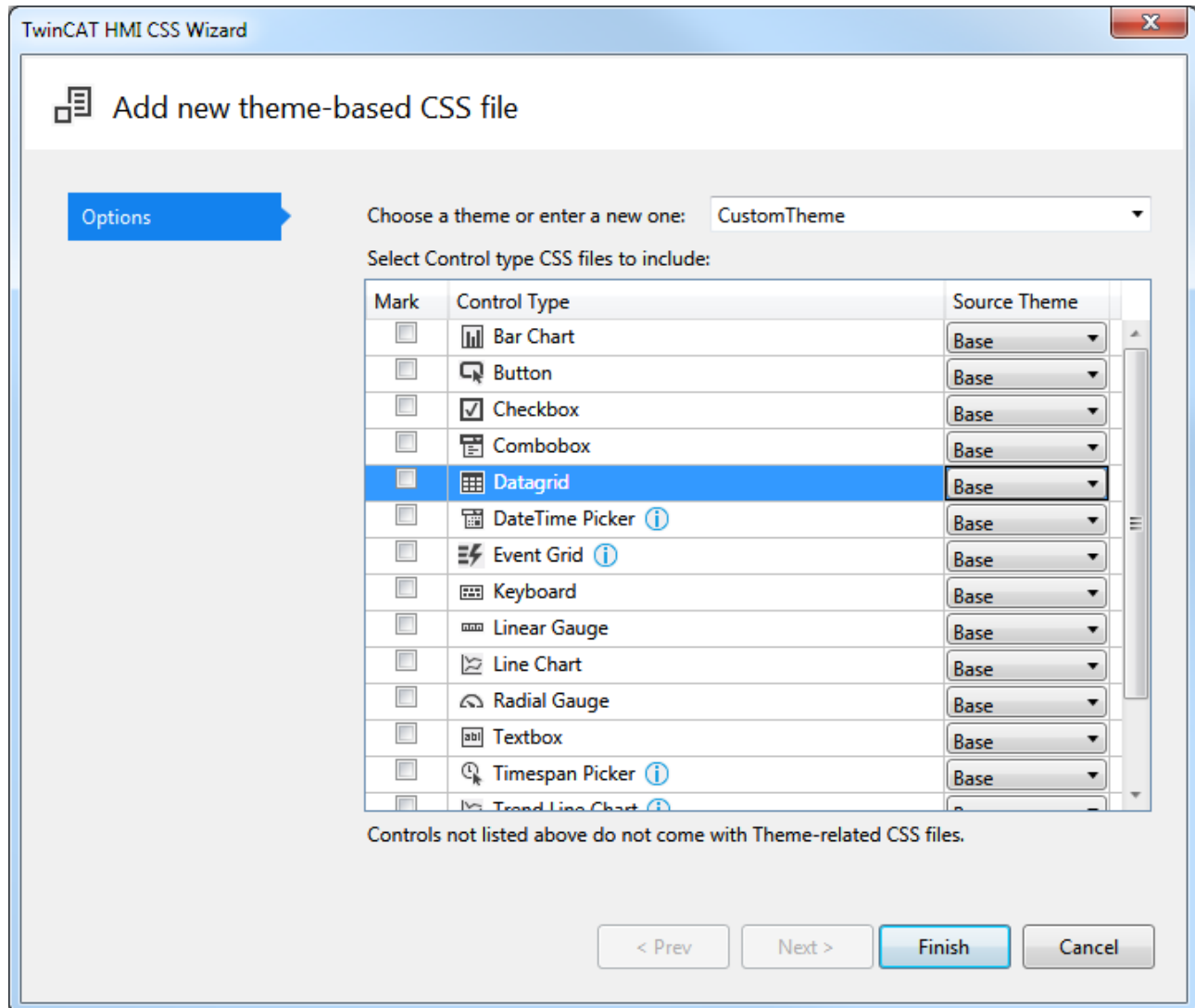
If a class theme [► 1008] is defined in the theme editor, it can be addressed in the CSS code via the class name with the prefix `tchmi-class-`. Example:

```
tchmi-class-myclassthemeclass
```

## CSS control theme file

A CSS control theme file can be used to replace specific CSS properties of the base theme. This is made possible by importing all CSS properties of the control into the CSS control theme file of the project.

In the next window you have to select the control for which you want to create a CSS control theme file.



In this dialog you can select several controls for which a CSS control theme is to be generated. You must also select from which theme the CSS control theme should be derived. If you select the Base theme, all properties defined in the Base theme of the control are displayed.

Some controls contain further TwinCAT HMI Controls, e.g. the Event Grid. This is indicated in the dialog by a note (upside down exclamation mark) after the control. If you want to overwrite all properties, you must also include the CSS files of the child controls. For more detailed information about the dependencies between the individual controls, see the documentation for each control.

The following example shows a CSS control theme file for the control `TcHmiButton` [► 175]:

```
/** Styles for the theme: Base */

/* Style for the main element */
.tchmi-button {
    /* color gradient for default view */
    background-image: linear-gradient(135deg, #eff1f3, #aeb9c2);
    /* default color for button text */
}
```

```

color: #4794da;
/* default box shadow */
box-shadow: 0px 0px 5px 0px rgba(0,0,0,0.6);
}

/* class down will be set/unset in the control on mouse/touch down */
.tchmi-button.down {
/* another color gradient */
background-image: linear-gradient(135deg, #aeb9c2, #eff1f3);
color: #000000;
box-shadow: inset 0px 0px 5px 0px rgba(0,0,0,0.6);
}

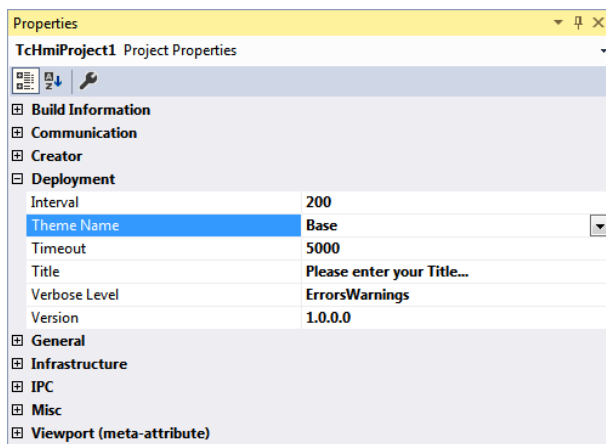
```

## 8.3 Theme switching

You can switch the entire theme in the project properties, the theme editor or during runtime using a function. Controls allow you to switch between different theme classes within a theme at runtime. Individual control attributes can be assigned a theme property at runtime if they have been overwritten previously.

### Switching in the properties

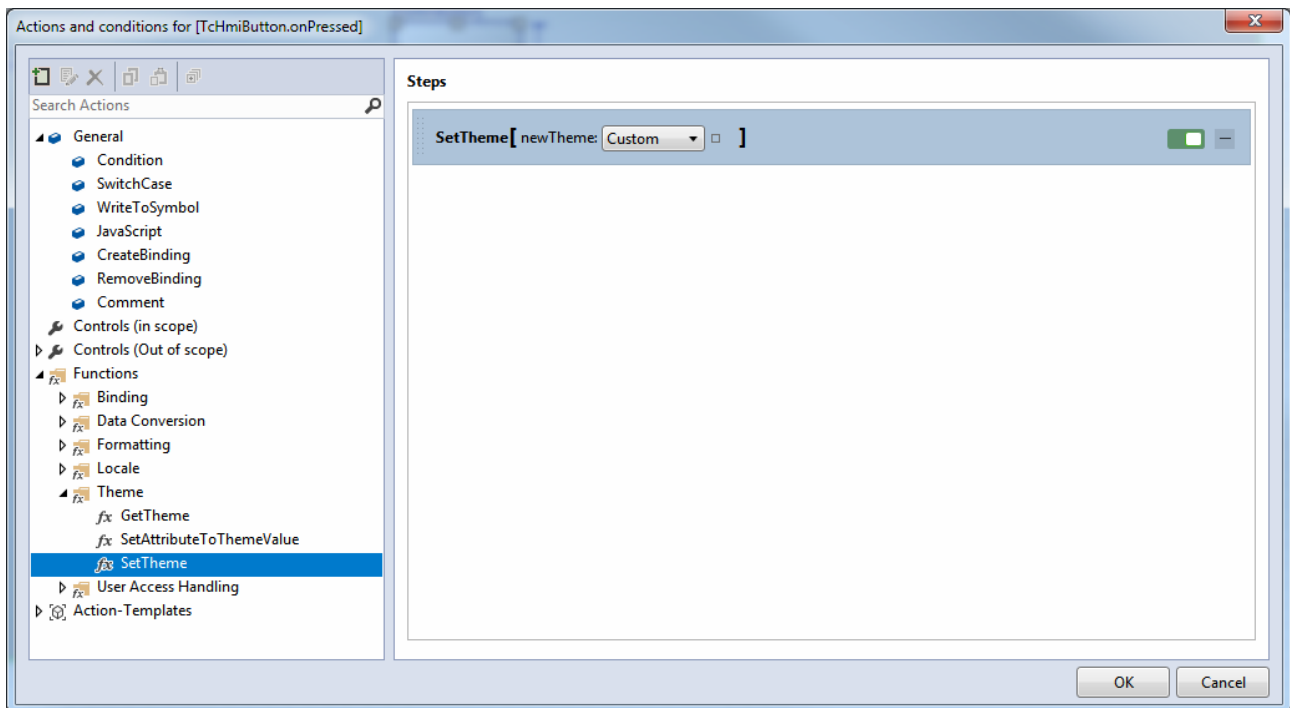
The default theme can be viewed and switched under the general project properties (click on the project node and open the Properties window).



The [theme editor](#) [► 1007] features the **Default Theme** property in the header bar at the top, irrespective of the theme. There you can set the default theme in the same way as in the project properties.

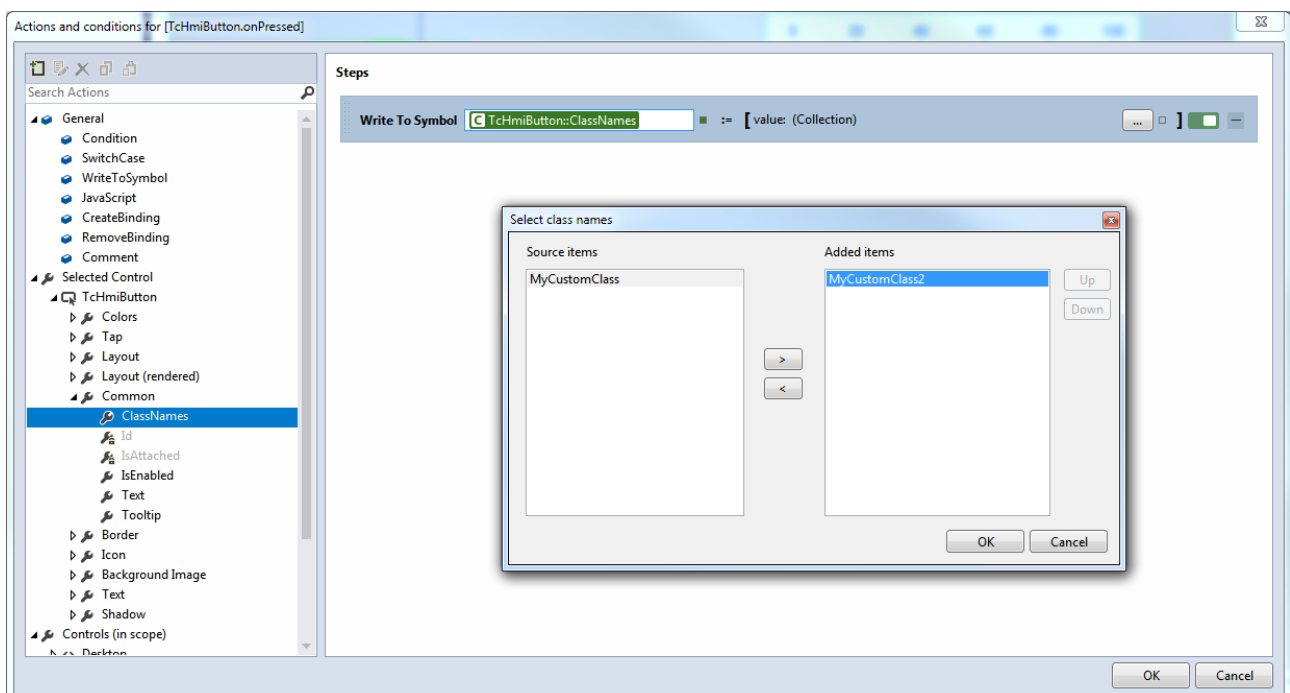
### Switching at runtime

The theme can be switched during runtime in the browser for each [client](#) [► 18]. To do this, an action must be configured, e.g. on the **.onPressed** event of a button (so that the theme is switched when a specific button is pressed). In the **Actions and Conditions** editor, the **Theme** folder contains the **SetTheme** function under functions. Use drag & drop to add this function under the actions and enter the name of the theme by selecting it in the combo box.



## Switching classes

In certain cases it is necessary to switch not the entire theme, but only the properties of a group of elements or a particular control instance during runtime. This is possible if different theme classes [► 1008] are defined for the control. During runtime the attribute ClassNames [► 759] of the control is then set again. To do this, an action must be configured at runtime, as for theme switching.

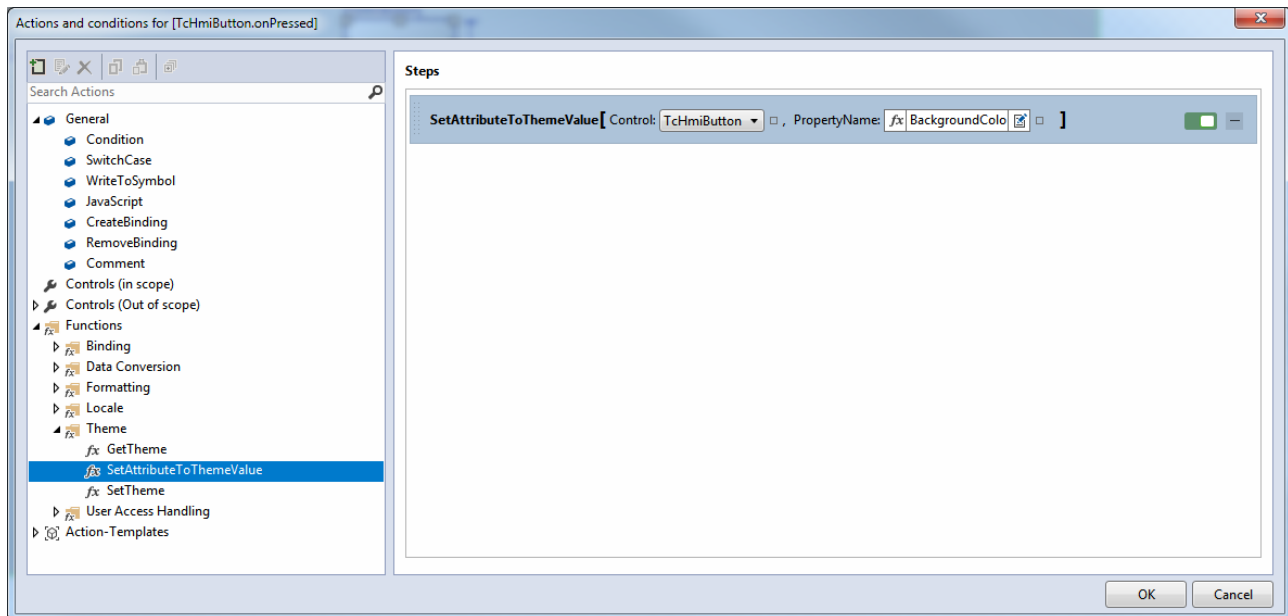


## Switching from control attributes to a theme

A control attribute, which is set by an attribute definition directly at the control (Level 1 [► 1016]), can be set to the value of the currently active theme during runtime with the SetAttributeToThemeValue [► 943] function. The value of the attribute is then changed according to the active theme each time the theme is switched.



This function is used if individual control attributes are to be overwritten and then reset to the value of a theme.

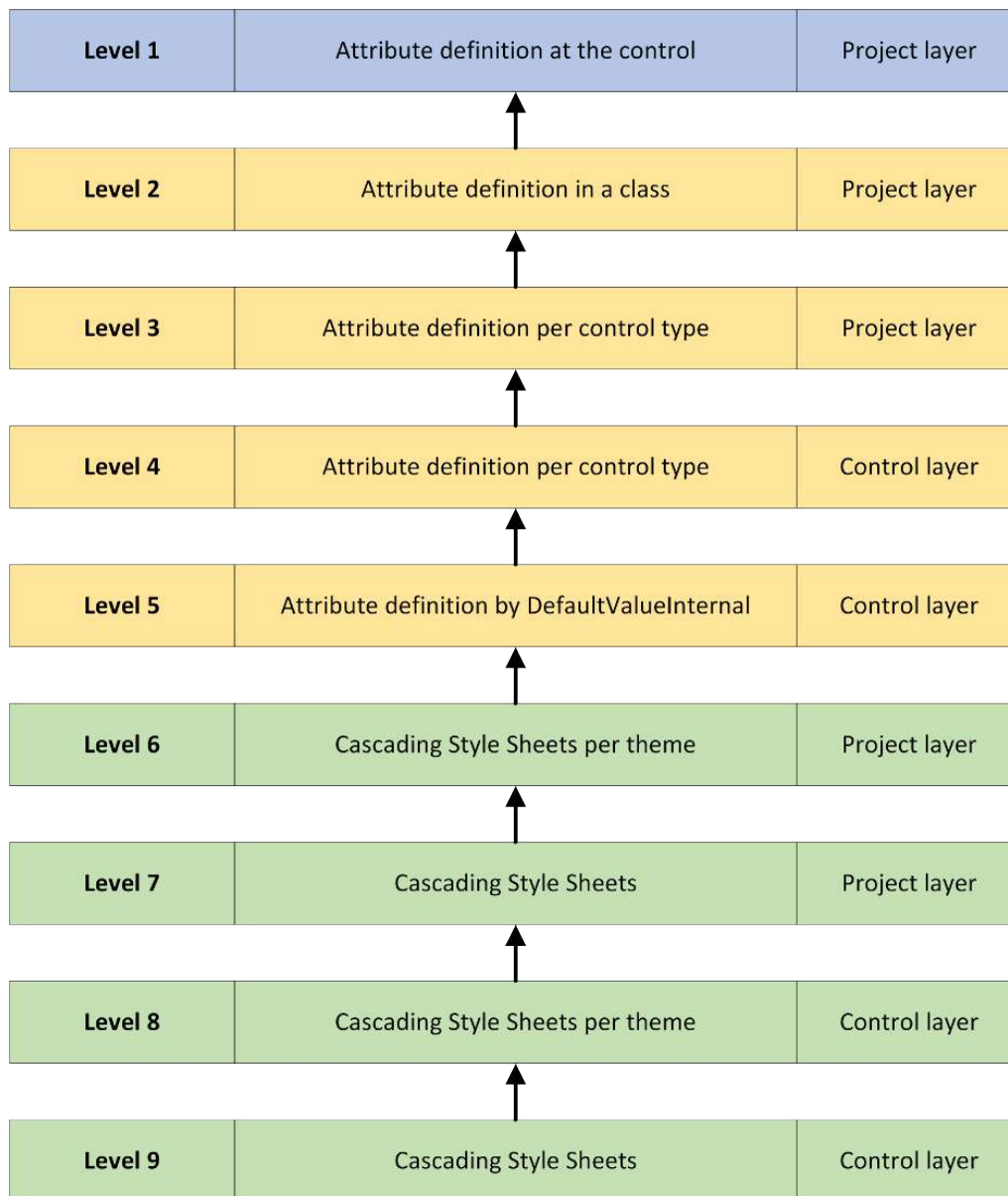


## 8.4 Concept

Theming in TwinCAT HMI distinguishes between control-based themes and class-based themes. A control theme [► 1011] specifies properties that apply to all instances of the respective control type. A class theme [► 1008] specifies properties that only apply to controls to which this class is assigned. You can assign several classes to a control.

The theme properties can be set at different levels. Cascading Style Sheets use a comparable approach in the sphere of web development, for example. The levels determine which property applies to an element if different properties are defined for an element. The properties of the higher levels are overwritten by the properties of the lower levels, if these are defined. The lowest level is level 1, which overwrites all properties of the higher levels.

The theme system has the following levels:



#### Level 1: [Attribute level](#) [► 1018]

This level describes the appearance using attribute definitions at the control. In analogy to the CSS world, this level would be a "style" attribute that is defined directly at the element.

#### Levels 2-4: [attribute levels](#) [► 1018]

Like level 1, these levels describe the appearance using attribute definitions at the control. In analogy to the CSS world, these levels would be external CSS files.

#### Level 5: [attribute levels](#) [► 1018]

Like levels 1-4, this level describes the appearance using attribute definitions at the control. If nothing is specified above levels 1-4, this `DefaultValueInternal` value applies. In the analogy to the CSS world these levels would be comparable to the font color black, for example, which applies even if nothing else has been defined.

#### Levels 6-9: [element levels](#) [► 1018]

These levels describe the appearance of a control using Cascading Style Sheets files if the appearance of a control cannot be defined using an attribute or has not been defined using an attribute.

## 8.4.1 Attribute levels

The attribute levels describe the appearance of the controls using attribute definitions.

### Level 1: Attribute definition at the control at project level

The attribute definition on a control instance overwrites all properties defined by a theme. The attribute definition at the [control](#) [► 113] is specified in the Properties window or directly in the HTML code. The attribute definition at the control follows the usual procedure for overwriting the default properties of the base theme if no other theme is defined.

This option has been available since version 1.8.

### Level 2: Attribute definition in a class at project level

The attribute definition in a [class](#) [► 1008] is specified in the theme editor of the respective theme at project level. The class is added to a control as a property so that it automatically adopts the attribute definitions of the class. The attribute definition in a class overwrites the attribute definition for a control type if both definitions contain the same attribute.

### Level 3: Attribute definition per control type at project level

The attribute definitions in a [control type](#) [► 1011] are specified in the theme editor of the respective theme at project level. The attribute definition in a control type applies to all instances of the respective control in the project and is only overwritten by level 1 or level 2.

### Level 4: Attribute definition per control type at control level

The attribute definition per [control type at control level](#) [► 1499] is specified directly in the directory of the control and is defined by the control developer. The definition is the same as in level 2 within a .theme file. For the standard controls, this property cannot be changed at the control level. The attribute definition per control type at control level is therefore only available for framework control developers.

### Level 5: Attribute definition through DefaultValueInternal at control level

The [DefaultValueInternal](#) [► 1492] defines the properties of an attribute independent of the active theme and is used if the attribute is not overwritten by a theme at the higher levels.

In addition to the attribute definitions, it is possible to configure so-called ThemedResources at levels 2 to 4. The ThemedResources are control properties that cannot be configured via the Properties window and can only be changed via the theme system. An example of this are the [knob definitions](#) [► 456] at the LinearGauge. The [definition](#) [► 1493] of ThemedResources is handled by the control developer.

## 8.4.2 Element levels

The element levels describe the appearance of the controls using Cascading Style Sheets files.

### Level 6: Cascading Style Sheets per theme at project level

At project level it is possible to add, in addition to the .theme file of the theme editor, any number of CSS files to a theme in the project (see [Introduction](#) [► 1005]).



If a control is described in the theme editor and also in a CSS file within the theme, the definitions within the theme editor (lower level) apply.

---

### Level 7: Cascading Style Sheets at project level

At the project level, any number of Cascading Style Sheets files can be defined, independent of a theme. This option has been available since **version 1.8** under the name CSS-Behind file. The definitions within the CSS file at the project level overwrite the CSS definitions at the control level and apply regardless of the theme.



Any CSS-Behind files at project level, which were already added to the project with **version 1.8**, can still be used. When using different themes, it usually makes sense to assign this file to a specific theme.

---

**Level 8:** Cascading Style Sheets per theme at control level

Any number of Cascading Style Sheets files can be added to a theme at the control level. The CSS definitions at control level describe the normal layout of all elements of a control. These properties apply if no properties of the control are overwritten by a theme at the higher levels. Each control should implement at least one theme called Base.

**Level 9:** Cascading Style Sheets at control level

At the control level, you can add any number of general Cascading Style Sheets files that describe the properties of elements, regardless of the theme.

## 9 Package management

The package management in TwinCAT HMI makes it possible to export TwinCAT HMI components such as a [Framework Control](#) [► 1476] or a [Server Extension](#) [► 1452] into a package. These packages can easily be installed in further TwinCAT HMI projects. This allows libraries to be created for HMI components to facilitate exchange within a company.

Many extensions in TwinCAT HMI are themselves delivered as a package and can optionally be installed in a TwinCAT HMI project.

### 9.1 Versions 1.8 and 1.10

The TwinCAT HMI package management available in versions 1.8 and 1.10 makes it possible to export a TwinCAT HMI extensibility project as a TwinCAT HMI package (.tchmipkg). A TwinCAT HMI Package can be installed as a reference in a TwinCAT HMI project.

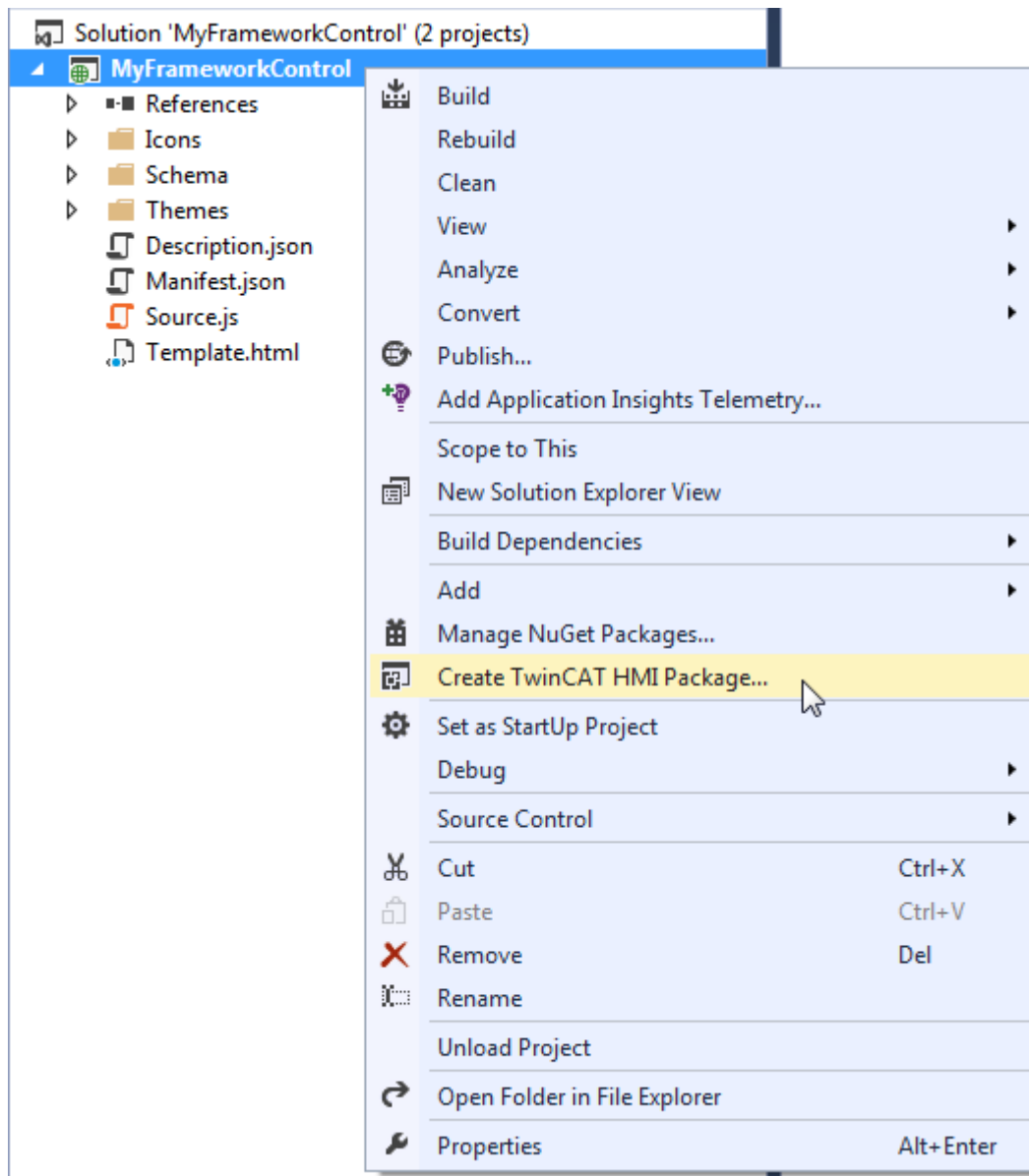


TwinCAT HMI packages are supported up to and including version 1.10. The package management in version 1.12 is based on NuGet as [package management system](#) [► 1029]. Legacy support for the TwinCAT HMI packages is also available in version 1.12.

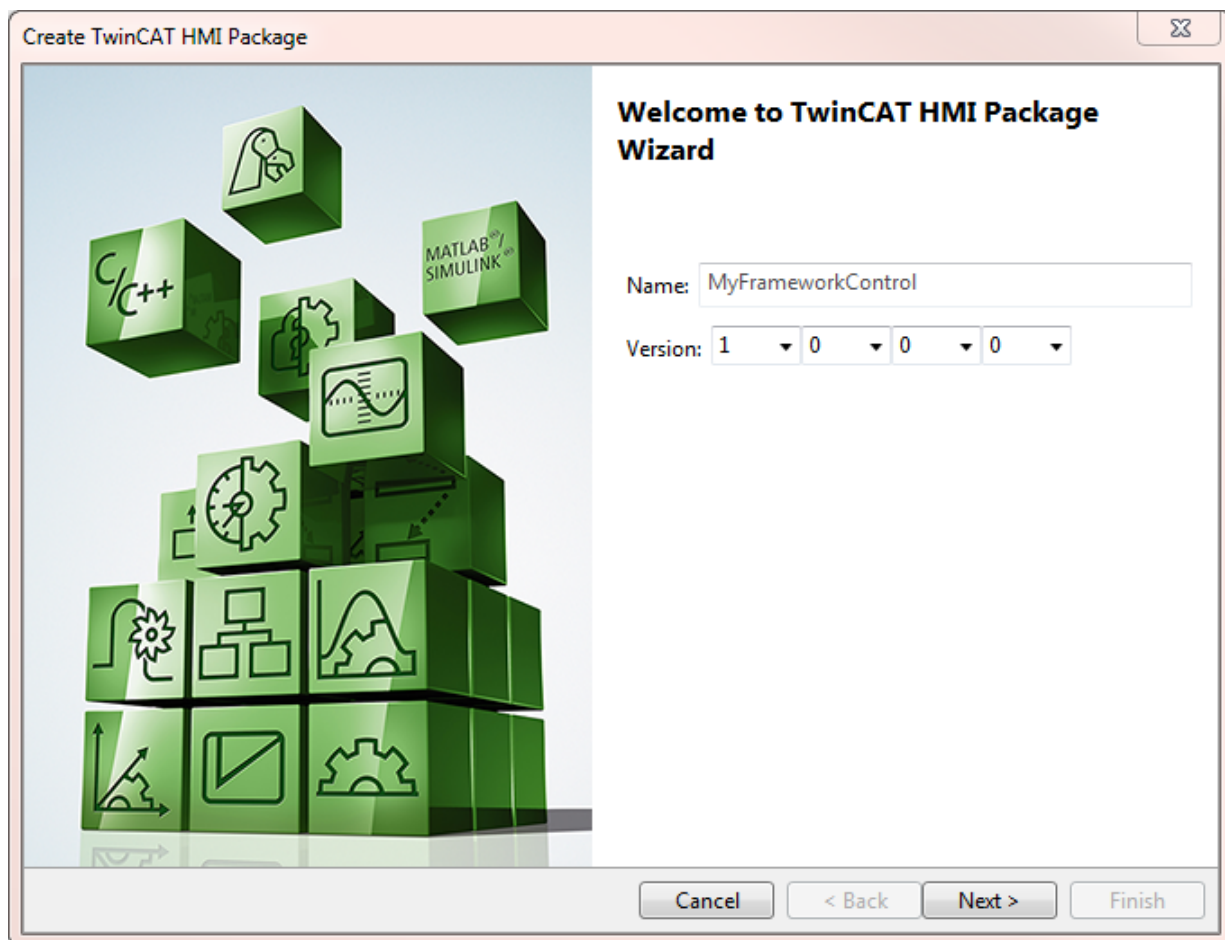


### 9.1.1 Creating a package

1. By means of a right mouse click on the uppermost node of the TwinCAT HMI extensibility project, select **Create TwinCAT HMI Package**.

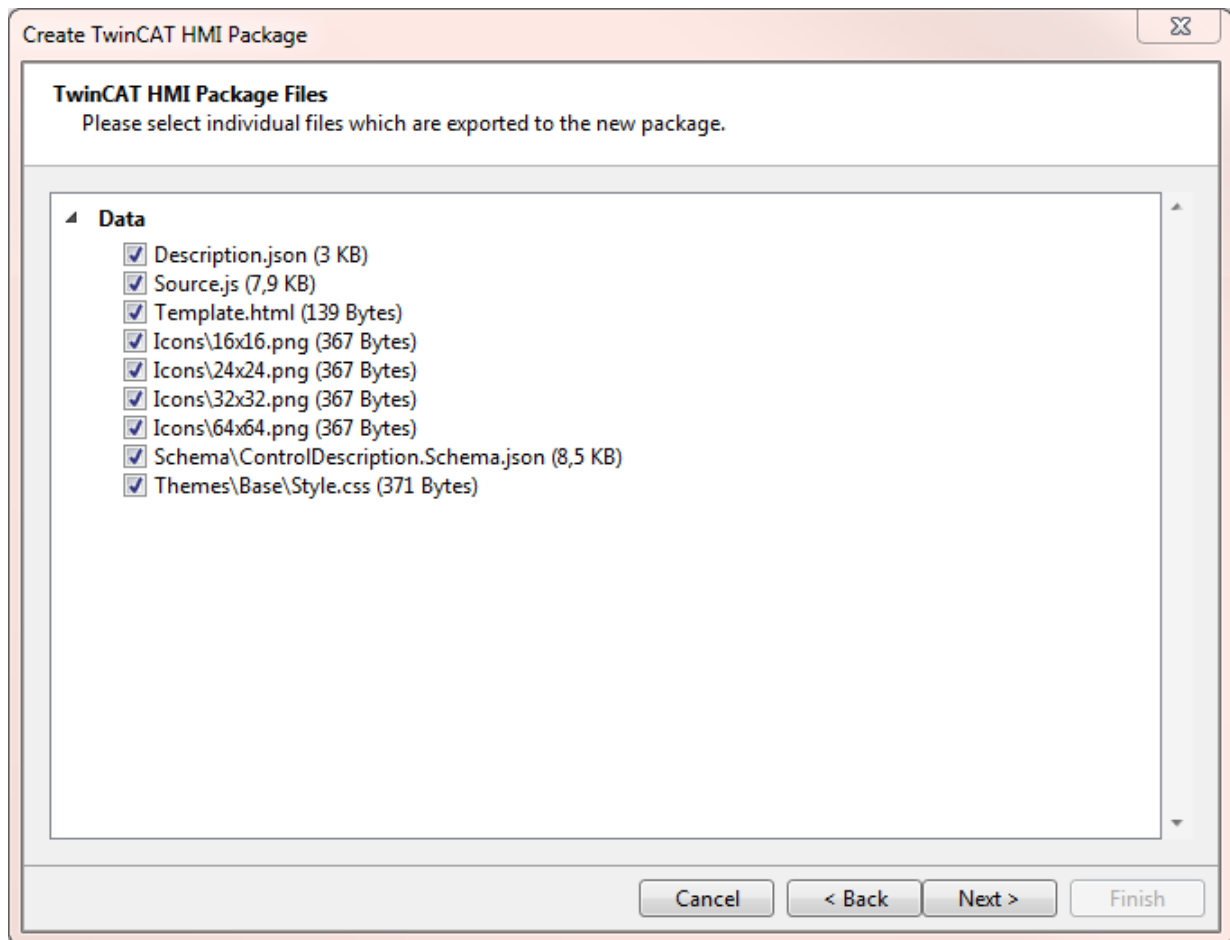


2. Assign a version. (The name is not editable as it is assigned via the project name).



3. Select **Next**.

4. Select all the project files that the package is to contain.



5. Optionally, select an **Industrial Field** for the package and specify the repository for the package. The following options are available for this:  
**Export to local repository:** Save in C:\TwinCAT\Functions\TE2000-HMI-Engineering\References

**Export to project directory:** Save in the project directory

**Export to specific directory:** Save via a specific path (selectable via **Select target directory**)

The screenshot shows a Windows-style dialog box titled "Create TwinCAT HMI Package". It has a close button in the top right corner. The main content area is divided into sections. The first section is titled "Summary" and contains the text "Please review your settings." Below this, it displays "Number of files: 9" and "Total bytes: 21,3 KB". Further down, there is a label "Industrial Field:" followed by a dropdown menu. Below the dropdown are three radio button options: "Export to local repository", "Export to project directory" (which is selected), and "c:\users\michaelschlo.beckhoff\documents\visual stud". To the right of the third option is a button labeled "Select target directory...". At the bottom of the dialog, there are four buttons: "Cancel", "< Back", "Next >", and "Finish".

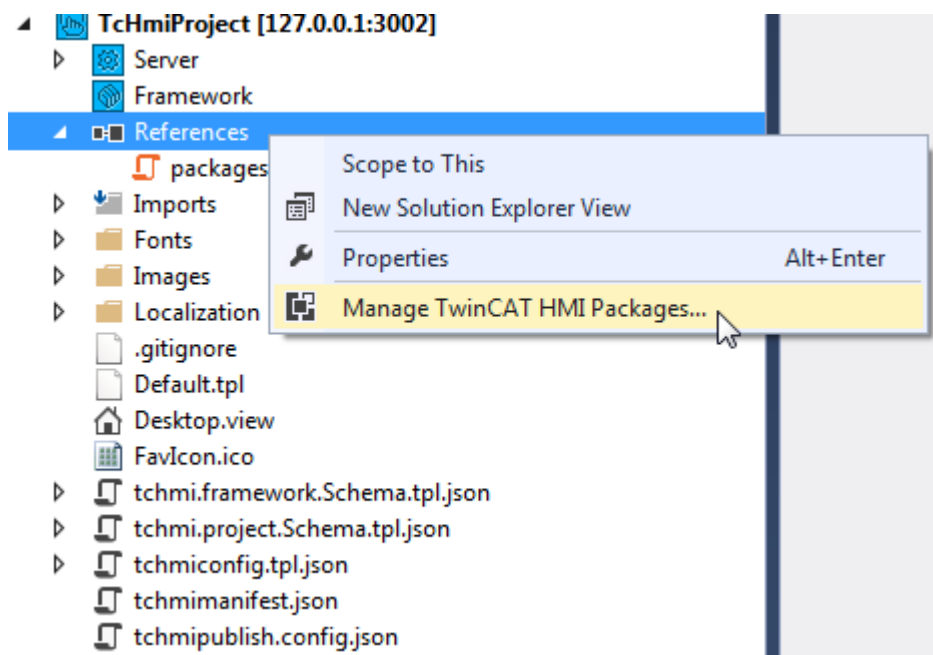
⇒ The creation of the package is concluded by actuating **Finish**.



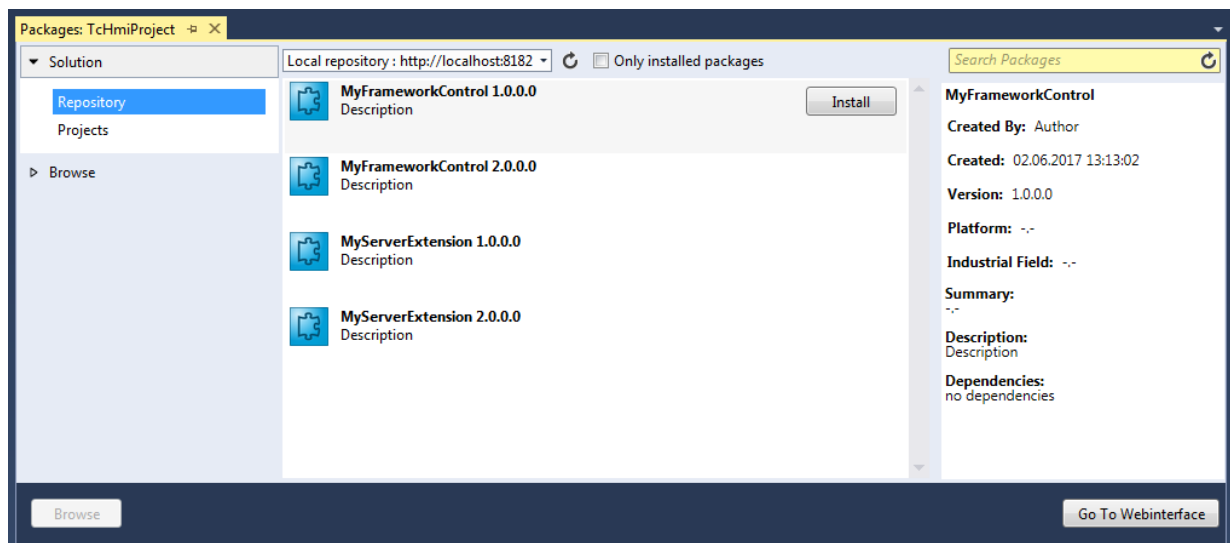
To provide the package with further metadata (e.g. author, description), edit the file Manifest.json in the associated TwinCAT HMI extensibility project.

## 9.1.2 Installing a package

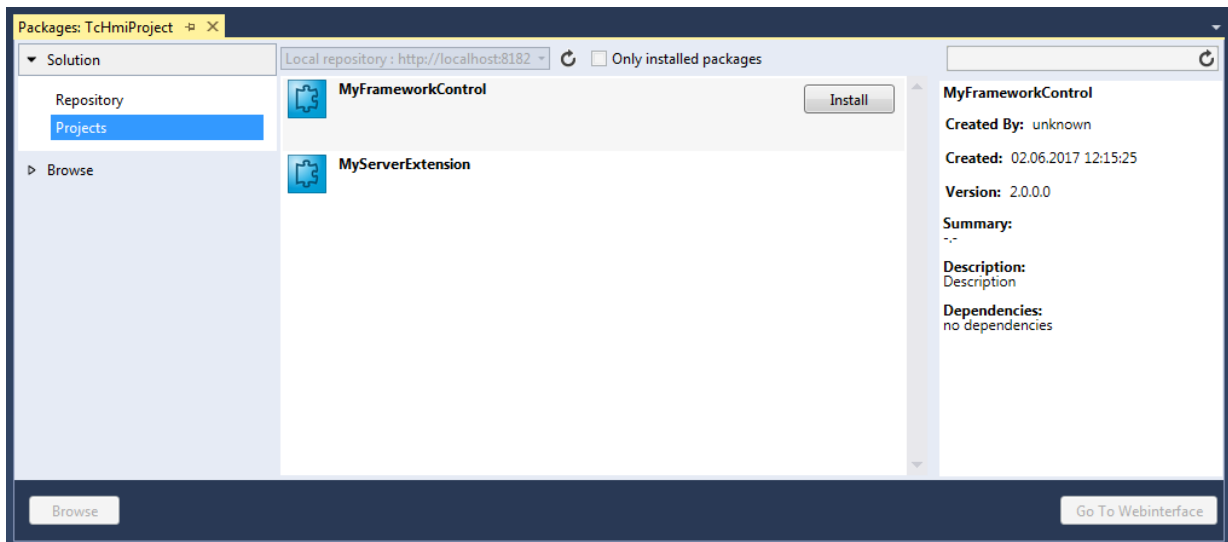
1. Open the Packages window by right-clicking on References **Manage TwinCAT HMI Packages**.



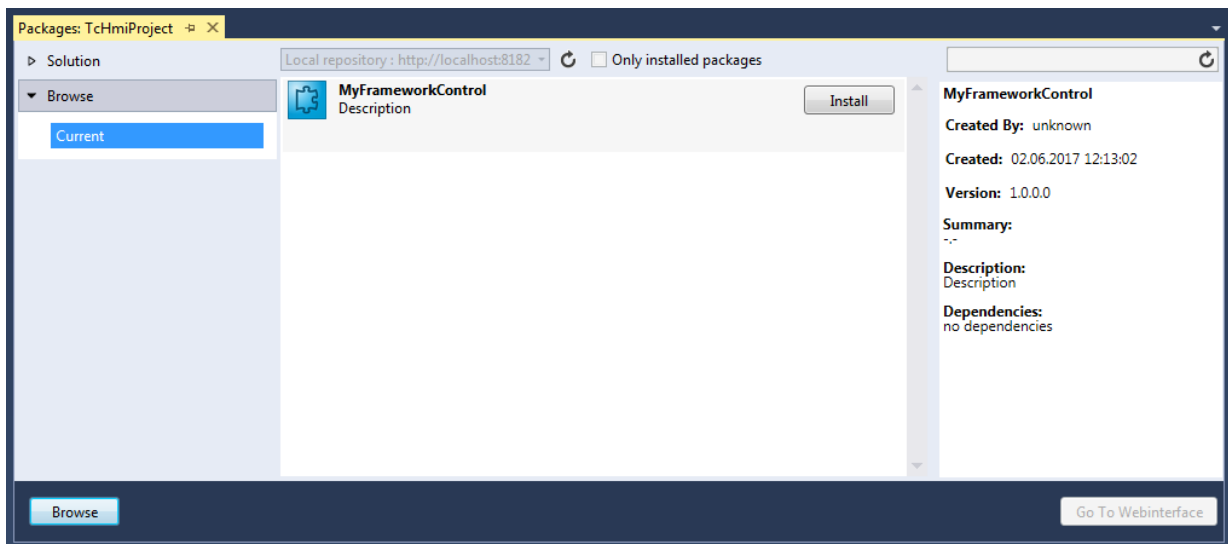
2. Select the package that you wish to install. The following sources are available for this:  
**Solution – Repository:** Local repository (under C:\TwinCAT\Functions\TE2000-HMI-Engineering\References)



**Solution – Projects:** List of packages within the Solution



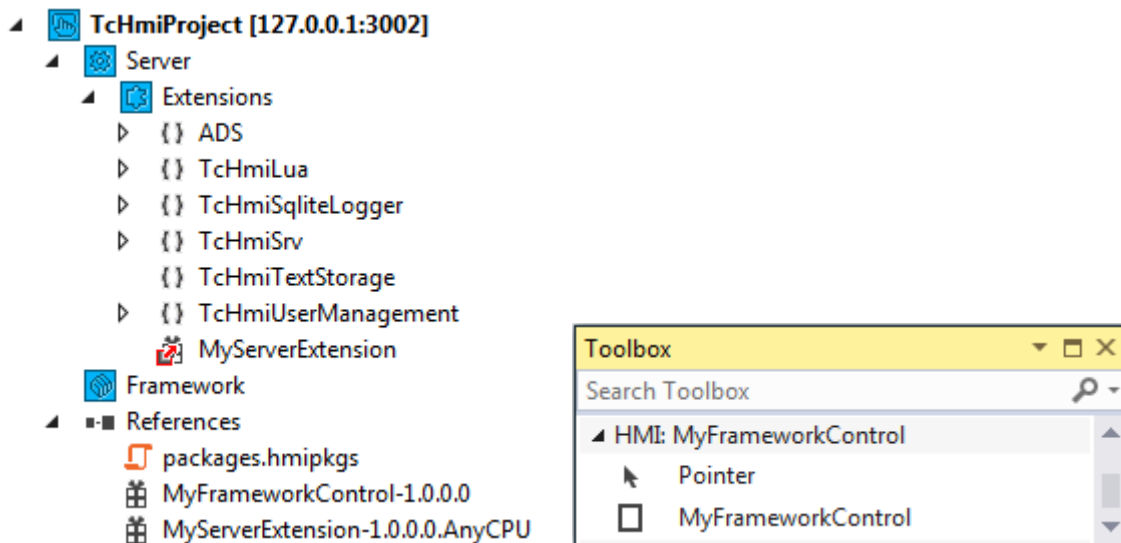
**Browse – Current:** Option to add a package by **Browse**.



3. Select **Install** to install the package.



- ⇒ The package contents are now available for use in the TwinCAT HMI project – framework controls inside the Toolbox, server extension in the Server Extensions area.



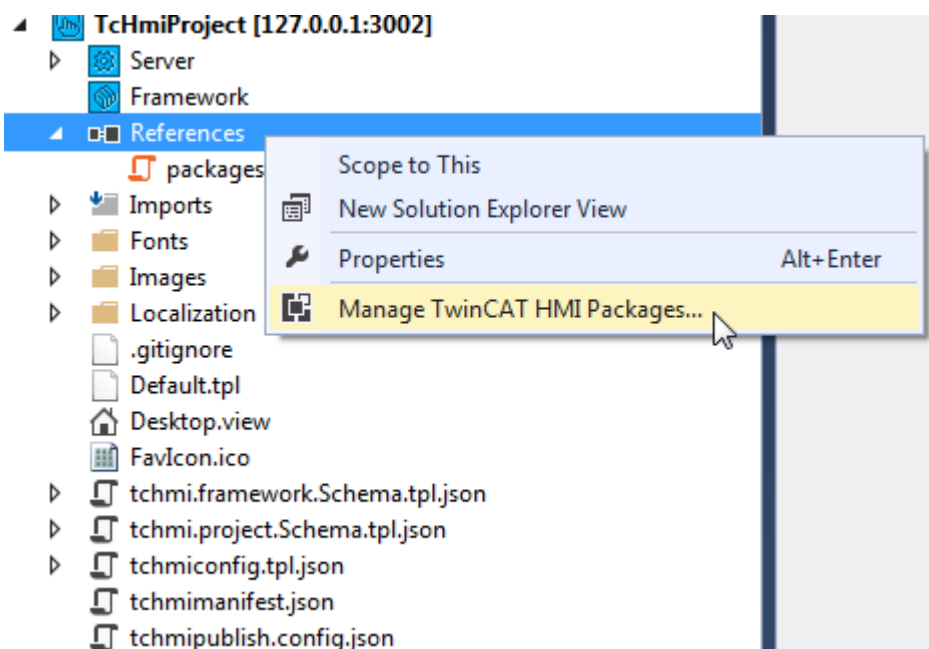
The Install option is only available in case the Package does not auto-install and another version of this package is not installed.



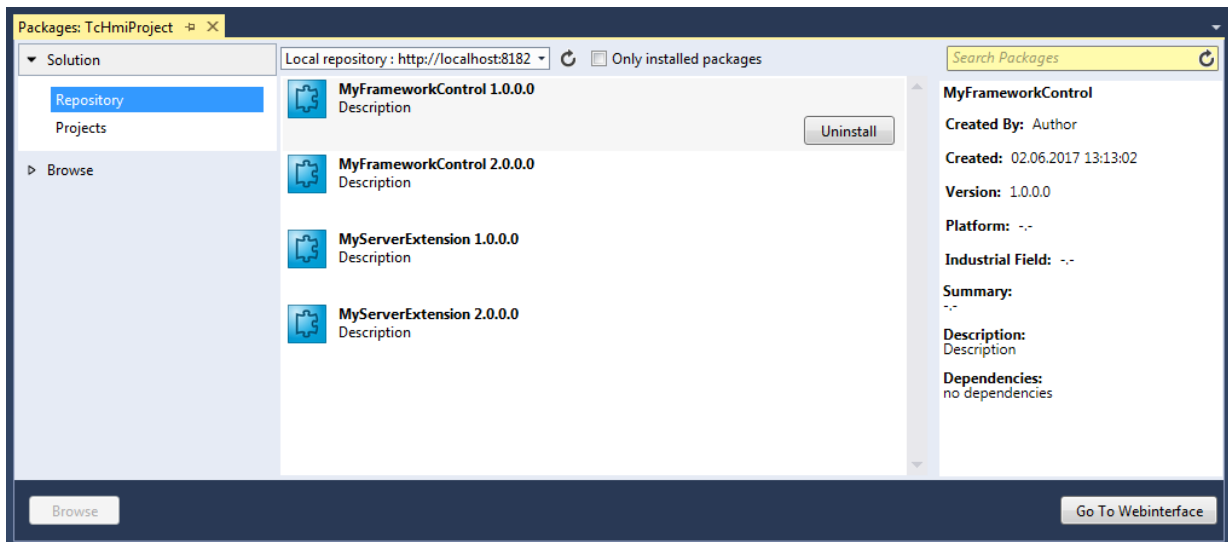
In order to be able to save a package without an associated TwinCAT HMI extensibility project in the repository, it must be saved manually in C:\TwinCAT\Functions\TE2000-HMI-Engineering\References.

### 9.1.3 Uninstalling a package

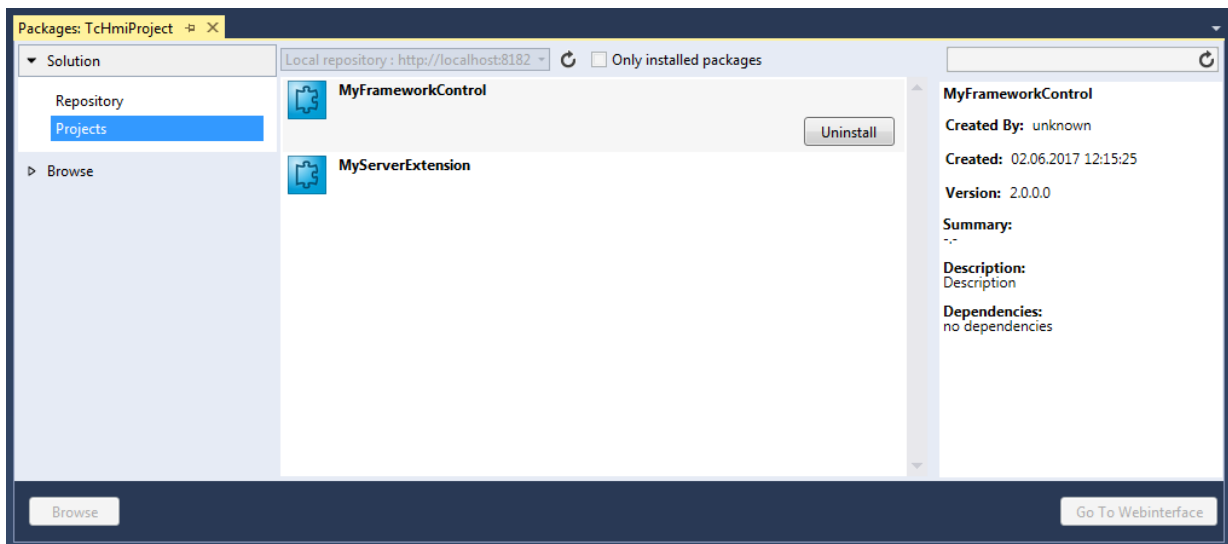
1. Open the Packages window by right-clicking on References **Manage TwinCAT HMI Packages**.



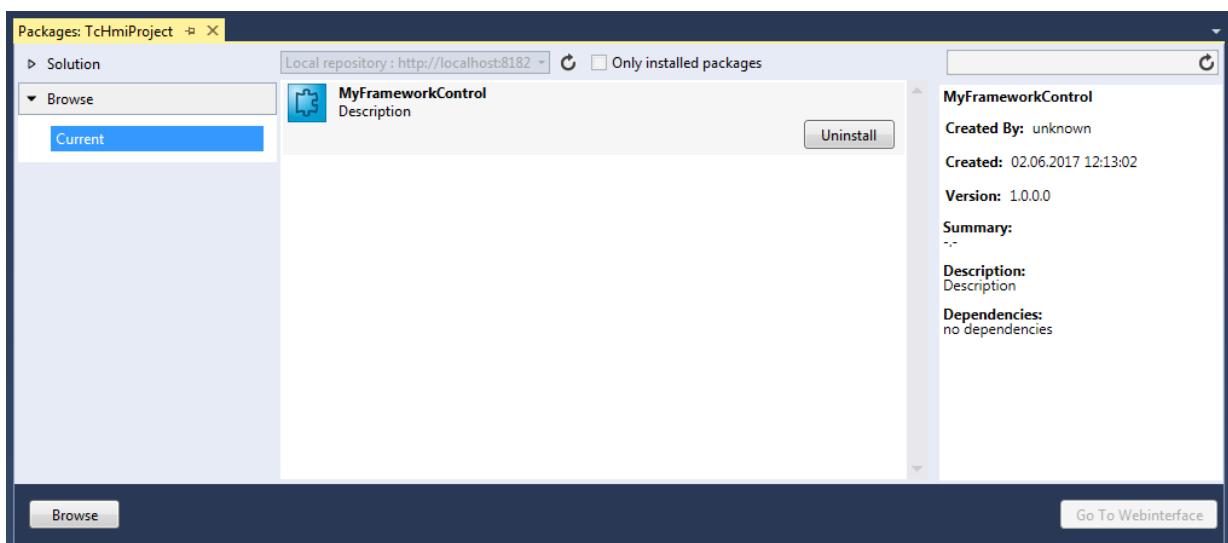
2. Select the package that you wish to uninstall. The following sources are available for this:  
**Solution – Repository:** Local repository (under C:\TwinCAT\Functions\TE2000-HMI-Engineering\References)



**Solution – Projects:** List of packages within the Solution



**Browse – Current:** List of packages that were added by **Browse**.





3. Select **Uninstall** to uninstall the package.



⇒ The package contents are no longer available for use in the TwinCAT HMI project.



If no updates of the package take place and the package is really to be removed, all references to the package used in the TwinCAT HMI project should be removed (Framework Control: remove all instances / Server Extension: remove all mapped symbols of the server extension).

### 9.1.4 Updating a package

1. [Uninstall \[► 1027\]](#) the package.
2. [Install \[► 1025\]](#) a different version of the package.



Since this is an update of the package, all references to the package used in the TwinCAT HMI project should be retained after uninstalling the package (Framework Control: all instances / Server Extension: all mapped symbols of the server extension).

## 9.2 Version 1.12

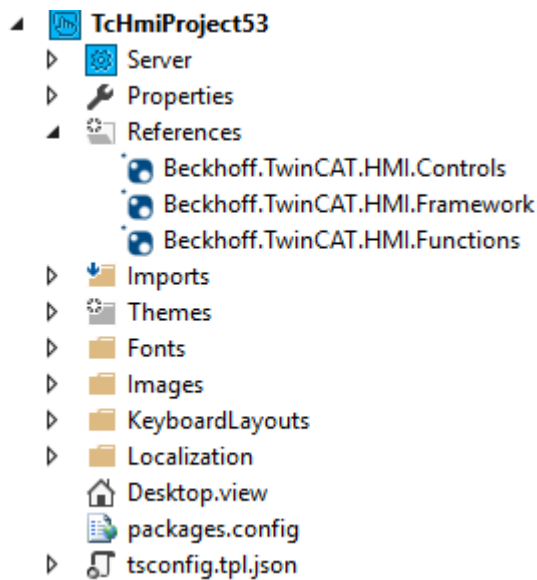
The package management in TwinCAT HMI version 1.12 is based on the NuGet package management system. This makes it possible to export the following TwinCAT HMI components into a NuGet package:

- Framework controls
- Server Extensions
- Functions (JavaScript/TypeScript)
- Code-behind files (JavaScript/TypeScript)
- Style sheets (CSS)
- Image files

Package management also enables export of several elements into one package, so that a whole control library can be contained in one NuGet package, for example. In addition, dependencies between packages can be defined such that when a package is installed, another package is automatically installed with it. NuGet also offers update management, so that users are automatically informed when a new version of a package is released and can install it directly.

The TwinCAT HMI components such as the TwinCAT HMI framework or a server extension are provided with version 1.12 as a NuGet package. The packages are provided in the public repository at [nuget.org](https://nuget.org) under the official Beckhoff account. Updates are also rolled out in this way.

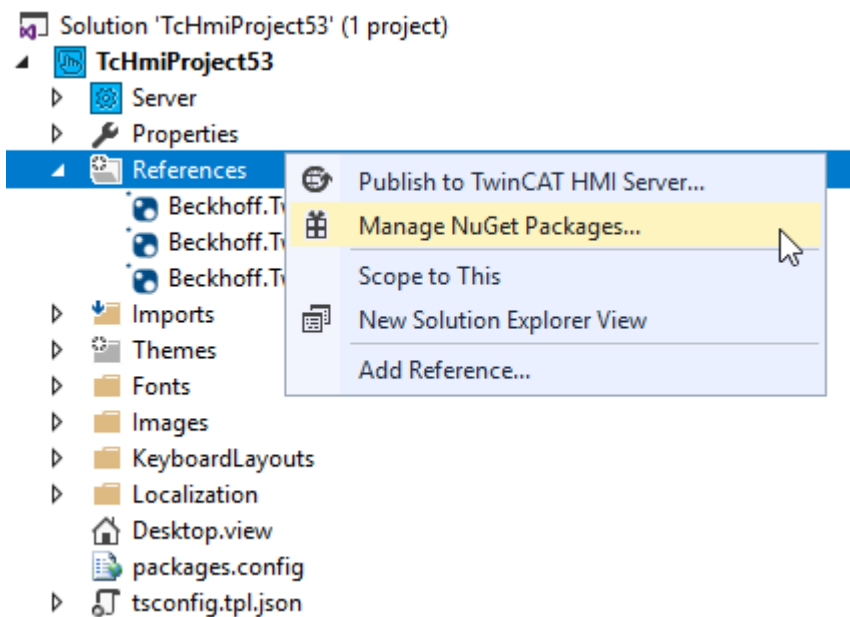
The NuGet packages installed in an HMI project can be found in the project under the **References** node. A new project contains the TwinCAT HMI Framework, the TwinCAT HMI Controls and the TwinCAT HMI Functions as standard.



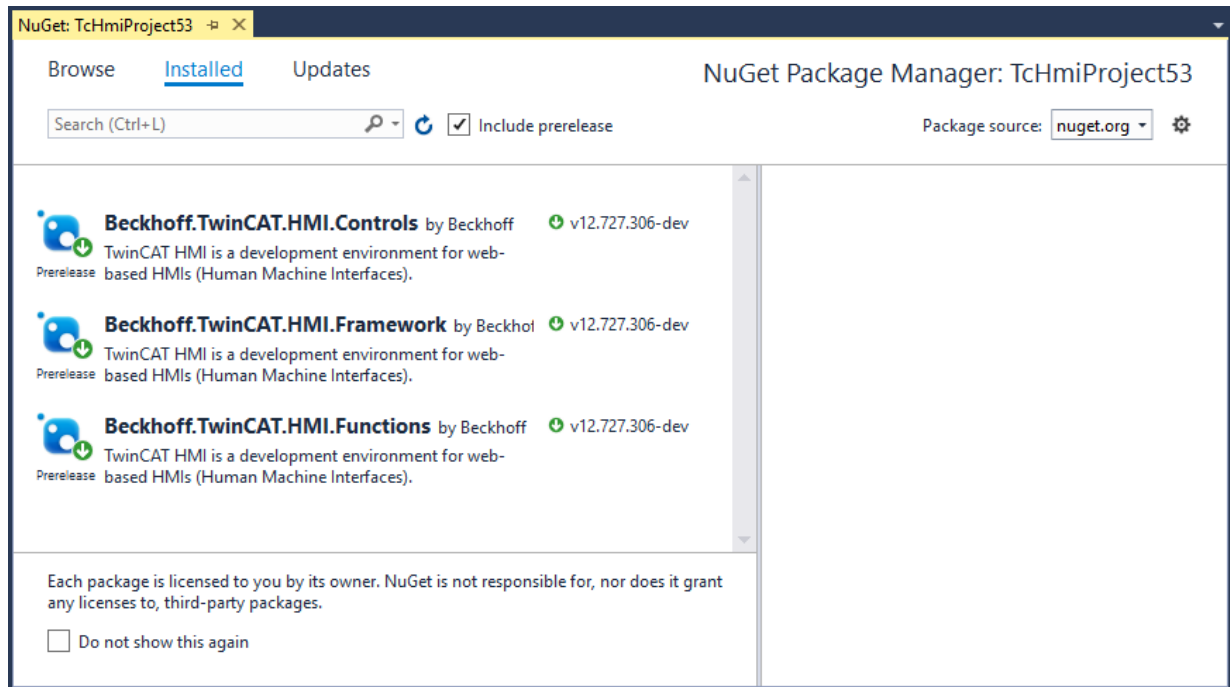
Available from version 1.12.742.0

## 9.2.1 Installing a NuGet package

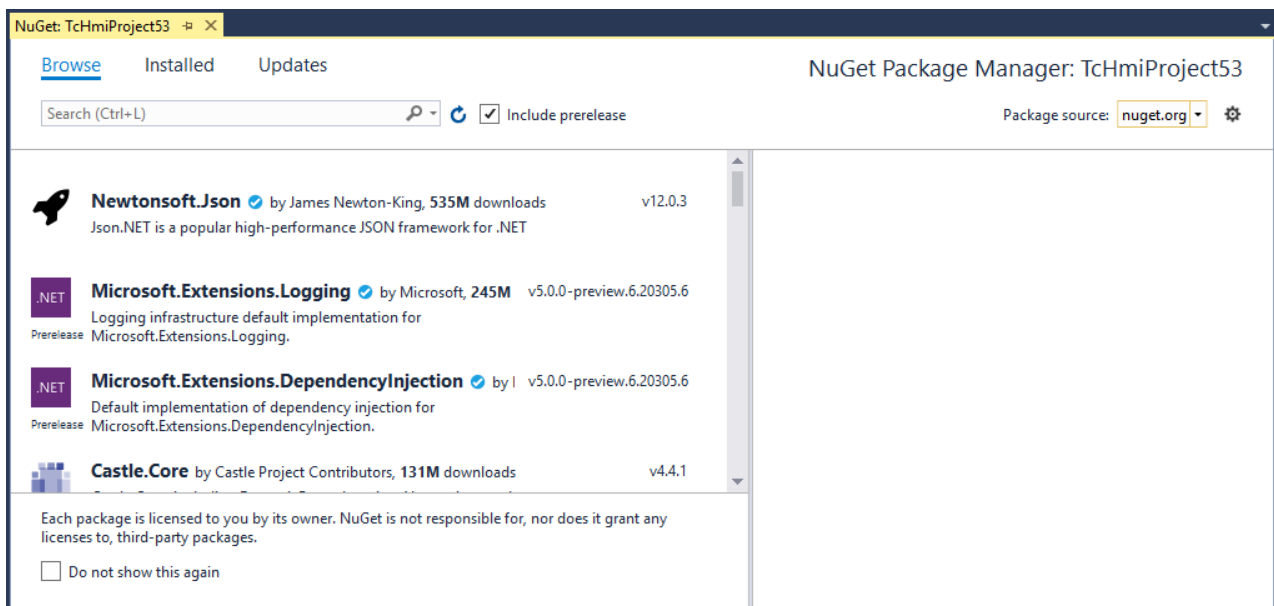
1. In the TwinCAT HMI project, right-click on the **References** node and then on the entry **Manage NuGet Packages...**:



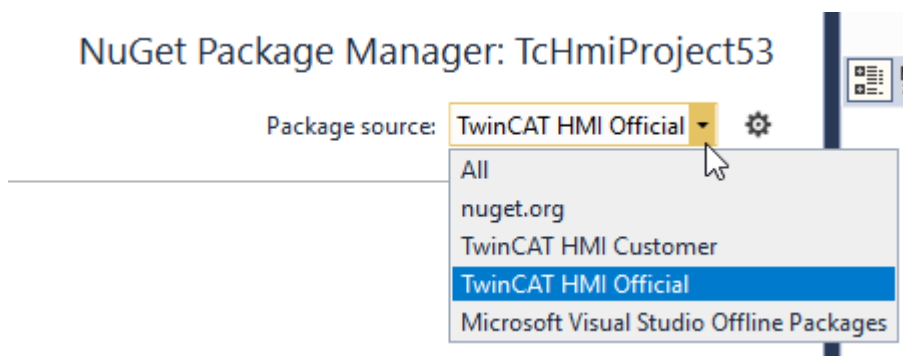
2. In the **NuGet Package Manager** you will then find an overview of the currently installed packages:



3. Switch to the **Browse** tab:

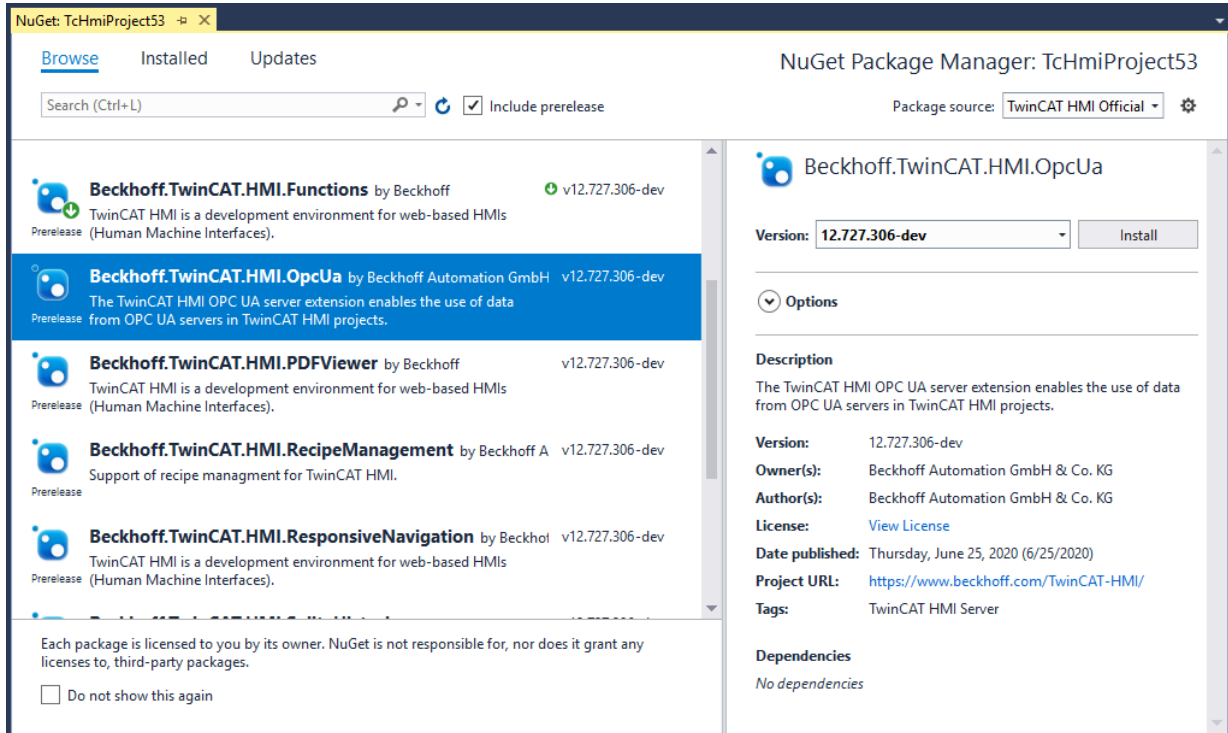


4. Make sure that the correct repository is selected in the upper right corner under **Package source**:

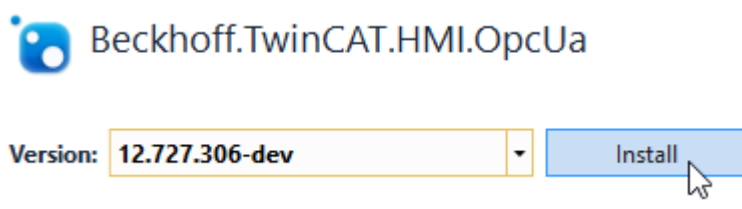


1. Repository explanations:

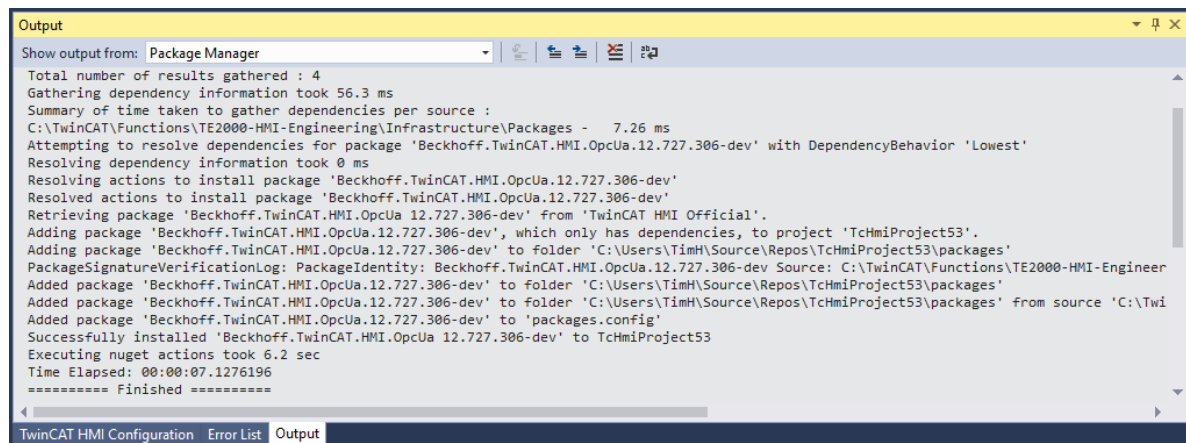
- nuget.org: Public repository that requires an internet connection. Search for **Beckhoff** or **TwinCAT HMI** here.
  - TwinCAT HMI Official: Offline repository of the TwinCAT HMI, for which no internet connection is required. The packages are stored on your system when the TE2000 setup is installed.
  - TwinCAT HMI Customer: Offline repository for self-created packages.
5. Select the package you want to install. Further information about the package is then displayed on the right.



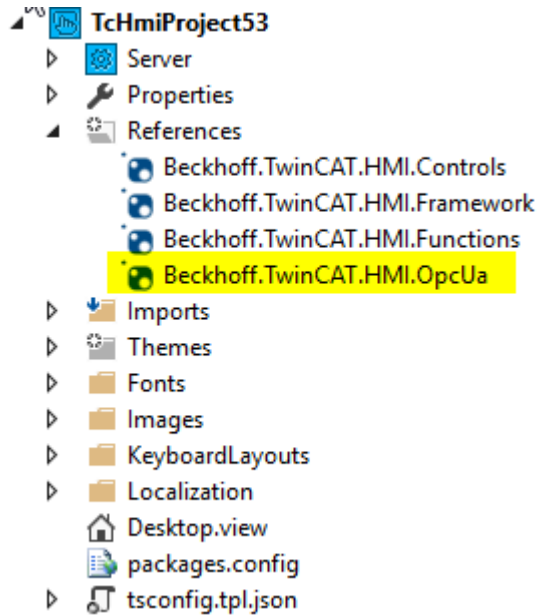
6. Select the required version on the right and click **Install**:



- ⇒ The package will now be installed. Detailed information about the installation progress can be found in **Package Manager Console**:

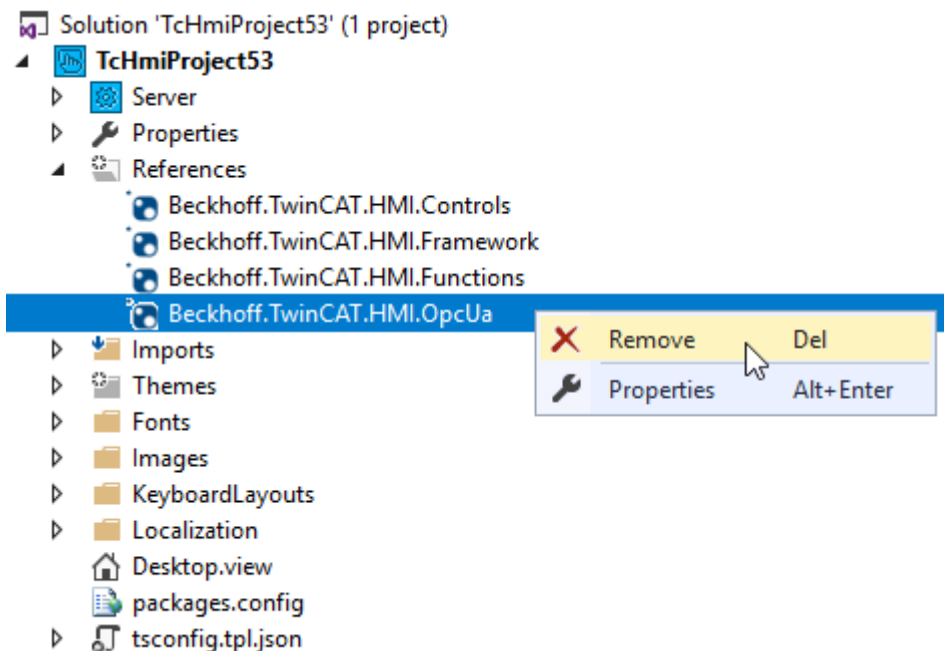


⇒ After successful installation the package can be found under the "References" node, and the corresponding functions can be used:



## 9.2.2 Uninstalling a NuGet package

1. Under the **References** node, select the package you want to remove. Then click **Remove** in the context menu:



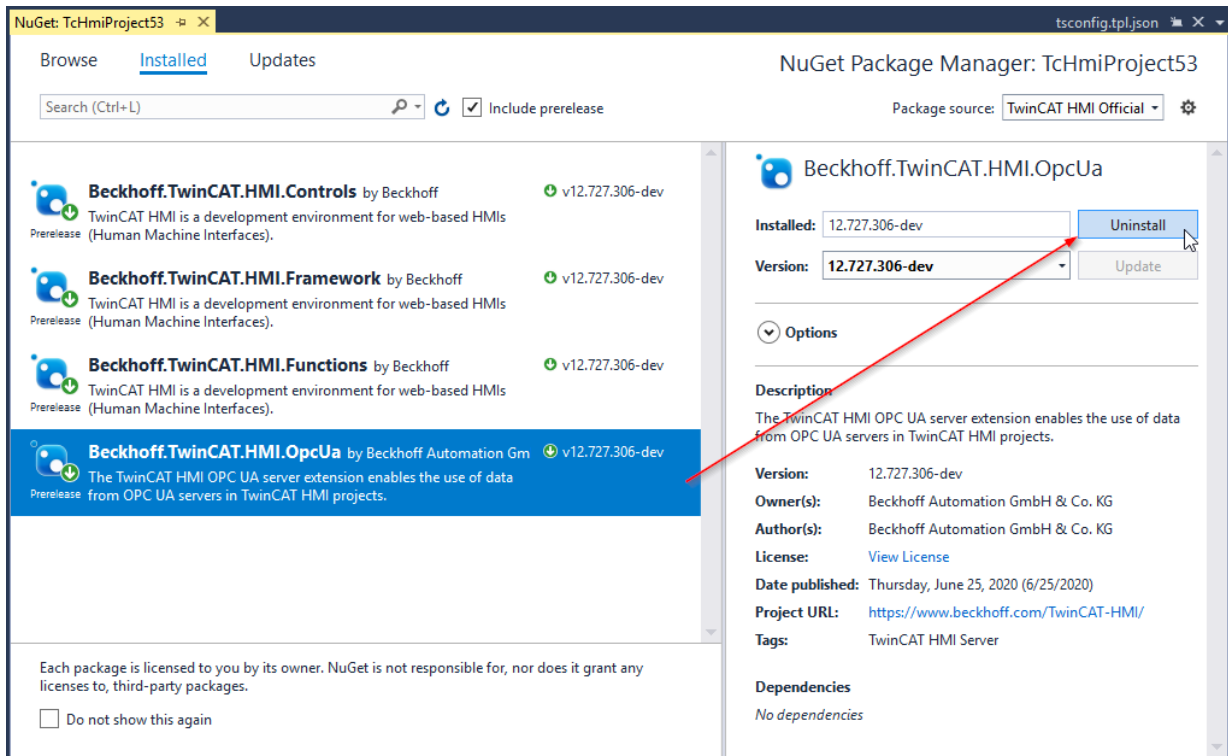
⇒ The package has been removed,

and the package functions can no longer be used. References (such as a control instance from a control in the package) are not automatically removed. If you subsequently see errors in the browser console, check that you are not trying to use any other resources from the removed package.

**Alternatively, you can remove the package using the NuGet Package Manager:**

1. Open the NuGet Package Manager by right-clicking the **References** node under **Manage NuGet Packages**.

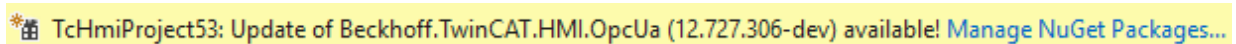
2. Select the package you want to remove and click **Uninstall**:



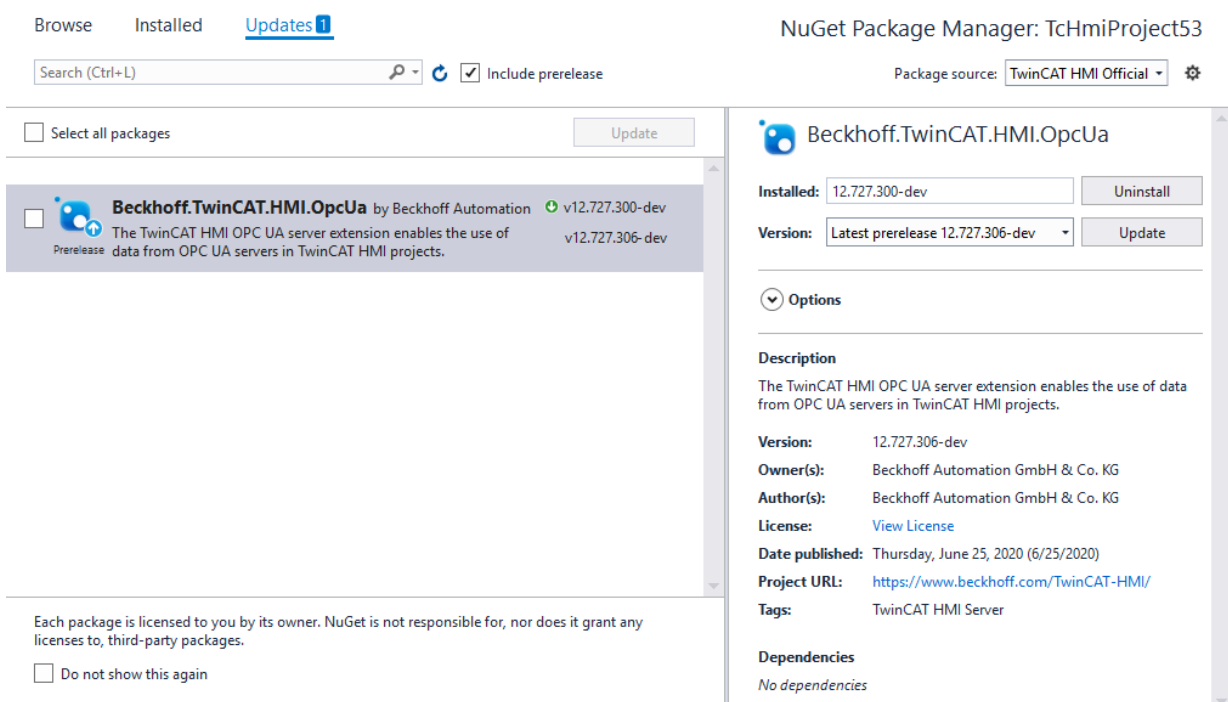
- ⇒ The package has been removed, Detailed information about the uninstall progress can be found in the **Package Manager Console**.

### 9.2.3 Updating a NuGet package

- ✓ When a newer version of an installed NuGet package is available, Visual Studio displays a yellow notification bar:



1. Click **Manage NuGet Packages...** to open the **NuGet Package Manager**. All available updates are displayed under the **Updates** tab.



2. In the next step you can choose between updating the packages individually (select a package and click Update in the right section) or updating multiple packages via **Select all packages** or by selecting several individual packages.

The screenshot displays the NuGet Package Manager interface for 'TcHmiProject53'. The 'Updates' tab is active, showing a list of packages with an update available. The package 'Beckhoff.TwinCAT.HMI.OpcUa' is highlighted, and a red arrow points to the 'Update' button. The right pane shows the package details, including the 'Update' button. A red arrow points to the 'Update' button in the right pane.

Package source: TwinCAT HMI Official

Beckhoff.TwinCAT.HMI.OpcUa

Installed: 12.727.300-dev Uninstall

Version: Latest prerelease 12.727.306-dev Update

Options

Description

The TwinCAT HMI OPC UA server extension enables the use of data from OPC UA servers in TwinCAT HMI projects.

Version: 12.727.306-dev

Owner(s): Beckhoff Automation GmbH & Co. KG

Author(s): Beckhoff Automation GmbH & Co. KG

License: [View License](#)

Date published: Thursday, June 25, 2020 (6/25/2020)

Project URL: <https://www.beckhoff.com/TwinCAT-HMI/>

Tags: TwinCAT HMI Server

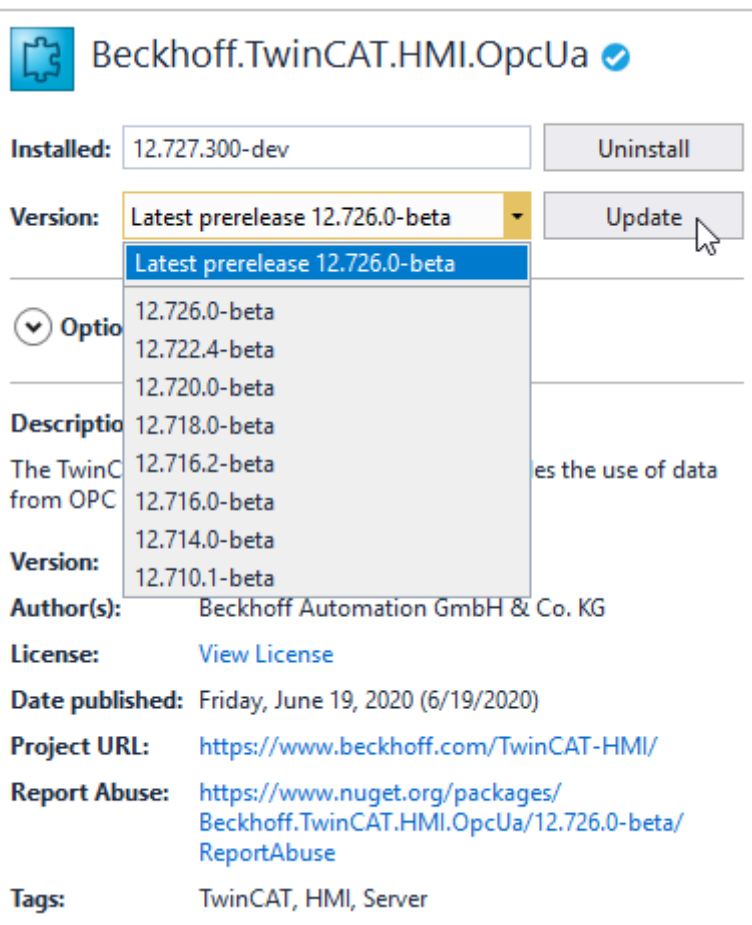
Dependencies

No dependencies

- ⇒ The NuGet packages have been updated. Information about the current progress can be found in the **Package Manager Console**.

## Downgrading NuGet packages

The Update button can also be used to downgrade NuGet packages. To do this, select the required NuGet package and the required version from the dropdown list, then click **Update**:



**Beckhoff.TwinCAT.HMI.OpcUa** ✓

**Installed:** 12.727.300-dev **Uninstall**

**Version:** Latest prerelease 12.726.0-beta **Update**

▼ **Options**

- 12.726.0-beta
- 12.722.4-beta
- 12.720.0-beta
- 12.718.0-beta
- 12.716.2-beta
- 12.716.0-beta
- 12.714.0-beta
- 12.710.1-beta

**Description:** The TwinCAT HMI Server enables the use of data from OPC UA clients.

**Author(s):** Beckhoff Automation GmbH & Co. KG

**License:** [View License](#)

**Date published:** Friday, June 19, 2020 (6/19/2020)

**Project URL:** <https://www.beckhoff.com/TwinCAT-HMI/>

**Report Abuse:** <https://www.nuget.org/packages/Beckhoff.TwinCAT.HMI.OpcUa/12.726.0-beta/ReportAbuse>

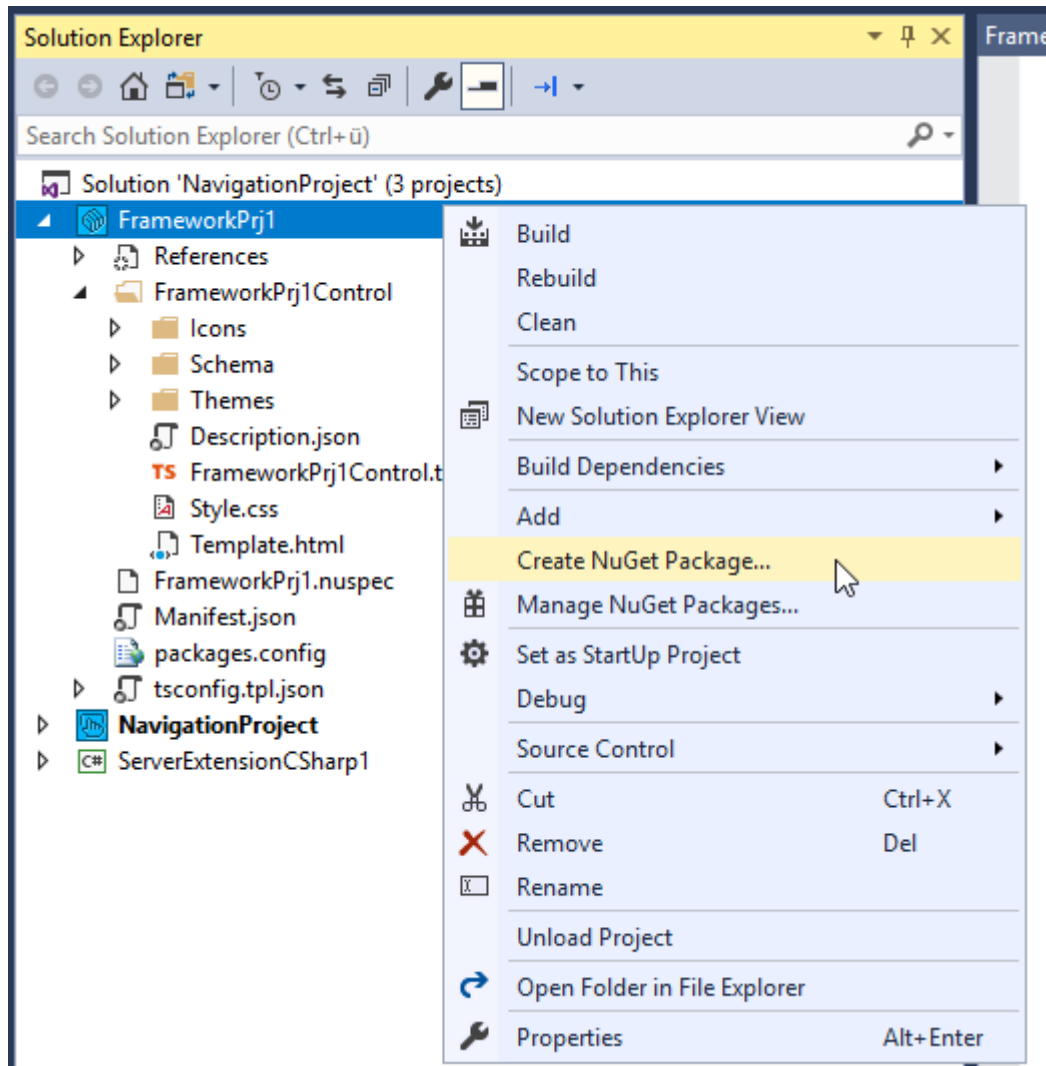
**Tags:** TwinCAT, HMI, Server

## 9.2.4 Creating a NuGet package

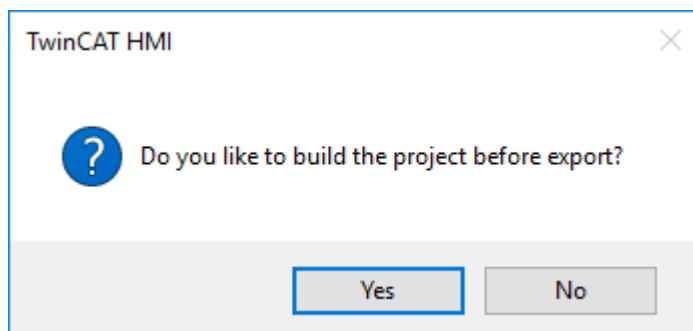
NuGet packages can be created from framework projects or from server extension projects.



1. Right-click on the respective project node and click **Create NuGet Package...** in the context menu:



2. Confirm the following query with **YES** to include the latest version of your sources in the package:

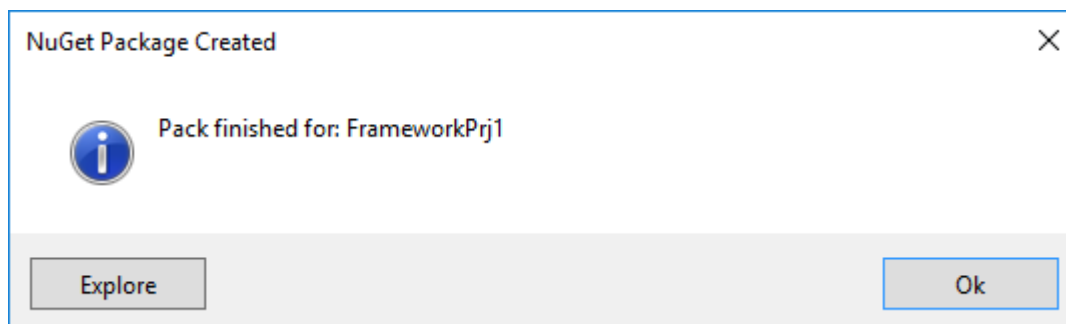


⇒ Package generation starts, and a progress bar shows the progress:



⇒ More detailed information about the current progress can be obtained from the Package Manager Console.

3. If the NuGet package is created successfully, the following message appears:



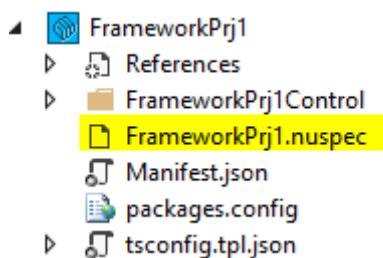
Click **Explore** to open the local repository for user-specific NuGet packages. This can be found in the installation directory under:

*C:\TwinCAT\Functions\TE2000-HMI-Engineering\References*

- ⇒ The NuGet package can now be installed in an HMI project [► 1030]. Select **TwinCAT HMI Customer** as package source.

### Specifying metadata for a NuGet package

Both project types contain a \*.nuspec file, in which meta information for the respective NuGet package is defined. The nuspec file at the top level in the respective project type:



For information on the structure of the \*.nuspec file please refer to the corresponding Microsoft documentation.

```

1 <?xml version="1.0"?>
2 <package xmlns="http://schemas.microsoft.com/packaging/2013/05/nuspec.xsd">
3   <metadata>
4     <id>FrameworkPrj1</id>
5     <version>1.0.0</version>
6     <title>FrameworkPrj1</title>
7     <authors>Admin</authors>
8     <owners>Admin</owners>
9     <licenseUrl>http://LICENSE_URL_HERE_OR_DELETE_THIS_LINE</licenseUrl>
10    <projectUrl>http://PROJECT_URL_HERE_OR_DELETE_THIS_LINE</projectUrl>
11    <iconUrl>http://ICON_URL_HERE_OR_DELETE_THIS_LINE</iconUrl>
12    <requireLicenseAcceptance>false</requireLicenseAcceptance>
13    <description>--</description>
14    <releaseNotes>Summary of changes made in this release of the package.</releaseNotes>
15    <copyright>Copyright 2020</copyright>
16    <tags>TwinCAT HMI</tags>
17    <dependencies>
18      <group targetFramework="native1.12-tchmi">
19        <dependency id="Beckhoff.TwinCAT.HMI.Framework" version="12.727.306-dev" />
20      </group>
21    </dependencies>
22  </metadata>
23  <files>
24    <file src="**\*"
25          target="runtimes\native1.12-tchmi\*"
26          exclude="**\*.nuspec;**\*.tpl.json;**\*.hmi*proj;**\~*;**\*.tmp;**\tmp*;**\*.user;**\tsconfig
27    </file>
28  </files>
29 </package>

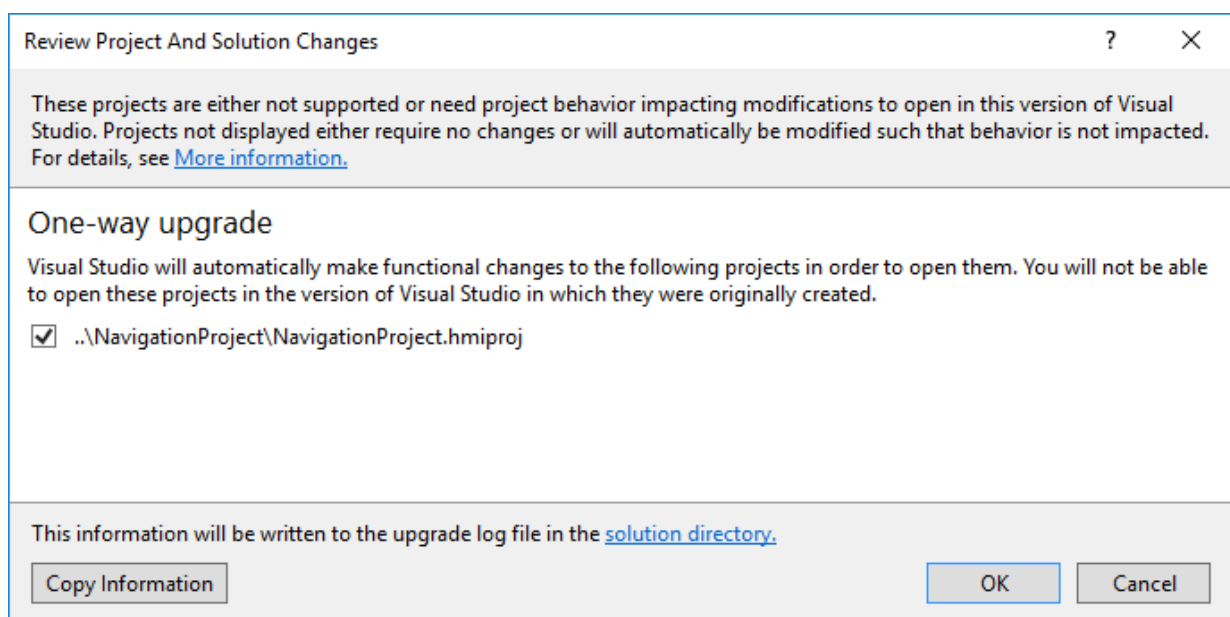
```

## 9.2.5 Support for TwinCAT HMI packages

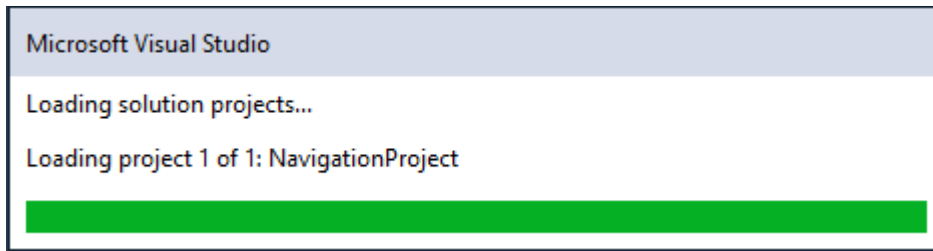
TwinCAT HMI packages from versions 1.8 and 1.10 can be used in version 1.12 as legacy NuGet packages. This makes the corresponding functionalities available in version 1.12. The legacy NuGet packages are created during the project migration.

✓ The prerequisite for this is a project in version 1.10 that contains the TwinCAT HMI packages.

1. Open the project with version 1.12.
2. Confirm the migration wizard by clicking **OK** (One-way upgrade):



3. The project is migrated and loaded.



⇒ After the migration is complete, a migration report opens in your web browser:

## Migration Report - NavigationProject

### Overview

	Project	Path	Errors	Warnings	Messages
⚠	<a href="#">NavigationProject</a>	NavigationProject\NavigationProject.hmiproj	0	<a href="#">1</a>	<a href="#">154</a>
⚠	<a href="#">Solution</a>	NavigationProject.sln	0	<a href="#">1</a>	<a href="#">2</a>

### Solution and projects

#### NavigationProject

Message

⚠ **NavigationProject\NavigationProject.hmiproj:** Important Notice: In Default.tpl the regions are renamed. MASTER changed to Designer and SLAVE changed to LiveView\_and\_Build. In case you have added any HTML-code to other regions, e.g. STANDARD, please move them manually.

ℹ [Show 154 additional messages](#)

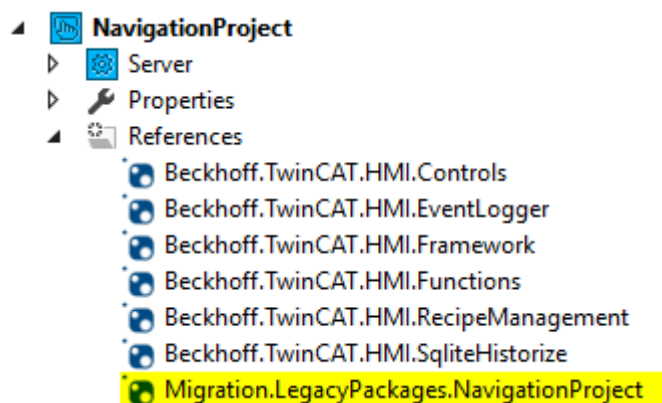
#### Solution

Message

⚠ **NavigationProject.sln:** Visual Studio needs to make non-functional changes to this project in order to enable the project to open in released versions of Visual Studio newer than Visual Studio 2010 SP1 without impacting project behavior.

ℹ [Show 2 additional messages](#)

⇒ The project now contains the NuGet legacy packages. All framework controls are put together into one package. Server extensions are added separately in a separate package.



⇒ You can now use the functionalities of the packages.

The migration wizard automatically converts TwinCAT HMI Framework Control projects to TwinCAT HMI Framework projects. You can create NuGet packages from these in version 1.12.

## 9.3 Version 1.14

The package management in TwinCAT HMI version 1.14 is based on the NuGet package management system. This makes it possible to export the following TwinCAT HMI components into a NuGet package:

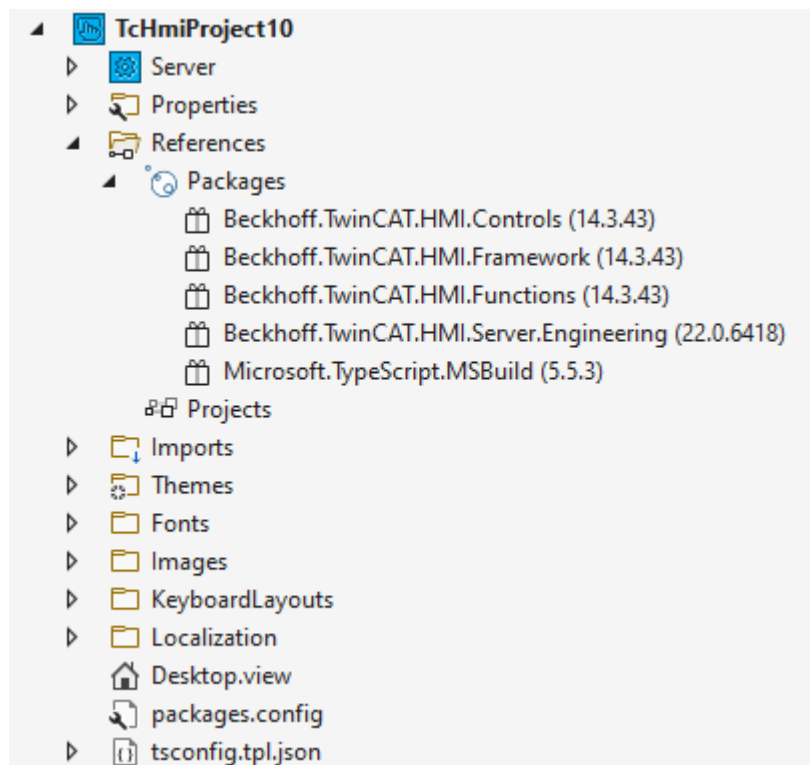
- Framework Controls
- Server Extensions
- Functions (JavaScript/TypeScript)
- Code-behind files (JavaScript/TypeScript)
- Style sheets (CSS)
- Image files

Package management also enables export of several elements into one package, so that a whole control library can be contained in one NuGet package, for example. In addition, dependencies between packages can be defined such that when a package is installed, another package is automatically installed with it. NuGet also offers update management, so that users are automatically informed when a new version of a package is released and can install it directly.

The TwinCAT HMI components such as the TwinCAT HMI Server, the TwinCAT HMI Framework or a server extension are provided as a NuGet package with version 1.14. The packages are provided in the public repository at "nuget.org" under the official Beckhoff account. Updates are also rolled out in this way.

The NuGet packages installed in an HMI project can be found in the project under the **References** node. The following packages are installed in a new project by default:

- Beckhoff.TwinCAT.HMI.Controls (Standard Controls of the TcHmi)
- Beckhoff.TwinCAT.HMI.Framework (Standard Framework of the TcHmi)
- Beckhoff.TwinCAT.HMI.Functions (Standard Functions of the TcHmi)
- Beckhoff.TwinCAT.HMI.Server.Engineering (Engineering Server of the TcHmi)
- Microsoft.TypeScript.MSBuild (Microsoft TypeScript for creating the TcHmi)



### 9.3.1 Installing a NuGet package

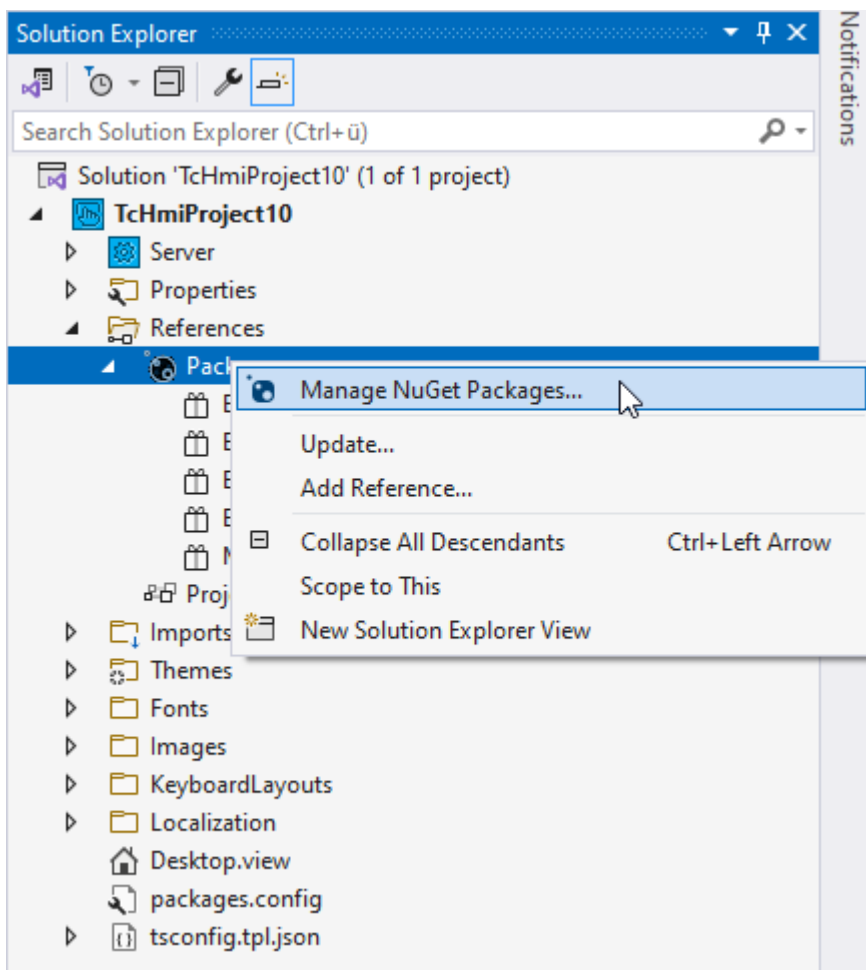
When installing NuGet packages in version 1.14, you must pay attention to the package source. With this version, all packages were installed offline in the appropriate version on the development computer. With version 1.14, packages that are not part of the default scope must be installed individually via the TwinCAT Packet Manager.

#### Installing a package with TcPkg

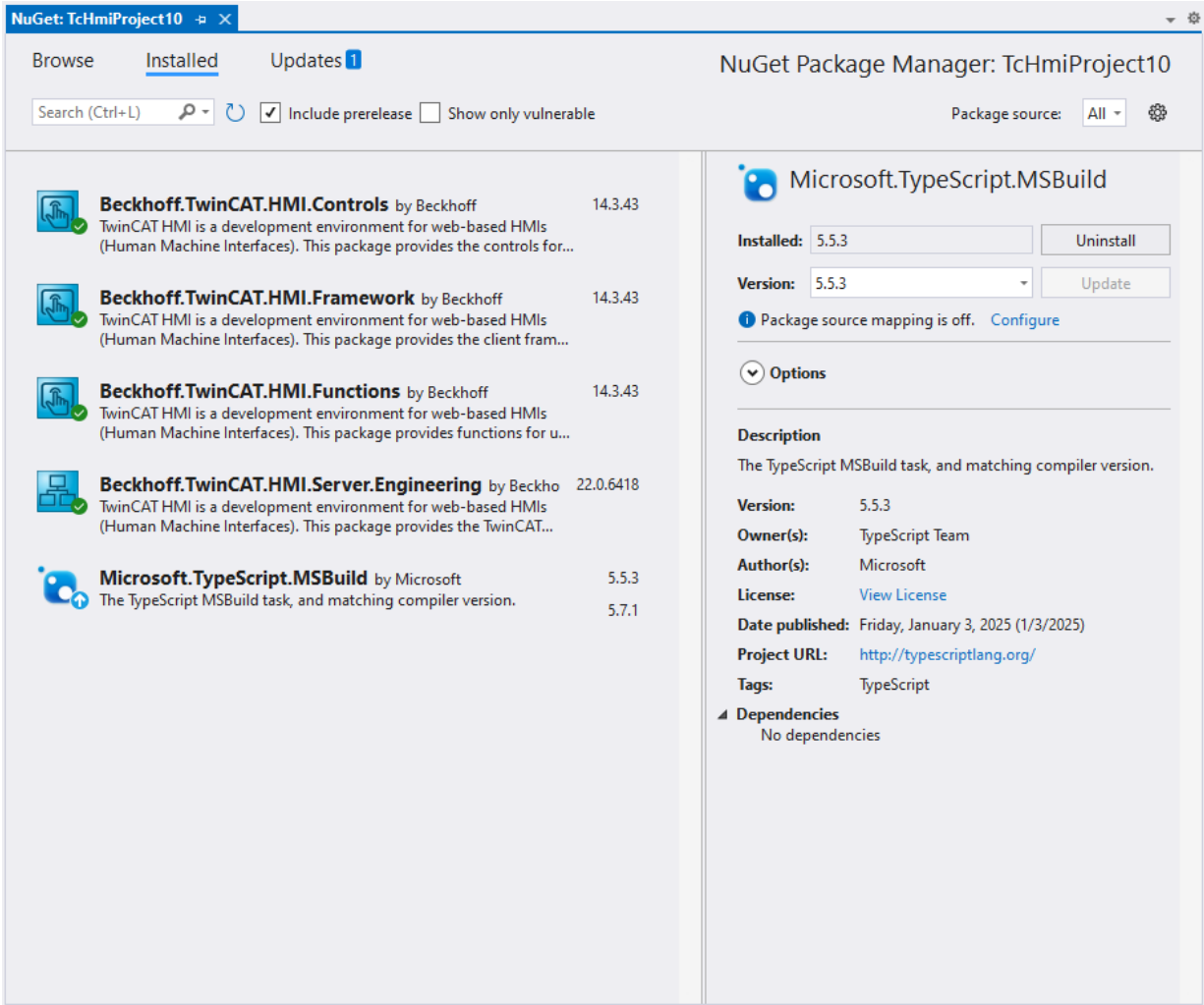
1. Close all Visual Studio instances.
  2. Start the command line or PowerShell with administrator rights.
  3. Use the command "tcpkg install <package name>" to install the latest version of the package.
- ⇒ The newly installed function is now available to you.

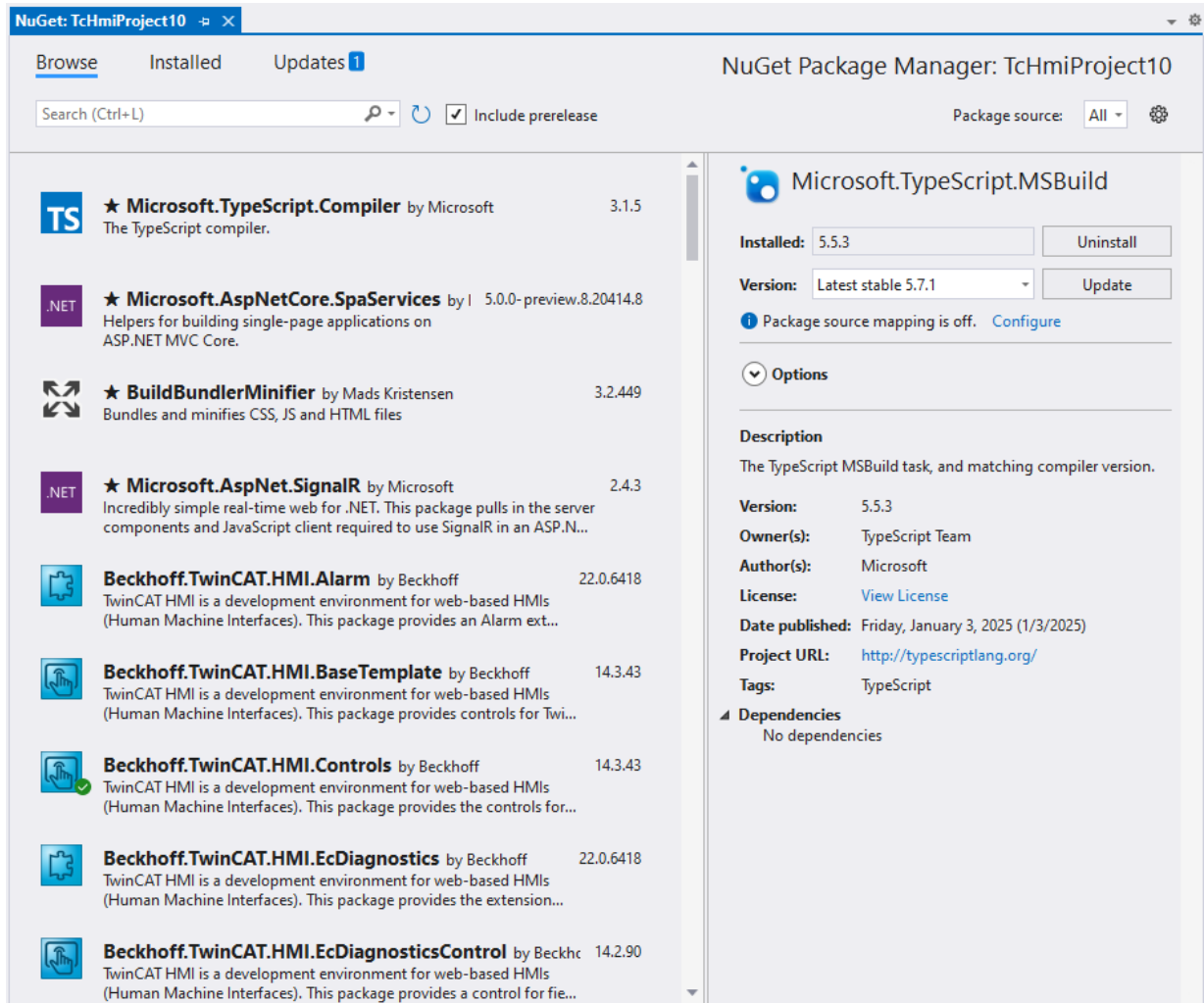
#### Installation NuGet package

1. In the TwinCAT HMI project, right-click on the **References** node and then on the entry **Manage NuGet Packages...**:

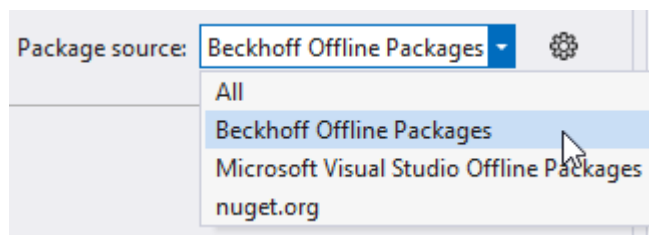


2. In the **NuGet Package Manager** you will then find an overview of the currently installed packages:



3. Switch to the **Browse** tab:

⇒ Make sure that the correct repository is selected at the top right under **Package source**:



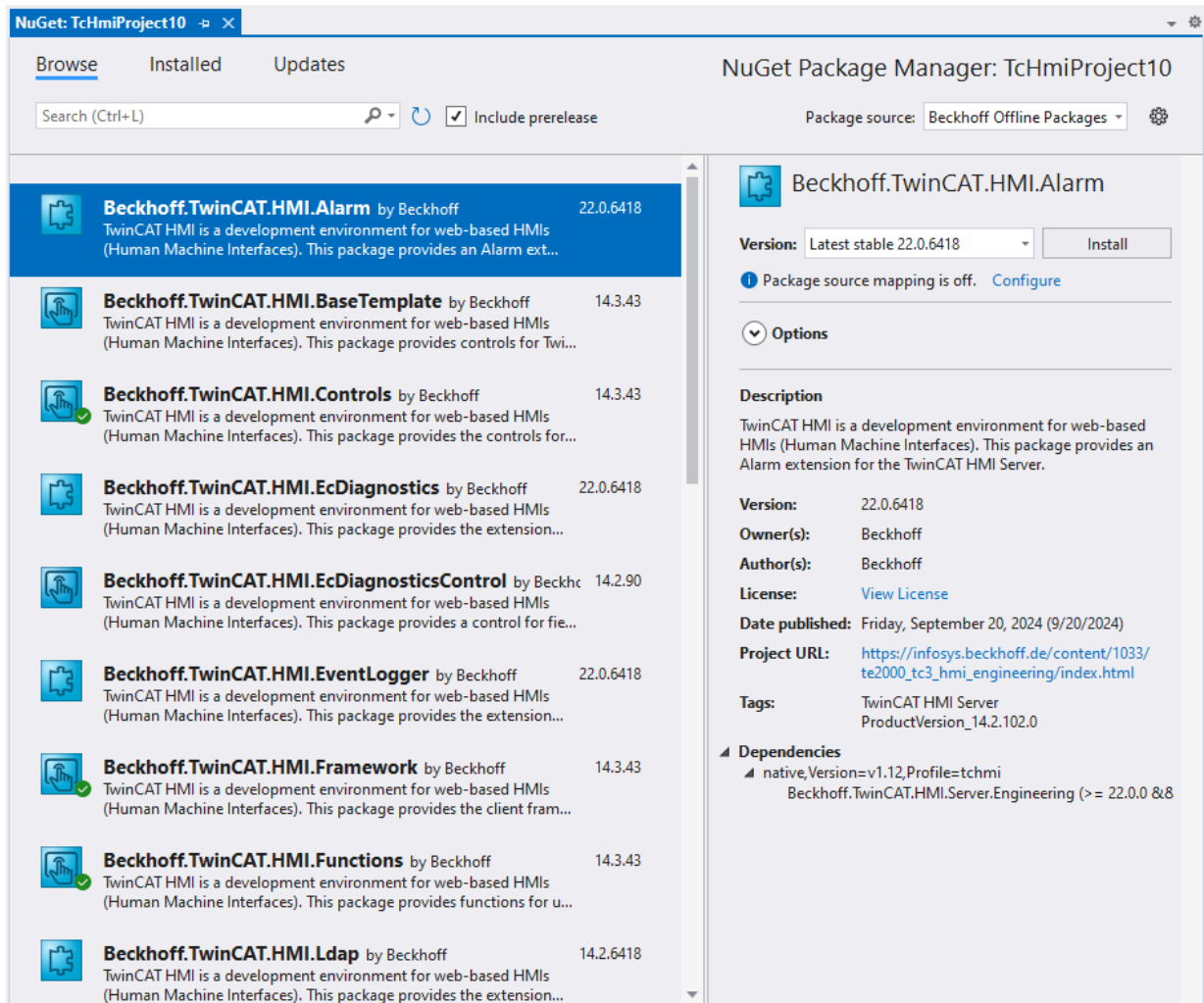
Explanation of the repository:

nuget.org: Public repository for which an internet connection is required. Search here for **Beckhoff** or **TwinCAT HMI**.

TwinCAT Offline Packages Repository from TwinCAT HMI, for which no internet connection is required. The packages must be installed in advance using the TwinCAT Package Manager.



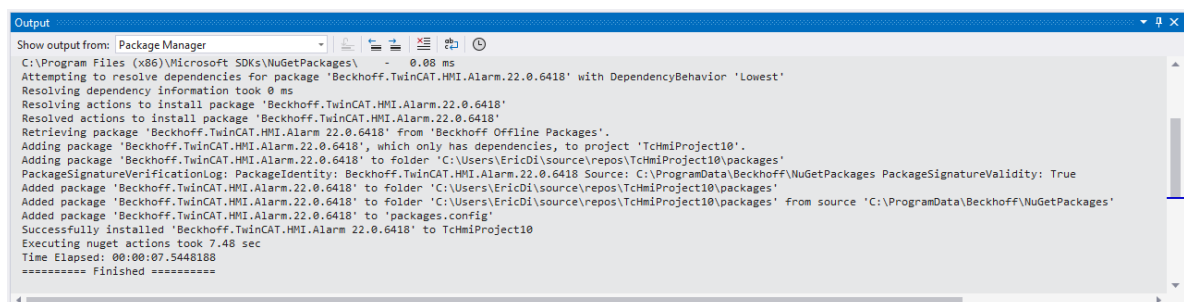
- Select the package you want to install. Further information about the package is then displayed on the right.



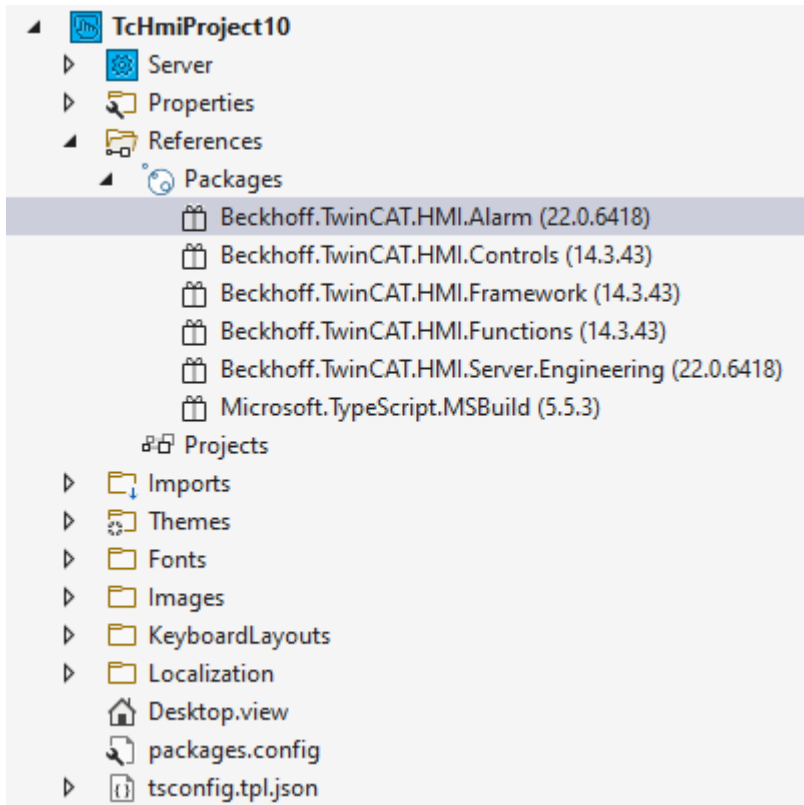
- Select the required version on the right and click **Install**:



- ⇒ The package will now be installed. Detailed information about the installation progress can be found in **Package Manager Console**:

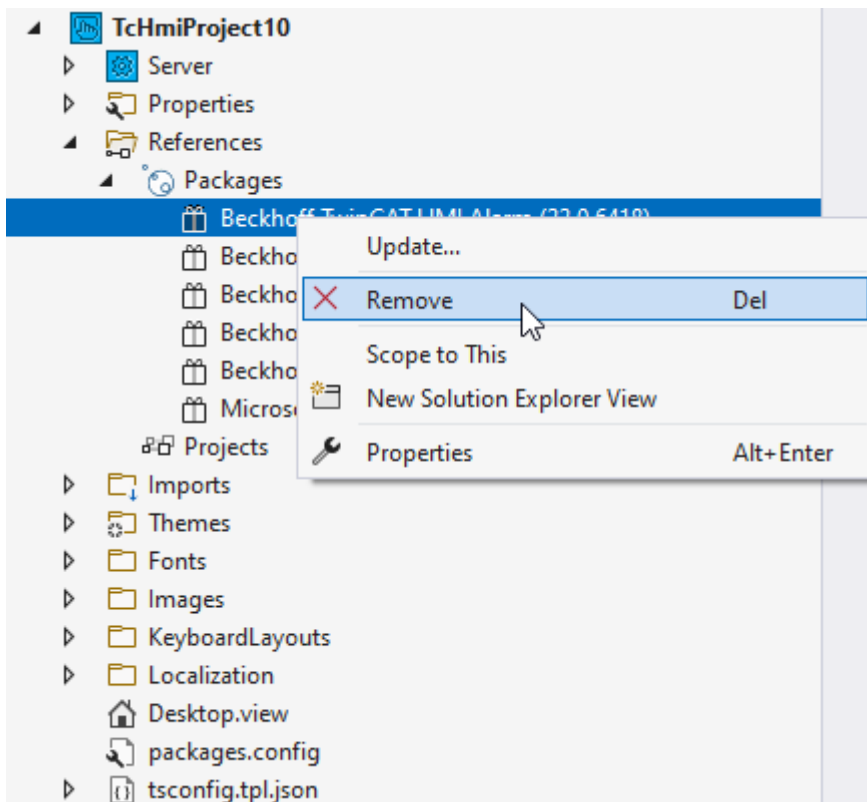


- ⇒ After successful installation the package can be found under the **References** node, and the corresponding functions can be used:



### 9.3.2 Uninstalling a NuGet package

1. Under the **References** node, select the package you want to remove. Then click **Remove** in the context menu:

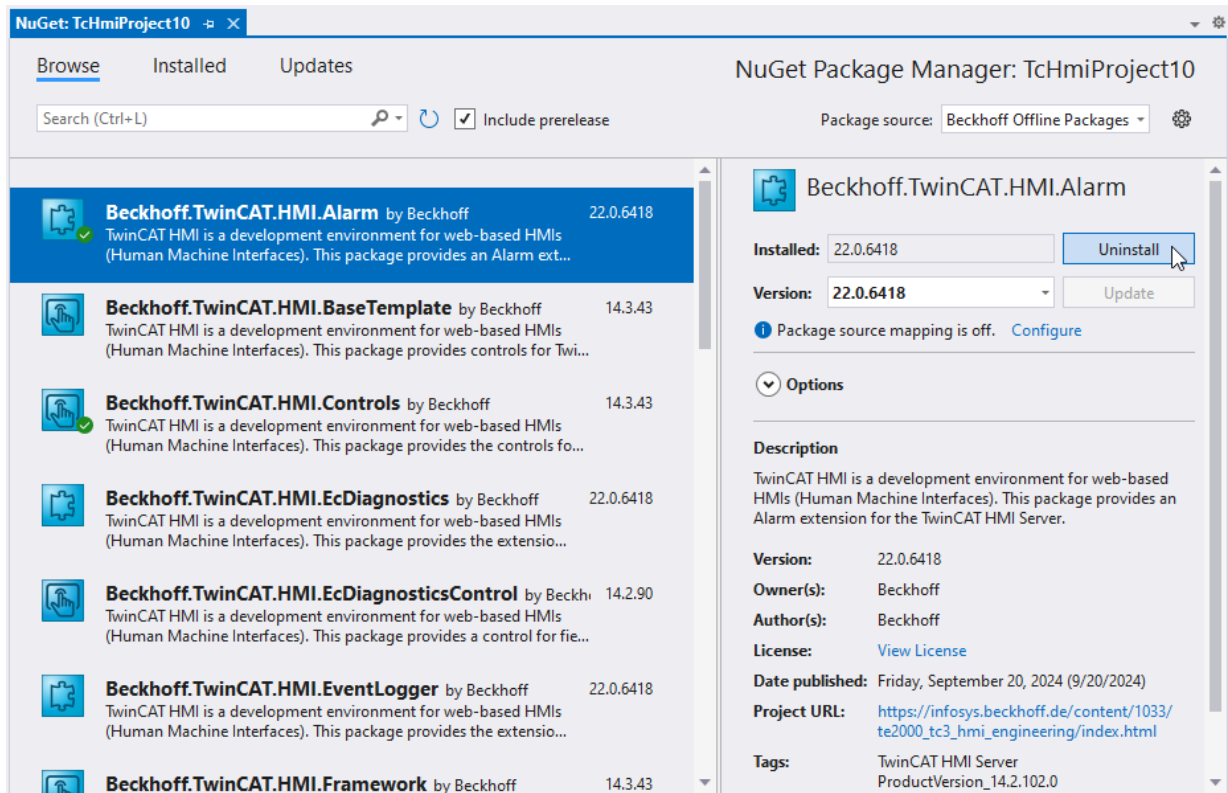


- ⇒ The package has been removed,

and the package functions can no longer be used. References (such as a control instance from a control in the package) are not automatically removed. If you subsequently see errors in the browser console, check that you are not trying to use any other resources from the removed package.

**Alternatively, you can remove the package using the NuGet Package Manager:**

1. Open the NuGet Package Manager by right-clicking the **References** node under **Manage NuGet Packages**.
2. Select the package you want to remove and click **Uninstall**:

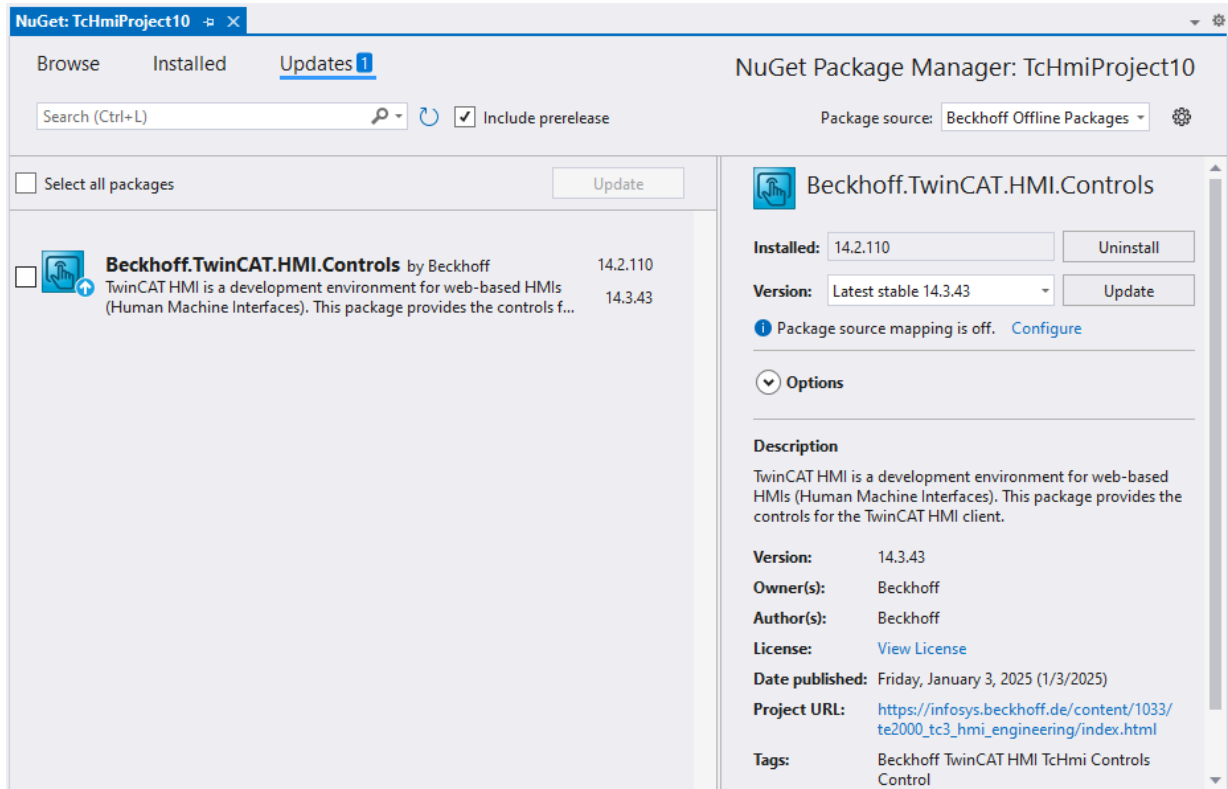


⇒ The package has been removed, Detailed information about the uninstall progress can be found in the **Package Manager Console**.

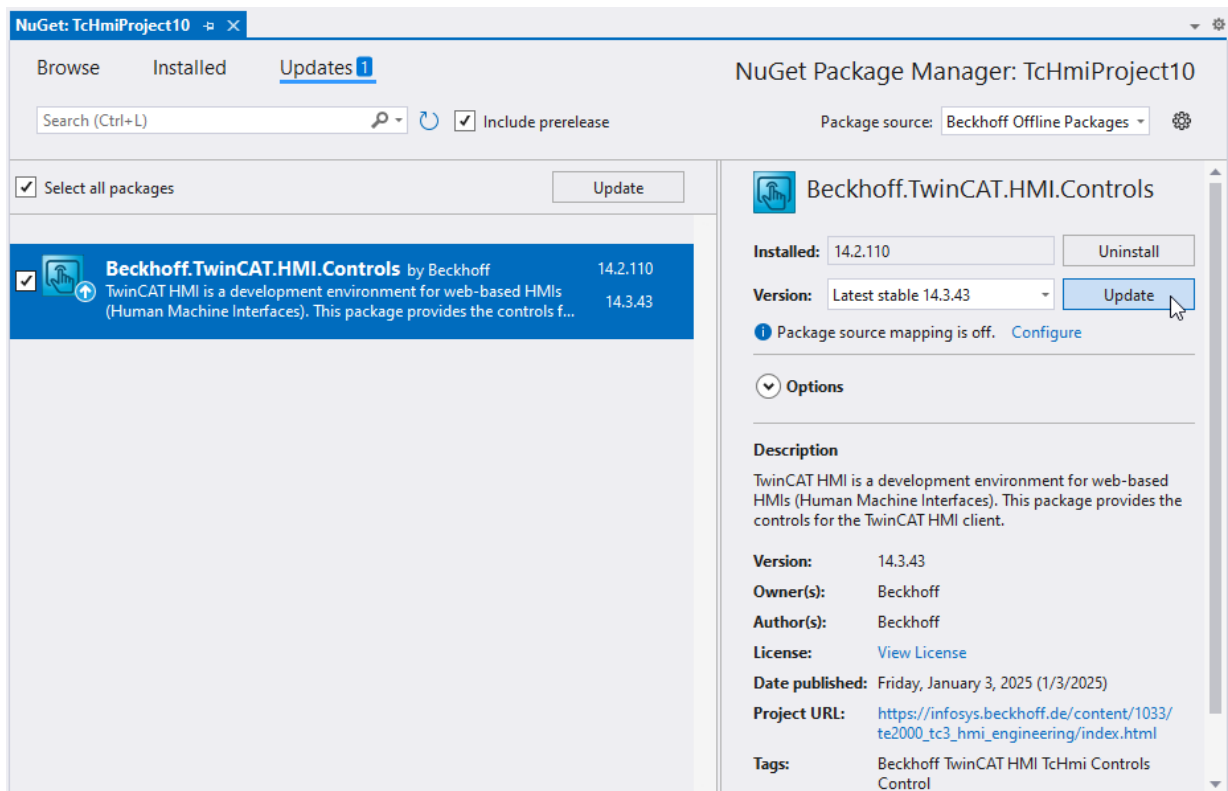
### 9.3.3 Updating a NuGet package

- ✓ As soon as a newer version of an installed NuGet package is available, you will be informed by Visual Studio via the yellow information bar:

1. Click **Manage NuGet Packages...** to open the **NuGet Package Manager**. All available updates are displayed under the **Updates** tab.



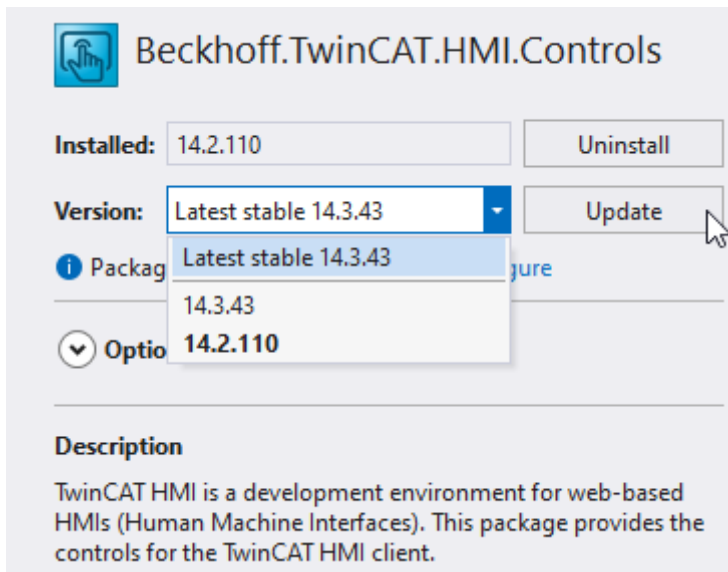
2. In the next step you can choose between updating the packages individually (select a package and click Update in the right section) or updating multiple packages via **Select all packages** or by selecting several individual packages.



- ⇒ The NuGet packages have been updated. Information about the current progress can be found in the **Package Manager Console**.

### Downgrading NuGet packages

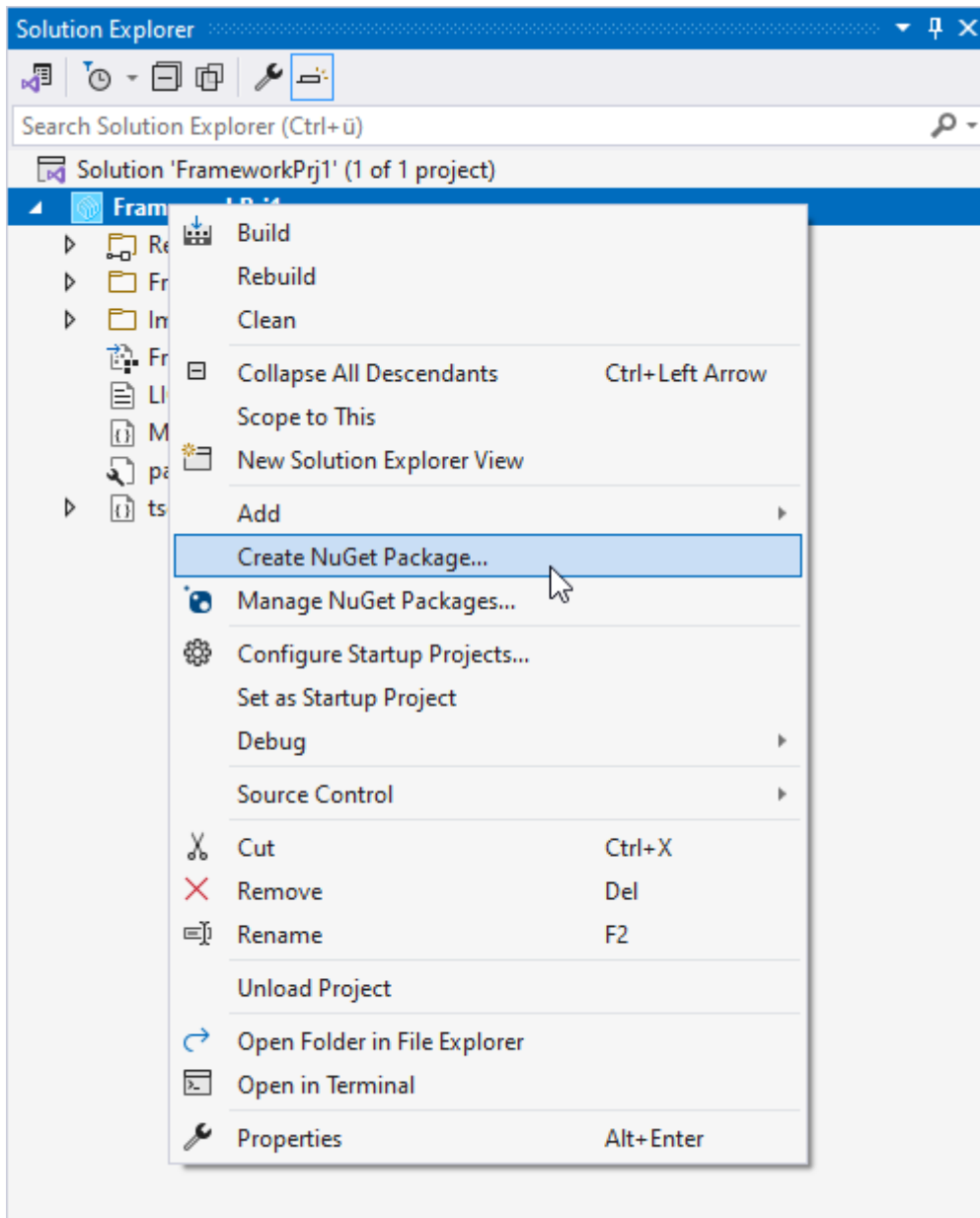
The Update button can also be used to downgrade NuGet packages. To do this, select the required NuGet package and the required version from the dropdown list, then click **Update**:



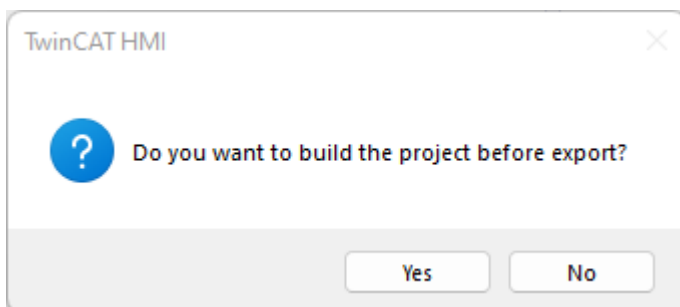
### 9.3.4 Creating a NuGet package

NuGet packages can be created from framework projects or from server extension projects.

1. Right-click on the respective project node and click **Create NuGet Package...** in the context menu:

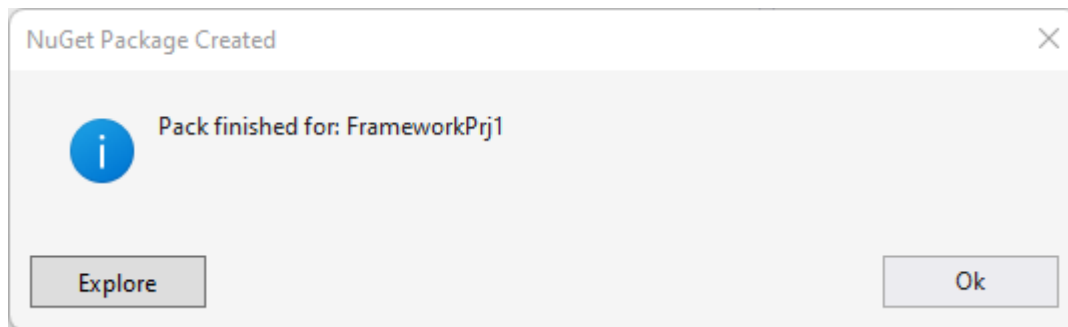


2. Confirm the following query with **Yes** to include the latest version of your sources in the package:



- ⇒ Package generation starts, and a progress bar shows the progress:
- ⇒ More detailed information about the current progress can be obtained from the Package Manager Console.

3. If the NuGet package has been successfully created, the following message appears:



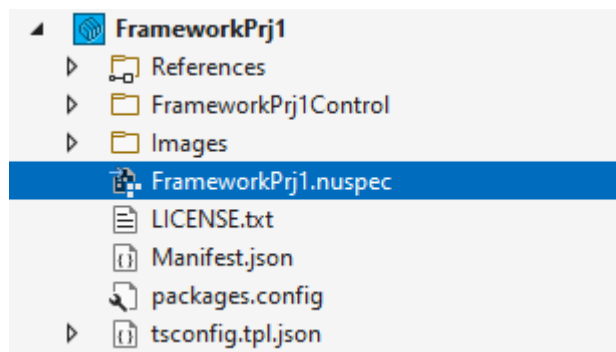
Clicking on **Explorer** opens the local repository for user-specific NuGet packages. This is located in the installation directory at:

`C:\ProgramData\Beckhoff\NuGetPackages`

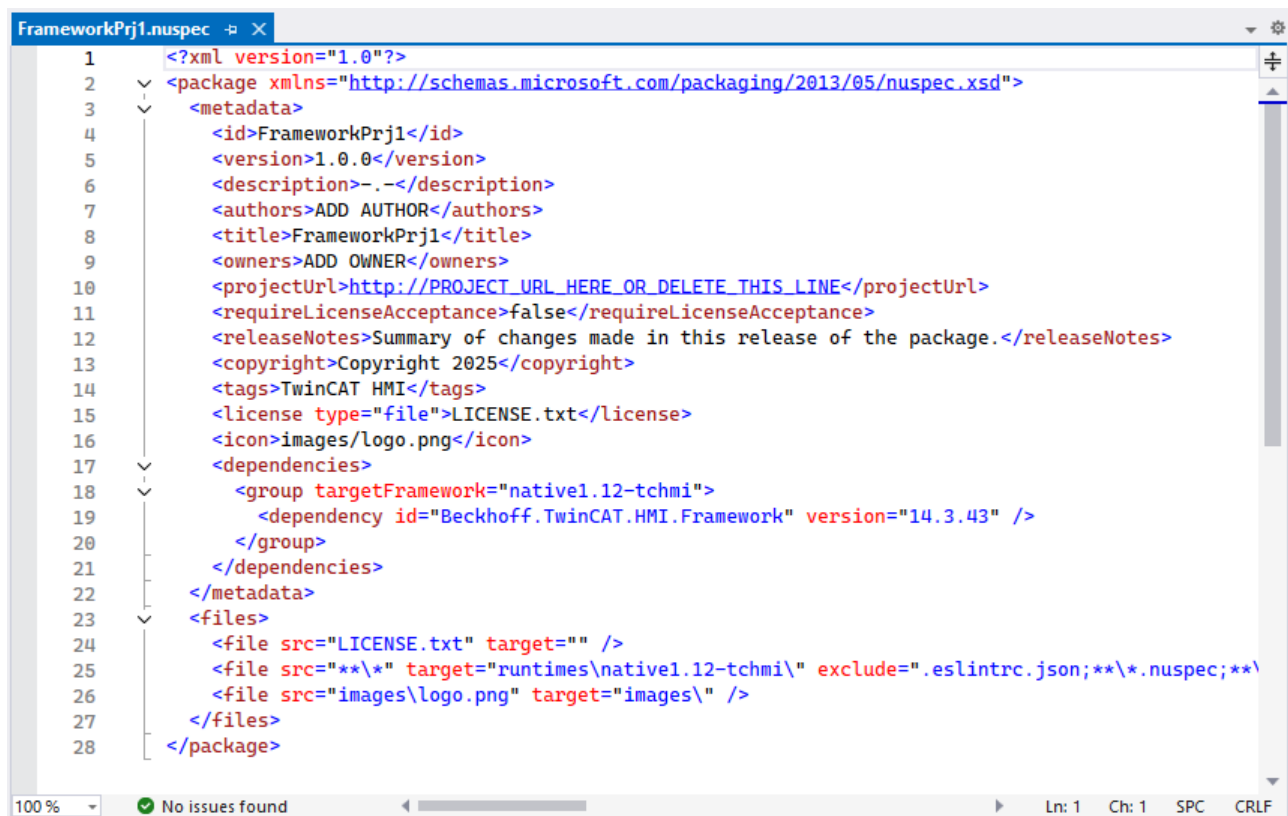
⇒ The NuGet package can now be installed in an HMI project [► 1042]. Select **TwinCAT HMI Customer** as package source.

### Specifying meta information for a NuGet package

Both project types contain a \*.nuspec file, in which meta information for the respective NuGet package is defined. The nuspec file at the top level in the respective project type:



For information on the structure of the \*.nuspec file please refer to the corresponding [Microsoft documentation](#).

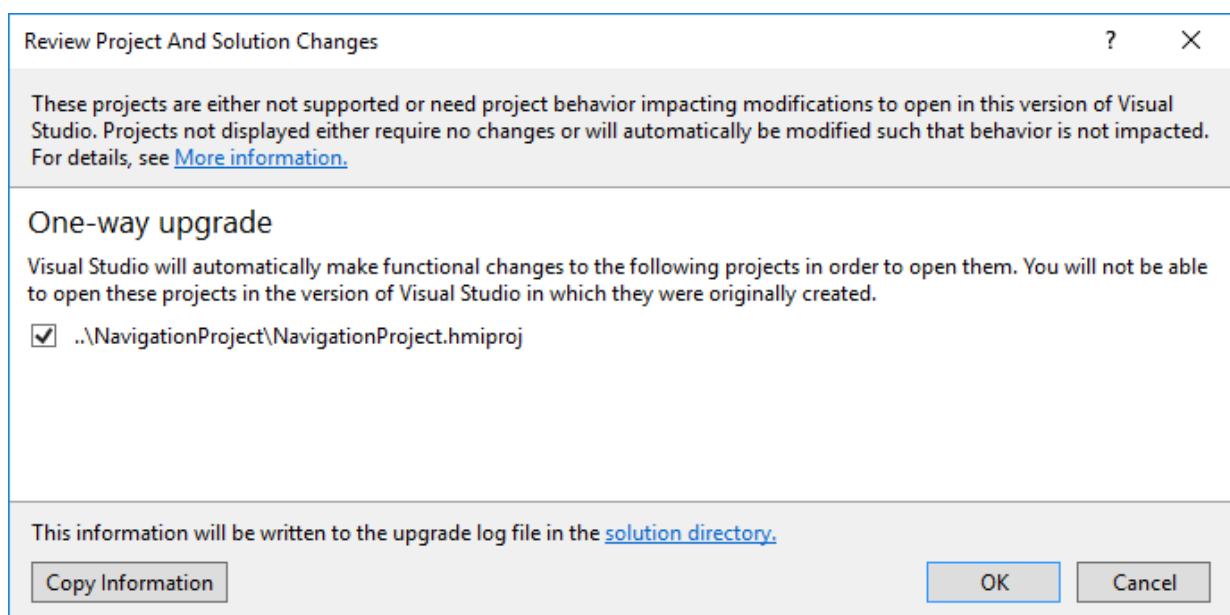


### 9.3.5 Support for TwinCAT HMI packages

TwinCAT HMI packages from versions 1.8 and 1.10 can be used in version 1.14 as legacy NuGet packages. This makes the corresponding functionalities available in version 1.14. The legacy NuGet packages are created during the project migration.

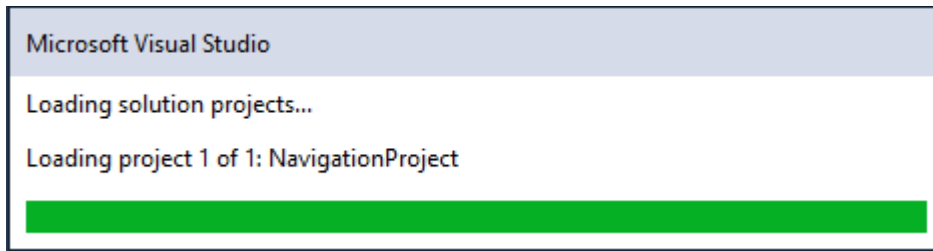
✓ The prerequisite for this is a project in version 1.10 that contains the TwinCAT HMI packages.

1. Open the project with version 1.14.
2. Confirm the migration wizard by clicking **OK** (one-way migration):





3. The project is migrated and loaded.



⇒ After the migration is complete, a migration report opens in your web browser:

## Migration Report - NavigationProject

### Overview

	Project	Path	Errors	Warnings	Messages
⚠	<a href="#">NavigationProject</a>	NavigationProject\NavigationProject.hmiproj	0	1	<a href="#">154</a>
⚠	<a href="#">Solution</a>	NavigationProject.sln	0	1	<a href="#">2</a>

### Solution and projects

#### NavigationProject

Message

⚠ **NavigationProject\NavigationProject.hmiproj:** Important Notice: In Default.tpl the regions are renamed. MASTER changed to Designer and SLAVE changed to LiveView\_and\_Build. In case you have added any HTML-code to other regions, e.g. STANDARD, please move them manually.

ℹ [Show 154 additional messages](#)

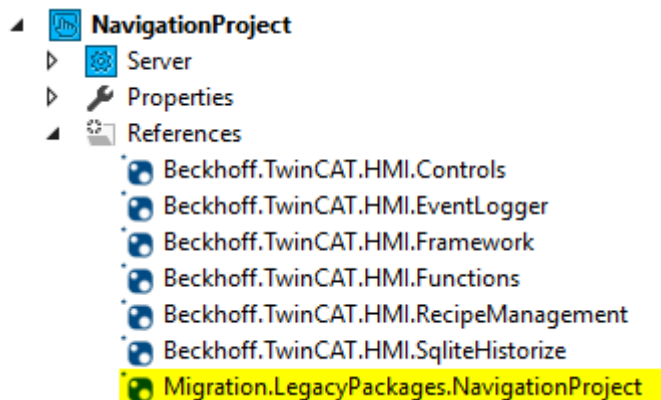
#### Solution

Message

⚠ **NavigationProject.sln:** Visual Studio needs to make non-functional changes to this project in order to enable the project to open in released versions of Visual Studio newer than Visual Studio 2010 SP1 without impacting project behavior.

ℹ [Show 2 additional messages](#)

⇒ The project now contains the NuGet legacy packages. All Framework Controls are put together into one package. Server extensions are added separately in a separate package.



⇒ You can now use the functionalities of the packages.

The migration wizard automatically converts TwinCAT HMI Framework Control projects to TwinCAT HMI Framework projects. You can create NuGet packages from these in version 1.14.

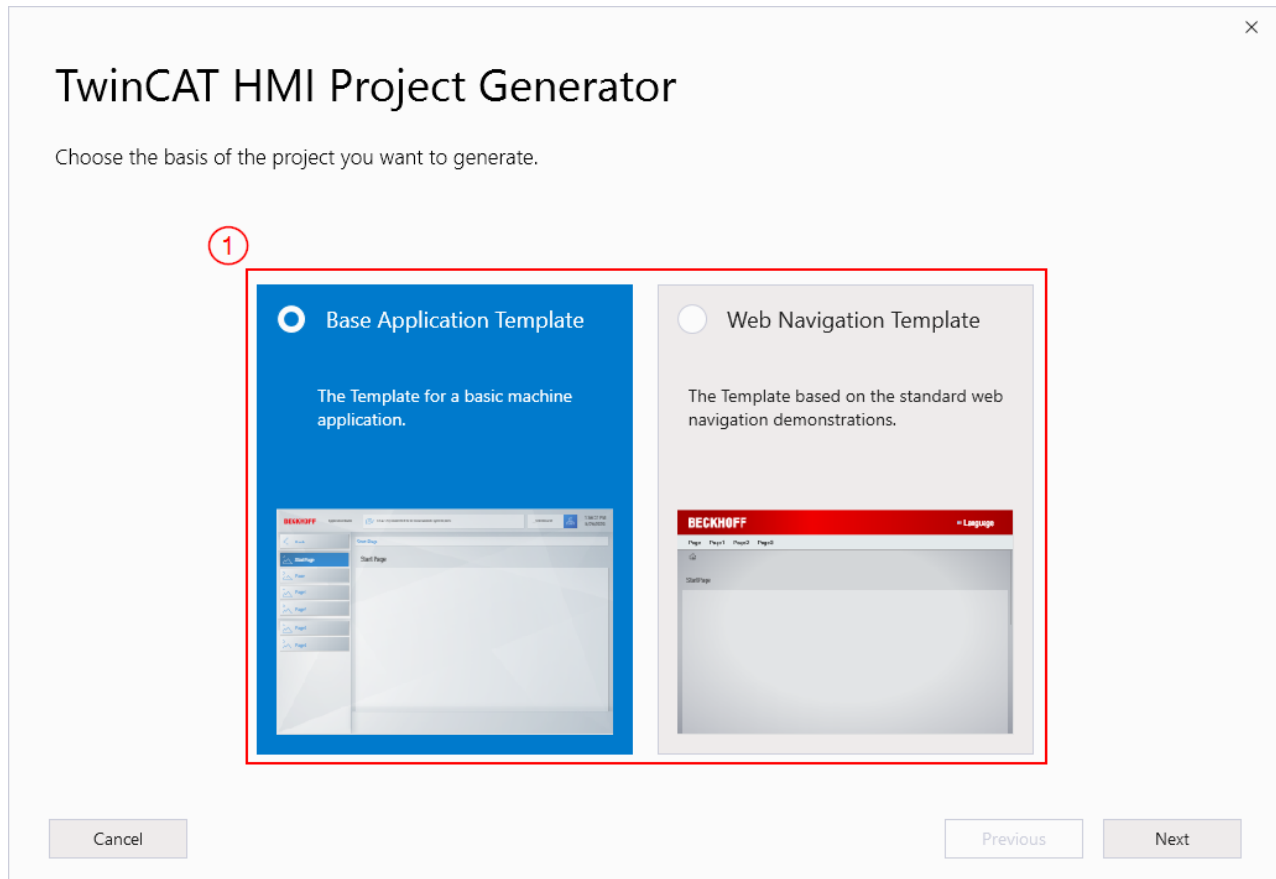
Packages from version 1.12 can be used in version 1.14. A new creation with the current 1.14 packages is recommended here.

## 10 Project Generator

The Project Generator is used to quickly and easily create a base frame for the HMI. In this you can customize a navigation tree.

Step by step guide: [Quick start \[► 1063\]](#)

Selection of a base project



### 1. Selection range of a base project

- ⇒ The "[Base Application Template \[► 1055\]](#)" is a template in the classic HMI design
- ⇒ The "[Web Navigation Template \[► 1060\]](#)" is based on a modern website design.



Available from version 1.12.750.1



Editing with the Project Generator is possible only once. Once you have completed your configuration, the configurator cannot be opened again. Changes have to be made in Engineering afterwards.

### 10.1 Base Application Template

The "Base Application Template" is a template in the classic HMI design.

## Selecting and setting the viewing areas

TwinCAT HMI Project Generator

Choose whether you want a static or a responsive application.

1

☒ Static Application

The static option generates an application with static resolution and does not adapt to other screen resolution.

☐ Responsive Application

The responsive option generates an application with non-static resolution and does adapt to other screen resolution.

2

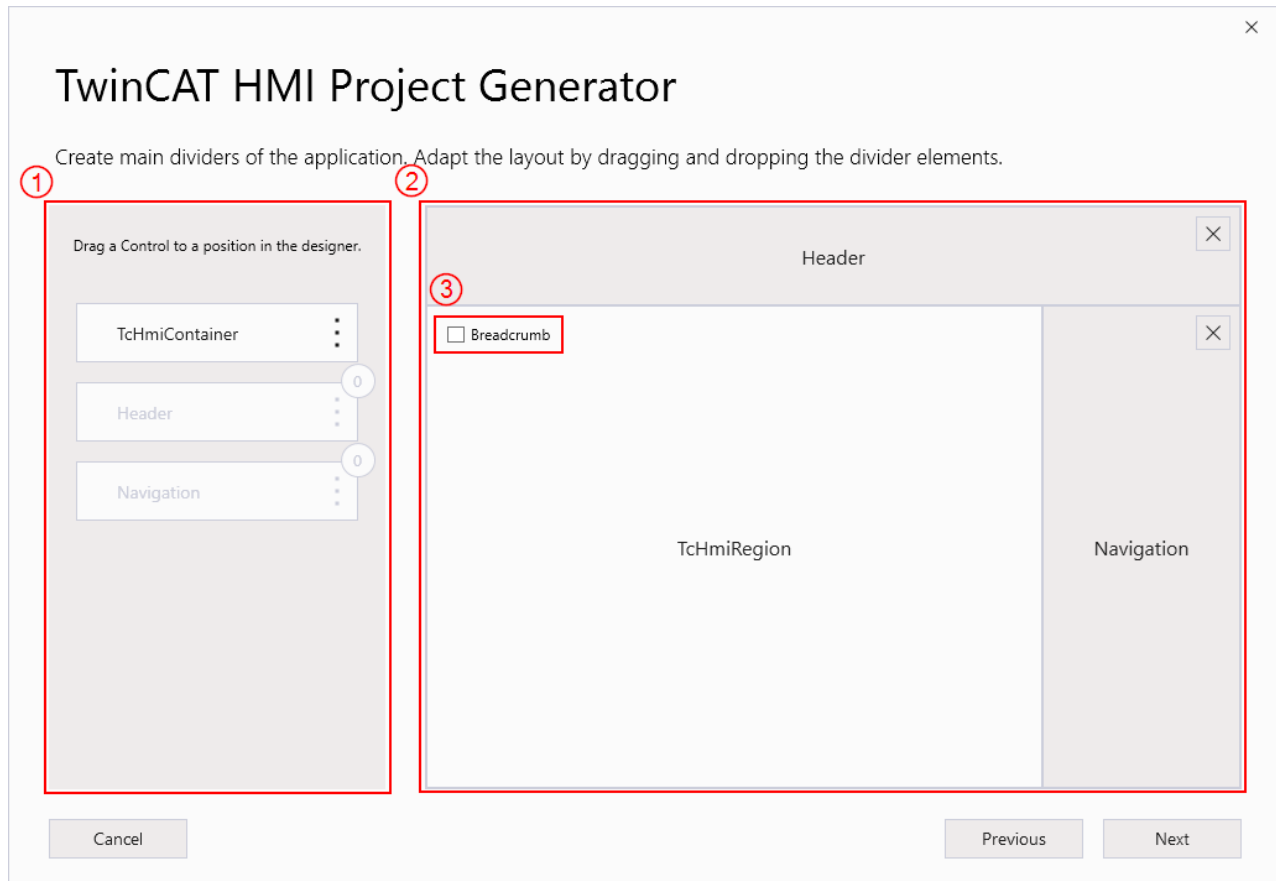
Application resolution in px (Width x Height)

1920 1080

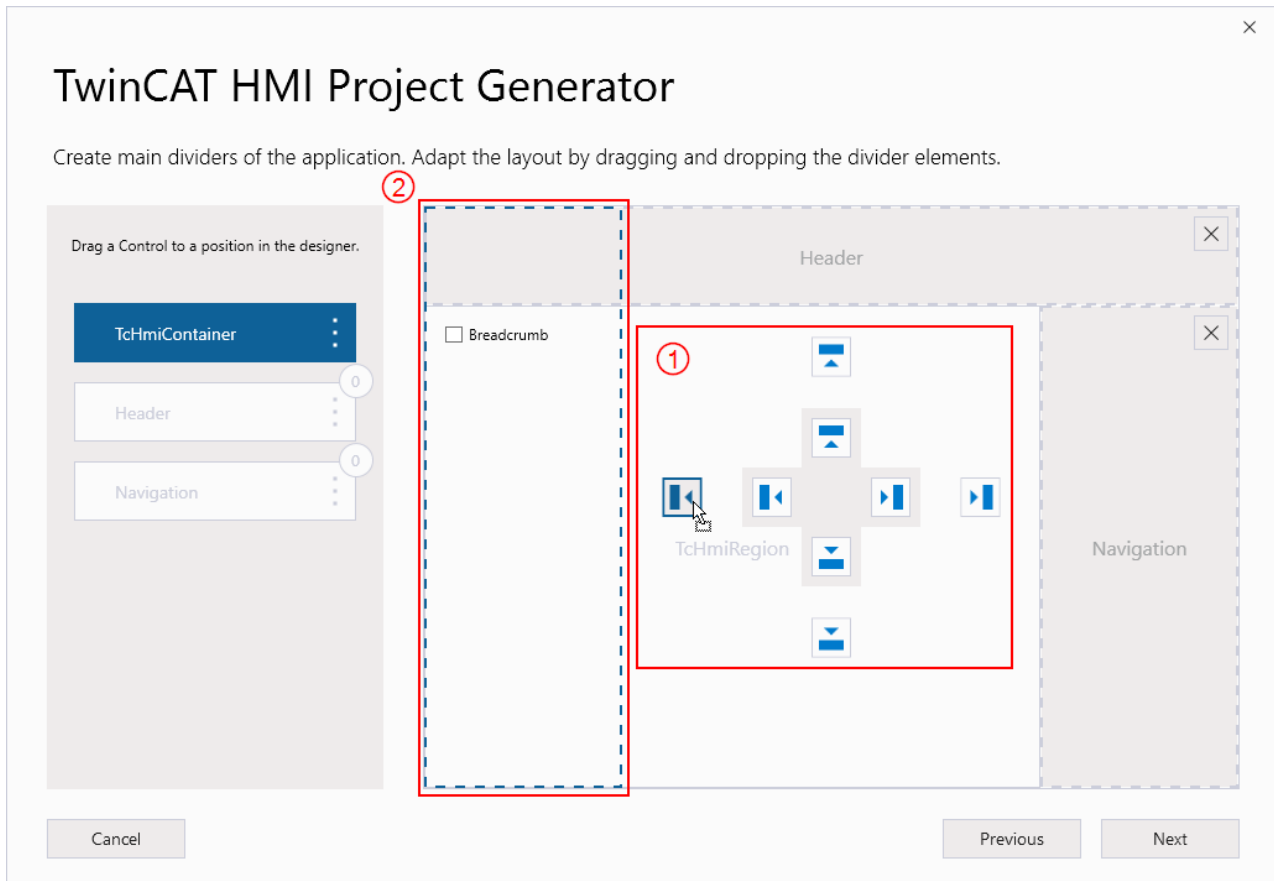
Cancel Previous Next

1. Selection of a static or responsive application
2. Adjustment range for static application for HMI size in pixels

## Setting the HMI layout



1. Elements available
2. Drop area for elements
3. Adding breadcrumb navigation

**Place element in drop area**

1. Docking areas for the element
2. Preview for the selected area

## Define and set media query

Minimal Width

1

2

3

800px

+

1280px

+

Maximal Width

Mobile

Tablet

Desktop

4

Media Query Name:

No Media Query selected

Minimal Width:

Maximal Width:

6

Delete Media Query

5

Element Behaviour:

☐ Full
 

Side bar elements will be displayed full width.

☐ Small Side Bar
 

Side bar elements will be displayed with a smaller width.

☐ Burger Menu Top
 

Generate a burger menu for the side bar elements in the footer.

☐ Burger Menu Bottom
 

Generate a burger menu for the side bar elements in the header.

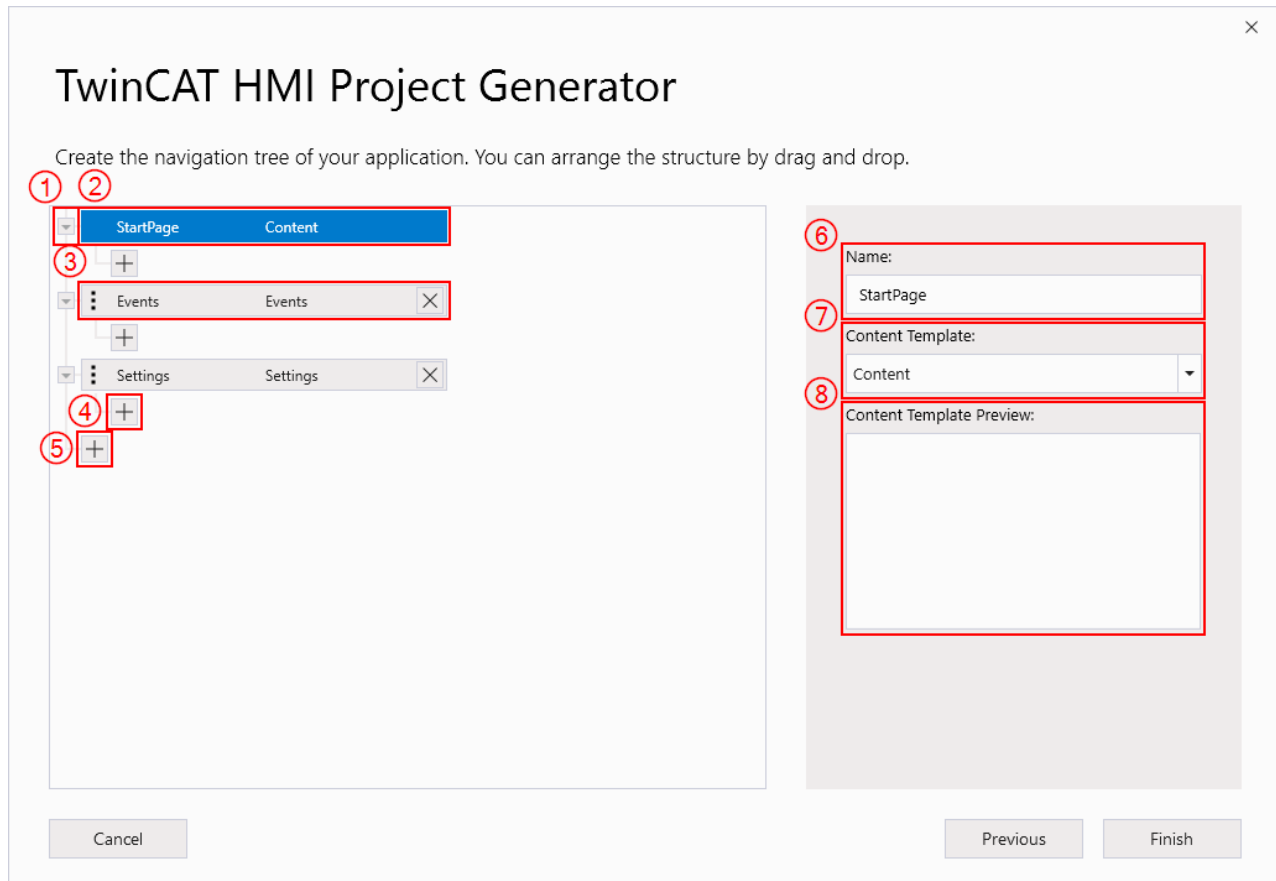
Cancel

Previous

Next

1. **MediaQuery**
2. Add new **MediaQuery**
3. Adjust switching range in px
4. On selection: name of the **MediaQuery**
5. On selection: behavior of the navigation
6. On selection: delete the **MediaQuery**

## Build navigation



1. Minimize and maximize the structure
2. Navigation element (**StartPage**) cannot be moved or deleted
3. Navigation element can be moved or deleted
4. Adding an element on the same layer
5. Adding an element on the same layer
6. On selection: name of the element
7. On selection: selection of content type
8. On selection: preview of the selected content template

## 10.2 Web Navigation Template

The "Web Navigation Template" is based on a modern website design.



## Selecting and setting the viewing areas

TwinCAT HMI Project Generator

Choose whether you want a static or a responsive application.

1

☒ Static Application

The static option generates an application with static resolution and does not adapt to other screen resolution.

☐ Responsive Application

The responsive option generates an application with non-static resolution and does adapt to other screen resolution.

2

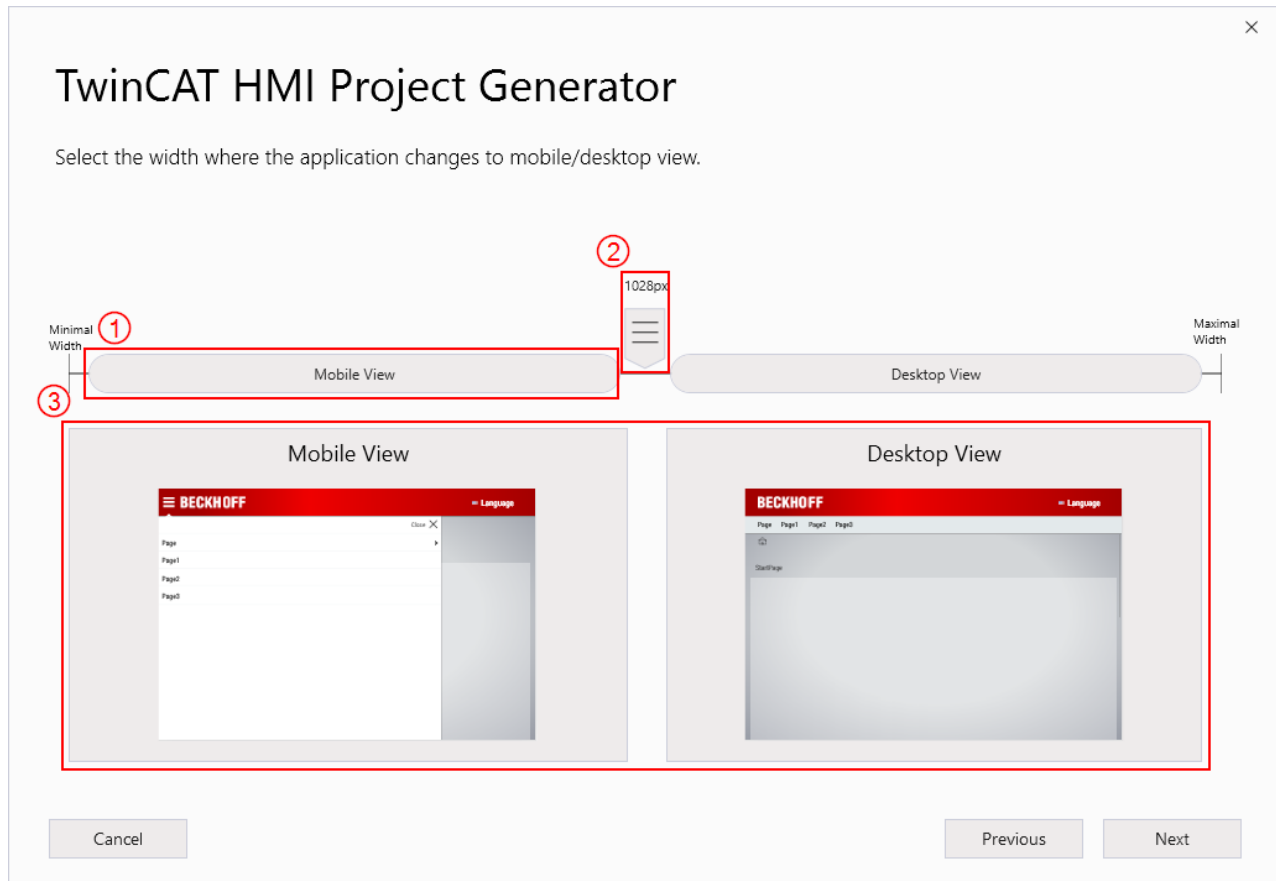
Application resolution in px (Width x Height)

1920 1080

Cancel Previous Next

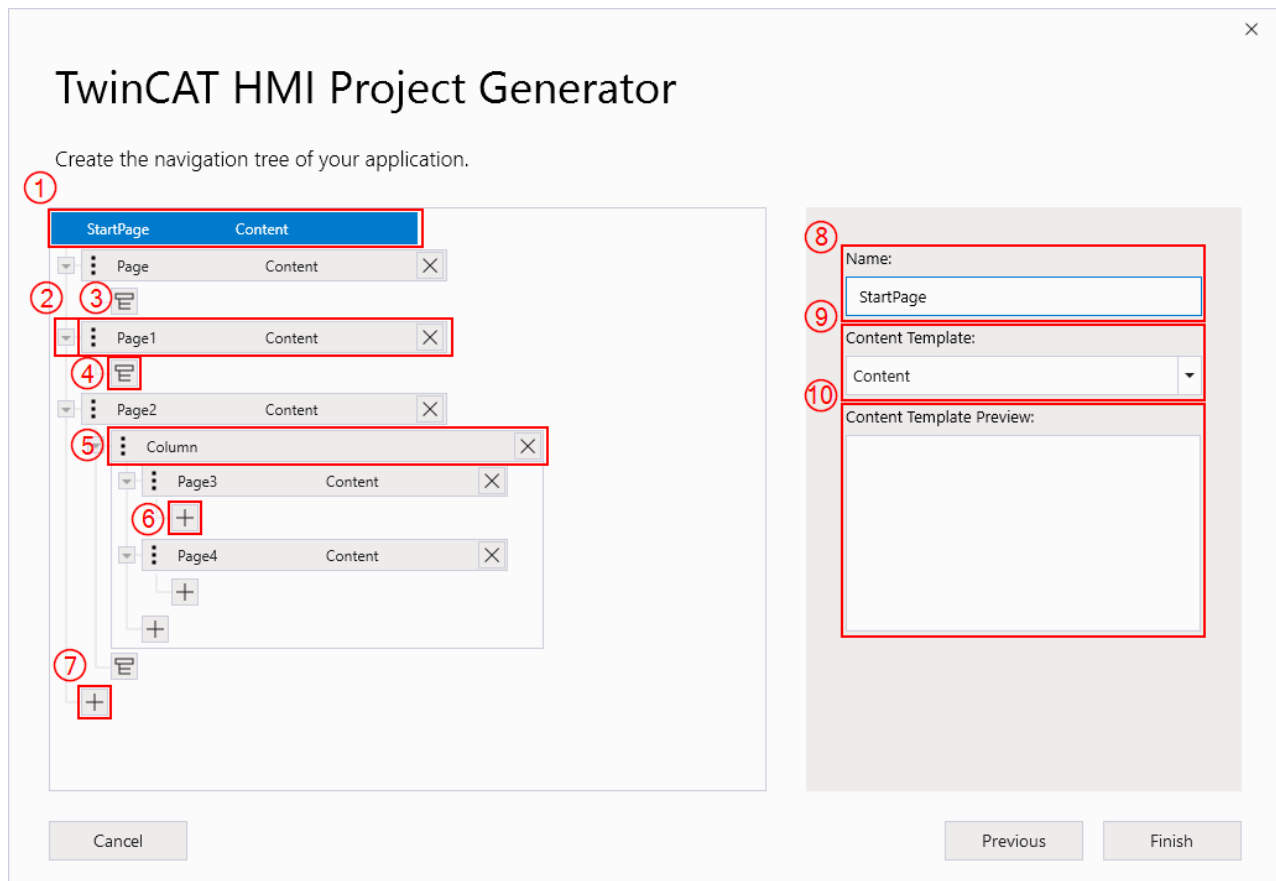
1. Selection of a static or responsive application
2. Adjustment range for static application for HMI size in pixels

## Define and set media query



1. MediaQuery
2. Switching range in px
3. Preview of the two versions

## Build navigation

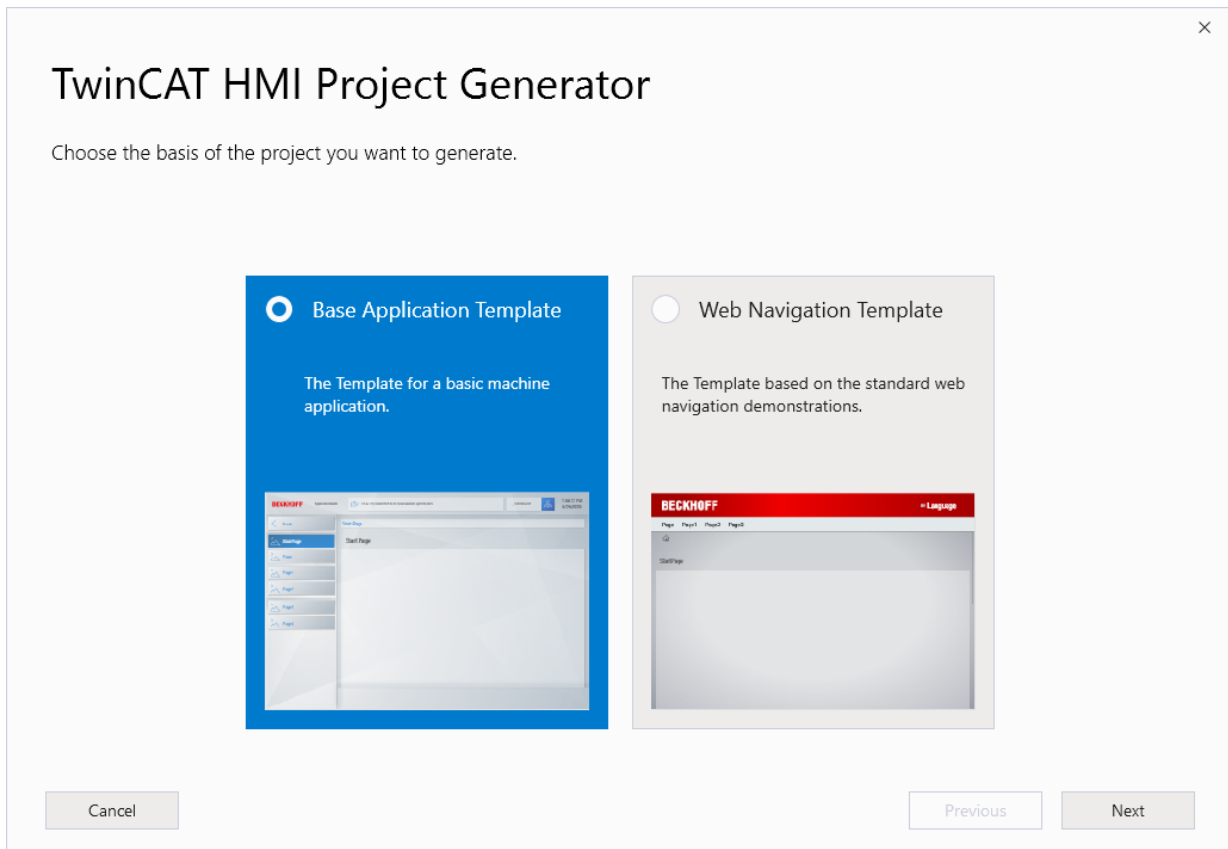


1. Navigation element (**StartPage**) cannot be moved or deleted
2. Minimize and maximize the structure
3. Navigation element (content) can be moved or deleted
4. Adding a grouping
5. Navigation element (grouping) can be moved or deleted
6. Adding an element on the same layer
7. Adding an element on the same layer
8. On selection: name of the element
9. On selection: selection of content type
10. On selection: preview of the selected content template

## 10.3 Quick start

1. Start your VisualStudio
2. Create a new project of the type "TwinCAT HMI Project Generator"

3. After confirmation, a configurator opens. Here you have the choice between different templates. Select the appropriate template for your application.



- ⇒ The "Base Application Template [[▶ 1064](#)]" is a template in the classic HMI design
- ⇒ The "Web Navigation Template [[▶ 1067](#)]" is based on a modern website design.

### 10.3.1 Base Application Template

The "Base Application Template" is a template in the classic HMI design.

1. The first step is about the behavior of the HMI. A distinction is made here between a "static" or a "responsive" application.

**TwinCAT HMI Project Generator**

Choose whether you want a static or a responsive application.

☒ **Static Application**

The static option generates an application with static resolution and does not adapt to other screen resolution.

☐ **Responsive Application**

The responsive option generates an application with non-static resolution and does adapt to other screen resolution.

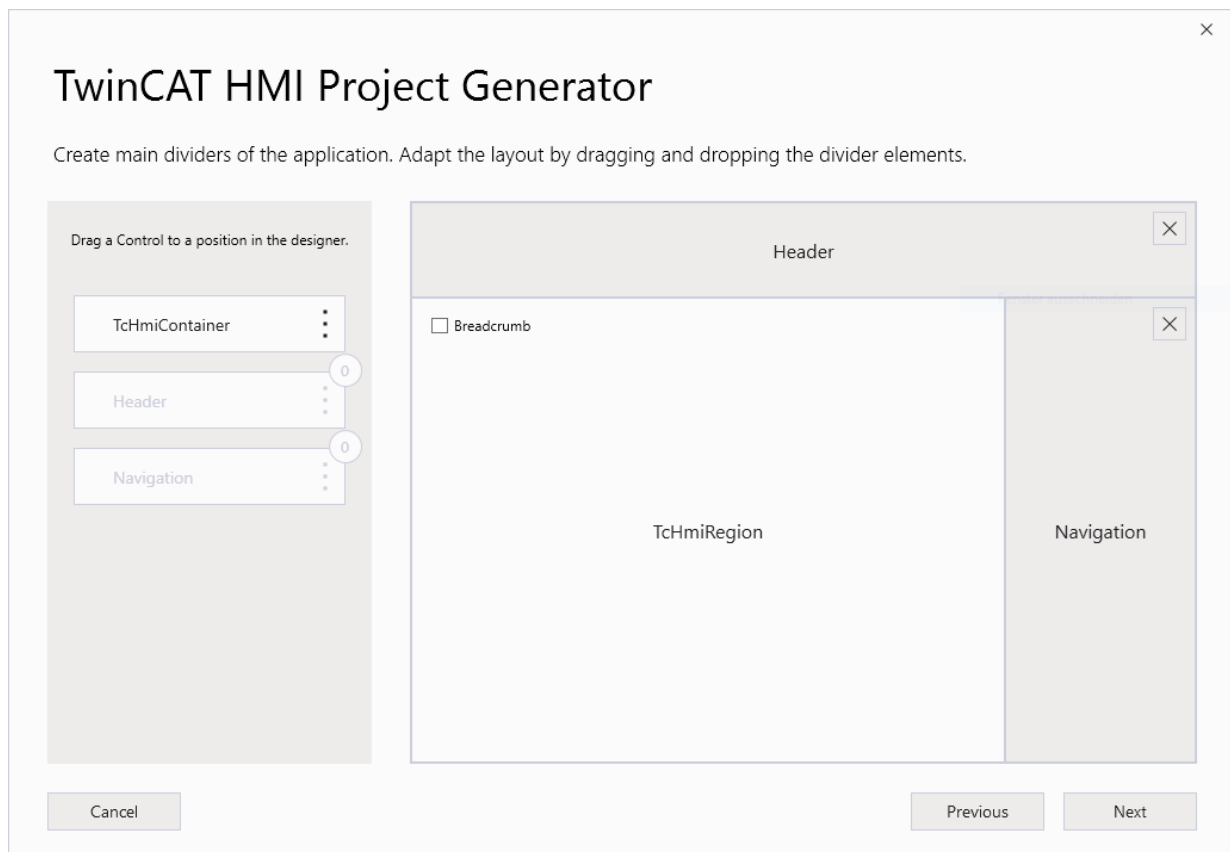
Application resolution in px (Width x Height)

1920 1080

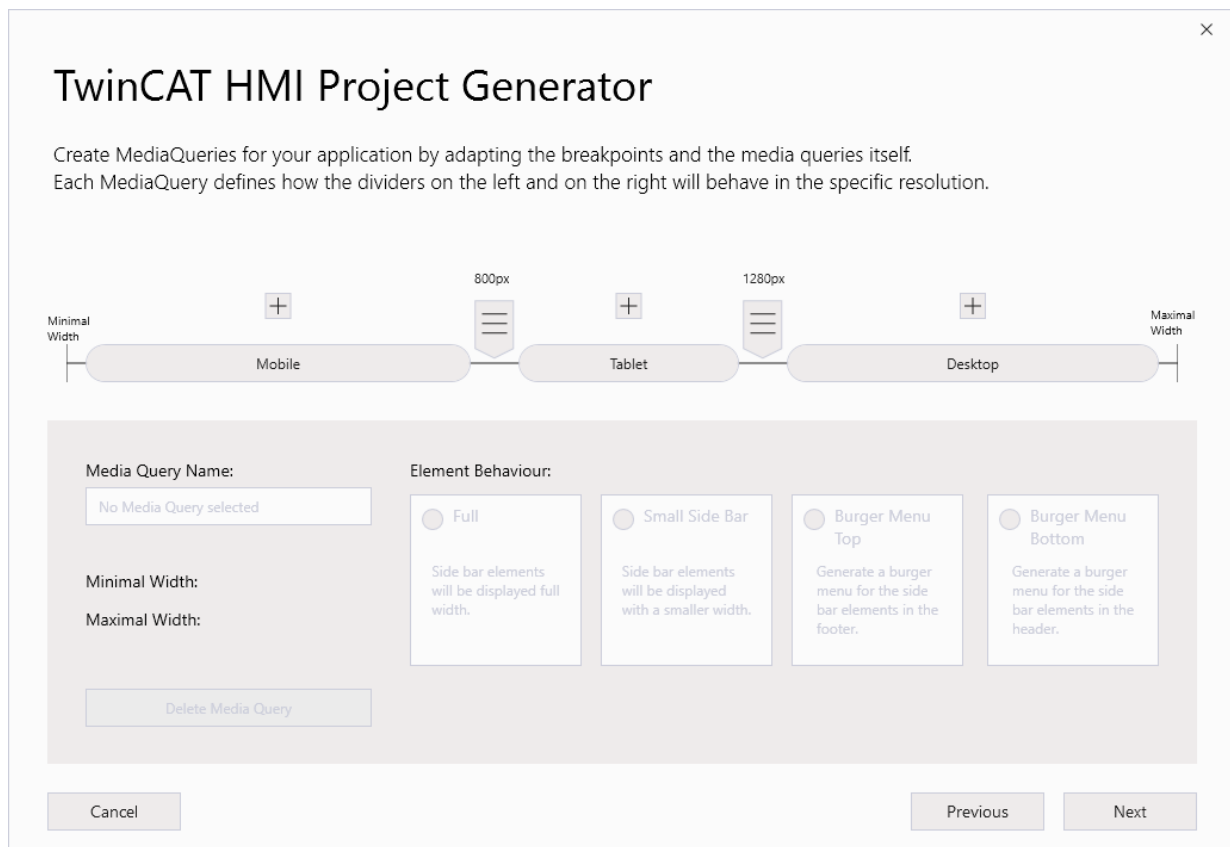
Cancel Previous Next

- ⇒ The static application is an HMI that works with fixed pixel values. With different resolutions there is only the possibility of scaling.
- ⇒ In the responsive application, the HMI is adapted depending on the resolution. It is possible to set "Media Querys".

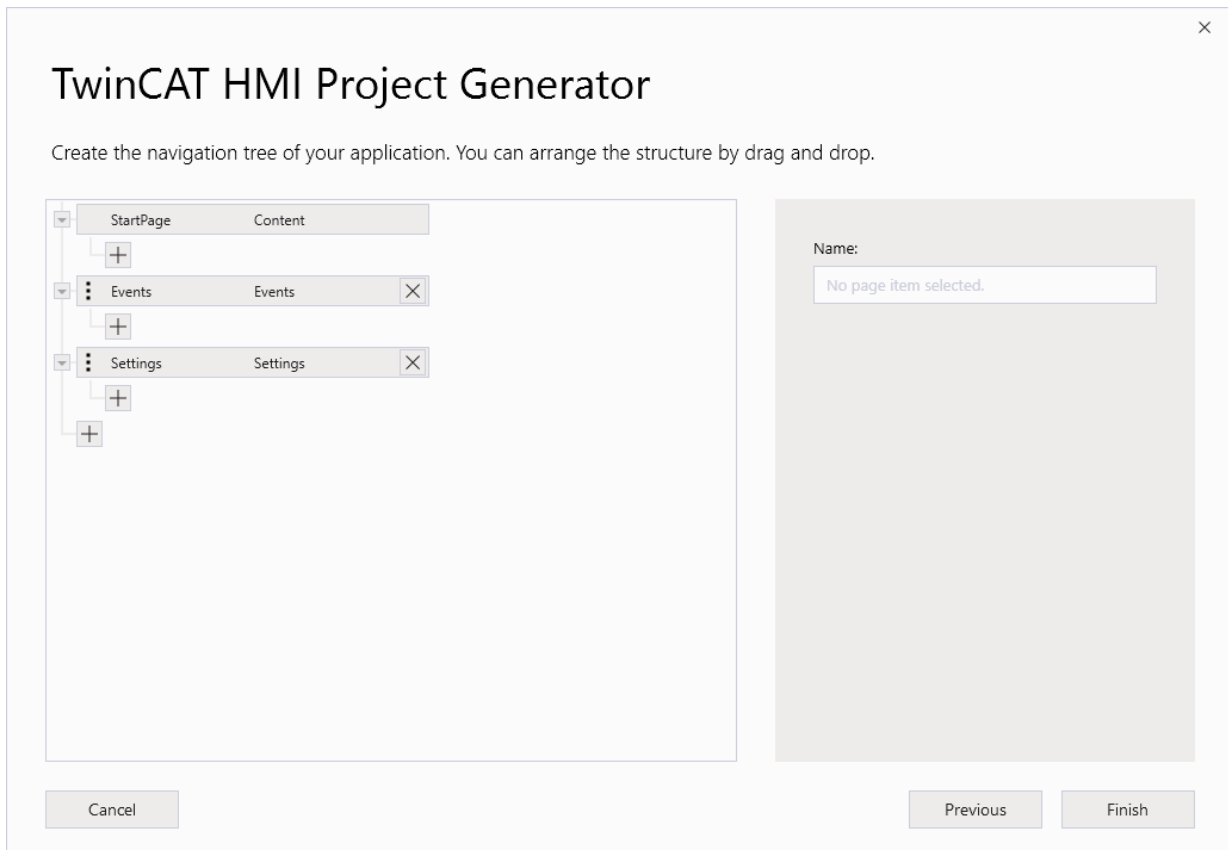
1. Define their areas in the HMI. To do this, you can drag controls into the HMI layout from the left side. This offers various docking options. However, you can also move or delete elements that have already been placed.



1. This step is available only if the responsive application is selected beforehand. In order to use the responsive design optimally, MediaQuerys must be defined. These describe when a break occurs.



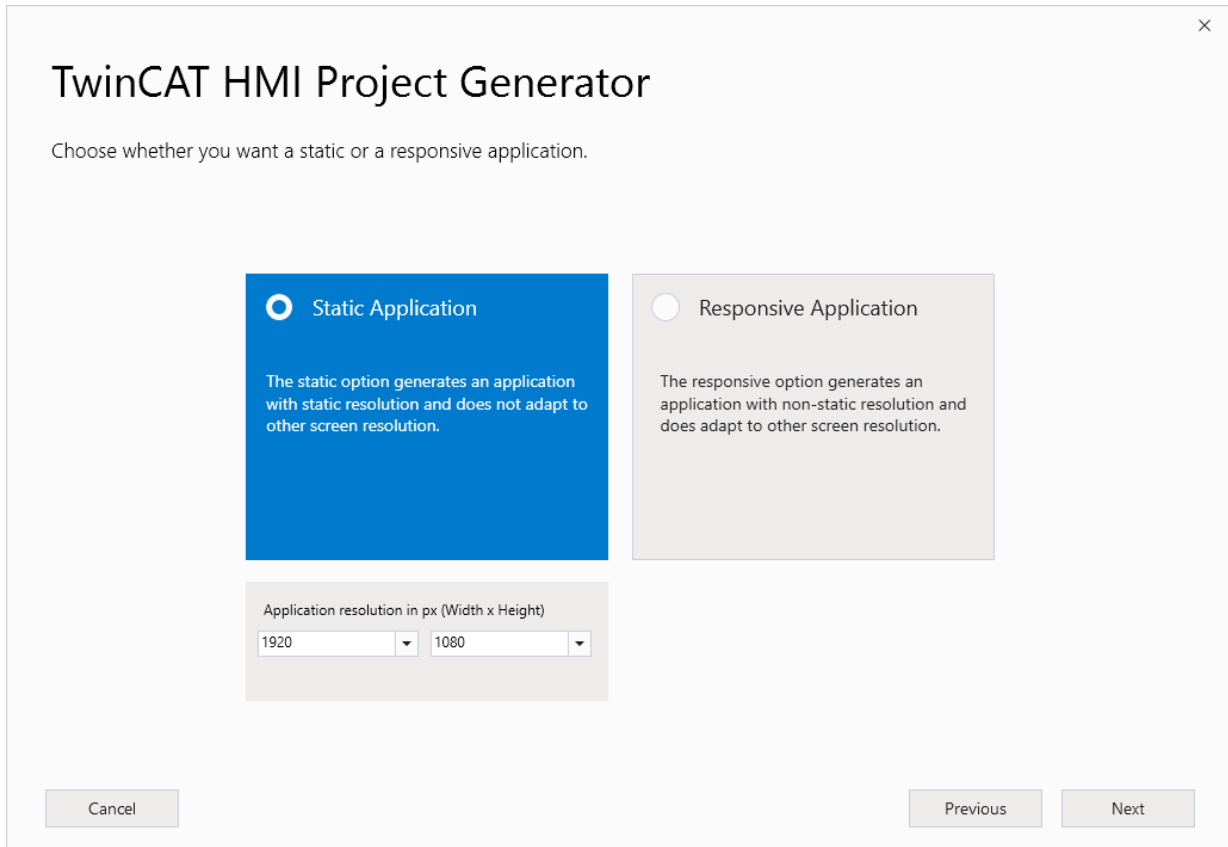
1. Create their navigation structure. Add new main nodes or sub-nodes. For created nodes there is a possibility to choose different templates. Furthermore, the nodes can be moved freely in the structure. If you want to finish the configuration, click the **Finish** button.



### 10.3.2 Web Navigation Template

The "Web Navigation Template" is based on a modern website design.

1. The first step is about the behavior of the HMI. A distinction is made here between a "static" or a "responsive" application.

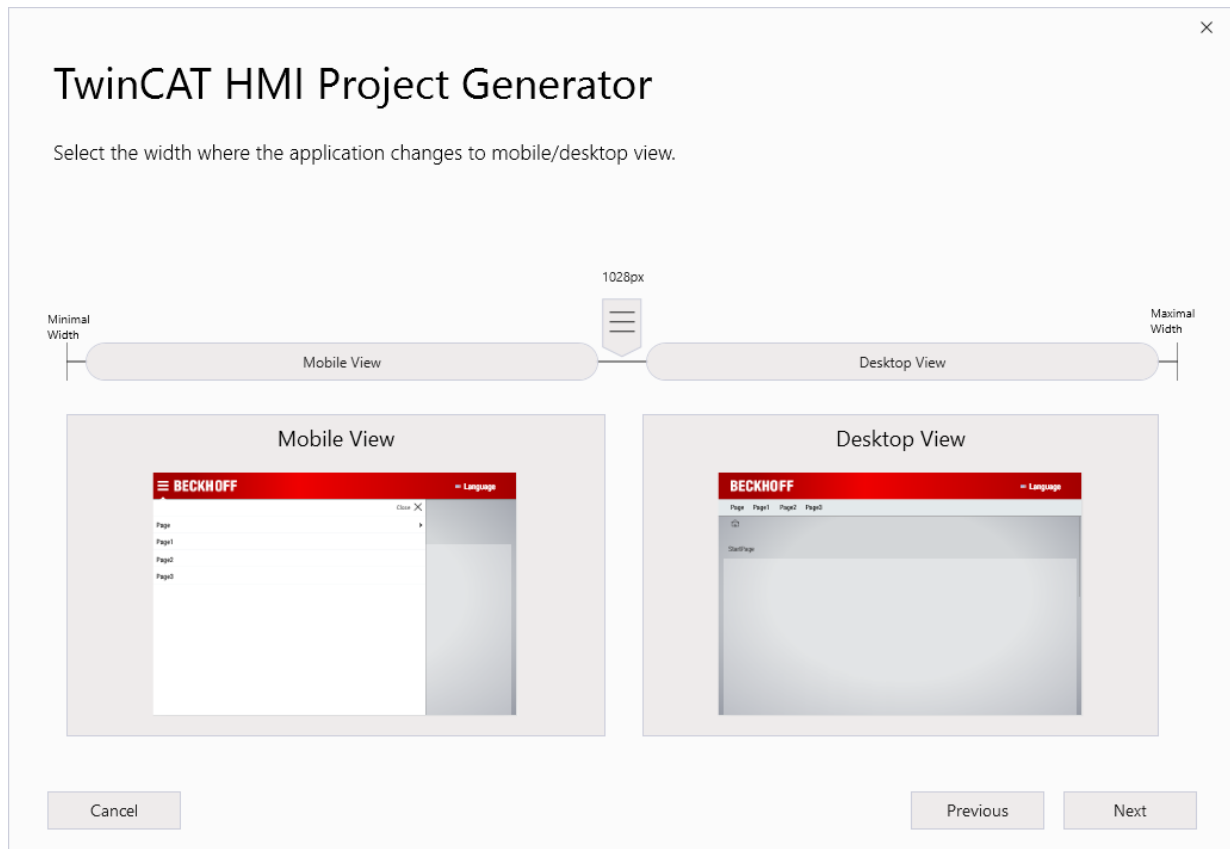


The screenshot shows the 'TwinCAT HMI Project Generator' window. It has a title bar with a close button (X). The main content area has the title 'TwinCAT HMI Project Generator' and a subtitle 'Choose whether you want a static or a responsive application.' Below this, there are two radio button options. The first option, 'Static Application', is selected and highlighted with a blue background. It includes a description: 'The static option generates an application with static resolution and does not adapt to other screen resolution.' The second option, 'Responsive Application', is unselected and has a light gray background. It includes a description: 'The responsive option generates an application with non-static resolution and does adapt to other screen resolution.' Below these options, there is a section for 'Application resolution in px (Width x Height)' with two dropdown menus. The first dropdown is set to '1920' and the second to '1080'. At the bottom of the window, there are three buttons: 'Cancel' on the left, and 'Previous' and 'Next' on the right.

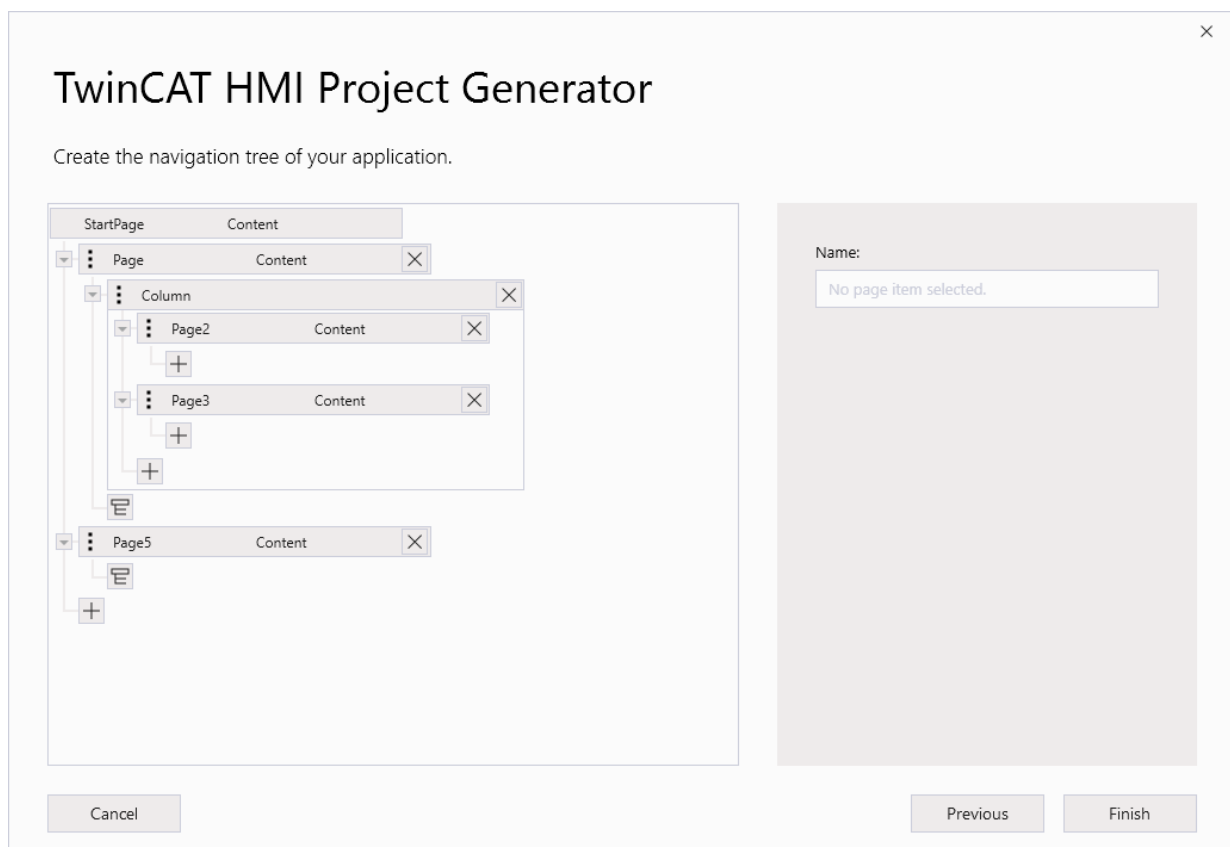
- ⇒ The static application is an HMI that works with fixed pixel values. With different resolutions there is only the possibility of scaling.
- ⇒ In the responsive application, the HMI is adapted depending on the resolution. It is possible to set "Media Querys".



1. This step is available only if the responsive application is selected beforehand. In order to use the responsive design optimally, MediaQuery's must be defined. These describe when a break occurs.



1. Create their navigation structure. Add new main nodes or sub-nodes. In addition, the WebNavigation has a grouping on the first level. For created nodes there is a possibility to choose different templates. Furthermore, the nodes can be moved freely in the structure inside or outside the grouping. If you want to finish the configuration, click the "Finish" button.



# 11 Controls

The TwinCAT HMI has various controls for displaying or editing data. Some controls are documented below using application examples.

## 11.1 7-segment display

The 7-segment display control is used to display values in a 7-segment display.



The control is included in the NuGet package Beckhoff.TwinCAT.HMI.Industries.Common >= 14.3. The package can be installed via TcPkg (TwinCAT.HMI.Industries.Common) or nuget.org.

### 11.1.1 Configuration

Configuration of the 7-segment display control

#### Integration:

Several settings can be made on the 7-segment display control.

**Value symbol:** Specifies the symbol that defines the value for the display. Only symbols are permitted and no direct values.

**Digits:** This specifies how many digits should be displayed before the decimal point.

**Decimal Digits:** This specifies how many digits should be displayed after the decimal point.

**Decimal Precision Mode:** Specifies whether the decimal places should be rounded or truncated if they are not displayed in full.

## 11.2 Audit Trail Grid

The Audit Trail Grid control is used to display the data stored in the [Audit Trail](#) [► 1175] extension in tabular form. This data can be filtered or exported within the control.

	Zeitstempel ▾	test	ID ▾	Name ▾	Alter Wert	Neuer Wert	Benutzername ▾	Fehlergrund
1	2024-02-16T07:02:27.5860172Z		9	settingMatch			TcHmiUserManagement::__SystemAdministrator	
2	2024-02-16T07:05:02.6029363Z		14	LOGIN_LOG			TcHmiUserManagement::__SystemUser	
3	2024-02-14T13:48:27.2354725Z		3	ADS.PLCT.MAIN.bData	false	true	TcHmiUserManagement::__SystemUser	
4	2024-02-14T13:48:29.7754269Z		4	ADS.PLCT.MAIN.bData	true	false	TcHmiUserManagement::__SystemUser	
5	2024-02-14T13:49:45.7774291Z		5	LOGIN_LOG			TcHmiUserManagement::__SystemUser	
6	2024-02-14T13:49:45.7814338Z		6	ADS.PLCT.MAIN.nData	0	1	TcHmiUserManagement::__SystemGuest	
7	2024-02-15T08:40:10.5142202Z		7	ADS.PLCT.MAIN.bData	false	true	TcHmiUserManagement::__SystemUser	
8	2024-02-15T08:40:11.1151438Z		8	ADS.PLCT.MAIN.bData	true	false	TcHmiUserManagement::__SystemUser	
9	2024-02-16T07:02:50.6064963Z		11	settingMatch			TcHmiUserManagement::__SystemAdministrator	
10	2024-02-16T07:02:50.6064963Z		12	settingMatch			TcHmiUserManagement::__SystemAdministrator	
11	2024-02-13T10:00:13.3689741Z		1	auditTrailErrorLogMessage			TcHmiUserManagement::__SystemAdministrator	
12	2024-02-14T10:49:57.2332853Z		2	settingMatch			TcHmiUserManagement::__SystemAdministrator	
13	2024-02-16T07:02:37.5949041Z		10	settingMatch			TcHmiUserManagement::__SystemAdministrator	
14	2024-02-16T07:05:02.6029363Z		13	LOGIN_LOG			TcHmiUserManagement::__SystemUser	
15	2024-02-16T08:07:40.5659923Z		15	auditTrailErrorLogMessage			TcHmiUserManagement::__SystemAdministrator	



The control is included in the NuGet package Beckhoff.TwinCAT.HMI.AuditTrailUtils >= 14.2. The package can be installed via TcPkg (TwinCAT.HMI.AuditTrailUtils) or nuget.org.

11.2.1 Configuration

Filter

Filters for the display can be set within the control. These filters define the visible area, e.g. to look at a specific symbol that has been changed.

BECKHOFF

6/28/2024, 2:03:26.806 PM | TcHmiAlarm | Alarm setting A...

>

Operator

11:19:30 AM  
8/5/2024

Start Page

	Timestamp ▾	test	ID ▾	Name ▾	Old Value	New Value
1	2024-08-05T09:17:40.4405872Z		6	LOGIN_LOG		
2	2024-08-05T09:12:29.1572696Z		5	ADS.PLCT.MAIN.bData		true
3	2024-08-05T09:12:28.3421111Z					true
4	2024-08-05T09:12:26.4592111Z					
5	2024-08-05T09:12:21.1892111Z					
6	2024-08-05T08:07:52.6559111Z					

Filter

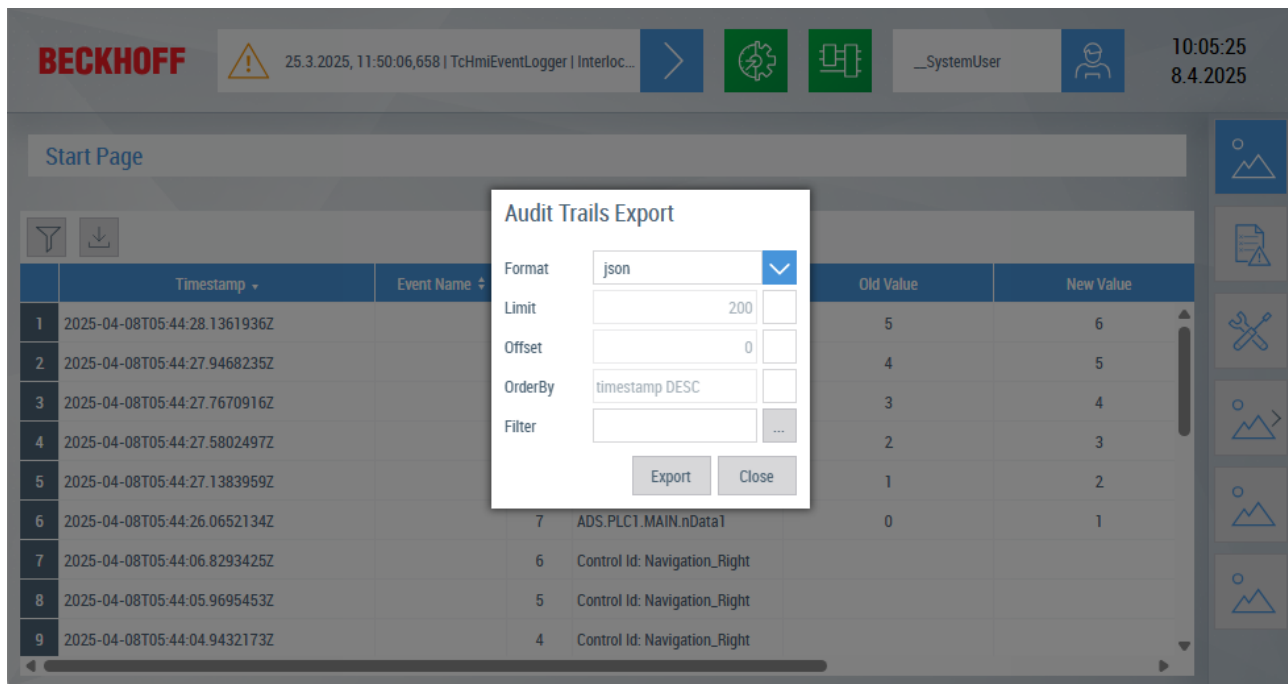
	And/Or	Path	Operator	Value
		contextDomain ▾	== ▾	TcHmiAlarm ▾

Load initial configuration

OKCancel

Export

The recorded values can be exported as JSON or CSV via the export function.



### Format

- Selection of the export format: JSON or CSV.

### Limit

- Limitation of exported entries.

### Offset

- Offset from which the data is exported.

### OrderBy

- Sort the entries "ASC" in ascending order and "DESC" in descending order for the corresponding column.

### Filter

- Filter settings for the data to be exported.

## 11.3 Dip Switch

The dip switch control is used for simple control of a Boolean value. This is a simple switch. The mode can be set between latching and non-latching.



The control is included in the NuGet package Beckhoff.TwinCAT.HMI.Industries.Common >= 14.3. The package can be installed via TcPkg (TwinCAT.HMI.Industries.Common) or nuget.org.

### 11.3.1 Configuration

Configuration of the dip switch control

**Integration:**

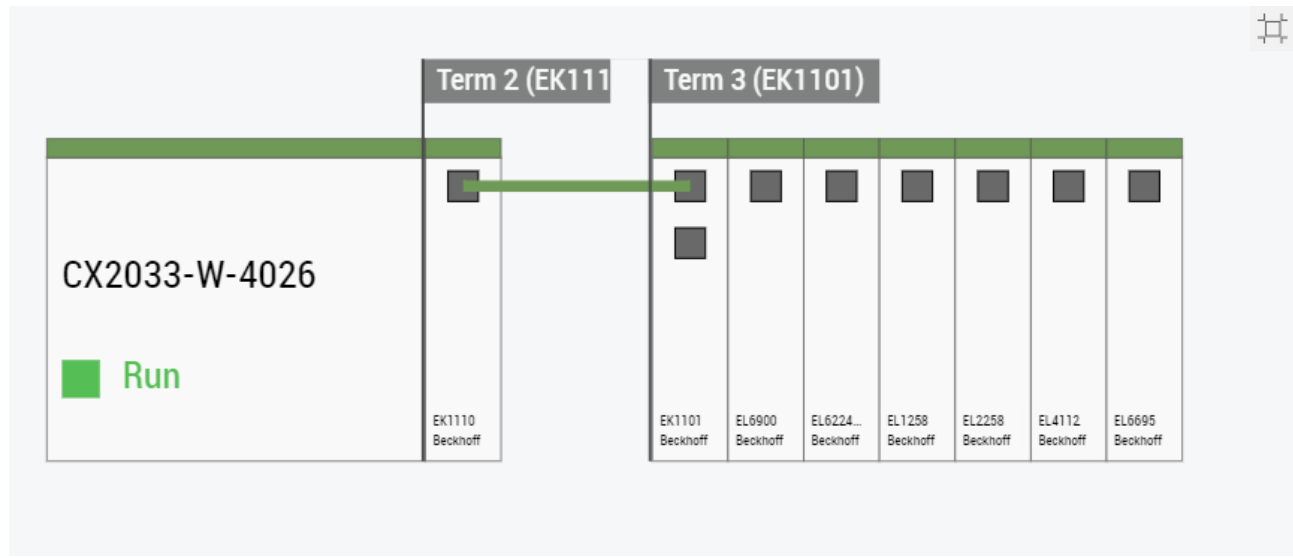
Several settings can be made on the dip switch control.

**State symbol:** Specifies the symbol that is switched when clicked. Only symbols are permitted and no direct values. A TwoWayBinding is not required, the symbol is automatically used for reading and writing.

**Tap mode:** Specifies whether the control signal toggles or taps.

## 11.4 EcDiagnostics

The EcDiagnostics control is used to display the bus topology of an EtherCAT master. The data required for this is provided by the [EcDiagnostics](#) [1197] extension. With the help of the control, errors in EtherCAT can be found quickly via the visual display.



Available since version 1.12.752.0.

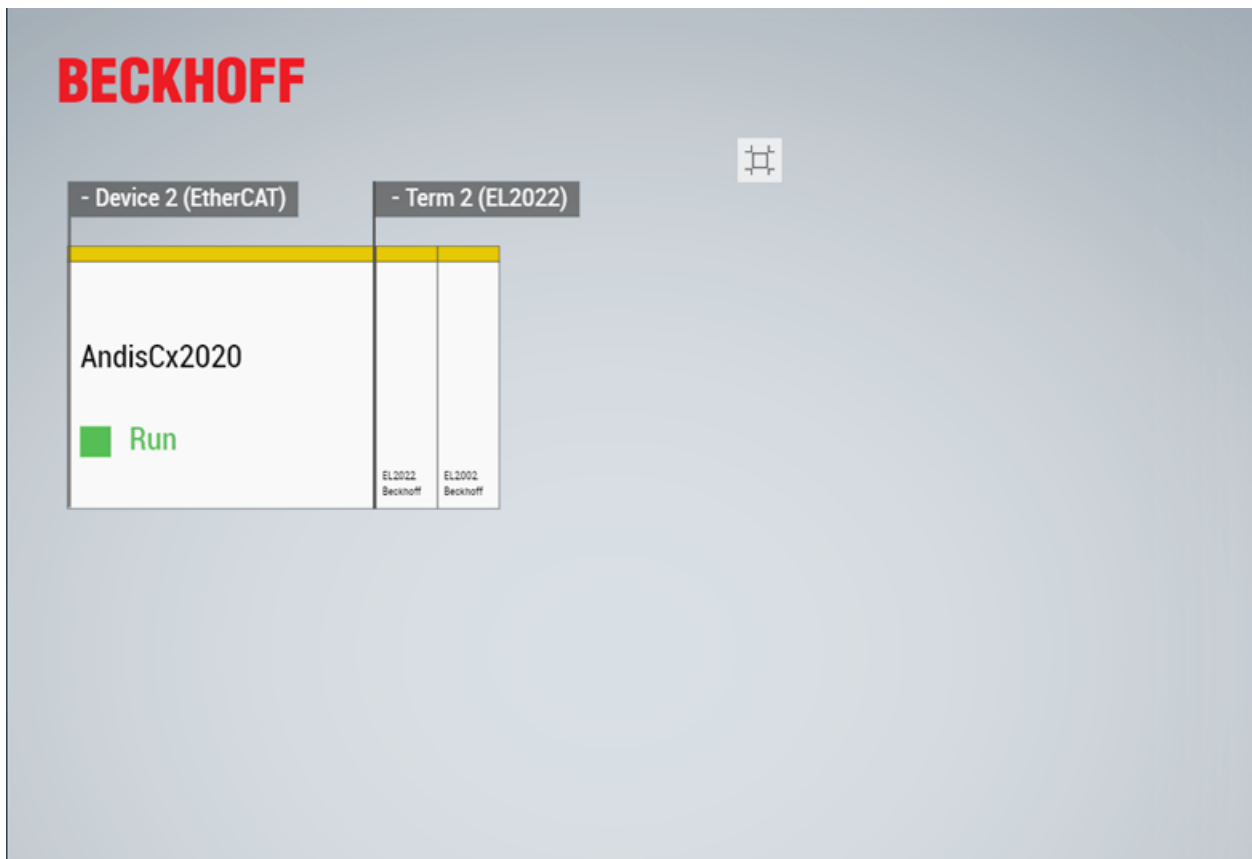
### 11.4.1 Configuration

#### Configuring the EcDiagnostics control

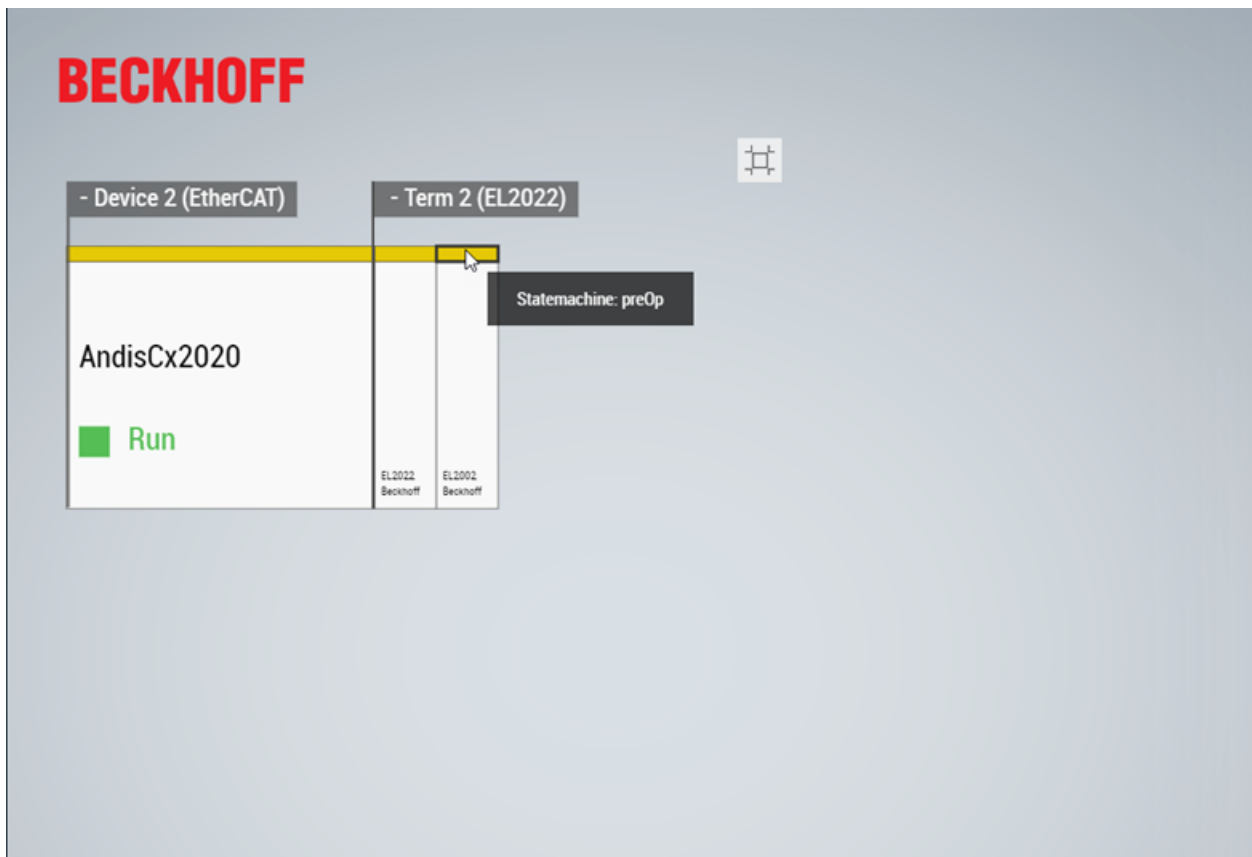
1. After installing the “Beckhoff.TwinCAT.HMI.EcDiagnosticsControl” package, add the control to the Designer using drag and drop.
2. Establish the connection to the server extension configuration in **Control Properties > Common** via the “Device” parameter by entering the name of the configuration here.
3. Test the control in Live View. The diagnostic data is also available there.

#### EcDiagnostics Control Overview

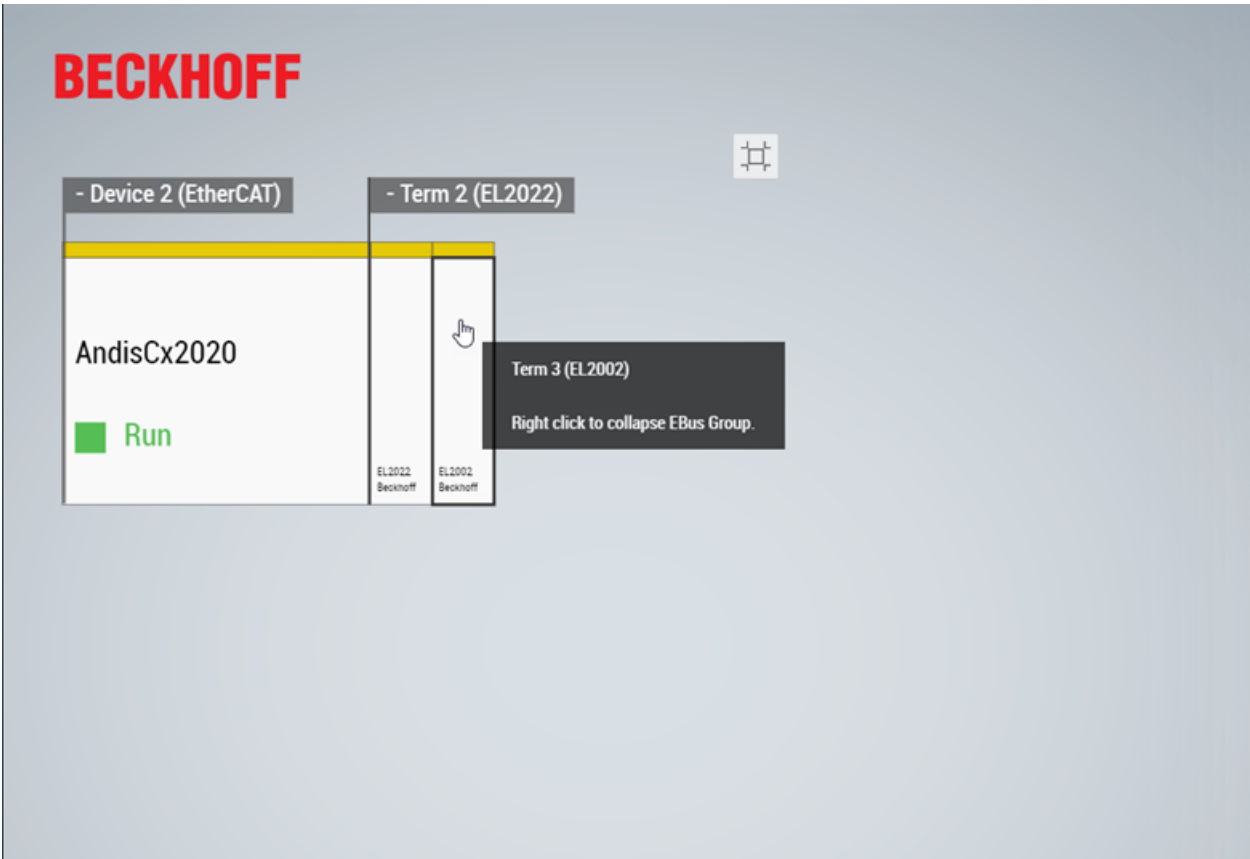
The defined EtherCAT masters and the connected elements are displayed in the control.



The status color at the top of the elements indicates their state.



The tooltip displays additional information about the elements.



You can get additional information by double-clicking on the respective element. Here you can also set values for terminals or read the online values.

BE

- De

And

Term 3 (EL2002)

A

B

EL2002  
Beckhoff

EtherCAT

Online

Ports

General

Name: Term 3 (EL2002)

Type: EL2002

Vendor: Beckhoff Automation GmbH & Co. KG

EtherCAT Addr: 1002

Auto Inc. Addr: 65535

Identity

Vendor Id: 2

Product Code: 131215442

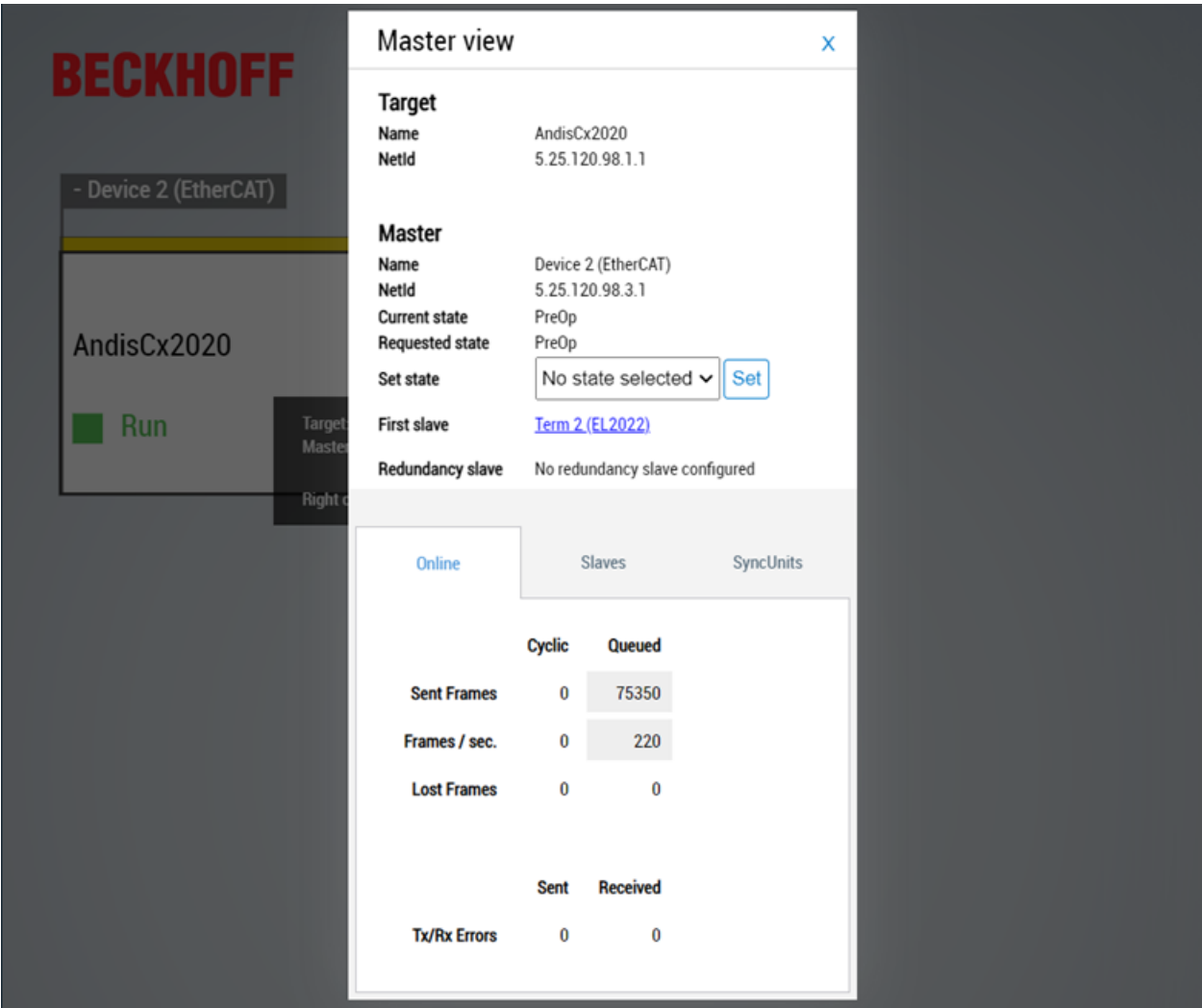
Revision No.: 1048576

Serial No.: 0

Processdata (Input: 0, Output: 2)

Name	Type	Size	Value	Prepared value	Apply all	Force all	Release all
Channel 1							
Output	BIT	1	FALSE		Apply	Force	Release
<div>truefalse</div>							
<div>false</div>							
Channel 2							





## 11.5 Event Grid

The Event Grid control is a control for the tabular display of alarms and messages. The filter of the control is predefined for the [Alarm](#) [► 1136] and [EventLogger](#) [► 1149] extension. Accordingly, the messages/alarms from both extensions, if available, are displayed in the control. Alarms can be confirmed directly in the control.

0

16

5

11

0

0

0

			Raised ▾	Text ▾
1			1/13/2025, 2:57:42.670 PM	Starting server version 14.3.79.0
2			1/13/2025, 2:57:42.313 PM	Error while checking the status of runtime PLC1 (127.0.0.1.1.1): ERR_TARGETPORTNOTFOUND (0x00000000)
3			1/13/2025, 2:57:42.265 PM	Connected to the local TwinCAT system
4			1/13/2025, 2:57:42.253 PM	Checking for connected TwinCAT license dongles
5			1/13/2025, 2:57:42.169 PM	Domain 'ADS' initialized
6			1/13/2025, 2:57:42.169 PM	The temporary events of the 'ADS' domain were reset.
7			1/13/2025, 2:57:41.821 PM	Listening at http://127.0.0.1:3001
8			1/13/2025, 2:57:41.818 PM	Listening at http://127.0.0.1:13001
9			1/13/2025, 2:57:41.816 PM	The temporary events of the 'TcHmiUserManagement' domain were reset.
10			1/13/2025, 2:57:41.813 PM	Domain 'TcHmiUserManagement' initialized
11			1/13/2025, 2:57:41.614 PM	Domain 'TcHmiLua' initialized
12			1/13/2025, 2:57:41.614 PM	The temporary events of the 'TcHmiLua' domain were reset.

API of the [Event Grid](#) [[▶ 285](#)] control.

i

Available since version 1.10.

### 11.5.1 Configuration

The Event Grid control is located in the Toolbox under the category **Beckhoff**, from where you can insert it into an HMI page by drag and drop.

3

4

0

4

2

1

0

			Raised	Text	Confirmed	Cleared
1			6/6/2018, 10:17:26 AM	Process started		
2			6/6/2018, 10:17:21 AM	Process stopped		6/6/2018, 10:17:27 AM
3			6/6/2018, 10:17:20 AM	Process started		
4			6/5/2018, 10:38:43 PM	Error 1		6/5/2018, 10:39:20 PM
5			6/5/2018, 10:38:43 PM	Warning 1		6/5/2018, 10:38:43 PM
6			6/5/2018, 10:38:43 PM	Information 1		
7			6/5/2018, 10:38:43 PM	Information 1		

Apart from the tabular display of the alarms and messages, the control offers various configuration options in the engineering and during the runtime in the browser.

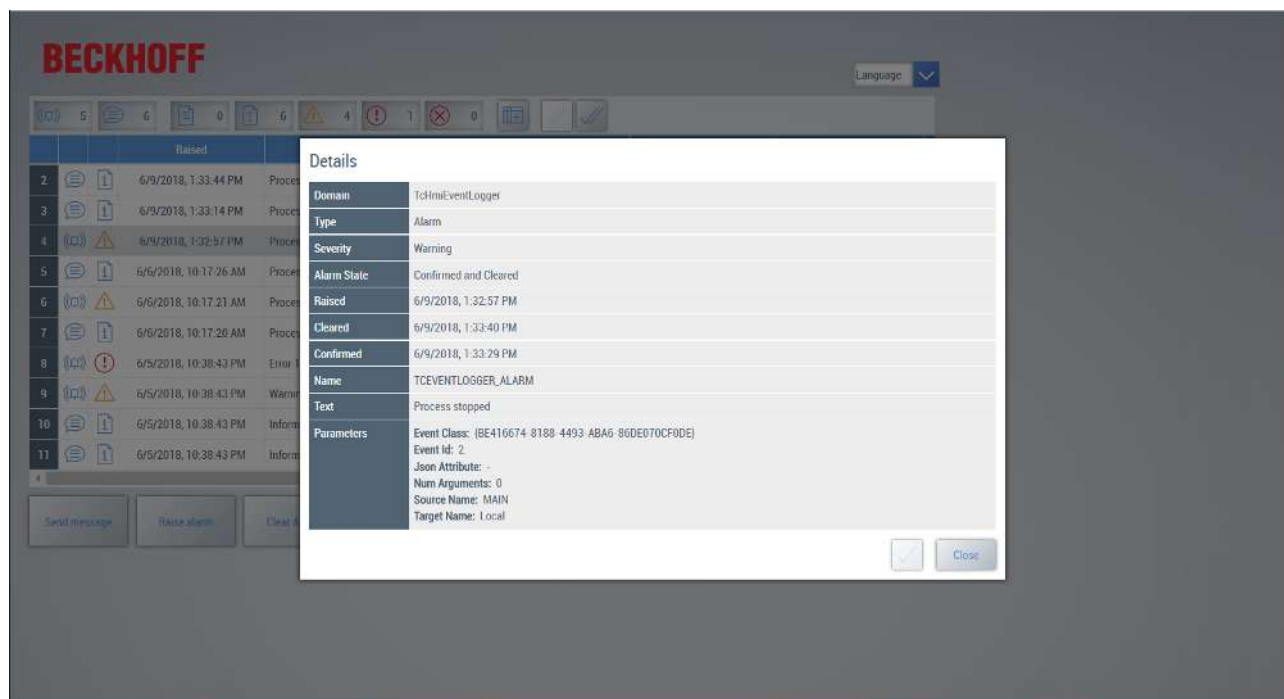
#### Detailed view

A detailed view can be called for each message and alarm in the Event Grid. The detailed view is opened by selecting a row in the Event Grid and double-clicking on the row. The detailed view provides additional information about the event.

1078

Version: 2.11.0

TE2000



## Filter

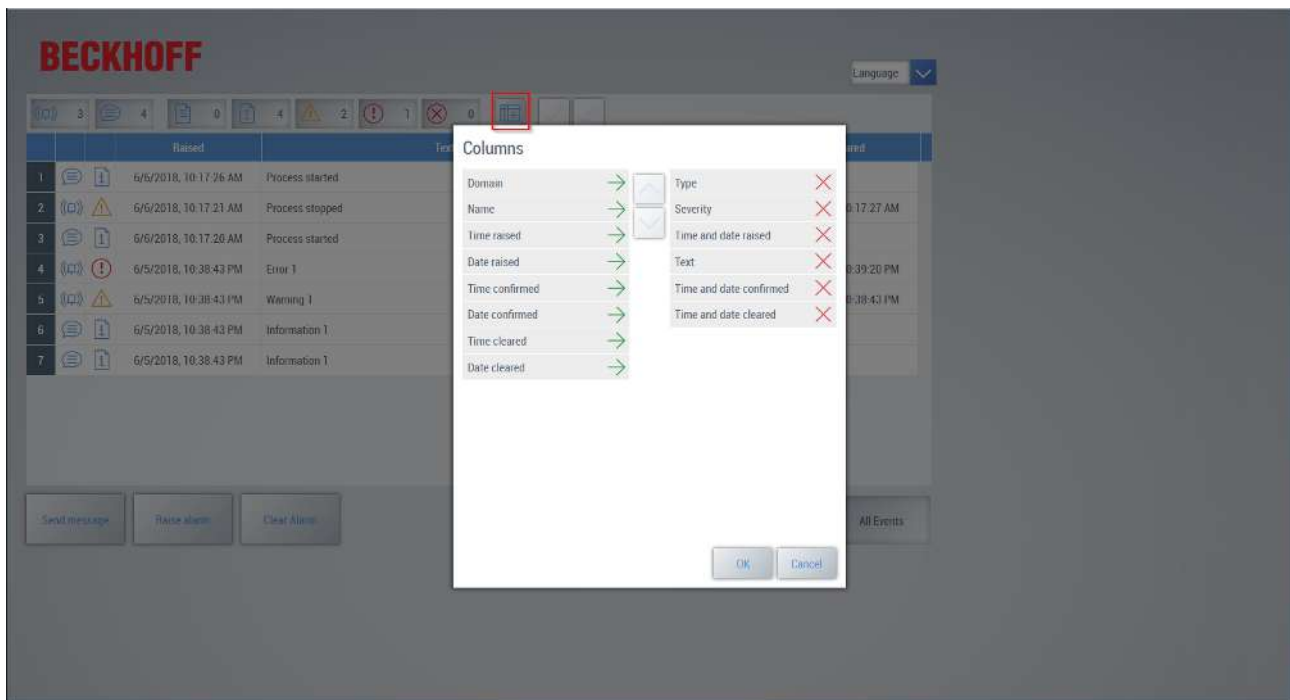
Filters enable the display of alarms and messages according to certain criteria. It is possible, for example, to display only active alarms or to filter according to a certain time period. The filters can be configured under [Filter \[► 292\]](#) in the control's properties.

You can switch between different filters at runtime by calling a [WriteToSymbol \[► 65\]](#) for the filter of the Event Grid. Alternatively, you can use various filter settings via the control's [menu bar \[► 304\]](#).

## Columns

The configuration of the columns defines which columns are displayed in the Event Grid control. By default the type (alarm or message), the severity, the timestamp of the input and the associated text are displayed. Further columns such as the time of the confirmation can be configured in the [control's properties \[► 293\]](#). The settings apply to all clients.

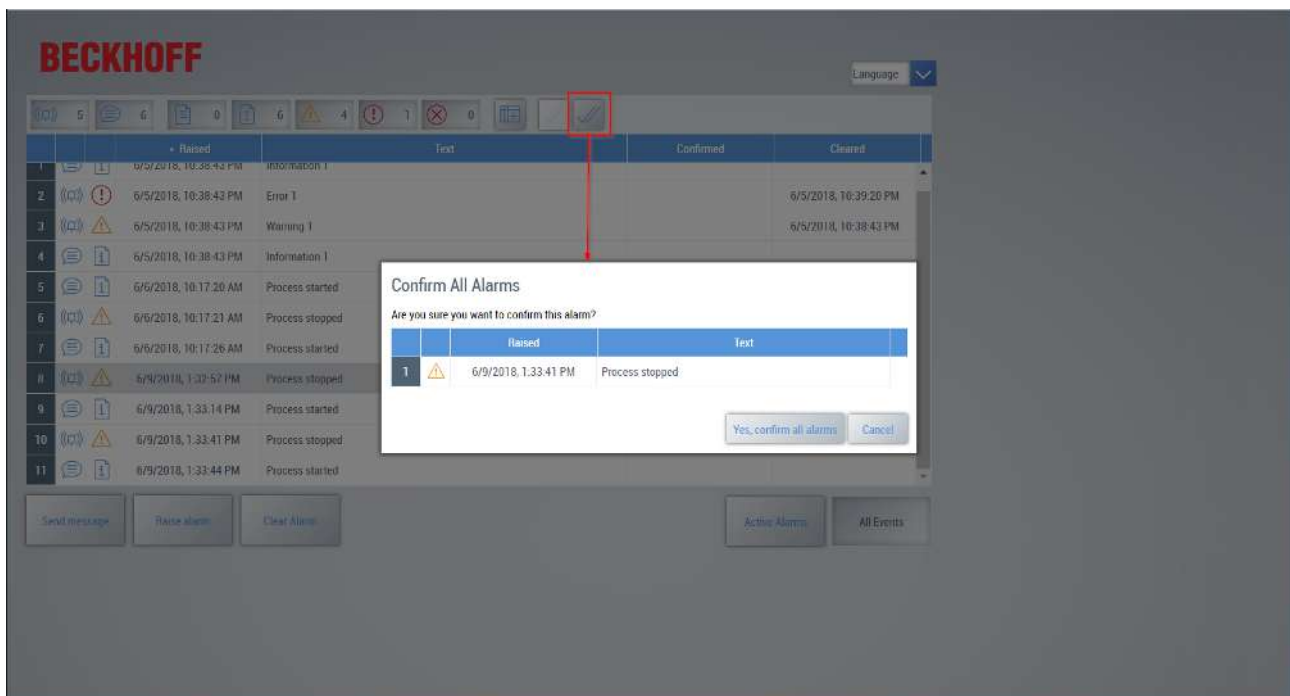
There is an option at runtime to change the columns displayed per client. To do this, open the column editor from the [menu bar \[► 304\]](#). The column editor automatically opens a popup with an overlay and positions itself in the center of the view:



### Confirming an alarm

An alarm can be confirmed by selecting the row containing the alarm and clicking on the button **Confirm alarm** (single check mark) in the menu bar [► 304].

If several alarms are active, there is an option to confirm all alarms simultaneously. To do this, click on the button **Confirm All Alarms** (two check marks) in the menu bar [► 304]. A popup with an overlay then opens automatically and displays all active alarms. At this point, you have the option of canceling the dialog or confirming all active alarms.



### Restricting rights

Within the context of an authorization system it may be useful to allow only certain operators to access the Event Grid. In addition, individual operators may be assigned rights to confirm the events. Rights are configured in TwinCAT HMI at two levels (see User Management [► 963]).

At control level the configuration right (configuration at runtime) and the right to a detail view can be granted [► 303] explicitly in addition to the standard rights for the Event Grid.

The right to confirm the alarms can be granted at symbol level. To do this, open the Permissions Management [► 973] in the expert view.

Symbol	Symbol Access		_SystemAdministrators			_SystemGuests			_SystemUsers		
	Read	Write	Read	Write	Group	Read	Write	Group	Read	Write	Group
	<input type="checkbox"/>	<input type="checkbox"/>	Default: <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	Toggle all: <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ConfirmAlarm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

### Further configuration options

Further configuration options for the Event Grid control can be found under Event Grid [► 285].

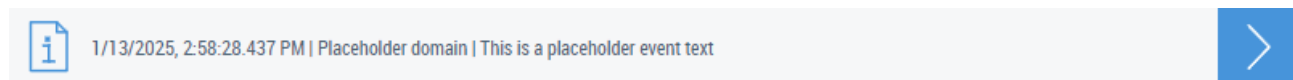
### Example

An example of the use of the EventLogger with the Event Grid: Example [► 1580]

The example shows two different configuration options for the Event Grid and the associated PLC project, in which example alarms and messages can be generated.

## 11.6 Event Line

The Event Line control is a control for displaying alarms or messages. The filter of the control is predefined for the Alarm [► 1136] and EventLogger [► 1149] extension. Accordingly, the messages/alarms from both extensions, if available, are displayed in the control.



API of the Event Line [► 305] control.



Available since version 1.12.748.0.

### 11.6.1 Configuration

There are several parameters for configuring the EventLine control:

#### Message Format:

The message format is set in the Message Format. Individual text blocks can be added, removed or changed in the display sequence.

#### Target Region:

In order to ensure fast page switching on a click, the region in which the content from "Target Content" is to be displayed can be set directly here.

**Target Content:**

To ensure fast page switching on a click, the content to be opened can be set directly here, which should be displayed in the region from "Target Region".

**Filter:**

A filter can be defined for the control in order to filter for specific messages. This will then only display the desired messages.

**Sorting:**

Sorting is used to define which message is to be displayed in the EventLine. A sort sequence is defined. Only the message at the top of the list is displayed.

**Server Interval:**

With the server interval, it is possible to change the query interval in order to receive messages faster or slower. A faster interval results in greater utilization and is therefore not recommended for small controllers.

**Show Message If Empty:**

Enable "Show Message If Empty" to receive textual feedback if no message is found. Without this option, the text field in the control remains empty.

## 11.7 Indicator Light

The Indicator Light control is used for the simple display of a Boolean value.



The control is included in the NuGet package Beckhoff.TwinCAT.HMI.Industries.Common >= 14.3. The package can be installed via TcPkg (TwinCAT.HMI.Industries.Common) or nuget.org.

### 11.7.1 Configuration

Configuration of the Indicator Light control.

**Integration:**

Several settings can be made on the Indicator Light control.

**State Symbol:** Specifies the symbol that generates a state change. Only symbols are permitted and no direct values. This is a reading symbol.

## 11.8 Motion Control


Motion Control is used for simple control of axes. This makes the control suitable for simple movement or optimization of axes. The built-in functions can be used to position the axis or perform a reversing sequence (NC mode). The control also offers an error display so that messages from the axis can be displayed directly.

Axis 1

Online

Functions

Error Log



438.08 mm  
0.00 mm/s

Setpoint Position  
438.08 mm

Setpoint Velocity  
0.00 mm/s

Lag Distance (min/max)  
0.00 (0.00, 0.00) mm

Total / Control Output  
0.00% / 0.00%

Error  
0 (0x0)

Target Position  
0 mm

Target Velocity  
0 mm/s

Status (log.)  
☒ Ready  
☐ Calibrated  
☐ Has Job  
☒ NOT Moving  
☐ Move Fw  
☐ Move Bw

Status (phys.)  
☐ Coupled  
☒ In Target Pos.  
☒ In Pos. Range

Enabling  
☐ Feed Fw  
☐ Feed Bw  
☐ 0 % Override  
☐ Controller  

All

Set

--

-

+

++

Start

Stop

Reset

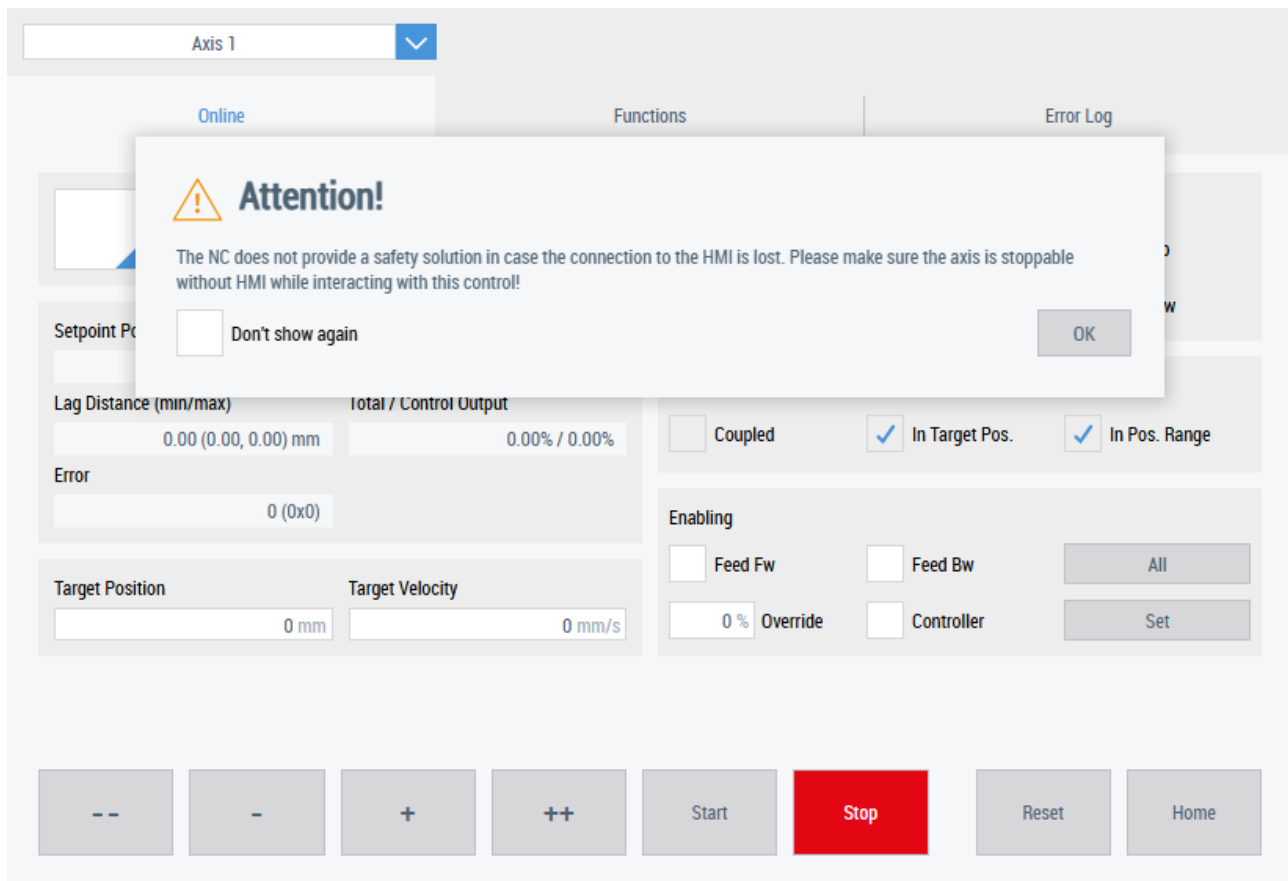
Home



The control is included in the NuGet package Beckhoff.TwinCAT.HMI.Motion >= 14.1.15. The package can be installed via TcPkg (TwinCAT.HMI.Motion) or nuget.org.

⚠ CAUTION

**No safe axis stop**  
This control has no safety function to stop an axis safely. This is the responsibility of the user. Therefore, the control points this out again.



### 11.8.1 Configuration

Configuration of the Motion Control.

#### Integration:

The integration can be made via two interfaces, whereby the PLC interface overwrites the NC interface if both are configured at the same time. In order to use the control, an interface must be used.

**NC:** Establishes a connection via ADS directly to the NC. You can switch between the individual axes within the NC task via dropdown. In addition, the direct NC integration has several functionalities such as a "Reversing Sequence" in addition to the normal control. The attributes are located under the "Common" category in the properties window of the control:

- **Main NC:** Connects the control directly to the Main NC. To do this, a new connection must be established in the ADS extension to the Main NC (default port: 500) with the name entered here.
- **NC task:** Connects the control directly to an NC task. To do this, a new connection must be established in the ADS extension to the NC task (default first task port: 501) with the name entered here.

**PLC:** Establishes a connection to the NC via PLC function blocks. Only one axis can be selected directly here. This type of integration only has an absolute function in addition to the normal control. The attributes are located under the "PLC" category in the properties window of the control:

- **AXIS\_REF:** Reference to the axis to be controlled. This is required to read information about the axis.
- **MC\_Halt:** Function block for stopping the axis.
- **MC\_Home:** Function block for referencing an axis.
- **MC\_MoveAbsolute:** Function block for executing an absolute movement of the axis.
- **MC\_MoveVelocity:** Function block to execute a continuous movement of the axis.
- **MC\_Power:** Function block to enable the axis.
- **MC\_Reset:** Function block for resetting axis errors.



**NOTICE****Loss of function**

When using the PLC interface, all function blocks must always be linked. Otherwise, some functionalities cannot be used or the control has no function.

**NOTICE****Linked function blocks of the PLC always have priority for the integration of the HMI**

If, for example, a value such as an enable is written from the PLC via an MC\_Power function block, it cannot be overwritten by the HMI.

**The control:**

The control is divided into three different tabs.

The dropdown for selecting the axes is only available in NC mode.

**Online:**

All important information about the axis can be seen in the Online tab. Enablings or movements ( ) can be executed. In addition, detailed information on the movement of the axis such as status, set/actual position or lag distance is listed. This makes it easy to set an axis in motion.

Axis 1

Online      Functions      Error Log

438.08 mm  
0.00 mm/s

Setpoint Position: 438.08 mm  
Setpoint Velocity: 0.00 mm/s  
Lag Distance (min/max): 0.00 (0.00, 0.00) mm  
Total / Control Output: 0.00% / 0.00%  
Error: 0 (0x0)

Target Position: 0 mm  
Target Velocity: 0 mm/s

Status (log.)  
☒ Ready    ☐ Calibrated    ☐ Has Job  
☒ NOT Moving    ☐ Move Fw    ☐ Move Bw

Status (phys.)  
☐ Coupled    ☒ In Target Pos.    ☒ In Pos. Range

Enabling  
☐ Feed Fw    ☐ Feed Bw      
 Override    ☐ Controller   

--    -    +    ++    Start    **Stop**    Reset    Home

**Functions:**

Various axis functions can be executed in the Functions tab. Only "Absolute" is available for an axis in PLC mode. For an axis that is connected via the NC, the same functions are available as in the System Manager. This allows functions such as "Reversing Sequence" to be used to move an axis back and forth between two positions. This could be interesting for optimizing the axis or for test movements. Depending on the function selected, the associated parameters under the dropdown will change.

Axis 1

▼

Online

Functions

Error Log

438.08 mm

0.00 mm/s

StartMode

Absolute

▼

Target Position

0 mm

Target Velocity

! 0 mm/s

Acceleration

0 mm/s²

Deceleration

0 mm/s²

Jerk

0 mm/s³

Error

0 (0x0)

Start

Stop

Error Log:

The axis errors are displayed in the Error Log tab. The display of axis errors enables quick countermeasures to be taken.

Axis 1

▼

Online

Functions

Error Log

Code	Domain	Reason
No elements were received due to the current configuration.		

Clear

## 11.8.2 Quick start

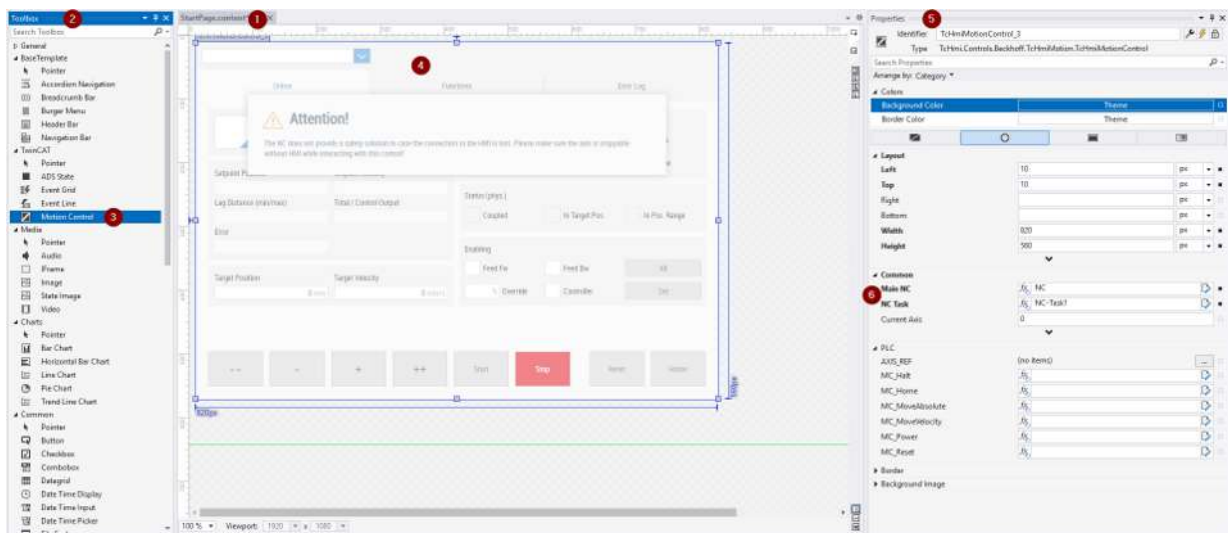
To start, create or open a TwinCAT HMI project

### Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.Motion" via the [NuGet Package Manager](#) [► 1041].

### Adding the control.

1. Open a View, Content or UserControl
2. Open your toolbox
3. Use drag and drop to add the Motion Control from your toolbox to the open View, Content or UserControl.
4. Select the newly added control.
5. Open the Properties window.
  - ⇒ Under the **Common** group, you will find the **Main NC** and **NC Task** parameters.
6. Set the **Main NC** and **NC Task** parameters. Use the existing names or adapt them. ("Main NC" = NC, "NC Task" = NC-Task1)



⇒ The control has been successfully configured.

### Configuring the ADS interface

1. Open the server configuration page
2. Go to the ADS tab.
  - ⇒ All configurations of the ADS interface are displayed here.
3. Open the subitem Runtime.

⇒ All configured runtimes are displayed here.

**TcHmiSrv** **ADS** TcHmiLua TcHmiSqliteLogger TcHmiUserManagement

**Laufzeiten**  
Zu allen aktiven Laufzeiten wird eine ADS-Verbindung hergestellt.  
Kann für spezielle Remote-Konfigurationen gesetzt werden.

**NC**

- ☐ Aktiv: true
- ☐ AmsNetId: 127.0.0.1.1.1
- ☐ Port: 500
- ☐ Nutze Whitelisting: false
- ☐ Nur Lesezugriff erlauben: false  
Verhindert den Schreibzugriff auf Variablen und Set-Properties sowie alle Methodenaufrufe.

**NC-Task1**

- ☐ Aktiv: true
- ☐ AmsNetId: 127.0.0.1.1.1
- ☐ Port: 501
- ☐ Nutze Whitelisting: false
- ☐ Nur Lesezugriff erlauben: false  
Verhindert den Schreibzugriff auf Variablen und Set-Properties sowie alle Methodenaufrufe.

**PLC1**

**TcSysService**

**+ Laufzeit hinzufügen**

**Timeout**: PT1S  
Standard-Timeout für ADS-Anfragen.

Paketversion: 14.3.208.0, Produktversion: 14.3.208.0, Konfigurationsversion: 1.0.1.3

4. Insert the corresponding ADS runtimes for Motion Control. Use the names that you entered in the control configuration.

Default values:

**Main NC:** "NC" Port 500

**NC Task:** "NC-Task1" Port 501

⇒ The configuration of the ADS extension is complete.

## Displays

1. Start the LiveView.
2. Go to the corresponding page where you have placed the control.

⇒ The control is displayed with the corresponding configuration.

The screenshot shows the 'Axis 1' control interface. At the top, there's a dropdown menu for 'Axis 1'. Below it, there are three tabs: 'Online', 'Functions', and 'Error Log'. The 'Online' tab is active, displaying a large digital readout (DRO) showing '438.08 mm' and '0.00 mm/s'. To the right of the DRO, there's a 'Status (log.)' section with checkboxes for 'Ready' (checked), 'Calibrated', 'Has Job', 'NOT Moving' (checked), 'Move Fw', and 'Move Bw'. Below the DRO, there are input fields for 'Setpoint Position' (438.08 mm), 'Setpoint Velocity' (0.00 mm/s), 'Lag Distance (min/max)' (0.00 (0.00, 0.00) mm), and 'Total / Control Output' (0.00% / 0.00%). There's also an 'Error' field showing '0 (0x0)'. At the bottom, there are input fields for 'Target Position' (0 mm) and 'Target Velocity' (0 mm/s). To the right of the input fields, there's an 'Enabling' section with checkboxes for 'Feed Fw', 'Feed Bw', '0 % Override', and 'Controller', along with 'All' and 'Set' buttons. At the very bottom, there are several control buttons: '--', '-', '+', '++', 'Start', 'Stop' (highlighted in red), 'Reset', and 'Home'.

## 11.9 Parameters and Functions

The Parameter and Functions control is used to display the data from the [System Engineering \[► 1272\]](#) extension. PLC variables are automatically mapped to the HMI in this extension. The control adopts these symbols and displays them. These can be parameters or functions.

The screenshot shows the 'Machine' control interface. On the left, there's a sidebar with a tree view showing the machine structure: 'Machine' (expanded), 'Infeed Container', 'Infeed Food', 'Inspection', 'Labeling', 'Unwinding', 'Outfeed', and 'Sealing'. The main area displays a table of parameters and functions. The table has columns for 'Symbolname', 'Value', and 'Prepared Value'. There are also buttons for 'Apply all', 'Apply', and 'History'. The table contains two entries: 'Machine name' with a value of 'Test' and 'Machine version' with a value of '1.0.0.1'. Both entries have a 'Click here to edit.' button. Below the table, there's a search bar with the text 'Type in anything you want to find.'.

API of the [Parameters and Functions \[► 483\]](#) control



The control is included in the NuGet package Beckhoff.TwinCAT.HMI.SystemEngineeringUtils >= 14.2. The package can be installed via TcPkg (TwinCAT.HMI.SystemEngineeringUtils) or nuget.org.

## 11.9.1 Configuration

### Show all

In the **Show all** area, all symbols available in the control are displayed in a large list. This makes it easier to search for symbols whose exact nesting is unclear.

### No changes

The **No changes** tab changes its text as soon as symbols for writing a new value are available. It shows a list of all symbols that have been prepared for writing to the PLC

### Import symbols

**Import symbols** can be used to re-insert the machine parameters from an export file.

### Export symbols

**Export symbols** exports all current values of the symbols persisted in the extension to a JSON file. This can be used to insert default parameters in standard machines or to save the current machine status.

### Config runtime

**Config runtime** shows which runtime is accessed in the System Engineering extension.

### Update PLC symbols

Clicking on **Update PLC symbols** triggers a reload of the configuration. This is necessary if no automatic update has been enabled in the background. If the structure in the PLC is changed, this does not automatically lead to an adjustment of the data in the control. During the update, an overlay opens to display the current status of the update.

### Navigation

The navigation, which is automatically generated by attributes in the PLC, is located in the lower area. You will see a lock next to the name if the appropriate authorization has been granted. You can use the lock to configure the authorization of the user groups for the individual symbols.

```
PROGRAM MAIN
VAR
  {attribute 'TcHmiSystemEng.Parameter.Name'           := 'Machine'}
  {attribute 'TcHmiSystemEng.Parameter.TreeViewImage'  := 'Portal/normal.svg'}
  fbMachine                                           : FB_MachineUnit;
END_VAR
```

The lock on the right-hand side of the navigation is used to set the read and write authorization. Clicking opens a pop-up for the corresponding level with its symbols. This setting can be enabled or disabled for the relevant users via the user management.

## 11.9.2 Machine parameters

The machine parameters are required to define the machine. Parameters that need to be adjusted for each machine can be entered here. These parameters are persisted in the background by the System Engineering Extension. When the TwinCAT 3 HMI server is started, the parameters are written to the PLC. This allows for quick and easy commissioning or maintenance of the individual areas of the machine.

Symbolname	Value	Prepared Value	
<input type="text" value="Type in anything you want to find."/>			
<b>Machine name</b> ⇨ Runtime1::PLC1::MAIN::fbMachine::_sMachineName ⓘ Enter the name from the machine	Test	Click here to edit.	<input type="button" value="⌂ Apply"/> <input type="button" value="📖 History"/>
<b>Machine version</b> ⇨ Runtime1::PLC1::MAIN::fbMachine::_sMachineVersion ⓘ Enter the version from the machine	1.0.0.1	Click here to edit.	<input type="button" value="⌂ Apply"/> <input type="button" value="📖 History"/>

### Search

There is a **search bar** at the top of the control that can be used to search for machine parameters. The locations found are highlighted in yellow. Entries that do not match the search are hidden.

### Symbolname

The name defined in the PLC using attributes ('TcHmiSystemEng.Parameter.Name') is used as the **Symbolname**. In addition, the symbol path within the PLC and an info text ('TcHmiSystemEng.Parameter.Info') are displayed. The symbol path can be hidden via an attribute on the control.

### Value

The current values of the variables within the PLC are displayed in the **Value** column.

### Prepared Value

The corresponding variables can be prepared for a change in **Prepared Value**. By clicking the **Edit** button, the required control is loaded and pre-initialized with the current value. The pre-initialization function can be disabled on the control via an attribute. If it is a value with Min ('TcHmiSystemEng.Parameter.Min') and/or Max ('TcHmiSystemEng.Parameter.Max') values, these are validated during input. The limits are also displayed on the input control.

### Apply

The **Apply** button can be used to write the values defined in Prepared Value to the PLC. This can be done individually using the corresponding button in the same line or collectively using the **Apply all** button.

### History

**History** is only available in connection with the [Audit Trail](#) [► 1175] Extension. All changes to the value from the HMI to the PLC are logged here. You can use the **History** button to view the change history for the corresponding variable.

## 11.10 Push Button

The Push Button control is used for simple control of a Boolean value. This is a simple switch. The mode can be set between latching and non-latching.





The control is included in the NuGet package Beckhoff.TwinCAT.HMI.Industries.Common  $\geq 14.3$ . The package can be installed via TcPkg (TwinCAT.HMI.Industries.Common) or nuget.org.

## 11.10.1 Configuration

Configuration of the Push Button control

### Integration:

Several settings can be made on the Push Button control.

**State symbol:** Specifies the symbol that is switched when clicked. Only symbols are permitted and no direct values. A TwoWayBinding is not required, the symbol is automatically used for reading and writing.

**Tap mode:** Specifies whether the control signal toggles or taps.

## 11.11 Power Button

The Power Button control is used for simple control of a Boolean value. This is a simple switch. The mode can be set between latching and non-latching.



The control is included in the NuGet package Beckhoff.TwinCAT.HMI.Industries.Common  $\geq 14.3$ . The package can be installed via TcPkg (TwinCAT.HMI.Industries.Common) or nuget.org.

### 11.11.1 Configuration

Configuration of the Power Button control

#### Integration:

Several settings can be made on the Power Button control.

**State symbol:** Specifies the symbol that is switched when clicked. Only symbols are permitted and no direct values. A TwoWayBinding is not required, the symbol is automatically used for reading and writing.

**Tap mode:** Specifies whether the control signal toggles or taps.

## 11.12 Rocker Switch

The Rocker Switch control is used for simple control of a Boolean value. This is a simple switch. The mode can be set between latching and non-latching.







The control is included in the NuGet package Beckhoff.TwinCAT.HMI.Industries.Common >= 14.3. The package can be installed via TcPkg (TwinCAT.HMI.Industries.Common) or nuget.org.

---

### 11.12.1 Configuration

Configuration of the Rocker Switch control

#### Integration:

Several settings can be made on the Rocker Switch control.

**State symbol:** Specifies the symbol that is switched when clicked. Only symbols are permitted and no direct values. A TwoWayBinding is not required, the symbol is automatically used for reading and writing.

**Tap mode:** Specifies whether the control signal toggles or taps.

**Orientation:** Specifies the orientation with which the control is to be displayed.

## 11.13 Rotary Switch

The Rotary Switch control is used for simple control of a Boolean value. This is a simple switch. The mode can be set between latching and non-latching.



The control is included in the NuGet package Beckhoff.TwinCAT.HMI.Industries.Common >= 14.3. The package can be installed via TcPkg (TwinCAT.HMI.Industries.Common) or nuget.org.

---

### 11.13.1 Configuration

Configuration of the Rotary Switch control

#### Integration:

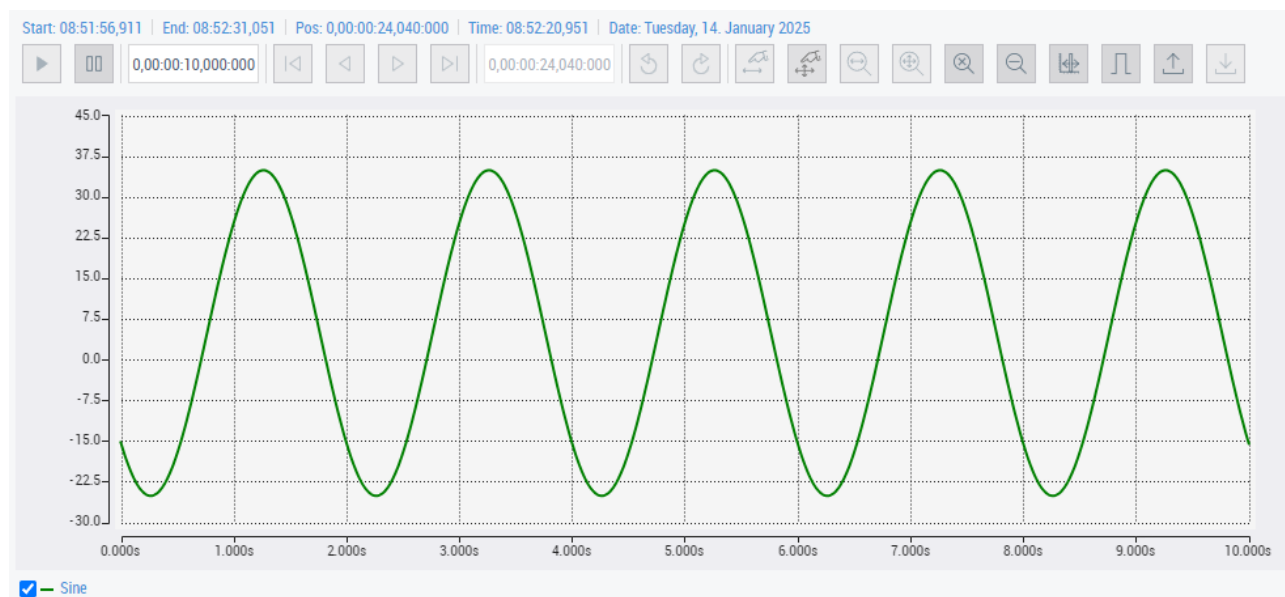
Several settings can be made on the Rotary Switch control.

**State symbol:** Specifies the symbol that is switched when clicked. Only symbols are permitted and no direct values. A TwoWayBinding is not required, the symbol is automatically used for reading and writing.

**Tap mode:** Specifies whether the control signal toggles or taps.

## 11.14 Scope

The Scope control is used to integrate the TwinCAT Scope into the HMI. The [Scope \[► 1264\]](#) extension is used to query the corresponding data from the scope and forward it to the control for display.



API of the `scope [► 582]` control.



To use the TwinCAT HMI Scope Extension, TwinCAT 3 HMI Scope (TF2300) or TwinCAT 3 Scope View Professional (TE1300) is required in combination with a license for the TwinCAT 3 HMI Scope Server (TF3300) on the system on which the TwinCAT HMI Server is running. TF2300 includes TF3300. This also applies to the engineering system (trial licenses are sufficient).



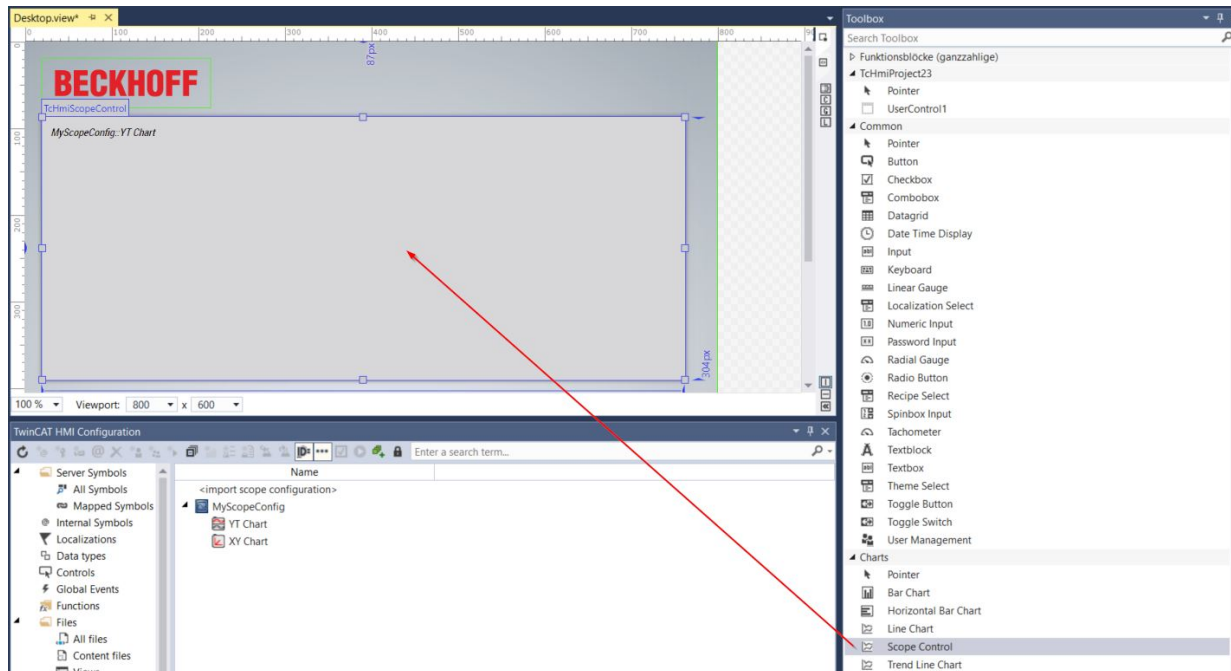
Available since version 1.12.748.0.



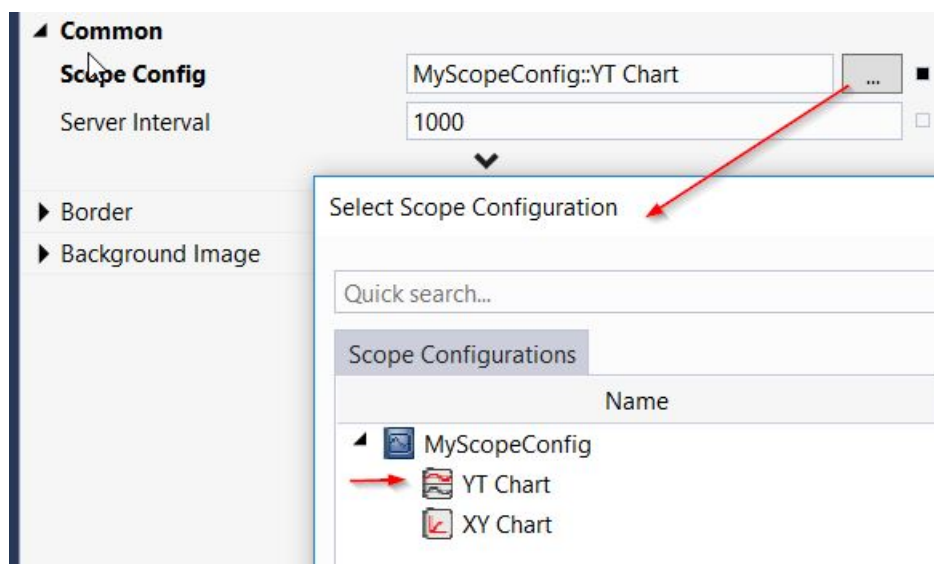
With version 1.12.748.0 the following chart types are supported: YT-Chart, XY-Chart, Single Bar Chart and Array Bar Chart.

## 11.14.1 Configuration

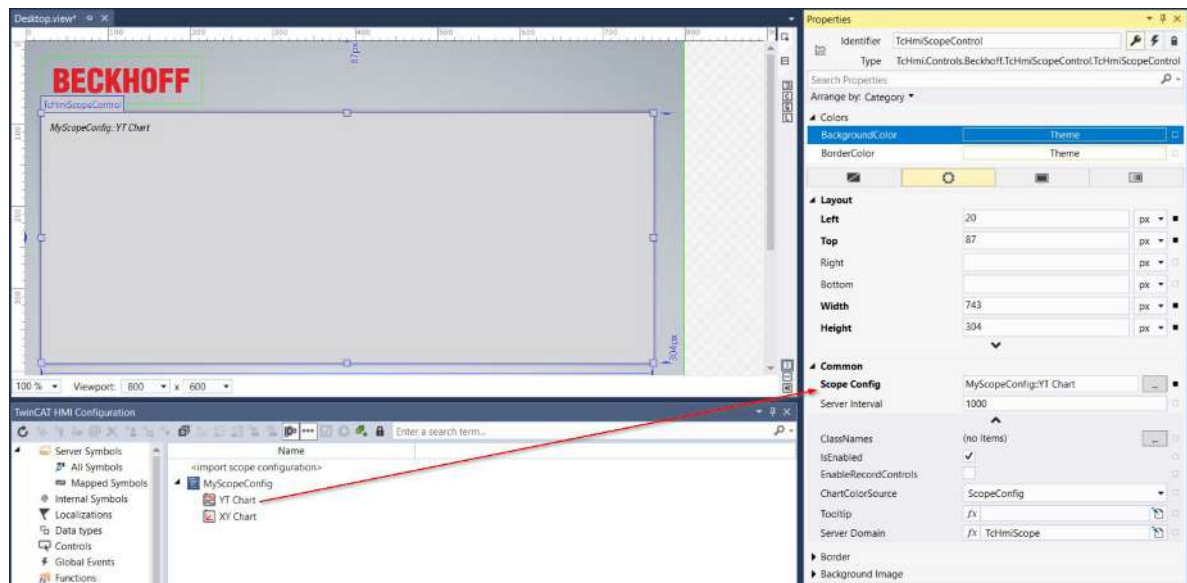
1. Open an HMI page and drop an instance of the TwinCAT HMI Scope Control [► 582]. This can be found in the Toolbox under the category **Charts**.



2. Go to the Properties window [► 60] to configure the control.
3. You can create a link between the Scope chart and the Scope control by linking the attribute "Scope Config [► 590]". Here you have two options:
  - ⇒ Select the chart below your Scope configuration by clicking on the "..." button next to the "Scope-Config" attribute:



- ⇒ Alternatively, you can drag and drop the chart from the [TwinCAT HMI Configuration window \[► 77\]](#) onto the "Scope-Config" attribute:



- ⇒ You can now use the chart in the [LiveView \[► 74\]](#) or in the [Client \[► 949\]](#).

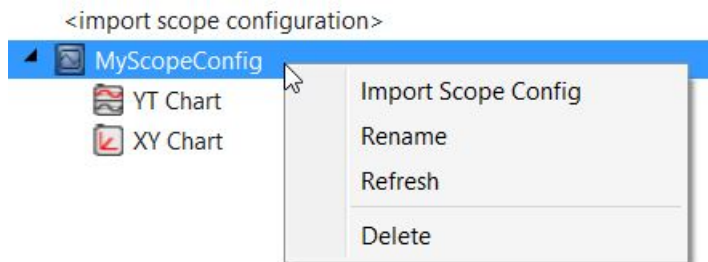
## Configure Scope Charts

The general configuration of the Scope charts (e.g. axes, colors, channels, data sources, etc.) is done in the Scope project. Instructions for this can be found in the [Documentation of the TwinCAT Scope](#).

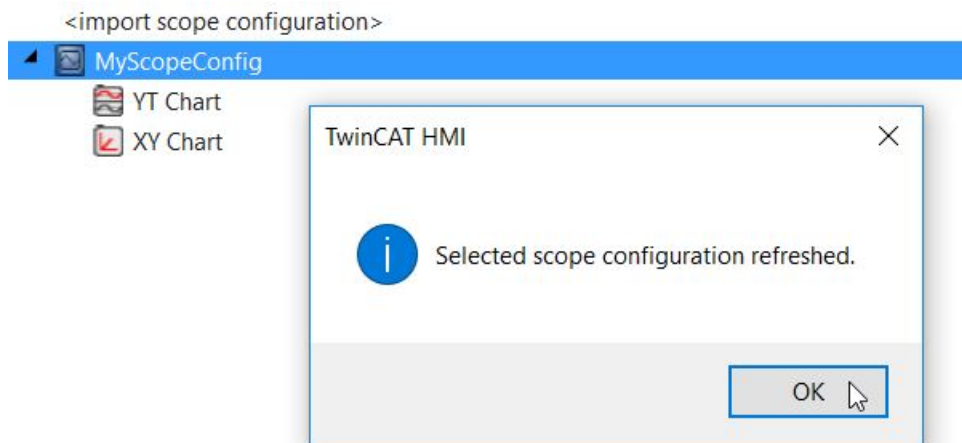


After you have made a change in the Scope project, you must update an already existing Scope configuration in the TwinCAT HMI project.

1. To do this, right-click on the Scope configuration entry in the TwinCAT HMI Configuration window and select **Refresh**.



- ⇒ The configuration has been updated.



## Configure Scope Control

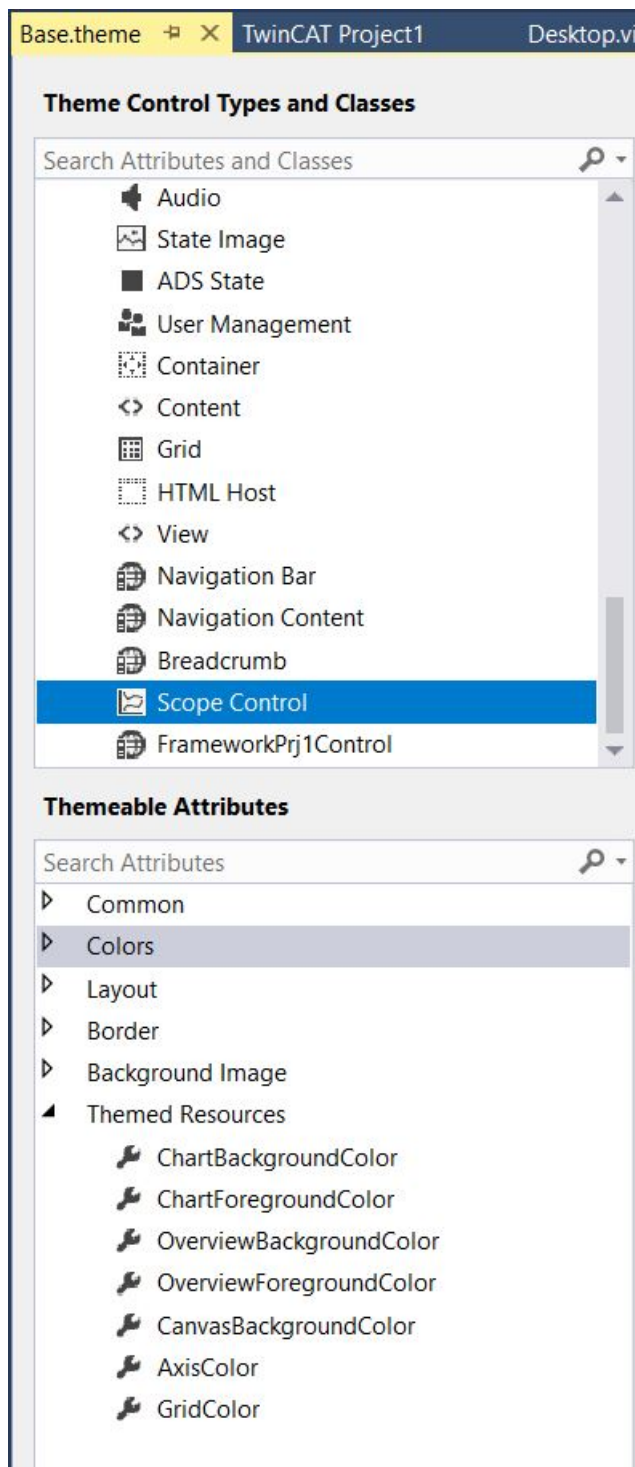
Further setting options are available in the [TwinCAT HMI Scope Control \[► 582\]](#). This can be found in the properties of the control under the category **Common**.

The screenshot shows the 'Common' configuration category for the 'Scope Control'. It contains the following settings:

- Scope Config:** A text field containing 'MyScopeConfig::YT Chart' with a dropdown arrow and a small square icon to its right.
- Server Interval:** A text field containing '1000' with a small square icon to its right.
- ClassNames:** A text field containing '(no items)' with a dropdown arrow and a small square icon to its right.
- IsEnabled:** A checkbox that is checked.
- EnableRecordControls:** A checkbox that is unchecked.
- ChartColorSource:** A dropdown menu showing 'ScopeConfig'.
- Tooltip:** A text field containing 'fx' with a small square icon to its right.
- Server Domain:** A text field containing 'fx TcHmiScope' with a small square icon to its right.

- [Scope Config \[► 590\]](#): Selection of the chart that is displayed in the current control instance. For example, you can create multiple instances of the control to display different charts simultaneously. Alternatively, you can switch the configuration at runtime within the control instance.
- [EnableRecordControls \[► 590\]](#): Specifies whether the start and stop record buttons are displayed in the Scope control.
- [Server Interval \[► 590\]](#): Interval at which the data between the control and the extension is updated.

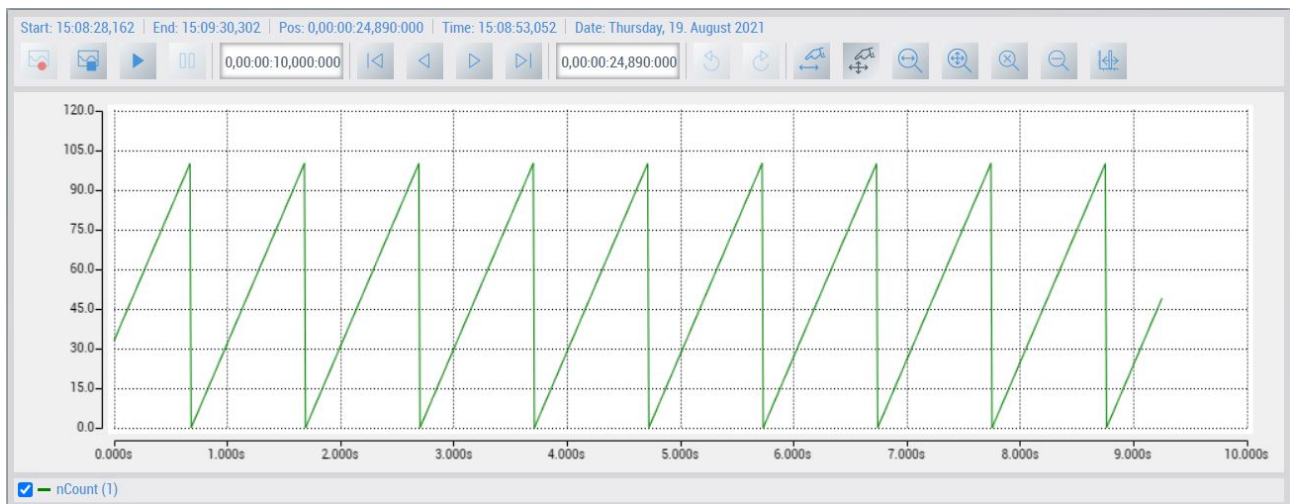
- [ChartColorSource](#) [► 591]: Defines whether the colors of the chart are taken from the Scope project, or whether they are set via the ThemedResources in a [TwinCAT HMI Theme](#) [► 1007].



- [Server Domain](#) [► 590]: Name of the Scope extension that provides the Scope configuration. This attribute usually does not have to be changed.

### Using the Scope Control in the Client

After you have completed the configuration, you can use the Scope in the client. The familiar TwinCAT Scope functionalities are available for analysis.

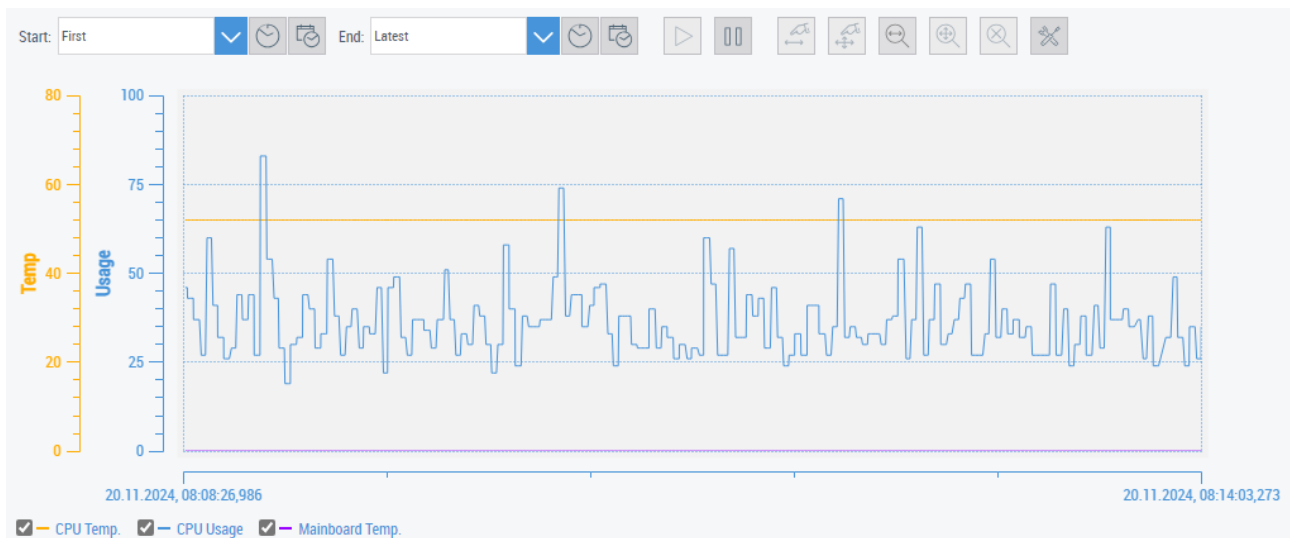


## Sample

A sample of the use of the scope in the TwinCAT HMI can be found in chapter [Samples](#) [► 1581].

## 11.15 Trend Line Chart

The Trend Line Chart control enables the display of the historized symbols. The control can display several historized symbols simultaneously. In addition, time periods from the past can be displayed and the data they contain enlarged and observed in detail. The data required for this comes from the [PostresHistorize](#) [► 1205] or [SqliteHistorize](#) [► 1219] extension.



API of the [Trend Line Chart](#) [► 695] control.

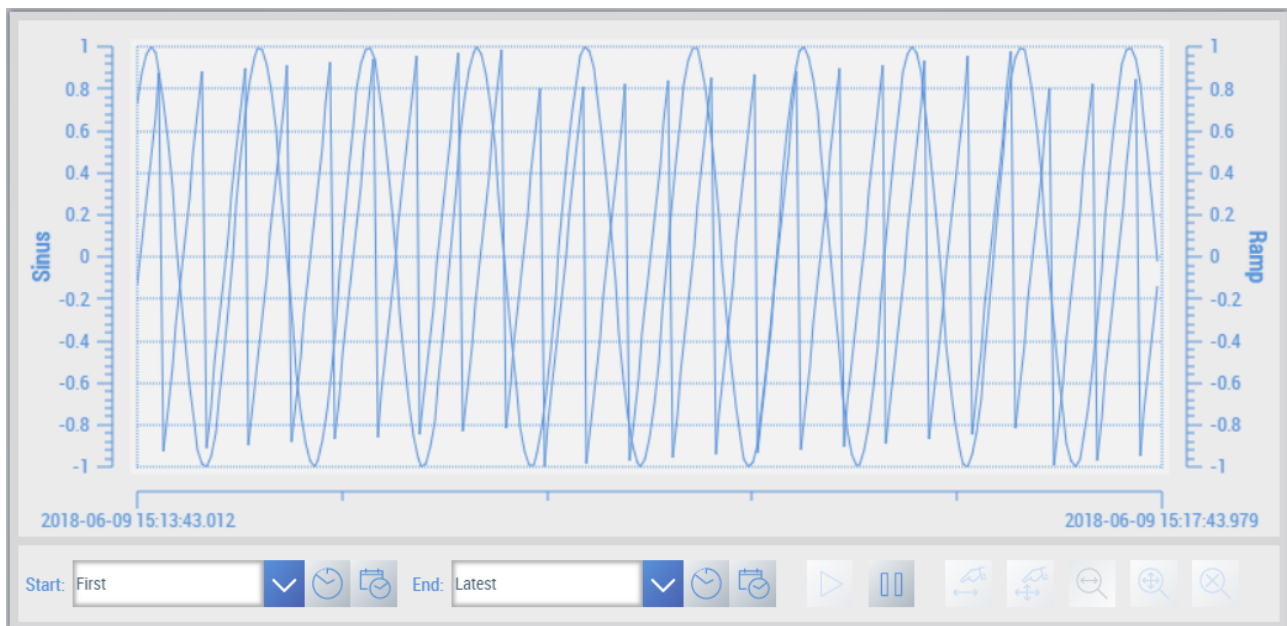


Available since version 1.10.

### 11.15.1 Configuration

The Trend Line Chart control is located in the Toolbox under the category **Beckhoff**, from where you can insert it into an HMI page by drag and drop.

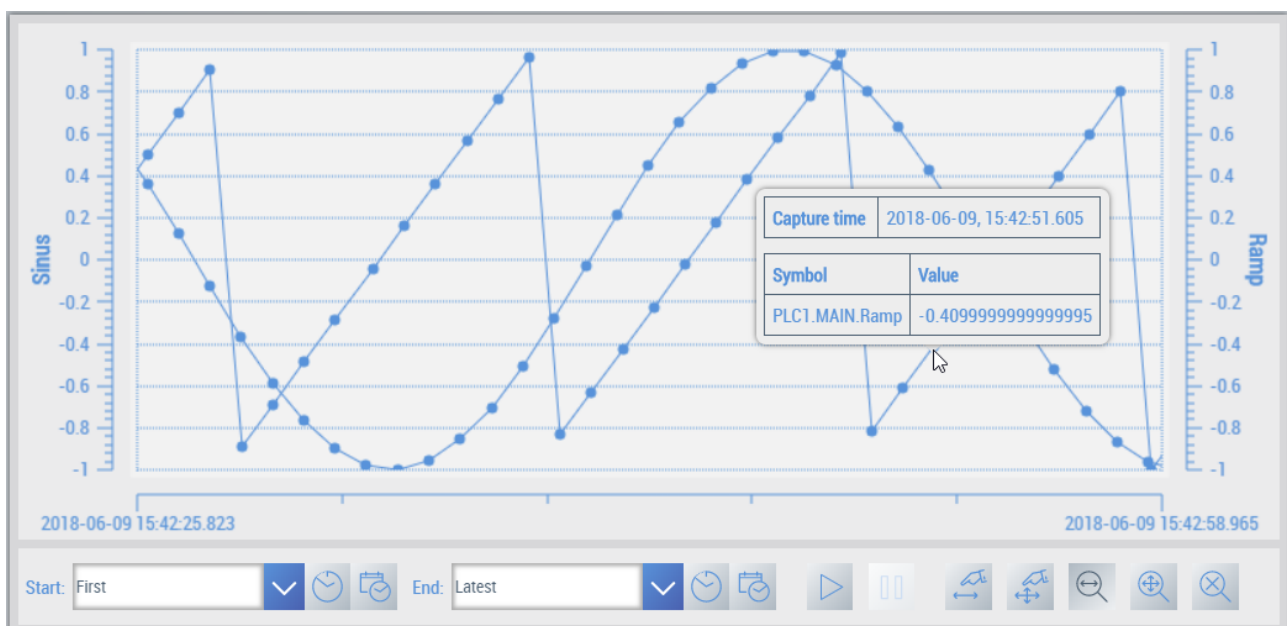




The control offers various configuration options in the engineering and during the runtime in the browser.

### Detailed view

If the live view in the Trend Line Chart has been paused, you can view individual data points with the aid of the zoom functions. Hovering with the mouse over a data point will bring up a display of detailed information on the time and data point.

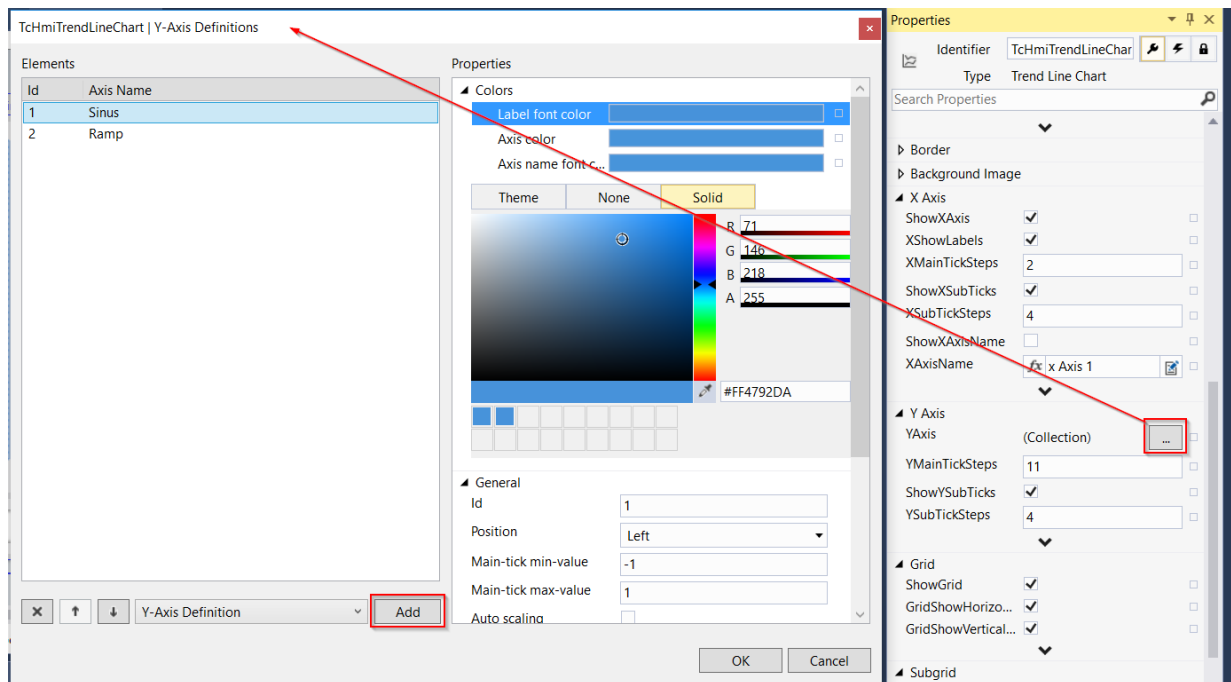


### Configuring axes

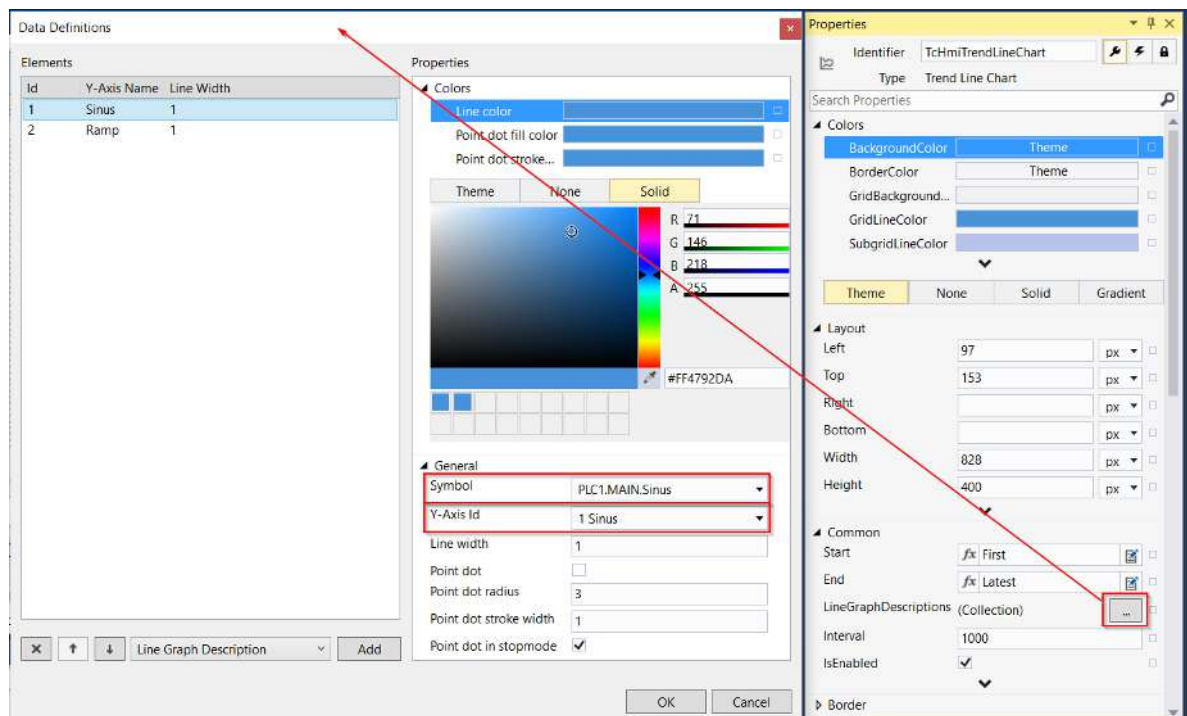
- ✓ If you wish to display a historized symbol in the Trend Line Chart you must first carry out a Y-axis configuration [► 704](#) for the symbol.
- 1. Select the control and open the **Properties** window,
- 2. where you select the property **Y Axis** under the category **Y Axis**.
  - ⇒ An editor then opens that enables the configuration of a Y-axis as well as the addition of further axes.



- Configure the axis [► 705] according to the settings that you need for the historized symbol (e.g. min. and max value on the Y-axis).



- Then confirm the dialog with **OK**.
- Open the Descriptions of the chart [► 704] (LineGraphDescriptions) under the **Common** category in the **Properties** window, where the configured Y-axes are linked with the historized symbols.
- Add a new description and select the historized symbol as well as the associated Y-axis.
  - ⇒ The available historized symbols or Y-axes respectively are displayed in the comboboxes.



- Confirm the dialog with **OK**.
  - ⇒ You can then start the LiveView or publish the project on a server and view the historized symbol in the chart.

## Configuring the interval time

You can configure the update rate of the control in the Trend Line Chart control. The update rate can be found under the entry **Interval** in the category **Common**. The update rate is specified in milliseconds.

Common

Start  ☐

End  ☐

LineGraphDescriptions (Collection) ☐

**Interval**  ☐

IsEnabled ☒ ☐



If you have a historized symbol with an update rate of 100 ms, you should also set the update rate of the control to 100 ms, as otherwise the control will be updated, for example, at 1-second intervals, even though your data are already available every 100 ms.

## Configuring the time period

The start and end times of the historized data displayed can be configured in the Properties window of the control. The times can be specified as timespan, point in time or "First" or "Latest" respectively.

Common

**Start**  ☐

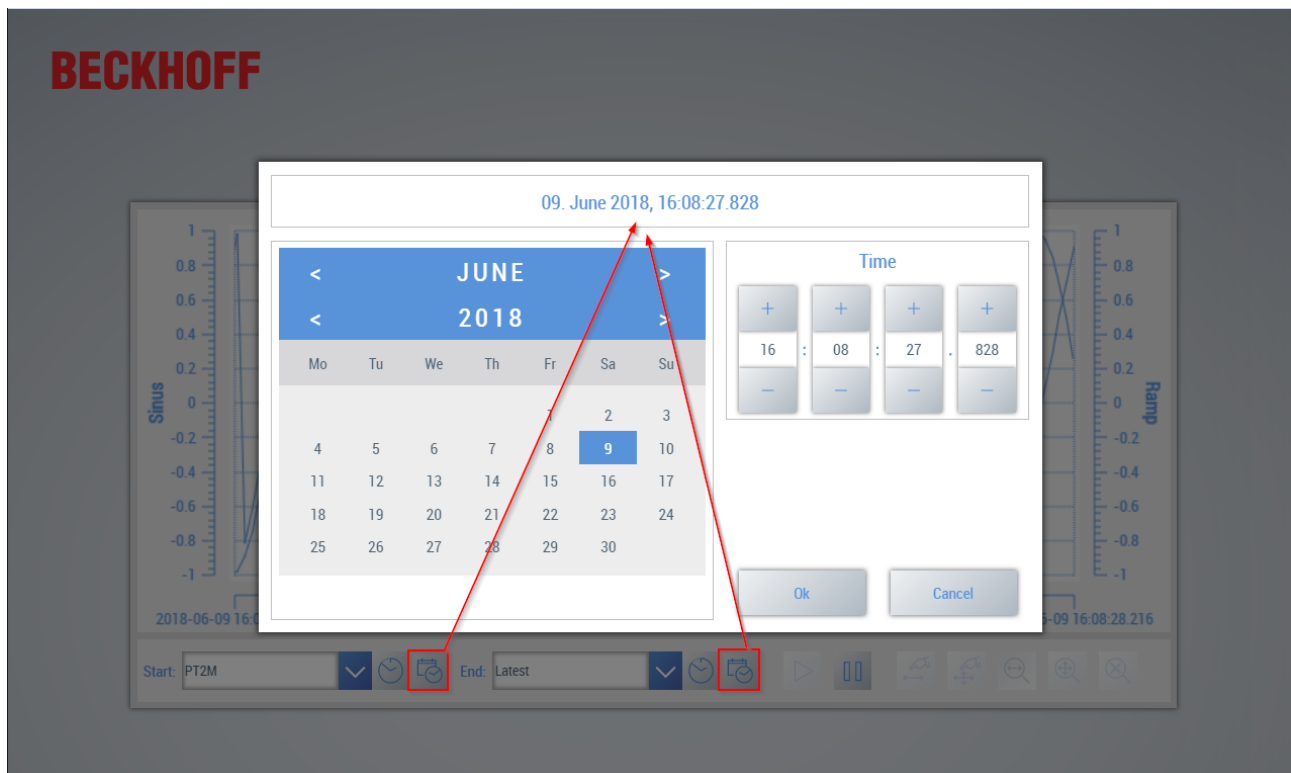
**End**  ☐

LineGraphDescriptions (Collection) ☐

Interval  ☐

IsEnabled ☒ ☐

In addition, it is possible to set the start and end times of the historized data displayed in the browser for each client (see menu bar).



## Menu bar

The Trend Line Chart control has a menu bar that can optionally be displayed under the properties of the control (**ShowMenuBar** in the category **MenuBar**). The menu bar enables the analysis of the data at runtime in the browser:



1. **Start:** Start time of the historized data displayed (**First** for the beginning of the recording).
2. **Select timespan:** Select the timespan for the start (e.g. two minutes before the last value).
3. **Select point in time:** Select point in time for the start (e.g. 6/16/2018 at 5:53 pm).
4. **End:** End time of the displayed historized data (**Latest** for the last recorded value).
5. **Select timespan:** Select the timespan for the end.
6. **Select point in time:** Select a point in time for the end.
7. **Start live view:** The live view can be started after pausing the live view.
8. **Pause live view:** The live view can be paused to view data points in greater detail.
9. **Shift data on the X-axis:** The data displayed can be shifted on the X-axis if the live view has been paused.
10. **Shift data on the X and Y-axes:** The data displayed can be shifted on all axes if the live view has been paused.
11. **Zoom X-axis:** When this button has been activated you can zoom in on the X-axis with the aid of the mouse.
12. **Zoom X-Y-axis::** When this button has been activated you can zoom in on both axis equally with the aid of the mouse.
13. **Reset Zoom:** This button resets all zoom settings.

## Further configuration options

Further configuration options for the Trend Line Chart control can be found under [Trend Line Chart \[► 695\]](#).

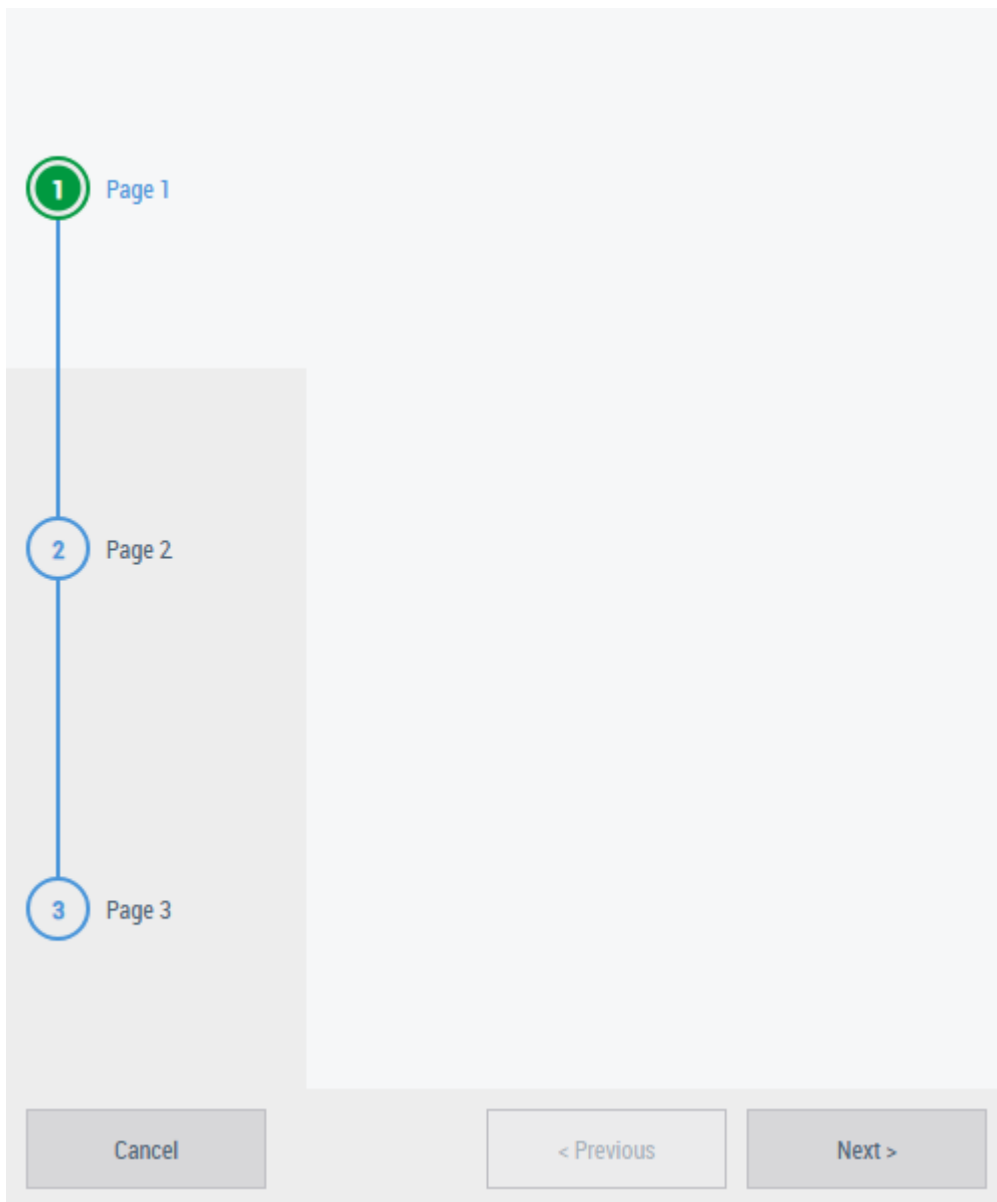
## Example

An example of the use of the historized symbols in interaction with the Trend Line Chart control: [Example \[► 1581\]](#).

The example shows two historized symbols (the associated TwinCAT project is included) and the associated configuration in the Trend Line Chart control.

## 11.16 User Guidance

The User Guidance control enables the user to be guided through tasks/instructions step by step. Examples of applications are the creation of a recipe, troubleshooting on the machine or instructions for the maintenance of components. It is possible to integrate content or UserControl in the User Guidance xontrol. These are created as an array and run through according to their sequence in the control. Individual steps can be provided with a switching condition. This is only possible in combination with a UserControl.



Available since version 1.14.3

**Application examples:**

**Recipe creation:**

Create new recipe




1

2

3

### Define New Product

This is a new product for the machine. Please define all nesesity parameter on the next steps. This is a short wizzard to help you to provide the new product.



Product Name

!

Recipe Type

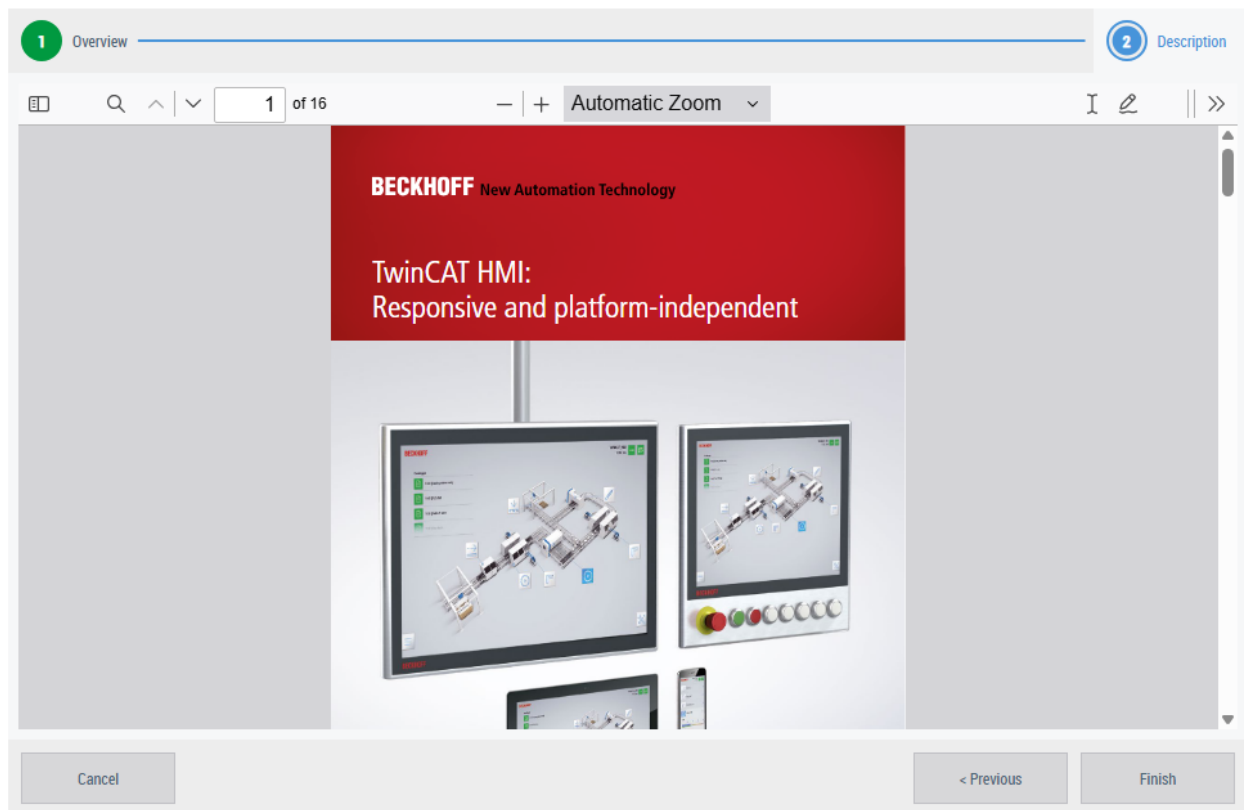
Bottle

Cancel

< Previous

Next >

Troubleshooting:



## 11.16.1 Configuration

Configuration of the User Guidance control.

### Integration:

The following parameters can be set to use the control. At least the "Pages" parameter must be configured.

**Pages:** Specifies the configuration of the individual steps that are run through one after the other, depending on the sort order in the array.

- **Name:** Specifies the name of the step
- **Display Name:** Specifies the display name in the step.
- **Target File:** Specifies the TargetFile that is displayed in this step. This can be a content or a UserControl. The transfer parameters are also specified for a UserControl.
- **Hidden:** Specifies whether the entry is hidden.
- **Scrolling:** Specifies whether scrolling is permitted within the control if the Content/UserControl is larger than the display area.
- **Horizontal Alignment:** Position of the Content/UserControl
- **Vertical Alignment:** Position of the Content/UserControl

**Progress Bar Alignment:** Specifies where the progress bar should be placed in the control.

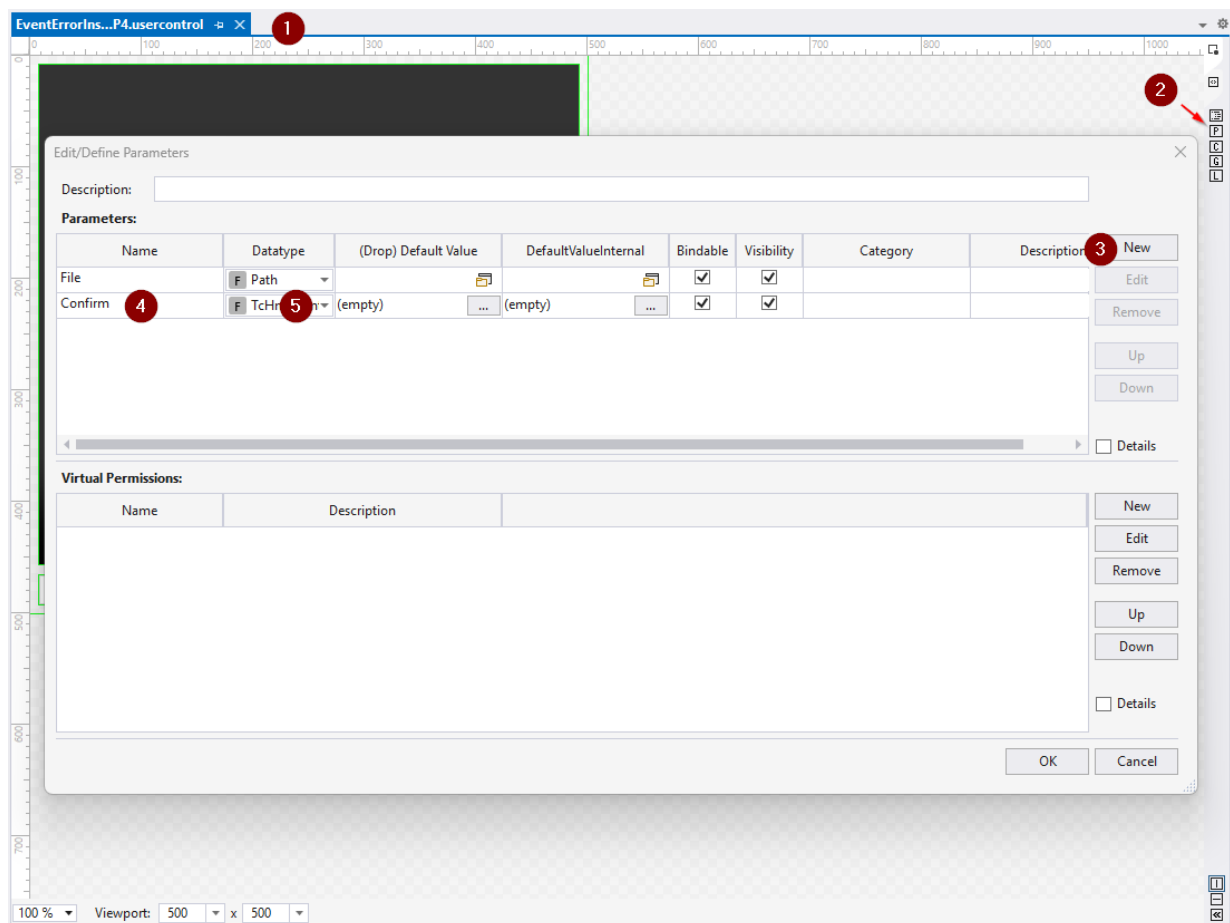
### Function:

**restartUserGuidance:** This function can be used to reset the control to the initial mode. The *force* parameter can be used to set whether this is accepted during operation or only after completion.

### 11.16.1.1 Adding a switching condition

Add a switching condition to the User Guidance control.

1. Create a new UserControl or select the desired UserControl
  2. Open the parameter window of the UserControl.
  3. Add a new parameter.
  4. The new entry can be named as desired.
  5. Select the data type "TcHmi.Controls.Beckhoff.TcHmiUserGuidance.UserControlInterop".
    - ⇒ The position of the new parameter is not relevant. The first occurrence of the data type is always searched for and only this is evaluated.
- ⇒ You have successfully added a switching condition for the User Guidance control. When this UserControl is called up in a User Guidance control, the "confirmNext" parameter is now queried in the UserControlInterop structure. If this has the value True, it is possible to switch on.



## 12 Extensions

The TwinCAT HMI server can be extended with server extensions. This section describes the server extensions supplied by Beckhoff, which are available for optional use. The following server extensions are available:

### General

- [Audit Trail \[► 1175\]](#): The Audit Trail Extension is required to record user interactions within the TwinCAT HMI.
- [EtherCAT Diagnostics \[► 1197\]](#): The EtherCAT Diagnostics Extension is required to connect to the EtherCAT I/Os and to provide the data for the EtherCAT Diagnostics Control.
- [LDAP \[► 1227\]](#): The LDAP extension is required to connect the TwinCAT HMI Server to LDAP Servers.
- [Reporting \[► 1240\]](#): The Reporting extension is required to create HTML or PDF reports.
- [Scope \[► 1264\]](#): The Scope extension is required to connect to the TwinCAT Scope.
- [TwinCAT Speech \[► 1270\]](#): The Speech extension is required to connect to TwinCAT Speech systems.
- [System Engineering \[► 1272\]](#): For generating control content based on attributes in the PLC code.
- [Vision \[► 1281\]](#): The vision extension is required to display images from TwinCAT Vision in the HMI.

### Historical data

- [PostgreSQL \[► 1205\]](#): The PostgreSQLHistorize extension is required to record historical data in the TwinCAT HMI Server.
- [Sqlite \[► 1219\]](#): The SqliteHistorize extension is required to record historical data in the TwinCAT HMI Server.

### Communication

- [ADS \[► 1109\]](#): The ADS extension is required for the connection of a Beckhoff PLC. This is included by default in new projects.
- [MDP \[► 1122\]](#): The MDP extension is required to connect to the MDP interface.
- [OPC UA client \[► 1126\]](#): The OPC UA client extension is required to connect to the OPC UA servers. Some of the server extensions are not included by default in a new HMI project and can be [installed via NuGet \[► 1030\]](#) if required.

### Event system

- [Alarm \[► 1136\]](#): The Alarm extension is required to create alarms in the HMI.
- [EventLogger \[► 1152\]](#): The EventLogger extension is required to connect to the TwinCAT EventLogger. In addition, [own server extensions \[► 1452\]](#) can be developed and integrated into the TwinCAT HMI Server.

### Recipe Management

- **Recipe Management**: The Recipe Management extension is required for the [Recipe Management \[► 1155\]](#) in the TwinCAT HMI.

### Licensing

One Target license is required per connection to an AMS NetId.

## 12.1 Communication

The TwinCAT HMI has various extensions for communicating with other devices via interfaces.

### **ADS [► 1109]**

The **A**utomation **D**evice **S**pecification is the TwinCAT communication protocol.



**MDP [► 1122]**

The **Modular Device Profile** is based on the Modular Device Profile specification of the EtherCAT Technology Group. This can be used to read system information from Beckhoff IPC.

**OPC UA Client [► 1126]**

The **Open Platform Communications Unified Architecture** is a standard for data exchange as a platform-independent architecture. This allows third-party controllers to be integrated into the TwinCAT HMI.

## **12.1.1 ADS**

The Automation Device Specification is the TwinCAT communication protocol. This can be used to access the individual modules.

### **12.1.1.1 Quick start**

To start, create or open a TwinCAT HMI project.

#### **Installation**

Installation is not necessary. This package is an integral part of the HMI Server.

#### **Configuration of the ADS extension**

1. Open the server configuration page.

- Go to the **ADS** tab.

**TcHmiSrv** **ADS** TcHmiEcDiagnostics TcHmiLua

▼ **Runtimes**  
An ADS connection is established to all enabled runtimes.  
Can be set for specific remote configuration.

▼ **PLC1**

- Enabled
- AmsNetId   
ADS route
- Port
- Use whitelisting
- Allow only read access   
Prevents write access to variables and setters, as well as all method calls.

> **Symbols**

+ Add Runtime

Timeout   
Default timeout for ADS requests.

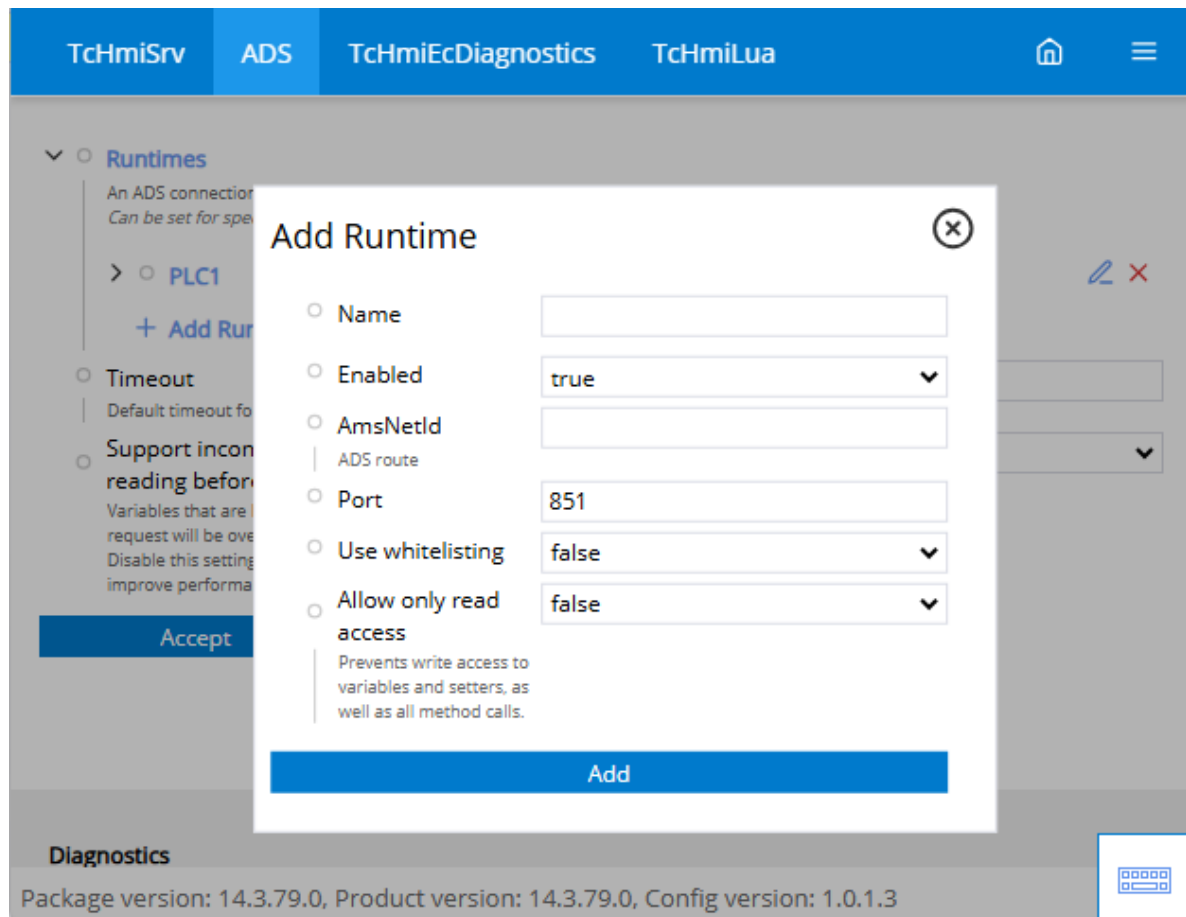
Support incomplete writes by reading before writing   
Variables that are hidden or not set in the write request will be overwritten with an old value. Disable this setting to prevent side effects and improve performance.

**Accept**

Package version: 14.3.79.0, Product version: 14.3.79.0, Config version: 1.0.1.3

- Click on **Runtimes** to open the submenu.  
⇒ An entry with **PLC1** is already set up by default.
- Adjust the **PLC1** entry or click on **Add runtime**

⇒ When adding, a pop-up opens for further settings.



5. Define the name of the runtime under:

**Name:** (Used as namespace for the symbols).

**Active:** Activate or deactivate the connection to the specified target system.

**AmsNetId:** The AmsNetId of the target system to which a connection is to be established.

**Port:** The Port for the ADS connection.

**Use Whitelisting:** If Whitelisting should be used. Variables in the PLC are only found if the corresponding attributes [► 1115] have been set on the PLC variable.

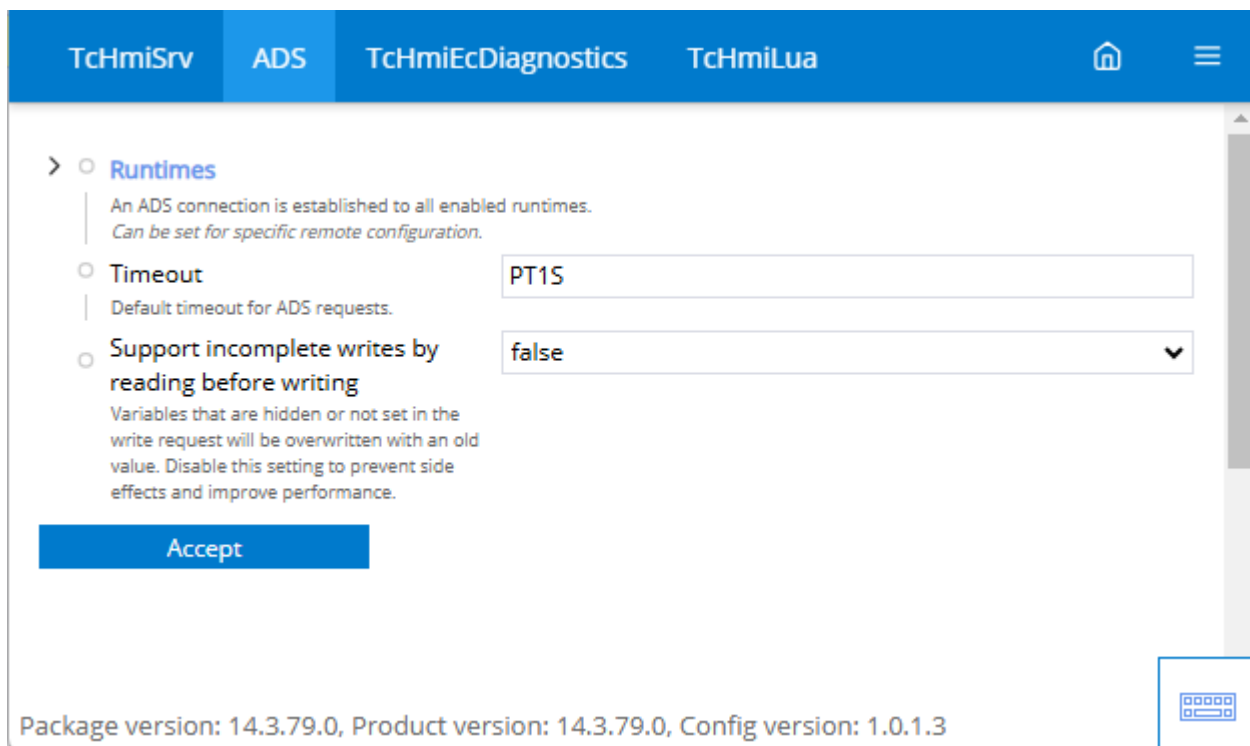
**Allow only read access:** Block write access to the system.

⇒ The connection you have configured is now available. The new symbols can now be read via the server. To do this, you can map directly via the server or the [configuration window](#) [► 77] within Visual Studio.

### 12.1.1.2 Configuration

#### General

The basic settings for the Server extension are specified in the **General** tab.



#### Runtimes [▶ 1113]

- Establish a connection to a device via ADS.

#### Timeout

- Specifies how long an attempt is made to establish a connection or a read request is performed before a timeout occurs.

#### Support incomplete writing operations by reading before writing

- Was required for older TwinCAT versions < 4024.17. With newer TwinCAT versions, disabling can lead to better performance.

#### Maximum timeout for runtime status determination (Advanced settings)

- A configured runtime is considered unavailable if a request takes longer than this period of time.

#### Interval of runtime status determination (advanced settings)

- The status of each configured runtime is checked at regular intervals.

#### Ignored PLC attributes (advanced settings)

- Attribute pragmas are added to the JSON schema. The attributes configured here are hidden.

#### Visible runtime ports (advanced settings)

- Target systems can have many ADS ports. Most of them are rarely used in HMI projects.

#### Limiting the response size of ADS requests (Advanced settings)

- The PLC task is blocked for each request. If the request is too large, the PLC cycle time may be exceeded.

#### Limitation of the number of ADS requests that can be bundled in a sum request (Advanced settings)

- The PLC task is blocked for each request. If a sum request contains too many requests, the PLC cycle time may be exceeded.

#### Limiting the number of ADS handles created with a sum request (Advanced settings)

- The TwinCAT handle buffer is not increased during a sum request. Creating too many ADS handles in a single sum request leads to errors if the TwinCAT handle buffer is full.

### 12.1.1.2.1 Runtimes

Establish a connection via ADS to another process.

The screenshot shows the Beckhoff configuration tool interface. The top navigation bar includes 'TcHmiSrv', 'ADS' (selected), 'TcHmiEcDiagnostics', and 'TcHmiLua'. The main content area is titled 'Runtimes' and contains a sub-section for 'PLC1'. Under 'PLC1', there are several settings: 'Enabled' (set to 'true'), 'AmsNetId' (set to '172.17.30.143.1.1'), 'Port' (set to '851'), 'Use whitelisting' (set to 'false'), and 'Allow only read access' (set to 'false'). Below these are 'Symbols' and 'Add Runtime' options. At the bottom, there are 'Timeout' (set to 'PT1S') and 'Support incomplete writes by reading before writing' (set to 'false') settings. An 'Accept' button is located at the bottom left. The footer shows 'Package version: 14.3.79.0, Product version: 14.3.79.0, Config version: 1.0.1.3'.

#### Enabled

- Enable or disable the connection to the set AMS Net Id.

#### AmsNetId

- AMS Net Id to which a connection is to be established.

#### Port

- Specifies the port for the ADS connection.

#### Use whitelisting

- Indicates whether whitelisting is used. Variables in the PLC are only found if the corresponding [attributes](#) [► 1115] have been set on the PLC variable.

#### Allow only read access

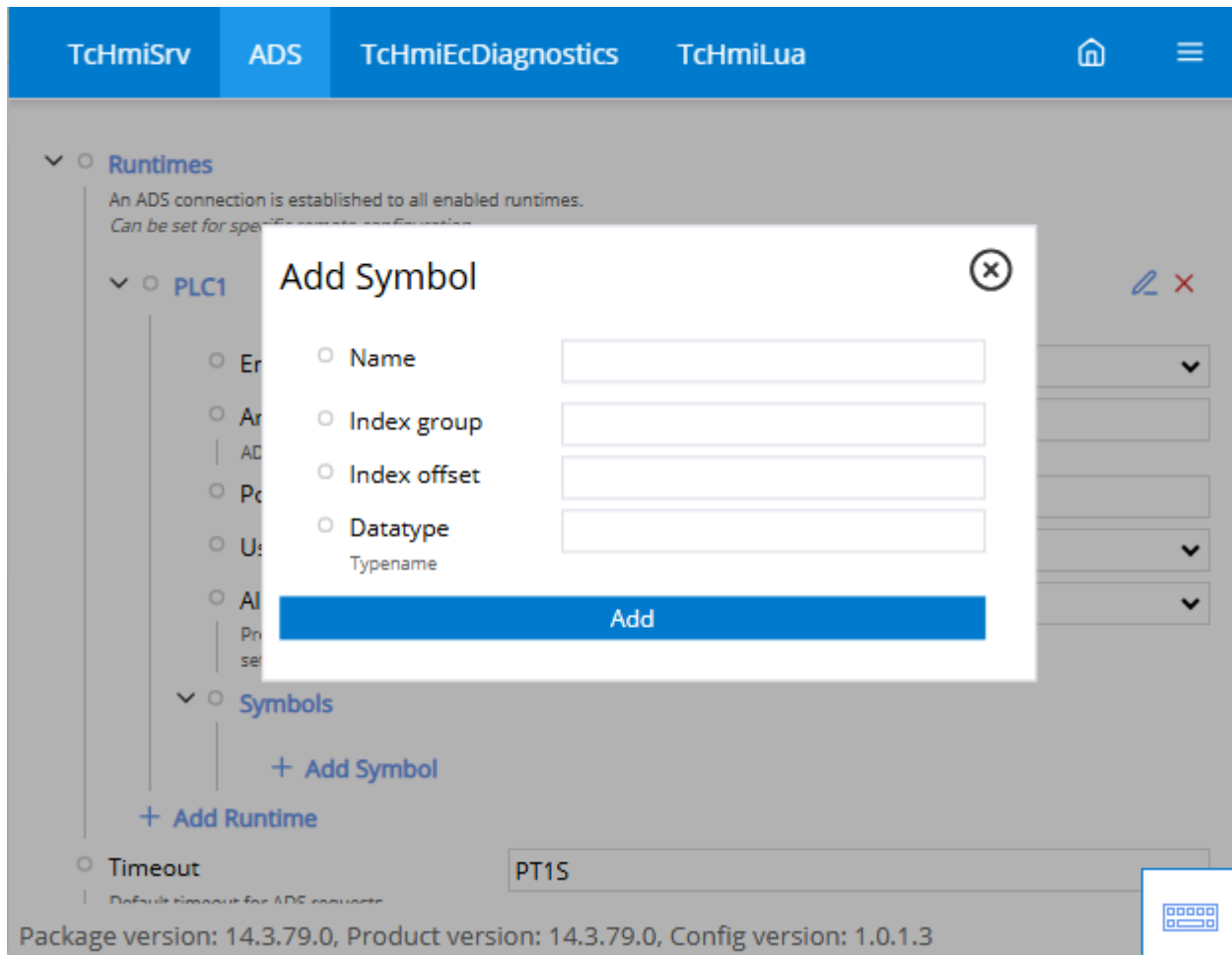
- Indicates whether only reading via ADS is possible.

[Symbols \[► 1114\]](#)

- Provides variables without symbol names. These are addressed via the Index group and the Index offset.

#### 12.1.1.2.1.1 Access by IndexGroup and Offset

It makes most sense to access PLC variables by symbol name in order to detect changes in the symbolism (e.g. due to an OnlineChange). Small controllers (e.g. BC/BX) that have no symbolism can be addressed directly via Index group and offset. Via the configured ADS runtime you can add a new symbol that fetches the values by Index group and offset (hex values are converted to the corresponding decimal values).



##### Name

- Name of the new symbol.

##### Index group

- Index group of the data which should be read.

##### Index offset

- Index offset of the data which should be read.

##### Data type



- Data type of the new symbol.

### 12.1.1.2.2 Blacklisting and whitelisting

With version 1.12, it is possible to use black or whitelisting for PLC symbols. With black or whitelisting, PLC symbols can be explicitly hidden or shown for use in the HMI. For this, you can tag the corresponding variables in the PLC with an attribute pragma. In the default case, blacklisting is active, which means that you have access to all variables of the PLC that are not explicitly hidden for the HMI. On the configuration page of the ADS extension, you can switch between black and whitelisting (**Use whitelisting**).

**TcHmiSrv** **ADS** TcHmiEcDiagnostics TcHmiLua

▼ **Runtimes**  
An ADS connection is established to all enabled runtimes.  
Can be set for specific remote configuration.

▼ **PLC1**  

☐ **Enabled**

☐ **AmsNetId**   
| ADS route

☐ **Port**

☐ **Use whitelisting**

☐ **Allow only read access**   
Prevents write access to variables and  
setters, as well as all method calls.

> **Symbols**

+ **Add Runtime**

☐ **Timeout**   
Default timeout for ADS requests.

☐ **Support incomplete writes by  
reading before writing**   
Variables that are hidden or not set in the  
write request will be overwritten with an old  
value. Disable this setting to prevent side  
effects and improve performance.

**Accept**

Package version: 14.3.79.0, Product version: 14.3.79.0, Config version: 1.0.1.3

The following attribute pragmas are available for black or whitelisting in the TwinCAT HMI:

```
{ attribute 'TcHmiSymbol.Show' }
{ attribute 'TcHmiSymbol.ShowRecursively' }
{ attribute 'TcHmiSymbol.Hide' }
{ attribute 'TcHmiSymbol.ReadOnly' }
{ attribute 'TcHmiSymbol.BLOB' }
```

#### Use:

- **TcHmiSymbol.Show:** If a variable has this attribute, it will be displayed in the HMI in case of whitelisting. With this attribute only the first level is displayed (example: only the struct, but not the sub-elements). The attribute has no effect on blacklisting.

- **TcHmiSymbol.ShowRecursively:** If a variable has this attribute, it is displayed with all sub-elements in the HMI in the case of whitelisting (e.g. structure or function block with all sub-elements). Variables in the sub-elements that are blacklisted with *TcHmiSymbol.Hide* are not displayed.
- **TcHmiSymbol.Hide:** If a variable has this attribute, it will not be displayed in the HMI in case of blacklisting. All variables without an attribute are displayed. If the attribute is used with a structure, all sub-elements are also hidden in the HMI, even if they are tagged with *TcHmiSymbol.Show*.
- **TcHmiSymbol.ReadOnly:** If a variable has this attribute, the variable with all sub-elements cannot be written in the HMI.
- **TcHmiSymbol.BLOB:** If a variable has this attribute, the data is transferred to the server and the client in binary form (reduction of packet size). The data must be converted in the client itself.



Blacklisting overrides whitelisting.

With blacklisting, all variables are visible in the HMI, except variables with the attribute *TcHmiSymbol.Hide*.

With whitelisting, no variables are visible in the HMI except variables with the attributes *TcHmiSymbol.Show* and *TcHmiSymbol.ShowRecursively*.



Available since version 1.12.

### 12.1.1.2.3 Methods and properties

With version 1.12 it is possible to access PLC properties in the HMI and to call PLC methods in the HMI.

#### PLC properties

The properties must be made visible in the PLC with an attribute pragma via ADS.

```
{attribute 'monitoring' := 'call'}
PROPERTY Prop : BOOL
```

You can then access the property in the TwinCAT HMI.

Name	Datatype	Mapped to
PLC1	object	
Constants	object	
Global_Version	#/definitions/PLC1.Global_Version	
MAIN	#/definitions/PLC1.MAIN	
fbGetInterface	#/definitions/PLC1.FB_GetInterface	
fbTest	#/definitions/PLC1.FB_Test	PLC1.MAIN.fbTest
InterfaceMethod	#/definitions/PLC1.BOOL(VOID)	PLC1.MAIN.fbTest::InterfaceMethod
MethodWithoutParam	#/definitions/PLC1.BOOL(VOID)	PLC1.MAIN.fbTest.MethodWithoutParam
MyMethod	#/definitions/PLC1.BOOL(bInput : BOOL)	PLC1.MAIN.fbTest.MyMethod
Prop	#/definitions/PLC1.BOOL(BOOL)	PLC1.MAIN.fbTest::Prop
<b>bProp</b>	<b>BOOL</b>	<b>PLC1.MAIN.fbTest::bProp</b>
nCount	<b>INT</b>	PLC1.MAIN.fbTest::nCount
iTest	#/definitions/PLC1.I_Test	
TwinCAT_SystemInfoVarList	#/definitions/PLC1.TwinCAT_SystemInfoVarList	





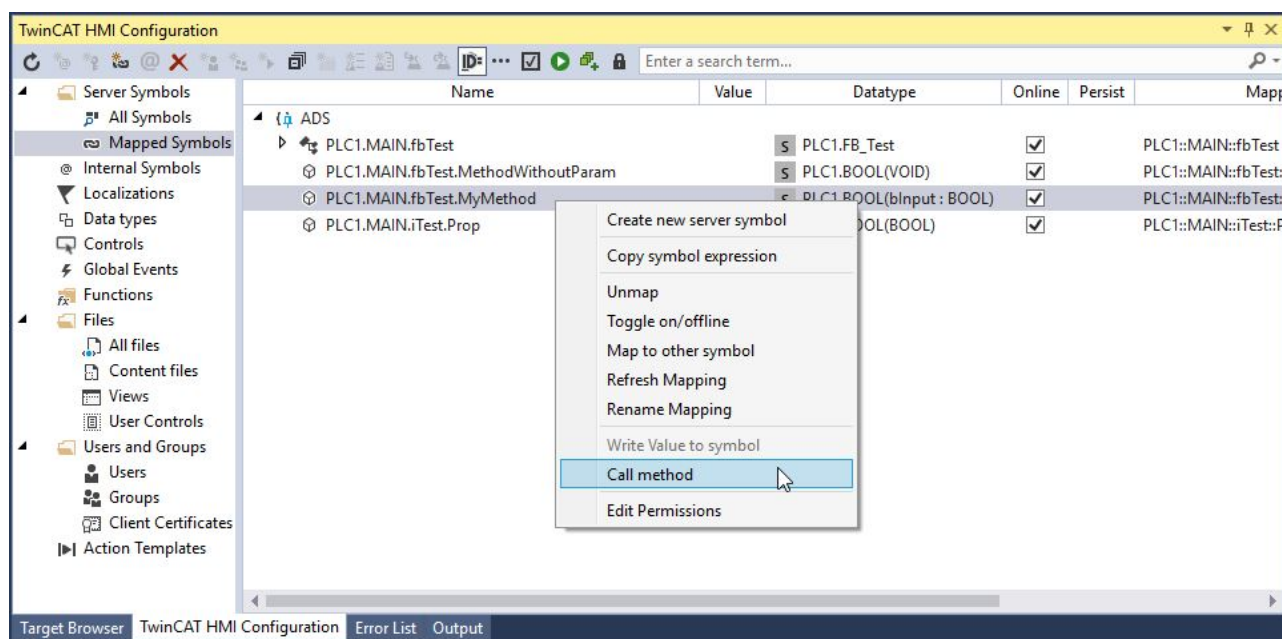
PLC properties can only be used explicitly in the HMI by linking the property individually to a control attribute. If the entire function block is linked to a control attribute, the property is not called. This is the case when a function block is used as the source data of the DataGrid or as a user control parameter.

## PLC methods

The methods must be switched visible in the PLC with an attribute pragma via ADS.

```
{attribute 'TcRpcEnable'}
METHOD MyMethod : BOOL
VAR_INPUT
bInput : BOOL;
END_VAR
```

Afterwards you can see the methods in the TwinCAT HMI. Within the TwinCAT HMI Configuration Window, you can call them explicitly.



At runtime in the client, you can call the methods using a JavaScript/TypeScript function and the Framework API. Below you will find an example for the call via Framework API.

```
// call of method without parameter
TcHmi.Symbol.readEx2("%s%PLC1.MAIN.fbTest.MethodWithoutParam%/s%", function (data) {
console.log(data);
});

// call of method with parameter
TcHmi.Symbol.writeEx("%s%PLC1.MAIN.fbTest.MyMethod%/s%", { bInput: true }, function (data) {
console.log(data);
});
```

If the method has a return value, you can access the return value within the callback function in the Result object.

```

▼ {error: 0, value: true, response: {...}, details: undefined} ⓘ CallAdsMethod.js:25
  details: undefined
  error: 0
  ▼ response:
    apiVersion: 16
    ▼ commands: Array(1)
      ▼ 0:
        commandOptions: ["SendMessage"]
        processedEnd: "2021-08-20T06:34:38.0236509Z"
        processedStart: "2021-08-20T06:34:38.0226506Z"
        readValue: true
        symbol: "PLC1.MAIN.FbTest.MethodWithoutParam"
        __proto__: Object
        length: 1
        __proto__: Array(0)
      id: 8
      requestType: "ReadWrite"
      serverId: "7b0ea0ff4248cdc7467cefd96a9d61a2602e084b43baf9198af11e6bd6079cca"
      sessionId: "6c4f5b488c64641623c0054c84159b5151758a55e6e1cb5f2f54be5297b9f4c178c6bc7d15dd1bfc5f0d12df304026bab56cffffced71b366ef104fb15ccc42f1"
      __proto__: Object
      value: true
      __proto__: Object

```

In a future version of the TwinCAT HMI, it will be possible to call the methods directly via the Actions and Conditions Editor without using JavaScript/TypeScript.



Methods must always be called explicitly and cannot be used as a control attribute. Note that calling a method from the HMI results in the execution of PLC code.



Available from version 1.12.

#### 12.1.1.2.4 Pointers and references

With version 1.12.748.0, [references](#), [pointers](#) and [interface pointers](#) can be resolved in the HMI. This makes it possible to access the original variable being pointed to via the pointer or reference. This can be read and written when accessing via the pointer or reference. The resolved pointers or references are listed as usual under the variables in the TwinCAT HMI Configuration Window.

Changing the addresses of the pointers or references so that they point to another variable is not possible in the HMI. This must be done in the PLC.



Available from version 1.12.748.0.

#### 12.1.1.3 ADS Server Interface

##### The HMI Server's ADS Server

When the HMI server is started as a service, the service manager opens an ADS server on port 19800. This ADS server can be used to discover and get the state of HMI server instances that are managed by the service manager.

##### Index groups and index offsets



##### Read-Write requests

The "RW" value in the "Access" column indicates that only Read-Write requests are supported for this index group index offset combination. All index offsets of the `INDEXGROUP_SERVERSTATES` index group expect the name of the managed server instance as a write-value. It is analogous to a function parameter.

The following table contains all supported index groups:

Index Group	Name	Description	Remarks
0x00000001	INDEXGROUP_SERVER STATES	Contains index offsets for the state of the managed server instances.	
0x00000002	INDEXGROUP_INSTANCES	Contains index offsets that provide access to the names of the managed server instances.	

The following table contains all supported index offsets for the INDEXGROUP\_SERVERSTATES index group:

Index Group	Index Offset	Access	Data Type	Offset Name	Description
0x00000001	0x00000001	RW	W: STRING R: STRING	INDEXOFFSET_SE RVERSTATE_JSON	The full state of a specific managed server instance as a JSON object.
0x00000001	0x00000002	RW	W: STRING R: STRING	INDEXOFFSET_SE RVERSTATE_ARCHITECTURE	The name of the architecture that a specific managed server instance is running on.
0x00000001	0x00000003	RW	W: STRING R: BOOL	INDEXOFFSET_SE RVERSTATE_CREATOR_MODE	True if the managed server instance is an engineering server (started with "--creator").
0x00000001	0x00000004	RW	W: STRING R: UINT64	INDEXOFFSET_SE RVERSTATE_PID	The process ID of a specific managed server instance.
0x00000001	0x00000005	RW	W: STRING R: HMIVERSION	INDEXOFFSET_SE RVERSTATE_PRODUCT_VERSION	The product version of a specific managed server instance.
0x00000001	0x00000006	RW	W: STRING R: STRING	INDEXOFFSET_SE RVERSTATE_PROJECT_NAME	The configured project name of a specific managed server instance.
0x00000001	0x00000007	RW	W: STRING R: HMIVERSION	INDEXOFFSET_SE RVERSTATE_PROJECT_VERSION	The configured project version of a specific managed server instance.
0x00000001	0x00000008	RW	W: STRING R: BOOL	INDEXOFFSET_SE RVERSTATE_PUBLISH_IN_PROGRESS	True if a project is being published onto the specified managed server instance.
0x00000001	0x00000009	RW	W: STRING R: BOOL	INDEXOFFSET_SE RVERSTATE_SERVICE_MODE	Always true, because all managed server instances are started by the service manager.
0x00000001	0x0000000A	RW	W: STRING R: STRING	INDEXOFFSET_SE RVERSTATE_SERVICE_NAME	The unique instance name of a specific managed server instance. This is pretty useless because you need to know it to request it.
0x00000001	0x0000000B	RW	W: STRING R: INT32	INDEXOFFSET_SE RVERSTATE_STATE	The running state of a specific managed server instance.
0x00000001	0x0000000C	RW	W: STRING R: HMIVERSION	INDEXOFFSET_SE RVERSTATE_VERSION	The version of a specific managed server instance.

Index Group	Index Offset	Access	Data Type	Offset Name	Description
0x00000001	0x0000000D	RW	W: STRING R: UINT8[n]	INDEXOFFSET_SERVERSTATE_ENDPOINTS	The number of returned strings as a UINT32, followed by all configured endpoints of a specific managed server instance concatenated, each separated by a 0x00 byte.
0x00000001	0x0000000E	RW	W: STRING R: UINT8[n]	INDEXOFFSET_SERVERSTATE_FOR_CEAUTHENDPOINTS	The forced authentication endpoints of a specific managed server instance.
0x00000001	0x0000000F	RW	W: STRING R: STRING	INDEXOFFSET_SERVERSTATE_SERVERTIME	The current ISO-8601 timestamp of a specific managed server instance.
0x00000001	0x0000001F	RW	W: STRING R: INT64	INDEXOFFSET_SERVERSTATE_SERVERTIME_NS	The current timestamp of a specific managed server instance in nanoseconds since the Unix epoch.

The following table contains all supported index offsets for the INDEXGROUP\_INSTANCES index group:

Index Group	Index Offset	Access	Data Type	Offset Name	Description
0x00000002	0x00000001	R	STRING	INDEXOFFSET_INSTANCE_NAMES_JSON	The names of the managed server instances as a JSON array of strings.
0x00000002	0x00000002	R	UINT8[n]	INDEXOFFSET_INSTANCE_NAMES	The number of returned strings as a UINT32, followed by the names of the managed server instances concatenated, each separated by a 0x00 byte.

### The HMIVERSION type

Normally, ADS uses three-part version numbers consisting of a major version, a revision number and a build number. The TwinCAT HMI uses four-part version numbers instead. To solve this problem, the HMIVERSION type was introduced. It is returned by requests to the following index group index offset combinations:

- INDEXGROUP\_SERVERSTATES:INDEXOFFSET\_SERVERSTATE\_PRODUCT\_VERSION
- INDEXGROUP\_SERVERSTATES:INDEXOFFSET\_SERVERSTATE\_VERSION
- INDEXGROUP\_SERVERSTATES:INDEXOFFSET\_SERVERSTATE\_PRODUCT\_VERSION
- INDEXGROUP\_SERVERSTATES:INDEXOFFSET\_SERVERSTATE\_PROJECT\_VERSION

Type definition in Structured Text (ST):

```

TYPE HMIVERSION :STRUCT
    one : UDINT;
    two : UDINT;
    three : UDINT;
    four : UDINT;
END_STRUCTEND_TYPE

```

Type definition in C:

```

struct HMIVERSION
{
    uint32_t one;

```

```
uint32_t two;
uint32_t three;
uint32_t four;
};
```

#### Example of the JSON object returned by INDEXGROUP\_SERVERSTATES:INDEXOFFSET\_SERVERSTATE\_JSON

```
{
  "architecture": "win-x64",
  "creatorMode": false,
  "endpoints": ["http://127.0.0.1:59150"],
  "forceAuthEndpoints": [],
  "pid": 31756,
  "productVersion": "0.0.0.0",
  "projectName": "",
  "projectVersion": "",
  "publishInProgress": false,
  "serviceMode": true,
  "serviceName": "ServerInstanceOne",
  "state": 1,
  "version": "0.0.0.0"
}
```

#### Example of the JSON array returned by INDEXGROUP\_INSTANCES:INDEXOFFSET\_INSTANCE\_NAMES\_JSON

```
["ServerInstanceOne", "ServerInstanceTwo"]
```

## 12.1.2 MDP

The **Modular Device Profile** (MDP) extension is an interface to the [Beckhoff Device Manager](#). Information can be read from a Beckhoff Industrial PC via this interface. This information can then be displayed to the operator via various controls. Communication takes place via the ADS protocol.

### 12.1.2.1 System requirements

#### Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-

#### Version 1.12

Technical data	
Operating system	Windows CE7 Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-

### 12.1.2.2 Quick start

To start, create or open a TwinCAT HMI project.

#### Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.Mdp" via the [NuGet Package Manager](#) [► 1041].

#### Configuration of the MDP extension

1. Open the server configuration page.

- Go to the **TcHmiMdp** tab.

**TcHmiSrv** **ADS** **TcHmiLua** **TcHmiMdp**

**Target systems**  
Target systems from which data can be queried.  
*Can be set for specific remote configuration.*

**Local**

☐ **AmsNetId**  
descAdsRoute  
127.0.0.1.1.1

☐ **Enabled**  
true

☐ **Allow only read access**  
false  
Prevents write access to variables, as well as to all service transfer objects.

**+ Add Target system**

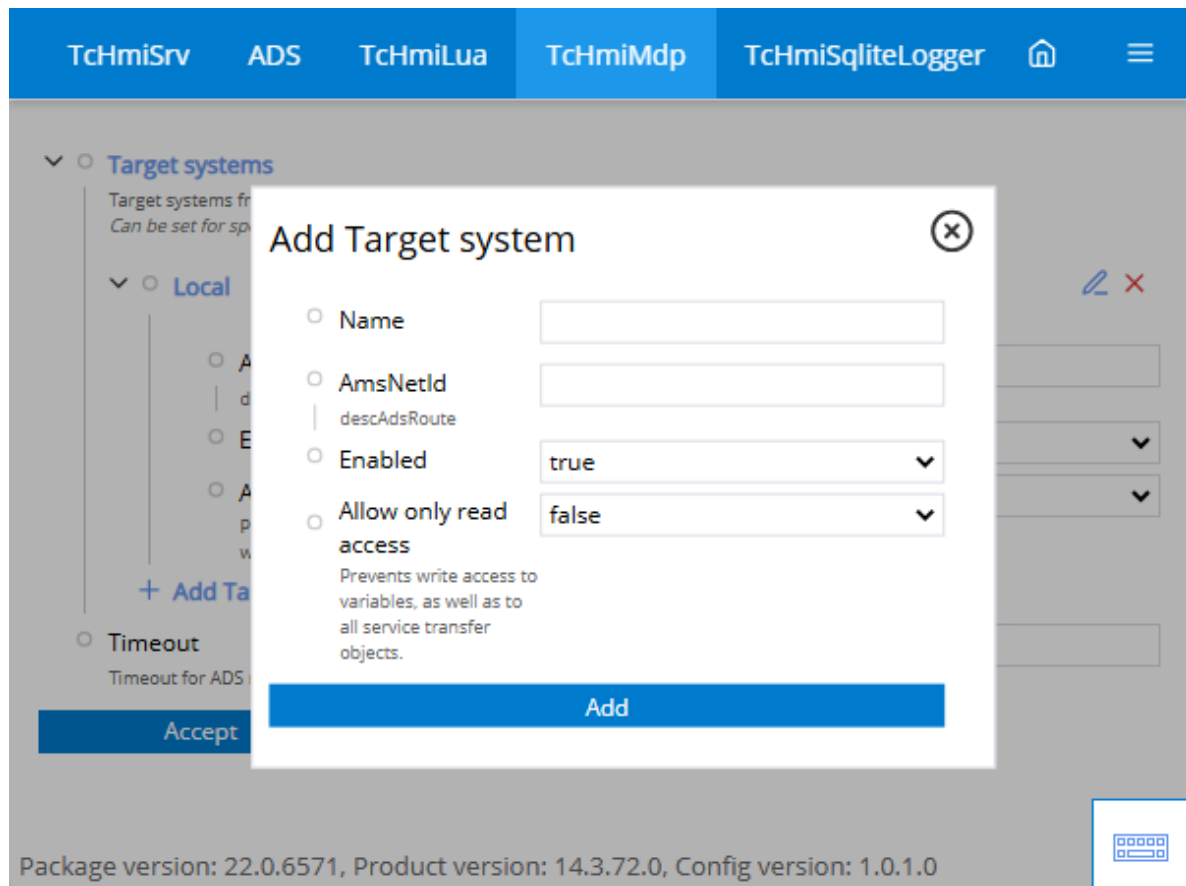
☐ **Timeout**  
Timeout for ADS requests.  
PT1S

**Accept**

Package version: 22.0.6571, Product version: 14.3.72.0, Config version: 1.0.1.0

- Click on **Target systems** to open the submenu.  
⇒ An entry with **Local** is already set up by default.
- Adjust the **Local** entry or click on **Add Target system**

⇒ When adding, a pop-up opens for further settings.



5. Define under:

**Name:** the name of the target system. (Used as namespace for the symbols).

**AmsNetId:** The AmsNetId of the target system to which a connection is to be established.

**Enabled:** Enable or disable the connection to the specified target system

**Allow only read access:** Block write access to the system.

⇒ The connection you have configured is available. The new symbols can be read via the server. To do this, you can map directly via the server or the [configuration window](#) [► 77] within Visual Studio.

### 12.1.2.3 Configuration

#### General

The basic settings for the Server extension are specified in the **General** tab.



TcHmiSrv
ADS
TcHmiLua
TcHmiMdp

Target systems

Target systems from which data can be queried.  
Can be set for specific remote configuration.

Local

AmsNetId
127.0.0.1.1.1
descAdsRoute

Enabled
true

Allow only read access
false
Prevents write access to variables, as well as to all service transfer objects.

+ Add Target system

Timeout
PT15

Timeout for ADS requests.

Accept

Package version: 22.0.6571, Product version: 14.3.72.0, Config version: 1.0.1.0

Target systems [▶ 1125]

- Establish a connection to a device via ADS.

#### Timeout

- Specifies how long an attempt is made to establish a connection or a read request is performed before a timeout occurs.

### 12.1.2.3.1 Target systems

Establish the connection to a Beckhoff Device Manager.

TE2000

Version: 2.11.0

1125

**TcHmiSrv** **ADS** **TcHmiLua** **TcHmiMdp**

▼ ○ **Target systems**  
Target systems from which data can be queried.  
*Can be set for specific remote configuration.*

▼ ○ **Local**

○ **AmsNetId**   
descAdsRoute

○ **Enabled**  ▼

○ **Allow only read access**  ▼  
Prevents write access to variables, as well as to all service transfer objects.

**+ Add Target system**

○ **Timeout**   
Timeout for ADS requests.

**Accept**

Package version: 22.0.6571, Product version: 14.3.72.0, Config version: 1.0.1.0

**AmsNetId**

- AMS Net Id to which a connection is to be established.

**Enabled**

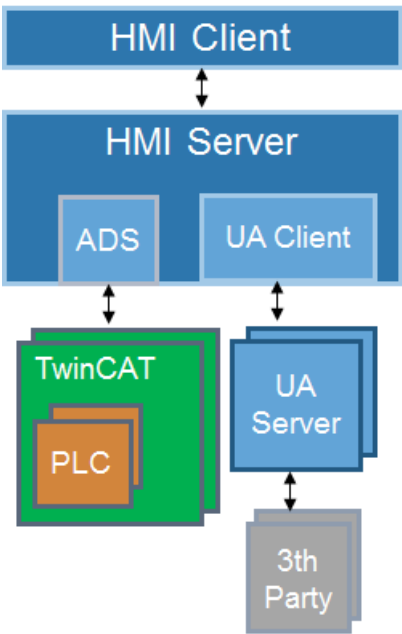
- Enable or disable the connection to the set AMS Net Id.

**Allow only read access**

- Specifies whether only read access to the Beckhoff Device Manager is possible.

### 12.1.3 OPC UA Client

The OPC UA Client Extension enables communication between the TwinCAT HMI Server and an OPC UA Server. The TwinCAT HMI Server connects as a client to the OPC UA Server. This can be used, for example, to connect third-party controllers that do not support the ADS protocol to the TwinCAT HMI. The data exchange is bidirectional. The data points of the OPC UA Server are automatically browsed by the OPC UA Client Extension.



To use the OPC UA Client Extension the license TF2110 is required. The license allows the connection to OPC UA servers and the use of a namespace. One TwinCAT HMI Target license (TF2050 - TF2090) per namespace is required for the use of additional namespaces.



Available since version 1.10.1336.0

12.1.3.1 System requirements

Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-

Version 1.12

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-

12.1.3.2 Quick start

To start, create or open a TwinCAT HMI project.

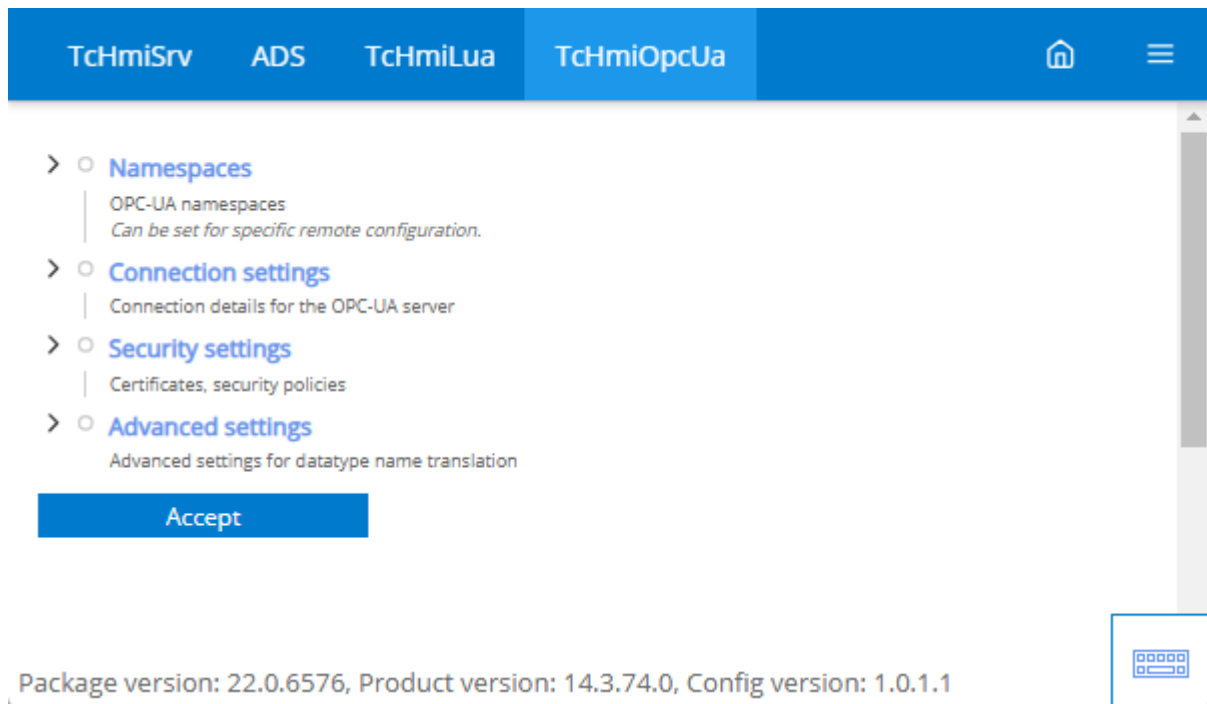
Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.OpcUa" via the [NuGet Package Manager](#) [► 1041].

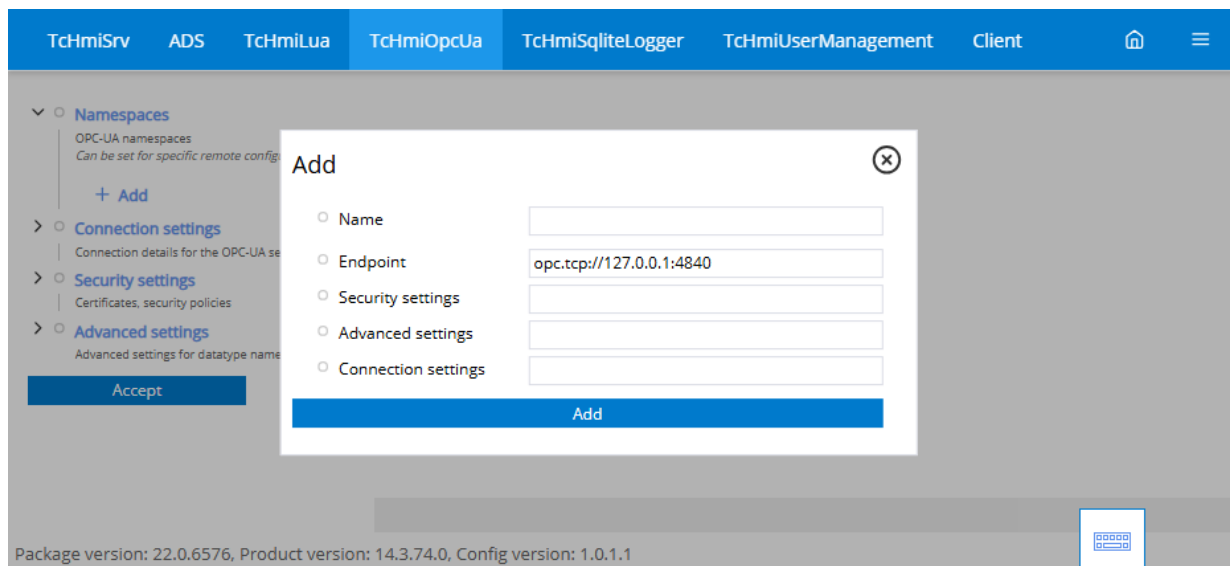
Configuration of the OpcUa extension

- 1. Open the server configuration page

- Go to the TcHmiOpcUa tab



- Click on **namespaces** to open the submenu.
- Click **Add** to create a new connection and enter the following values:  
**Name:** Name and namespace of the connection  
**endpoint:** OPC UA address to which a connection is to be established  
**security settings:** Select a profile from the security settings area.  
**Advanced settings:** Select a profile from the advanced settings area.  
**Connection settings:** Select a profile from the Connection settings section.

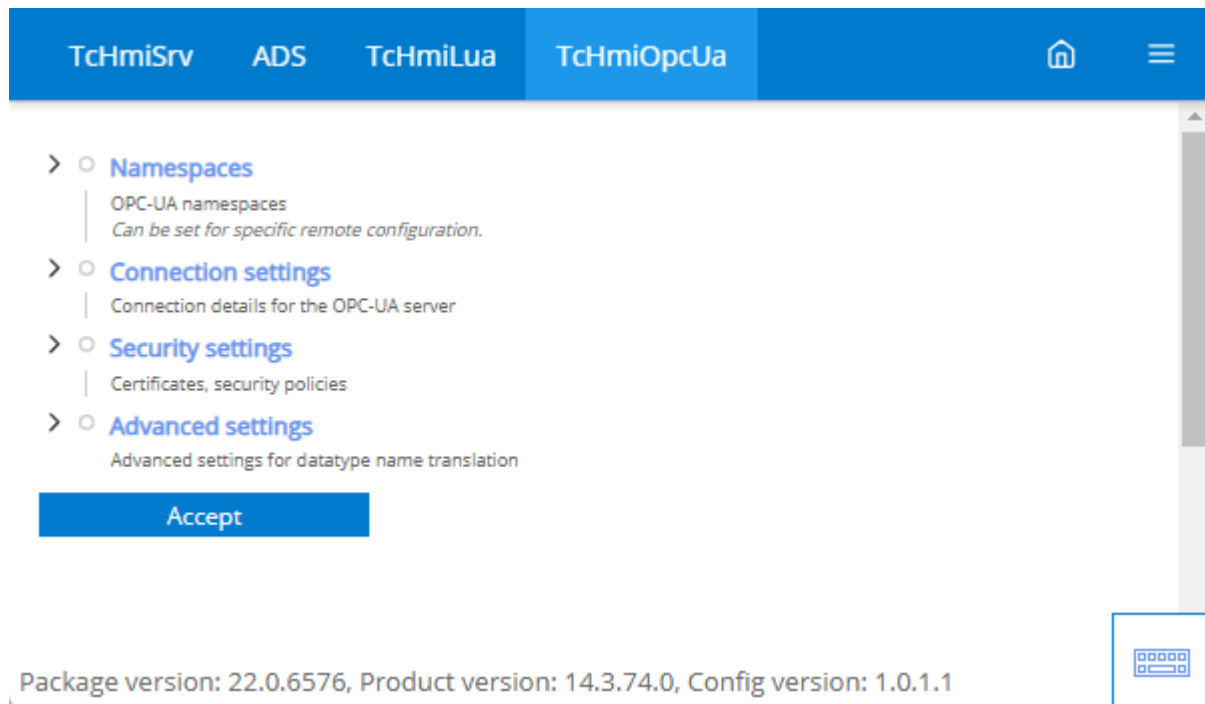


- ⇒ The connection you have configured is available. The new symbols can be read via the server. To do this, you can map directly via the server or the [configuration window](#) [► 77] within Visual Studio.

### 12.1.3.3 Configuration

#### General

The basic settings for the Server extension are specified in the **General** tab.



#### Namespaces [► 1129]

- The connection to an OPC UA server is configured under the namespaces. The configuration profiles can be selected for each connection.

#### Connection settings [► 1130]

- You can create profiles for establishing a connection under Connection settings.

#### Security settings [► 1131]

- Under the security settings you can create profiles for the OPA UA Security.

#### Advanced settings [► 1133]

- Under the advanced settings you can create profiles for the display of the browsed variables.

### **12.1.3.3.1 Namespaces**

Establish a connection to an OPC UA server via the namespaces.

TcHmiSrv
ADS
TcHmiLua
TcHmiOpcUa
TcHmiSqliteLogger

Add successful

Namespaces
  
OPC-UA namespaces
  
Can be set for specific remote configuration.
  
TestPLC
  
Endpoint: opc.tcp://127.0.0.1:4840
  
Security settings: basic
  
Advanced settings: basic
  
Connection settings: basic
  
+ Add
  
Connection settings
  
Connection details for the OPC-UA server
  
Security settings
  
Certificates, security policies
  
Advanced settings
  
Advanced settings for datatype name translation
  
Accept

Package version: 22.0.6576, Product version: 14.3.74.0, Config version: 1.0.1.1

### Endpoint

- OPC UA address to which a connection is to be established

### Security settings [► 1131]

- Select a profile from the Security settings area.

### Advanced settings [► 1133]

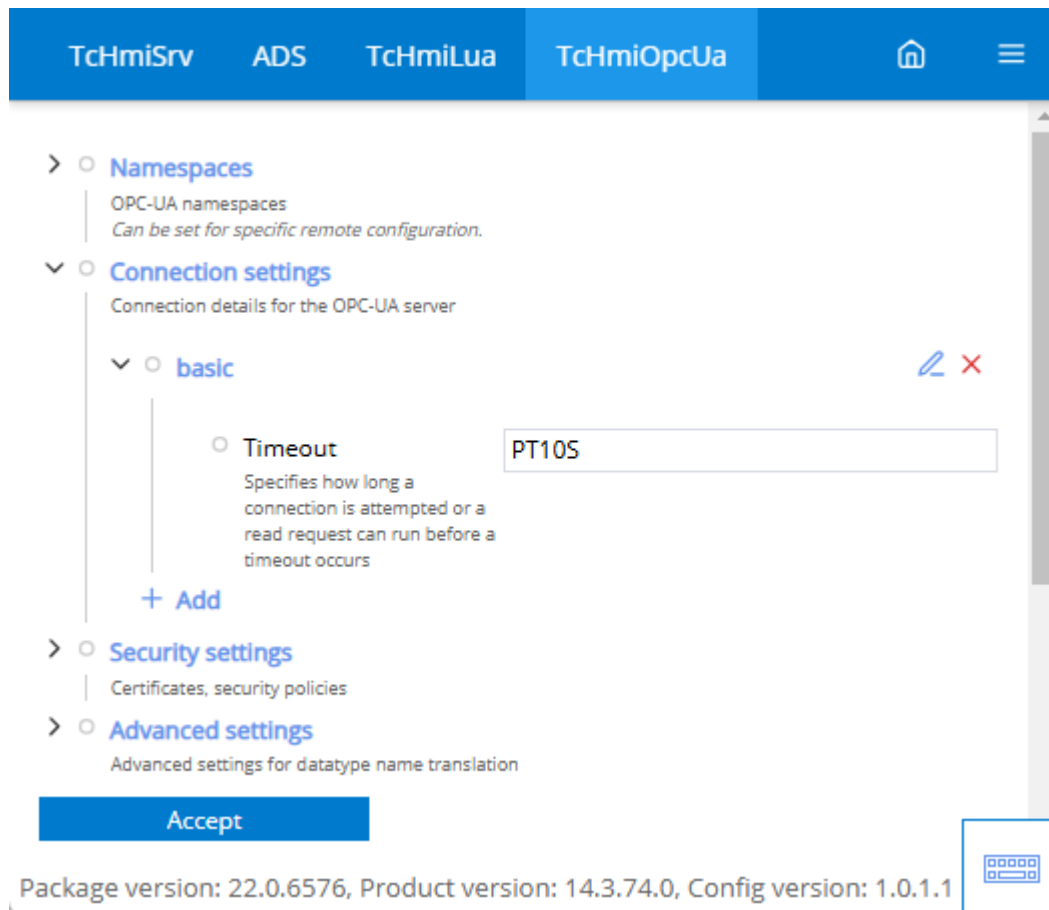
- Select a profile from the Advanced settings area.

### Connection settings [► 1130]

- Select a profile from the Connection settings area.

## 12.1.3.3.2 Connection settings

Provide a profile for establishing a connection. This profile is later assigned to a namespace.



### Timeout

- Specifies how long an attempt is made to establish a connection or a read request is performed before a timeout occurs.

### 12.1.3.3 Security settings

Provide a profile for security settings. This profile is later assigned to a namespace.

TcHmiSrv
ADS
TcHmiLua
TcHmiOpcUa
TcHmiSqliteLogger

Namespaces
OPC-UA namespaces  
Can be set for specific remote configuration.
Connection settings
Connection details for the OPC-UA server
Security settings
Certificates, security policies

basic

Accept all server certificates
true
Accept self-signed certificates
true
Enable authentication
false
Trusted certificate
Select a file
Use client certificate
Select a file
Client private key
Select a file
Password used for authentication
Username used for authentication
Security policy
none
Security mode
none
Use global user
true
The user configured here is logged in to the UA server, otherwise he logs in anonymously
Use HMI server's certificate
false

+ Add

Advanced settings
Advanced settings for datatype name translation

Accept

Package version: 22.0.6576, Product version: 14.3.74.0, Config version: 1.0.1.1

**Accept all server certificates**

- Specifies whether all server certificates are accepted by the extension.

**Accept self-signed certificates**

- Specifies whether self-signed certificates are accepted by the extension.

**Enable authentication**

- This option is used to log the OPC UA server into an OPC UA server with authentication.

**Trusted certificate**

- Trusted certificates can be uploaded here. This is important with the "Accept all server certificates" option.



**Use client certificate**

- Client certificates issued by the server can be uploaded here. This certificate is then used when logging on to the OPC UA server.

**Private key of the client****Password for authentication**

- If authentication is active, the password for the corresponding user must be entered here.

**User name used for authentication**

- If authentication is active, the user name to be used to log in to the OPC UA server must be entered here.

**Security policy**

- Specifies the security policy(encryption) to be used for the connection to the OPC UA server.

**Security mode**

- Specifies which security mode is used to establish the connection to the OPC UA server.

**Use global user**

- The user configured here is logged on to the UA server, otherwise he logs on anonymously.

**Use HMI server's certificate****12.1.3.3.4      Advanced settings**

Provide a profile for advanced settings. This profile is later assigned to a namespace.

TcHmiSrv
ADS
TcHmiLua
TcHmiOpcUa
TcHmiSqliteLogger

Namespaces
OPC-UA namespaces  
Can be set for specific remote configuration.
Connection settings
Connection details for the OPC-UA server
Security settings
Certificates, security policies
Advanced settings
Advanced settings for datatype name translation

basic

Close array replacement `]`
Open array replacement `[`
Browse value sub-elements
Colon character replacement `:`
colonReplacement
verticalLineReplacement
asteriskReplacement
percentReplacement
Mode for generating definition names

\_HMI\_RESERVED\_ARRAYCLOSE\_
\_HMI\_RESERVED\_ARRAYOPEN\_
false
\_HMI\_RESERVED\_DOUBLECOLON\_
\_HMI\_RESERVED\_COLON\_
\_HMI\_RESERVED\_VERTICALLINE\_
\_HMI\_RESERVED\_ASTERISK\_
\_HMI\_RESERVED\_PERCENT\_
Use reference types as symbol names

Ignore node IDs
Node IDs that are ignored when listing the symbols
Ambiguous reference node IDs
Reference node IDs, which must not be used as type ID
Start node
Root node where the list of symbols starts

+ Add

Accept

Package version: 22.0.6576, Product version: 14.3.74.0, Config version: 1.0.1.1

Close array replacement `]`

Open array replacement `[`

Browse value sub-elements

Colon character replacement `:``

ColonReplacement

verticalLineReplacement

1134

Version: 2.11.0

TE2000

**asteriskReplacement****percentReplacement**

### Mode for generating definition names

- Changes the result of List Symbols and how definition names are created. A setting based on ID-based symbols can cause performance problems. Not all servers support unique reference types.

## Ignore Node IDs

- Node IDs that are ignored when listing the symbols.

### Ambiguous reference node IDs

- Reference node IDs that may not be used as type IDs.

## Start node

- Root node at which the list of symbols begins.

## 12.2 Event systems

The TwinCAT HMI has various extensions to implement an event system.

**Alarm [▶ 1136]**

With the Alarm extension, you can configure alarms in the TwinCAT HMI yourself. The extension can monitor symbols in a defined interval and generate a message if the value changes above a defined limit or is equal.

### EventLogger [► 1149]

With the EventLogger extension you integrate the TwinCAT EventLogger.

## Controls [► 1154]

Controls for displaying these messages are available to match the event system extensions.

	↑	↓	Raised ▾	Text ▾
1			1/13/2025, 2:57:42.670 PM	Starting server version 14.3.79.0
2			1/13/2025, 2:57:42.313 PM	Error while checking the status of runtime PLC1 (127.0.0.1.1.1): ERR_TARGETPORTNOTFOUND (0x00000000)
3			1/13/2025, 2:57:42.265 PM	Connected to the local TwinCAT system
4			1/13/2025, 2:57:42.253 PM	Checking for connected TwinCAT license dongles
5			1/13/2025, 2:57:42.169 PM	Domain 'ADS' initialized
6			1/13/2025, 2:57:42.169 PM	The temporary events of the 'ADS' domain were reset.
7			1/13/2025, 2:57:41.821 PM	Listening at http://127.0.0.1:3001
8			1/13/2025, 2:57:41.818 PM	Listening at http://127.0.0.1:13001
9			1/13/2025, 2:57:41.816 PM	The temporary events of the 'TcHmiUserManagement' domain were reset.
10			1/13/2025, 2:57:41.813 PM	Domain 'TcHmiUserManagement' initialized
11			1/13/2025, 2:57:41.614 PM	Domain 'TcHmiLua' initialized
12			1/13/2025, 2:57:41.614 PM	The temporary events of the 'TcHmiLua' domain were reset.

## 12.2.1 Alarm

The extension makes it possible to generate events (alarms and messages) in the HMI server depending on conditions. The EventGrid Control and the EventLine Control can be used to display current or historical events from the Alarm Extension.

### 12.2.1.1 System requirements

#### Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-

#### Version 1.12

Technical data	
Operating system	Windows CE7 Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-

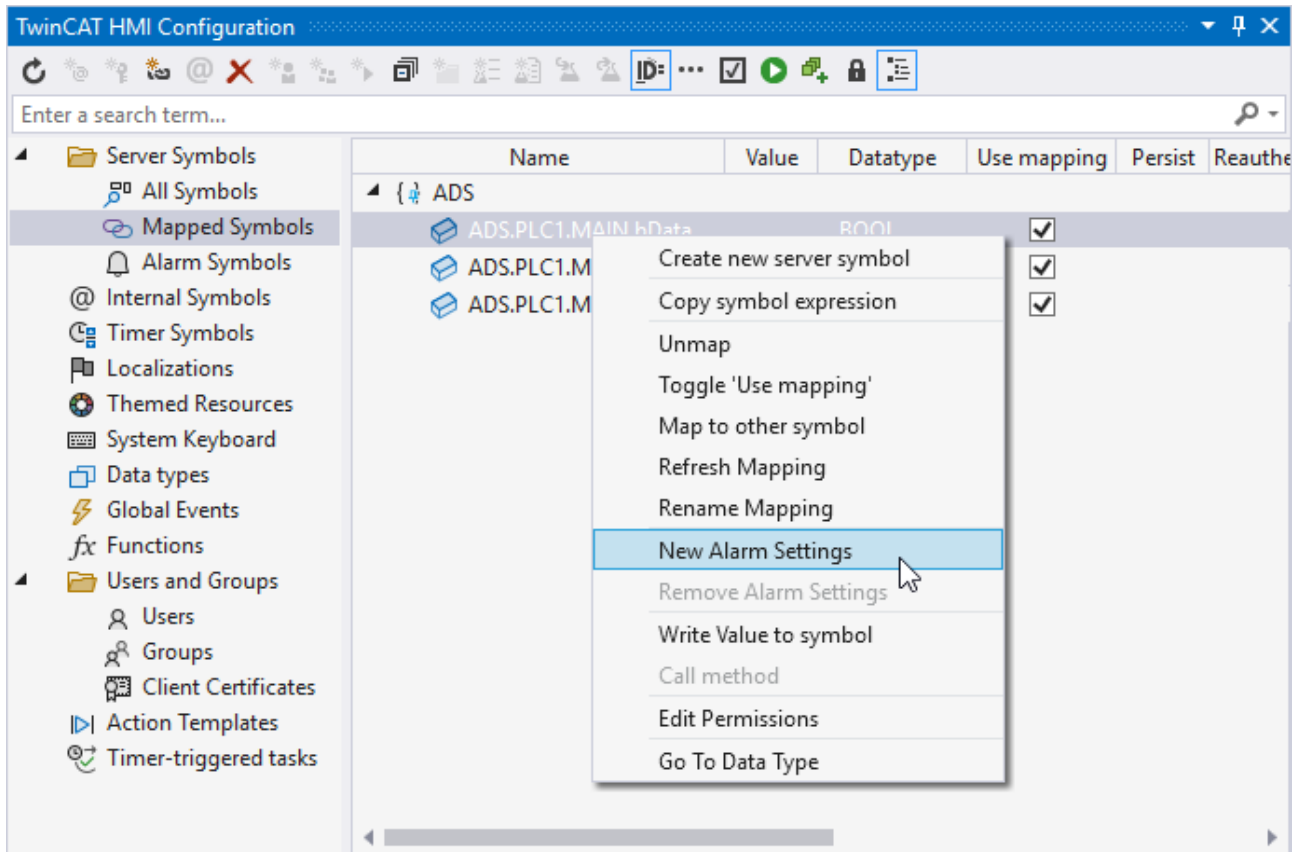
### 12.2.1.2 Quick start

To start, create or open a TwinCAT HMI project.

#### Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.Alarm" via the [NuGet Package Manager](#) [► 1041].

## Adding an alarm in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
2. Go to the **Server Symbols / Mapped Symbols** tab.
3. Select the symbol to be added to the Alarm extension.
4. Add these to the Alarm extension configuration by right-clicking on **New Alarm Settings**.

⇒ A pop-up opens for further settings.

Alarm settings of symbol ADS.PLC1.MAIN.bData

Name: ALARMSETTING

Text (key): settingMatch

Severity: Info

Notification Type: Message

Interval (symbol): 1 s

Buttons: Add condition, Delete condition, Group conditions, Ungroup conditions

And/Or	Operator	Type	Value
--------	----------	------	-------

OK Cancel

5. Define under:

**Name** the name of the alarm function to be created

**Text (key)** the message text (the text is localized)

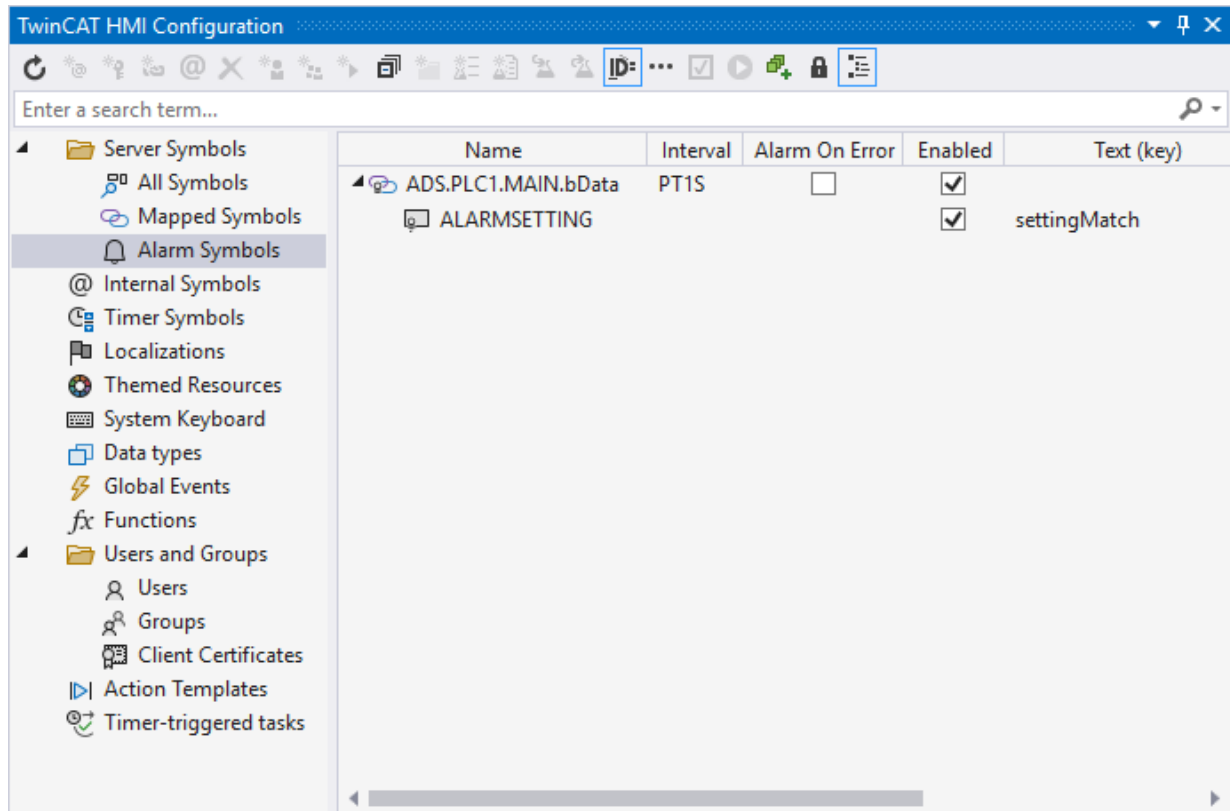
**Severity** what type of message it is

**Notification Type** whether it is a message or an alarm.

**Interval** at which the symbol is checked for changes.

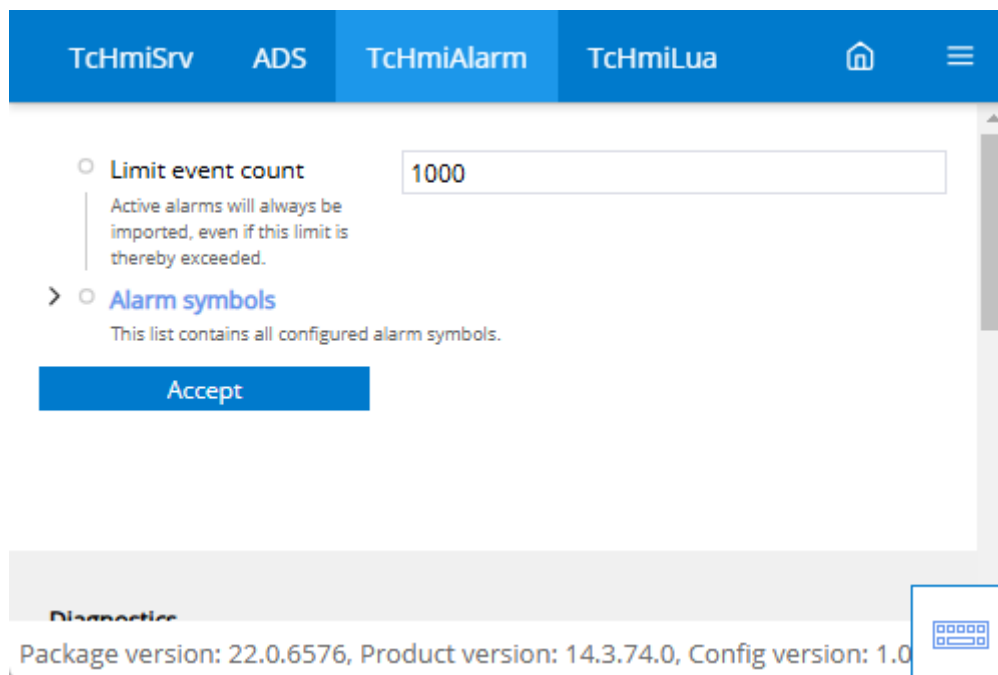
**Condition** when the alarm is triggered.

- ⇒ The alarm you have created is now monitored by the Alarm extension in the background. The EventGrid or EventLine Control can be used for display.



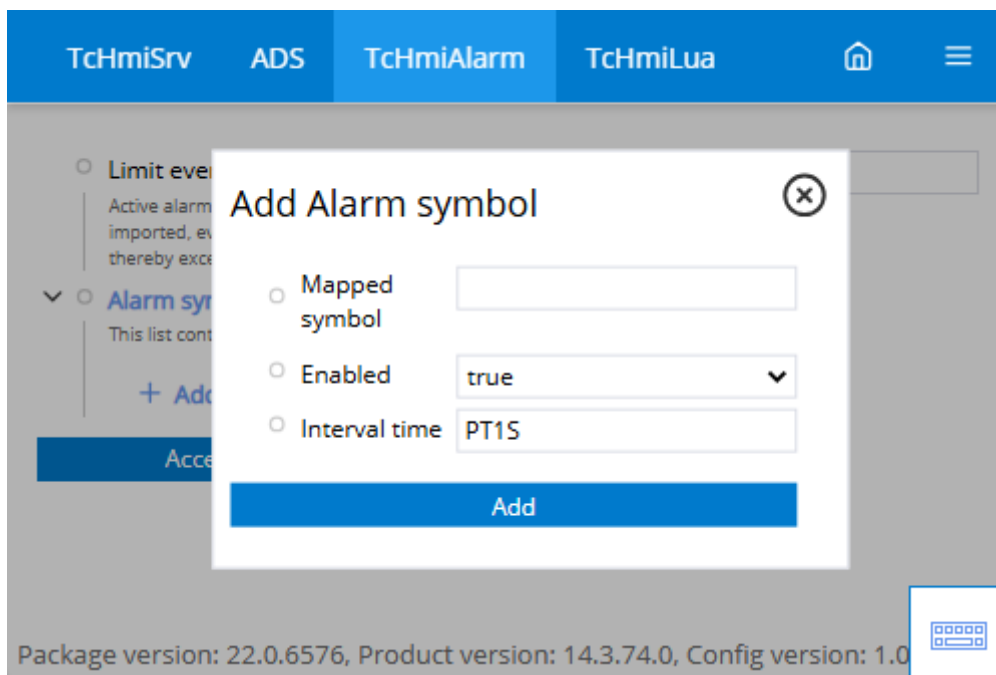
### Adding a symbol via the server configuration page

1. Open the server configuration page.
2. Go to the **TcHmiAlarm**



3. Go to **Alarm Symbols**.  
⇒ All currently configured alarm symbols are displayed here.
4. Click on **Add alarm symbol**.

⇒ A pop-up opens for further settings.



5. Define under:

**Symbol-Mapping**, the name of the corresponding symbol.

**Enabled** whether the value should currently be monitored.

**Interval time** at which the symbol is checked for changes.

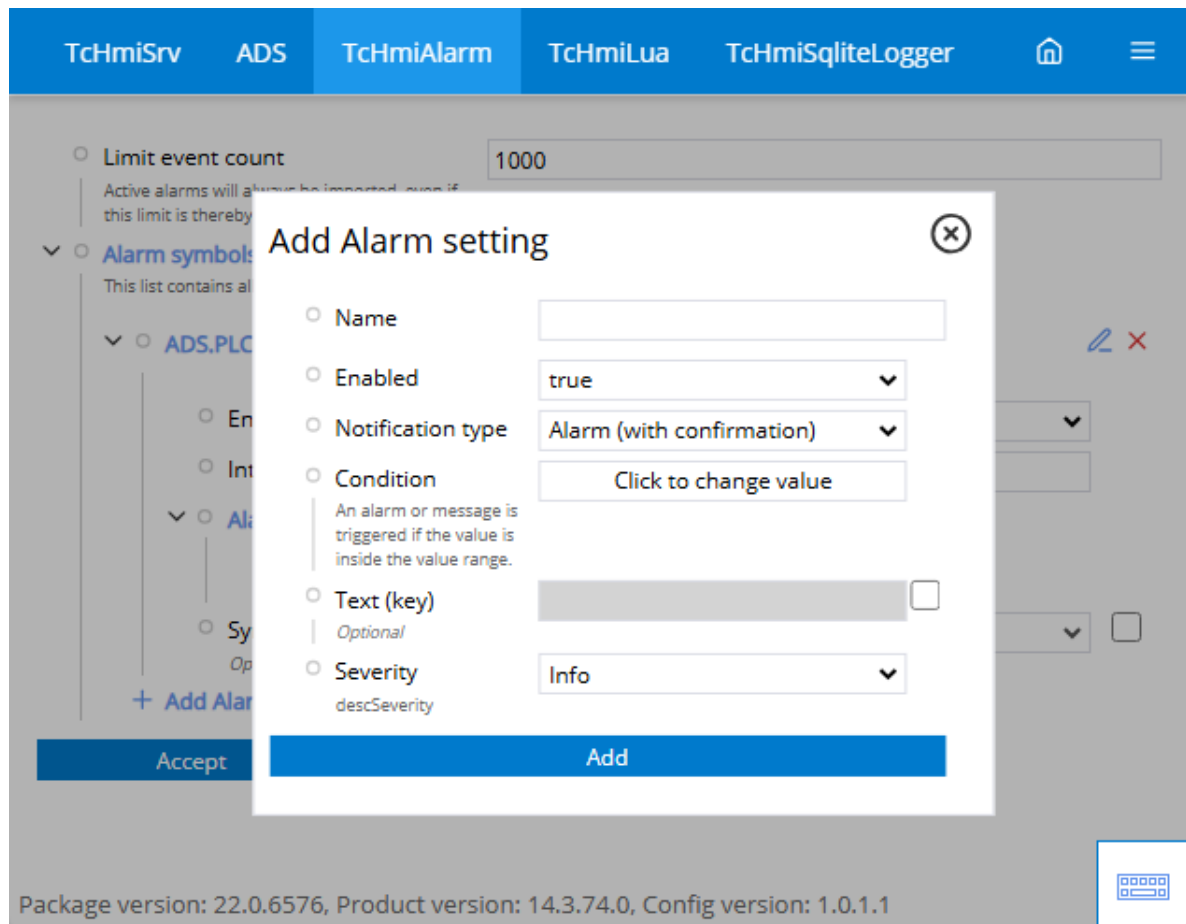
6. Go to **Alarm settings**.

⇒ All currently configured alarm settings for this symbol are displayed here.

7. Click on **Add alarm settings**.



⇒ A pop-up opens for further settings.



8. Define under:

**Name**, the name of the corresponding setting.

**Enabled** whether the setting is used.

**Message type** whether it is a message or an alarm.

**Condition** when the alarm is triggered.

**Text (key)** the message text (the text is localized)

**Severity** what kind of message it is

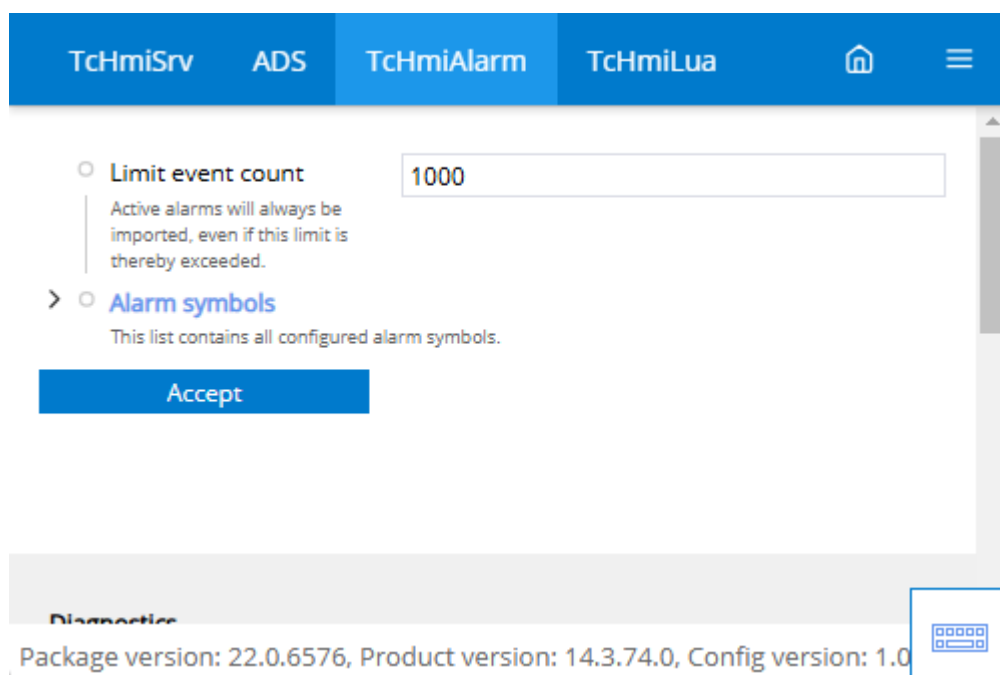
⇒ The alarm you have created is now monitored by the Alarm extension in the background. The EventGrid or EventLine Control can be used for display.

When using the EventGrid or the EventLine, the filter must be set to the "TcHmiAlarm" domain accordingly. All alarms of the extension run under this domain and can only be displayed if the filter allows messages from the domain.

### 12.2.1.3 Configuration

#### General

The basic settings for the Server extension are specified in the **General** tab.



### Maximum number of events

- Active alarms are always imported, even if this limit is exceeded.

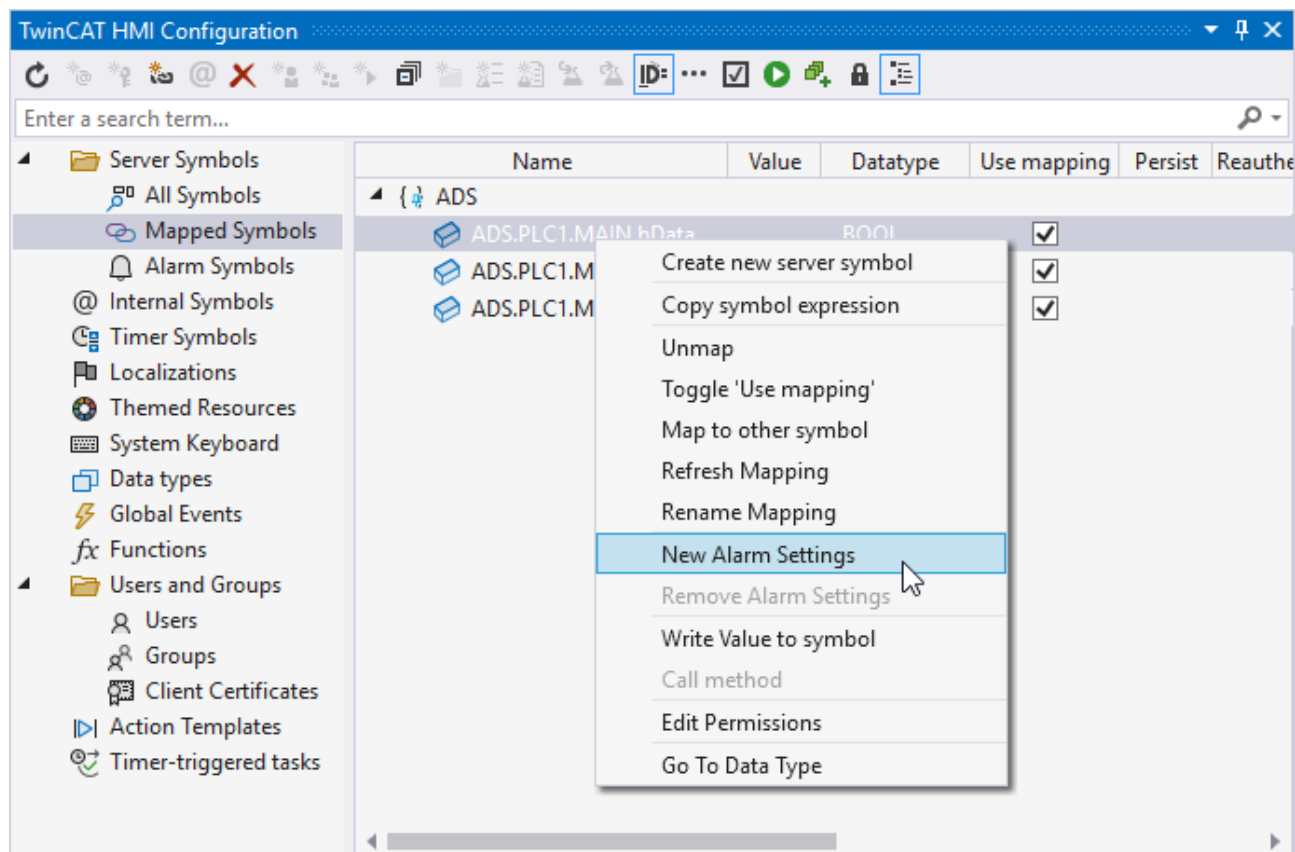
### Alarm symbols

- This list contains all configured alarm symbols

## 12.2.1.3.1 Add alarm

Add new symbols to the Alarm extension.

### Adding an alarm in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
2. Go to the **Server Symbols / Mapped Symbols** tab.
3. Select the symbol to be added to the Alarm extension.
4. Add these to the Alarm extension configuration by right-clicking on **New Alarm Settings**.  
⇒ A pop-up opens for further settings.

Alarm settings of symbol ADS.PLC1.MAIN.bData

Name:

Text (key):  ☐

Severity:

Notification Type:

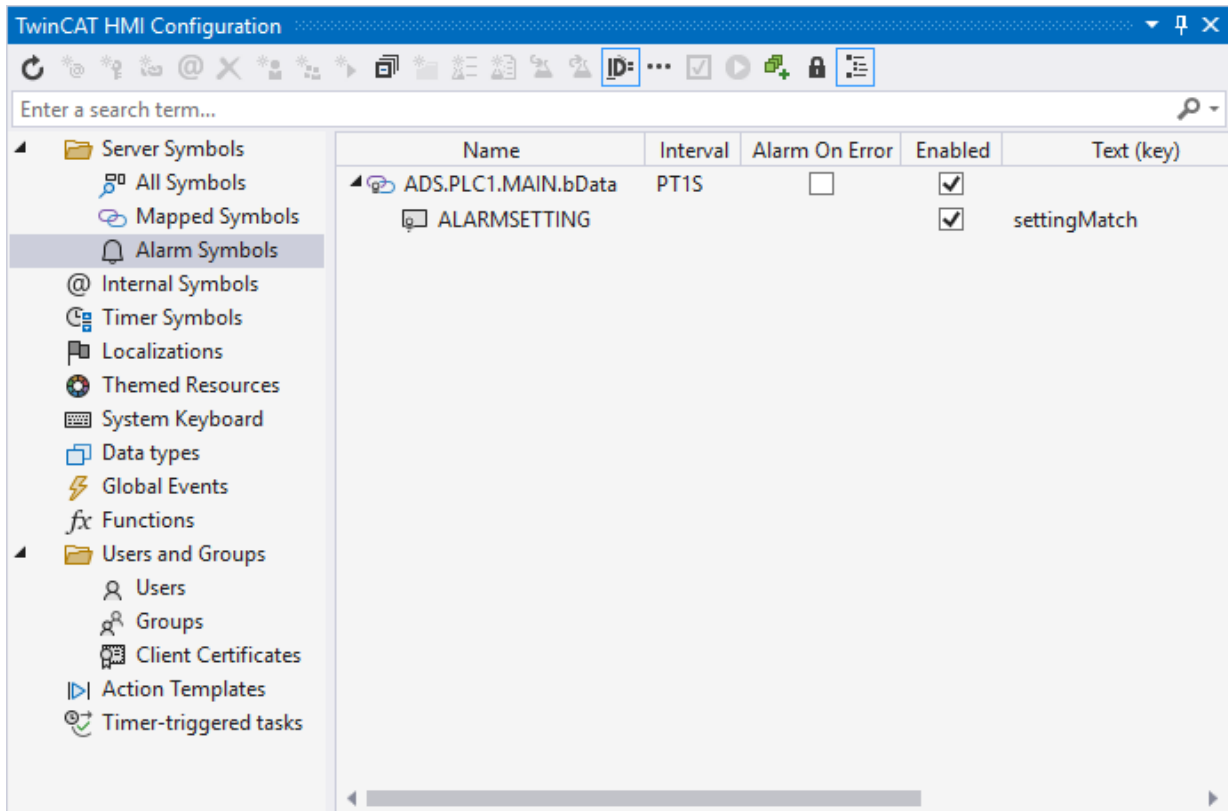
Interval (symbol):

And/Or	Operator	Type	Value

OK Cancel

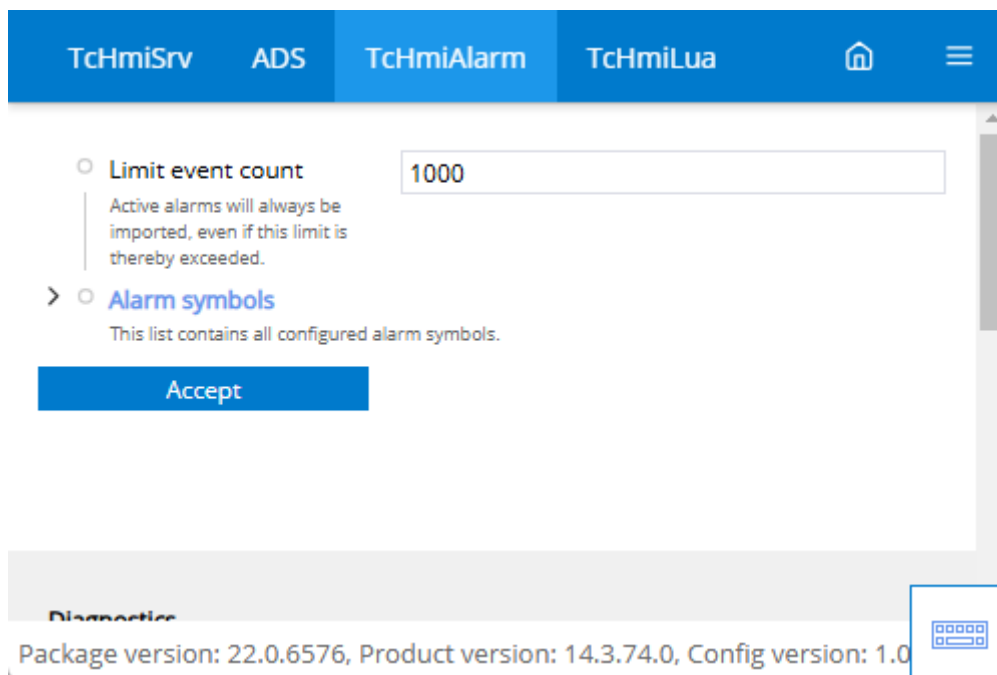
5. Define under:
  - Name** the name of the alarm function to be created
  - Text (key)** the message text (the text is localized)
  - Severity** what type of message it is
  - Notification Type** whether it is a message or an alarm.
  - Interval** at which the symbol is checked for changes.
  - Condition** when the alarm is triggered.

- ⇒ The alarm you have created is now monitored by the Alarm extension in the background. The EventGrid or EventLine Control can be used for display.



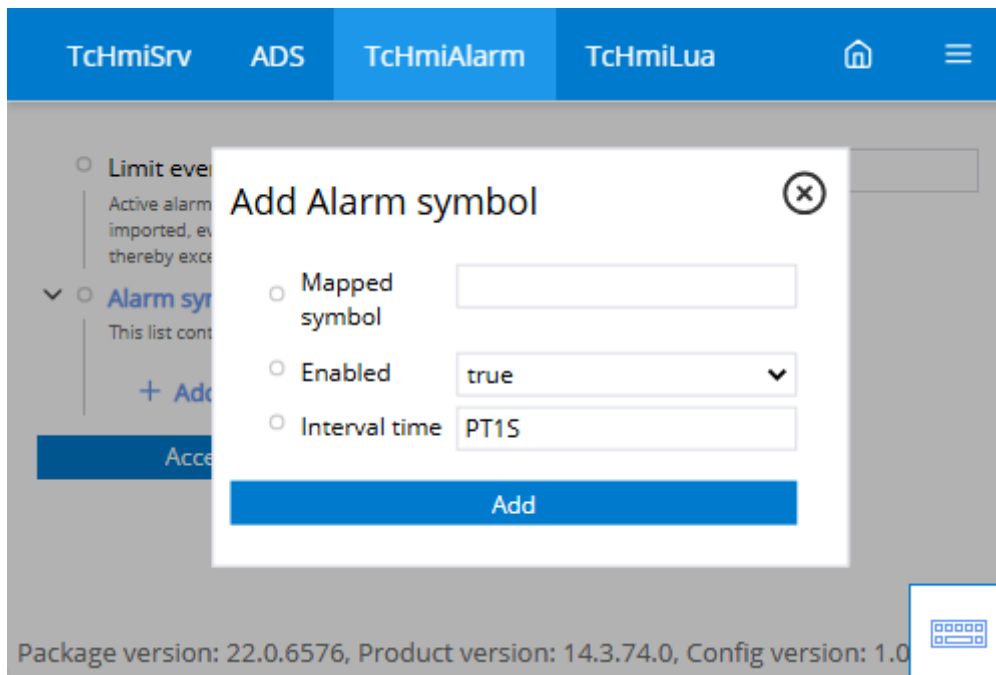
### Adding a symbol via the server configuration page

1. Open the server configuration page.
2. Go to the **TcHmiAlarm**



3. Go to **Alarm Symbols**.  
⇒ All currently configured alarm symbols are displayed here.
4. Click on **Add alarm symbol**.

⇒ A pop-up opens for further settings.



5. Define under:

**Symbol-Mapping**, the name of the corresponding symbol.

**Enabled** whether the value should currently be monitored.

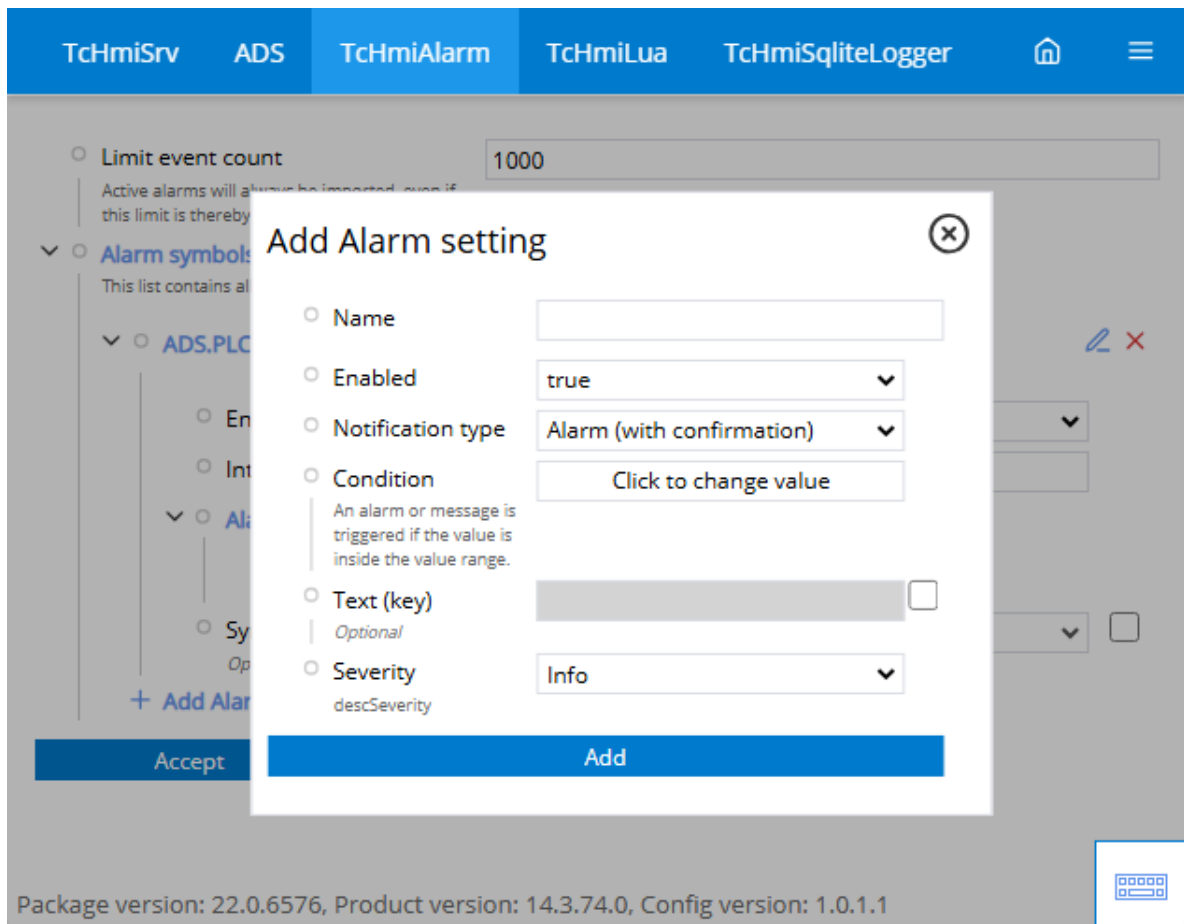
**Interval time** at which the symbol is checked for changes.

6. Go to **Alarm settings**.

⇒ All currently configured alarm settings for this symbol are displayed here.

7. Click on **Add alarm settings**.

⇒ A pop-up opens for further settings.



8. Define under:

**Name**, the name of the corresponding setting.

**Enabled** whether the setting is used.

**Message type** whether it is a message or an alarm.

**Condition** when the alarm is triggered.

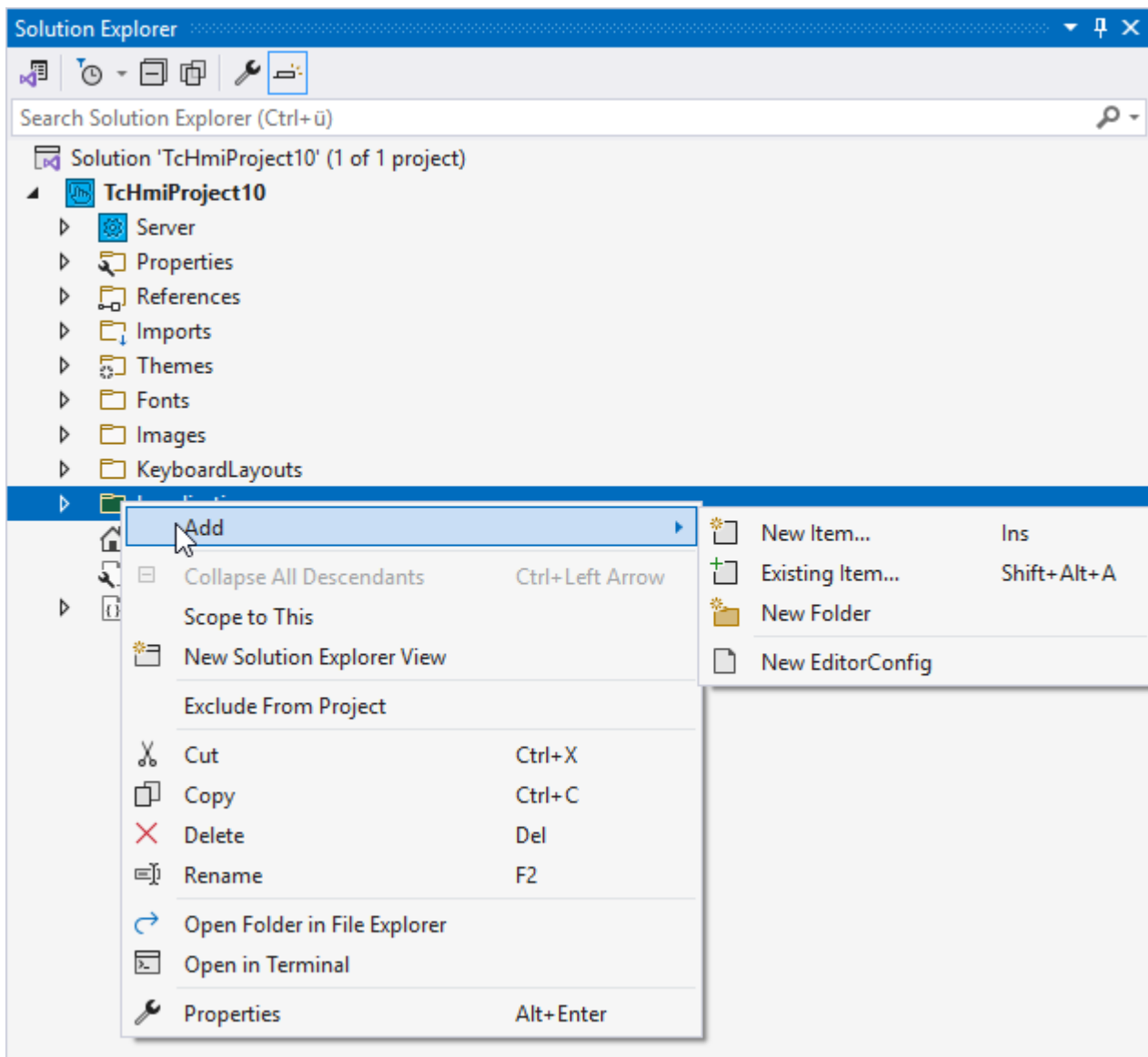
**Text (key)** the message text (the text is localized)

**Severity** what kind of message it is

⇒ The alarm you have created is now monitored by the Alarm extension in the background. The EventGrid or EventLine Control can be used for display.

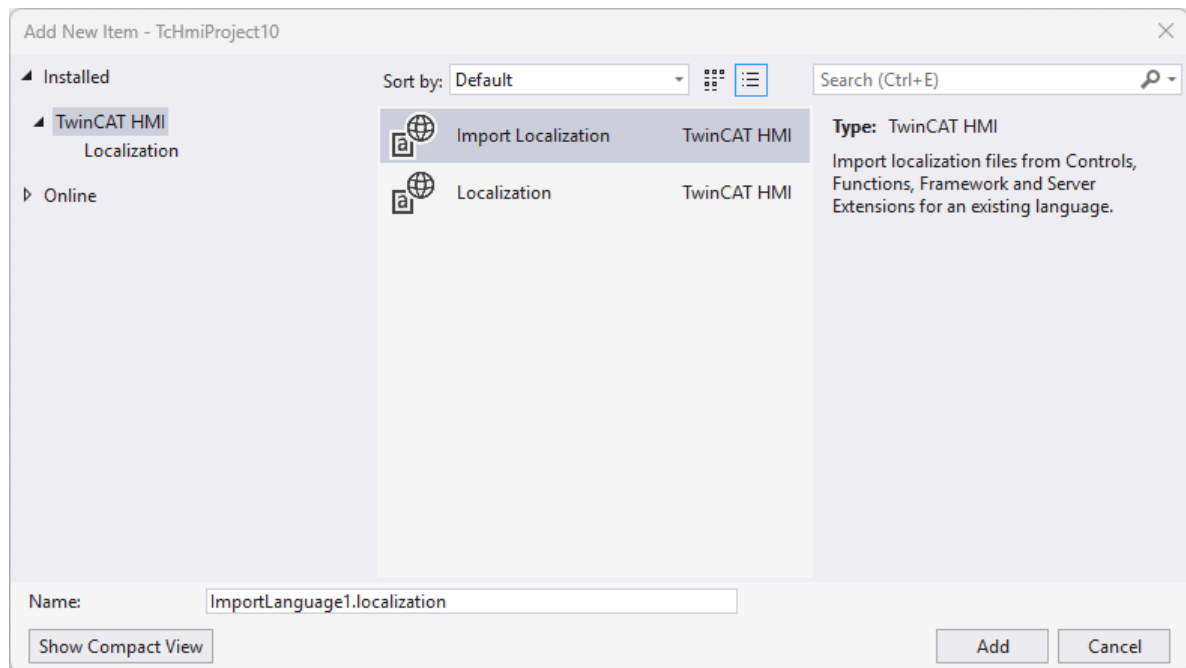
### 12.2.1.3.2 Add localization

Add a new localized key for the Alarm extension.



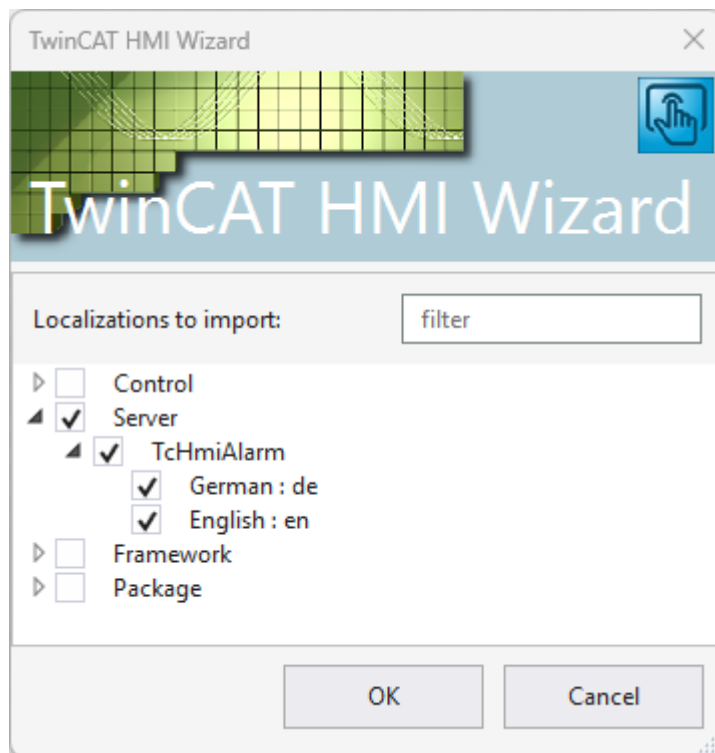
1. Right-click on the **Localization** folder in the **Solution Explorer**.
2. Add a new item.

⇒ A dialog for adding a new item opens



### 3. Select **Import Localization**.

⇒ A dialog for importing existing localization texts opens

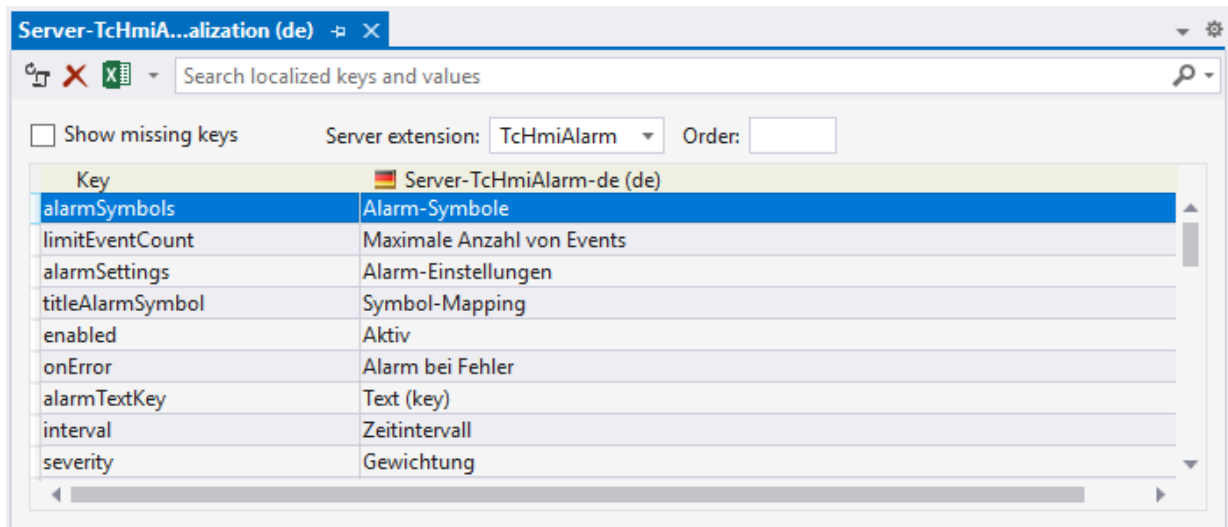


### 4. Select the TcHmiAlarm extension.

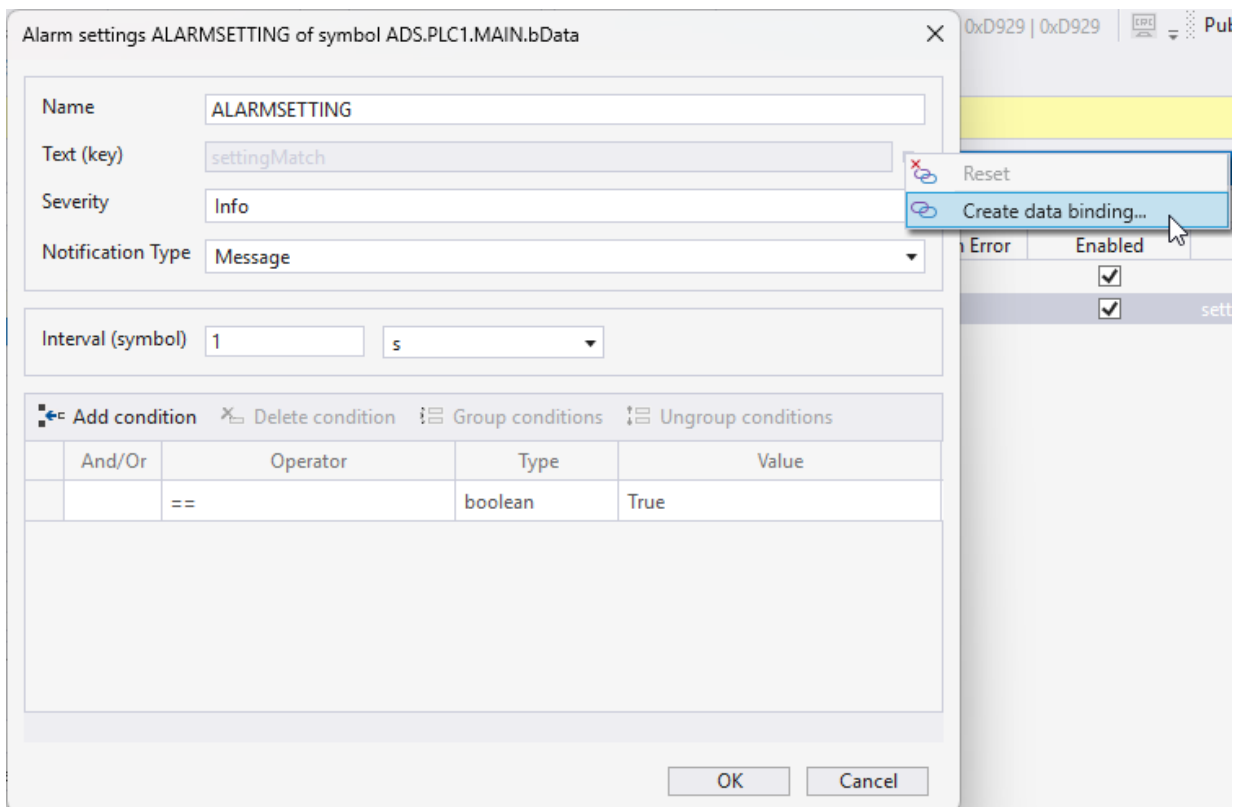
⇒ New localization files are created in your project.



5. Open the new localization file from the Solution Explorer



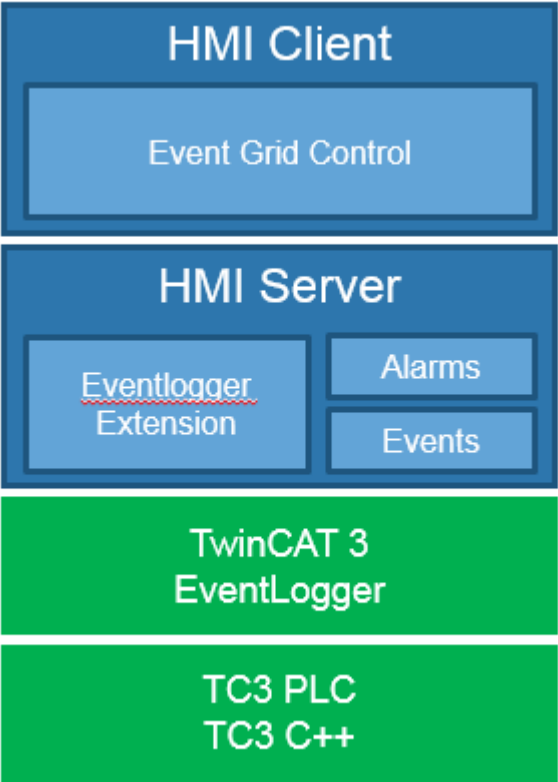
6. Add the new key at the end of the file. Add this to all localization files.  
 7. Open or create [► 1142] an alarm.  
 8. Enter the created key under **Text (key)**.



- ⇒ The localized text has been assigned to your alarm. Depending on the client localization, the Alarm extension will send the message text to the client in the corresponding language.

## 12.2.2 EventLogger

With the EventLogger extension, the TwinCAT EventLogger can be integrated into the HMI. The extension is used to read the messages available in the EventLogger and make them available to the clients. The client can query the data with a filter. This allows you to create filters for historical events or only for current events.



12.2.2.1      **System requirements**

**Version 1.14**

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-

**Version 1.12**

Technical data	
Operating system	Windows CE7 Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-

12.2.2.2      **Quick start**

To start, create or open a TwinCAT HMI project.

**Installation**

Installation is only necessary since version 1.12. In the earlier versions, this package was a fixed part of the server.

Install the NuGet package "Beckhoff.TwinCAT.HMI.EventLogger" via the [NuGet Package Manager](#) [► 1041].

**Configuration of the EventLogger extension**

1. Open the server configuration page

2. Go to the **TcHmiEventLogger** tab

**TcHmiSrv** **ADS** **TcHmiEventLogger** TcHmiLua

> ○ **Target systems**  
Target systems from which events and alarms are collected.  
*Can be set for specific remote configuration.*

○ **Timeout**   
Default timeout for TwinCAT EventLogger requests.

○ **Limit event count**   
Active alarms are always imported, even if this limit is exceeded as a result.

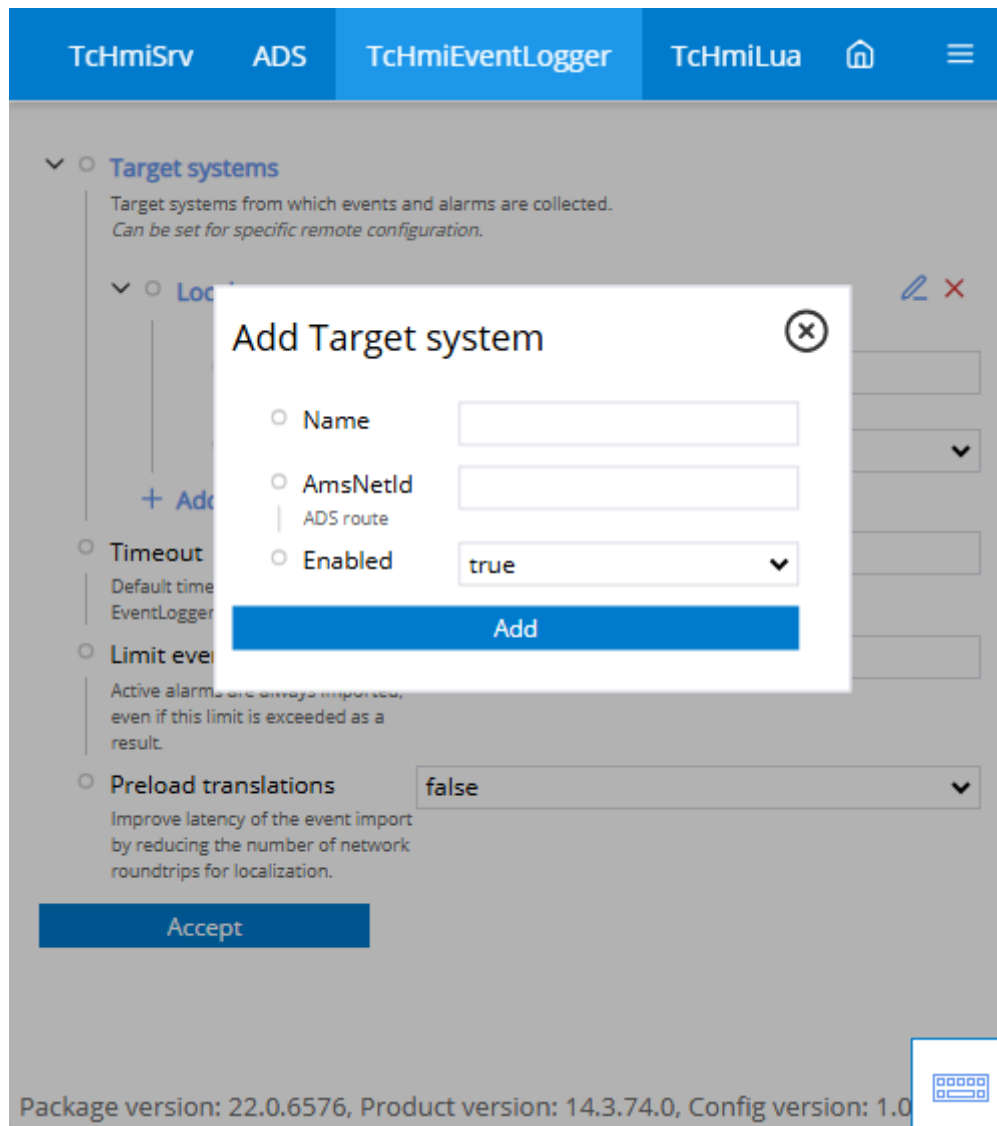
○ **Preload translations**    
Improve latency of the event import by reducing the number of network roundtrips for localization.

**Accept**

Package version: 22.0.6576, Product version: 14.3.74.0, Config version: 1.0

3. Click on **Target systems** to open the submenu
4. Adjust the **Local** entry or click on **Add Target system**

⇒ When adding, a pop-up opens for further settings.



5. Define under:

**Name:** the name of the target system. (Used as namespace for the symbols).

**AmsNetId:** AmsNet Id of the target system to which a connection is to be established.

**Enabled** or disabled connection to the specified target system

⇒ The connection you have configured is available. The events can be displayed accordingly via the EventGrid or EventLine Controls. Alternatively, the values can be queried via a JavaScript subscription.

When using the EventGrid or the EventLine, the filter must be set to the "TcHmiEventLogger" domain accordingly. All events of the extension run under this domain and can only be displayed if the filter allows messages from the domain.

### 12.2.2.3 Configuration

#### General

The basic settings for the Server extension are specified in the **General** tab.

TcHmiSrv
ADS
TcHmiEventLogger
TcHmiLua

Target systems

Target systems from which events and alarms are collected.  
Can be set for specific remote configuration.

Timeout

Default timeout for TwinCAT EventLogger requests.

PT55
Limit event count

Active alarms are always imported, even if this limit is exceeded as a result.

1000
Preload translations

Improve latency of the event import by reducing the number of network roundtrips for localization.

false

Accept

Package version: 22.0.6576, Product version: 14.3.74.0, Config version: 1.0

Target system [▶ 1153]

- Specifies the connection configuration to a device via ADS.

#### Timeout

- Specifies how long an attempt is made to establish a connection or a read request is performed before a timeout occurs.

#### Maximum number of events

- Active alarms are always imported, even if this limit is overwritten.

#### Preload translations

- Reduces the number of network round trips for localization and thus improves the latency when importing events.

### 12.2.2.3.1 Target systems

Establish the connection to a Beckhoff EventLogger.

TcHmiSrv

ADS

TcHmiEventLogger

TcHmiLua

▼

○

Target systems

Target systems from which events and alarms are collected.  
*Can be set for specific remote configuration.*

▼

○

Local

○

AmsNetId

127.0.0.1.1.1

|

ADS route

○

Enabled

true

+

Add Target system

○

Timeout

PT5S

Default timeout for TwinCAT  
EventLogger requests.

○

Limit event count

1000

Active alarms are always  
imported, even if this limit is  
exceeded as a result.

○

Preload translations

false

Improve latency of the event  
import by reducing the number of  
network roundtrips for  
localization.

Accept

Package version: 22.0.6576, Product version: 14.3.74.0, Config version: 1.0

## AmsNetId

- Enter an AmsNetId to which a connection is to be established.

**Enabled**

- Enable or disable the connection to the set AmsNetId.

### 12.2.3 Controls

The following controls are available to match the event system extensions.

**Event Grid [► 1077]**

🔊

0

💬

16

📄

5

📁

11

⚠️

0

❗

0

❌

0

🔍

📅

✅

✔️

	🗨️	📄	Raised ▾	Text ▾
1	🗨️	📄	1/13/2025, 2:57:42.670 PM	Starting server version 14.3.79.0
2	🗨️	📄	1/13/2025, 2:57:42.313 PM	Error while checking the status of runtime PLC1 (127.0.0.1.1.1): ERR_TARGETPORTNOTFOUND (0x00000000)
3	🗨️	📄	1/13/2025, 2:57:42.265 PM	Connected to the local TwinCAT system
4	🗨️	📄	1/13/2025, 2:57:42.253 PM	Checking for connected TwinCAT license dongles
5	🗨️	📄	1/13/2025, 2:57:42.169 PM	Domain 'ADS' initialized
6	🗨️	📄	1/13/2025, 2:57:42.169 PM	The temporary events of the 'ADS' domain were reset.
7	🗨️	📄	1/13/2025, 2:57:41.821 PM	Listening at http://127.0.0.1:3001
8	🗨️	📄	1/13/2025, 2:57:41.818 PM	Listening at http://127.0.0.1:13001
9	🗨️	📄	1/13/2025, 2:57:41.816 PM	The temporary events of the 'TcHmiUserManagement' domain were reset.
10	🗨️	📄	1/13/2025, 2:57:41.813 PM	Domain 'TcHmiUserManagement' initialized
11	🗨️	📄	1/13/2025, 2:57:41.614 PM	Domain 'TcHmiLua' initialized
12	🗨️	📄	1/13/2025, 2:57:41.614 PM	The temporary events of the 'TcHmiLua' domain were reset.

- The Event Grid Control is used to display the messages from the server. These can come from various sources, e.g. Alarm extension, EventLogger extension, etc.

**Event Line [► 1081]**

📄	1/13/2025, 2:58:28.437 PM   Placeholder domain   This is a placeholder event text	➤
---	---	---

- The Event Line Control is used to display the messages from the server. These can come from various sources, e.g. Alarm extension, EventLogger extension, etc.

## 12.3 Recipe Management

The TwinCAT HMI has an extension for processing recipes.

**Recipe Management [► 1155]**

Recipe Management is used for easy handling of recipes. Recipe Management can be used to create and change recipes based on a recipe type. The recipe is loaded via the HMI. When loading, the values from the recipe are written to the corresponding symbols (variables) in the PLC.

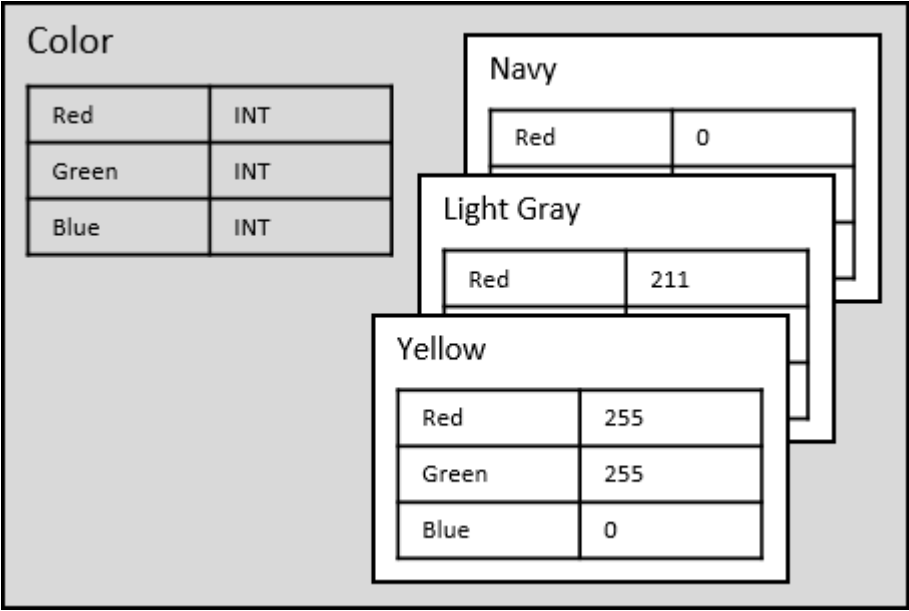
### 12.3.1 Recipe Management

The Recipe Management enables the activation of symbol values that are managed in recipes. Furthermore, online values from the development environment and from the visualization clients can be saved by the target system in a recipe. Prerequisite for the use of the recipe management is the installation of the Recipe Management extension.

**Recipe types and recipes**

A fundamental distinction is made between recipe types and recipes. Comparable with a class in the object orientation, a recipe type is a general description of a set of symbols. On the basis of this description you can create various recipes, comparable with an instance of a class. Specific values for the symbols defined in the recipe type can be saved in a recipe.

The definition of colors as color codes is used as an example. In this example the recipe type Color describes the general structure of a color with its red, green and blue components. Three color recipes for yellow, light gray and navy are created on the basis of this description. The color components defined for these colors are each saved in the three different recipes.



**Inheritance of symbol configurations**

If, by default, certain recipe types are to have a base set of symbols managed in a central place, then these recipe types can inherit [► 1161] from one or more recipe types. As a result they contain the symbol entries configured in these parent recipe types. These entries are automatically updated in case of changes being made in the parent recipe types.

**Reuse of recipes in other recipes**

In order to reuse already defined recipes [► 1162] in other recipes, a recipe type may possess one or more recipe types as members, comparable with standard symbol entries. To do this you can drag and drop the recipe type of the recipe to be reused from the TC HMI Configuration window into the symbol list [► 1166] in the basic recipe type and then enter the recipe to be reused into the recipes derived from it.



Available since version 1.10.1171.142

**See also**

Actions and Conditions Editor [► 61]

Recipe [► 939]

**12.3.1.1      System requirements**

**Version 1.14**

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-



## Version 1.12

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD Windows CE7
Additional software required	-

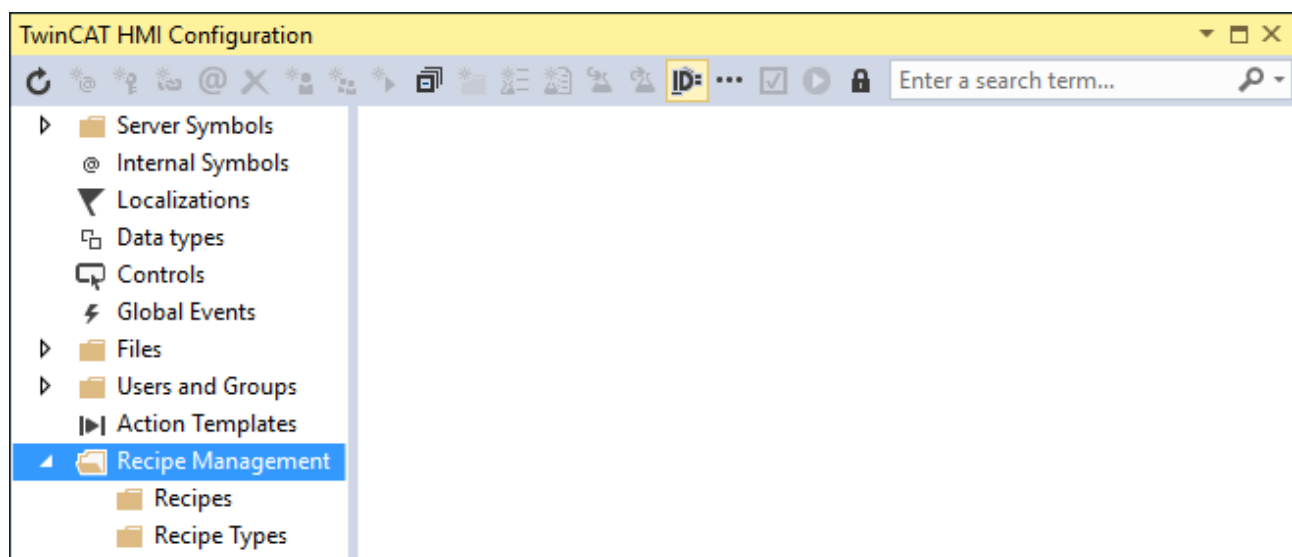
### 12.3.1.2 Configuration

#### General

There are no parameters for the Recipe Management extension on the server configuration page. Create recipe types and recipes in the development environment or on the HMI client side.

#### 12.3.1.2.1 Management in the engineering

The management of recipe types and recipes is integrated in the TwinCAT HMI configuration window [► 77] under **Recipe Management**, where all available recipes are listed under the entry **Recipes** and all recipe types under **Recipe Types**. Both the recipes and the recipe types can be managed there in a self-made folder structure.

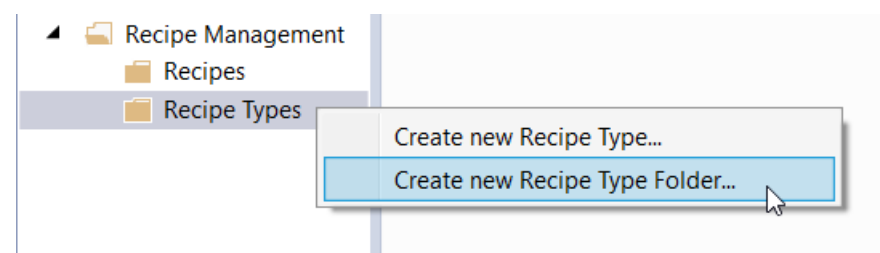


##### 12.3.1.2.1.1 Create folder

Folders can be created for the structuring of recipe types and recipes. The folders can be nested in one another as required. The folders represent the relative path of a recipe.

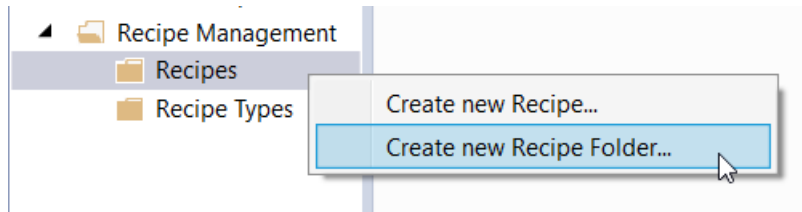
#### Create recipe type folder:

Click on **Create new Recipe Type Folder....** in the configuration window.



#### Adding a recipe folder:

Click on **Create new Recipe Folder....** in the configuration window

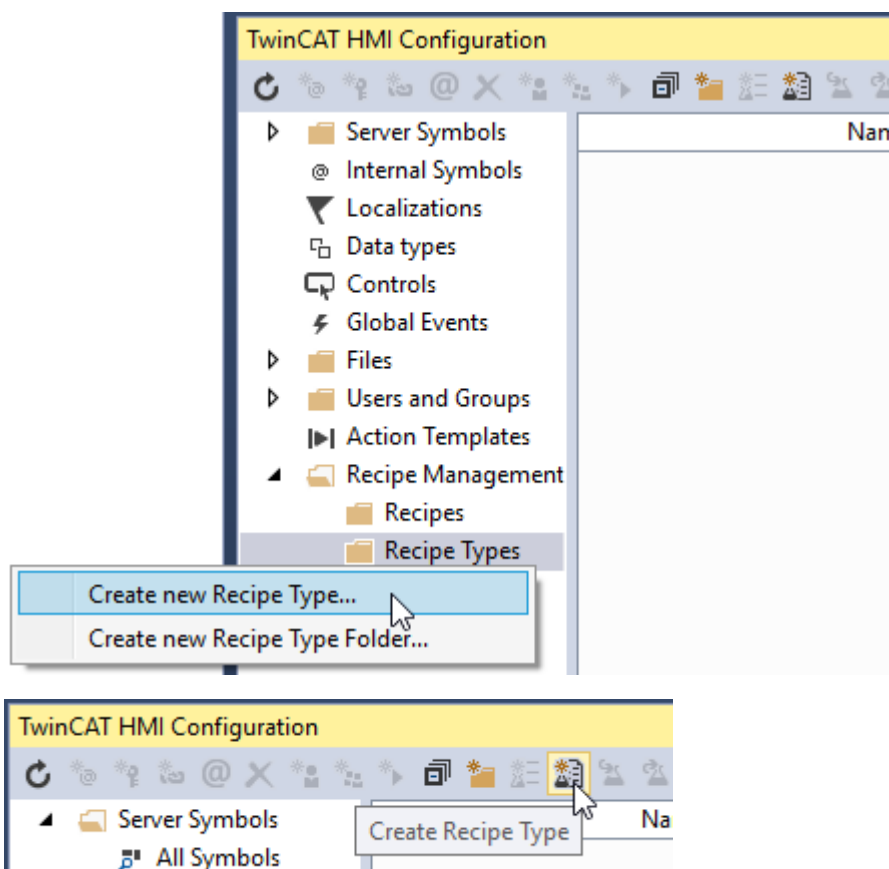


You can then insert recipe types, recipes or further folders in the folders.

Existing folders can be deleted with a right click on **Delete** and renamed by right-clicking on **Rename**.

#### 12.3.1.2.1.2 Create new recipe type

1. In the TwinCAT HMI configuration window, right-click on **Recipe Types** and select **Create new Recipe Type** in the context menu or click on the **Create new Recipe Type** button in the toolbar.

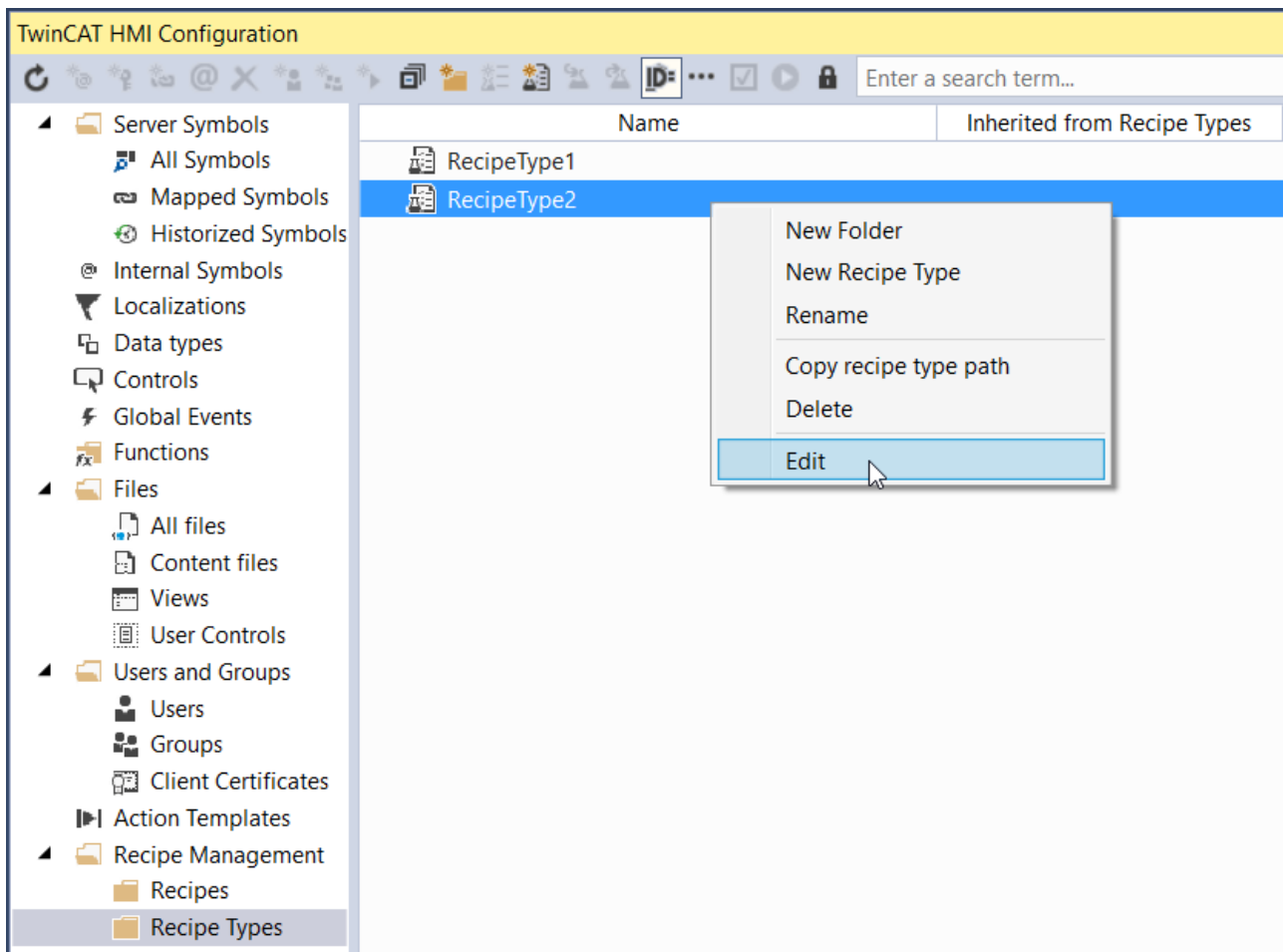


2. Enter a name for the new recipe type.
  3. Confirm the dialog with **OK**.
- ⇒ You have now created a new recipe type.

The [Recipe Type Editor](#) [[▶ 1159](#)] is opened with a double click on the recipe type or by right-clicking on **Edit**.

#### 12.3.1.2.1.3 Changing the recipe type

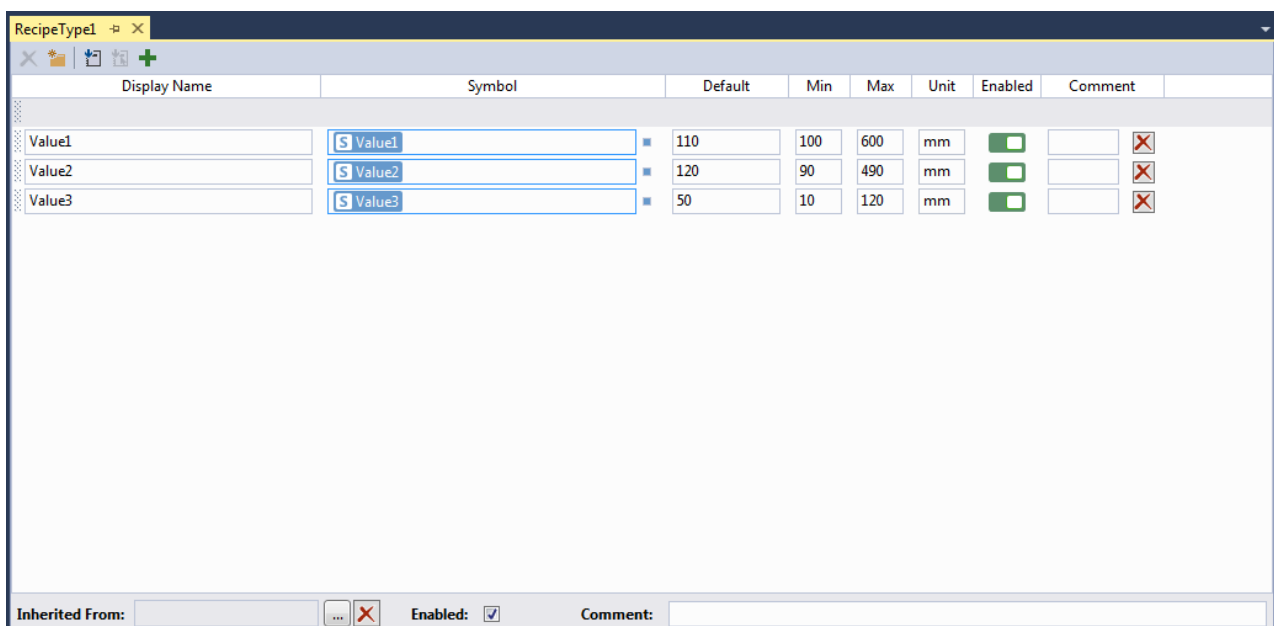
In the TwinCAT HMI configuration window, right-click on the recipe type to be changed and select **Edit** in the context menu or double-click on this recipe type to open the [Recipe Type Editor](#) [[▶ 1159](#)].



#### 12.3.1.2.1.4 Recipe Type Editor

A recipe type can be configured in the Recipe Type Editor. The editor has a toolbar in the upper area, a configurable list of server symbols in the central area and general settings for the entire recipe type in the lower area.

New symbols can be added directly to the recipe type by drag-and-drop on the TwinCAT HMI configuration window. Alternatively, they can be added to the toolbar via the + button.



## Symbol list

Server symbols that are to be added to a recipe type can either be placed in the symbol list by drag and drop from the TwinCAT HMI configuration window or selected in the symbol selection window, which is accessible via the [toolbar](#) [► 1167]. The symbol list has different columns.






Display Name	The name to be used for the symbol entry in the recipes derived from the recipe type is defined here.
Symbol	This entry is automatically set by drag and drop.
Default	Define a default value here that is adopted automatically when creating a new recipe. <b>Info:</b> A value must be entered here so that the recipe type can be saved. The <b>Read Default Values from Target</b> function in the toolbar can be used to adopt the current values of all symbols from the PLC into this field.
Min	If necessary, define a minimum value for this symbol here that can be used in the recipes derived from the recipe type. <b>Info:</b> This field is available only with numerical values and enumerations.
Max	If necessary, define a maximum value for this symbol here that can be used in the recipes derived from the recipe type. <b>Info:</b> This field is available only with numerical values and enumerations.
Unit	If necessary, enter a unit for the symbol here.
Enabled	Enable or disable individual symbols for the recipe type here. <b>Info:</b> This setting is automatically adopted for the recipes derived from the recipe type. When enabling one of these recipes, the values of the disabled symbol entries are not written to the corresponding server symbols.
Comment	If necessary, enter a comment for the symbol entry here.

You can mark several symbol entries in the symbol list at the same time by keeping the Ctrl key pressed while selecting the individual entries. This allows you, for example, to delete several entries at the same time with the Delete key or the X button.

Other recipe types can also be added by drag and drop in the symbol list for the [reuse of recipes in other recipes](#) [► 1162].

## Toolbar

You can execute various functions via the toolbar in the upper area of the editor.

	Delete selected rows	The selected entries in the symbol list are deleted from the recipe type.
	Create new group	A new group in which the symbol entries can be summarized is created in the symbol list.
	Read default values from target	The default values are read from the target and entered for all symbol entries.
	Read default values of the selected rows from the target	The default values are read from the target and entered only for the selected symbol entries.
	Add symbols to this recipe type	The symbol selection window is opened, where you can select the desired symbols and add them to the recipe type as an alternative to drag-and-drop.

## General settings

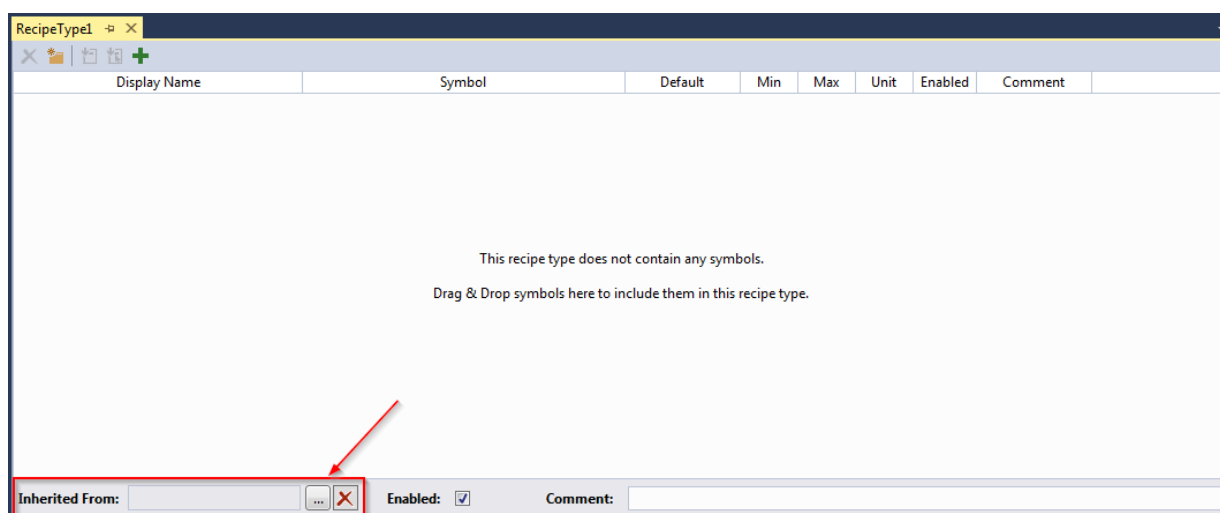
In the lower part of the editor you can configure generally valid settings for the entire recipe type.

Inherited From	Select one or more recipe types from which the currently opened recipe type should <u>inherit</u> [▶ 1161].
Enabled	Activate or deactivate the entire recipe type here. <b>Info:</b> The recipes derived from the recipe type are deactivated automatically.
Comment	If necessary, enter a comment for the entire recipe type here.

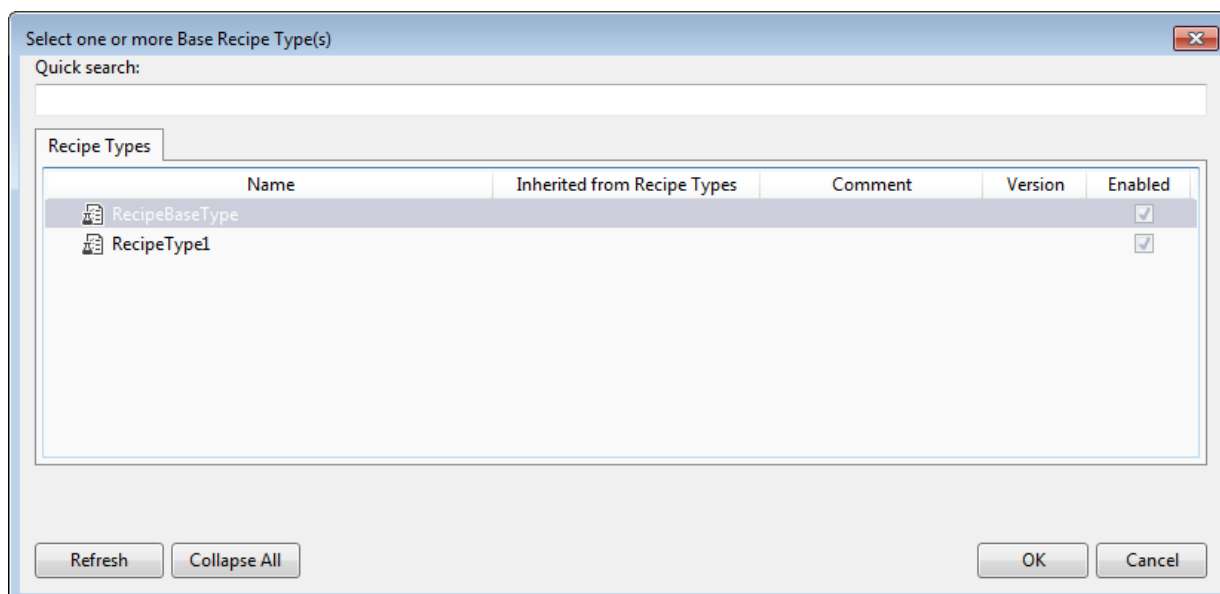
### 12.3.1.2.1.4.1 Inheritance of recipe types

A recipe type can inherit from one or more recipe types. In the process, all symbols of the base recipe type are adopted into the derived recipe type (comparable with inheritance in object-oriented programming). Inheritance hierarchies can be constructed as desired through the support of inheritance. Changes in the base recipe type are automatically adopted into the derived recipe types.

1. Create a new recipe type.
2. Select the base recipe type in the lower status bar under "Inherited From:" via the "... " button:



3. In the following window you have the possibility to select the base recipe types:

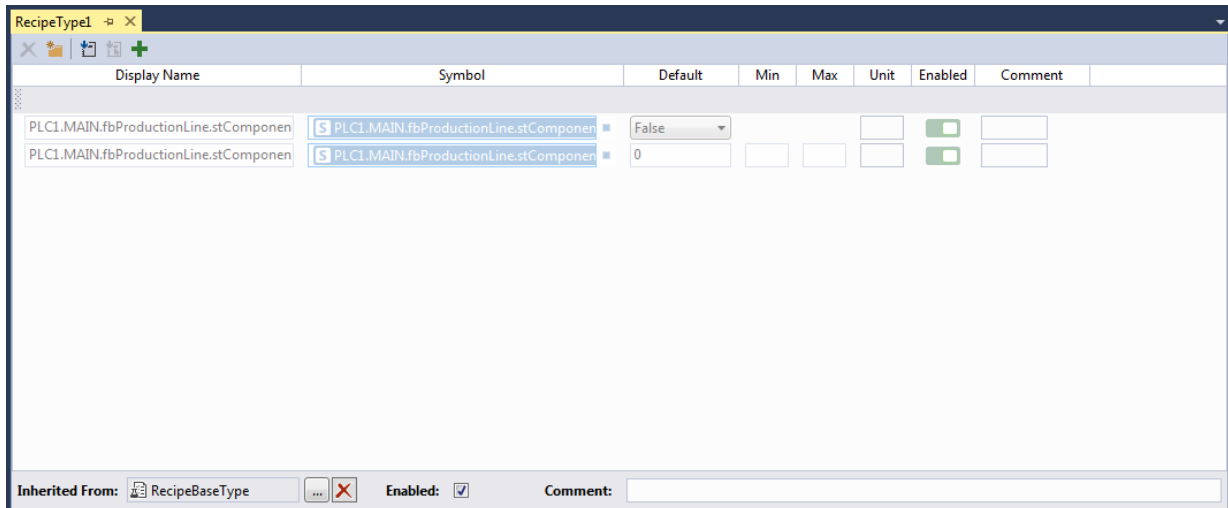


Multiple selection is possible by holding down the "CTRL" key.



A recipe type cannot inherit from itself.

- The symbols are inherited by the derived recipe type. The symbols are displayed grayed out since a change is only possible in the base recipe type.

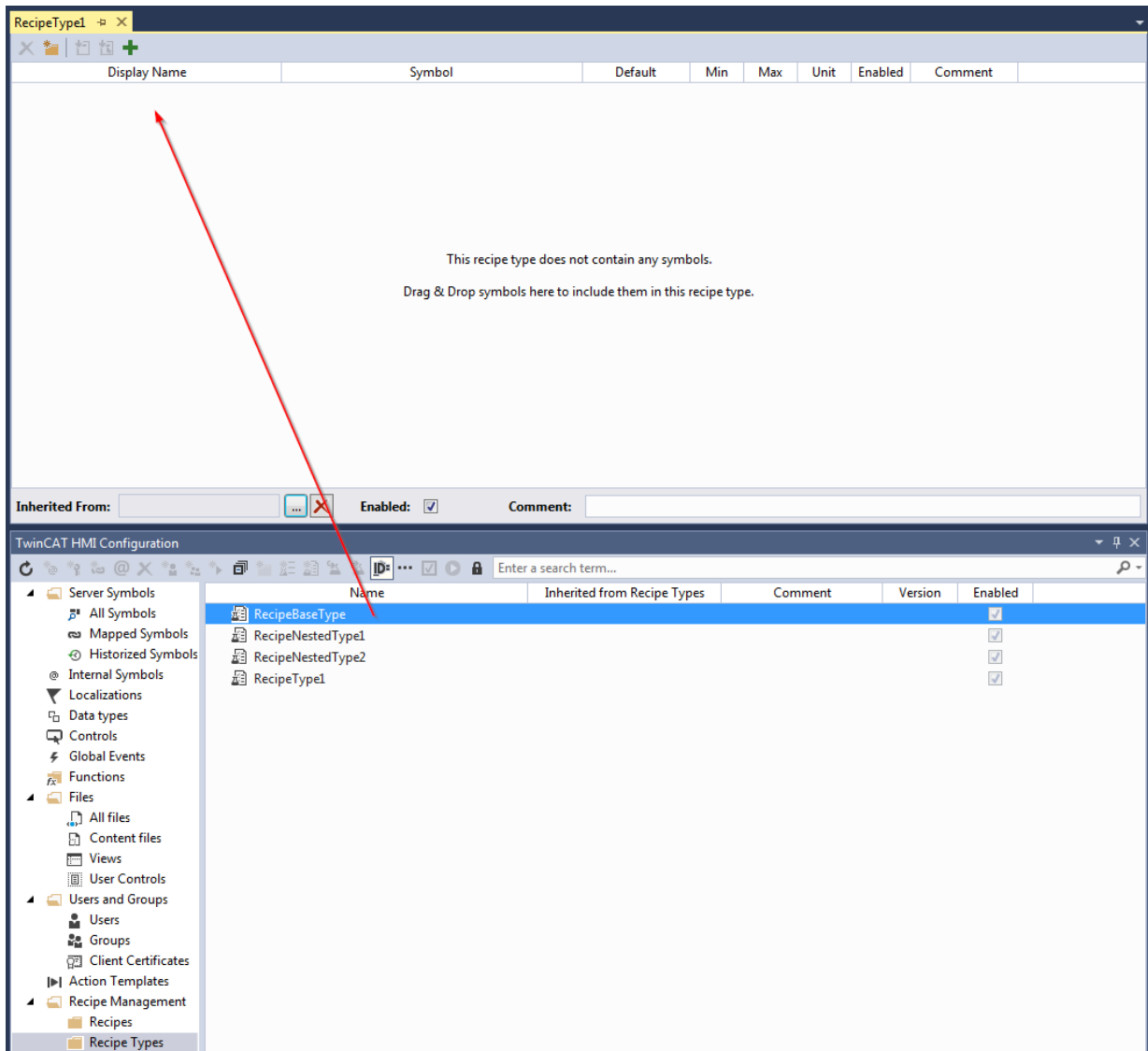


#### 12.3.1.2.1.4.2 Reuse of recipe types

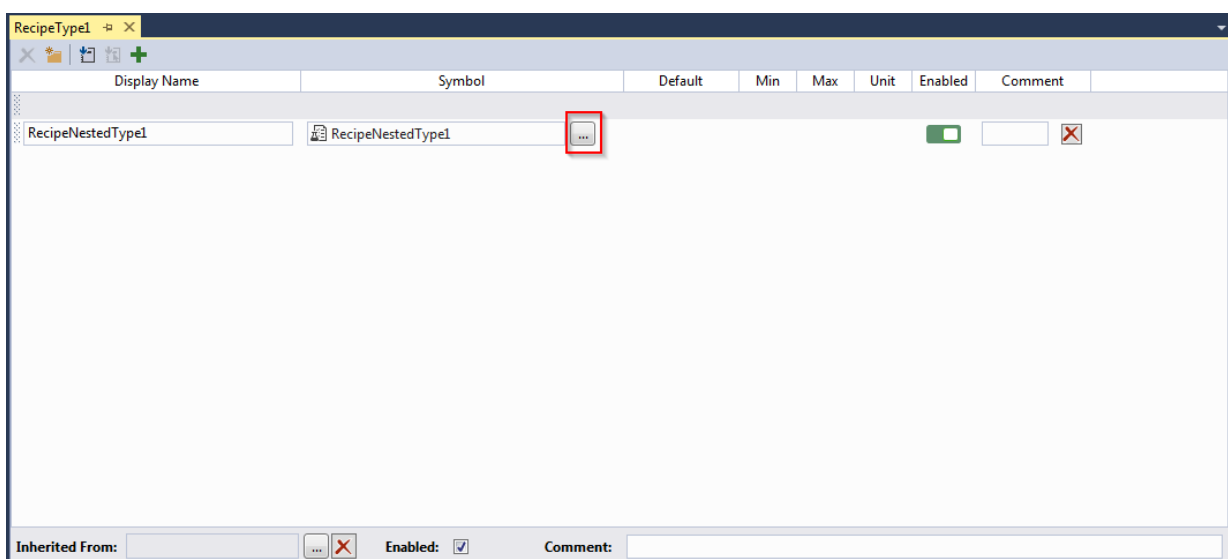
A recipe type can contain further recipe types as members. This enables several recipe types to be reused in a recipe type. When creating a recipe, other recipes (instead of a value as in the case of the symbols) are stored for the individual recipe type members.

- Create a new recipe type.

2. Add a recipe type from the configuration window to the new recipe type by drag-and-drop.

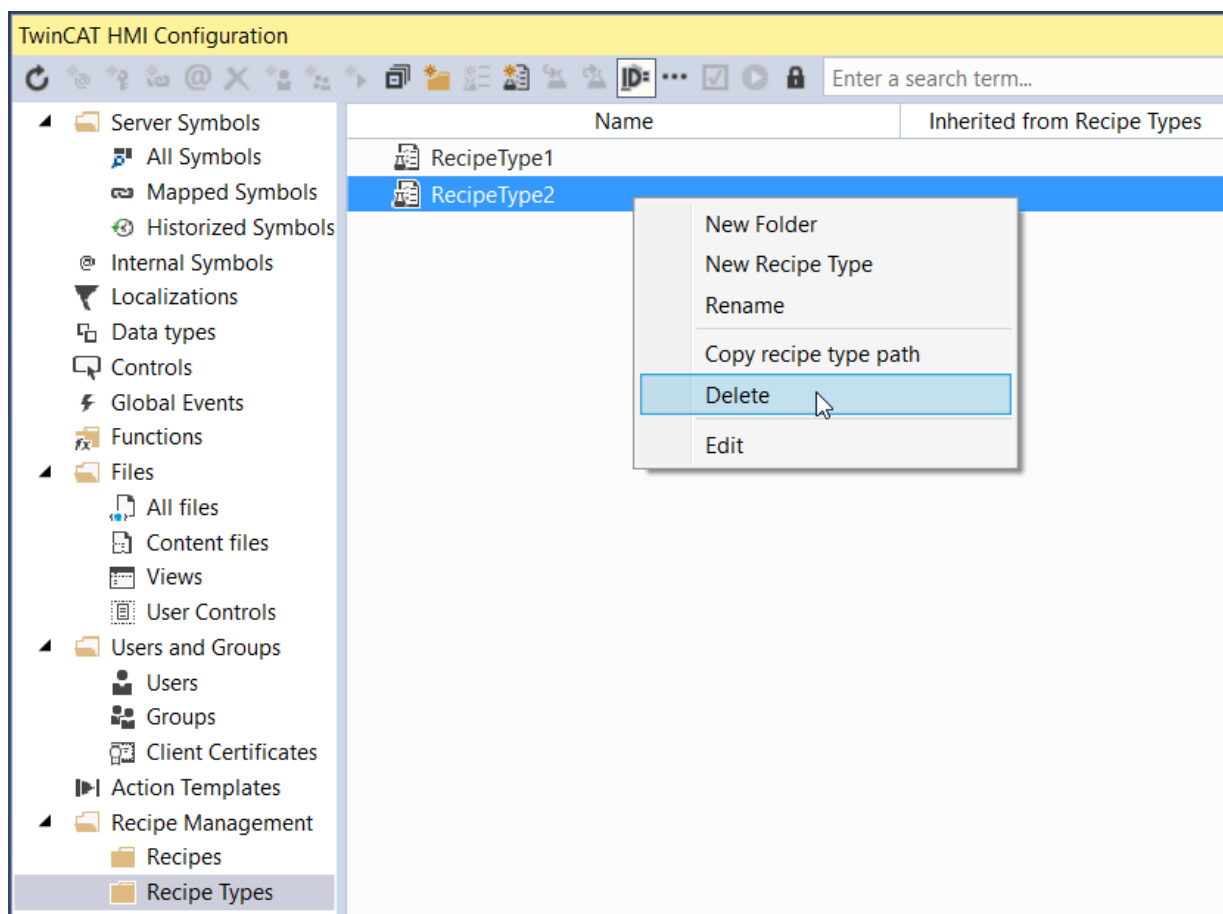


3. The recipe type is now contained as a member. The recipe type can subsequently be replaced by another recipe type by clicking on the ... button behind the symbol name.



### 12.3.1.2.1.5 Deleting a recipe type

1. In the TwinCAT HMI configuration window, right-click on the recipe type to be deleted and select **Delete** in the context menu.

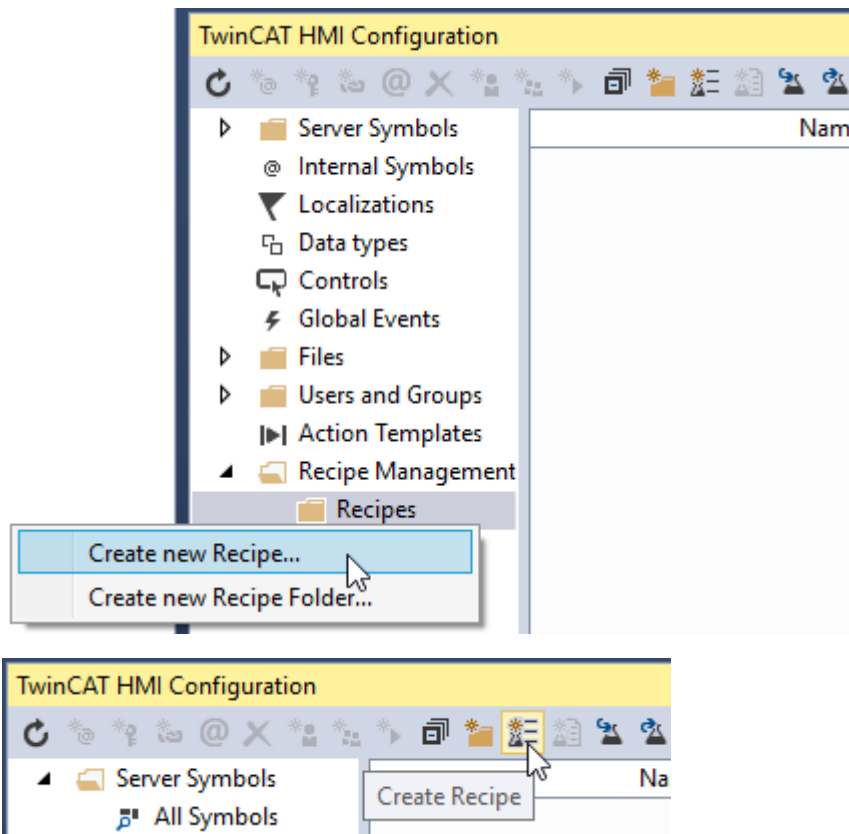


2. Confirm the dialog with **OK** if you wish to delete the selected recipe type(s) including all recipes derived from it/them.

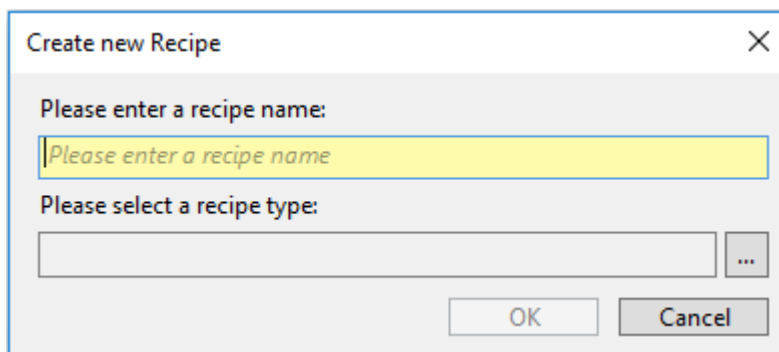


### 12.3.1.2.1.6 Creating a new recipe

1. In the TwinCAT HMI configuration window, right-click on **Recipes** and select **Create new Recipe** in the context menu or click on the **Create new Recipe** button in the toolbar.



2. Enter a name for the new recipe in the **Create new Recipe** dialog.

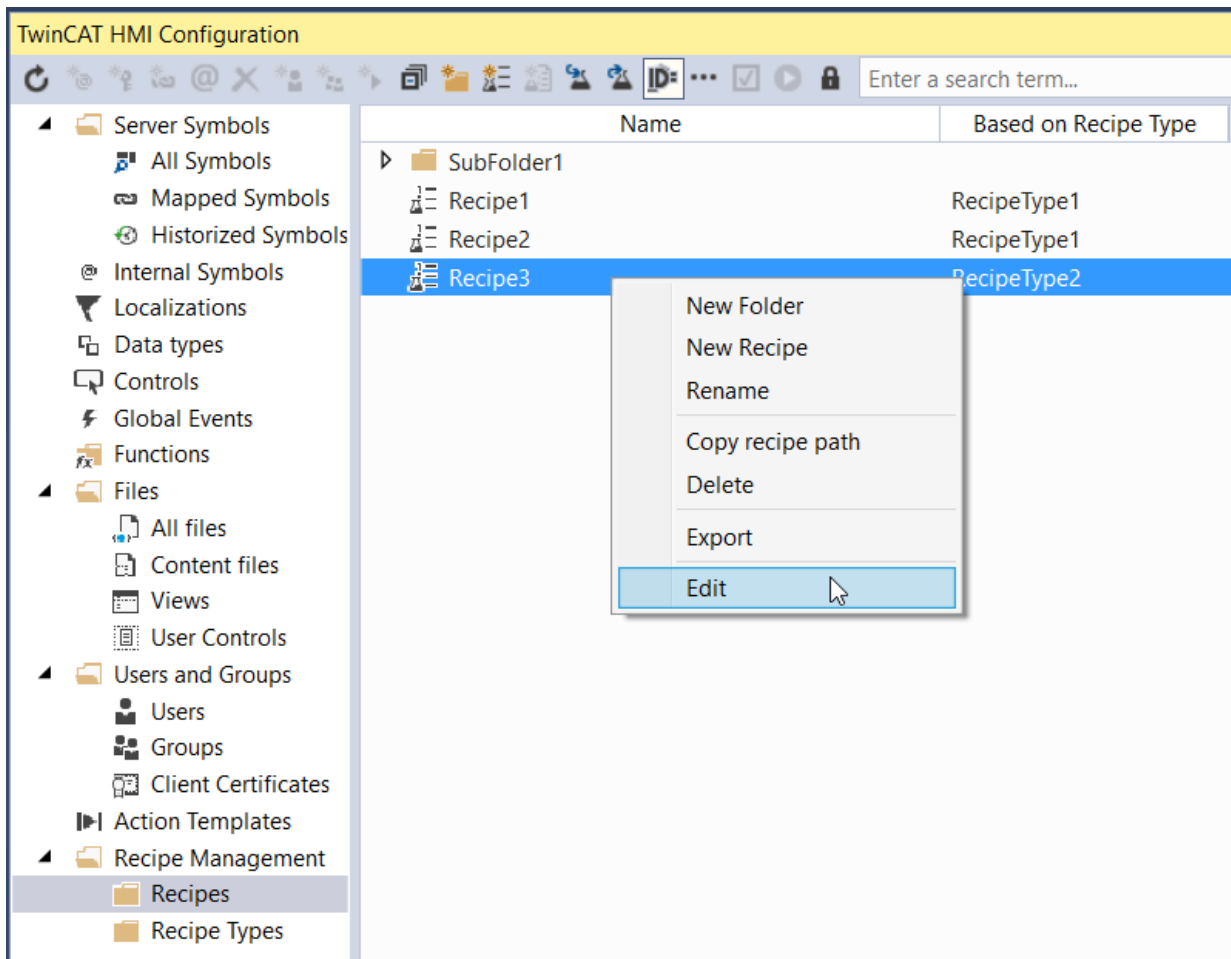


3. Using the ... button, select one of the existing recipes on which the new recipe is to be based.
4. Confirm the dialog with **OK**.

The Recipe Editor [► 1166] is opened by double-clicking on the recipe or right-clicking on **Edit**.

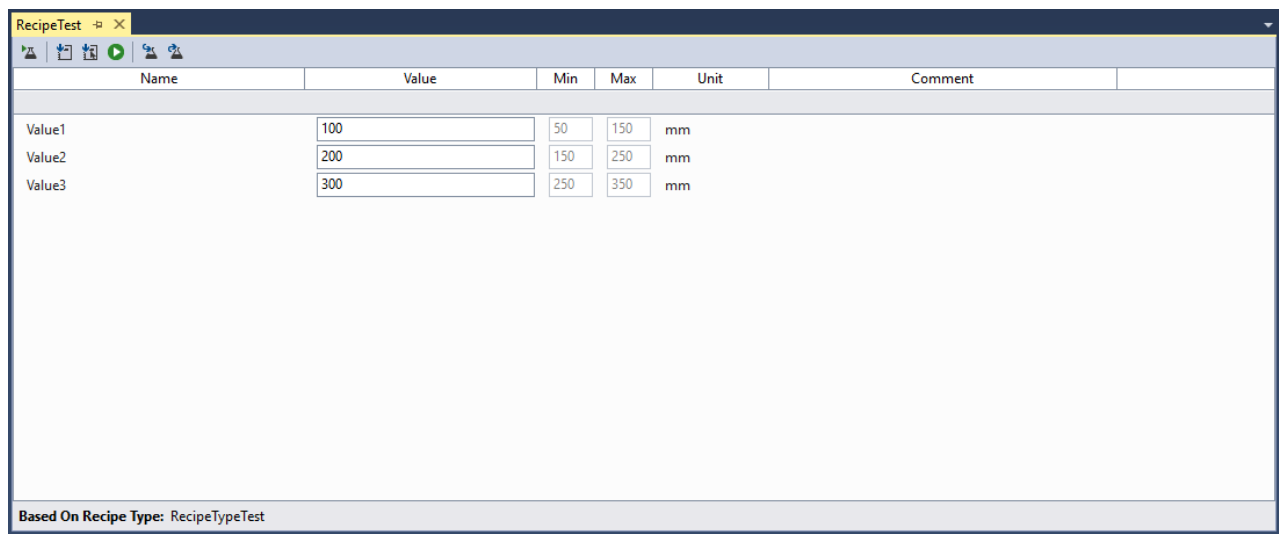
12.3.1.2.1.7 Changing the recipe

1. In the TwinCAT HMI configuration window, right-click on the recipe to be changed and select Edit in the context menu or double-click on this recipe to open the [Recipe Editor](#) [► 1166].



12.3.1.2.1.8 Recipe Editor

A recipe can be managed in the Recipe Editor. The editor has a toolbar in the upper area, a symbol list in the central area and general information in the lower area.









Symbol list

All symbol entries with the information defined in the recipe type are shown in the symbol list. Here you can change the values of the individual entries, save them together with the recipe and manage them via the toolbar [► 1167]. You can mark several symbol entries at the same time by keeping the Ctrl key pressed while selecting the individual entries.

Name	The name of the symbol entry is shown here.
Value	Define a value for the symbol entry here. <b>Info:</b> When creating a new recipe the default value is automatically adopted from the recipe type.
Min	The lowest possible value for the symbol is shown here.
Max	The highest possible value for the symbol is shown here.
Unit	The unit of the value is shown here.
Comment	The comment for a symbol entry is shown here.

### Toolbar

You can execute various functions via the toolbar in the upper area of the editor.

	Activate recipe	The values saved in the recipe are written to the symbols.
	Read values from target	The current values of all symbols are read from the target and written to the recipe.
	Read values for the selected symbols from target	The current values of the selected symbols are read from the target and written to the recipe.
	Show the online values for the symbols	The current values of the symbols are displayed in an extra column.
	Import recipes	The recipes selected in the dialog are imported into the server.
	Export recipe	The opened recipe is exported with a name that is to be defined.

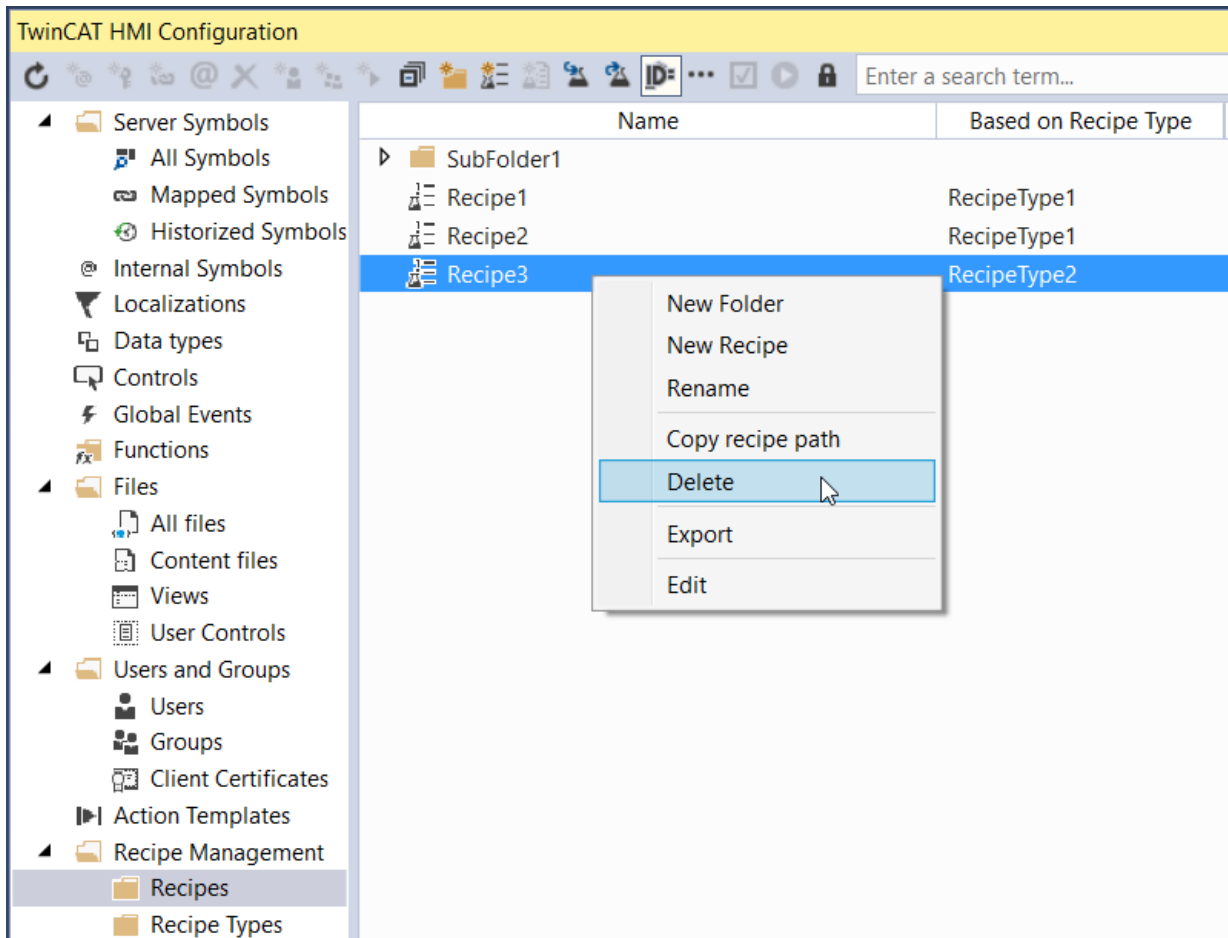
### General Information

General information about the recipe is displayed in the lower part of the editor.

Based on Recipe Type	The recipe type on which the recipe is based is displayed here.
----------------------	---

### 12.3.1.2.1.9 Delete recipe

1. In the TwinCAT HMI configuration window, right-click on the recipe to be deleted and select **Delete** in the context menu.

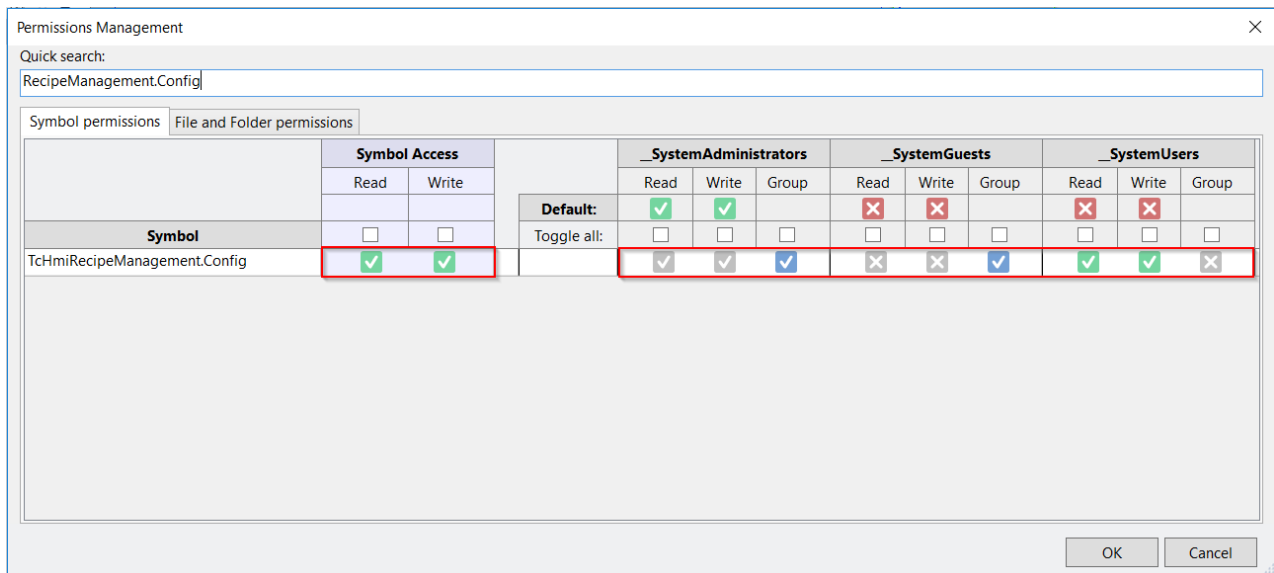


### 12.3.1.2.2 Management in the client

The recipe management can also be used in the client at runtime. Base functionalities are mapped via the [Actions and Conditions Editor](#) [► 61], so that preconfigured recipes can simply be activated or newly learned [► 939] at runtime. The Framework API offers the option to run all the functions, which are also available in the engineering, in the client by means of Code Behind. The recipe management example shows the use of the Framework API at runtime.

#### Authorization concept

If user authentication is active, [► 963] you must explicitly enable access to the recipe configuration for the desired user groups. Access is not granted by default. Open the [authorization system for the symbols](#) [► 973] in the extended view [► 77] and search for the term "TcHmiRecipeManagement.Config". You can assign the corresponding authorizations on this symbol.



### 12.3.1.2.2.1 Example

The Recipe Management Sample shows the use of the [Recipe Management](#) [► 1155] at runtime. It thereby extends the functions available in the [Actions and Conditions Editor](#) [► 61] by the use of the Framework API. The sample serves as the point of entry to the recipe management and can be extended as desired. In parallel with the sample project, observe the chapter "[Management in the engineering](#) [► 1157]".

The sample consists of a TwinCAT HMI project and a TwinCAT project with example symbols in the PLC. The sample contains a total of three symbols, which are used by two different recipe types. Symbol 1 and Symbol 2 are the symbols from the PLC and Symbol 3 is an [offline symbol](#) [► 81]. The offline symbol illustrates that symbols from other sources (OPC UA, user-specific server extension, etc.) can also be used as the ADS extension.

The sample can be [downloaded here](#) [► 1581].

### User interface

The sample has a user interface in the client that can execute various functions of the recipe management at runtime. These are described in more detail below.

## BECKHOFF Recipe Management Sample

**1** Selected recipe:

Recipe11

▼

**2** New recipe name:

NewRecipe

**3**

Teach selected recipe

Activate selected recipe

Upload recipe

Teach as new recipe

Delete selected recipe

Download recipe

**4**

Member name ↕	Saved value ↕	New value ↕
Value1	10	10
Value3	30	30

Update selected recipe

Read values from target

**5** Online values:

Value 1: 10  
  
Value 2: 20  
  
Value 3: 30

**1. Recipe selection:** All available recipe types are displayed in the combo box. If there is a recipe inside a folder, the relative path to the recipe is displayed. The combo box is used to select the recipe that is used as the basis for the other buttons and fields in this sample.

**2. Teach and activate recipe:** The recipe currently selected in the combo box can be edited in this area.

- Teach selected recipe: The currently selected recipe is taught again. This means that the current online values are adopted from the PLC and saved in the recipe.
- Teach as new recipe: A new recipe is created with the current online values from the PLC based on the currently selected recipe. A new name for the recipe must be entered in the text box.
- Activate selected recipe: The currently selected recipe is activated. This means that the values stored in the recipe are written to the corresponding symbols in the PLC.
- Delete selected recipe: The currently selected recipe is deleted.

**3. Upload and download recipe:** This area enables recipes to be downloaded and uploaded. The file browser of the respective browser that enables the selection of the storage location or the selection of the recipe thereby opens.



The upload and download functions are not available in the LiveView in Visual Studio.

**4. Display and edit recipe:** This area enables the display and editing of the recipe members (symbols) of the currently selected recipe.

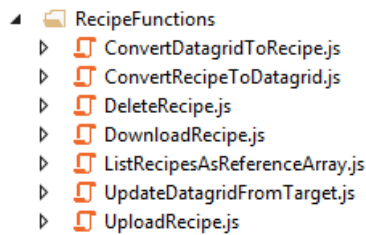
- Datagrid: The currently selected recipe is loaded and the individual members are displayed in the datagrid. The "New value" column has two different functions. Firstly, the column is used to receive new values for the individual members of the recipe, which are subsequently saved by clicking on the **Update selected recipe** button. Secondly, the column is used to display the current online values of the members for comparison with the stored values by clicking on the **Read values from target** button.
- **Update selected recipe:** This button saves the recipe with the new values specified in the "New value" column.
- **Read values from target:** This button reads the current online values of the recipe members and displays them in the "New value" column.

**5. Online recipe values:** The current online values of the three symbols Value 1, Value 2 and Value 3 are displayed in this area.

### 12.3.1.2.2.1.1 Logic in the background

The example extends the "Activate [[▶ 939](#)]", "Teach [[▶ 940](#)]" and "TeachAsNew [[▶ 941](#)]" functions available in the Action and Conditions Editor by further user-specific functions that call the Framework API of the recipe management in the background. These functions can also be reused in other projects if they are imported accordingly.

The functions can be found in the HMI project in the **RecipeFunctions** folder.



Since all functions are called [asynchronously](#) [[▶ 1464](#)], they are additionally given a [context object](#) [[▶ 1473](#)] as a parameter value. This provides information about the success or failure of the function.

#### ConvertDatagridToRecipe

The ConvertDatagridToRecipe function reads the current contents of the data grid and saves them in the transferred recipe. This function is executed by clicking on the **Update selected recipe** button.

**Parameter:**

Name	Type	Description
datagridControl	tchmi:framework#/definitions/Control	The TcHmiDatagrid, in which the recipe members are to be displayed.
recipeReference	tchmi:framework#/definitions/RecipeReference	The reference to the recipe that is to be described. The reference consists of the recipe path (with folder structure).

**Return value:**

Type	Description
void	No return value.

#### ConvertRecipeToDatagrid

The ConvertRecipeToDatagrid function displays all members of the transferred recipe in a data grid. The function is transferred to the SrcData attribute of the data grid when changing the selection in the combo box in order to load the newly selected recipe.

**Parameter:**

Name	Type	Description
recipeReference	tchmi:framework#/definitions/RecipeReference	The reference to the recipe that is to be displayed. The reference consists of the recipe path (with folder structure).

**Return value:**

Type	Description
void	No return value.

The data set for the data grid is transferred to the context object.

### DeleteRecipe

The DeleteRecipe function deletes a transferred recipe.

#### Parameter:

Name	Type	Description
recipeReference	tchmi:framework#/definitions/RecipeReference	The reference to the recipe that is to be deleted. The reference consists of the recipe path (with folder structure).

#### Return value:

Type	Description
void	No return value.

### DownloadRecipe

The Download function enables the download of a transferred recipe as a JSON file. This can then be imported using the UploadRecipe function.

#### Parameter:

Name	Type	Description
recipeReference	tchmi:framework#/definitions/RecipeReference	The reference to the recipe that is to be downloaded. The reference consists of the recipe path (with folder structure).

#### Return value:

Type	Description
void	No return value.



The upload and download functions are not available in the LiveView in Visual Studio.

### ListRecipeAsReferenceArray

The ListRecipeAsReferenceArray function creates an array of all available recipes that is needed for the selection in the combo box. The function is used on the SrcData attribute of the combo box.

#### Parameter:

Name	Type	Description
recipeList	tchmi:server#/definitions/folderRecipe	The reference to all recipes. The list of all recipes is the "recipeList" symbol in the RecipeManagement extension.

#### Return value:

Type	Description
void	No return value.



The data set for the combo box is transferred to the context object.

### UpdateDatagridFromTarget

The UpdateDatagridFromTarget function lists the current online values of the recipe members of the transferred recipe in the "New value" column in the data grid. The function is executed by clicking on the **Read values from target** button.

**Parameter:**

Name	Type	Description
datagridControl	tchmi:framework#/definitions/Control	The TcHmiDatagrid, in which the online values are to be displayed in the "New value" column.
recipeReference	tchmi:framework#/definitions/RecipeReference	The reference to the recipe that is to be displayed in the data grid. The reference consists of the recipe path (with folder structure).

**Return value:**

Type	Description
void	No return value.

### UploadRecipe

The UploadRecipe function loads a recipe from a JSON file into the recipe management. Recipes that were exported using the DownloadRecipe function can be imported with this function.

**Parameter:**

Name	Type	Description
-	-	-

The recipe in the form of the JSON file is selected directly via the file browser in the browser.

**Return value:**

Type	Description
void	No return value.



The upload and download functions are not available in the LiveView in Visual Studio.

#### 12.3.1.2.2.1.2 *Extension with filter function*

The sample can be extended by a filter function that filters the list of recipes based on the recipe name.

You can download the extension of the sample [here](#) [► 1581].

**BECKHOFF**

Recipe Management Sample

Filter:

Recipe1

Selected recipe:

Recipe1

▼

Teach selected recipe

Activate selected recipe

Download recipe

New recipe name:

NewRecipe

Teach as new recipe

Delete selected recipe

Upload recipe

Member name	Saved value	New value
Value1	111	111
Value2	222	222

Update selected recipe

Read values from target

Online values:

Value 1: 0

Value 2: 0

Value 3: 0

12.3.1.3 Controls

The following controls are available for the Recipe Management extension.

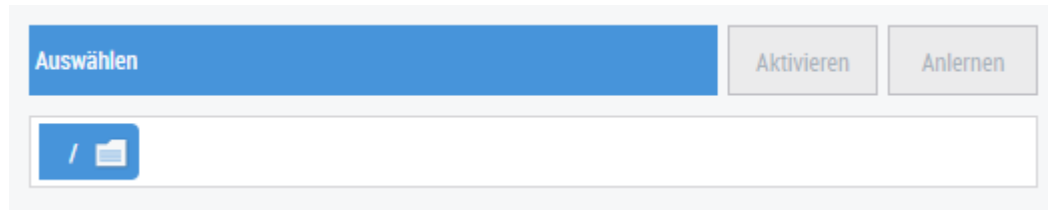
Recipe Edit

/

Apple Pie

- The Recipe Edit Control is used to edit recipes. This includes functions such as: create new, delete, copy, cut, etc. Recipes can also be activated.

## Recipe Select



- The Recipe Select Control is used to display and activate recipes.

## 12.4 Audit Trail

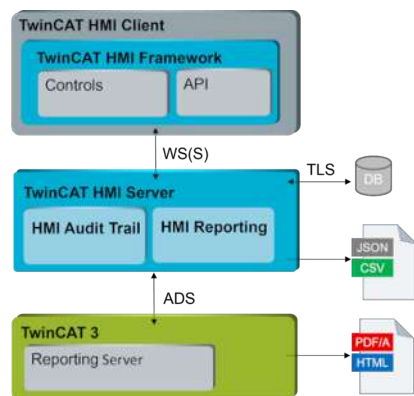
The Audit Trail is an extension that records user interactions on the HMI page and saves them in a database.

### Application scenario

Audit Trail is often used in the pharmaceutical or food industry. Certain regulations must be observed here.

- FDA (Food and Drug Administration) 21 CFR Part 11
- GMP (Good Manufacturing Practices)
- GAMP (Good Automated Manufacturing Practice)

### Architecture



The extension is available with the NuGet package Beckhoff.TwinCAT.HMI.AuditTrail >= 22.0.0. The package can be installed via TcPkg (TwinCAT.HMI.AuditTrail) or nuget.org.

### 12.4.1 System requirements

#### Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	PostgreSQL

### 12.4.2 Licensing

#### Basic license

TF2400

- CPU license
- Price Performance Level dependent
- Incl. 250 Audit Trail Symbols
- E Signature
- PDF Report

### Stackable licenses

**TF2410** = 250 symbols

**TF2420** = 500 symbols

**TF2430** = 1000 symbols

**TF2440** = 2000 symbols

### Calculation example

TF2400 + TF2410 = 500 symbols

TF2400 + TF2430 = 1250 symbols

TF2400 + TF2420 + TF2440 = 2750 symbols

### Calculation of the number of symbols

One symbol corresponds to one variable.

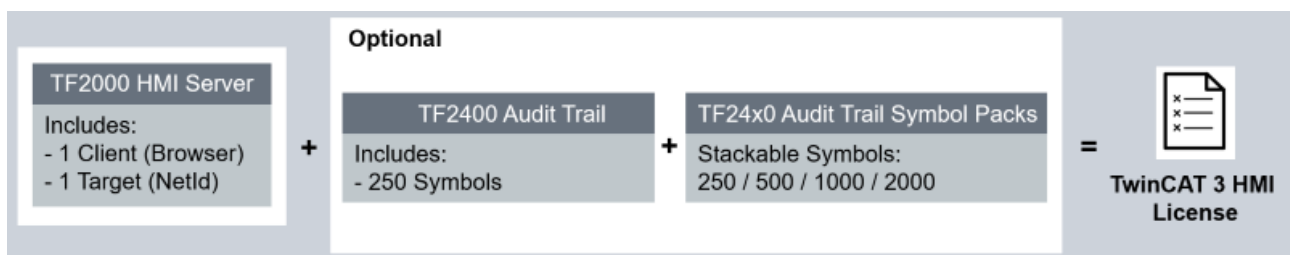
BOOL, BYTE, WORD, DWORD, SINT, USINT, INT, UINT, DINT, UDINT, REAL, LREAL, STRING, TIME, ....

Each sub-element in a structure is counted.

```
FUNCTION_BLOCK FB_Struct
VAR
    _sColor          : STRING;
    _bData           : BOOL;
    _nCount          : USINT;
END_VAR
```

\_sColor (1 symbol) + \_nbData (1 symbol) + \_nCount (1 symbol) = 3 symbols

### Architecture




Licensing

## 12.4.3 Functionality

### Logging of write operations on symbols


When a symbol is written by an operator, this can also be logged. To do this, the corresponding symbol in the extension must be registered for monitoring.

	<p><b>Timestamp</b></p> <ul style="list-style-type: none"> <li>• Timestamp at which the command was executed</li> </ul> <p><b>User</b></p> <ul style="list-style-type: none"> <li>• Name of the user who triggered the change.</li> </ul> <p><b>Comment</b></p> <ul style="list-style-type: none"> <li>• If activated, the comment entered is also saved</li> </ul> <p><b>Symbol Name</b></p> <ul style="list-style-type: none"> <li>• Name of the symbol that was changed.</li> </ul> <p><b>Value</b></p> <ul style="list-style-type: none"> <li>• New value that has been written</li> <li>• Old value before writing</li> <li>• Value read back after writing</li> </ul> <p><b>Session Id</b></p> <ul style="list-style-type: none"> <li>• Id of the client session from which the write command was sent</li> </ul> <p><b>Error</b></p> <ul style="list-style-type: none"> <li>• Error during the write process <ul style="list-style-type: none"> <li>◦ Reauthentication is activated for the symbol. An error occurred during the login attempt</li> <li>◦ The comment function for the symbol is activated. The configured requirements were not met when writing (no comment specified / shorter than the minimum length).</li> </ul> </li> </ul>
---	---

You can find more information under [Add symbols \[► 1184\]](#).

### Logging of event messages

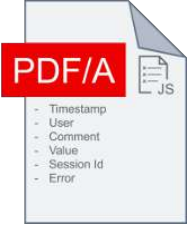
All Extension messages can be logged within the HMI.

	<p><b>Timestamp</b></p> <ul style="list-style-type: none"> <li>• Timestamp on which the Event was created</li> </ul> <p><b>Message</b></p> <ul style="list-style-type: none"> <li>• Name of the user who confirmed the change.</li> </ul> <p><b>Domain</b></p> <ul style="list-style-type: none"> <li>• Domain of the server part from which the message was created.</li> </ul>
---	--

You can find more information under [Add events \[► 1185\]](#).

### Creating entries via JavaScript

JavaScript can be used to create entries in the Audit Trail.

	<p>Timestamp</p> <ul style="list-style-type: none"> <li>• Timestamp at which the command was executed</li> </ul> <p>User</p> <ul style="list-style-type: none"> <li>• Name of the user who triggered the change.</li> </ul> <p>Comment</p> <ul style="list-style-type: none"> <li>• Can be transferred via the JavaScript function</li> </ul> <p>Value</p> <ul style="list-style-type: none"> <li>• Applicative value.</li> </ul> <p>Session Id</p> <ul style="list-style-type: none"> <li>• Id of the client session from which the write command was sent</li> </ul> <p>Error</p> <ul style="list-style-type: none"> <li>• Error during the write process</li> </ul>
---	--

You can find more information under [Add JavaScript](#) [► 1188].

### Forwarding of data


Data from the database can be exported in various formats. Exported data is provided with a signature to detect any changes to the data.

	<p>Export</p> <ul style="list-style-type: none"> <li>• JSON</li> <li>• CSV</li> </ul>
--	---

You can find more information under [Export](#) [► 1190].

### Reports

To create reports, it is possible to connect the Audit Trail Extension with the Reporting Extension.

	<p>Reports</p> <ul style="list-style-type: none"> <li>• PDF/A</li> <li>• HTML</li> </ul>
---	--

You can find more information under [Reporting](#) [► 1240].

## 12.4.4 Quick start

To start, create or open a TwinCAT HMI project.

### Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.AuditTrail" via the [NuGet Package Manager](#) [► 1041].

### Installation of a required database

Install the database required by Audit Trail.

- [PostgreSQL](#) [► 1192]

### Configuring the Audit Trail extension

1. Open the configuration page of the Audit Trail in the HMI project

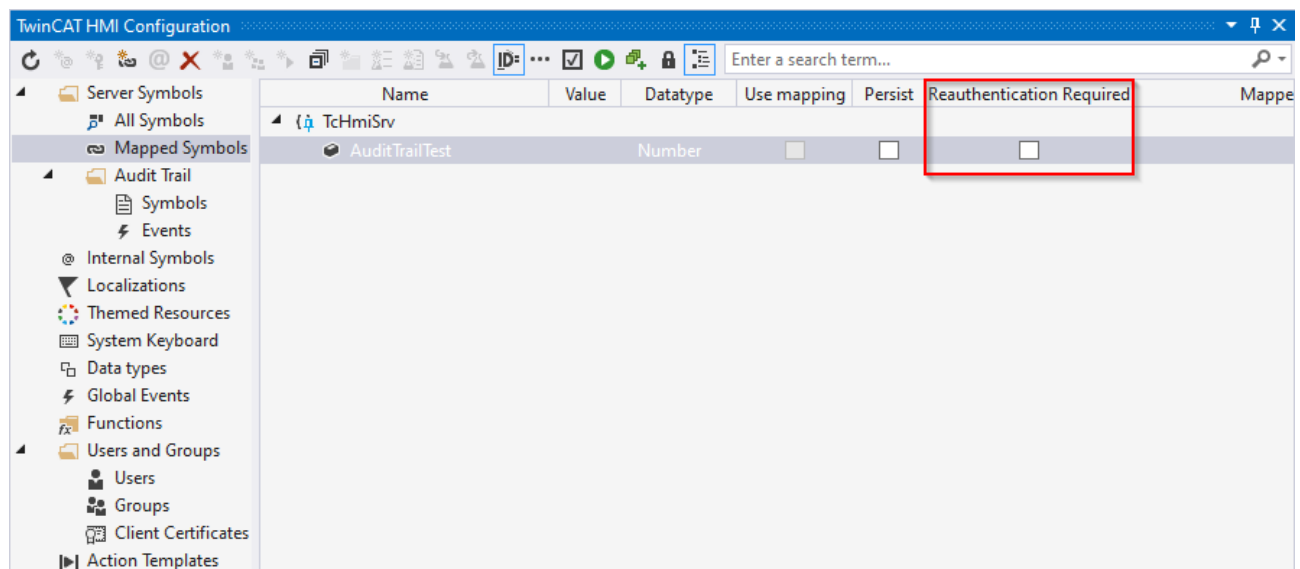
## 2. Go to the DB settings [► 1181] tab

Package version: 22.0.6737, Product version: 14.3.143.0, Config version: 1.0.1.10

## 3. Establish the connection to the database here.

- ⇒ The diagnostics window shows whether a connection has been established.
- ⇒ This completes the basic configuration.

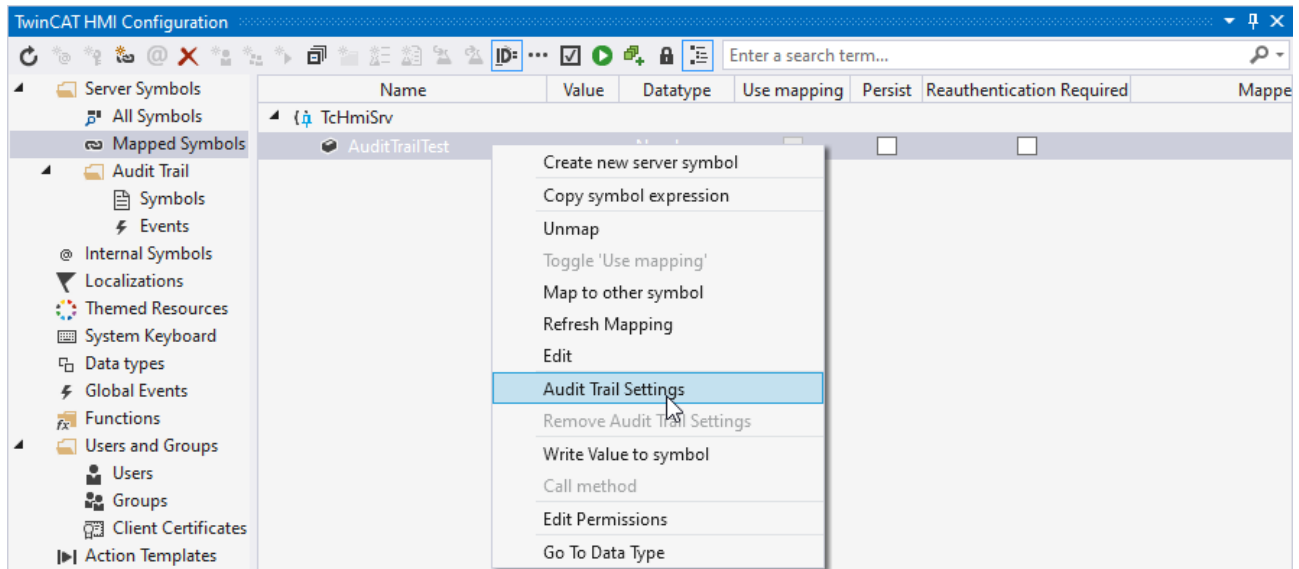
## Enable reauthentication on a symbol in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
  2. Go to the **Server Symbols / Mapped Symbols** tab.
  3. Activate the checkmark under the **Reauthentication Required** column.
- ⇒ All symbols with the checkmark set require reauthentication in order to write the value.

You can find more information under Add new authentication [► 1189].

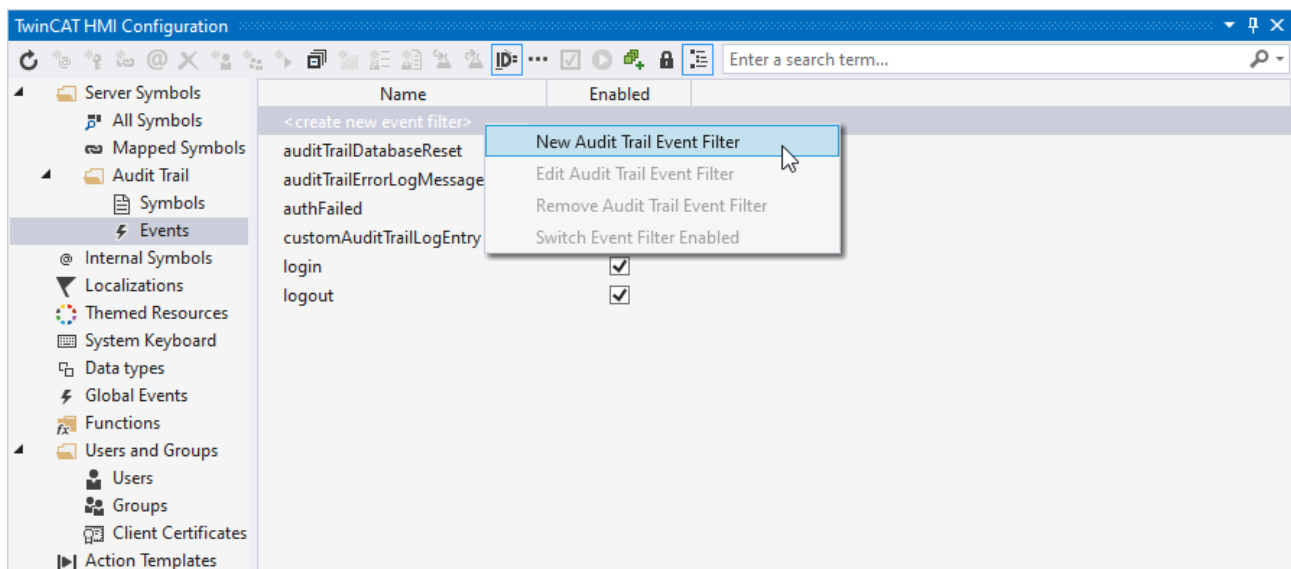
## Adding a symbol in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
2. Go to the **Server Symbols / Mapped Symbols** tab.
3. Select the symbols to be added to the Audit Trail.
4. Add these to the Audit Trail configuration by right-clicking on **Audit Trail Settings**.
  - ⇒ A pop-up opens for further settings.
5. Define whether symbol monitoring is active and a comment must be entered when writing.
  - ⇒ The symbols you have configured are now automatically logged in the Audit Trail during a write operation. If the comment function has been activated, this is also entered.

You can find more information under [Add symbols \[► 1184\]](#).

## Adding an event in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
2. Go to the **Server Symbols / Audit Trail / Events** tab.
3. Add a new filter option by double-clicking on **create new event filter** or by right-clicking on **New Audit Trail Event Filter**.
4. Define a name for your filter.
5. Create an appropriate filter configuration.
  - ⇒ All events that match your filter are also included in the Audit Trail.



You can find more information under [Add events](#) [► 1185].

### Adding a JavaScript in Visual Studio / TcXaeShell

1. Add a new JavaScript file to the project.
2. Open the JavaScript file you have created.
3. Call the function `TcHmi.Server.AuditTrail.createAuditLogEntryEx`.  
⇒ This function adds a new entry to the audit trail.

You can find more information under [Add JavaScript](#) [► 1188].

## 12.4.5 Configuration

### General

The basic settings for the server extension are specified in the **General** tab.

The screenshot shows the TcHmi configuration window with the 'General' tab selected. The 'Audit Trail Database' sub-tab is active. The settings are as follows:

- Signature Key:** A button labeled 'Select a file' with a red 'X' icon.
- Event Filters:** A section with a right-pointing arrow and the text 'Events which should be recorded'.
- Enabled Symbols:** A section with a right-pointing arrow and the text 'Symbols which should be tracked'.
  - Maximum number of entries to be displayed:** A text box containing '200'. Below it, a note states: 'Maximum number of entries to be displayed on the configuration page'.
  - Block commands on database error:** A dropdown menu set to 'false'.
  - Maximum size of the error log:** A text box containing '97152'. Below it, a note states: 'If block commands is disabled, failed database updates are written to a log file. This value describes the max size of the log.'
  - Minimum comment length:** A text box containing '5'.

On the right, the **Diagnostics** panel shows:

- Connection state:** PostgreSQL System Connected
- Number of entries:** 25
- Size:** 9122275 byte
- Active connections:** 10
- License:** A link with a right-pointing arrow.

At the bottom, the status bar shows: Package version: 22.0.6312, Product version: 14.2.48.0, Config version: 1.0.1.7.

### Signature key

- Key used to sign the export files

### Event filter

- Events that are to be recorded.

### Activated symbols

- Symbols that are to be recorded.

### Maximum number of entries to be displayed

- Maximum number of entries to be displayed on the configuration page.

### Block commands in the event of a database error

- If the value is "false", write commands are executed on a symbol and the change is written to a separate file. Once the connection to the database has been established, the content of the file is included as an entry in the Audit Trail. If the value is set to "true", all write operations to a symbol are blocked.

## Maximum size of the error log

- If command blocking is deactivated, failed database commands are written to a log file. This value describes the maximum size of the log.

## Minimum length of a comment

- Fixes the minimum length of a comment.

## Database settings

All settings relating to the database are made in the **Database settings** tab.

Package version: 22.0.6737, Product version: 14.3.143.0, Config version: 1.0.1.10

## Current database connection

- Password: Password of the database.
- Table ID: Identifies the tables currently in use. Can be set for special remote configurations.
- Connection: Connection setting to the database via ODBC. Enter the IP, port, database name, user ID, password and timeout here. (@{password} is a placeholder and will be replaced by the password entered above)

## Maximum number of database entries

- Maximum number of entries to be saved in the database.

## Limit for the reference of the remaining database entries

- This value specifies the minimum number of available entries that should remain in the database before a notification is triggered to display the remaining database entries.

## Audit Trail database

The current entries from the database are displayed in the **Audit Trail Database** tab. These can be filtered or exported. Furthermore, exported files can be verified here or all entries in the database can be deleted.

TcHmiSrvADS

TcHmiAlarm

TcHmiAuditTrail

TcHmiEventLogger

TcHmiLdap

TcHmiLua

TcHmiMdp

General

Database Settings

Audit Trail Database

Verify signature

ZIP file: 

Choose File

 No file chosen 

Verify

Timestamp	Type	Name	Old Value	New Value	Username	Session-ID	Comment	Error
8/5/2024, 10:07:52 AM	Event	auditTrailDatabaseReset <i>The audit trail database was reset by the user 'TcHmiUserManagement::__SystemUser'.</i>		{ name: auditTrailDatabaseReset, domain: TcHmiAuditTrail, params: ...show value... severity: 1, timeRaised: 2024-08-05T08:07:52.6541669Z }	TcHmiUserManagement::__SystemAdministrator	c2056b5b5371c78b616a247d1e8ca873c510026aea832de0b734c90f0fee96339688247e55314fdbd9f751570edef9a38a88a5c2bee7a0fd4795beb117402157		

Failed commands

Filter:

Name

Timestamp (from): 

mm/dd/yyyy --:-- --

Timestamp (to): 

mm/dd/yyyy --:-- --

Apply filter

Export

Reset database

Package version: 22.0.6312, Product version: 14.2.48.0, Config version: 1.0.1.7

Verify signature

- Check the signature of exported files (check for manipulation).

Table

- Listing of the Audit Trail data contained in the database.

Filter

- Filter settings for the table.

Export [ 1190]

- Export the data as HTML, JSON or CSV.

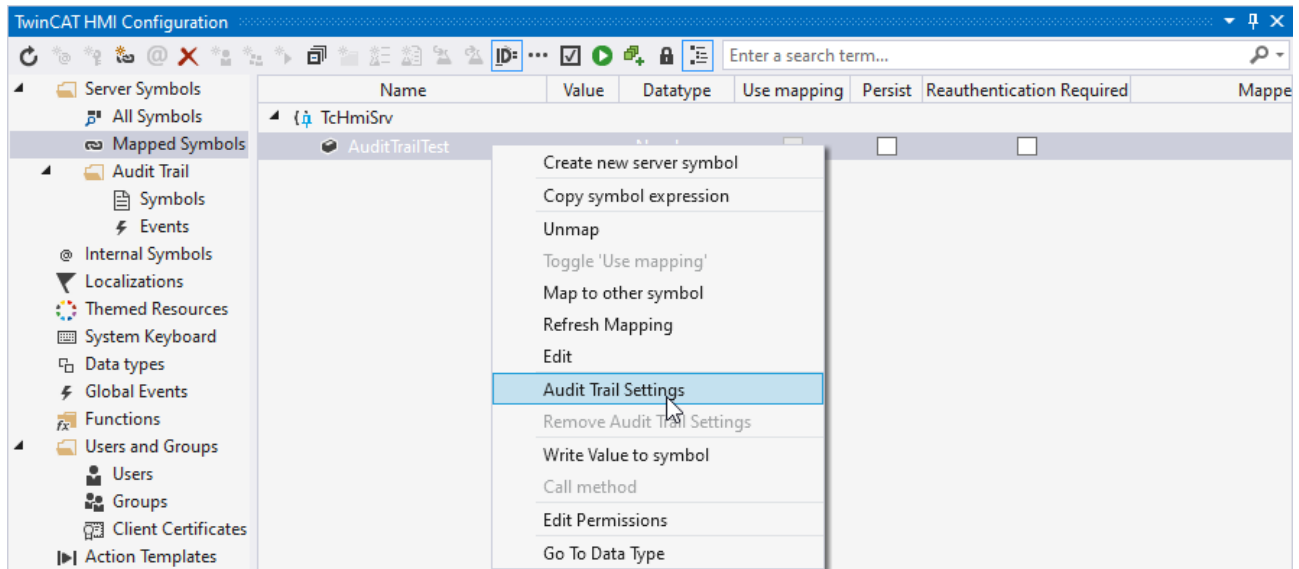
Reset database

- Deleting all database entries and creating a new entry with information on the deletion process.

### 12.4.5.1 Adding symbols

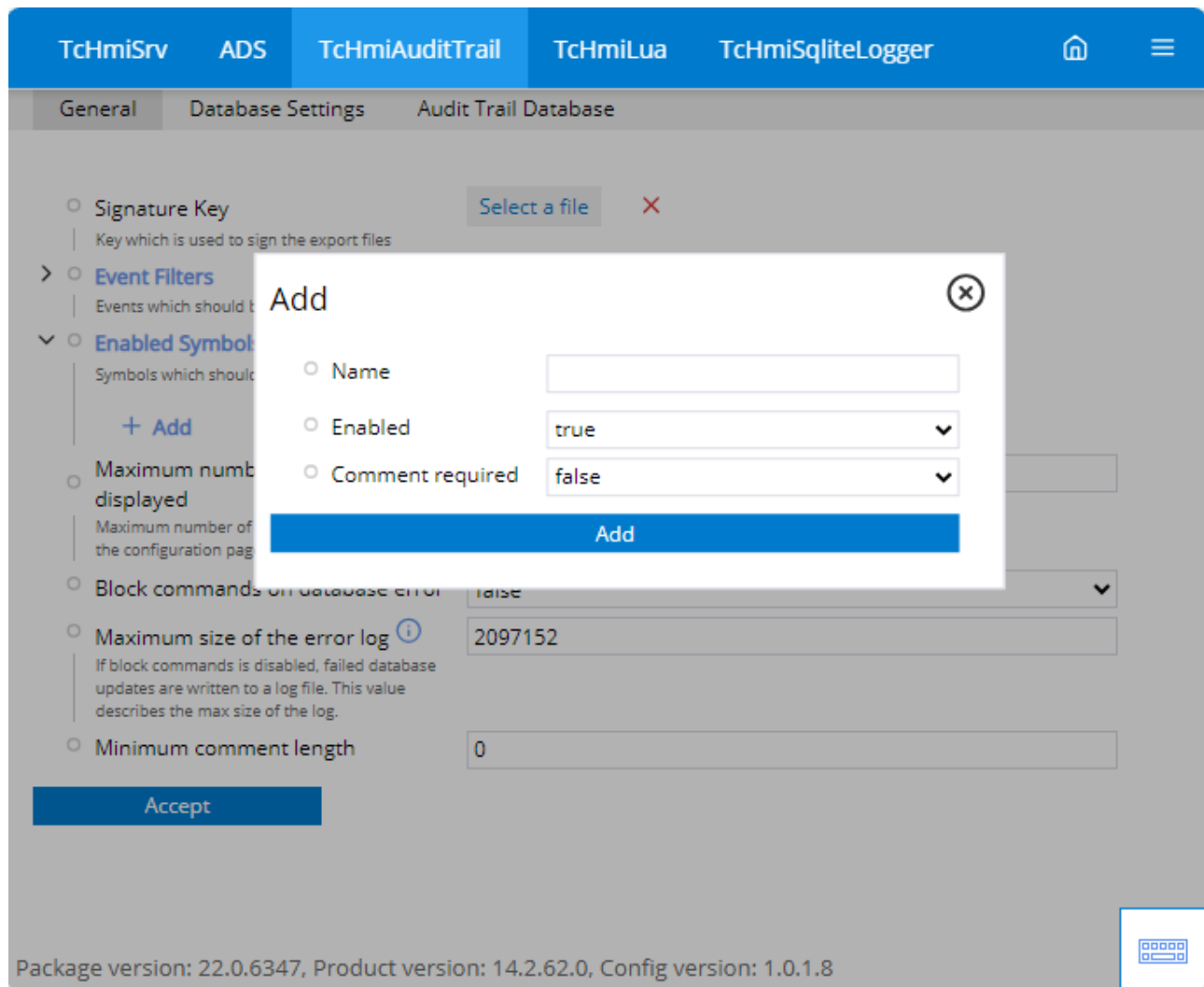
Use **Symbols** to add new entries to the Audit Trail. Here it is only possible to log write commands from the client to the server. If there is a write command from a symbol added to the Audit Trail, the value change is logged in the Audit Trail together with the user and timestamp.

#### Adding a symbol in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
2. Go to the **Server Symbols / Mapped Symbols** tab.
3. Select the symbols to be added to the Audit Trail.
4. Add these to the Audit Trail configuration by right-clicking on **Audit Trail Settings**.
  - ⇒ A pop-up opens for further settings.
5. Define whether symbol monitoring is active and a comment must be entered when writing.
  - ⇒ The symbols you have configured are now automatically logged in the Audit Trail during a write operation. If the comment function has been activated, this is also entered.

## Adding a symbol via the server configuration page

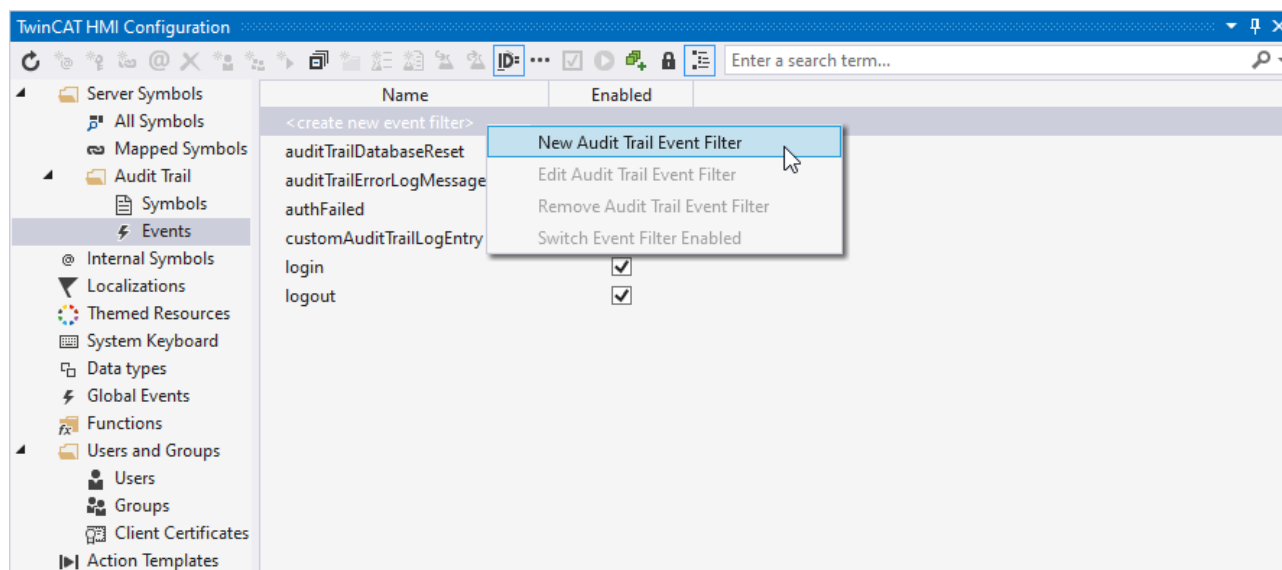


1. Open the server configuration page.
2. Go to the **TcHmiAuditTrail / General** tab.
3. Go to **Activated symbols**.
  - ⇒ All currently configured symbols are displayed here.
4. Click on **Add** to create a new symbol.
5. Enter the corresponding symbol for the name.
6. Set **Active** to **true** so that the selected symbol is included in Audit Trail.
7. Set **Comment required** to **true** so that a comment must be entered during the writing process.
  - ⇒ The symbols you have configured are now automatically logged in the Audit Trail during a write operation.

### 12.4.5.2 Adding events

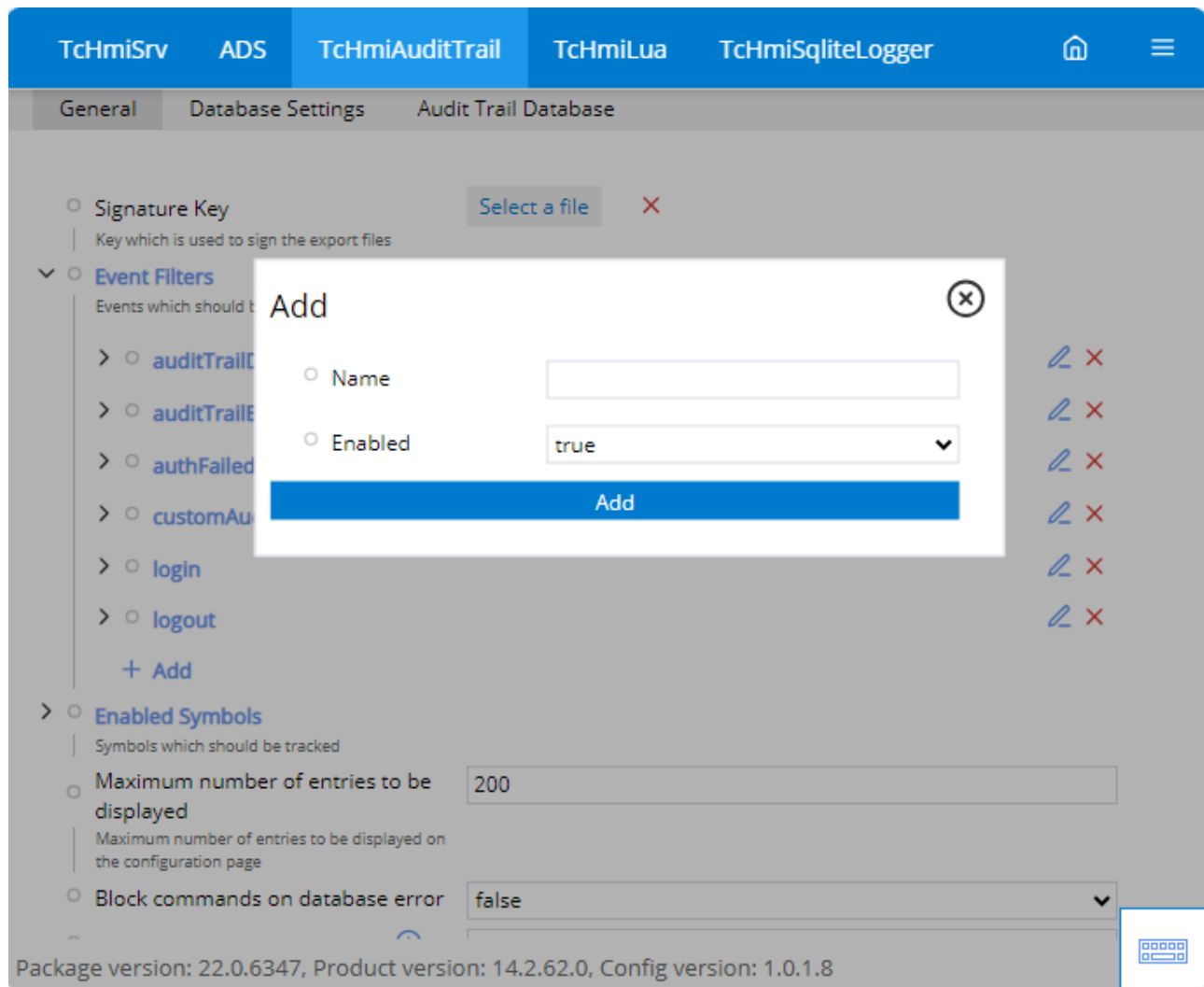
Add new entries to the audit trail via Events. Various filter options are available to enable you to respond to events with special content.

## Adding an event in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
  2. Go to the **Server Symbols / Audit Trail / Events** tab.
  3. Add a new filter option by double-clicking on **create new event filter** or by right-clicking on **New Audit Trail Event Filter**.
  4. Define a name for your filter.
  5. Create an appropriate filter configuration.
- ⇒ All events that match your filter are also included in the Audit Trail.

## Adding an event via the server configuration page



1. Open the server configuration page.
2. Go to the **TcHmiAuditTrail / General** tab.
3. Go to **Event filter**.
  - ⇒ All currently configured event filters are displayed here.
4. Click on **Add** to create a new filter.
5. Enter a unique name for the filter in the name field.
6. Set **Active** to **true** so that the selected filter is also tracked in Audit Trail.
7. After adding, go to the corresponding event.
8. Select Add under Filter.
9. Now enter the filter you require.
  - ⇒ All events that match your filter are also included in the Audit Trail

**Sample – JSON (filter):**

```
{
  "comparator": "==",
  "path": "domain",
  "value": "TcHmiAlarm"
}
```

This filter enters all events from the Alarm Server extension to the Audit Trail.

### 12.4.5.3 Adding JavaScript

Add new entries to your Audit Trail using a JavaScript function. This allows all interactions with the interface to be logged.

#### Adding a JavaScript in Visual Studio / TcXaeShell

1. Add a new JavaScript file to the project.
  2. Open the JavaScript file you have created.
  3. Call the function `TcHmi.Server.AuditTrail.createAuditLogEntryEx`.
- ⇒ This function adds a new entry to the audit trail.

#### Function - JavaScript:

```
TcHmi.Server.AuditTrail.createAuditLogEntryEx (
{
    name: string,
    contextDomain: string,
    comment: string,
    data: any
},
null,
(data) => {
}
);
```

#### Sample – JavaScript (Navigation Information):

```
(function (** @type {globalThis.TcHmi} */ TcHmi) {
    // If you want to unregister an event outside the event code you need to use the return value of
    the method register()
    let destroyOnInitialized = TcHmi.EventProvider.register('onInitialized', (e, data) => {
        // This event will be raised only once, so we can free resources.
        // It's best practice to use destroy function of the event object within the callback
        function to avoid conflicts.
        e.destroy();

        let __this = this;
        let destroyNavigationRightonPressed;

        // Navigation_Right
        TcHmi.EventProvider.register('Navigation_Right.onAttached', function (e, data) {
            __this.controlNavigationRight = data;

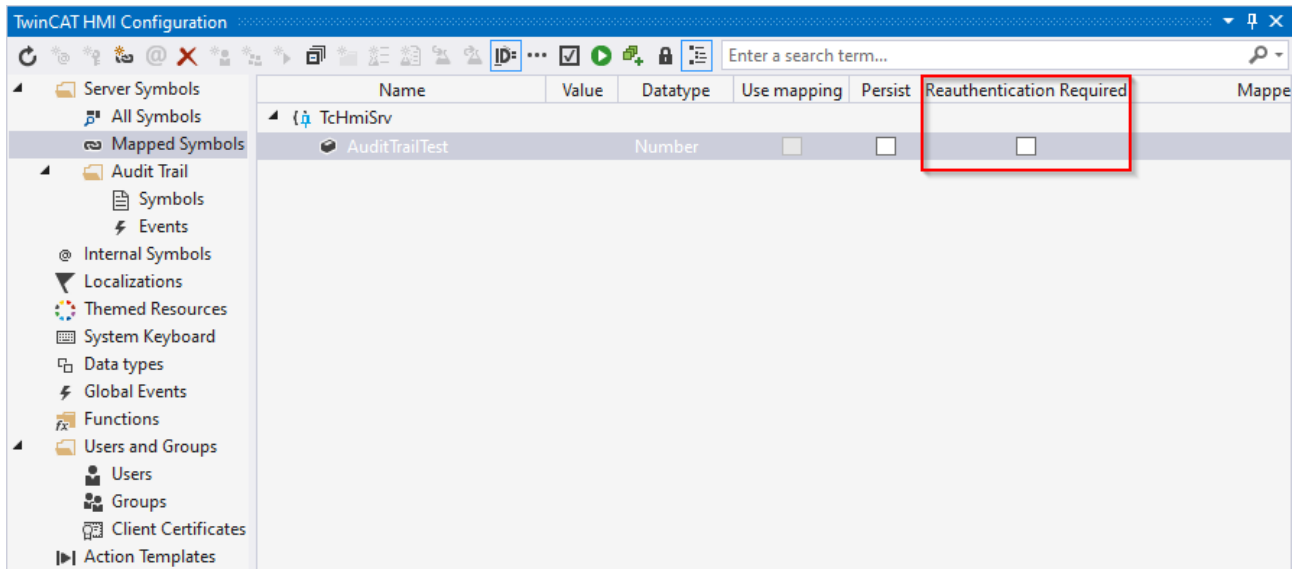
            // create event listener
            destroyNavigationRightonPressed = TcHmi.EventProvider.register(`${data.__id}.onPressed`,
function (e, data) {
            TcHmi.Server.AuditTrail.createAuditLogEntryEx(
                {
                    name: `Control Id: ${__this.controlNavigationRight.getId()}`,
                    contextDomain: `TriggeredUserInteraction`,
                    comment: `Navigation changed to "$
${__this.controlNavigationRight.getBreadcrumbPath().join(" || ")}" on ip $
${TcHmi.Server.getCurrentUserConfig().clientId}`,
                    data: { data: "Test" }
                },
                null,
                (data) => {
                }
            );
        });
    });
    TcHmi.EventProvider.register('Navigation_Right.onDetached', function (e, data) {
        // destroy sub events
        if (destroyNavigationRightonPressed) {
            destroyNavigationRightonPressed();
            destroyNavigationRightonPressed = undefined;
        }
        __this.controlNavigationRight = undefined;
    });
});
})(TcHmi);
```



### 12.4.5.4 Add reauthentication

Reauthentication can be used to implement an additional security query before writing a variable. This prevents someone without the appropriate rights from writing. This functionality is also available without an Audit Trail.

#### Enable reauthentication on a symbol in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
  2. Go to the **Server Symbols / Mapped Symbols** tab.
  3. Activate the checkmark under the **Reauthentication Required** column.
- ⇒ All symbols with the checkmark set require reauthentication in order to write the value.

### Activate reauthentication via the server configuration page

The screenshot shows the Beckhoff server configuration interface. The top navigation bar includes tabs for TcHmiSrv, ADS, TcHmiAuditTrail, TcHmiLua, and TcHmiSqliteLogger. Below this, a sub-navigation bar shows 'General', 'Mapped Symbols', 'Webserver', 'Security', and 'Advanced'. The 'Mapped Symbols' section is expanded, showing a list of mapped symbols. The 'AuditTrailTest' symbol is selected. The configuration for this symbol includes fields for 'Domain' (TcHmiSrv), 'Mapping', 'Default symbol access' (Read-write), 'Extension data domains' (Click to change value), and 'Re-Authentication required' (checked). A red box highlights the 'Re-Authentication required' entry. The bottom of the page shows the package version: 22.0.6347, Product version: 14.2.62.0, and Config version: 1.0.1.9.

1. Open the server configuration page.
2. Go to the **TcHmiSrv / Symbol mappings** tab.
3. Go to **Symbol mappings**.  
⇒ All currently mapped symbols are displayed here.
4. Select the symbol you want to change.
5. Go to the **Reauthentication required** entry.
6. Check the box on the right side.
7. Now select **true** to activate or **false** to deactivate.  
⇒ The symbols you have configured now require reauthentication before the write command can be executed.

### 12.4.5.5 Export

#### Exporting the database entries via the server configuration page

In the **TcHmiAuditTrail/Audit Trail database** tab, the current entries in the database can be exported in JSON or CSV format.

TcHmiSrv ADS TcHmiAlarm TcHmiAuditTrail TcHmiEventLogger TcHmiLdap TcHmiLua TcHmiMdp

General Database settings Audit trail database

Verify signature

ZIP file:  No file chosen

Timestamp	Type	Name	Old value	New value	userName	Session ID	Comment	Error
4/8/2025, 7:44:28 AM	Symbol	ADS.PLCL1.MAI	5	6	TcHmiUserMa	7f6d0dd8c4f3		
4/8/2025, 7:44:27 AM	Symbol							
4/8/2025, 7:44:27 AM	Symbol	ADS.PLCL1.MAI	3	4	TcHmiUserMa	7f6d0dd8c4f3		

Failed commands

Filter:  Name

Timestamp (from):

Timestamp (to):

Package version: 22.0.6856, Product version: 14.3.187.0, Config version: 1.0.1.11

## Format

- Selection of the JSON or CSV format to be exported.

## Start time

- Start time from which the values are exported.

## End time

- Time up to which the data is exported.

## Limit

- Limitation of exported entries.

## Offset

- Offset from which the data is exported.

## Order

- Sort order of the data to be exported.

### Filter

- Filter settings for the data to be exported.

## Exporting the database entries via the "TcHmiAuditTrailGrid" control

### Exporting the database entries via an HTTP request

```
/**
 * Exports and download the audit trails due to the given parameters
 */
// format: 'json' | 'csv',
// limit: number | null,
// offset: number | null,
// orderBy: string | null,
// filter: string | null,
let _exportAuditTrail = function (format, limit, offset, orderBy, filter) {
    let url = TcHmi.Environment.getHostBaseUri() + '/Config/ExtensionData/TcHmiAuditTrail';
    url += '?format=' + format;
    if (filter) {
        url += '&filter=' + encodeURIComponent(filter);
    }
    if (limit) {
        url += '&limit=' + limit;
    }
    if (offset) {
        url += '&offset=' + offset;
    }
    if (orderBy) {
        url += '&orderby=' + encodeURIComponent(orderBy);
    }

    let xhr = new XMLHttpRequest();
    xhr.responseType = 'blob';
    xhr.addEventListener('load', (_event) => {
        if (xhr.status !== 200) {
            // handel error
        } else {
            const blob = new Blob([xhr.response], { type: 'application/zip' });
            const url = window.URL.createObjectURL(blob);
            const a = document.createElement('a');
            a.href = url;
            a.download = 'AuditTrail-' + new Date().toISOString().replace(/[:.]/g, '_') + '.zip';
            a.click();
            window.URL.revokeObjectURL(url);
        }
    });
    const errorHandler = (_event) => {
        if (xhr.status === 0) {
            // aborted
        } else {
            // handle error
        }
    };
    xhr.addEventListener('error', errorHandler);
    xhr.addEventListener('abort', errorHandler);
    xhr.addEventListener('timeout', errorHandler);
    xhr.open('GET', tchmi_path(url));
    xhr.send();
}
```

## 12.4.5.6 PostgreSQL

### PostgreSQL documentation

[www.postgresql.org](http://www.postgresql.org)

### Windows:

### Installation:

1. Download the installation file.

2. Install the database
  - ⇒ PostgreSQL Server
  - ⇒ Command Line Tools
  - ⇒ PG Admin (for easy access to the database)
- ⇒ The database has been installed and is now available without any specific configuration.

### Creating a new database

1. Open the pgAdmin.
2. Select the server on which you want to add a new database.
3. Right-click on the server.
4. Click on **Create database**.
  - ⇒ Another window opens in which you can configure your database.
- ⇒ You have created a new database.

### Settings for access via the network

1. Use a text editor to open the file `pg_hba.config` in `C:\Program Files\PostgreSQL\*version*\data\`
2. Adjust the entry **host all all 127.0.0.1/32 scram-sha-256** or add a new one.
  - ⇒ By default, 127.0.0.1/32 is entered as local only. If other systems are to have access to the database, the corresponding IP address must be set.
3. Configure your firewall according to the port selected during installation (default: 5432/tcp).
- ⇒ Thanks to the new configuration, your database is now accessible over the network.

## TwinCAT/BSD

### Installation

- ✓ Connect to the FreeBSD® PackageManager to install the appropriate package.
1. Open the configuration file "FreeBSD.conf".  
`doas ee /usr/local/etc/pkg/repos/FreeBSD.conf`
  2. Change the value "enabled" to yes.
  3. Perform an update of the packages.  
`doas pkg update`
    - ⇒ You will now see the available FreeBSD packages.
  4. Install the PostgreSQL database server.  
`doas pkg install xxxx`
  5. Enable the PostgreSQL service.  
`doas sysrc postgresql_enable="YES"`
- ⇒ The database has been successfully installed and the service has been set up in the autostart.

### Creating a new database

1. Initialize the database.  
`doas /usr/local/etc/rc.d/postgresql initdb`
  2. Start the database service.  
`doas service postgresql start`
  3. Set a password for the default user.  
`doas passwd postgres`
- ⇒ The database has been successfully initialized and started.

### Settings for access via the network

1. Open pf.conf to configure the firewall.  
`doas ee /etc/pf.conf`

2. Add the port 5432.  
pass in quick proto tcp to port 5432 keep state
  3. Save and exit the editor.
  4. Reload the firewall configuration.  
doas pfctl -f /etc/pf.conf  
⇒ Port 5432 has been opened in the firewall.
  5. Open postgresql.conf to adjust "listen\_addresses".  
doas ee /var/db/postgres/data17/postgresql.conf
  6. Change the entry listen\_addresses to '\*'.
  7. Save and exit the editor.
  8. Open pg\_hba.conf to adjust the security settings.  
doas ee /var/db/postgres/data17/pg\_hba.conf
  9. Adjust the entry **host all all 127.0.0.1/32** or add a new one. Change the method to md5.  
⇒ By default, 127.0.0.1/32 is entered as local only. If other systems are to have access to the database, the corresponding IP address must be set.
- | #     | TYPE   | DATABASE                                   | USER | ADDRESS      | METHOD |
|-------|--|--|------|--------------|--------|
| #     | "local"  | is for Unix domain socket connections only |      |              |        |
| local | all  |  | all  |              | md5    |
| #     | IPv4   | local connections:                         |      |              |        |
| host  | all  |  | all  | 127.0.0.1/32 | md5    |
| #     | IPv6   | local connections:                         |      |              |        |
| host  | all  |  | all  | :::1/128     | md5    |
| #     | Allow replication connections from localhost, by a user with the |  |      |              |        |
| #     | replication privilege.   |  |      |              |        |
| local | replication  |  | all  |              | md5    |
| host  | replication  |  | all  | 127.0.0.1/32 | md5    |
| host  | replication  |  | all  | :::1/128     | md5    |
10. Save and exit the editor.
  11. Restart the service.  
doas service postgresql restart  
⇒ Thanks to the new configuration, your database is now accessible over the network.

## 12.4.6 Dialogs

### Reauthentication

If reauthentication is required to write the symbol, a window opens for a new login process. If other server extensions are available for user management, these are displayed in another drop-down menu.

## Audit Trail

### ADS.PLC1.MAIN.nData

Username

Operator

Password

Previous Value

0

New Value

1

OK

Cancel

#### Username

- Selection of the user.

#### Password

- Confirmation by password.

#### Previous Value and New Value

- Display of the old value and the new value.

#### Entering a change comment

If a comment is expected when the symbol is written, a window for entering this comment opens. Depending on the configuration, a minimum comment length is required here.

## Audit Trail

### ADS.PLC1.MAIN.sData

Previous Value

New Value

Hello World

Comment

OK

Cancel

#### Previous Value and New Value

- Display of the old value and the new value.

**Comment**

- Enter a change comment.

**Reauthentication with comment**

If reauthentication and the entry of a comment is required, a window for logging in again and entering a comment will open. If further Server Extensions are available for user management, these are displayed in a further drop-down menu. Depending on the configuration, a minimum length is required for the comment.

**Audit Trail****ADS.PLC1.MAIN.nData**

Username

Operator



Password

Previous Value

New Value

Comment

OK

Cancel

**Username**

- Selection of the user.

**Password**

- Confirmation by password.

**Previous Value and New Value**

- Display of the old value and the new value.

**Comment**

- Enter a change comment.

## 12.4.7 Controls

The following controls are available for the Audit Trail extension.



Audit Trail Grid [▶ 1070]

	Zeitstempel ↕	test	ID ↕	Name ↕	Alter Wert	Neuer Wert	Benutzername ↕	Fehlergrund
1	2024-02-16T07:02:27.5860172Z		9	settingMatch			TcHmiUserManagement::SystemAdministrator	
2	2024-02-16T07:05:02.6029363Z		14	LOGIN_LOG			TcHmiUserManagement::SystemUser	
3	2024-02-14T13:48:27.2354725Z		3	ADS.PLC1.MAIN.bData	false	true	TcHmiUserManagement::SystemUser	
4	2024-02-14T13:48:29.7754269Z		4	ADS.PLC1.MAIN.bData	true	false	TcHmiUserManagement::SystemUser	
5	2024-02-14T13:49:45.7774291Z		5	LOGIN_LOG			TcHmiUserManagement::SystemUser	
6	2024-02-14T13:49:45.7814338Z		6	ADS.PLC1.MAIN.nData	0	1	TcHmiUserManagement::SystemGuest	
7	2024-02-15T08:40:10.5142202Z		7	ADS.PLC1.MAIN.bData	false	true	TcHmiUserManagement::SystemUser	
8	2024-02-15T08:40:11.1151438Z		8	ADS.PLC1.MAIN.bData	true	false	TcHmiUserManagement::SystemUser	
9	2024-02-16T07:02:50.6064963Z		11	settingMatch			TcHmiUserManagement::SystemAdministrator	
10	2024-02-16T07:02:50.6064963Z		12	settingMatch			TcHmiUserManagement::SystemAdministrator	
11	2024-02-13T10:00:13.3689741Z		1	auditTrailErrorMessage			TcHmiUserManagement::SystemAdministrator	
12	2024-02-14T10:49:57.2332853Z		2	settingMatch			TcHmiUserManagement::SystemAdministrator	
13	2024-02-16T07:02:37.5949041Z		10	settingMatch			TcHmiUserManagement::SystemAdministrator	
14	2024-02-16T07:05:02.6029363Z		13	LOGIN_LOG			TcHmiUserManagement::SystemUser	
15	2024-02-16T08:07:40.5659923Z		15	auditTrailErrorMessage			TcHmiUserManagement::SystemAdministrator	

- The Audit Trail Grid Control is used to display the current values within the Audit Trail database.

12.5 EtherCAT diagnostics

The EtherCAT Diagnostics Extension provides an interface for diagnosing the EtherCAT fieldbus and the topology of the target system. Visualization in the client is handled by the EtherCAT Diagnostics Control.

12.5.1 System requirements

Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT/BSD
Additional software required	-

Version 1.12

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT/BSD
Additional software required	-

12.5.2 Quick start

To start, create or open a TwinCAT HMI project.

## Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.EcDiagnostics" via the [NuGet Package Manager](#) [► 1041]. In addition, the "Beckhoff.TwinCAT.HMI.EcDiagnosticsControl" package must be installed to display the bus topology.

## Configuration of the LDAP extension

1. Open the server configuration page.
2. Go to the **TcHmiEcDiagnostics** tab.

**TcHmiSrv**   **ADS**   **TcHmiEcDiagnostics**   TcHmiLua   TcHmiSqliteLogger    

▼ **EtherCAT devices**  
EtherCAT devices  
*Can be set for specific remote configuration.*

▼ **Device1**

<input type="radio"/> Enabled	<input type="text" value="true"/>
<input type="radio"/> TargetNetId	<input type="text" value="0.0.0.0.1.1"/>
<input type="radio"/> MasterNetId	<input type="text" value="0.0.0.0.2.1"/>

[+ Add](#)

> **Vendors overwrite**  
Add vendor ID

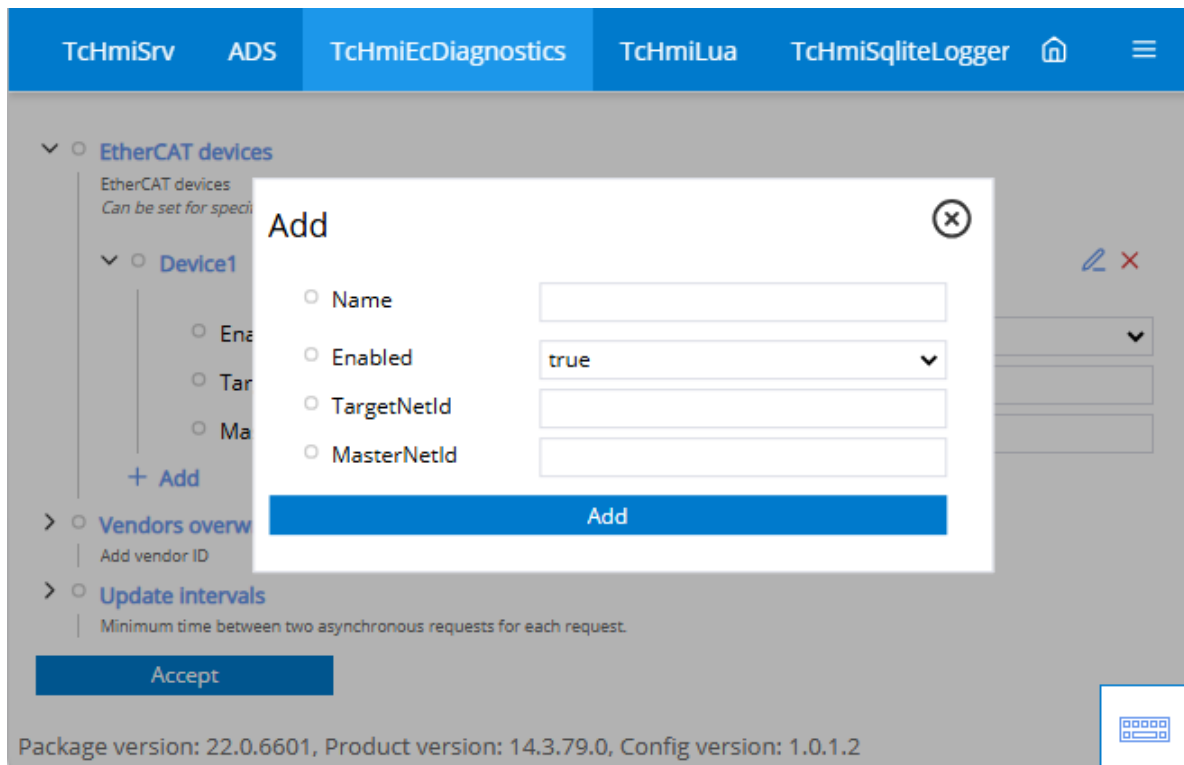
> **Update intervals**  
Minimum time between two asynchronous requests for each request.

**Accept**

Package version: 22.0.6601, Product version: 14.3.79.0, Config version: 1.0.1.2

3. Click on **EtherCAT devices** to open the submenu.  
⇒ An entry with **Device1** is already set up by default.
4. Adjust the **Device 1** entry or click on **Add**

⇒ When adding, a pop-up opens for further settings.



5. Define under:

**Name:** the name of the device. (Used as the name to establish the connection on the Control).

**Enabled:** Enable or disable the connection to the specified device

**TargetNetId:** The Target NetId of the target device (system) to which a connection is to be established.

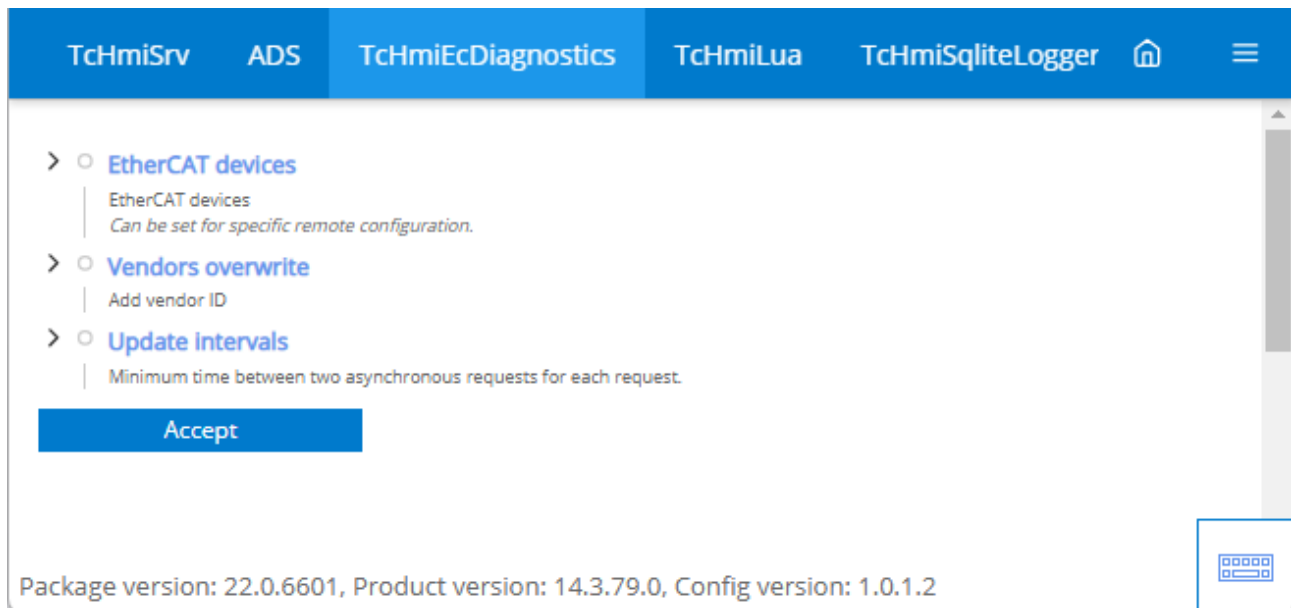
**MasterNetId:** The Master NetId of the target device (EtherCAT master) to which a connection is to be established.

The connection you configured to the target system is established. To be able to display the bus topology, you need the EcDiagnostics Control.

## 12.5.3 Configuration

### General

The basic settings for the server extension are specified in the **General** tab.



#### EtherCAT devices [► 1200]

- Specifies the EtherCAT devices to which a connection can be established.

#### Vendors overwrite [► 1201]

- Specifies whether standard vendors are overwritten. The Vendor ID of the vendor is used as a reference here.

#### Update intervals [► 1202]

- Defines the various update intervals.

#### **Maximum timeout for runtime status determination (Advanced settings)**

- A configured runtime is considered unavailable if a request takes longer than this period of time.

### **12.5.3.1 EtherCAT devices**

Establish the connection to an EtherCAT device.

TcHmiSrv
ADS
TcHmiEcDiagnostics
TcHmiLua
TcHmiSqliteLogger
Home
Menu

EtherCAT devices
Can be set for specific remote configuration.

Device1
Edit
Delete

☐ Enabled

☐ TargetNetId

☐ MasterNetId

+ Add

Vendors overwrite
Add vendor ID

Update intervals
Minimum time between two asynchronous requests for each request.

Accept

Package version: 22.0.6601, Product version: 14.3.79.0, Config version: 1.0.1.2

### Enabled

- Indicates whether the connection is active and can therefore be used.

### TargetNetId

- Specifies the Target NetId (system) to which a connection is established.

### MasterNetId

- Specifies the Master NetId (EtherCAT master) to which a connection is established from the Target NetId.

The NetId 0.0.0.0.x.x is always the local system.

## 12.5.3.2 Vendors overwrite

Overwrite the vendor name. Each EtherCAT device has a Vendor ID. This ID is assigned to a vendor of EtherCAT devices ([list](#)). If you want to change the name and/or abbreviation of the vendor, add a new entry with the corresponding Vendor Id. The name and abbreviation then specified overwrite the default value. If this is only necessary for individual devices, a new entry can be created via EtherCAT devices where individual devices can be specifically changed.

Package version: 22.0.6601, Product version: 14.3.79.0, Config version: 1.0.1.2

### EtherCAT devices

- Specifies an extra entry for a device type.  
**Pattern** specifies the name of the component for which the name and abbreviation are overwritten.  
**Name** specifies the new name that is displayed.  
**Abbreviation** specifies the new abbreviation that is displayed.

#### Name

- Specifies the new name that is displayed.

#### Abbreviation

- Specifies the new abbreviation that is displayed.

### 12.5.3.3 Update intervals

Set the update intervals for the individual connections.

TcHmiSrv   ADS   **TcHmiEcDiagnostics**   TcHmiLua   TcHmiSqliteLogger   Home   Menu

- > ☐ **EtherCAT devices**
  - EtherCAT devices
  - Can be set for specific remote configuration.
- > ☐ **Vendors overwrite**
  - Add vendor ID
- ▼ ☒ **Update Intervals**
  - Minimum time between two asynchronous requests for each request.
  - ☐ **MasterList**
    - Minimum time between two requests in ms.
    - 1000
  - ☐ **MasterOnlineInfo**
    - Including frame statistic (sent frames, damaged frames, lost frames, ...) and master state.
    - 300
  - ☐ **Slaves**
    - 1000
  - ☐ **SlavesOnlineInfo**
    - 1000
  - ☐ **ProcessDataValues**
    - 1000

Accept

Package version: 22.0.6601, Product version: 14.3.79.0, Config version: 1.0.1.2

### MasterList

- Specifies the minimum time between two requests.

### MasterOnlineInfo

- Specifies the interval at which the master information is queried (sent frames, damaged frames, ...).

### Slaves

- Specifies the interval at which the EtherCAT slaves are queried.

### SlavesOnlineInfo

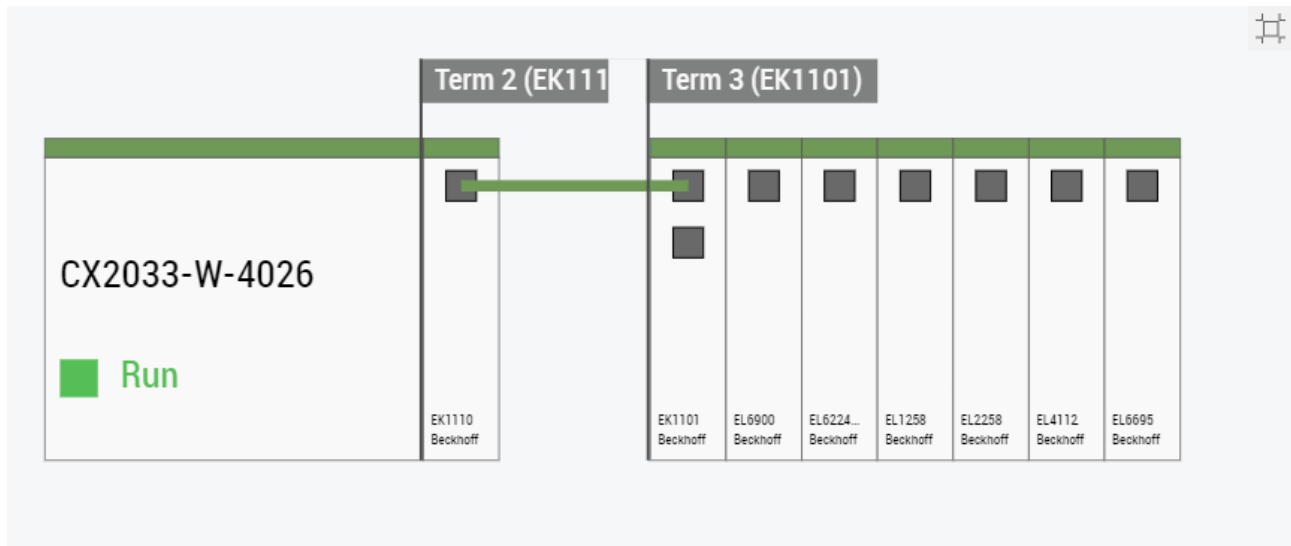
- Specifies the interval at which the EtherCAT slaves are queried for information.

### ProcessDataValues

- Specifies the interval at which the process data is queried.

## 12.5.4 Controls

The following controls are available to match the EtherCAT Diagnostics Extension.

**EcDiagnostics [► 1073]**

- The EcDiagnostics Control is used to display the bus topology read by the EtherCAT Diagnostics Extension.

## 12.6 Historical data

Historical data are data from earlier points in time that are stored in a database. Any server symbols of the TwinCAT HMI (e.g. numerical value from the PLC) can be historized using a Historize Extension. The extension saves the data in a ring memory in a database. The interval at which the data are saved in the database can be defined for each symbol. The data are saved in the database only as long as the server is running. No historical data are written to the database if the server is terminated.

The TwinCAT HMI has various extensions for recording historical data.

**SQLite [► 1219]**

Use the Historize Extension in connection with an SQLite database.

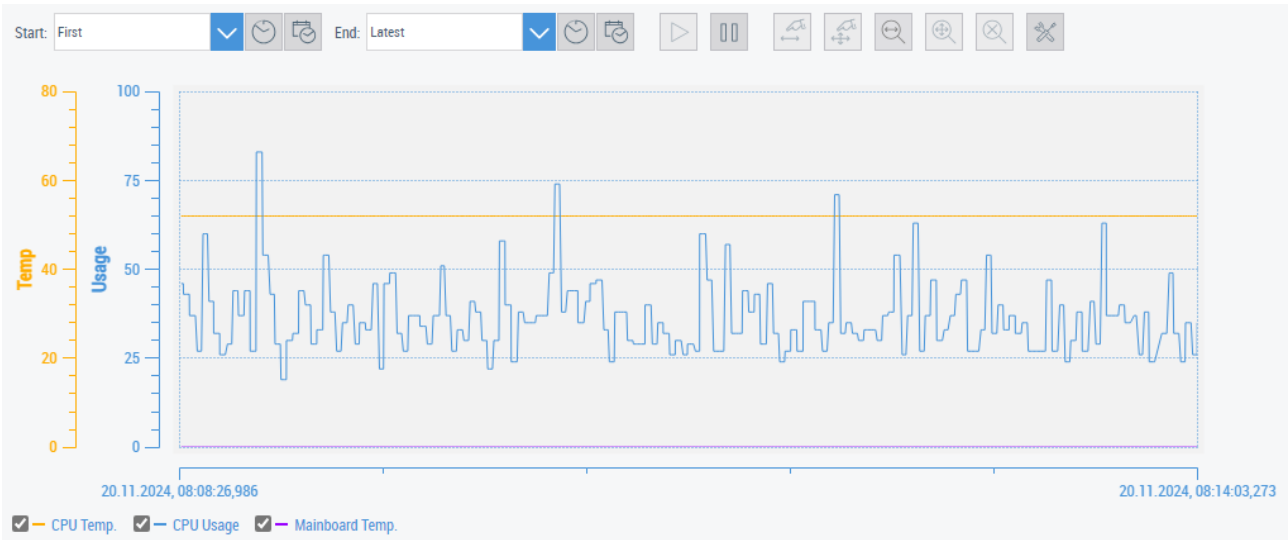
**PostgreSQL [► 1205]**

Use the Historize Extension in connection with a PostgreSQL database.

**Controls [► 1226]**

The historical data are displayed in an included control – the Trend Line Chart. The control enables the display of various historical data at the same time.





12.6.1 PostgreSQL

Use the Historize Extension in connection with a PostgreSQL database.



Available since version 1.14

12.6.1.1 System requirements

Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	PostgreSQL

12.6.1.2 Quick start

To start, create or open a TwinCAT HMI project.

Installation

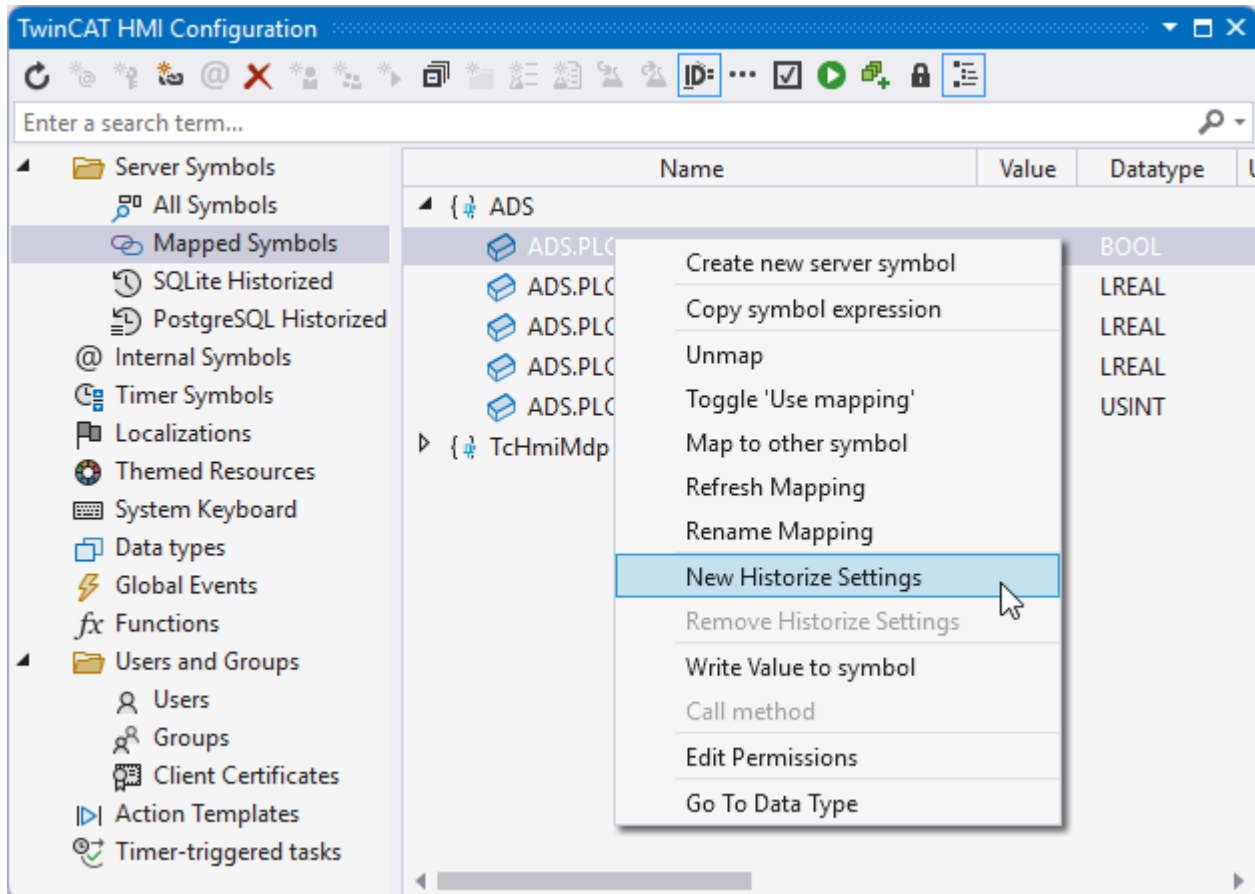
Install the NuGet package "Beckhoff.TwinCAT.HMI.PostgresHistorize" via the [NuGet Package Manager](#) [[▶ 1041](#)].

Installing the database

Install the database required for the extension:

- [PostgreSQL](#) [[▶ 1214](#)]

## Adding a symbol in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
2. Go to the **Server Symbols / Mapped Symbols** tab.
3. Select the symbols to be added to the Historized data.
4. Right-click on **New Historize Settings** to add Historize data to the configuration.

⇒ A pop-up opens for further settings.

5. Check the **Historize Domain** (TcHmiPostgresHistorized).

6. Define under:

**Max. Entries**, the maximum number of values for this symbol to be saved in the database.

**recording interval** at which new values are transferred to the database.

**deletion interval** at which invalid values are removed from the database.

⇒ The symbols you have configured are now included with the corresponding configuration. An overview of all configured symbols can be found under **Server Symbols /SQLite Historized**.

Name	Datatype	Interval	Deletion Interval	Max Entries	Recording
ADS.PL1.MAIN_bData	BOOL	PT1S	PT1S	10000	<input checked="" type="checkbox"/>

### Adding a symbol via the server configuration page

1. Open the server configuration page.
2. Go to the **TcHmiPostgresHistorize** tab.
3. Go to **Historized symbols**.
  - ⇒ All currently configured symbols are displayed here.
4. Click on **Add symbol**.
  - ⇒ A pop-up opens for further settings.

**Add Symbol** (Close button)

- ☐ Symbol-Mapping
- ☐ Maximum number of entries
- ☐ Interval for data recording
- ☐ Recording enabled - ☐ Frequency of scheduled data deletions 

Lower frequencies cause larger deletions, while higher frequencies ensure smoother charts.

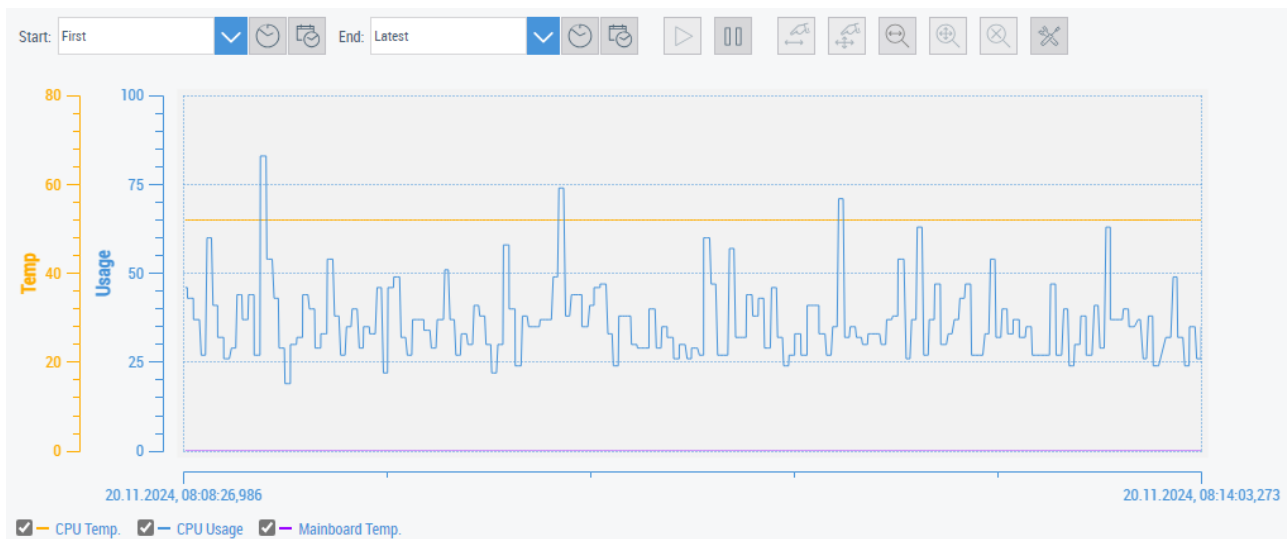
**Add**

5. Define under:
    - Symbol-Mapping**, the name of the corresponding symbol.
    - Maximum number of entries** the maximum number of values for this symbol to be saved in the database.
    - Interval for data recording** at which new values are transferred to the database.
    - Recording enabled** whether the configured symbol should currently be recorded.
    - Frequency of scheduled data deletions** at which invalid values are removed from the database.
- ⇒ The symbols you have configured are now available in the Historize Extension and can be written to the database with the corresponding intervals.

### Include the control to display the values in a line chart.

1. Add the TrendLineChart to a View or Content page.
  2. Check under Common /
  3. Go to **Line Graph Description** in the properties window.
  4. Create a new element:
    - Choose the desired symbol.
    - Select an Axis ID.
- ⇒ Start the Live View. If the configuration is successful, the symbol is displayed as a Line in the graph.

Example with two Y-axes and three symbols.



### 12.6.1.3 Configuration

#### General

The basic settings for the server extension are specified in the **General** tab.

#### Historized Symbols

- All configured symbols are displayed here or new ones can be added [▶ 1210](#).

#### Compression enabled

- Compression reduces the size of the data in the database. Compression increases the access time.

#### Compress after

- Time from which older data is compressed, if compression is enabled.  
Example: Default P30D = Data older than 30 days is compressed.

#### Compression frequency

- Specifies the interval at which the older data is compressed if compression is enabled.

## Database settings

All settings relating to the database are made in the **Database settings** tab.

**Update successful**

Current database connection

PostgreSQL database settings  
Can be set for specific remote configuration.

☐ Password: .....  
☐ Table-ID: 1.00  
☐ Connection string: Server=localhost; Port=5432; Database=historize\_postgres; Uid=postgres; Pwd=@{password}; Timeout=10;

Accept

**Diagnostics**

☐ Connection state: Connected  
☐ Domain state: Good  
☐ Database size: 73728  
 The size of the hypertable used by this configuration.  
☐ Number of entries: 0

Package version: 22.0.6737, Product version: 14.3.143.0, Config version: 1.0.0.2

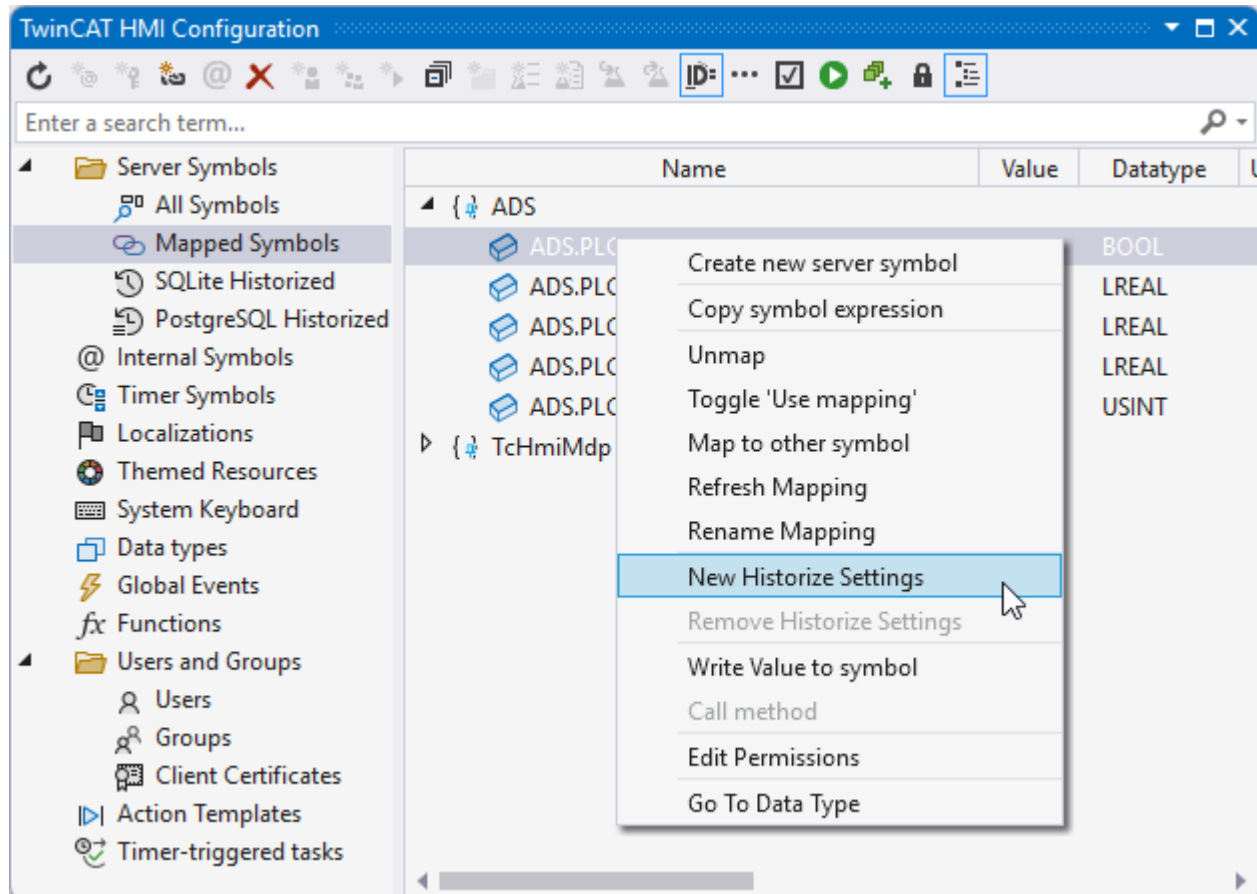
### Current database connection

- Password: Password of the database.
- Table ID: Identifies the tables currently in use. Can be set for special remote configurations.
- Connection: Connection setting to the database via ODBC. Enter the IP, port, database name, UserId, password and timeout here. (@{password} is a placeholder and will be replaced by the password entered above)

### 12.6.1.3.1 Add symbols

Add symbols to the Historize extension so that they are saved in the database.

## Adding a symbol in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
2. Go to the **Server Symbols / Mapped Symbols** tab.
3. Select the symbols to be added to the Historized data.
4. Right-click on **New Historize Settings** to add Historize data to the configuration.

⇒ A pop-up opens for further settings.

5. Check the **Historize Domain** (TcHmiPostgresHistorized).

6. Define under:

**Max. Entries**, the maximum number of values for this symbol to be saved in the database.

**recording interval** at which new values are transferred to the database.

**deletion interval** at which invalid values are removed from the database.

⇒ The symbols you have configured are now included with the corresponding configuration. An overview of all configured symbols can be found under **Server Symbols /SQLite Historized**.

Name	Datatype	Interval	Deletion Interval	Max Entries	Recording
ADS.PLC1.MAIN._bData	BOOL	PT1S	PT1S	10000	<input checked="" type="checkbox"/>



### Adding a symbol via the server configuration page

1. Open the server configuration page.
2. Go to the **TcHmiPostgresHistorize** tab.
3. Go to **Historized symbols**.
  - ⇒ All currently configured symbols are displayed here.
4. Click on **Add symbol**.
  - ⇒ A pop-up opens for further settings.

5. Define under:
    - Symbol-Mapping**, the name of the corresponding symbol.
    - Maximum number of entries** the maximum number of values for this symbol to be saved in the database.
    - Interval for data recording** at which new values are transferred to the database.
    - Recording enabled** whether the configured symbol should currently be recorded.
    - Frequency of scheduled data deletions** at which invalid values are removed from the database.
- ⇒ The symbols you have configured are now available in the Historize Extension and can be written to the database with the corresponding intervals.

#### 12.6.1.3.2 Delete entry

To delete an entry from the PostgresHistorize extension, you must write to the "TchmiSqliteHistorize.DeleteDatabaseEntries" symbol. If no symbol is specified in the command, all entries are deleted. Recording can be stopped for one or all symbols via "disableRecording".

##### Parameter

Name	Type	Description
disableRecording	boolean	Stops recording for the specified symbol.
symbolName	string	Symbol which is to be deleted. If no symbol is specified, all entries are deleted.

##### Sample - Javascript

```
TcHmi.Server.writeSymbol(
  'TchmiPostgresHistorize.DeleteDatabaseEntries',
  {
    "disableRecording": true,
    "symbolName": "MySymbol"
  },
  data => {
    if (data.error !== TcHmi.Errors.NONE ||
        data.response.error ||
```

```

        data.response.commands[0].error) {
            // Handle error(s)...
            return;
        }
        // Handle result...
        console.info(
            'TcHmiPostgresHistorize.DeleteDatabaseEntries=' +
            data.response.commands[0].readValue);
    }
};

```

### 12.6.1.3.3 PostgreSQL

#### PostgreSQL documentation

[www.postgresql.org](http://www.postgresql.org)

#### Windows:

##### Installation:

1. Download the installation file.
2. Install the database
  - ⇒ PostgreSQL Server
  - ⇒ Command Line Tools
  - ⇒ PG Admin (for easy access to the database)
- ⇒ The database has been installed and is now available without any specific configuration.

##### Creating a new database

1. Open the pgAdmin.
2. Select the server on which you want to add a new database.
3. Right-click on the server.
4. Click on **Create database**.
  - ⇒ Another window opens in which you can configure your database.
- ⇒ You have created a new database.

##### Settings for access via the network

1. Use a text editor to open the file *pg\_hba.config* in *C:\Program Files\PostgreSQL\\*version\*\data\*
2. Adjust the entry **host all all 127.0.0.1/32 scram-sha-256** or add a new one.
  - ⇒ By default, 127.0.0.1/32 is entered as local only. If other systems are to have access to the database, the corresponding IP address must be set.
3. Configure your firewall according to the port selected during installation (default: 5432/tcp).
- ⇒ Thanks to the new configuration, your database is now accessible over the network.

#### TwinCAT/BSD

##### Installation

- ✓ Connect to the FreeBSD® PackageManager to install the appropriate package.
1. Open the configuration file "FreeBSD.conf".
 

```
doas ee /usr/local/etc/pkg/repos/FreeBSD.conf
```
  2. Change the value "enabled" to yes.
  3. Perform an update of the packages.
 

```
doas pkg update
```

    - ⇒ You will now see the available FreeBSD packages.

4. Install the PostgreSQL database server.  
doas pkg install xxxx
  5. Enable the PostgreSQL service.  
doas sysrc postgresql\_enable="YES"
- ⇒ The database has been successfully installed and the service has been set up in the autostart.

### Creating a new database

1. Initialize the database.  
doas /usr/local/etc/rc.d/postgresql initdb
  2. Start the database service.  
doas service postgresql start
  3. Set a password for the default user.  
doas passwd postgres
- ⇒ The database has been successfully initialized and started.

### Settings for access via the network

1. Open pf.conf to configure the firewall.  
doas ee /etc/pf.conf
2. Add the port 5432.  
pass in quick proto tcp to port 5432 keep state
3. Save and exit the editor.
4. Reload the firewall configuration.  
doas pfctl -f /etc/pf.conf  
⇒ Port 5432 has been opened in the firewall.
5. Open postgresql.conf to adjust "listen\_addresses".  
doas ee /var/db/postgres/data17/postgresql.conf
6. Change the entry listen\_addresses to '\*'.
7. Save and exit the editor.
8. Open pg\_hba.conf to adjust the security settings.  
doas ee /var/db/postgres/data17/pg\_hba.conf
9. Adjust the entry **host all all 127.0.0.1/32** or add a new one. Change the method to md5.  
⇒ By default, 127.0.0.1/32 is entered as local only. If other systems are to have access to the database, the corresponding IP address must be set.

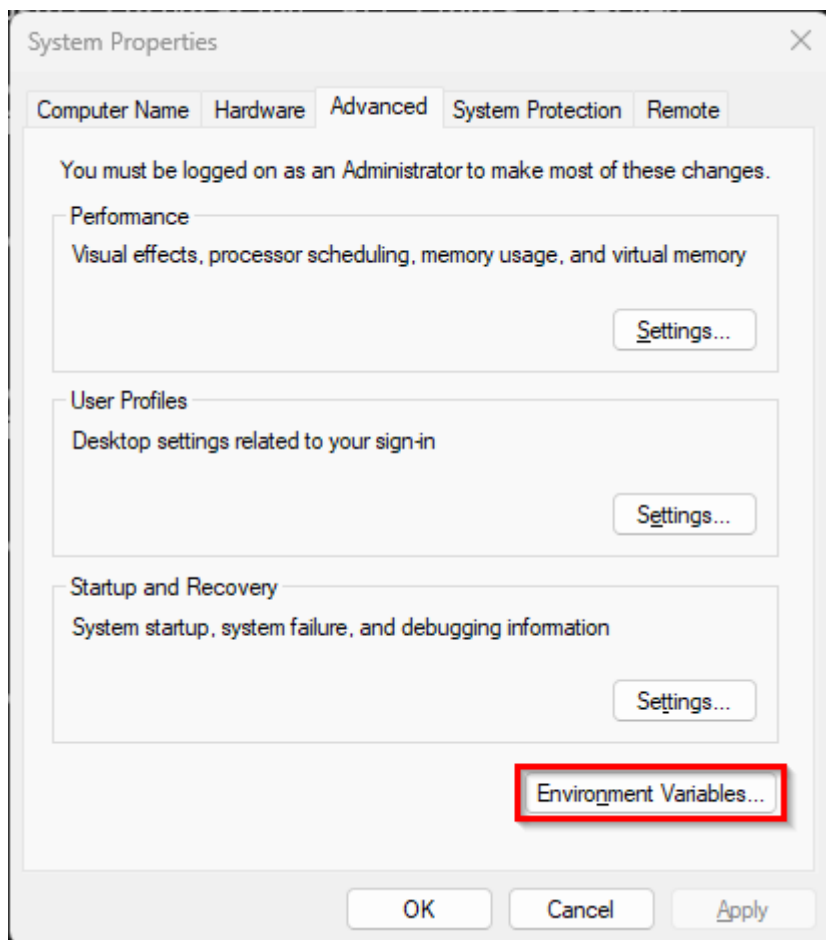
#	TYPE	DATABASE	USER	ADDRESS	METHOD
# "local" is for Unix domain socket connections only					
local	all		all		md5
# IPv4 local connections:					
host	all		all	127.0.0.1/32	md5
# IPv6 local connections:					
host	all		all	:::1/128	md5
# Allow replication connections from localhost, by a user with the # replication privilege.					
local	replication		all		md5
host	replication		all	127.0.0.1/32	md5
host	replication		all	:::1/128	md5

10. Save and exit the editor.
11. Restart the service.  
doas service postgresql restart  
⇒ Thanks to the new configuration, your database is now accessible over the network.

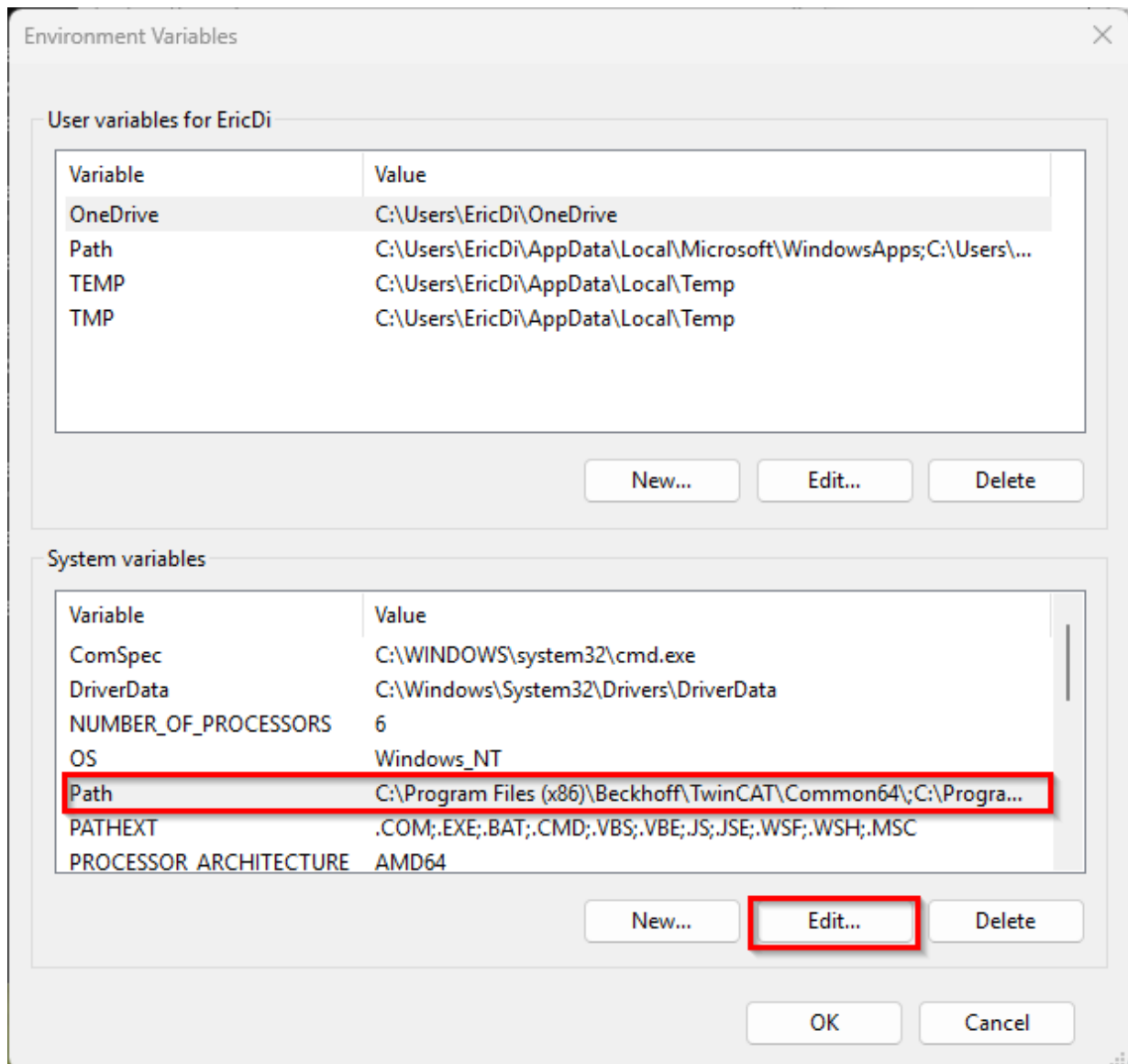
### Enter PostgreSQL in System Environments

1. Enter **System Environment Variables** in the Windows search.

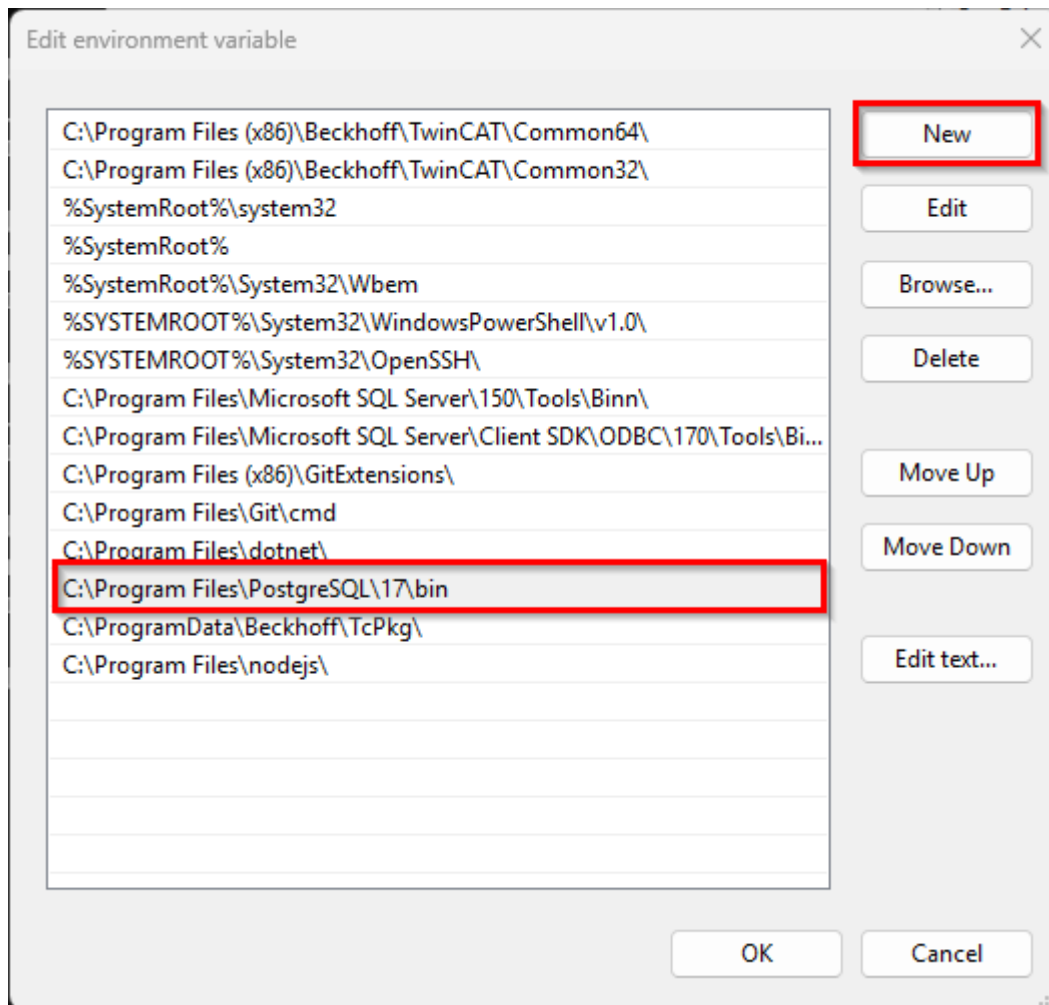
2. Open the **Environment Variables** window.



3. Edit the **Path** entry.



4. Add the path of the PostgreSQL database. *C:\Program Files\PostgreSQL\<version>\bin*



⇒ "pg\_config" can now be addressed directly in the command line or PowerShell.

### Installing TimescaleDB

1. Download the [installation file](#).
  2. Stop the PostgreSQL (Windows/PostgreSQL17: net stop postgresql-x64-17).
  3. Install the [TimescaleDB](#)
    - ⇒ Postgresql.conf (Windows/PostgreSQL17: C:\Program Files\PostgreSQL\17\data)
  4. Start PostgreSQL (Windows/PostgreSQL17: net start postgresql-x64-17).
- ⇒ The TimescaleDB has been successfully installed

### Optimizing the PostgreSQL configuration

There are various ways to optimize the PostgreSQL database for use with TimescaleDB. You can find a detailed overview on the [TimescaleDB](#) page. Disable "[synchronous\\_commit](#)" to reduce the write operations on the hard disk.

#### NOTICE

##### Loss of data

Disabling the "[synchronous\\_commit](#)" function can lead to data loss within the database. This must be observed in conjunction with [Audit Trail](#) [► 1175].

### Disabling the "synchronous\_commit" function

1. Open pgAdmin.

2. Select or create the database in which the historical data are to be saved.
  3. Open PSQL under "Tools/PSQL Tool".
  4. To disable, enter the following command.  
alter system set synchronous\_commit = 'off';
  5. Reload the database configuration with the following command.  
SELECT pg\_reload\_conf();
  6. Open the Query Tool window under "Tools/Query Tool"
  7. Check the configuration using the SQL command.  
select \* from pg\_settings
- ⇒ The "synchronous\_commit" entry should now be set to "off". The functionality is disabled.

## 12.6.2 SQLite

Use the Historize Extension in connection with an SQLite database.



Available since version 1.10

### 12.6.2.1 System requirements

#### Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-

#### Version 1.12

Technical data	
Operating system	Windows CE7 Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-

### 12.6.2.2 Quick start

To start, create or open a TwinCAT HMI project.

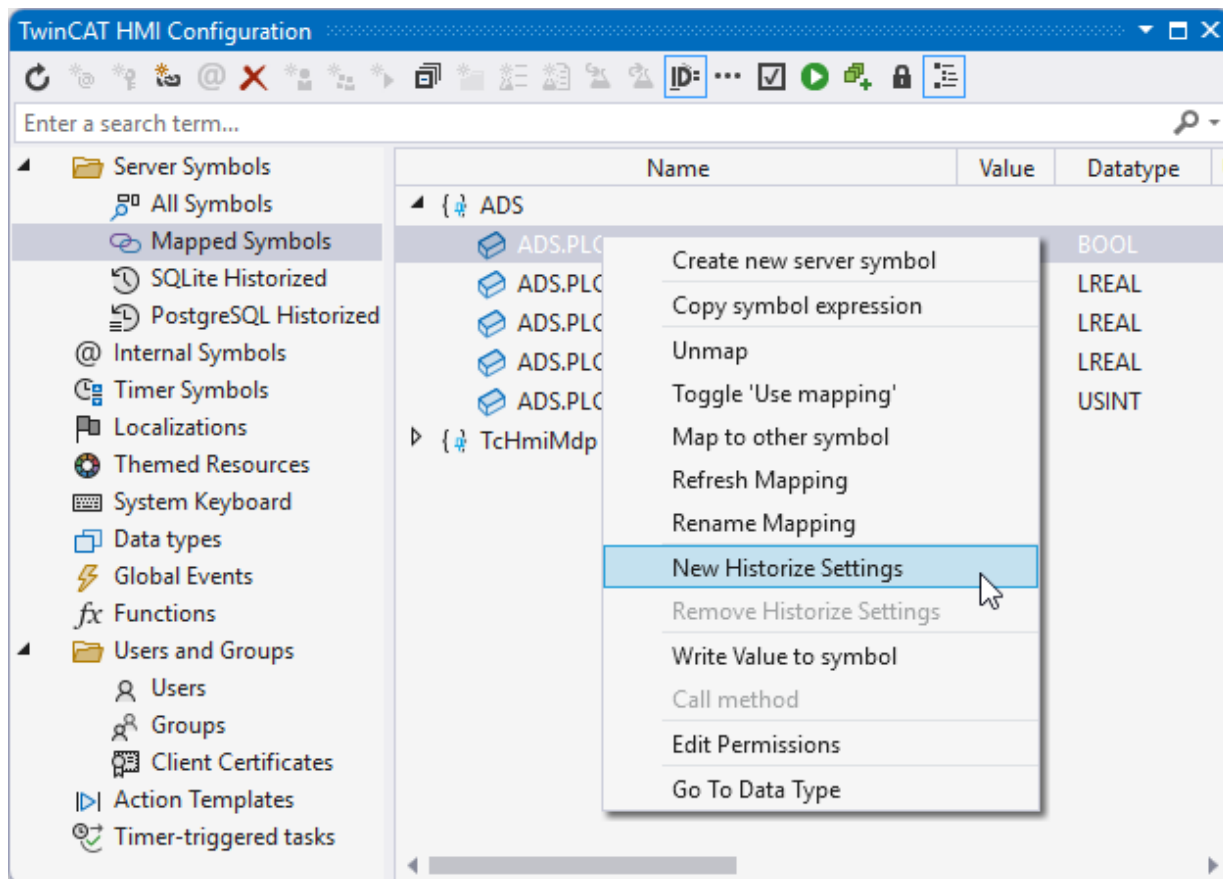
#### Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.SqliteHistorize" via the [NuGet Package Manager](#) [► 1041].

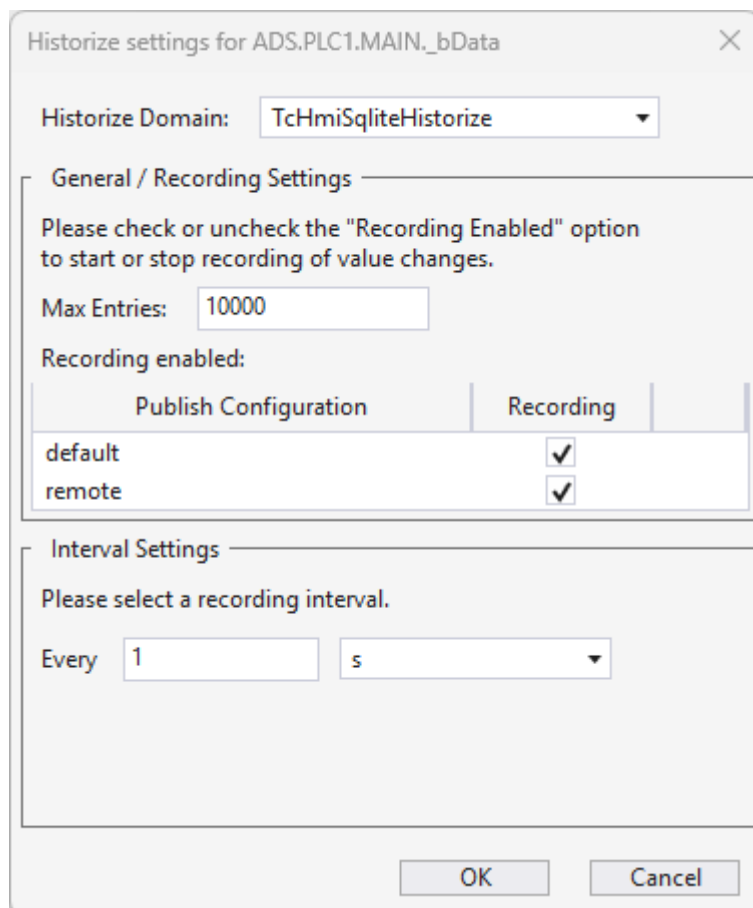
#### Adding a symbol in Visual Studio / TcXaeShell

- ✓ Open the **TwinCAT HMI Configuration** window.
- 1. Go to the **Server Symbols / Mapped Symbols** tab.
- 2. Select the symbols to be added to the Historized data.

3. Right-click on **New Historize Settings** to add Historize data to the configuration.

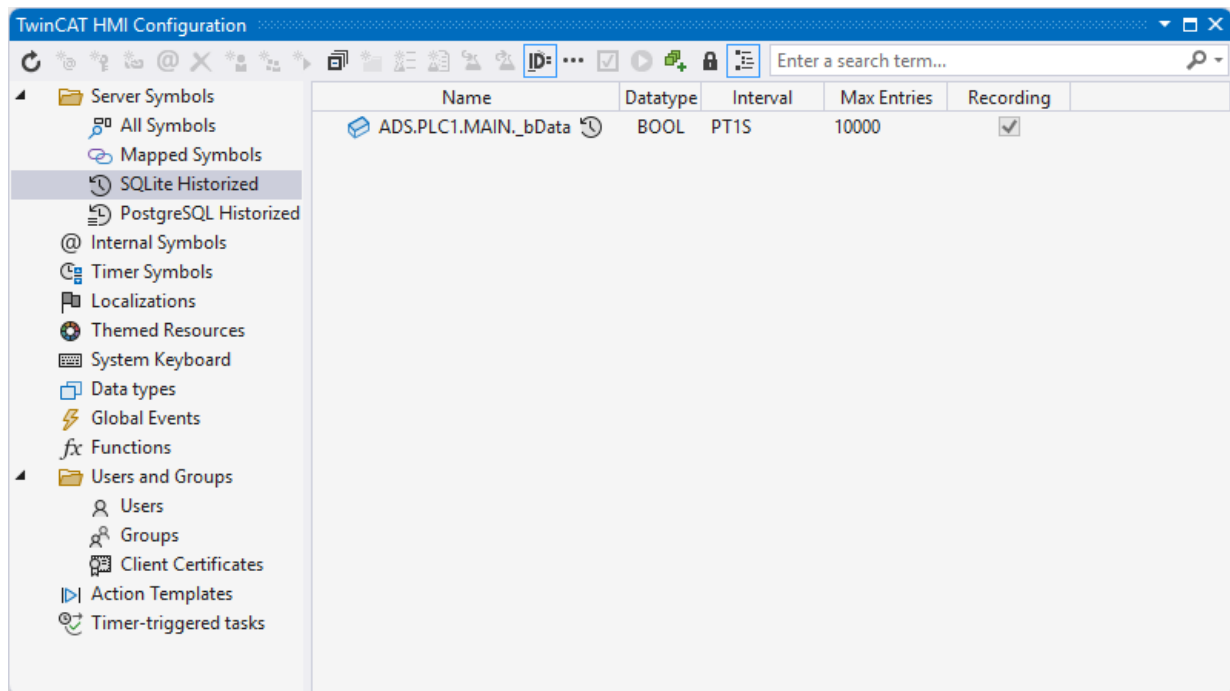


⇒ A pop-up opens for further settings.





4. Check the **Historize Domain** (TcHmiSqliteHistorized).
  5. Define under:
    - Max Entries** the maximum number of values for this symbol to be saved in the database.
    - recording interval** at which new values are transferred to the database.
- ⇒ The symbols you have configured are now included with the corresponding configuration. An overview of all configured symbols can be found under **Server Symbols /SQLite Historized**.



### Adding a symbol via the server configuration page

1. Open the server configuration page.
2. Go to the **TcHmiSqliteHistorize** tab.
3. Go to **Historized symbols**.
  - ⇒ All currently configured symbols are displayed here.
4. Click on **Add symbol**.
  - ⇒ A pop-up opens for further settings.

The 'Add Symbol' dialog box contains the following fields and options:

- Mapped symbol**: A text input field.
- Maximum number of entries**: A text input field with the value '10000'.
- Interval time**: A text input field with the value 'PT1S'.
- Recording enabled**: A dropdown menu with the value 'true'.
- Add**: A blue button at the bottom.

5. Define under:
  - Symbol-Mapping**, the name of the corresponding symbol.
  - Maximum number of entries** how many values of this symbol should be stored in the database.
  - Interval time** at which new values are transferred to the database.
  - Recording enabled** whether the configured symbol should currently be recorded.

- ⇒ The symbols you have configured are now available in the Historize extension and can be written to the database with the corresponding intervals.

#### Include the control to display the values in a line chart.

1. Add the TrendLineChart to a View or Content page.
2. Check under Common /
3. Go to **Line Graph Description** in the properties window.
4. Create a new element:  
Choose the desired symbol.  
Select an Axis ID.

- ⇒ Start the Live View. If the configuration is successful, the symbol is displayed as a Line in the graph.

Example with two Y-axes and three symbols.



### 12.6.2.3 Configuration

#### General

The basic settings for the server extension are specified in the **General** tab.

Package version: 22.0.6511, Product version: 14.3.18.0, Config version: 1.0.1.1

## Historized Symbols

- All configured symbols are displayed here and new ones can be added [[▶ 1223](#)].

## Enable database backups

- By setting the Database backups option, a backup of the SQLite database is created in the background.

## Maximum number of database backups

- Maximum number of database backups before the first file is overwritten.

## In-memory database

- By setting the non-persistent database, the data is written to the PC's RAM. This enables faster access times and eliminates write accesses to the hard disk. As this is a volatile memory, the data is lost when the device is restarted.

## Vacuum at start

- Optimizes the database size when starting the extension.

## Commit interval (extended view)

- The write interval of the extension to the database can be adjusted via Commit Interval.

## Mode (extended view)

- The sync and journal mode of the SQLite database can be set via Mode.

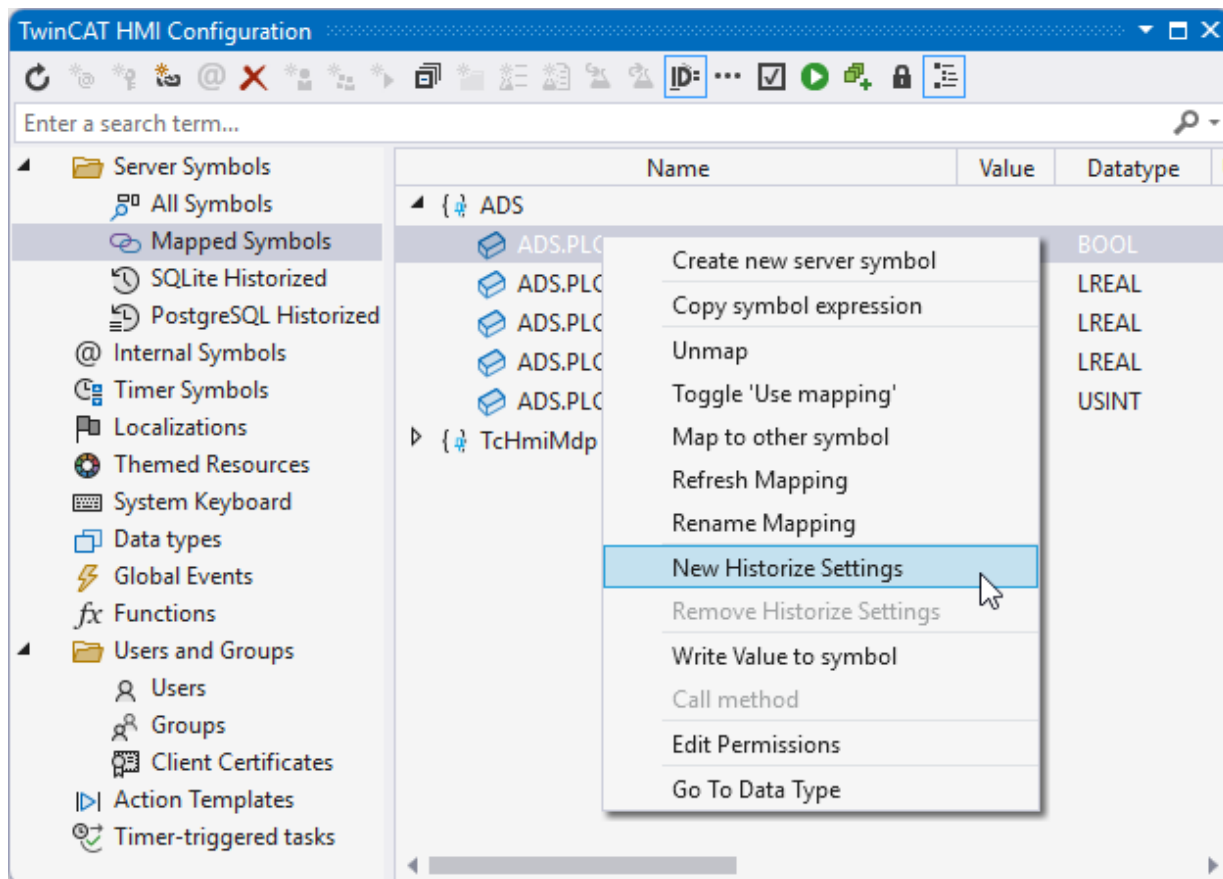
### 12.6.2.3.1 Add symbols

Add symbols to the Historize extension so that they are saved in the database.

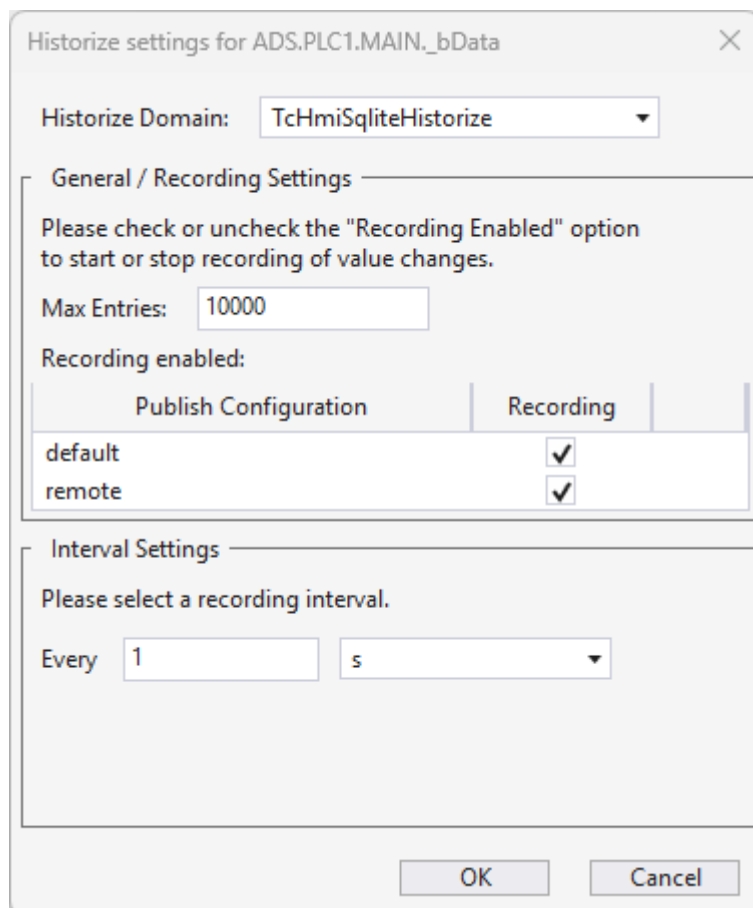
#### Adding a symbol in Visual Studio / TcXaeShell

- ✓ Open the **TwinCAT HMI Configuration** window.
- 1. Go to the **Server Symbols / Mapped Symbols** tab.
- 2. Select the symbols to be added to the Historized data.

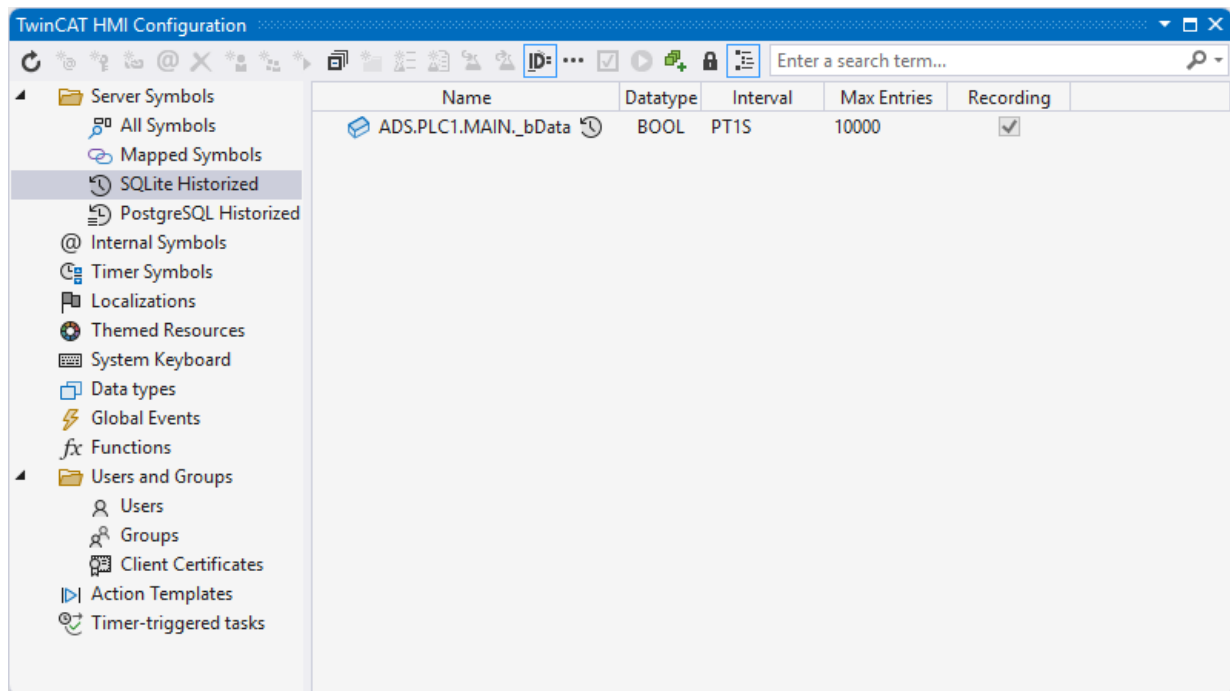
3. Right-click on **New Historize Settings** to add Historize data to the configuration.



⇒ A pop-up opens for further settings.



4. Check the **Historize Domain** (TcHmiSqliteHistorized).
  5. Define under:
    - Max Entries** the maximum number of values for this symbol to be saved in the database.
    - recording interval** at which new values are transferred to the database.
- ⇒ The symbols you have configured are now included with the corresponding configuration. An overview of all configured symbols can be found under **Server Symbols /SQLite Historized**.



### Adding a symbol via the server configuration page

1. Open the server configuration page.
2. Go to the **TcHmiSqliteHistorize** tab.
3. Go to **Historized symbols**.
  - ⇒ All currently configured symbols are displayed here.
4. Click on **Add symbol**.
  - ⇒ A pop-up opens for further settings.

The 'Add Symbol' dialog box contains the following fields and options:

- Mapped symbol**: A text input field.
- Maximum number of entries**: A text input field with the value '10000'.
- Interval time**: A text input field with the value 'PT1S'.
- Recording enabled**: A dropdown menu with the value 'true'.
- Add**: A blue button at the bottom.

5. Define under:
  - Symbol-Mapping**, the name of the corresponding symbol.
  - Maximum number of entries** how many values of this symbol should be stored in the database.
  - Interval time** at which new values are transferred to the database.
  - Recording enabled** whether the configured symbol should currently be recorded.

⇒ The symbols you have configured are now available in the Historize extension and can be written to the database with the corresponding intervals.

### 12.6.2.3.2 Delete entries

To delete an entry from the SqliteHistorize extension, the symbol "TchmiSqliteHistorize.DeleteDatabaseEntries" must be written. If no symbol is specified in the command, all entries are deleted. Recording can be stopped for one or all symbols via "disableRecording".

#### Parameter

Name	Type	Description
disableRecording	boolean	Stops recording for the specified symbol.
symbolName	string	Symbol which is to be deleted. If no symbol is specified, all entries are deleted.

#### Example - Javascript

```
TcHmi.Server.writeSymbol(  
    'TchmiSqliteHistorize.DeleteDatabaseEntries',  
    {  
        "disableRecording": true,  
        "symbolName": "MySymbol"  
    },  
    data => {  
        if (data.error !== TcHmi.Errors.NONE ||  
            data.response.error ||  
            data.response.commands[0].error) {  
            // Handle error(s)...  
            return;  
        }  
        // Handle result...  
        console.info(  
            'TchmiSqliteHistorize.DeleteDatabaseEntries=' +  
            data.response.commands[0].readValue);  
    }  
);
```



Available from version 1.12.758.8

## 12.6.3 Controls

The following controls are available for the Historical Data extensions.

**Trend Line Chart [▶ 1099]**

- The Trend Line Chart Control is used to display the values from the Historize extensions.

## 12.7 LDAP

The **L**ightweight **D**irectory **A**ccess **P**rotocol (LDAP) is a network protocol for retrieving user information (e.g. user names, groups) from a directory service. The directory service (e.g. Active Directory from Microsoft) is often used in larger companies to centrally manage users and groups.

### Application scenario

The TwinCAT HMI LDAP Extension enables access to an LDAP server so that the user groups in the TwinCAT HMI server are available for user management.

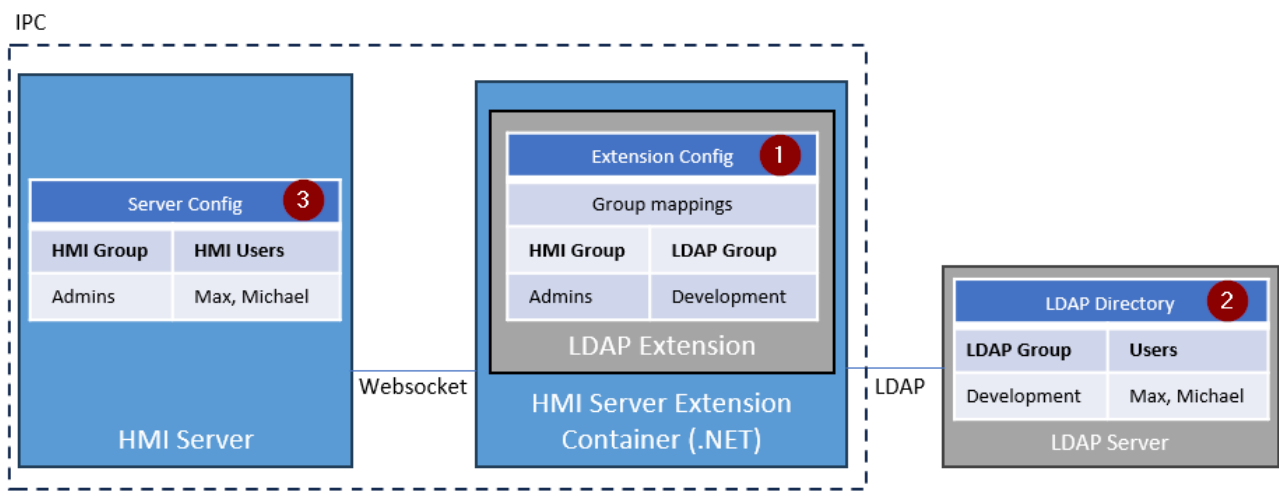
### Advantages

- **Central user management:** The TwinCAT HMI server uses the TwinCAT HMI user management extension by default, from which only a local HMI server can access. The TwinCAT HMI LDAP extension can be used by several HMI servers locally or in the network (LAN and WAN).
- **User management without HMI admin rights:** Users and groups can be managed centrally by the company's IT department. If a new employee joins or leaves the company, the rights can be adjusted without HMI engineering. It is not necessary to restart the server.
- **Access to all directory information:** In addition to the user groups, all directory information can be queried.
- **No additional license required:** The TwinCAT HMI LDAP extension is included in the TF2000 HMI server license.

### Architecture

The LDAP Server Extension runs in the .NET Extension Container (1) in an independent process and connects to the server (2) via LDAP. The HMI Server and LDAP Extension communicate as usual via Websocket (3).

Within the HMI project, authorizations cannot be configured directly with the LDAP groups. HMI groups are created and configured in the usual way. In the LDAP Extension, the HMI and LDAP groups can be connected via group mappings (1, 2). The HMI Server creates the LDAP users as HMI users at the first login (3).



## 12.7.1 System requirements

### Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	.NET Desktop Runtime 8

### Version 1.12

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	.NET Desktop Runtime 6

## 12.7.2 Quick start

To start, create or open a TwinCAT HMI project.

### Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.Ldap" via the [NuGet Package Manager](#) [► 1041].

### Configuration of the LDAP extension

1. Open the server configuration page



## 2. Go to the TcHmiLdap / General tab

**TcHmiSrv**   **ADS**   **TcHmiLdap**   TcHmiLua   TcHmiSqliteLogger

General   LDAP authentication   HMI authentication   Group mappings

☐ **Host**  
A hostname, a domain name, or an IP address.  
IPv6 is currently not supported.  
*Can be set for specific remote configuration.*

☐ **Port**  
The most common ports are 636 for TLS and 389 for unencrypted connections.  
*Can be set for specific remote configuration.*

☐ **Use TLS**  
Strongly recommended, especially when using the 'Simple' authentication mechanism.  
*Can be set for specific remote configuration.*

☐ **Trust all certificates**  
If 'false', check whether the server certificate was issued by a certificate authority trusted by the operating system.  
*Can be set for specific remote configuration.*

☐ **Base DN**  
Entry point for LDAP search requests. If empty, the domain components of the host are used.

☐ **Synchronization interval**  
In this interval, the groups of active sessions are synchronized with the LDAP server. Sessions of blocked users will be terminated.

**Accept**

**Diagnostics**

Package version: 14.2.6576, Product version: 14.3.74.0, Config version: 1.0.1.0

## 3. Define under:

**Host**, the name of the domain or the IP address of the LDAP Server.

**Port** of the LDAP service. Typically, port 389 is used for unencrypted connections and port 636 is used for encrypted connections.

**Use TLS** Activates encryption via TLS (recommended setting).

**Trust all certificates** should only be disabled for test purposes. Otherwise the server certificate will not be validated.

**Base DN** Base *Distinguished Name* (DN) specifies the entry point for the user search. E.g. use "DC=beckhoff,DC=com" if the domain is "Beckhoff.com".

**Synchronization interval** at which the groups of active sessions are synchronized. Sessions for blocked users are terminated.

4. Go to the **LDAP authentication** tab

Authentication mechanism for bind user: None

Bind user DN:

Bind user password:

Accept

Package version: 14.2.6576, Product version: 14.3.74.0, Config version: 1.0.1.0

5. Define under:

**Authentication mechanism for the bind user** in a protected environment, "Simple" can be used.

**Bind user DN** full *Distinguished Name* of the administrative user that can be used for the search.

**Bind user password** Password of the administrative user.

6. Go to the **HMI authentication** tab

**TcHmiSrv** **ADS** **TcHmiLdap** **TcHmiLua** **TcHmiSqliteLogger**

General LDAP authentication **HMI authentication** Group mappings

☐ **Authentication mechanism** Simple

The most common mechanism is 'Simple'. 'Digest-MD5' is recommended when TLS is unavailable.

☐ **User filter** (&({username\_attribute}={input}))(objectClass=person)

Used to search for the user entry. {input} is a placeholder replaced by what the user inputs in the login form. {username\_attribute} is a placeholder replaced by the configured username attribute.

☐ **Username attribute** userPrincipalName

Attribute used to identify the user.

☐ **Ignore the domain suffix during login** false

Ignore everything after the first @ in the username submitted by the user. If you are, for example, using 'userPrincipalName' on Active Directory, you need to disable this setting because the userPrincipalName contains an @.

☐ **Append the domain during login**

For example, if the 'email' or 'userPrincipalName' is used for login, this setting can be used to automatically add the domain suffix so that it does not need to be specified at login. The extension does a case-insensitive check to find out if the domain suffix is already present.

☐ **Use LDAP search for ListUsers** false

Depending on the size of the directory, the search might take too long or return too many results. If disabled, the usernames are collected from the TcHmiSrv configuration.

**Accept**

**Diagnostics**

Connection state: Not Connected

Package version: 14.2.6576, Product version: 14.3.74.0, Config version: 1.0.1.0

7. Define:

**Authentication mechanism**, use *Simple* for Quickstart.

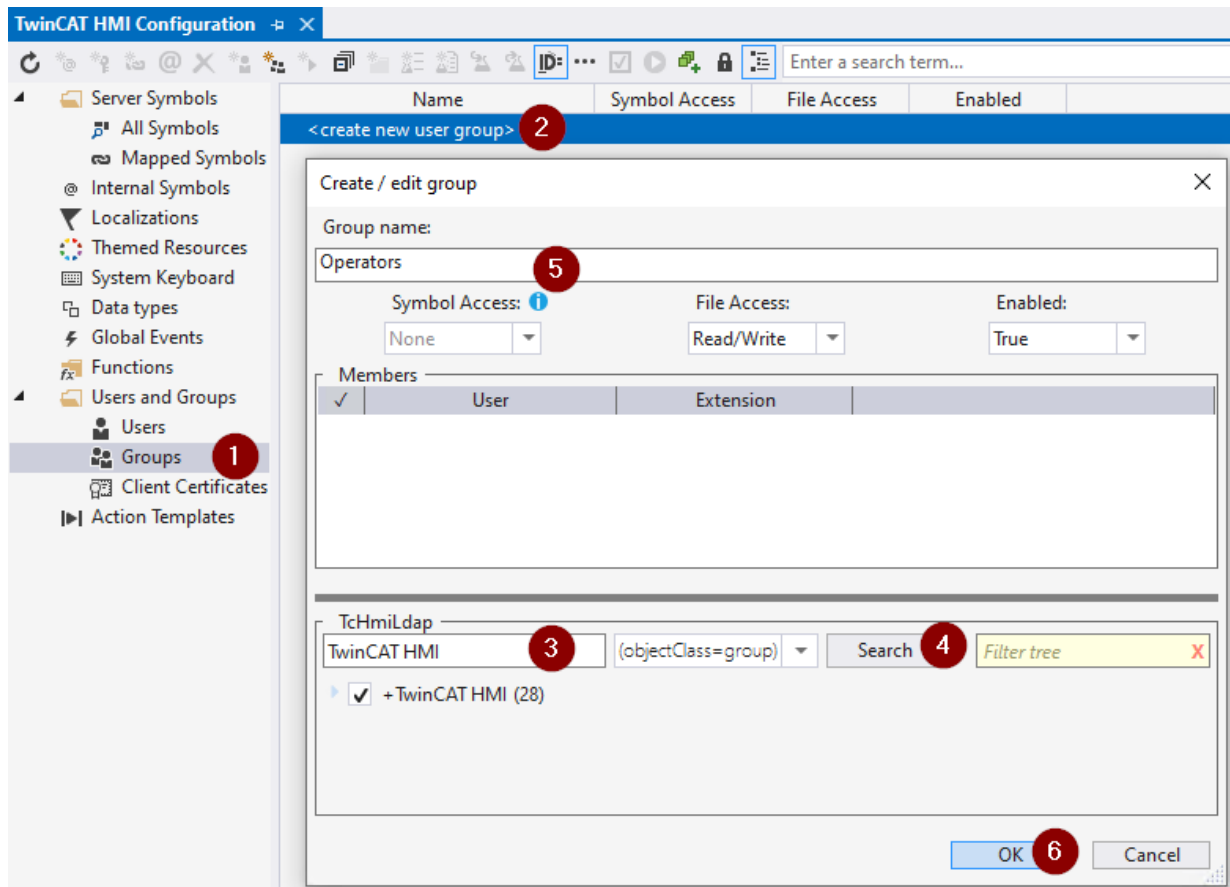
**User name attribute**, use *userPrincipleName*, this allows the user name and domain to be specified in e-mail format (e.g. user@beckhoff.com)

**Append the domain during login**, append the domain (e.g. beckhoff.com) if you only want to log in with the username.

⇒ The users and groups found in the LDAP are now available in the user management.

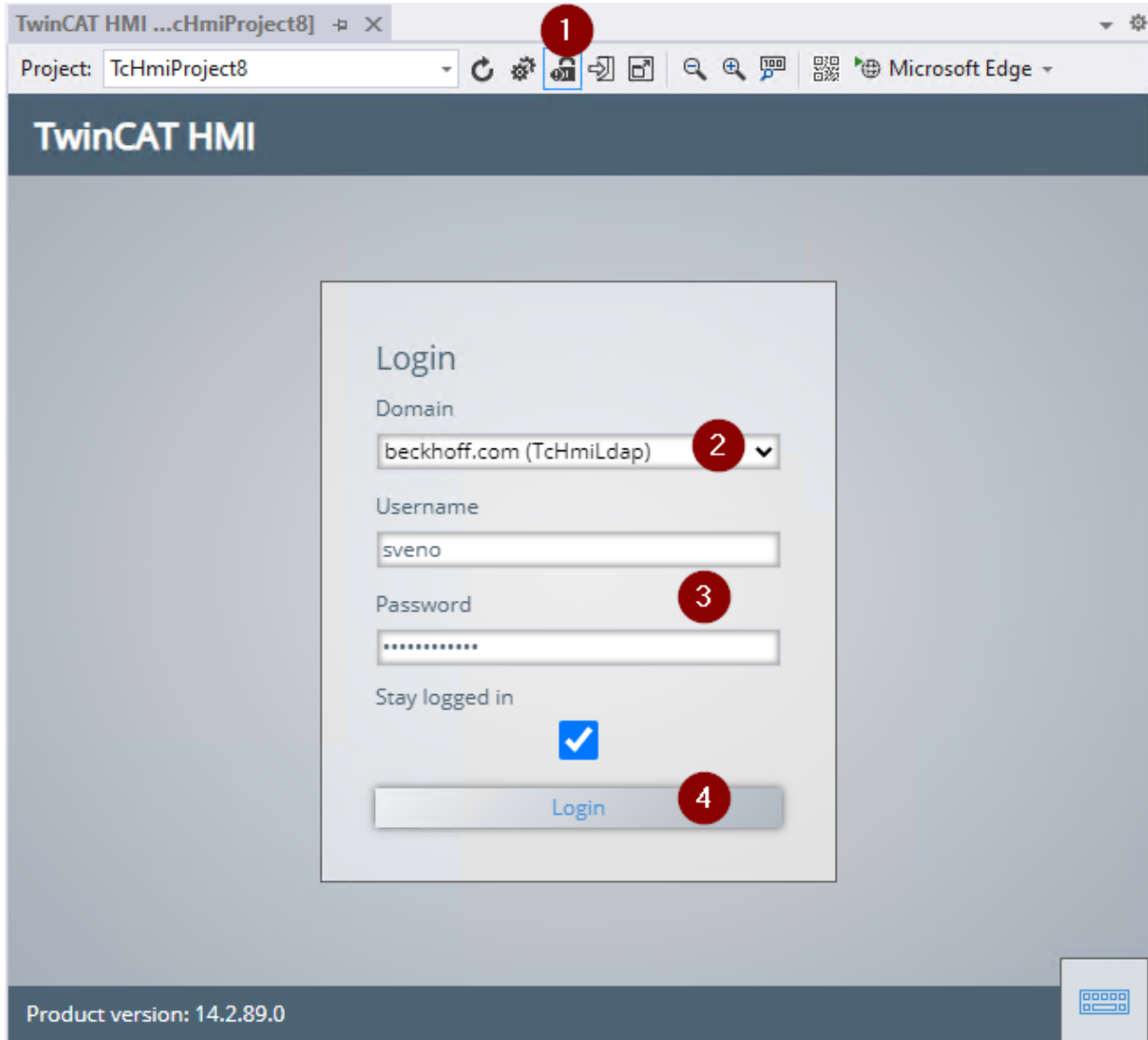
## Configuration of the user management

1. Open the **TwinCAT HMI Configuration** tool window to create a new group mapping and open the dialog to create a new group (1, 2). Search for the desired LDAP group (3, 4) and activate the checkbox. Enter the name of the new group (5) and confirm with **OK** (6).

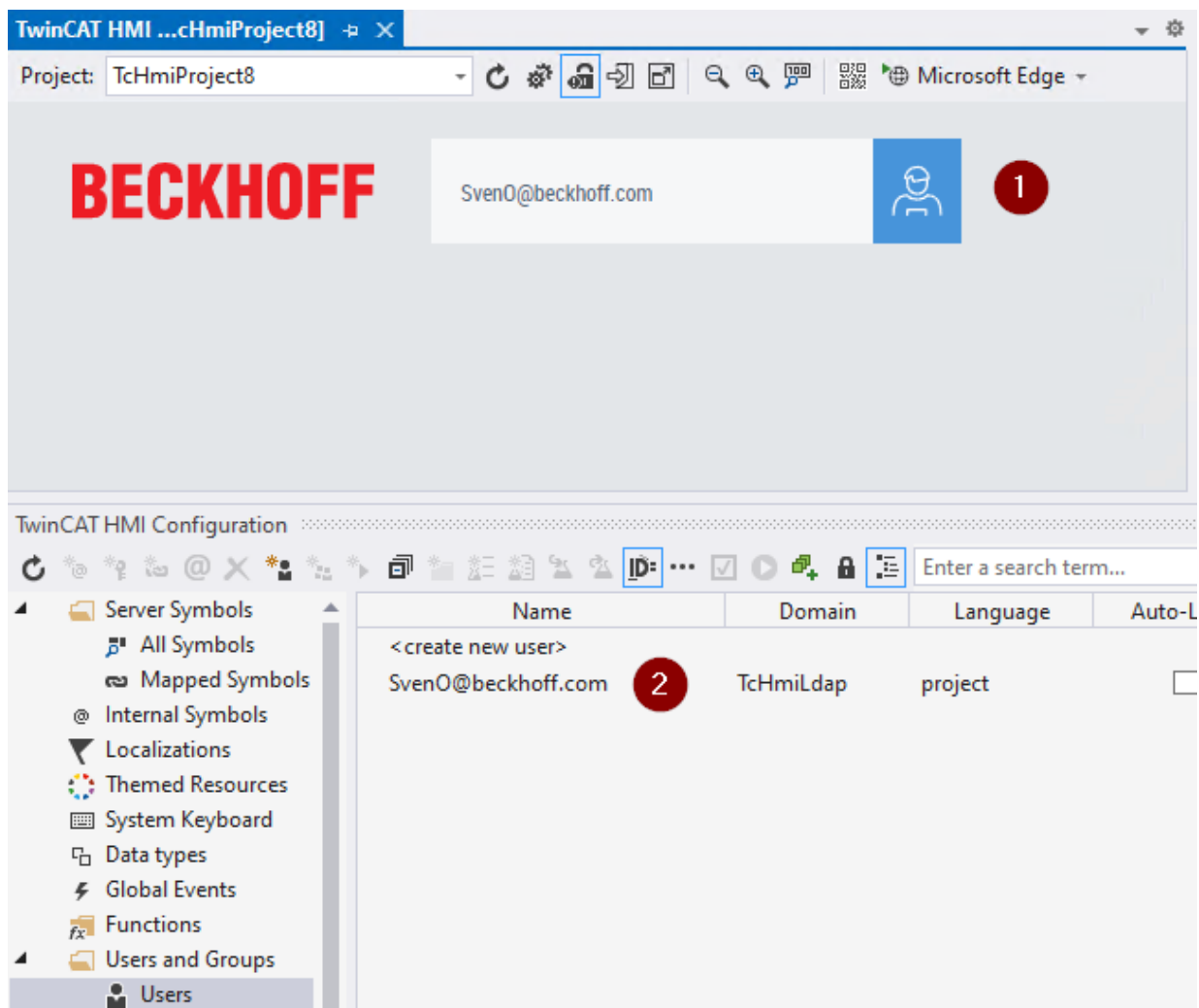


2. In the HMI project, go to the configuration page of the TwinCAT HMI Server on the **Security** tab and set the **Select user by** setting to **Textfield**. This allows the user names to be created via a text field.

3. To test, drop a UserManagement Control onto the Desktop.view, open the LiveView and activate the authentication simulation (1). Select the LDAP extension (2), use your LDAP login data (3) and log in (4).



4. The user management control shows the current user (1). When an LDAP user logs in for the first time, the appropriate HMI user is also configured (2).



⇒ The configured user is now available in the user management and can be used.

### 12.7.3 Configuration

#### General

The basic settings for the server extension are specified in the **General** tab.

TcHmiSrv
ADS
TcHmiLdap
TcHmiLua
TcHmiSqliteLogger

General
LDAP authentication
HMI authentication
Group mappings

☐ Host

A hostname, a domain name, or an IP address.  
IPv6 is currently not supported.  
*Can be set for specific remote configuration.*

☐ Port

The most common ports are 636 for TLS and 389 for unencrypted connections.  
*Can be set for specific remote configuration.*

☐ Use TLS

Strongly recommended, especially when using the 'Simple' authentication mechanism.  
*Can be set for specific remote configuration.*

false

☐ Trust all certificates

If 'false', check whether the server certificate was issued by a certificate authority trusted by the operating system.  
*Can be set for specific remote configuration.*

false

☐ Base DN

Entry point for LDAP search requests. If empty, the domain components of the host are used.

☐ Synchronization interval

In this interval, the groups of active sessions are synchronized with the LDAP server. Sessions of blocked users will be terminated.

Accept

Diagnostics

Package version: 14.2.6576, Product version: 14.3.74.0, Config version: 1.0.1.0

## Host

- The domain name or IP address of the device on which the LDAP server is running.

## Port

- Normally 389 for insecure connections and 636 for connections that use TLS.

## Use TLS

- TLS should be used: this is highly recommended, especially when using "Simple" authentication.

## Trust all certificates

- If disabled, the certificate of the LDAP Server is compared with the certificate store of the device on which the TwinCAT HMI Server is running. If enabled, the server certificate is not checked. It should only be used for test purposes. Even when self-signed certificates are used, this setting should be deactivated and the self-signed certificate should be added to the certificate store.

## Base DN

- The distinguished name of the LDAP entry in which users can be searched for. Normally this only consists of domain components, e.g. "DC=Beckhoff,DC=com". For more information, see [Distinguished Names](#).

### Synchronization interval

- The user groups and the blocking status of active users are periodically synchronized with the LDAP directory server. The group memberships are adjusted and sessions of blocked users are terminated. An interval of PT0S means that synchronization only takes place during the login process.

### Timeout (advanced settings)

- Network timeout for the connection to the LDAP server

### Follow Referrals (advanced settings)

- Specifies whether the referrals returned by the LDAP server should be followed automatically. LDAP servers can return referrals to other LDAP servers, which may contain further search results.

### Compare attribute values taking into account upper/lower case (advanced settings)

- Normally, LDAP attributes and DN's are not case-sensitive. However, there are a few cases in which it is useful to take upper/lower case into account.

## LDAP authentication

Depending on the configuration of the LDAP server, the user profiles may not be public. In these cases, it is necessary to configure an administrative user account that is used for the directory search.

The screenshot shows the 'TcHmiLdap' configuration window with the 'LDAP authentication' tab selected. The 'Authentication mechanism for bind user' is set to 'None'. Below this, there are fields for 'Bind user DN' and 'Bind user password', both currently empty. An 'Accept' button is at the bottom left. At the bottom right, there is a small icon of a keyboard. At the very bottom, a status bar displays: 'Package version: 14.2.6576, Product version: 14.3.74.0, Config version: 1.0.1.0'.

### Authentication mechanism for the bind user

- If the user profiles are completely public, you do not need a bind user and you can select "None". If the information is public, but anonymous binding is required to perform searches, you can select "Anonymous". If the user profiles are not public, you should enable TLS and use "Simple" authentication, or you can equally use the "Digest-MD5" mechanism. The "Kerberos credentials file" setting is also supported. If you select this setting, the user account that is currently logged in on the device that TwinCAT HMI Server is running on is used.

### Bind user DN



- Normally the full **Distinguished Name (DN)** of the administrative user. If the LDAP server allows direct binding with a unique name attribute, such as the "userPrincipalName", you can also use this attribute here. For more information, see [Distinguished Names](#).

### Bind user password

- The password of the administrative user.

### HMI authentication

TcHmiSrv
ADS
TcHmiLdap
TcHmiLua
TcHmiSqliteLogger

General
LDAP authentication
HMI authentication
Group mappings

☐ **Authentication mechanism**  
The most common mechanism is 'Simple'. 'Digest-MD5' is recommended when TLS is unavailable.
Simple

☐ **User filter**  
Used to search for the user entry. {input} is a placeholder replaced by what the user inputs in the login form. {username\_attribute} is a placeholder replaced by the configured username attribute.
(&({username\_attribute}={input})(objectClass=person))

☐ **Username attribute**  
Attribute used to identify the user.
userPrincipalName

☐ **Ignore the domain suffix during login**  
Ignore everything after the first @ in the username submitted by the user. If you are, for example, using 'userPrincipalName' on Active Directory, you need to disable this setting because the userPrincipalName contains an @.
false

☐ **Append the domain during login**  
For example, if the 'email' or 'userPrincipalName' is used for login, this setting can be used to automatically add the domain suffix so that it does not need to be specified at login. The extension does a case-insensitive check to find out if the domain suffix is already present.

☐ **Use LDAP search for ListUsers**  
Depending on the size of the directory, the search might take too long or return too many results. If disabled, the usernames are collected from the TcHmiSrv configuration.
false

Accept

Diagnostics

Connection state
Not Connected

Package version: 14.2.6576, Product version: 14.3.74.0, Config version: 1.0.1.0

### Authentication mechanism

- Typically, the user wants to enable TLS and use the "simple" authentication mechanism. The "Digest-MD5" mechanism prevents the simple password being sent over the network, but is based on cryptographic algorithms that are no longer considered secure.

## User filter

- The user filter is used in search queries to find the user profile based on the entries in the registration form. "{input}" is a placeholder that is replaced by the user's input in the registration form. "{username\_attribute}" is a placeholder that is replaced by the configured attribute 'username', see [format specification](#).

The recommended settings are as follows:

### Microsoft Active Directory:

```
(&({username_attribute}={input})(objectCategory=person)(objectClass=user))
```

### OpenLDAP:

```
(&({username_attribute}={input})(objectClass=person))' or '(&({username_attribute}={input})  
(objectClass=inetOrgPerson))
```

## User name attribute

- LDAP attribute that is used in the USER\_FILTER. Microsoft Active Directory servers usually use the "userPrincipalName", while OpenLDAP servers usually use the "uid" attribute. Useful documentation of the naming attributes supported by Microsoft Active Directory, see [User Naming Attributes](#).

## Ignore the domain during login

- Ignores everything after the first @ in the user name entered by the user. For example, if you use "userPrincipalName" on ActiveDirectory, you must deactivate this setting as the userPrincipalName contains an @.

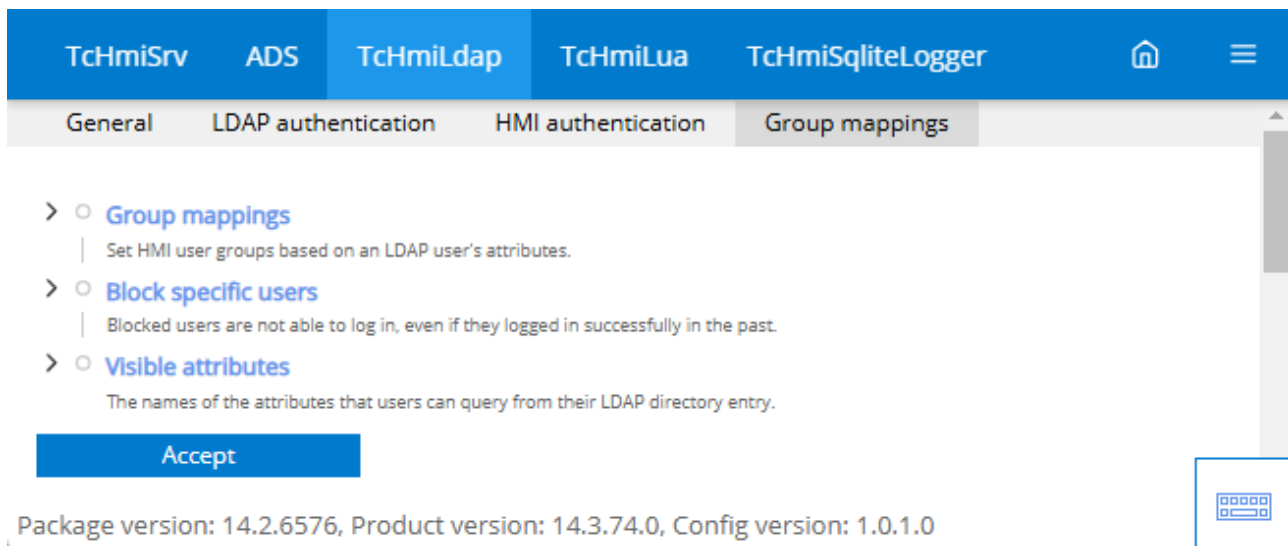
## Append the domain during login

- For example, if "email" or "userPrincipalName" is used for login, this setting can be used to automatically add the domain suffix so that it does not have to be specified during login. The extension checks the upper and lower case to determine whether the domain suffix already exists.

## Use LDAP search request for ListUsers

- Depending on the size of the directory, the search may take too long or return too many results. If this setting is deactivated, the user names from the TcHmiSrv configuration are collected. This setting should be deactivated to improve performance.

## Group mappings



## Group mappings

- The LDAP group must be assigned to a TwinCAT HMI group so that the LDAP user can log on to the HMI. By default, the SystemUser rights are granted, and these should not normally be deleted.

## Block specific users

- By default, all LDAP users can log in to the HMI and are assigned to the HMI user groups based on the groups. If you want to completely prevent authentication for certain users, you can block users based on LDAP attributes using the blacklist or whitelist.

**Visible attributes**

- The names of the LDAP attributes that users can query from the LDAP directory entry linked to their account (e.g. user picture, room, telephone number).

**Cache for automatically added user groups (Advanced settings)**

- This cache is required to be able to correctly remove user groups that are configured based on group mappings.

**12.7.3.1 Group mappings**

Establish the connection between the HMI user group and the LDAP user using attributes.

The screenshot shows the 'TcHmiLdap' configuration window with the 'Group mappings' tab selected. The window has a blue header with tabs for 'TcHmiSrv', 'ADS', 'TcHmiLdap', 'TcHmiLua', and 'TcHmiSqliteLogger'. Below the header are sub-tabs: 'General', 'LDAP authentication', 'HMI authentication', and 'Group mappings'. The 'Group mappings' section is expanded, showing a list of mappings. One mapping is visible with the following fields: 'LDAP attribute name' (empty), 'LDAP attribute value' (empty), and 'Map to HMI group' (set to '\_SystemUsers'). There is a '+ Add' button and a red 'X' icon. Below the mappings section are sections for 'Block specific users' and 'Visible attributes'. At the bottom, there is an 'Accept' button and a status bar showing 'Package version: 14.2.6576, Product version: 14.3.74.0, Config version: 1.0.1.0'.

**LDAP attribute name**

- Name of the LDAP attribute

**LDAP attribute value**

- Value of the attribute.

**HMI user group**

- Name of the HMI group.

**12.7.3.2 Block specific users**

Specify which user groups are blocked.

TcHmiSrv ADS **TcHmiLdap** TcHmiLua TcHmiSqliteLogger

General LDAP authentication HMI authentication **Group mappings**

> ○ **Group mappings**  
Set HMI user groups based on an LDAP user's attributes.

▼ ○ **Block specific users**  
Blocked users are not able to log in, even if they logged in successfully in the past.

○ **Use whitelisting** false ▼  
If false, blacklisting is used.

○ **Whitelist accounts affected by group mappings** false ▼  
Treat every group mapping as whitelist entry.

▼ ○ **List**  
+ Add

> ○ **Visible attributes**  
The names of the attributes that users can query from their LDAP directory entry.

**Accept**

Package version: 14.2.6576, Product version: 14.3.74.0, Config version: 1.0.1.0

### Use whitelisting

- If disabled, blacklisting is used.

### Add accounts affected by group mappings to the whitelist

- Each group mapping is treated as a whitelist entry.

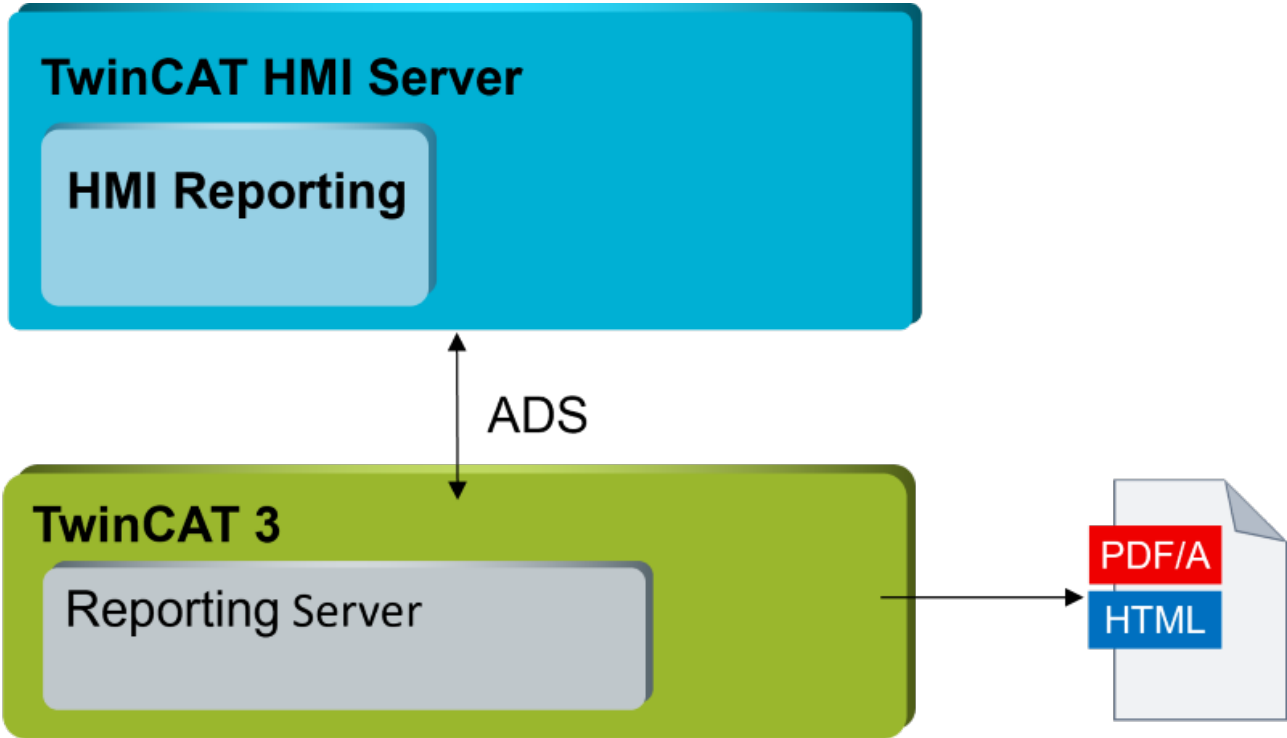
## 12.8 Reporting

The Reporting Extension is an extension for creating report documents.

### Application scenario

Report documents can later be used for batch tracking, quality management or further processing, for example. It is possible to create these documents as HTML or PDF/A.

Architecture



The extension is available with the NuGet package Beckhoff.TwinCAT.HMI.AuditTrail >= 22.0.0. The package can be installed via TcPkg (TwinCAT.HMI.AuditTrail) or nuget.org.



The Reporting Extension requires the TwinCAT.XAR.ReportingServer, which must be installed using TcPkg.

12.8.1 System requirements

Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	TwinCAT.XAR.ReportingServer .NET Desktop Runtime 8

12.8.2 Licensing

The TwinCAT Reporting Server is licensed via the TF2000 license, no additional license is required.

12.8.3 Quick start

To start, create or open a TwinCAT HMI project.

Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.Reporting" via the [NuGet Package Manager](#) [► 1041].

The TwinCAT Reporting Server (TwinCAT.XAR.ReportingServer) is required to use the Reporting Extension. Install this using TcPkg if it is not available.

### Configuring the Reporting Extension

1. Open the configuration page of the Reporting Extension in Visual Studio or separately in the browser.
  2. Go to the **Reporting** tab.
- ⇒ You can configure the Reporting Extension here.

The basic configuration of the report is carried out in the General area.

### Creating a new runtime:

1. Adjust the connection of the existing runtime or create a new one.
  2. Connect this to a TwinCAT Reporting Server via the AMS Net Id of the target system. If it is an external TwinCAT Reporting Server, pay attention to the router configuration.
  3. Create a new configuration.
  4. Enter the desired name.
- ⇒ You have now created a basic configuration for the Reporting Server.

### Creating a new report:

1. Create a new report.
  2. Enter the desired name and connect the report with an associated runtime and configuration.
  3. Create a new entry under **Text fields**.
  4. Enter a name and the symbol to be read.
- ⇒ This provides you with a basic configuration for creating a report. You can add elements such as tables, text fields or HTML containers to the report at any time.



To create a report, at least one text field, table or HTML element must be included in the report.



The PDF is created directly after the HTML page has been created. Anything delayed will result in an incorrect display.

Example: If CSS animations are present in the background, they may not have been completed when the PDF is created. This results in an image being created at some point during the animation that does not correspond to the final result. This behavior can be found, for example, in the integration of charting libraries with animation.

---

### Creating a report file (HTML, PDF, JSON)

You have the option of creating a report in the User-defined configuration area.

1. Under Reports, select the runtime of the TwinCAT Report Server on which you want to create the report.
  2. Under Report generation, select the report to be created.
  3. Click on the **Create** button in the **Report generation** group.
- ⇒ The report is generated and displayed as an HTML file under **Last report**, if this has been configured. If no "Export path" is set, you will find the files on the Reporting Server system at *C:\Program Files (x86)\Beckhoff\TwinCAT\Functions\Reporting-Server\Reports*.

## 12.8.4 Configuration

### General

The basic settings for the server extension are specified in the General tab.

TcHmiSrv
ADS
TcHmiLua
**TcHmiReporting**
TcHmiSqliteLogger

General
Custom config

☐ Signature certificate

Select a file

Signature certificates can be created with Adobe Acrobat. Instruction:  
<https://helpx.adobe.com/acrobat/using/digital-ids.html>

☐ Signature key

☒ Runtimes

☐ Chunk size ⓘ

Size of chunk packet when downloading a report.

☒ Reports

☐ Overwrite reports

Only one report exists at a time. The old one is overwritten when a new one is generated.

☐ Export path

Path to generated reports. Default: Extension directory

☐ Timeout of report generation

Specifies the longest duration to wait for the report to be generated.

Accept

Package version: 14.2.6571, Product version: 14.3.72.0, Config version: 1.0.1.8

### Signature certificate

- Add a signature to the report as a PDF. [Add a digital signature \[► 1248\]](#).

### Signature key

- Signature key for the signature certificate.

### Runtimes [► 1245]

- Connection to the TwinCAT Reporting Server with a basic configuration for the report frame.

### Chunk size

- Size of a chunk package when downloading a report.

### Reports [► 1255]

- Content of the report to be created.

### Overwrite reports

- Only one report exists at a time. The old file is overwritten when a new one is created.

### Export path

- Path to the generated reports. Standard: Extension directory (TcHmiReporting\reports). If a path is entered here, the created files are stored at the specified location. If the path does not yet exist, it is created during the creation process.

### Report generation timeout

- Specifies the maximum waiting time until the report is generated.

### Removing the remote file (extended view)

- Specifies whether the data saved in reporting is deleted after copying. If this option is false, the reports are saved in the Reporting folder and in the Server folder. This results in higher memory consumption.

### User-defined configuration

In the User-defined configuration tab, you can create a report or upload a CSS file.

TcHmiSrv ADS TcHmiLua TcHmiReporting TcHmiSqliteLogger

General Custom config

## Reports

Select runtime local

### Upload CSS/JavaScript file

Choose File No file chosen Upload

### Report generation

Beckhoff Create

Download report

### Last report

Beckhoff

**BECKHOFF**

Package version: 14.2.6571, Product version: 14.3.72.0, Config version: 1.0.1.8

### Reports

- Selection of the runtime on which a report is to be created.

### Upload CSS / JavaScript

- Upload a user-defined CSS / JavaScript file for integration into the report file.

### Report generation

- Selection of the report to be created. The created report can then be downloaded.

### Reports in progress (only if generation is active)



- Displays all reports requested at the moment in a list. Once a creation process has been completed, the GUID disappears again. As soon as there are no more entries, this grouping is hidden.

**Last report**

- Displays the last HTML file created (if activated). The HTML file is taken from the path (TcHmiReporting\reports) if no other path has been specified under Export path. If no HTML file is available, you will see the error message that no file was found. If the path is not found, this is also displayed as an error message. When a report is created for the first time, it is created.

**12.8.4.1 Runtimes**

Establish the connection to a TwinCAT Reporting Server.

Name (Local)

Establishes a connection to a Reporting Server with the corresponding AMS Net Id.

---



If it is a Remote Reporting Server, pay attention to the ADS route configuration of the two systems.

---

TcHmiSrv
ADS
TcHmiLua
**TcHmiReporting**
TcHmiSqliteLogger

Runtimes

- local
  - AmsNetId
  - Configurations
    - Beckhoff
      - Header
Headline of the report
      - Style sheets
      - Script files
      - Default data
      - Data configurations
Can be used to sort and individualize the data that is sent dynamically from the Reporting Clients.
        - Store type
      - Footer
        - Logo
      - Publish locations
      - Signature configuration
Signing reports is only available if the reporting server has the full license (no trial license).
      - Handwritten signature settings
      - Digital signature settings

+ Add

Chunk size

Size of chunk packet when downloading a report.

Reports

Package version: 14.2.6571, Product version: 14.3.72.0, Config version: 1.0.1.8

## Configuration

The configuration is a basic layout of the report file. Various things such as header, logo or similar can be predefined here.

### Header

- Add a heading to the report.

### Stylesheets [\[▶ 1247\]](#)

- Add CSS files to your report. These can be used to customize the style of the report. Pay attention to the implementation order here.

### Script files [\[▶ 1248\]](#)

- Add JavaScript files to your report. These can be used to integrate your own lines of code or third-party libraries. These can be libraries for creating graphics, for example.

**Standard data**

- Create a table with fixed data that is displayed in every report.

**Data configurations (extended view)**

- Adjustments to individual keys from the later report can be configured here. These can be settings such as a sorted order.

**Memory type (extended view)**

- Configuration of the buffer during the creation process.

**Footer**

- The footer of the report can be customized here.

**Logo**

- Under Logo, customer-specific logos can be inserted into the reporting form.

**Storage locations**

- Specify what the generated report is to be used for. A distinction is made between e-mail and file publish.

**Signature configuration**

- Add your own signature to the report. Signing reports is only possible if the Reporting Server has a full license (no trial license).

**Settings for handwritten signatures**

- Add an image of the required handwritten signature.

**Settings for digital signature**

- Add a digital signature to your report.

**Placeholder**

Placeholders can be set within the configuration.

{date}	Current date
{time}	Current time of day
{page}	Current page number
{total-pages}	Current number of all pages
{html-title}	Not implemented
{pdf-title}	Not implemented
{url}	Not implemented

**12.8.4.1.1 Stylesheets**

By adding CSS files, you can integrate your own styles or 3rd party libraries. These are useful if the style of the document is to be adapted centrally or a third-party library is to be used. These files can be uploaded via the TcHmi server. The server stores the files at "TwinCAT:XAR.ReportingServer". The files stored here provide the corresponding functions. Pay attention to the order in which the files are initialized.

**Add a CSS file.**

1. Open the server configuration page.
2. Go to the configuration of **TcHmiReporting**.  
⇒ The **General** tab opens.
3. Open the path. If not available, create the path *Runtimes/{RuntimeName}/Configurations/{ConfigurationName}/Stylesheets*.

4. Click on **Add** to enter a new CSS file and enter the following values:  
**File name:** Name of the CSS file  
**Sort order:** Initialization order of the CSS files  
 ⇒ The Reporting Extension of the HMI integrates the CSS file.
5. Now add the CSS file to the Reporting Server.
6. Switch to the **User-defined configuration** tab.
7. You can upload the CSS file under **Upload CSS/JavaScript file**.  
 ⇒ The file is automatically copied to the folder "C:\Program Files (x86)\Beckhoff\TwinCAT\Functions\Reporting-Server\Configuration\ReportStyleSheets".  
 ⇒ The CSS file has been successfully added.

#### 12.8.4.1.2 Script files

By adding JavaScript files, you can integrate your own libraries or third-party libraries. These are useful if functions are required repeatedly or sophisticated code such as for charts is to be integrated. These files can be uploaded via the TcHmi server. The server stores the files at "TwinCAT:XAR.ReportingServer". The files stored here provide the corresponding functions. Pay attention to the order in which the files are initialized.

##### Adding a JavaScript file.

1. Open the server configuration page.
2. Go to the configuration of **TcHmiReporting**.  
 ⇒ The **General** tab opens.
3. Open the path. If not available, create the path *Runtimes/{RuntimeName}/Configurations/{ConfigurationName}/Script files*.
4. Click on **Add** to enter a new JS file and enter the following values:  
**File name:** Name of the JS file  
**Sort order:** Initialization order of the JS files  
**Parent tag:** Embedding of the files in the HTML object (body or head)  
 ⇒ The Reporting Extension of the HMI integrates the JS file.
5. Now add the JS file to the Reporting Server.
6. Switch to the **User-defined configuration** tab.
7. The JS file can be uploaded under **Upload CSS/JavaScript file**.  
 ⇒ The file is automatically copied to the folder C:\Program Files (x86)\Beckhoff\TwinCAT\Functions\Reporting-Server\Configuration\ReportScripts.  
 ⇒ The JS file was successfully added.

#### 12.8.4.1.3 Adding a digital signature

Adding a digital signature to your PDF.

##### Creating a signature in Adobe Reader.

1. Create a signature for the PDF in Adobe Reader:  
 ⇒ By default, the Adobe Reader certificate is stored under C:\Users\<user>\AppData\Roaming\Adobe\Acrobat\DC\Security.

##### Server Extension configuration.

1. Open the configuration page.
2. Go to the configuration of **TcHmiReporting**.
3. Add the original certificate to the Reporting extension under **Signature certificate**.
4. Enter the password selected for the certificate as the **signature key**.  
 ⇒ The certificate was successfully added to the Reporting Server.

5. Open the path. If not available, create the path Runtimes/{RuntimeName}/Configurations/{Configuration name}/**Signature configuration**.
6. Enter a name for the signature configuration.
7. Activate **Use digital signature**.
  - ⇒ The signature is now integrated.
8. Open the path. If not available, create the path Runtimes/{RuntimeName}/Configurations/{Configuration name}/**Settings for digital signature**.
9. Click Add to create a new configuration and enter the following values:
  - Signature name:** Name of the configuration (must be identical to the name of the signature configuration)
  - Contact:** Contact person
  - Location:** Location of creation
  - Reason:** Reason for creation

- ⇒ The configuration of the signature is now complete. The signature is now added to the PDF when it is generated.

The screenshot shows the Beckhoff configuration interface with the 'TcHmiReporting' tab selected. The 'Custom config' section is active, and the 'Signature configuration' is expanded. The 'Signature certificate' and 'Signature key' fields are empty. The 'Runtimes' section is expanded, showing the 'local' runtime. The 'Configurations' section is expanded, showing the 'Beckhoff' configuration. The 'Header', 'Style sheets', 'Script files', 'Default data', and 'Data configurations' are expanded. The 'Store type' is set to 'Ram'. The 'Footer' section is expanded, showing the 'Logo' field. The 'Publish locations' section is expanded. The 'Signature configuration' section is expanded, showing the 'Name' field set to 'Signature', 'Use digital signature' set to 'true', and 'Use handwritten signature' set to 'false'. The 'Handwritten signature settings' section is expanded. The 'Digital signature settings' section is expanded, showing the '0' configuration. The 'Signature name' field is set to 'Signature', 'Contact' is set to 'Beckhoff', 'Location' is set to 'Verl', and 'Reason' is set to 'Hello'. The 'Package version' is 14.3.6856, 'Product version' is 14.3.187.0, and 'Config version' is 1.0.1.11.

General Custom config

Signature certificate [Select a file](#) ✕  
Signature certificates can be created with Adobe Acrobat. Instruction: <https://helpx.adobe.com/acrobat/using/digital-ids.html>

Signature key

✕ Runtimes

✕ local

✕ AmsNetId   
ADS route

✕ Configurations

✕ Beckhoff

> Header  
Headline of the report

> Style sheets

> Script files

> Default data

> Data configurations  
Can be used to sort and individualize the data that is sent dynamically from the Reporting Clients.

Store type

> Footer

Logo [Select a file](#)

> Publish locations

✕ Signature configuration  
Signing reports is only available if the reporting server has the full license (no trial license).

Name

Use digital signature

Use handwritten signature

> Handwritten signature settings

✕ Digital signature settings

✕ 0

Signature name

Contact

Location

Reason

+ Add

+ Add

+ Add

Package version: 14.3.6856, Product version: 14.3.187.0, Config version: 1.0.1.11

10. Switch to the User-defined configuration tab.

11. Create a new report.

12. Open the newly created PDF file with Acrobat Reader.

⇒ A banner indicating the signature contained will appear at the top.



Adding a digital signature is only possible with a full license of the Reporting Server. This is integrated in the TF2000 TwinCAT HMI Server license.

---

#### 12.8.4.1.4 Add handwritten signature

##### Server Extension configuration.

1. Open the configuration page.
2. Go to the configuration of **TcHmiReporting**.
3. Open the path. If not available, create the path Runtimes/{RuntimeName}/Configurations/{ConfigurationName}/**Signature configuration**.
4. Enter a name for the signature configuration.
5. Enable **Use handwritten signature**
  - ⇒ The signature is now integrated.
6. Open the path. If not available, create the path Runtimes/{RuntimeName}/Configurations/{ConfigurationName}/**Settings for handwritten signatures**.
7. Click on Add to create a new configuration and enter the following values:
  - Signature name**: Name of the configuration (must be identical to the name of the signature configuration)
  - Owner**: Name of the person to whom the signature belongs
  - Location**: Location of the creation
  - Height**: Height of the image
  - Width**: Width of the image
  - Align bottom**: Distance to the bottom edge
  - Align left**: Distance to the left edge
  - Signature image**: Image file of the signature.

- ⇒ The configuration of the signature is now complete. The signature is now added to the PDF when it is generated.

The screenshot displays the Beckhoff TcHmiReporting configuration window. The top navigation bar includes tabs for TcHmiSrv, ADS, TcHmiLua, TcHmiReporting (selected), and TcHmiSqliteLogger. Below the navigation bar, the 'General' tab is active, showing the 'Custom config' section. The configuration is organized into a tree view on the left, with the following structure:

- Signature certificate
  - Select a file (button)
- Signature key
  - Text input field containing a single dot (.)
- Runtimes
  - local
    - AmsNetId
      - ADS route
        - 127.0.0.1.1.1
    - Configurations
      - Beckhoff
        - Header
          - Headline of the report
        - Style sheets
        - Script files
        - Default data
        - Data configurations
          - Can be used to sort and individualize the data that is sent dynamically from the Reporting Clients.
        - Store type
          - Ram
        - Footer
          - Logo
            - Select a file (button)
        - Publish locations
        - Signature configuration
          - Signing reports is only available if the reporting server has the full license (no trial license).
          - Name
            - Signature
          - Use digital signature
            - false
          - Use handwritten signature
            - true
        - Handwritten signature settings
          - 0
            - Signature name
              - Signature
            - Owner
              - Beckhoff
            - Date format
              -
            - Location
              - Verl
            - Height
              - 100
            - Width
              - 60
            - Bottom align
              - 20
            - Left align
              - 25
            - Signature image
              - Select a file (button)

At the bottom of the configuration tree, there is a '+ Add' button and a 'Digital signature settings' section.

Package version: 14.3.6856, Product version: 14.3.187.0, Config version: 1.0.1.11



8. Switch to the User-defined configuration tab.
  9. Create a new report.
  10. Open the newly created PDF file with Acrobat Reader.
- ⇒ A banner indicating the signature contained will appear at the top.

#### 12.8.4.1.5 Send e-mail

The Reporting Server can send the created report by e-mail.

##### Configuration of the Reporting Server.

1. Open the EmailConfiguration.json in *C:\Program Files (x86)\Beckhoff\TwinCAT\Functions\Reporting-Server\Configuration\EmailConfiguration*
  2. Configure an SMTP server and the Http proxy if required in your network.
  3. Save the new configuration.
  4. Restart the Reporting Server.  
(PowerShell: "Restart-Service -Name TcReportingServer")
- ⇒ The Reporting Server can now communicate with your e-mail server via SMTP.

##### Server Extension configuration.

1. Open the configuration page.
2. Go to the configuration of **TcHmiReporting**.
3. Open the path. If not available, create the path *Runtimes/{RuntimeName}/Configurations/{ConfigurationName}/Locations/E-Mail*.
4. Click Add to create a new configuration and enter the following values:  
**Address:** Specify the email addresses of the recipients.  
**Use BCC:** Specify whether the recipients defined in Address should be entered as BCC.  
**Text:** Specify the email text.  
**Format:** Specify the format in which the generated files are to be attached to the email.

⇒ The configuration is now complete.

TcHmiSrv

ADS

TcHmiLua

**TcHmiReporting**

TcHmiSqliteLogger

⚙️

🏠

☰

GeneralCustom config

Signature certificate

Select a file

Signature certificates can be created with Adobe Acrobat. Instruction:  
<https://helpx.adobe.com/acrobat/using/digital-ids.html>

Signature key

Runtimes

local

AmsNetId

127.0.0.1.1.1

ADS route

Configurations

Beckhoff

Header

Headline of the report

Style sheets

Script files

Default data

Data configurations

Can be used to sort and individualize the data that is sent dynamically from the Reporting Clients.

Store type

Ram

Footer

Logo

Select a file

Publish locations

E-Mail

0

Address

Provides the ability to send the report to multiple email addresses.

E.Diekmeier@beckhoff.com

+ Add

Use BCC

true

Provides the option to set the email addresses in BCC.

Text

Hello World!

Provides the option to specify a specific email text. This text replaces the default email text.

Format

PDF

PDF

+ Add

+ Add

File

Signature configuration

Signing reports is only available if the reporting server has the full license (no trial license).

Package version: 14.3.6856, Product version: 14.3.187.0, Config version: 1.0.1.11

5. Switch to the User-defined configuration tab.
  6. Create a new report.
- ⇒ The report with the corresponding attachments should now have been sent by email to the addresses entered.

### 12.8.4.2 Reports

Create the content for a report.

The screenshot displays the Beckhoff TcHmiReporting configuration window. The 'Custom config' tab is active, showing various settings. The 'Reports' section is expanded, revealing the 'Beckhoff' report configuration. Within this report, the 'Runtime' is set to 'local' and the 'Configuration name' is 'Beckhoff'. Other settings include 'Chunk size' at 1048576, 'Overwrite reports' set to 'true', and a 'Timeout of report generation' of 'PT1M'. An 'Accept' button is located at the bottom left of the configuration area. The status bar at the bottom indicates the package, product, and config versions.

#### Name (Report)

- Provides a structure for configuring the report content.

#### Runtime [▶ 1245]

- Connection to a runtime for the creation process.

**Configuration name**

- Connection to a report frame.

**Tables** [► 1256]

- Creates a table based on the data of a symbol. The corresponding columns must be entered for this purpose. Only then will they be displayed.

**Text fields** [► 1259]

- Creates an entry in the report based on a symbol.

**HTML container** [► 1261]

- Adds an HTML object to the report.

**Special feature of text fields and table columns**

The Value option is available in text fields and table columns. In the Value dialog, you can create your own implementations of HTML in connection with JavaScript and CSS. The uploaded JavaScript and CSS files can also be used for this purpose.

The value is located in the table column under the Values item.

The placeholder {value} can be used to integrate the value of the external symbol directly.

{value}	Value of the symbol
---------	---------------------



There must be no spaces between the curly bracket and "value".

**Sample:**

```
<p class="users"></p>
<script>
  let usersElement = document.querySelector('.users');
  let value = {value};
  usersElement ? usersElement.innerHTML = JSON.stringify(value) : console.warn("HTML object not found");
</script>
<style>
  .users {
    color: green;
  }
</style>
```

**12.8.4.2.1 Tables**

An array from a structure can be quickly visualized using a table. Columns and rows are created according to the configuration.

**Adding a table.**

1. Open the server configuration page.
2. Go to the configuration of **TcHmiReporting**.
  - ⇒ The **General** tab opens.
3. Open the path. If not available, create the path *Reports/{Reportname}/Tables*.
4. Click on **Add** to create a new table and enter the following values:
  - Name:** Name of the table (taken as default if no title is active).
  - Symbol:** Symbol from which the data is read.
  - Filter** [► 1258] (optional): Filter on specific values.
  - Limit** [► 1258] (optional): Maximum number of data to be displayed (number of rows).
  - Sort by** [► 1258] (optional): Specifies a sort order within the table.
  - Title** (optional): Heading of the table.

- ⇒ The table is created but does not yet show any values.
- 5. Open the path *Reports/{report name}/Tables/{table name}/columns*.
- 6. Click on **Add** to create a new **column** and enter the following values:
  - Name:** Name of the column (If this name corresponds to the variable name, it is automatically displayed. Taken as default if no title is active.)
  - Column order** (optional): Specifies the order in which the columns are arranged.
  - Title** (optional): Name of the column that is displayed in the header.
- ⇒ The table is now configured appropriately and displays the values of the configured symbol.

### Use of HTML/JavaScript/CSS in a column

It is possible to execute HTML/JavaScript/CSS within a column. This may be necessary, for example, to round values.

1. Go to the configuration of the column.
2. Open the subitem **Values**.
3. Click **Add** to create a new entry and enter the following values:
  - Name:** Name of the function
  - Value** (optional): Editor for adding HTML code
- ⇒ If a filter is required, it can be found and edited as a subitem.
- ⇒ You can now execute the desired code under Value.



If an array consists of a data type, such as a string, no column can be assigned. If you still want it to be displayed, you must proceed as described under **Using HTML/JavaScript/CSS in a column**. Here, however, it is sufficient to simply enter the placeholder **{value}**. The value is overwritten with the current value.

### Sample HTML code (value rounded to 2 decimal places)

In the first step, the element in which the JavaScript code is executed is retrieved. This is required to write the result in the appropriate place. The placeholder is integrated with **{value}**. As a direct allocation is not necessarily possible here, the entire value of the series is shown. Find the corresponding value and process it. In the sample, the code block at the end is overwritten by the result of the function.

```
<script>
  var scriptTag = document.getElementsByTagName('script');
  var parent = scriptTag[scriptTag.length - 1].parentNode;

  var valueFull = {value};
  parent.innerHTML = valueFull.nValue.toFixed(2);
</script>
```

## PlcTable

Time	Id	Name	Value
2025-01-07T06:17:15.689Z	0	Hello World 0	0.00
2025-01-07T06:17:15.689Z	1	Hello World 1	1.35
2025-01-07T06:17:15.689Z	2	Hello World 2	2.70
2025-01-07T06:17:15.689Z	3	Hello World 3	4.05
2025-01-07T06:17:15.689Z	4	Hello World 4	5.40
2025-01-07T06:17:15.689Z	5	Hello World 5	6.75
2025-01-07T06:17:15.689Z	6	Hello World 6	8.10
2025-01-07T06:17:15.689Z	7	Hello World 7	9.45
2025-01-07T06:17:15.690Z	8	Hello World 8	10.80
2025-01-07T06:17:15.690Z	9	Hello World 9	12.15
2025-01-07T06:17:15.690Z	10	Hello World 10	13.50

### 12.8.4.2.1.1 Options

Use of optional functions.

#### Symbol bound options

##### Filter:

The values can be filtered accordingly using the filter option. This may be necessary if only certain areas are to be displayed in a separate report.

Sample:

In connection with the "TcHmiAuditTrail.GetAuditTrail" symbol, all values from the AuditTrail database are displayed. If a value is to be displayed from a certain timestamp, the filter would look as follows.

```
"timestamp" >= "2025-04-17T10:45:34.4209685Z"
```

If this filter is to be extended by a specific value, it would look as follows.

```
"timestamp" >= "2025-04-17T10:45:34.4209685Z"&&"newValue" == "53"
```

##### Limit:

To limit the number of entries to a fixed value, a value can be entered here. The value 5 would mean that a maximum of five entries are transferred. Depending on the sort order and filter, the first entries are taken.

##### Sort by:

The entries in the symbol can be sorted using the sort function.

Sample:

In connection with the "TcHmiAuditTrail.GetAuditTrail" symbol, all values from the AuditTrail database are displayed. To sort the newValue in descending order, the configuration would look like this.

```
newValue DESC
```

If the sorting is to be extended by a value, such as the id in ascending order, this would look as follows.

```
newValue DESC, id ASC
```

### 12.8.4.2.2 Text fields

A text field can be used to display a single value. However, structures can also be displayed. These are usually inappropriately formatted and require appropriate formatting via HTML/JavaScript/CSS.

#### Adding a text field

1. Open the server configuration page.
2. Go to the configuration of **TcHmiReporting**.
  - ⇒ The **General** tab opens.
3. Open the path or (if not available) create the path *Reports/{report name}/text fields*
4. Click **Add** to create a new text field and enter the following values:
  - Name:** Name of the text field (taken as default if no title is active).
  - Symbol:** Symbol from which the data is read.
  - Filter** [► 1261] (optional): Filter on specific values.
  - Limit** [► 1261] (optional): Maximum number of data to be displayed (number of rows).
  - Sort by** [► 1261] (optional): Specifies a sort order within the table.
  - Title** (optional): Heading of the text field.
  - Value** (optional): Editor for adding HTML code (without an entry, the value from the symbol is displayed).
  - ⇒ The value is read from the symbol and displayed.

#### Sample HTML code (add text to symbol value)

In the first step, the element in which the JavaScript code is executed is retrieved. This is required to write the result in the appropriate place. The placeholder is integrated with **{value}**. In this case, it is a string, which is why it is in quotation marks. In the sample, the code block at the end is overwritten by the result of the function.

```
<script>
  var scriptTag = document.getElementsByTagName('script');
  var parent = scriptTag[scriptTag.length - 1].parentNode;

  var valueFull = "{value}";
  parent.innerHTML = valueFull + " Hello World!";
</script>
```

## Project Name with JS

### Reporting sample project Hello World!

#### Sample HTML code (temperature monitoring)

The required HTML objects are embedded directly in this sample. Styles are used to format the appearance accordingly. In the Script area, JavaScript is used to search for the required HTML objects in the first step. The current value is then evaluated. The JavaScript switches the color of the integrated SVG and the value is output to two decimal places with a unit.

The value read out here is an LREAL from the PLC.

```
<style>
  .temperature {
    width: 100%;
    height: 100%;
    display: flex;
  }
  .temperature-image {
    height: 80px;
    width: 80px;
  }
  .temperature-text {
```

```

        display: flex;
        align-items: center;
    }
    .temperature-text-value {
        width: 200px;
        font-size: larger;
        font-weight: bold;
        margin: 0;
        color: lightslategrey;
    }
    .temperature-red {
        --tchmi-icons-color: #EF0000;
    }
    .temperature-orange {
        --tchmi-icons-color: #FFA500;
    }
    .temperature-green {
        --tchmi-icons-color: #009940;
    }
}
</style>
<div class="temperature">
    <div class="temperature-image">
        <svg class="temperature-svg" width="100%" height="100%" viewBox="0 0 80 80" version="1.1"
            xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
            <g stroke="none" stroke-width="1" fill="none" fill-rule="evenodd">
                <g transform="translate(30, 18)" fill="var(--tchmi-icons-color, #4c6374)">
                    <path
                        d="M9.4008,-0.0004 C12.1738,-0.0004 14.4298,2.2556 14.4298,5.0286 L14.4298,5
.5766 L17.5298,5.5766 C17.8058,5.5766 18.0298,5.8006 18.0298,6.0766 C18.0298,6.3526 17.8058,6.5766 1
7.5298,6.5766 L14.4298,6.5766 L14.4298,10.1696 L17.5298,10.1696 C17.8058,10.1696 18.0298,10.3936 18.
0298,10.6696 C18.0298,10.9456 17.8058,11.1696 17.5298,11.1696 L14.4298,11.1696 L14.4298,14.7626 L17.
5298,14.7626 C17.8058,14.7626 18.0298,14.9866 18.0298,15.2626 C18.0298,15.5386 17.8058,15.7626 17.52
98,15.7626 L14.4298,15.7626 L14.4298,19.3556 L17.5298,19.3556 C17.8058,19.3556 18.0298,19.5796 18.02
98,19.8556 C18.0298,20.1316 17.8058,20.3556 17.5298,20.3556 L14.4298,20.3556 L14.4298,23.9486 L17.52
98,23.9486 C17.8058,23.9486 18.0298,24.1726 18.0298,24.4486 C18.0298,24.7246 17.8058,24.9486 17.5298
,24.9486 L14.4298,24.9486 L14.4298,28.1376 C16.3348,29.3776 17.7058,31.2466 18.3188,33.4556 C18.9848
,35.8576 18.6758,38.3746 17.4488,40.5436 C15.7958,43.4656 12.6808,45.2806 9.3208,45.2806 C7.7198,45.
2806 6.1338,44.8616 4.7338,44.0696 C0.2568,41.5366 -1.3252,35.8326 1.2078,31.3546 C1.9738,30.0016 3.
0608,28.8666 4.3718,28.0446 L4.3718,5.0286 C4.3718,2.2556 6.6278,-0.0004 9.4008,-0.0004 Z M9.4008,1.
9996 C7.7308,1.9996 6.3718,3.3586 6.3718,5.0286 L6.3718,28.6186 C6.3718,28.9856 6.1708,29.3236 5.846
8,29.4986 C4.6308,30.1546 3.6288,31.1376 2.9488,32.3396 C0.9588,35.8576 2.2008,40.3386 5.7188,42.328
6 C6.8188,42.9516 8.0648,43.2806 9.3208,43.2806 C11.9618,43.2806 14.4088,41.8546 15.7078,39.5586 C16
.6718,37.8546 16.9148,35.8776 16.3918,33.9906 C15.8688,32.1036 14.6418,30.5336 12.9378,29.5696 C12.6
238,29.3916 12.4298,29.0596 12.4298,28.6996 L12.4298,5.0286 C12.4298,3.3586 11.0718,1.9996 9.4008,1.
9996 Z M9.3282,14.2621 C9.8802,14.2621 10.3282,14.7101 10.3282,15.2621 L10.3282,32.8361 C11.6172,33.
2601 12.5572,34.4611 12.5572,35.8901 C12.5572,37.6711 11.1082,39.1191 9.3282,39.1191 C7.5482,39.1191
6.0992,37.6711 6.0992,35.8901 C6.0992,34.4611 7.0392,33.2601 8.3282,32.8361 L8.3282,15.2621 C8.3282
,14.7101 8.7762,14.2621 9.3282,14.2621 Z M9.3282,34.6611 C8.6502,34.6611 8.0992,35.2131 8.0992,35.89
01 C8.0992,36.5681 8.6502,37.1191 9.3282,37.1191 C10.0062,37.1191 10.5572,36.5681 10.5572,35.8901 C1
0.5572,35.2131 10.0062,34.6611 9.3282,34.6611 Z" />
                </g>
            </g>
        </svg>
    </div>
    <div class="temperature-text">
        <p class="temperature-text-value">
        </p>
    </div>
</div>
<script>
    var elementTextValue = document.getElementsByClassName("temperature-text-value");
    var elementSvg = document.getElementsByClassName("temperature-svg");

    var value = {value};
    if (elementSvg && value) {
        elementSvg[0].classList.toggle("temperature-green", value < 10);
        elementSvg[0].classList.toggle("temperature-orange", value >= 10 && value < 30);
        elementSvg[0].classList.toggle("temperature-red", value >= 30);
    }
    if (elementTextValue && value) {
        elementTextValue[0].innerHTML = value.toFixed(2) + " °C";
    }
}
</script>

```



## Temperature with HTML



28.06 °C

### 12.8.4.2.2.1 Options

Use of optional functions.

#### Symbol bound options

##### Filter:

The values can be filtered accordingly using the filter option. This may be necessary if only certain areas are to be displayed in a separate report.

Sample:

In connection with the "TcHmiAuditTrail.GetAuditTrail" symbol, all values from the AuditTrail database are displayed. If a value is to be displayed from a certain timestamp, the filter would look as follows.

```
"timestamp" >= "2025-04-17T10:45:34.4209685Z"
```

If this filter is to be extended by a specific value, it would look as follows.

```
"timestamp" >= "2025-04-17T10:45:34.4209685Z"&&"newValue" == "53"
```

##### Limit:

To limit the number of entries to a fixed value, a value can be entered here. The value 5 would mean that a maximum of five entries are transferred. Depending on the sort order and filter, the first entries are taken.

##### Sort by:

The entries in the symbol can be sorted using the sort function.

Sample:

In connection with the "TcHmiAuditTrail.GetAuditTrail" symbol, all values from the AuditTrail database are displayed. To sort the newValue in descending order, the configuration would look like this.

```
newValue DESC
```

If the sorting is to be extended by a value, such as the id in ascending order, this would look as follows.

```
newValue DESC, id ASC
```

### 12.8.4.2.3 HTML container

HTML elements can be inserted using an HTML container. These can also be extended with JavaScript and CSS. No access to symbols is available here.

#### Adding an HTML container

1. Open the server configuration page.
2. Go to the configuration of **TcHmiReporting**.
  - ⇒ The **General** tab opens.
3. Open the path or, if not available, create the path *Reports/{Reportname}/HTML-Container*.

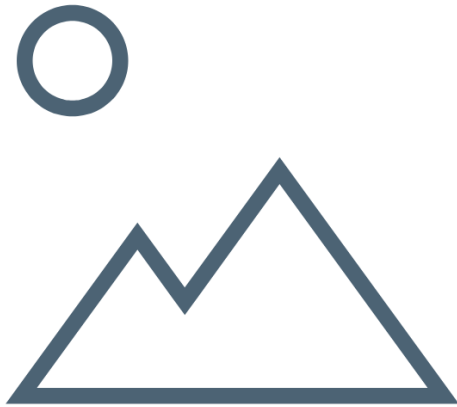
4. Click on **Add** to create a new text field and enter the following values:
    - Name:** Name of the HTML container (taken as default if no title is active)
    - HTML:** HTML code for execution
    - Class name** (optional): Class name for easy selection via CSS
    - Title** (optional): Heading of the text field
- ⇒ The code stored in HTML is displayed.

#### Sample HTML code (embedding an SVG image)

The code entered here is transferred directly to the HTML object and displayed.

```
<svg xmlns="http://www.w3.org/2000/svg" viewBox="0 0 80 80" width="100%" height="100%">
  <g fill="var(--tchmi-icons-color, #4c6374)">
    <path d="M49.48,39.4,68.08,65H19L31.63,47.62l4.33,6,1.62,2.23,1.62-2.23L49.48,39.4m0-3.4L37.
57,52.41-5.94-8.18L15.08,67H72L49.48,36Z"/>
    <path d="M23.47,18.88a5,5,0,1,1-5,5,5,5,0,0,1,5-5m0-2a7,7,0,1,0,7,7,7,7,0,0,0-7-7Z"/>
  </g>
</svg>
```

SVG



#### 12.8.4.3 Creating a report

You have two options for creating a report, one via the configuration page and the other via a symbol.

## Creating a report via the configuration page

**Reports**

Select runtime: local

**Upload CSS/JavaScript file**

Choose File No file chosen Upload

**Report generation**

Beckhoff Create

Download report

**Last report**

Beckhoff

BECKHOFF

Package version: 14.2.6571, Product version: 14.3.72.0, Config version: 1.0.1.8

1. Open the server configuration page.
  2. Go to the configuration of **TcHmiReporting**.
  3. Select the **User-defined configuration** area.
  4. Select your report in the **Report generation** grouping.
  5. Click on **Create** to generate the report.
- ⇒ The report is located in the path you have defined or in the default path. (*Projekt Server Pfad / TcHmiReporting/reports*)

## Creating a report via a symbol

Write the **TcHmiReporting.OrderReport** symbol with the name of the report you want to create. You receive feedback from the server about the new request and which requests are currently being processed via a Callback function. If an error occurs, it will be returned to you.

```
TcHmi.Symbol.writeEx('%sTcHmiReporting.OrderReport%s%', 'Beckhoff', function (data) {
    if (data.error === TcHmi.Errors.NONE) {
        let requestGuid = data.value.currentGuid;
```

```
        let reportsInProgress = data.value.inProgress;
    } else {
        // Handle error...
    }
});
```

## 12.9 Scope

The TwinCAT Scope extension enables connection to a TwinCAT Scope Server. For this purpose, an existing Scope project (.tcsopex file) can be integrated into the TwinCAT HMI. The visualization in the client takes place in [Scope Control](#) [► 1093]. The configuration of the charts (e.g. linking with the PLC variables, configuration of the axes, etc.) is done in the Scope project itself.

### 12.9.1 System requirements

#### Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11
Additional software required	.NET Framework 4.8

#### Version 1.12

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11
Additional software required	.NET Framework 4.7.2

### 12.9.2 Licensing

The Scope Extension for the HMI is licensed via the TF2300 or TE1300 license. One of the licenses is required to enable the Scope server in the background.

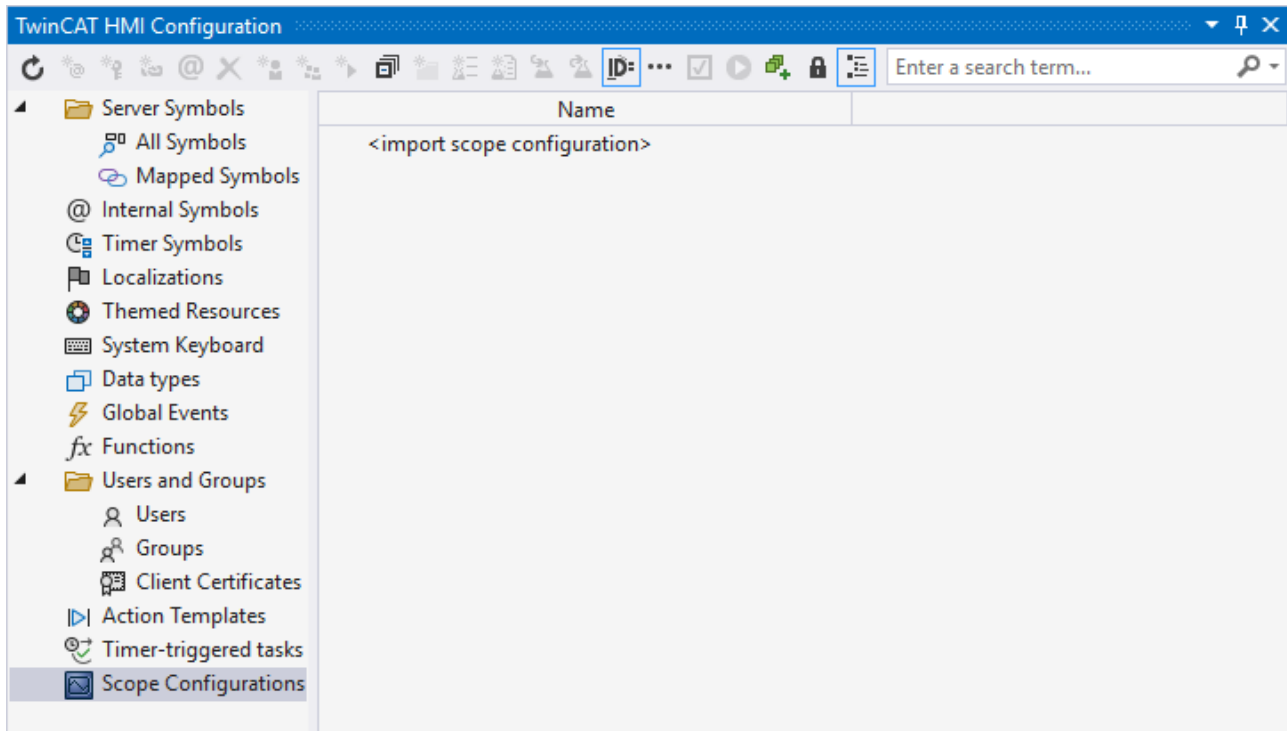
### 12.9.3 Quick start

To start, create or open a TwinCAT HMI project.

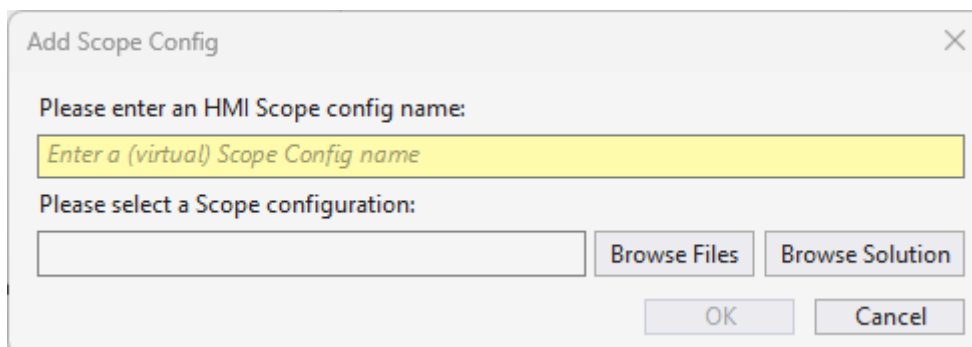
#### Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.Scope" via the [NuGet Package Manager](#) [► 1041]. In addition, the "Beckhoff.TwinCAT.HMI.ScopeControl" package must be installed in order to display the data.

## Adding a symbol in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
2. Go to the **Scope Configurations** tab.
3. Add a new configuration by right-clicking or double-clicking on **<import scope configuration>**.  
⇒ A pop-up opens for further settings.



4. Define under:
  - Name** the name of the configuration to be created.
  - Scope Configuration** the scope project to be used.
 ⇒ Your configuration is now used by the extension to read the data from the Scope Server. The Scope Control [► 1093] can be used for display.

## Adding a symbol via the server configuration page

1. Open the server configuration page.

- Go to the **TcHmiScope** tab.

- Go to **Scope configuration**.
  - ⇒ All currently configured alarm symbols are displayed here.
- Click **Add**.
  - ⇒ A pop-up opens for further settings.

- Define under:
    - Name**, the name of the corresponding setting.
    - File**, the scope project to be used.
    - Start recording automatically**, whether the recording of the scope starts immediately.
- ⇒ The configuration you have created is now used by the extension to read the data from the Scope Server. The [Scope Control](#) [► 1093] can be used for display.

## 12.9.4 Configuration

### General

The basic settings for the server extension are specified in the **General** tab.

Configuration window for TcHmiScope. The window displays the following settings:

- Chunk size**: 1048576 (Size of chunk packet when downloading a record.)
- Compression**: true (Defines whether to compress when downloading a record.)
- Timeout**: PT5S (Default timeout for requests.)
- Scope configurations**: Scope configurations. (+ Add)

Accept

Package version: 14.2.6601, Product version: 14.3.79.0, Config version: 1.0.1.1

### Chunk size

- Size of a chunk package when downloading a recording.

### Compression

- Defines whether a recording should be compressed when it is downloaded.

### Timeout

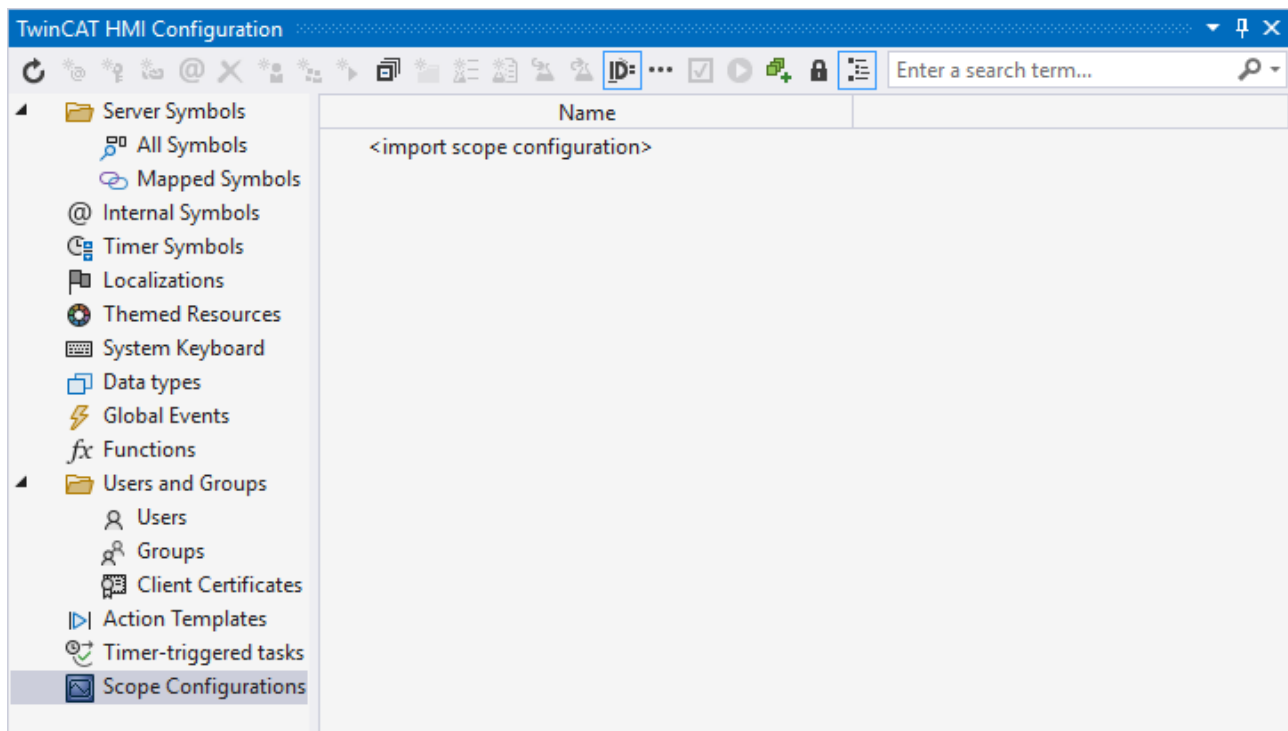
- Specifies how long an attempt is made to establish a connection or a read request is performed before a timeout occurs.

### Scope configuration

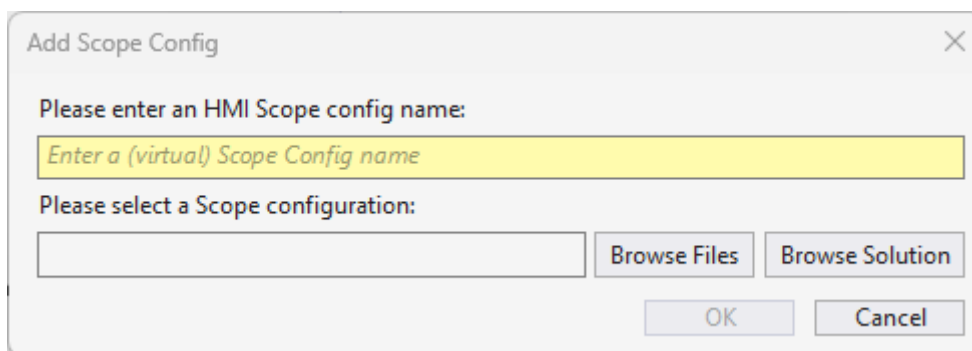
- Specifies the scope project that is to be read via the extension. A finished scope project is integrated here.

### 12.9.4.1 Add scope

#### Adding a symbol in Visual Studio / TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
2. Go to the **Scope Configurations** tab.
3. Add a new configuration by right-clicking or double-clicking on **<import scope configuration>**.  
⇒ A pop-up opens for further settings.



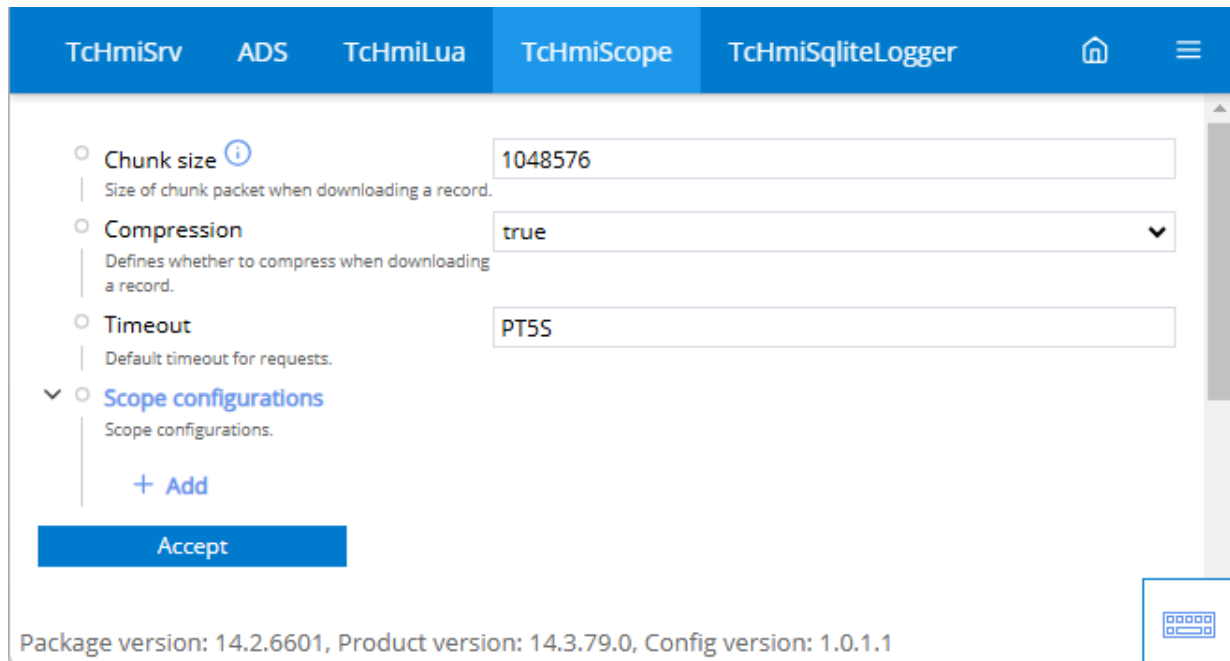
4. Define under:
    - Name** the name of the configuration to be created.
    - Scope Configuration** the scope project to be used.
- ⇒ Your configuration is now used by the extension to read the data from the Scope Server. The Scope Control [► 1093] can be used for display.

#### Adding a symbol via the server configuration page

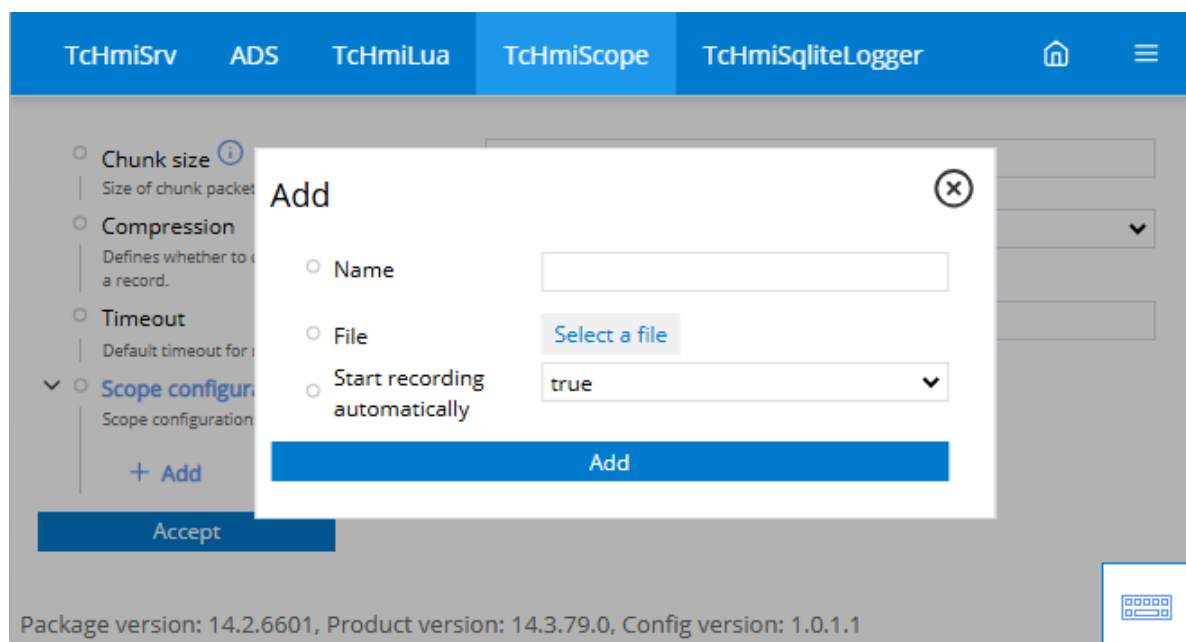
1. Open the server configuration page.



- Go to the **TcHmiScope** tab.



- Go to **Scope configuration**.  
⇒ All currently configured alarm symbols are displayed here.
- Click **Add**.  
⇒ A pop-up opens for further settings.

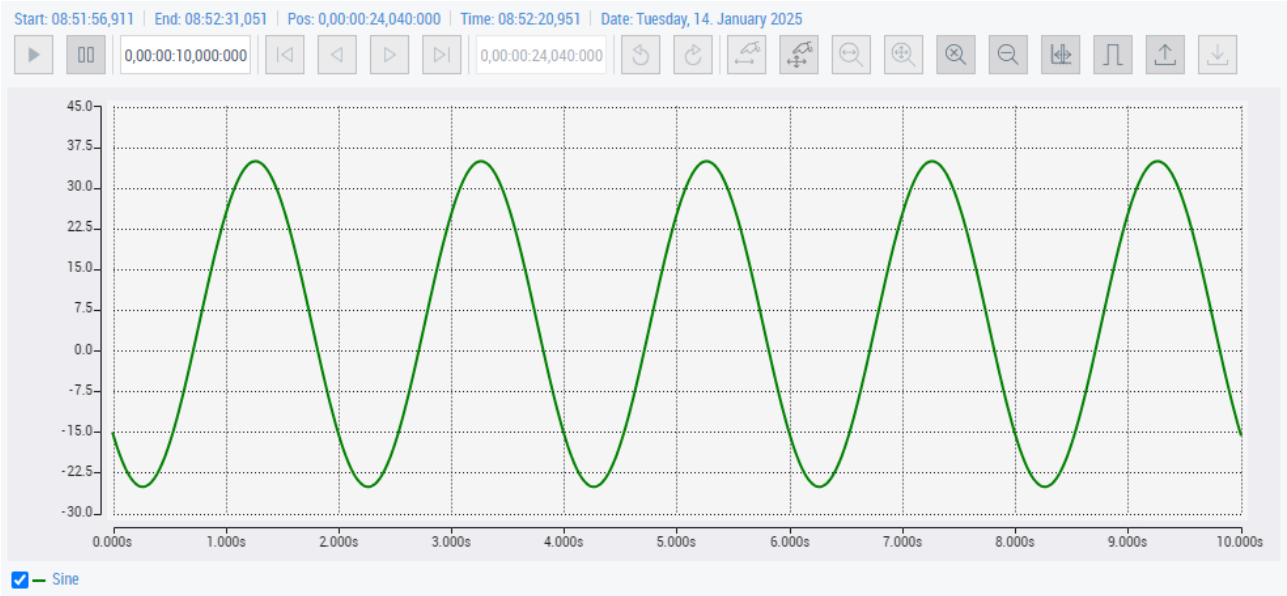


- Define under:
  - Name**, the name of the corresponding setting.
  - File**, the scope project to be used.
  - Start recording automatically**, whether the recording of the scope starts immediately.
 ⇒ The configuration you have created is now used by the extension to read the data from the Scope Server. The [Scope Control](#) [► 1093] can be used for display.

## 12.9.5 Controls

The following controls are available for the Scope Extension.

Scope **[▶ 1093]**



- The Scope Control is used to display the TwinCAT Scope in the HMI.

12.10 Speech

The TwinCAT Speech Extension offers a connection to TwinCAT Speech systems. This allows a TwinCAT HMI client/browser to be used as an audio input and output device.

The extension is now responsible for the exchange of data between TwinCAT Speech and the browser. Therefore, nothing needs to be configured on the extension itself.

**i** Available since version 1.12.744.0

12.10.1 System requirements

Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	.NET Desktop Runtime 8

Version 1.12

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	.NET Desktop Runtime 6

12.10.2 Quick start

To start, create or open a TwinCAT HMI project.

## Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.Speech" via the [NuGet Package Manager](#) [► 1041].

## Establishing a connection

The server must be announced first in TwinCAT Speech (see [Documentation of TwinCAT Speech](#)).

## Basic configuration

By default, no Speech connection is established. For this purpose, a connection must be actively started by a TypeScript/JavaScript API call.

```
TcHmi.TcSpeech.openConnection({
    enableMicrophone: true,
    enableSpeaker: true
});
```

Further possible parameters of the call with the respective default value are:

`defaultVolume: 1` This is the volume of the sound output when loading the application. This can be set from 0 to 1.

`domain: 'TcHmiSpeech'` Domain name under which the Speech Extension is reachable.

`confidenceThreshold: 0.2` Each recognition event has a probability that the recognized text corresponds to the specified entry. This threshold value specifies the value from which this is treated as a genuine event. If, for example, 0.9 is specified here, an HMI event is only triggered in the case of a very precise match. (see also the [Documentation from Microsoft](#))

## Use of recognized events in the project

Recognized texts call events in the Speech system. These are transferred to the browser and can be used there in the same way as control events (such as `myButton.onClick`). The **Recognition Tag** from the [SRGS file](#) is taken here as the name.

It can thus be used as an event in the [Actions and Conditions Editor](#) [► 61] in the HMI. The name is entered in the Custom area for this purpose. If, for example, `SpeechOnCommand<SET_ENGLISH>` is entered here, then an action is started on recognition of the Recognition Tag `SET_ENGLISH`.

Use via [CodeBehind](#) [► 1473] is also possible. Sample code with TypeScript:

```
TcHmi.EventProvider.register('SpeechOnCommand<SET_ENGLISH>', (e, data:
TcHmi.TcSpeech.IEventCallbackParameter) => {
    // Will output:
    // 'The user said a text which triggered the recognition tag: SET_ENGLISH'
    console.log('The user said a text which triggered the recognition tag: ' + data.Command);
    if (data.Confidence > 0.9) {
        console.log('The speech recognition was pretty sure about that.');
```

## 12.10.3 Configuration

### General

There are no parameters for the Speech Extension on the server configuration page. Set the connection in the Speech configuration. (see [documentation of TwinCAT Speech](#)).

# 12.11 System Engineering

System Engineering is an extension to support the setup of a machine. The extension automatically generates the mappings in the HMI server using variables marked with attributes in the PLC. The associated control automatically generates corresponding input buttons from the mappings.

Machine

Show all

No changes.

Import symbols

Export symbols

Config runtime: Runtime1

Update PLC symbols

Machine

Infeed Container

Infeed Food

Inspection

Labeling

Unwinding

Outfeed

Sealing

Symbolname	Value	Prepared Value	
Type in anything you want to find.			
<b>Machine name</b> Runtime1:PLC1:MAIN:fbMachine:sMachineName Enter the name from the machine	Test	Click here to edit.	<div>Apply</div> <div>History</div>
<b>Machine version</b> Runtime1:PLC1:MAIN:fbMachine:sMachineVersion Enter the version from the machine	1.0.0.1	Click here to edit.	<div>Apply</div> <div>History</div>

## Application scenario

The extension provides support when setting up a machine.

- Machine parameters: parameter settings of a machine. All parameters are persisted in the extension and automatically written to the PLC when the extension is started.

## Sample using a standard machine

With a standard machine, there are certain parameters that must be set for each machine individually during commissioning. These can be displayed via the machine parameters in the user interface, for example. In this case, the parameters are persisted in the extension and written to the PLC when the TwinCAT 3 HMI server is started. This allows for quick and easy commissioning or maintenance of the individual areas of the machine.



The extension is available with the NuGet package Beckhoff.TwinCAT.HMI.SystemEngineering >= 22.0.0. The package can be installed via TcPkg (TwinCAT.HMI.SystemEngineering) or nuget.org.



The control is available with the NuGet package Beckhoff.TwinCAT.HMI.SystemEngineeringUtils >= 14.3.0. The package can be installed via TcPkg (TwinCAT.HMI.SystemEngineeringUtils) or nuget.org.

## 12.11.1 System requirements

### Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11 TwinCAT BSD
Additional software required	-

## 12.11.2 Licensing

The System Engineering itself does not require any licenses. In the event that value changes are recorded, System Engineering uses the [Audit Trail \[► 1175\]](#). Accordingly, an [Audit Trail license \[► 1175\]](#) is required here with the corresponding number of symbols.

## 12.11.3 Quick start

### Creating a PLC project

1. Create a new PLC project in VS or TcXaeShell.
2. Add a new PLC project.
3. Create a new variable in the MAIN function block.
4. Create a new function block for the machine.
5. Declare the following variables including attributes in the main and machine function block.

```
PROGRAM MAIN
VAR
    {attribute 'TcHmiSystemEng.Parameter.Name' := 'Machine'}
    _fbMachine          : FB_Machine;
END_VAR

FUNCTION_BLOCK FB_Machine
VAR
    {attribute 'TcHmiSystemEng.Parameter.Name' := 'Machine name'}
    {attribute 'TcHmiSystemEng.Parameter.Info' := 'Define the name of the machine'}
    _machineName        : STRING;
END_VAR
```

6. Activate your PLC project.
- ⇒ You have completed the configuration of the PLC so far.

### Creating a new HMI project

1. Create a new TwinCAT HMI project
  2. [Install \[► 1041\]](#) the following NuGet packages **Beckhoff.TwinCAT.HMI.SystemEngineering** and **Beckhoff.TwinCAT.HMI.SystemEngineeringUtils**.  
⇒ If the packages are not available, install the corresponding TcPkg packages to obtain the NuGet packages (**TwinCAT.HMI.SystemEngineering** and **TwinCAT.HMI.SystemEngineeringUtils**).
  3. Add the **Parameters and Functions** control to the corresponding View or Content. (The default configuration of the control accesses the default configuration of the extension directly).
- ⇒ You have now completed the configuration of the HMI project.

### Configuring the ADS extension

1. Open the **Server configuration page**.
  2. Select the [ADS \[► 1109\]](#) tab.
  3. Establish a connection to the PLC created in advance.
- ⇒ You have now established an ADS connection to the PLC.

## Configuring the SystemEngineering extension

The screenshot displays the Beckhoff System Configuration tool interface. The top navigation bar includes tabs for TcHmiSrv, ADS, TcHmiAuditTrail, TcHmiEcDiagnostics, TcHmiLua, TcHmiMdp, and TcHmiSystemEngineering. The 'TcHmiSystemEngineering' tab is selected.

**Left Pane (Configuration):**

- Runtimes:** Can be set for specific remote configuration.
  - Runtime1:**
    - Enabled:** true
    - ADS runtime:** PLC1
    - Automatic symbol update:** false
 

Automatically checks the plc for changes and maps the symbols. Mapping of the symbols may take some time. Therefore, for smaller changes on the plc that does not effect the TcHmiSystemEng.\* it is recommended to set this to false
    - Enable audit trail:** true
 

Uses AuditTrail to historize symbols.
    - Entry path:** MAIN
    - Symbol for initialization status:** MAIN::bHmilsinitialized

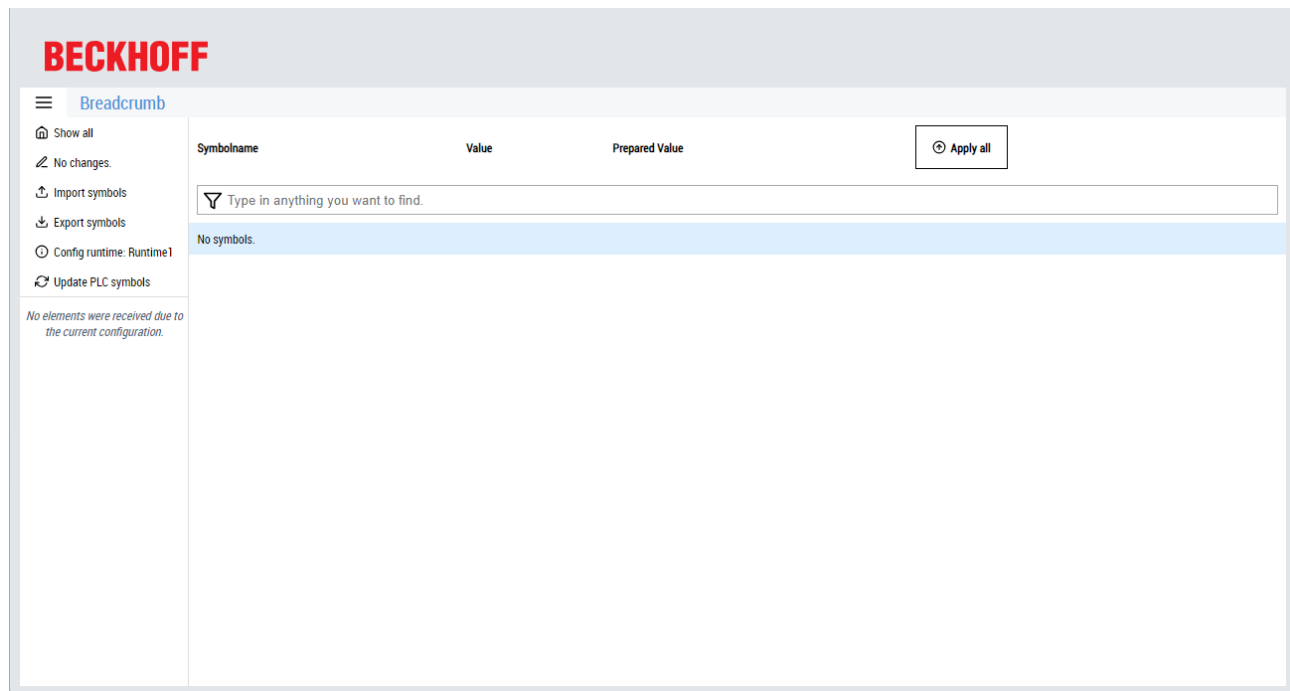
**Right Pane (Diagnostics):**

- Runtime1:**
  - ADS runtime:**
    - Connection state: Good
    - System service ADS state: Run
    - ADS state: Run
    - Device name: TwinCAT System
    - Project name: SystemEngineering\_PLC
    - TwinCAT version: 3.1.4026
    - Symbol update description: Runtime successfully initialized.

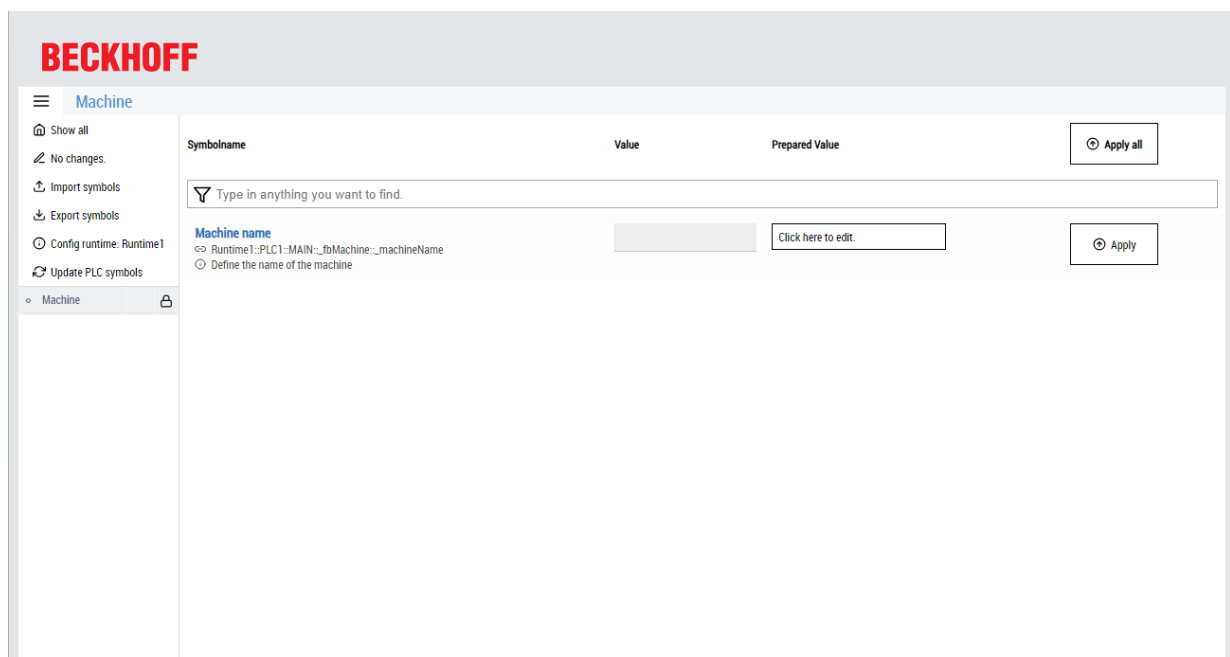
At the bottom left, the package version is 22.0.6424, product version is 14.2.105.0, and config version is 1.0.0.0. A small Beckhoff logo is visible at the bottom right.

1. Open the **Server configuration page**.
2. Select the **TcHmiSystemEngineering** tab.
3. Click on **Runtimes**
  - ⇒ You will receive an overview of the runtimes created. The default is **Runtime1**. The name of this matches the default value of the control.
4. Under **ADS runtime**, set the connection to your PLC that you have created in the ADS extension. (Default: PLC1)
5. Enter the value **MAIN** as the entry path.
6. Now activate the runtime by setting the value to **TRUE**.
  - ⇒ As a result of the configuration, the extension now has access to the data within the PLC.

## Show result



1. Start the **LiveView**
  2. Click on **Update PLC symbols** to start the automatic search.
- ⇒ Once the search process is complete, the structure defined in the PLC is displayed.



## 12.11.4 Functionalities

System Engineering consists of several functionalities. In the first step, only the machine parameters are available.

### Navigation attributes

To create a navigation, the corresponding FBs must be provided with attributes. The substructure is only searched for further attributes if they are available. This is necessary, for example, to find symbols for the machine parameters.

Attributes	Description
'TcHmiSystemEng.Parameter.Name'	Name of the variable or node. If other variables are in use below this variable, this name is used as the navigation name in the TreeView. If the variable is not resolved further, the name is used as the display name of the variable within the control.  'Packing'
'TcHmiSystemEng.Parameter.TreeViewImage'	The TreeViewImage can be used to attach an image file for the TreeView. This image is then added to the navigation in the TreeView at the corresponding position.  'Images/Labeling.svg'
'TcHmiSystemEng.Parameter.Layer'	The display path for the TreeView can be adjusted by setting the layer. The symbol path from the PLC is used as the default value. By setting the value, the path can be moved upwards in the structure by the set value.  '-2' (Moves the entry point up two levels.)

```
PROGRAM MAIN
VAR
  {attribute 'TcHmiSystemEng.Parameter.Name'           := 'Machine'}}
  {attribute 'TcHmiSystemEng.Parameter.TreeViewImage'  := 'Portal/normal.svg'}}
  fbMachine                                           : FB_MachineUnit;
END_VAR
```

12.11.4.1 Machine parameters

The machine parameters are required to define the machine. Parameters that need to be adjusted for each machine can be entered here. These parameters are persisted in the background by the System Engineering Extension. When the TwinCAT 3 HMI server is started, the parameters are written to the PLC. This allows for quick and easy commissioning or maintenance of the individual areas of the machine.

Symbolname

Value

Prepared Value

⌂ Apply all

🔍 Type in anything you want to find.

Machine name

⌄ Runtime1::PLC1::MAIN::fbMachine::\_sMachineName

⌚ Enter the name from the machine

Test

Click here to edit.

⌂ Apply

📜 History

Machine version

⌄ Runtime1::PLC1::MAIN::fbMachine::\_sMachineVersion

⌚ Enter the version from the machine

1.0.0.1

Click here to edit.

⌂ Apply

📜 History

Attributes

To include a variable from the PLC in the control for the machine parameters, the variable must be marked accordingly in the PLC with attributes.

General



Attributes	Description
'TcHmiSystemEng.Parameter.Name'	Name of the variable or node. If other variables are in use below this variable, this name is used as the navigation name in the TreeView. If the variable is not resolved further, the name is used as the display name of the variable within the control. 'Packing'
'TcHmiSystemEng.Parameter.TreeViewImage'	The TreeViewImage can be used to attach an image file for the TreeView. This image is then added to the navigation in the TreeView at the corresponding position. 'Images/Labeling.svg'
'TcHmiSystemEng.Parameter.Layer'	The display path for the TreeView can be adjusted by setting the layer. The symbol path from the PLC is used as the default value. By setting the value, the path can be moved upwards in the structure by the set value. '-2' (Moves the entry point up two levels.)

### Machine parameters

Attributes	Description
'TcHmiSystemEng.Parameter.Info'	An additional information text for the symbol can be transferred via Info. This can be helpful to clarify the function/effect of a change. 'Simulation with no sensor present'
'TcHmiSystemEng.Parameter.Unit'	Specify the unit of the variable to be displayed. This is displayed later on the control 'mm'
'TcHmiSystemEng.Parameter.Min'	The lower limit of the variable can be defined via the minimum value. This is checked for plausibility in the control and displayed. '100'
'TcHmiSystemEng.Parameter.Max'	The upper limit of the variable can be defined via the maximum value. This is checked for plausibility in the control and displayed. '2000'
'TcHmiSystemEng.Parameter.GroupName'	Variables can be grouped within the control by specifying a grouping. These are displayed together and can be expanded or collapsed. 'Configuration'

### Special features

#### Link variable to attributes

As it is not always possible to specify a fixed value, e.g. for the minimum and maximum value, it is possible to bind these to a variable.

Access to a variable at the same structure level:

```
FUNCTION_BLOCK FB_Machine
VAR
    {attribute 'TcHmiSystemEng.Parameter.Name' := 'Label Speed'}
    {attribute 'TcHmiSystemEng.Parameter.Unit' := 'mm/1'}
    {attribute 'TcHmiSystemEng.Parameter.Min' := '@nMinSpeed'}
    {attribute 'TcHmiSystemEng.Parameter.Max' := '@nMaxSpeed'}
    nSpeed      : REAL;

    nMinSpeed   : REAL := 0;
    nMaxSpeed   : REAL := 3000;
END_VAR
```

**Label Speed**  
 ⇄ Runtime1::PLC1::MAIN::fbMachine::\_nSpeed

32  
 mm/1

!  
 Min: 0, Max: 3000  
 mm/1

✕

Apply

Access to a variable in a substructure:

```
FUNCTION_BLOCK FB_MachineUnit
VAR
  {attribute 'TcHmiSystemEng.Parameter.Name' := 'Inspection'}
  {attribute 'TcHmiSystemEng.Parameter.TreeViewImage' := '@this._sImage'}
  _fbInspection      : FB_InspectionUnit;
END_VAR

FUNCTION_BLOCK FB_InspectionUnit
VAR
  {attribute 'TcHmiSystemEng.Parameter.Name' := 'Station Image'}
  {attribute 'TcHmiSystemEng.Parameter.Info' := 'Image of the station'}
  _sImage            : STRING := 'Vision/normal.svg';
END_VAR
```

fbMachine > \_fbInspection

Show all  
 No changes.  
 Import symbols  
 Export symbols  
 Config runtime: Runtime1  
 Update PLC symbols

Machine
 

- Infeed Containe
- Infeed Food
- Inspection
- Labeling
- Outfeed
- Sealing

Symbolname	Value
Type in anything you want to find.	
<b>Resolution</b> ⇄ Runtime1::PLC1::MAIN::fbMachine::_fbInspection::_nResolution Resolution of the image	0
<b>Station Image</b> ⇄ Runtime1::PLC1::MAIN::fbMachine::_fbInspection::_sImage Image of the station	Vision/normal.svg
<b>Station name</b> ⇄ Runtime1::PLC1::MAIN::fbMachine::_fbInspection::_sStationName Enter the name from the station	Inspection1

## Preset variables

Placeholder attributes can be defined using so-called preset attributes. These can be used in substructures of function blocks. This is necessary, for example, if the attribute declarations have been made within a library function block. Function blocks that are in a library cannot be changed in the project. By declaring the placeholder in the variable, the value is transferred to the function block. In the case of multiple initialization, the preset variables can be used, for example, to create a separate name for each individual function block.

```
FUNCTION_BLOCK FB_Machine
VAR
  {attribute 'TcHmiSystemEng.Parameter.Name' := 'Cut Cylinder'}
  {attribute 'TcHmiSystemEng.Parameter.Preset.Informations' := 'Cut Cylinder'}
  _fbCutCylinder      : FB_Cylinder;
END_VAR

FUNCTION_BLOCK FB_Cylinder
VAR_INPUT
  {attribute 'TcHmiSystemEng.Parameter.Name' := 'Timeout'}
  {attribute 'TcHmiSystemEng.Parameter.Info' := 'TcHmiSystemEng.Preset.Informations'}
  timeout              : TIME;

  {attribute 'TcHmiSystemEng.Parameter.Name' := 'Simulation Feedback'}
  {attribute 'TcHmiSystemEng.Parameter.Info' := 'TcHmiSystemEng.Preset.Informations'}
  simulationFeedback   : TIME;
END_VAR
```

**Simulation Feedback**

↔ Runtime1::PLC1::MAIN::fbMachine::\_fbCutCylinder::simulationFeedback  
 ⓘ Cut Cylinder

PTOS



Click here to edit.

⌄ Apply

**Timeout**

↔ Runtime1::PLC1::MAIN::fbMachine::\_fbCutCylinder::timeout  
 ⓘ Cut Cylinder

PTOS



Click here to edit.

⌄ Apply

**Grouping variables**

Variables can be grouped together using grouping. This means that they are displayed together in a group.

```
FUNCTION_BLOCK FB_Cylinder
VAR_INPUT
{attribute 'TcHmiSystemEng.Parameter.Name' := 'Simulation Feedback'}
{attribute 'TcHmiSystemEng.Parameter.Info' := 'Work process simulation time'}
{attribute 'TcHmiSystemEng.Parameter.GroupName' := 'Cut Cylinder'}
simulationFeedback      : TIME;

{attribute 'TcHmiSystemEng.Parameter.Name' := 'Timeout'}
{attribute 'TcHmiSystemEng.Parameter.Info' := 'Work process timeout'}
{attribute 'TcHmiSystemEng.Parameter.GroupName' := 'Cut Cylinder'}
timeout                 : TIME;
END_VAR
```

▼ Cut Cylinder

**Simulation Feedback**

↔ Runtime1::PLC1::MAIN::fbMachine::\_fbLabeling::\_fbSegment::\_fbCutCylinder::simulationFeedback::value  
 ⓘ Work process simulation time

**Timeout**

↔ Runtime1::PLC1::MAIN::fbMachine::\_fbLabeling::\_fbSegment::\_fbCutCylinder::timeout::value  
 ⓘ Work process timeout

## 12.11.5 Configuration

**General**

The basic settings for the server extension are specified in the **General** tab.

The screenshot shows the Beckhoff TwinCAT configuration interface. The top navigation bar includes tabs for TcHmiSrv, ADS, TcHmiAuditTrail, TcHmiEcDiagnostics, TcHmiLua, TcHmiMdp, and TcHmiSystemEngineering. The 'Runtimes' panel on the left is expanded, showing 'Runtime1' configuration. The 'Diagnostics' panel on the right shows the 'Runtime1' status.

**Runtimes Configuration:**

- Runtime1**
  - Enabled: true
  - ADS runtime: PLC1
  - Automatic symbol update: false
  - Enable audit trail: true
  - Entry path: MAIN
  - Symbol for initialization status: MAIN::bHmilsinitialized

**Diagnostics:**

- Runtime1**
  - ADS runtime
    - Connection state: Good
    - System service ADS state: Run
    - ADS state: Run
    - Device name: TwinCAT System
    - Project name: SystemEngineering\_PLC
    - TwinCAT version: 3.1.4026
    - Symbol update description: Runtime successfully initialized.

Package version: 22.0.6424, Product version: 14.2.105.0, Config version: 1.0.0.0

## Runtimes

Several runtimes can be created under Runtimes. A runtime is the connection to a PLC.

### Enabled

- Enables access to the runtime.

### ADS runtime

- Selection of runtime from the [ADS extension \[► 1109\]](#). All available runtimes from the ADS extension are made available here in the dropdown.

### Automatic symbol update

- Automatically checks the PLC for changes and updates the symbols. Mapping the symbols can take some time. It is therefore recommended to set this to FALSE for small changes to the PLC that do not affect "TcHmiSystemEng.\*".

### Enable audit trail

- Uses audit trail for the historization of symbols.

### Entry path

- Set the level from which the PLC is to be searched. The smaller the structure to be searched, the less time is required.

### Symbol for initialization status

- Configure an initialization bit to see whether the initial values have been written to the PLC. If the bit in the PLC is set to FALSE, this triggers the persisted data to be written to the PLC again.



The values persisted in the extension are initially written to the PLC when the HMI server is started.

## 12.11.6 Controls

The following controls are available for the System Engineering Extension.

### Parameters and Functions [► 1089]

- The Parameters and Functions Control is used to display the symbols found via the System Engineering Extension.

## 12.12 Vision

The TwinCAT Vision Extension offers a link to TwinCAT Vision systems. It can be used to display images from the PLC in the TwinCAT HMI.

### Configuration

The extension configuration and the linking of images is described in the [TwinCAT Vision documentation](#).



Available since version 1.12.742.0

### 12.12.1 System requirements

#### Version 1.14

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11
Additional software required	.NET Desktop Runtime 8

**Version 1.12**

Technical data	
Operating system	Windows 10 (32/64-bit) Windows 11
Additional software required	.NET Desktop Runtime 6

## 12.12.2 Quick start

To start, create or open a TwinCAT HMI project.

### Installation

Install the NuGet package "Beckhoff.TwinCAT.HMI.Vision" via the [NuGet Package Manager](#) [► 1041].

### Configuration

The extension configuration and the linking of images is described in the [TwinCAT Vision documentation](#).

## 13 Server

### 13.1 Configuration

#### 13.1.1 TcHmiSrv

##### Type definitions

Name	Description
<a href="#">adsRoute [► 1288]</a>	ADS Route
<a href="#">threadPoolSize [► 1288]</a>	Thread pool size
<a href="#">accessEnum [► 1288]</a>	Access level
<a href="#">severity [► 1289]</a>	Severity
<a href="#">timing [► 1290]</a>	Timing
<a href="#">valueType [► 1291]</a>	Data type
<a href="#">alarmState [► 1293]</a>	Alarm state
<a href="#">confirmationState [► 1294]</a>	Alarm confirmation
<a href="#">nullableDateTime [► 1295]</a>	Nullable datetime
<a href="#">eventType [► 1295]</a>	Event type
<a href="#">message [► 1296]</a>	Message
<a href="#">alarm [► 1297]</a>	Alarm
<a href="#">event [► 1297]</a>	Event
<a href="#">symbol [► 1298]</a>	Symbol
<a href="#">filter [► 1299]</a>	Filter
<a href="#">userLocale [► 1301]</a>	Client-Locale
<a href="#">userTimeZone [► 1307]</a>	Client time zone
<a href="#">userGroups [► 1318]</a>	User groups
<a href="#">eventFilter [► 1318]</a>	Event filter

## Web server

Symbol name	Text	Description
<u>CLIENT_CACHE_MAX_AGE</u> [▶ 1376]	Client cache storage duration	Defines how long server responses may be cached.
<u>COOKIEEXPIRATIONDATE</u> [▶ 1358]	Cookie expiration date	The server uses cookies to store session IDs. Make sure that the cookie expiration date and the time of automatic logout do not contradict each other.
<u>CLIENTPRIORITYLIST</u> [▶ 1376]	Client prioritization	Ip addresses of prioritized clients. If the client limit is reached, these clients can still connect by disconnecting the connection from clients that are not in the list.
<u>SESSIONSTORAGE</u> [▶ 1359]	Stored sessions	Sessions are stored here so that they are still valid after a server restart.
<u>DISCOVERY</u> [▶ 1360]	SSDP Discovery	Change becomes active after server restart
<u>ENDPOINTS</u> [▶ 1362]	Endpoints	IPv4 and IPv6 endpoints are supported. Only HTTPS endpoints should be enabled for remote access. Use the wildcard addresses '0.0.0.0' and '[::]' to accept remote connections on all network interfaces.
<u>KEEP_ALIVE</u> [▶ 1363]	Keep alive	Timer for persistent connections.
<u>SOCKET_TIMEOUT</u> [▶ 1363]	Socket timeout	Timeout for incomplete message body.
<u>ETAGENABLED</u> [▶ 1364]	ETAG enabled	The entity tag HTTP header is an identification number for a specific version of a resource.
<u>GZIPENABLED</u> [▶ 1364]	GZIP enabled	GZIP compression is used by the server and web clients to improve transmission speed and bandwidth utilization.
<u>GZIPMINSIZE</u> [▶ 1365]	GZIP Minimum size	Prevents the compression of small amounts of data.
<u>DEFLATECOMPRESSIONLEVEL</u> [▶ 1365]	GZIP compression level	GZIP compression is used by the server and web clients to improve transmission speed and bandwidth utilization.
<u>PERMESSAGEDEFLATEENABLED</u> [▶ 1366]	PerMessageDeflate enabled	Attempts to enable compression for all WebSocket requests. Compression is not enabled for clients that do not support this function.
<u>CACHEENABLED</u> [▶ 1367]	Cache enabled	If this function is activated, the web server stores frequently requested data such as web pages, images and similar media content in RAM to improve response times.
<u>CACHEMAXENTRYSIZE</u> [▶ 1367]	Maximum size cache entry	Server restart required.
<u>CACHEMAXSIZE</u> [▶ 1368]	Maximum cache size	Server restart required.
<u>CACHEMAXAGE</u> [▶ 1368]	Storage duration of cache entries	Server restart required.
<u>GLOBALHTTPHEADERS</u> [▶ 1369]	Global HTTP(S) header	These headers are set in all HTTP responses.
<u>REVALIDATION</u> [▶ 1377]	Force re-validation	Corresponding Cache Control, Pragma and Expire headers are set.
<u>MIME</u> [▶ 1378]	MIME HTTP headers	Assignments for the Internet Media Type.
<u>DEFAULTDOCUMENT</u> [▶ 1383]	Default document	This default page is displayed when a web client requests a URL that points to a directory structure instead of an actual web pages within the directory structure.



## General properties

Symbol name	Text	Description
PROJECTNAME [ <a href="#">▶ 1323</a> ]	Project name	The name of the HMI project.
PROJECTVERSION [ <a href="#">▶ 1323</a> ]	Project version	The version of the most recently uploaded HMI project.
DEFAULTLOCALE [ <a href="#">▶ 1324</a> ]	Default localization	Leave blank to use the client language setting.
DEFAULTTIMEZONE [ <a href="#">▶ 1324</a> ]	Default time zone	Leave blank to use the client time zone setting.
DEFAULTTIMEFORMATLOCALCALE [ <a href="#">▶ 1325</a> ]	Default time localization	Leave blank to use the client language setting.
CONFIGURATIONS [ <a href="#">▶ 1325</a> ]	Configurations	The names of all existing configurations.
FILES [ <a href="#">▶ 1326</a> ]	Files	Special settings and authorizations for certain files or directories.
VIRTUALDIRECTORIES [ <a href="#">▶ 1326</a> ]	Virtual directories	Virtual directories are used to specify which folder paths of the file system are to be made available via the web server.
REQUIREAUTH [ <a href="#">▶ 1327</a> ]	Authentication required	Authentication should only be disabled in private networks.
EXTENSIONS [ <a href="#">▶ 1328</a> ]	Extensions	Server extensions are used to integrate additional functions into the server.
USERGROUPS [ <a href="#">▶ 1329</a> ]	User groups	User groups have access rights to certain symbols and files. Authorizations are assigned to users based on the user groups to which they belong.
USERGROUPUSERS [ <a href="#">▶ 1332</a> ]	Group members	The account settings and group memberships of all users of all authentication extensions.
REMOTESERVERS [ <a href="#">▶ 1335</a> ]	Remote server	Connections to other HMI servers. The symbol mappings of remote servers can be used like symbols of extensions of the current server.
REMOTESERVERS_CERTIFICATES [ <a href="#">▶ 1336</a> ]	Allowed certificates for remote servers	Certificates of the remote servers.

## Advanced

Symbol name	Text	Description
<a href="#">MAXSESSIONS [► 1336]</a>	Maximum number of connections	Maximum number of simultaneous connections.
<a href="#">THREADPOOLSIZE [► 1337]</a>	Size of the thread pool	Server restart required.
<a href="#">FLOODPROTECTION [► 1337]</a>	Flood protection	Permitted WebSocket and HTTP requests per client IP per second
<a href="#">HTTP_FLOODPROTECTION [► 1343]</a>	Flood protection HTTP	Allowed HTTP requests per client IP per second per URI
<a href="#">INITTIMEOUT [► 1344]</a>	Timeout when initializing extensions	Initializing a server extension should not take more than this time.
<a href="#">SHUTDOWNTIMEOUT [► 1338]</a>	Timeout when unloading extensions	Unloading a server extension should not take more than this time.
<a href="#">UPLOADTIMEOUT [► 1339]</a>	Upload timeout	Upload requests will be rejected if they are not completed after this period of time.
<a href="#">CHUNKSIZE [► 1339]</a>	Size of a chunk package	When downloading, files are sent in chunks of this size.
<a href="#">VIDEO_SEGMENTSIZE [► 1340]</a>	Size of a video segment	HTTP range requests (video streams) are divided into chunks of this size.
<a href="#">CHECKSUMENABLED [► 1340]</a>	Checksum enabled	The checksum of the files is validated during the publish process
<a href="#">DEFAULTEVENTEXTENSION [► 1341]</a>	Default logger extension	When the 'ListEvents' function symbol is called, the events are requested from the default event extension.
<a href="#">DIAGNOSTICS_DOMAINS [► 1341]</a>	Log diagnostic data for domains	Diagnostic messages can be used for error diagnosis. However, this setting has a negative impact on performance.
<a href="#">MAXCONNECTIONSPERCLIENT [► 1344]</a>	Maximum number of connections per client	Please note that web browsers may open several connections to the same server at the same time in order to achieve faster loading times.
<a href="#">MAXHTTPHEADERSIZE [► 1342]</a>	Maximum size of the HTTP header	Requests with HTTP headers that are larger than this limit are rejected by the web server.
<a href="#">MAXREQUESTSIZE [► 1342]</a>	Maximum request size	Requests that exceed this value are rejected by the web server.
<a href="#">ENABLE_SERVER_UPDATE [► 1345]</a>	Enable server updates	Remote servers can be updated to new versions during the publish process if server updates are enabled
<a href="#">SHOW_CONFIGURATION_HINTS [► 1343]</a>	Display configuration hints	Configuration hints provide information about problematic settings or combinations of settings in the configurations of the server or the server extensions.
<a href="#">DISABLED_CONFIGURATION_HINTS [► 1345]</a>	Disabled configuration hints	Configuration hints that should no longer be shown.

## Security

Symbol name	Text	Description
<a href="#">DEFAULTAUTHEXTENSION [► 1346]</a>	Default authentication extension	Several authentication extensions can be used at the same time. The default authentication extension is selected by default on the login page.
<a href="#">USERSELECTTYPE [► 1346]</a>	Select users based on	If there are only a few user accounts, selecting the user account via a list box can simplify the login process.
<a href="#">AUTO_LOGOFF [► 1347]</a>	Automatic logoff	Can be overwritten for individual user accounts. This value is used if no other value is specified for the current user. Make sure that the cookie expiration date and the time of automatic logout do not contradict each other.
<a href="#">DEFAULTUSERGROUP [► 1347]</a>	Default user group	All user accounts are automatically added to this user group.
<a href="#">AUTO_LOGINUSER [► 1354]</a>	Automatic login	The user configured here is automatically logged in when a new session is opened.
<a href="#">CERTIFICATE [► 1348]</a>	Certificate	Certificate in PEM or PFX format.
<a href="#">CERTIFICATEEXPIRATION [► 1349]</a>	Validity period for certificates	Shorter validity periods limit the damage caused by key compromise and incorrect issuance. Stolen keys and incorrectly issued certificates are valid for a shorter period of time.
<a href="#">SELSIGNEDROOTCA [► 1349]</a>	Self-signed root certificate	This certificate is used to create self-signed server certificates.
<a href="#">SELSIGNEDROOTCAKEY [► 1350]</a>	Self-signed root certificate key	This key is used to decrypt the root certificate.
<a href="#">KEY [► 1350]</a>	Key	This key is used to decrypt the certificate. For certification in PFX format, this field can remain empty.
<a href="#">TEMPDH [► 1351]</a>	TempDH	User-defined parameters for the Diffie-Hellman (DH) key exchange.
<a href="#">KEYPASSWORD [► 1351]</a>	Key password	Password for decoding the private key or the PFX file. If the certificate does not require a password, this field can be left blank.
<a href="#">AUTHCLIENTCERTIFICATE [► 1352]</a>	Authentication only via client certificates	HTTPS connection to the server can only be established by clients with a valid client certificate.
<a href="#">LOCKOUT_PROTECTION_CLIENT_CERTIFICATE [► 1352]</a>	Lockout protection	Activation of client certificates only possible with local endpoint.
<a href="#">CLIENTCERTIFICATES [► 1353]</a>	Client certificates	Client certificates can be used as an alternative authentication mechanism that is not based on passwords.
<a href="#">SAMESITE_ATTRIBUTE [► 1354]</a>	SameSite attribute	Defines whether cookies should be sent with cross-site requests.

## Symbols

Symbol name	Text	Description
<a href="#">DEFINITIONS [► 1355]</a>	Definitions	JSON schema definitions are stored here.
<a href="#">SYMBOLS [► 1357]</a>	Symbol mappings	Symbol mapping enables access to the internal symbols of a domain.

### 13.1.1.1 Type Definitions

#### 13.1.1.1.1 adsRoute

ADS route

##### General Information

Domain	TcHmiSrv
--------	----------

##### Schema

Type	string
------	--------

##### JSON Schema

```
{
  "allof": [
    {
      "oneOf": [
        {
          "format": "ipv4"
        },
        {
          "format": "amsnetid"
        }
      ]
    },
    {
      "description": "descAdsRoute",
      "optionMethod": {
        "symbol": "ADS.ListRoutes"
      },
      "type": "string"
    }
  ]
}
```

#### 13.1.1.1.2 threadPoolSize

Thread pool size

##### General Information

Domain	TcHmiSrv
--------	----------

##### Schema

Type	integer
Minimum	4
Maximum	128

##### JSON Schema

```
{
  "description": "descThreadPoolSize",
  "maximum": 128,
  "minimum": 4,
  "type": "integer"
}
```

#### 13.1.1.1.3 accessEnum

Access level

**General Information**

Domain	TcHmiSrv
--------	----------

**Schema**

Enumeration type	integer
Default value	3

**Options**

Value	Label
0	None
1	Read
2	Write
3	Read-Write

**JSON Schema**

```
{
  "default": 3,
  "description": "descAccessEnum",
  "enum": [
    0,
    1,
    2,
    3
  ],
  "options": [
    {
      "label": "ENUM_NONE",
      "value": 0
    },
    {
      "label": "ENUM_READ",
      "value": 1
    },
    {
      "label": "ENUM_WRITE",
      "value": 2
    },
    {
      "label": "ENUM_READWRITE",
      "value": 3
    }
  ],
  "type": "integer"
}
```

**13.1.1.1.4 severity**

Severity

**General Information**

Domain	TcHmiSrv
--------	----------

**Schema**

Enumeration type	integer
Default value	1

Options

Value	Label
-1	Diagnostics
0	Verbose
1	Info
2	Warning
3	Error
4	Critical

JSON Schema

```
{
  "default": 1,
  "description": "descSeverity",
  "enum": [
    -1,
    0,
    1,
    2,
    3,
    4
  ],
  "options": [
    {
      "label": "ENUM_m1_DIAGNOSTICS",
      "value": -1
    },
    {
      "label": "ENUM_0_VERBOSE",
      "value": 0
    },
    {
      "label": "ENUM_1_INFO",
      "value": 1
    },
    {
      "label": "ENUM_2_WARNING",
      "value": 2
    },
    {
      "label": "ENUM_3_ERROR",
      "value": 3
    },
    {
      "label": "ENUM_4_CRITICAL",
      "value": 4
    }
  ],
  "type": "integer"
}
```

13.1.1.1.5 timing

Timing

General Information

Domain	TcHmiSrv
--------	----------

Schema

Enumeration type	integer
Default value	1

Options

Value	Label
0	Early
1	Normal
2	Delayed

JSON Schema

```
{
  "default": 1,
  "description": "descTiming",
  "enum": [
    0,
    1,
    2
  ],
  "options": [
    {
      "label": "ENUM_EARLY",
      "propertyOrder": 1,
      "value": 0
    },
    {
      "label": "ENUM_NORMAL",
      "propertyOrder": 2,
      "value": 1
    },
    {
      "label": "ENUM_DELAYED",
      "propertyOrder": 3,
      "value": 2
    }
  ],
  "type": "integer"
}
```

13.1.1.1.6 valueType

Value type

General Information

Domain	TcHmiSrv
--------	----------

Schema

Enumeration type	integer
Default value	0

## Options

Value	Label
0	null
1	boolean
2	integer
3	number
4	string
5	array
6	map
7	object
8	binary
9	int64
10	date-time
11	timespan
64	event
65	message
66	alarm
256	any

## JSON Schema

```
{
  "default": 0,
  "description": "descValueType",
  "enum": [
    0,
    1,
    2,
    3,
    4,
    5,
    6,
    7,
    8,
    9,
    10,
    11,
    64,
    65,
    66,
    256
  ],
  "options": [
    {
      "label": "ENUM_VALUETYPE_NULL",
      "value": 0
    },
    {
      "label": "ENUM_VALUETYPE_BOOL",
      "value": 1
    },
    {
      "label": "ENUM_VALUETYPE_INT",
      "value": 2
    },
    {
      "label": "ENUM_VALUETYPE_DOUBLE",
      "value": 3
    },
    {
      "label": "ENUM_VALUETYPE_STRING",
      "value": 4
    },
    {
      "label": "ENUM_VALUETYPE_ARRAY",
      "value": 5
    },
    {
```



```
        "label": "ENUM_VALUETYPE_MAP",
        "value": 6
    },
    {
        "label": "ENUM_VALUETYPE_STRUCT",
        "value": 7
    },
    {
        "label": "ENUM_VALUETYPE_BINARY",
        "value": 8
    },
    {
        "label": "ENUM_VALUETYPE_INT64",
        "value": 9
    },
    {
        "label": "ENUM_VALUETYPE_DATETIME",
        "value": 10
    },
    {
        "label": "ENUM_VALUETYPE_TIMESPAN",
        "value": 11
    },
    {
        "label": "ENUM_VALUETYPE_EVENT",
        "value": 64
    },
    {
        "label": "ENUM_VALUETYPE_MESSAGE",
        "value": 65
    },
    {
        "label": "ENUM_VALUETYPE_ALARM",
        "value": 66
    },
    {
        "label": "ENUM_VALUETYPE_ANY",
        "value": 256
    }
],
"type": "integer"
}
```

13.1.1.1.7 alarmState

Alarm state

General Information

Domain	TcHmiSrv
--------	----------

Schema

Enumeration type	integer
Default value	0

Options

Value	Label
0	Raised
1	Confirmed
2	Cleared
3	Cleared and Confirmed
4	Invalid

JSON Schema

```
{
    "default": 0,
    "description": "descAlarmState",
```

```

    "enum": [
      0,
      1,
      2,
      3,
      4
    ],
    "options": [
      {
        "label": "ENUM_0_RAISED",
        "value": 0
      },
      {
        "label": "ENUM_1_CONFIRMED",
        "value": 1
      },
      {
        "label": "ENUM_2_CLEARED",
        "value": 2
      },
      {
        "label": "ENUM_3_CLEARED_AND_CONFIRMED",
        "value": 3
      },
      {
        "label": "ENUM_4_INVALID",
        "value": 4
      }
    ],
    "type": "integer"
  }

```

### 13.1.1.1.8 confirmationState

Alarm confirmation state

#### General Information

Domain	TcHmiSrv
--------	----------

#### Schema

Enumeration type	integer
Default value	1

#### Options

Value	Label
0	Not supported
1	Not required
2	Waiting for confirmation
3	Confirmed
4	Reset

#### JSON Schema

```

{
  "default": 1,
  "description": "descConfirmationState",
  "enum": [
    0,
    1,
    2,
    3,
    4
  ],
  "options": [
    {
      "label": "ENUM_NOTSUPPORTED",
      "propertyOrder": 2,

```

```
        "value": 0
      },
      {
        "label": "ENUM_NOTREQUIRED",
        "propertyOrder": 5,
        "value": 1
      },
      {
        "label": "ENUM_WAIT",
        "propertyOrder": 4,
        "value": 2
      },
      {
        "label": "ENUM_CONFIRMED",
        "propertyOrder": 3,
        "value": 3
      },
      {
        "label": "ENUM_RESET",
        "propertyOrder": 1,
        "value": 4
      }
    ],
    "type": "integer"
  }
}
```

13.1.1.1.9 nullableDateTime

Nullable datetime

General Information

Domain	TcHmiSrv
--------	----------

JSON Schema

```
{
  "allof": [
    {
      "oneOf": [
        {
          "format": "date-time",
          "type": "string"
        },
        {
          "type": "null"
        }
      ]
    },
    {
      "description": "descNullableDateTime"
    }
  ]
}
```

13.1.1.1.10 eventType

Event type

General Information

Domain	TcHmiSrv
--------	----------

Schema

Enumeration type	integer
Default value	1

### Options

Value	Label
0	Message
1	Alarm
2	Payload

### JSON Schema

```
{
  "default": 1,
  "description": "descEventType",
  "enum": [
    0,
    1,
    2
  ],
  "options": [
    {
      "label": "ENUM_0_MESSAGE",
      "value": 0
    },
    {
      "label": "ENUM_1_ALARM",
      "value": 1
    },
    {
      "label": "ENUM_2_PAYLOAD",
      "value": 2
    }
  ],
  "type": "integer"
}
```

### 13.1.1.1.11 message

Message

### General Information

Domain	TcHmiSrv
--------	----------

### Schema

Type	object
------	--------

### JSON Schema

```
{
  "additionalProperties": false,
  "description": "descMessage",
  "properties": {
    "domain": {
      "type": "string"
    },
    "name": {
      "type": "string"
    },
    "params": {
      "additionalProperties": {},
      "type": "object"
    },
    "severity": {
      "$ref": "tchmi:server#/definitions/severity"
    },
    "timeRaised": {
      "format": "date-time",
      "type": "string"
    }
  },
  "required": [
    "name",

```

```
        "domain",
        "severity"
    ],
    "type": "object"
}
```

13.1.1.1.12 alarm

Alarm

General Information

Domain	TcHmiSrv
--------	----------

Schema

Type	object
------	--------

JSON Schema

```
{
  "additionalProperties": false,
  "description": "descAlarm",
  "properties": {
    "alarmState": {
      "$ref": "tchmi:server#/definitions/alarmState"
    },
    "confirmationState": {
      "$ref": "tchmi:server#/definitions/confirmationState"
    },
    "domain": {
      "type": "string"
    },
    "id": {
      "type": "integer"
    },
    "isActive": {
      "$ref": "tchmi:general#/definitions/Boolean"
    },
    "name": {
      "type": "string"
    },
    "params": {
      "additionalProperties": {},
      "type": "object"
    },
    "severity": {
      "$ref": "tchmi:server#/definitions/severity"
    },
    "timeCleared": {
      "$ref": "tchmi:server#/definitions/nullableDateTime"
    },
    "timeConfirmed": {
      "$ref": "tchmi:server#/definitions/nullableDateTime"
    },
    "timeRaised": {
      "format": "date-time",
      "type": "string"
    }
  },
  "required": [
    "name",
    "domain",
    "confirmationState"
  ],
  "type": "object"
}
```

13.1.1.1.13 event

Event

**General Information**

Domain	TcHmiSrv
--------	----------

**Schema**

Type	object
------	--------

**JSON Schema**

```
{
  "additionalProperties": false,
  "description": "descEvent",
  "properties": {
    "domain": {
      "type": "string"
    },
    "name": {
      "type": "string"
    },
    "payload": {
      "anyOf": [
        {
          "$ref": "tchmi:server#/definitions/alarm"
        },
        {
          "$ref": "tchmi:server#/definitions/message"
        },
        {}
      ],
      "description": "Payload can be alarms, messages or any type of user data."
    },
    "payloadType": {
      "$ref": "tchmi:server#/definitions/eventType"
    },
    "sessionId": {
      "type": "string"
    },
    "timeReceived": {
      "format": "date-time",
      "type": "string"
    }
  },
  "required": [
    "name",
    "domain"
  ],
  "type": "object"
}
```

**13.1.1.1.14 symbol**

Symbol

**General Information**

Domain	TcHmiSrv
--------	----------

**Schema**

Type	object
------	--------

**JSON Schema**

```
{
  "configDescription": "DESC_SYMBOL",
  "properties": {
    "ACCESS": {
      "allOf": [
        {
          "$ref": "tchmi:server#/definitions/accessEnum"
        },
        {}
      ]
    }
  }
}
```

```
        "configDescription": "DESC_ACCESS"
      }
    ],
    },
    "CUSTOMERDATA": {
      "type": "string"
    },
    },
    "DOMAIN": {
      "description": "Domain of the symbol",
      "optionMethod": {
        "symbol": "ListDomains"
      },
      "type": "string"
    },
    },
    "DYNAMIC": {
      "default": true,
      "description": "Only dynamic symbols can be removed.",
      "type": "boolean"
    },
    },
    "HIDDEN": {
      "default": false,
      "description": "Hide this symbol in the symbol browser.",
      "type": "boolean"
    },
    },
    "MAPPING": {
      "description": "This is how the given domain will access the symbol.",
      "type": "string"
    },
    },
    "OPTIONS": {
      "additionalProperties": {},
      "type": "object"
    },
    },
    "SCHEMA": {
      "allof": [
        {
          "$ref": "tchmi:server#/definitions/schemaRef"
        },
        {
          "description": "Json schema describing the output parameters of the symbol."
        }
      ]
    },
    },
    "SUBSYMBOL_MAPPING": {
      "description": "This sub-path is not forwarded to the extension. The server
automatically browses into the result of the mapped symbol.",
      "type": "string"
    },
    },
    "USEMAPPING": {
      "default": true,
      "description": "If true the mapping will be used, otherwise the symbol will be evaluated
in the server.",
      "type": "boolean"
    },
    },
    "required": [
      "DOMAIN",
      "MAPPING",
      "ACCESS"
    ],
    "type": "object"
  }
}
```

13.1.1.1.15 filter

Filter

General Information

Domain	TcHmiSrv
--------	----------

Schema

Type	array
------	-------

## JSON Schema

```

{
  "description": "descFilter",
  "items": {
    "oneOf": [
      {
        "additionalProperties": false,
        "configDescription": "descComparator",
        "properties": {
          "comparator": {
            "enum": [
              "=",
              "!=",
              "<",
              ">",
              "<=",
              ">=",
              "contains",
              "contains not",
              "== [ignore case]",
              "!= [ignore case]",
              "contains [ignore case]",
              "contains not [ignore case]"
            ],
            "type": "string"
          },
          "path": {
            "type": "string"
          },
          "value": {
            "oneOf": [
              {
                "type": "string"
              },
              {
                "type": "number"
              },
              {
                "type": "boolean"
              },
              {
                "type": "null"
              }
            ]
          }
        },
        "required": [
          "comparator",
          "value"
        ],
        "type": "object"
      },
      {
        "additionalProperties": false,
        "configDescription": "descLogic",
        "properties": {
          "logic": {
            "enum": [
              "AND",
              "OR"
            ],
            "type": "string"
          }
        },
        "required": [
          "logic"
        ],
        "type": "object"
      }
    ],
    "$ref": "tchmi:server#/definitions/filter"
  },
  "type": "array"
}

```



**13.1.1.1.16      userLocale**

User locale

**General Information**

Domain	TcHmiSrv
--------	----------

**Schema**

Enumeration type	string
Default value	"project"

Enumeration value
af
af-ZA
ar
ar-AE
ar-BH
ar-DZ
ar-EG
ar-IQ
ar-JO
ar-KW
ar-LB
ar-LY
ar-MA
ar-OM
ar-QA
ar-SA
ar-SY
ar-TN
ar-YE
az
az-AZ
be
be-BY
bg
bg-BG
bs-BA
ca
ca-ES
cs
cs-CZ
cy
cy-GB
da
da-DK
de
de-AT
de-CH
de-DE
de-LI
de-LU
dv
dv-MV
el
el-GR
en
en-AU
en-BZ
en-CA

Enumeration value
en-CB
en-GB
en-IE
en-JM
en-NZ
en-PH
en-TT
en-US
en-ZA
en-ZW
eo
es
es-AR
es-BO
es-CL
es-CO
es-CR
es-DO
es-EC
es-ES
es-GT
es-HN
es-MX
es-NI
es-PA
es-PE
es-PR
es-PY
es-SV
es-UY
es-VE
et
et-EE
eu
eu-ES
fa
fa-IR
fi
fi-FI
fo
fo-FO
fr
fr-BE
fr-CA
fr-CH
fr-FR
fr-LU
fr-MC

Enumeration value
ga-IE
gl
gl-ES
gu
gu-IN
he
he-IL
hi
hi-IN
hr
hr-BA
hr-HR
hu
hu-HU
hy
hy-AM
id
id-ID
is
is-IS
it
it-CH
it-IT
ja
ja-JP
ka
ka-GE
kk
kk-KZ
kn
kn-IN
ko
ko-KR
kok
kok-IN
ky
ky-KG
lt
lt-LT
lv
lv-LV
mi
mi-NZ
mk
mk-MK
mn
mn-MN
mr

Enumeration value
mr-IN
ms
ms-BN
ms-MY
mt
mt-MT
nb
nb-NO
nl
nl-BE
nl-NL
nn-NO
ns
ns-ZA
pa
pa-IN
pl
pl-PL
ps
ps-AR
pt
pt-BR
pt-PT
qu
qu-BO
qu-EC
qu-PE
ro
ro-RO
ru
ru-RU
sa
sa-IN
se
se-FI
se-NO
se-SE
sk
sk-SK
sl
sl-SI
so-SO
sq
sq-AL
sr-BA
sr-SP
sv
sv-FI

Enumeration value
sv-SE
sw
sw-KE
syr
syr-SY
ta
ta-IN
te
te-IN
th
th-TH
tl
tl-PH
tn
tn-ZA
tr
tr-TR
tt
tt-RU
ts
uk
uk-UA
ur
ur-PK
uz
uz-UZ
vi
vi-VN
xh
xh-ZA
zh
zh-CN
zh-HK
zh-MO
zh-SG
zh-TW
zu
zu-ZA
client
project

## JSON Schema

```
{
  "oneOf": [
    {
      "$ref": "tchmi:general#/definitions/Locale"
    },
    {
      "default": "project",
      "description": "descUserLocale",
      "enum": [
        "client",
        "project"
      ]
    }
  ]
}
```

```
    ],  
    "type": "string"  
  }  
]  
}
```

13.1.1.1.17      **userTimeZone**

User timezone

**General Information**

Domain	TcHmiSrv
--------	----------

**Schema**

Enumeration type	string
Default value	"project"

Enumeration value
Africa/Abidjan
Africa/Accra
Africa/Addis_Ababa
Africa/Algiers
Africa/Asmara
Africa/Bamako
Africa/Bangui
Africa/Banjul
Africa/Bissau
Africa/Blantyre
Africa/Brazzaville
Africa/Bujumbura
Africa/Cairo
Africa/Casablanca
Africa/Ceuta
Africa/Conakry
Africa/Dakar
Africa/Dar_es_Salaam
Africa/Djibouti
Africa/Douala
Africa/El_Aaiun
Africa/Freetown
Africa/Gaborone
Africa/Harare
Africa/Johannesburg
Africa/Juba
Africa/Kampala
Africa/Khartoum
Africa/Kigali
Africa/Kinshasa
Africa/Lagos
Africa/Libreville
Africa/Lome
Africa/Luanda
Africa/Lubumbashi
Africa/Lusaka
Africa/Malabo
Africa/Maputo
Africa/Maseru
Africa/Mbabane
Africa/Mogadishu
Africa/Monrovia
Africa/Nairobi
Africa/Ndjamena
Africa/Niamey
Africa/Nouakchott
Africa/Ouagadougou
Africa/Porto-Novo



Enumeration value
Africa/Sao_Tome
Africa/Timbuktu
Africa/Tripoli
Africa/Tunis
Africa/Windhoek
America/Adak
America/Anchorage
America/Anguilla
America/Antigua
America/Araguaina
America/Argentina/Buenos_Aires
America/Argentina/Catamarca
America/Argentina/Cordoba
America/Argentina/Jujuy
America/Argentina/La_Rioja
America/Argentina/Mendoza
America/Argentina/Rio_Gallegos
America/Argentina/Salta
America/Argentina/San_Juan
America/Argentina/San_Luis
America/Argentina/Tucuman
America/Argentina/Ushuaia
America/Aruba
America/Asuncion
America/Atikokan
America/Atka
America/Bahia
America/Bahia_Banderas
America/Barbados
America/Belem
America/Belize
America/Blanc-Sablon
America/Boa_Vista
America/Bogota
America/Boise
America/Buenos_Aires
America/Cambridge_Bay
America/Campo_Grande
America/Cancun
America/Caracas
America/Catamarca
America/Cayenne
America/Cayman
America/Chicago
America/Chihuahua
America/Coral_Harbour
America/Cordoba
America/Costa_Rica

Enumeration value
America/Creston
America/Cuiaba
America/Curacao
America/Danmarkshavn
America/Dawson
America/Dawson_Creek
America/Denver
America/Detroit
America/Dominica
America/Edmonton
America/Eirunepe
America/El_Salvador
America/Ensenada
America/Fort_Nelson
America/Fort_Wayne
America/Fortaleza
America/Glace_Bay
America/Godthab
America/Goose_Bay
America/Grand_Turk
America/Grenada
America/Guadeloupe
America/Guatemala
America/Guayaquil
America/Guyana
America/Halifax
America/Havana
America/Hermosillo
America/Indiana/Indianapolis
America/Indiana/Knox
America/Indiana/Marengo
America/Indiana/Petersburg
America/Indiana/Tell_City
America/Indiana/Vevay
America/Indiana/Vincennes
America/Indiana/Winamac
America/Indianapolis
America/Inuvik
America/Iqaluit
America/Jamaica
America/Jujuy
America/Juneau
America/Kentucky/Louisville
America/Kentucky/Monticello
America/Kralendijk
America/La_Paz
America/Lima
America/Los_Angeles

Enumeration value
America/Louisville
America/Lower_Princes
America/Maceio
America/Managua
America/Manaus
America/Marigot
America/Martinique
America/Matamoros
America/Mazatlan
America/Mendoza
America/Menominee
America/Merida
America/Metlakatla
America/Mexico_City
America/Miquelon
America/Moncton
America/Monterrey
America/Montevideo
America/Montreal
America/Montserrat
America/Nassau
America/New_York
America/Nipigon
America/Nome
America/Noronha
America/North_Dakota/Beulah
America/North_Dakota/Center
America/North_Dakota/New_Salem
America/Ojinaga
America/Panama
America/Pangnirtung
America/Paramaribo
America/Phoenix
America/Port-au-Prince
America/Port_of_Spain
America/Porto_Acre
America/Porto_Velho
America/Puerto_Rico
America/Punta_Arenas
America/Rainy_River
America/Rankin_Inlet
America/Recife
America/Regina
America/Resolute
America/Rio_Branco
America/Rosario
America/Santa_Isabel
America/Santarem

Enumeration value
America/Santiago
America/Santo_Domingo
America/Sao_Paulo
America/Scoresbysund
America/Shiprock
America/Sitka
America/St_Barthelemy
America/St_Johns
America/St_Kitts
America/St_Lucia
America/St_Thomas
America/St_Vincent
America/Swift_Current
America/Tegucigalpa
America/Thule
America/Thunder_Bay
America/Tijuana
America/Toronto
America/Tortola
America/Vancouver
America/Virgin
America/Whitehorse
America/Winnipeg
America/Yakutat
America/Yellowknife
Antarctica/Casey
Antarctica/Davis
Antarctica/Macquarie
Antarctica/Mawson
Antarctica/Palmer
Antarctica/Rothera
Antarctica/South_Pole
Antarctica/Syowa
Antarctica/Vostok
Arctic/Longyearbyen
Asia/Aden
Asia/Almaty
Asia/Amman
Asia/Anadyr
Asia/Aqtau
Asia/Aqtobe
Asia/Ashgabat
Asia/Ashkhabad
Asia/Atyrau
Asia/Baghdad
Asia/Bahrain
Asia/Baku
Asia/Bangkok

Enumeration value
Asia/Barnaul
Asia/Beirut
Asia/Bishkek
Asia/Brunei
Asia/Calcutta
Asia/Chita
Asia/Choibalsan
Asia/Chongqing
Asia/Chungking
Asia/Colombo
Asia/Dacca
Asia/Damascus
Asia/Dhaka
Asia/Dili
Asia/Dubai
Asia/Dushanbe
Asia/Famagusta
Asia/Gaza
Asia/Harbin
Asia/Hebron
Asia/Ho_Chi_Minh
Asia/Hong_Kong
Asia/Hovd
Asia/Irkutsk
Asia/Istanbul
Asia/Jakarta
Asia/Jayapura
Asia/Jerusalem
Asia/Kabul
Asia/Kamchatka
Asia/Karachi
Asia/Kashgar
Asia/Kathmandu
Asia/Khandyga
Asia/Kolkata
Asia/Krasnoyarsk
Asia/Kuala_Lumpur
Asia/Kuching
Asia/Kuwait
Asia/Macau
Asia/Magadan
Asia/Makassar
Asia/Manila
Asia/Muscat
Asia/Nicosia
Asia/Novokuznetsk
Asia/Novosibirsk
Asia/Omsk

Enumeration value
Asia/Oral
Asia/Phnom_Penh
Asia/Pontianak
Asia/Pyongyang
Asia/Qatar
Asia/Qyzylorda
Asia/Rangoon
Asia/Riyadh
Asia/Saigon
Asia/Sakhalin
Asia/Samarkand
Asia/Seoul
Asia/Shanghai
Asia/Singapore
Asia/Srednekolymsk
Asia/Taipei
Asia/Tashkent
Asia/Tbilisi
Asia/Tehran
Asia/Tel_Aviv
Asia/Thimbu
Asia/Thimphu
Asia/Tokyo
Asia/Tomsk
Asia/Ujung_Pandang
Asia/Ulaanbaatar
Asia/Ulan_Bator
Asia/Urumqi
Asia/Ust-Nera
Asia/Vientiane
Asia/Vladivostok
Asia/Yakutsk
Asia/Yangon
Asia/Yekaterinburg
Asia/Yerevan
Atlantic/Azores
Atlantic/Bermuda
Atlantic/Canary
Atlantic/Cape_Verde
Atlantic/Faeroe
Atlantic/Faroe
Atlantic/Jan_Mayen
Atlantic/Madeira
Atlantic/Reykjavik
Atlantic/South_Georgia
Atlantic/St_Helena
Atlantic/Stanley
Australia/Adelaide

Enumeration value
Australia/Brisbane
Australia/Broken_Hill
Australia/Canberra
Australia/Currie
Australia/Darwin
Australia/Eucla
Australia/Hobart
Australia/Lindeman
Australia/Lord_Howe
Australia/Melbourne
Australia/Perth
Australia/Queensland
Australia/Sydney
Australia/Yancowinna
Europe/Amsterdam
Europe/Andorra
Europe/Astrakhan
Europe/Athens
Europe/Belfast
Europe/Belgrade
Europe/Berlin
Europe/Bratislava
Europe/Brussels
Europe/Bucharest
Europe/Budapest
Europe/Busingen
Europe/Chisinau
Europe/Copenhagen
Europe/Dublin
Europe/Gibraltar
Europe/Guernsey
Europe/Helsinki
Europe/Isle_of_Man
Europe/Istanbul
Europe/Jersey
Europe/Kaliningrad
Europe/Kiev
Europe/Kirov
Europe/Lisbon
Europe/Ljubljana
Europe/London
Europe/Luxembourg
Europe/Madrid
Europe/Malta
Europe/Mariehamn
Europe/Minsk
Europe/Monaco
Europe/Moscow

Enumeration value
Europe/Nicosia
Europe/Oslo
Europe/Paris
Europe/Podgorica
Europe/Prague
Europe/Riga
Europe/Rome
Europe/Samara
Europe/San_Marino
Europe/Sarajevo
Europe/Saratov
Europe/Simferopol
Europe/Skopje
Europe/Sofia
Europe/Stockholm
Europe/Tallinn
Europe/Tirane
Europe/Tiraspol
Europe/Ulyanovsk
Europe/Uzhgorod
Europe/Vaduz
Europe/Vatican
Europe/Vienna
Europe/Vilnius
Europe/Volgograd
Europe/Warsaw
Europe/Zagreb
Europe/Zaporozhye
Europe/Zurich
Indian/Antananarivo
Indian/Chagos
Indian/Christmas
Indian/Cocos
Indian/Comoro
Indian/Kerguelen
Indian/Mahe
Indian/Maldives
Indian/Mauritius
Indian/Mayotte
Indian/Reunion
Pacific/Apia
Pacific/Auckland
Pacific/Bougainville
Pacific/Chatham
Pacific/Chuuk
Pacific/Easter
Pacific/Efate
Pacific/Enderbury



Enumeration value
Pacific/Fakaofu
Pacific/Fiji
Pacific/Funafuti
Pacific/Galapagos
Pacific/Gambier
Pacific/Guadalcanal
Pacific/Guam
Pacific/Honolulu
Pacific/Johnston
Pacific/Kiritimati
Pacific/Kosrae
Pacific/Kwajalein
Pacific/Majuro
Pacific/Marquesas
Pacific/Midway
Pacific/Nauru
Pacific/Niue
Pacific/Norfolk
Pacific/Noumea
Pacific/Pago_Pago
Pacific/Palau
Pacific/Pitcairn
Pacific/Pohnpei
Pacific/Ponape
Pacific/Port_Moresby
Pacific/Rarotonga
Pacific/Saipan
Pacific/Samoa
Pacific/Tahiti
Pacific/Tarawa
Pacific/Tongatapu
Pacific/Truk
Pacific/Wake
Pacific/Wallis
Pacific/Yap
UTC
client
project

### JSON Schema

```
{
  "oneOf": [
    {
      "$ref": "tchmi:general#/definitions/TimeZone"
    },
    {
      "default": "project",
      "description": "descUserTimeZone",
      "enum": [
        "client",
        "project"
      ],
      "type": "string"
    }
  ]
}
```

```
}  
]  
}
```

### 13.1.1.1.18 userGroups

User groups

#### General Information

Domain	TcHmiSrv
--------	----------

#### Schema

Type	array
Unique items	Yes

#### JSON Schema

```
{  
  "description": "descUserGroups",  
  "items": {  
    "configDescription": "DESC_GROUP",  
    "optionMethod": {  
      "symbol": "TcHmiSrv.Config::USERGROUPS"  
    },  
    "type": "string"  
  },  
  "type": "array",  
  "uniqueItems": true  
}
```

### 13.1.1.1.19 eventFilter

Event filter

#### General Information

Domain	TcHmiSrv
--------	----------

#### Schema

Type	array
------	-------

#### JSON Schema

```
{  
  "description": "descEventFilter",  
  "items": {  
    "anyOf": [  
      {  
        "properties": {  
          "comparator": {  
            "enum": [  
              "=",  
              "!=",  
              "contains",  
              "contains not",  
              "== [ignore case]",  
              "!= [ignore case]",  
              "contains [ignore case]",  
              "contains not [ignore case]"  
            ],  
            "type": "string"  
          },  
          "path": {  
            "enum": [  
              "domain",  
              "sourceDomain",  
              "name",  
            ]  
          }  
        }  
      }  
    ]  
  }  
}
```

```

        "text",
        "sessionId"
    ],
    "type": "string"
},
"value": {
    "type": "string"
}
},
"required": [
    "path",
    "comparator",
    "value"
],
"type": "object"
},
{
    "properties": {
        "comparator": {
            "enum": [
                "=",
                "!=",
                "<",
                ">",
                "<=",
                ">="
            ],
            "type": "string"
        },
        "path": {
            "enum": [
                "id"
            ],
            "type": "string"
        },
        "value": {
            "type": "number"
        }
    },
    "required": [
        "path",
        "comparator",
        "value"
    ],
    "type": "object"
},
{
    "properties": {
        "comparator": {
            "enum": [
                "=",
                "!=",
                "<",
                ">",
                "<=",
                ">="
            ],
            "type": "string"
        },
        "path": {
            "enum": [
                "timeRaised"
            ],
            "type": "string"
        },
        "value": {
            "format": "date-time",
            "type": "string"
        }
    },
    "required": [
        "path",
        "comparator",
        "value"
    ],
    "type": "object"
},
{
    "properties": {
        "comparator": {

```

```

        "enum": [
            "==",
            "!=",
            "<",
            ">",
            "<=",
            ">="
        ],
        "type": "string"
    },
    "path": {
        "enum": [
            "timeCleared",
            "timeConfirmed"
        ],
        "type": "string"
    },
    "value": {
        "$ref": "tchmi:server#/definitions/nullableDateTime"
    }
},
"required": [
    "path",
    "comparator",
    "value"
],
"type": "object"
},
{
    "properties": {
        "comparator": {
            "enum": [
                "==",
                "!=",
                "<",
                ">",
                "<=",
                ">="
            ],
            "type": "string"
        },
        "path": {
            "enum": [
                "type"
            ],
            "type": "string"
        },
        "value": {
            "enum": [
                0,
                1
            ],
            "options": [
                {
                    "label": "ENUM_0_MESSAGE",
                    "value": 0
                },
                {
                    "label": "ENUM_1_ALARM",
                    "value": 1
                }
            ],
            "type": "integer"
        }
    },
    "required": [
        "path",
        "comparator",
        "value"
    ],
    "type": "object"
},
{
    "properties": {
        "comparator": {
            "enum": [
                "==",
                "!=",
                "<",
                ">",

```

```

        "<=",
        ">="
    ],
    "type": "string"
},
"path": {
    "enum": [
        "severity"
    ],
    "type": "string"
},
"value": {
    "$ref": "tchmi:server#/definitions/severity"
}
},
"required": [
    "path",
    "comparator",
    "value"
],
"type": "object"
},
{
    "properties": {
        "comparator": {
            "enum": [
                "=",
                "!=",
                "<",
                ">",
                "<=",
                ">="
            ],
            "type": "string"
        },
        "path": {
            "enum": [
                "alarmState"
            ],
            "type": "string"
        },
        "value": {
            "$ref": "tchmi:server#/definitions/alarmState"
        }
    },
    "required": [
        "path",
        "comparator",
        "value"
    ],
    "type": "object"
},
{
    "properties": {
        "comparator": {
            "enum": [
                "=",
                "!=",
                "<",
                ">",
                "<=",
                ">="
            ],
            "type": "string"
        },
        "path": {
            "enum": [
                "confirmationState"
            ],
            "type": "string"
        },
        "value": {
            "$ref": "tchmi:server#/definitions/confirmationState"
        }
    },
    "required": [
        "path",
        "comparator",
        "value"
    ],

```

```

    "type": "object"
  },
  {
    "properties": {
      "comparator": {
        "enum": [
          "==",
          "!=",
        ],
        "type": "string"
      },
      "path": {
        "enum": [
          "isActive"
        ],
        "type": "string"
      },
      "value": {
        "type": "boolean"
      }
    },
    "required": [
      "path",
      "comparator",
      "value"
    ],
    "type": "object"
  },
  {
    "properties": {
      "comparator": {
        "enum": [
          "==",
          "!=",
          "<",
          ">",
          "<=",
          ">=",
          "contains",
          "contains not",
          "== [ignore case]",
          "! = [ignore case]",
          "contains [ignore case]",
          "contains not [ignore case]"
        ],
        "type": "string"
      },
      "path": {
        "pattern": "^params:",
        "type": "string"
      },
      "value": {
        "oneOf": [
          {
            "type": "string"
          },
          {
            "type": "number"
          },
          {
            "type": "boolean"
          }
        ]
      }
    },
    "required": [
      "path",
      "comparator",
      "value"
    ],
    "type": "object"
  },
  {
    "properties": {
      "logic": {
        "enum": [
          "AND",
          "OR"
        ],
        "type": "string"
      }
    }
  }
}

```

```
        },
        "required": [
            "logic"
        ],
        "type": "object"
    },
    {
        "$ref": "tchmi:server#/definitions/eventFilter"
    }
]
},
"type": "array"
}
```

### 13.1.1.2 General Properties

#### 13.1.1.2.1 Project name

The name of the HMI project.

##### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::PROJECTNAME
Property is hidden	No
Contained in every configuration by default	No

##### Schema

Type	string
------	--------

##### JSON Schema

```
{
  "description": "DESC_PROJECTNAME",
  "propertyOrder": 1,
  "type": "string"
}
```

#### 13.1.1.2.2 Project version

This is the version of the HMI project that has been published to this server.

##### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::PROJECTVERSION
Property is hidden	No
Contained in every configuration by default	No

##### Schema

Type	string
Format	version

##### JSON Schema

```
{
  "description": "DESC_PROJECTVERSION",
  "format": "version",
  "propertyOrder": 2,
  "type": "string"
}
```

### 13.1.1.2.3 Default Locale

Leave empty to use client locale.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DEFAULTLOCALE
Property is hidden	No
Contained in every configuration by default	No

#### JSON Schema

```
{
  "allOf": [
    {
      "oneOf": [
        {
          "$ref": "tchmi:general#/definitions/Locale"
        },
        {
          "default": "client",
          "enum": [
            "client"
          ],
          "type": "string"
        }
      ]
    },
    {
      "configDescription": "DESC_LOCALE",
      "propertyOrder": 8
    }
  ]
}
```

### 13.1.1.2.4 Default timezone

Leave empty to use client timezone.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DEFAULTTIMEZONE
Property is hidden	No
Contained in every configuration by default	No

#### JSON Schema

```
{
  "allOf": [
    {
      "oneOf": [
        {
          "$ref": "tchmi:general#/definitions/TimeZone"
        },
        {
          "default": "client",
          "enum": [
            "client"
          ],
          "type": "string"
        }
      ]
    },
    {
      "configDescription": "DESC_TIMEZONE",
      "propertyOrder": 9
    }
  ]
}
```



```
}  
]  
}
```

### 13.1.1.2.5 Default Time Locale

Leave empty to use client locale.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DEFAULTTIMEFORMATLOCALE
Property is hidden	No
Contained in every configuration by default	No

#### JSON Schema

```
{  
  "allof": [  
    {  
      "oneOf": [  
        {  
          "$ref": "tchmi:general#/definitions/Locale"  
        },  
        {  
          "default": "client",  
          "enum": [  
            "client"  
          ],  
          "type": "string"  
        }  
      ]  
    },  
    {  
      "configDescription": "DESC_LOCALE",  
      "propertyOrder": 10  
    }  
  ]  
}
```

### 13.1.1.2.6 Configurations

The names of all existing configurations.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CONFIGURATIONS
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	array
Unique items	Yes

#### Default value

```
[  
  "remote"  
]
```

#### JSON Schema

```
{  
  "default": [  
    "remote"  
  ]  
}
```

```

    },
    "description": "DESC_CONFIGURATIONS",
    "items": {
      "type": "string"
    },
    "propertyOrder": 5,
    "type": "array",
    "uniqueItems": true
  }
}

```

### 13.1.1.2.7 Files

Special handling and permissions for specific files or directories.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::FILES
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	object
------	--------

#### JSON Schema

```

{
  "additionalProperties": {
    "default": {
      "ACCESS": 3
    },
    "properties": {
      "ACCESS": {
        "$ref": "tchmi:server#/definitions/accessEnum"
      },
      "FILESHTTPHEADERS": {
        "format": "multiline",
        "type": "string"
      },
      "HTTPSTATUSCODE": {
        "enum": [
          "",
          "301",
          "302",
          "307",
          "308",
          "401",
          "403",
          "404"
        ],
        "type": "string"
      },
      "LOGINPAGE": {
        "type": "string"
      }
    },
    "type": "object"
  },
  "description": "DESC_FILES",
  "propertyOrder": 11,
  "type": "object"
}

```

### 13.1.1.2.8 Virtual directories

Virtual directories are used to specify which folders paths on the file system should be served by the web server.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::VIRTUALDIRECTORIES
Property is hidden	No
Contained in every configuration by default	Yes

**Schema**

Type	object
Minimum number of properties	1

**Default value**

```
{
  "/": "www"
}
```

**JSON Schema**

```
{
  "additionalProperties": {
    "format": "filename",
    "type": "string"
  },
  "default": {
    "/": "www"
  },
  "defaultConfigurable": true,
  "description": "DESC_VIRTUALDIRECTORIES",
  "minProperties": 1,
  "propertyOrder": 12,
  "type": "object"
}
```

**13.1.1.2.9 Authentication required**

Authentication should only be disabled on private networks.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::REQUIREAUTH
Property is hidden	No
Contained in every configuration by default	Yes

**Schema**

Enumeration type	integer
Default value	2

**Options**

Value	Label
0	None
1	Authentication only for remote access
2	Always authenticate

**JSON Schema**

```
{
  "default": 2,
  "defaultConfigurable": true,
  "description": "DESC_REQUIREAUTH",
}
```

```

    "enum": [
      0,
      1,
      2
    ],
    "options": [
      {
        "label": "ENUM_NONE",
        "value": 0
      },
      {
        "label": "ENUM_REMOTE",
        "value": 1
      },
      {
        "label": "ENUM_ALWAYS",
        "value": 2
      }
    ],
    "propertyOrder": 13,
    "type": "integer"
  }
}

```

### 13.1.1.2.10 Extensions

Server extensions are used to integrate additional functionality into the server.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::EXTENSIONS
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	object
------	--------

#### Default value

```

{
  "ADS": {
    "NAME": "TcHmiAds",
    "PATH": "TcHmiAds",
    "REQUIRED": true,
    "STARTUPTYPE": 1
  },
  "TcHmiLua": {
    "NAME": "TcHmiLua",
    "PATH": "TcHmiLua",
    "REQUIRED": true,
    "STARTUPTYPE": 1
  },
  "TcHmiSqliteLogger": {
    "NAME": "TcHmiSqliteLogger",
    "PATH": "TcHmiSqliteLogger",
    "REQUIRED": true,
    "STARTUPTYPE": 0
  },
  "TcHmiUserManagement": {
    "NAME": "TcHmiUserManagement",
    "PATH": "TcHmiUserManagement",
    "REQUIRED": true,
    "STARTUPTYPE": 1
  }
}

```

#### JSON Schema

```

{
  "additionalProperties": {
    "additionalProperties": false,
    "properties": {

```

```

        "ENABLED": {
            "default": true,
            "type": "boolean"
        },
        "NAME": {
            "type": "string"
        },
        "PATH": {
            "configDescription": "DESC_EXTENSION_PATH",
            "format": "filename",
            "type": "string"
        },
        "PROCESSID": {
            "default": -1,
            "hidden": true,
            "type": "integer"
        },
        "REQUIRED": {
            "default": false,
            "readOnly": true,
            "type": "boolean"
        },
        "STARTUPTYPE": {
            "$ref": "tchmi:server#/definitions/timing"
        }
    },
    "readOnly": {
        "$data": "#/properties/EXTENSIONS/additionalProperties/properties/REQUIRED"
    },
    "required": [
        "NAME",
        "ENABLED",
        "STARTUPTYPE"
    ],
    "title": "TITLE_EXTENSION",
    "type": "object"
},
"default": {
    "ADS": {
        "NAME": "TcHmiAds",
        "PATH": "TcHmiAds",
        "REQUIRED": true,
        "STARTUPTYPE": 1
    },
    "TcHmiLua": {
        "NAME": "TcHmiLua",
        "PATH": "TcHmiLua",
        "REQUIRED": true,
        "STARTUPTYPE": 1
    },
    "TcHmiSqliteLogger": {
        "NAME": "TcHmiSqliteLogger",
        "PATH": "TcHmiSqliteLogger",
        "REQUIRED": true,
        "STARTUPTYPE": 0
    },
    "TcHmiUserManagement": {
        "NAME": "TcHmiUserManagement",
        "PATH": "TcHmiUserManagement",
        "REQUIRED": true,
        "STARTUPTYPE": 1
    }
},
"description": "DESC_EXTENSION",
"propertyOrder": 4,
"required": [
    "TcHmiSqliteLogger",
    "TcHmiLua",
    "TcHmiUserManagement",
    "ADS"
],
"type": "object"
}

```

### 13.1.1.2.11 User groups

User groups have access permissions to specific symbols and files. Permissions are assigned to users based on user groups they are a member of.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::USERGROUPS
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	object
------	--------

**Default value**

```
{
  "__SystemAdministrators": {
    "ENABLED": true,
    "FILEACCESS": 3,
    "SYMBOLACCESS": 3
  },
  "__SystemGuests": {
    "ENABLED": true,
    "FILEACCESS": 0,
    "FILES": {
      "/Config/ServerState": 1,
      "/FavIcon.ico": 1
    },
    "SYMBOLACCESS": 0,
    "SYMBOLS": {
      "DefaultAuthExtension": 1,
      "DefaultUserGroup": 1,
      "GetCurrentUser": 3,
      "GetSymbolAccess": 3,
      "Heartbeat": 3,
      "IsAuthRequired": 3,
      "ListDomains": 3,
      "ListUserNames": 3,
      "Login": 3,
      "Logout": 3,
      "SetLocale": 3,
      "Unsubscribe": 3,
      "UserSelectType": 1
    }
  },
  "__SystemUsers": {
    "ENABLED": true,
    "FILEACCESS": 3,
    "FILES": {
      "/Config": 1
    },
    "SYMBOLACCESS": 0,
    "SYMBOLS": {
      "ChangeUserSettings": 3,
      "ConfirmAlarm": 3,
      "CreateEvent": 3,
      "DefaultAuthExtension": 1,
      "DefaultUserGroup": 1,
      "Diagnostics": 3,
      "GetConfiguration": 3,
      "GetCurrentUser": 3,
      "GetDefinitions": 3,
      "GetSchema": 3,
      "GetSymbolAccess": 3,
      "Heartbeat": 3,
      "IsAuthRequired": 3,
      "ListDomains": 3,
      "ListEvents": 3,
      "ListSymbols": 3,
      "ListUserNames": 3,
      "LocalizeText": 3,
      "Login": 3,
      "Logout": 3,
      "SetLocale": 3,
      "SubscribeEvents": 3,
      "Unsubscribe": 3,
      "UnsubscribeEvents": 3,
      "UpdateEventsSubscription": 3
    }
  }
}
```

```

    }
}

```

## JSON Schema

```

{
  "additionalProperties": {
    "additionalProperties": false,
    "configDescription": "DESC_USERGROUP",
    "properties": {
      "ENABLED": {
        "default": true,
        "type": "boolean"
      },
      "FILEACCESS": {
        "$ref": "tchmi:server#/definitions/accessEnum"
      },
      "FILES": {
        "additionalProperties": {
          "allOf": [
            {
              "$ref": "tchmi:server#/definitions/accessEnum"
            },
            {
              "configDescription": "DESC_FILE"
            }
          ]
        },
        "type": "object"
      },
      "SYMBOLACCESS": {
        "allOf": [
          {
            "$ref": "tchmi:server#/definitions/accessEnum"
          },
          {
            "configDescription": "DESC_SYMBOLACCESS"
          }
        ]
      },
      "SYMBOLS": {
        "additionalProperties": {
          "allOf": [
            {
              "$ref": "tchmi:server#/definitions/accessEnum"
            },
            {
              "configDescription": "DESC_SYMBOL"
            },
            {
              "optionMethod": {
                "symbol": "ListSymbolNames"
              }
            }
          ]
        },
        "configDescription": "DESC_USERGROUPS_SYMBOLS",
        "type": "object"
      }
    },
    "required": [
      "ENABLED",
      "SYMBOLACCESS",
      "FILEACCESS",
      "SYMBOLS",
      "FILES"
    ],
    "type": "object"
  },
  "default": {
    "__SystemAdministrators": {
      "ENABLED": true,
      "FILEACCESS": 3,
      "SYMBOLACCESS": 3
    },
    "__SystemGuests": {
      "ENABLED": true,
      "FILEACCESS": 0,
      "FILES": {

```

```

        "/Config/ServerState": 1,
        "/FavIcon.ico": 1
    },
    "SYMBOLACCESS": 0,
    "SYMBOLS": {
        "DefaultAuthExtension": 1,
        "DefaultUserGroup": 1,
        "GetCurrentUser": 3,
        "GetSymbolAccess": 3,
        "Heartbeat": 3,
        "IsAuthRequired": 3,
        "ListDomains": 3,
        "ListUserNames": 3,
        "Login": 3,
        "Logout": 3,
        "SetLocale": 3,
        "Unsubscribe": 3,
        "UserSelectType": 1
    }
},
    "__SystemUsers": {
        "ENABLED": true,
        "FILEACCESS": 3,
        "FILES": {
            "/Config": 1
        },
        "SYMBOLACCESS": 0,
        "SYMBOLS": {
            "ChangeUserSettings": 3,
            "ConfirmAlarm": 3,
            "CreateEvent": 3,
            "DefaultAuthExtension": 1,
            "DefaultUserGroup": 1,
            "Diagnostics": 3,
            "GetConfiguration": 3,
            "GetCurrentUser": 3,
            "GetDefinitions": 3,
            "GetSchema": 3,
            "GetSymbolAccess": 3,
            "Heartbeat": 3,
            "IsAuthRequired": 3,
            "ListDomains": 3,
            "ListEvents": 3,
            "ListSymbols": 3,
            "ListUserNames": 3,
            "LocalizeText": 3,
            "Login": 3,
            "Logout": 3,
            "SetLocale": 3,
            "SubscribeEvents": 3,
            "Unsubscribe": 3,
            "UnsubscribeEvents": 3,
            "UpdateEventsSubscription": 3
        }
    }
},
    "description": "DESC_USERGROUPS",
    "propertyOrder": 6,
    "required": [
        "__SystemAdministrators",
        "__SystemUsers",
        "__SystemGuests"
    ],
    "type": "object"
}

```

### 13.1.1.2.12 Members of user groups

The account settings and group memberships of all users from all authentication extensions.



## General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::USERGROUPUSERS
Property is hidden	No
Contained in every configuration by default	No

## Schema

Type	object
------	--------

## Default value

```
{
  "TcHmiUserManagement": {
    "__SystemAdministrator": {
      "USERGROUPUSERS_GROUPS": [
        "__SystemAdministrators"
      ],
      "USERGROUPUSERS_LOCALE": "project"
    },
    "__SystemGuest": {
      "USERGROUPUSERS_GROUPS": [
        "__SystemGuests"
      ],
      "USERGROUPUSERS_LOCALE": "project"
    }
  }
}
```

## JSON Schema

```
{
  "additionalProperties": {
    "additionalProperties": {
      "additionalProperties": false,
      "configDescription": "DESC_USERNAME",
      "optionMethod": {
        "symbol": "ListUserNames"
      },
      "properties": {
        "USERGROUPUSERS_AUTO_LOGOFF": {
          "default": "PT0S",
          "format": "timespan",
          "type": "string"
        },
        "USERGROUPUSERS_GROUPS": {
          "$ref": "tchmi:server#/definitions/userGroups"
        },
        "USERGROUPUSERS_LOCALE": {
          "allOf": [
            {
              "$ref": "tchmi:server#/definitions/userLocale"
            },
            {
              "configDescription": "DESC_LOCALE"
            }
          ]
        },
        "USERGROUPUSERS_TIMEFORMATLOCALE": {
          "allOf": [
            {
              "$ref": "tchmi:server#/definitions/userLocale"
            },
            {
              "configDescription": "DESC_LOCALE"
            }
          ]
        },
        "USERGROUPUSERS_TIMEZONE": {
          "allOf": [
            {
              "$ref": "tchmi:server#/definitions/userTimeZone"
            }
          ]
        }
      }
    }
  }
}
```

```

        "configDescription": "DESC_TIMEZONE"
      }
    ]
  },
  "required": [
    "USERGROUPUSERS_LOCALE",
    "USERGROUPUSERS_GROUPS",
    "USERGROUPUSERS_AUTO_LOGOFF"
  ],
  "type": "object"
},
"configDescription": "DESC_AUTHENTICATION_DOMAIN",
"type": "object"
},
"default": {
  "TcHmiUserManagement": {
    "__SystemAdministrator": {
      "USERGROUPUSERS_GROUPS": [
        "__SystemAdministrators"
      ],
      "USERGROUPUSERS_LOCALE": "project"
    },
    "__SystemGuest": {
      "USERGROUPUSERS_GROUPS": [
        "__SystemGuests"
      ],
      "USERGROUPUSERS_LOCALE": "project"
    }
  }
},
"description": "DESC_USERGROUPUSERS",
"propertyOrder": 7,
"required": [
  "TcHmiUserManagement"
],
"type": "object"
}

```

### 13.1.1.2.13 Default document

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DEFAULTDOCUMENT
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	array
Unique items	Yes

#### Default value

```
[
  "Default.html"
]
```

#### JSON Schema

```

{
  "default": [
    "Default.html"
  ],
  "items": {
    "format": "filename",
    "type": "string"
  },
  "type": "array",
  "uniqueItems": true
}

```

### 13.1.1.2.14 Internal storage

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::INTERNALSTORAGE
Property is hidden	Yes
Contained in every configuration by default	No

#### Schema

Type	object
------	--------

#### JSON Schema

```
{
  "additionalProperties": {},
  "hidden": true,
  "type": "object"
}
```

### 13.1.1.2.15 Remote Server

Connections to other HMI servers. The mapped symbols of remote servers can be used like symbols from extensions of the current server.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::REMOTESERVERS
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	object
------	--------

#### JSON Schema

```
{
  "additionalProperties": {
    "additionalProperties": false,
    "properties": {
      "REMOTE_CONNECT_TIMEOUT": {
        "default": "PT5S",
        "format": "timespan",
        "type": "string"
      },
      "REMOTE_ENABLED": {
        "default": true,
        "type": "boolean"
      },
      "REMOTE_PASSWORD": {
        "default": "",
        "format": "encrypted",
        "propertyOrder": 3,
        "type": "string"
      },
      "REMOTE_URL": {
        "propertyOrder": 1,
        "type": "string"
      },
      "REMOTE_USERNAME": {
        "configDescription": "DESC_REMOTE_USERNAME",
        "default": "",
        "propertyOrder": 2,
        "type": "string"
      }
    }
  }
}
```

```
    },
    "required": [
        "REMOTE_ENABLED",
        "REMOTE_URL",
        "REMOTE_USERNAME",
        "REMOTE_PASSWORD",
        "REMOTE_CONNECT_TIMEOUT"
    ],
    "title": "REMOTESERVERS_TITLE",
    "type": "object"
},
"configDescription": "DESC_REMOTESERVERS",
"description": "DESC_REMOTESERVERS",
"propertyOrder": 14,
"type": "object"
}
```

### 13.1.1.2.16 Allowed certificates for remote servers

Certificates of the remote servers.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::REMOTESERVERS_CERTIFICATES
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	array
------	-------

#### JSON Schema

```
{
  "configDescription": "DESC_REMOTESERVERS_CERTIFICATES",
  "description": "DESC_REMOTESERVERS_CERTIFICATES",
  "items": {
    "configDescription": "DESC_PEM_CERT",
    "default": "",
    "format": "certificate",
    "type": "string"
  },
  "propertyOrder": 15,
  "type": "array"
}
```

### 13.1.1.3 Advanced

#### 13.1.1.3.1 Maximum number of connections

Maximum number of concurrent connections.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::MAXSESSIONS
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	integer
Minimum	1
Maximum	4294967295
Default value	128

**JSON Schema**

```
{
  "allOf": [
    {
      "$ref": "tchmi:general#/definitions/UINT32"
    },
    {
      "category": "CATEGORY_ADVANCED",
      "default": 128,
      "description": "DESC_MAXSESSIONS",
      "minimum": 1,
      "propertyOrder": 8
    }
  ]
}
```

**13.1.1.3.2 Size of thread pool**

Server restart required.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::THREADPOOLSIZE
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	integer
Minimum	4
Maximum	128
Default value	32

**JSON Schema**

```
{
  "allOf": [
    {
      "$ref": "tchmi:server#/definitions/threadPoolSize"
    },
    {
      "category": "CATEGORY_ADVANCED",
      "configDescription": "DESC_THREADPOOLSIZE",
      "default": 32,
      "propertyOrder": 14
    }
  ]
}
```

**13.1.1.3.3 Flood protection**

Allowed WebSocket-requests per client IP per second

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::FLOODPROTECTION
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	integer
Maximum	4294967295
Default value	500

**JSON Schema**

```
{
  "allof": [
    {
      "$ref": "tchmi:general#/definitions/UINT32"
    },
    {
      "category": "CATEGORY_ADVANCED",
      "configDescription": "DESC_FLOODPROTECTION",
      "default": 500,
      "propertyOrder": 10
    }
  ]
}
```

**13.1.1.3.4 Timeout for unloading extensions**

It should not take longer than this to unload a server extension.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::SHUTDOWNTIMEOUT
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Format	timespan
Minimum	PT1S
Default value	"PT10S"

**JSON Schema**

```
{
  "category": "CATEGORY_ADVANCED",
  "default": "PT10S",
  "description": "DESC_SHUTDOWNTIMEOUT",
  "format": "timespan",
  "formatMinimum": "PT1S",
  "propertyOrder": 13,
  "type": "string"
}
```

### 13.1.1.3.5 Upload timeout

Upload requests will be rejected if they do not succeed after this duration.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::UPLOADTIMEOUT
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	string
Format	timespan
Minimum	PT1S
Default value	"PT20S"

#### JSON Schema

```
{
  "category": "CATEGORY_ADVANCED",
  "default": "PT20S",
  "description": "DESC_UPLOADTIMEOUT",
  "format": "timespan",
  "formatMinimum": "PT1S",
  "propertyOrder": 12,
  "type": "string"
}
```

### 13.1.1.3.6 Size of chunk packet

Downloaded files will be split into chunks of this size.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CHUNKSIZE
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Maximum	4294967295
Default value	1048576

#### JSON Schema

```
{
  "allof": [
    {
      "$ref": "tchmi:general#/definitions/UINT32"
    },
    {
      "category": "CATEGORY_ADVANCED",
      "configDescription": "DESC_CHUNKSIZE",
      "default": 1048576,
      "displayClass": "byte",
      "propertyOrder": 4
    }
  ]
}
```

```
}  
]  
}
```

### 13.1.1.3.7 Size of video segments

HTTP range requests (streamed videos) will be split in chunks of this size.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::VIDEOSEGMENTSIZE
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Maximum	4294967295
Default value	1048576

#### JSON Schema

```
{  
  "allof": [  
    {  
      "$ref": "tchmi:general#/definitions/UINT32"  
    },  
    {  
      "category": "CATEGORY_ADVANCED",  
      "configDescription": "DESC_RANGE_REQUEST_SIZE",  
      "default": 1048576,  
      "displayClass": "byte",  
      "propertyOrder": 5  
    }  
  ]  
}
```

### 13.1.1.3.8 Checksum enabled

Checksum of uploaded files will be validated during publishing.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CHECKSUMENABLED
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	boolean
Default value	True

#### JSON Schema

```
{  
  "category": "CATEGORY_ADVANCED",  
  "configDescription": "DESC_CHECKSUMENABLED",  
  "default": true,  
}
```



```

    "propertyOrder": 3,
    "type": "boolean"
}

```

### 13.1.1.3.9 Default logging extension

When the 'ListEvents' function symbol is called, the events are requested from the default event extension.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DEFAULTEVENTEXTENSION
Category	Advanced
Property is hidden	Yes
Contained in every configuration by default	No

#### Schema

Type	string
Default value	"TcHmiSqliteLogger"

#### JSON Schema

```

{
  "category": "CATEGORY_ADVANCED",
  "default": "TcHmiSqliteLogger",
  "description": "DESC_DEFAULTEVENTEXTENSION",
  "hidden": true,
  "type": "string"
}

```

### 13.1.1.3.10 Log diagnostics data for domains

Logging diagnostics data are useful to diagnose problems but they have a negative impact on performance.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DIAGNOSTICS_DOMAINS
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	array
------	-------

#### Default value

```

[]

```

#### JSON Schema

```

{
  "category": "CATEGORY_ADVANCED",
  "default": [],
  "description": "DESC_DIAGNOSTICS_DOMAINS",
  "items": {
    "minLength": 1,
    "optionMethod": {
      "symbol": "ListDomains"
    },
    "type": "string"
  },
}

```

```

    "propertyOrder": 2,
    "type": "array"
}

```

### 13.1.1.3.11 Maximum size of HTTP header

Requests with HTTP headers that are larger than this limit will be rejected by the web server.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::MAXHTTPHEADERSIZE
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Minimum	1024
Default value	32768

#### JSON Schema

```

{
  "category": "CATEGORY_ADVANCED",
  "default": 32768,
  "description": "DESC_MAXHTTPHEADERSIZE",
  "displayClass": "byte",
  "minimum": 1024,
  "propertyOrder": 6,
  "type": "integer"
}

```

### 13.1.1.3.12 Maximum request size

Requests that are larger than this limit will be rejected by the web server.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::MAXREQUESTSIZE
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Minimum	1024
Default value	1048576

#### JSON Schema

```

{
  "category": "CATEGORY_ADVANCED",
  "default": 1048576,
  "description": "DESC_MAXREQUESTSIZE",
  "displayClass": "byte",
  "minimum": 1024,
  "propertyOrder": 7,
  "type": "integer"
}

```

### 13.1.1.3.13 Show configuration hints

Configuration hints inform about problematic settings or combinations of settings in the configurations of the server or server extensions.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::SHOW_CONFIGURATION_HINTS
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	boolean
Default value	True

#### JSON Schema

```
{
  "category": "CATEGORY_ADVANCED",
  "default": true,
  "description": "DESC_SHOW_CONFIGURATION_HINTS",
  "propertyOrder": 1,
  "type": "boolean"
}
```

### 13.1.1.3.14 Flood protection HTTP

Allowed HTTP-requests per client IP per second per URI

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::HTTP_FLOODPROTECTION
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Maximum	4294967295
Default value	10

#### JSON Schema

```
{
  "allof": [
    {
      "$ref": "tchmi:general#/definitions/UINT32"
    },
    {
      "category": "CATEGORY_ADVANCED",
      "configDescription": "DESC_HTTP_FLOODPROTECTION",
      "default": 10,
      "propertyOrder": 10
    }
  ]
}
```

### 13.1.1.3.15 Init timeout

It should not take longer than this to initialize a server extension.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::INITTIMEOUT
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	string
Format	timespan
Minimum	PT1S
Default value	"PT10S"

#### JSON Schema

```
{
  "category": "CATEGORY_ADVANCED",
  "default": "PT10S",
  "description": "DESC_INITTIMEOUT",
  "format": "timespan",
  "formatMinimum": "PT1S",
  "propertyOrder": 13,
  "type": "string"
}
```

### 13.1.1.3.16 Maximum connections per client

Keep in mind that web browsers might open multiple simultaneous connections to the same server to achieve faster load times.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::MAXCONNECTIONSPERCLIENT
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Minimum	1
Default value	32

#### JSON Schema

```
{
  "category": "CATEGORY_ADVANCED",
  "default": 32,
  "description": "DESC_MAXCONNECTIONSPERCLIENT",
  "minimum": 1,
  "propertyOrder": 9,
  "type": "integer"
}
```

### 13.1.1.3.17 Enable server updates

When server updates are enabled remote servers can be updated to new versions during the publish process.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::ENABLE_SERVER_UPDATE
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	boolean
Default value	True

#### JSON Schema

```
{
  "category": "CATEGORY_ADVANCED",
  "configDescription": "DESC_ENABLE_SERVER_UPDATE",
  "default": true,
  "propertyOrder": 11,
  "type": "boolean"
}
```

### 13.1.1.3.18 Disabled configuration hints

Hints which should not be shown anymore.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DISABLED_CONFIGURATION_HINTS
Category	Advanced
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	array
Unique items	Yes

#### JSON Schema

```
{
  "category": "CATEGORY_ADVANCED",
  "description": "DESC_DISABLED_CONFIG_HINTS",
  "items": {
    "type": "string"
  },
  "propertyOrder": 2,
  "type": "array",
  "uniqueItems": true
}
```

### 13.1.1.4 Security

#### 13.1.1.4.1 Default authentication extension

Multiple authentication extensions can be used at the same time. The default authentication extension is automatically selected on the login page.

##### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DEFAULTAUTHEXTENSION
Category	Security
Property is hidden	No
Contained in every configuration by default	No

##### Schema

Type	string
Default value	"TcHmiUserManagement"

##### JSON Schema

```
{
  "category": "CATEGORY_SECURITY",
  "default": "TcHmiUserManagement",
  "description": "DESC_DEFAULTAUTHEXTENSION",
  "optionMethod": {
    "filter": [
      {
        "comparator": "==",
        "path": "authExtension",
        "value": true
      }
    ],
    "symbol": "ListDomains"
  },
  "propertyOrder": 12,
  "type": "string"
}
```

#### 13.1.1.4.2 Select User by

If there are only a few user accounts, selecting the user account using a list box can simplify the login process.

##### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::USERSELECTTYPE
Category	Security
Property is hidden	No
Contained in every configuration by default	No

##### Schema

Enumeration type	integer
Default value	0

## Options

Value	Label
0	List box
1	Text field

## JSON Schema

```
{
  "category": "CATEGORY_SECURITY",
  "default": 0,
  "description": "DESC_USERSELECTTYPE",
  "enum": [
    0,
    1
  ],
  "options": [
    {
      "label": "ENUM_COMBOBOX",
      "value": 0
    },
    {
      "label": "ENUM_TEXTFIELD",
      "value": 1
    }
  ],
  "propertyOrder": 14,
  "type": "integer"
}
```

### 13.1.1.4.3 Auto logoff

Can be overridden for individual user accounts. This value is used when no other value is specified for the current user.

## General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::AUTO_LOGOFF
Category	Security
Property is hidden	No
Contained in every configuration by default	No

## Schema

Type	string
Format	timespan
Default value	"P30D"

## JSON Schema

```
{
  "category": "CATEGORY_SECURITY",
  "default": "P30D",
  "description": "DESC_AUTO_LOGOFF",
  "format": "timespan",
  "propertyOrder": 2,
  "type": "string"
}
```

### 13.1.1.4.4 Default user group

All user accounts are automatically added to this user group.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DEFAULTUSERGROUP
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Default value	"__SystemUsers"

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "default": "__SystemUsers",
  "description": "DESC_DEFAULTUSERGROUP",
  "optionMethod": {
    "symbol": "TcHmiSrv.Config::USERGROUPS"
  },
  "propertyOrder": 13,
  "type": "string"
}
```

**13.1.1.4.5 Login user automatically****General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::AUTO_LOGINUSER
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Default value	

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "default": "",
  "optionMethod": {
    "symbol": "ListUserNames"
  },
  "type": "string"
}
```

**13.1.1.4.6 Certificate**

PEM or PFX formatted certificate.



**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CERTIFICATE
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Format	certificate
Default value	""

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "configDescription": "DESC_PEM_CERT",
  "default": "",
  "format": "certificate",
  "propertyOrder": 6,
  "type": "string"
}
```

**13.1.1.4.7 Duration for default certificate**

Shorter validity durations limit the damage from key compromise and mis-issuance. Stolen keys and mis-issued certificates are valid for a shorter period of time.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CERTIFICATEEXPIRATION
Category	Security
Property is hidden	Yes
Contained in every configuration by default	Yes

**Schema**

Type	string
Format	timespan
Default value	"P14000D"

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "default": "P14000D",
  "defaultConfigurable": true,
  "description": "DESC_CERTIFICATEEXPIRATION",
  "format": "timespan",
  "hidden": true,
  "type": "string"
}
```

**13.1.1.4.8 Self signed root certificate**

This certificate is used to create self-signed server certificates.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::SELSIGNEDROOTCA
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Format	certificate
Default value	""

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "default": "",
  "description": "DESC_SELFSIGNEDROOTCA",
  "format": "certificate",
  "propertyOrder": 7,
  "type": "string"
}
```

**13.1.1.4.9 Self signed root certificate key**

This key is used to decrypt the root certificate.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::SELSIGNEDROOTCAKEY
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Format	base64
Default value	""

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "default": "",
  "description": "DESC_SELFSIGNEDROOTCAKEY",
  "format": "base64",
  "propertyOrder": 8,
  "type": "string"
}
```

**13.1.1.4.10 Key**

This key is used to decrypt the certificate.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::KEY
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Format	base64
Default value	""

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "default": "",
  "description": "DESC_KEY",
  "format": "base64",
  "propertyOrder": 9,
  "type": "string"
}
```

**13.1.1.4.11 TempDH**

Custom parameters for the Diffie-Hellman (DH) key-exchange.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::TEMPDH
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Format	base64
Default value	""

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "configDescription": "DESC_TEMPDH",
  "default": "",
  "format": "base64",
  "propertyOrder": 11,
  "type": "string"
}
```

**13.1.1.4.12 Key Password**

Password used to decrypt the private key.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::KEYPASSWORD
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Format	base64
Default value	""

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "default": "",
  "description": "DESC_KEYPASSWORD",
  "format": "base64",
  "propertyOrder": 10,
  "type": "string"
}
```

**13.1.1.4.13 Only client certificates allowed to authenticate**

Require an approved client certificate to establish a HTTPS connection.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::AUTHCLIENTCERTIFICATE
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	boolean
Default value	False

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "configDescription": "DESC_AUTHCLIENTCERTIFICATE",
  "default": false,
  "propertyOrder": 4,
  "type": "boolean"
}
```

**13.1.1.4.14 Lockout Protection**

Enabling client certificate requires a local endpoint.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::LOCKOUT_PROTECTION_CLIENT_CERTIFICATE
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	boolean
Default value	True

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "configDescription": "DESC_LOCKOUT_PROTECTION_CLIENT_CERTIFICATE",
  "default": true,
  "propertyOrder": 3,
  "type": "boolean"
}
```

**13.1.1.4.15 Client Certificates**

Client certificates constitute an alternative authentication mechanism that is not based on passwords.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CLIENTCERTIFICATES
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	array
Unique items	Yes

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "description": "DESC_CLIENTCERTIFICATES",
  "items": {
    "properties": {
      "CLIENTCERTIFICATE": {
        "configDescription": "DESC_PEM_CERT",
        "default": "",
        "format": "certificate",
        "type": "string"
      },
      "DEFAULTUSER": {
        "default": "",
        "optionMethod": {
          "symbol": "ListUserNames"
        },
        "type": "string"
      },
      "ENABLECLIENTCERTIFICATE": {
        "default": true,
        "type": "boolean"
      }
    }
  },
}
```

```

    "type": "object"
  },
  "propertyOrder": 5,
  "type": "array",
  "uniqueItems": true
}

```

#### 13.1.1.4.16 SameSite attribute

Specifies whether cookies should be sent for cross-page requests.

##### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::SAMESITE_ATTRIBUTE
Category	Security
Property is hidden	No
Contained in every configuration by default	No

##### Schema

Enumeration type	integer
Default value	2

##### Options

Value	Label
0	None
1	Lax
2	Strict

##### JSON Schema

```

{
  "category": "CATEGORY_SECURITY",
  "configDescription": "DESC_SAMESITE_ATTRIBUTE",
  "default": 2,
  "enum": [
    0,
    1,
    2
  ],
  "options": [
    {
      "label": "ENUM_SAMESITE_NONE",
      "value": 0
    },
    {
      "label": "ENUM_SAMESITE_LAX",
      "value": 1
    },
    {
      "label": "ENUM_SAMESITE_STRICT",
      "value": 2
    }
  ],
  "propertyOrder": 15,
  "type": "integer"
}

```

#### 13.1.1.4.17 Automatic Login

The user account that is configured here is logged in automatically when a new session is opened.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::AUTO_LOGINUSER
Category	Security
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Default value	""

**JSON Schema**

```
{
  "category": "CATEGORY_SECURITY",
  "configDescription": "DESC_AUTO_LOGINUSER",
  "default": "",
  "optionMethod": {
    "symbol": "ListUserNames"
  },
  "propertyOrder": 1,
  "type": "string"
}
```

**13.1.1.5 Symbols****13.1.1.5.1 Definitions**

Storage for JSON schema definitions.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DEFINITIONS
Category	Symbols
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	object
------	--------

**Default value**

```
{ }
```

**JSON Schema**

```
{
  "additionalProperties": {
    "$ref": "tchmi:server#/definitions/schemaRef"
  },
  "category": "CATEGORY_SYMBOLS",
  "default": {},
  "description": "DESC_DEFINITIONS",
  "type": "object"
}
```

### 13.1.1.5.2 Symbols

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::SYMBOLS
Category	Symbols
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	object
------	--------

#### Default value

```
{
  "DefaultAuthExtension": {
    "ACCESS": 3,
    "DOMAIN": "TcHmiSrv",
    "HIDDEN": true,
    "MAPPING": "Config::DEFAULTAUTHEXTENSION",
    "SCHEMA": {
      "function": true,
      "type": "string"
    },
    "USEMAPPING": true
  },
  "UserSelectType": {
    "ACCESS": 3,
    "DOMAIN": "TcHmiSrv",
    "HIDDEN": true,
    "MAPPING": "Config::USERSELECTTYPE",
    "SCHEMA": {
      "function": true,
      "type": "number"
    },
    "USEMAPPING": true
  }
}
```

#### JSON Schema

```
{
  "additionalProperties": {
    "$ref": "tchmi:server#/definitions/symbol"
  },
  "category": "CATEGORY_SYMBOLS",
  "default": {
    "DefaultAuthExtension": {
      "ACCESS": 3,
      "DOMAIN": "TcHmiSrv",
      "HIDDEN": true,
      "MAPPING": "Config::DEFAULTAUTHEXTENSION",
      "SCHEMA": {
        "function": true,
        "type": "string"
      },
      "USEMAPPING": true
    },
    "UserSelectType": {
      "ACCESS": 3,
      "DOMAIN": "TcHmiSrv",
      "HIDDEN": true,
      "MAPPING": "Config::USERSELECTTYPE",
      "SCHEMA": {
        "function": true,
        "type": "number"
      },
      "USEMAPPING": true
    }
  },
  "type": "object"
}
```



### 13.1.1.5.3 Mapped symbols

Symbol mapping enables access to the internal symbols of a domain.

#### General Information

Domain	TcHmiSrv
Complete symbol path	TcHmiSrv.Config::SYMBOLS
Category	Symbols
Property is hidden	No
Included by default in every configuration	No

#### Schema

Type	object
------	--------

#### Default value

```
{
  "DefaultAuthExtension": {
    "ACCESS": 3,
    "DOMAIN": "TcHmiSrv",
    "DYNAMIC": false,
    "HIDDEN": true,
    "MAPPING": "Config::DEFAULTAUTHEXTENSION",
    "SCHEMA": {
      "function": true,
      "type": "string"
    },
    "USEMAPPING": true
  },
  "DefaultUserGroup": {
    "ACCESS": 3,
    "DOMAIN": "TcHmiSrv",
    "DYNAMIC": false,
    "HIDDEN": true,
    "MAPPING": "Config::DEFAULTUSERGROUP",
    "SCHEMA": {
      "function": true,
      "type": "string"
    },
    "USEMAPPING": true
  },
  "UserSelectType": {
    "ACCESS": 3,
    "DOMAIN": "TcHmiSrv",
    "DYNAMIC": false,
    "HIDDEN": true,
    "MAPPING": "Config::USERSELECTTYPE",
    "SCHEMA": {
      "function": true,
      "type": "number"
    },
    "USEMAPPING": true
  }
}
```

#### JSON schema

```
{
  "additionalProperties": {
    "$ref": "tchmi:server#/definitions/symbol"
  },
  "category": "CATEGORY_SYMBOLS",
  "configDescription": "DESC_SYMBOLS",
  "default": {
    "DefaultAuthExtension": {
      "ACCESS": 3,
      "DOMAIN": "TcHmiSrv",
      "DYNAMIC": false,
      "HIDDEN": true,
      "MAPPING": "Config::DEFAULTAUTHEXTENSION",
      "SCHEMA": {
```

```

        "function": true,
        "type": "string"
    },
    "USEMAPPING": true
},
"DefaultUserGroup": {
    "ACCESS": 3,
    "DOMAIN": "TcHmiSrv",
    "DYNAMIC": false,
    "HIDDEN": true,
    "MAPPING": "Config::DEFAULTUSERGROUP",
    "SCHEMA": {
        "function": true,
        "type": "string"
    },
    "USEMAPPING": true
},
"UserSelectType": {
    "ACCESS": 3,
    "DOMAIN": "TcHmiSrv",
    "DYNAMIC": false,
    "HIDDEN": true,
    "MAPPING": "Config::USERSELECTTYPE",
    "SCHEMA": {
        "function": true,
        "type": "number"
    },
    "USEMAPPING": true
}
},
"type": "object"
}

```

### 13.1.1.6 Webserver

#### 13.1.1.6.1 Cookie expiration date

The server uses cookies to store session IDs. Make sure that the cookie expiration date and the automatic logout duration are not in conflict.

##### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::COOKIEEXPIRATIONDATE
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

##### Schema

Type	string
Format	timespan
Default value	"P30D"

##### JSON Schema

```

{
    "category": "CATEGORY_WEBSERVER",
    "default": "P30D",
    "description": "DESC_COOKIEEXPIRATIONDATE",
    "format": "timespan",
    "propertyOrder": 13,
    "type": "string"
}

```

### 13.1.1.6.2 Maximum connections per client

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::MAXCONNECTIONSPERCLIENT
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Minimum	1
Default value	32

#### JSON Schema

```
{
  "category": "CATEGORY_WEBSERVER",
  "default": 32,
  "minimum": 1,
  "type": "integer"
}
```

### 13.1.1.6.3 Network Adapter

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::NETWORKADAPTER
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	string
Default value	

#### JSON Schema

```
{
  "category": "CATEGORY_WEBSERVER",
  "default": "",
  "type": "string"
}
```

### 13.1.1.6.4 Saved sessions

Sessions are saved here so that they are still valid after a server restart.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::SESSIONSTORAGE
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	object
------	--------

**JSON Schema**

```
{
  "additionalProperties": {
    "properties": {
      "created": {
        "format": "date-time",
        "type": "string"
      },
      "domain": {
        "type": "string"
      },
      "userName": {
        "type": "string"
      }
    },
    "required": [
      "created",
      "userName",
      "domain"
    ],
    "type": "object"
  },
  "category": "CATEGORY_WEBSERVER",
  "description": "DESC_SESSIONSTORAGE",
  "propertyOrder": 18,
  "type": "object"
}
```

**13.1.1.6.5 SSDP discovery**

Changes will become active after a server restart

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DISCOVERY
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Enumeration type	integer
Default value	2

**Options**

Value	Label
0	Disabled
1	Enabled
2	Enabled on alternative port

**JSON Schema**

```
{
  "category": "CATEGORY_WEBSERVER",
  "default": 2,
  "description": "DISCOVERY_DESC",
  "enum": [
    0,
    1,
    2
  ],
}
```

```

    "options": [
      {
        "label": "DISCOVERY_0_DISABLED",
        "value": 0
      },
      {
        "label": "DISCOVERY_1_ENABLED",
        "value": 1
      },
      {
        "label": "DISCOVERY_2_ALTERNATIVE",
        "value": 2
      }
    ],
    "propertyOrder": 1,
    "type": "integer"
  }
}

```

### 13.1.1.6.6 Remote Server

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::REMOTESERVERS
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	object
------	--------

#### JSON Schema

```

{
  "additionalProperties": {
    "additionalProperties": false,
    "configDescription": "DESC_REMOTESERVERS",
    "properties": {
      "REMOTE_CONNECT_TIMEOUT": {
        "default": "PT5S",
        "format": "timespan",
        "type": "string"
      },
      "REMOTE_ENABLED": {
        "default": true,
        "type": "boolean"
      },
      "REMOTE_PASSWORD": {
        "configDescription": "DESC_REMOTE_PASSWORD",
        "default": "",
        "format": "encrypted",
        "propertyOrder": 3,
        "type": "string"
      },
      "REMOTE_URL": {
        "propertyOrder": 1,
        "type": "string"
      },
      "REMOTE_USERNAME": {
        "configDescription": "DESC_REMOTE_USERNAME",
        "default": "",
        "propertyOrder": 2,
        "type": "string"
      }
    },
    "required": [
      "REMOTE_ENABLED",
      "REMOTE_URL",
      "REMOTE_USERNAME",
      "REMOTE_PASSWORD",
      "REMOTE_CONNECT_TIMEOUT"
    ]
  }
}

```

```

        "title": "REMOTESERVERS_TITLE",
        "type": "object"
    },
    "category": "CATEGORY_WEBSERVER",
    "propertyOrder": 100,
    "type": "object"
}

```

### 13.1.1.6.7 Allowed certificates for remote servers

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::REMOTESERVERS_CERTIFICATES
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	array
------	-------

#### JSON Schema

```

{
  "category": "CATEGORY_WEBSERVER",
  "items": {
    "configDescription": "DESC_PEM_CERT",
    "default": "",
    "format": "certificate",
    "type": "string"
  },
  "propertyOrder": 101,
  "type": "array"
}

```

### 13.1.1.6.8 Endpoints

IPv4 and IPv6 endpoints are supported. Only HTTPS endpoints should be enabled for remote access. Use the wildcard addresses '0.0.0.0' and '[::]' to accept remote connections on all network interfaces.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::ENDPOINTS
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	array
Unique items	Yes
Minimum number of elements	1

#### Default value

```

[
  "http://127.0.0.1:1010",
  "https://0.0.0.0:1020"
]

```

## JSON Schema

```
{
  "category": "CATEGORY_WEBSERVER",
  "default": [
    "http://127.0.0.1:1010",
    "https://0.0.0.0:1020"
  ],
  "description": "DESC_ENDPOINTS",
  "items": {
    "type": "string"
  },
  "minItems": 1,
  "propertyOrder": 2,
  "type": "array",
  "uniqueItems": true
}
```

### 13.1.1.6.9 Keep alive

Timer for persistent connections

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::KEEP_ALIVE
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	string
Format	timespan
Minimum	PT1S
Default value	PT40S

## JSON Schema

```
{
  "category": "CATEGORY_WEBSERVER",
  "configDescription": "DESC_KEEP_ALIVE",
  "default": "PT40S",
  "format": "timespan",
  "formatMinimum": "PT1S",
  "type": "string"
}
```

### 13.1.1.6.10 Socket timeout

Timeout for incomplete message body.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::SOCKET_TIMEOUT
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Format	timespan
Minimum	PT1S
Default value	"PT10S"

**JSON Schema**

```
{
  "category": "CATEGORY_WEBSERVER",
  "configDescription": "DESC_SOCKET_TIMEOUT",
  "default": "PT10S",
  "format": "timespan",
  "formatMinimum": "PT1S",
  "propertyOrder": 12,
  "type": "string"
}
```

**13.1.1.6.11 Enable ETAG**

The entity tag HTTP header is an identifier for a specific version of a resource.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::ETAGENABLED
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	boolean
Default value	True

**JSON Schema**

```
{
  "category": "CATEGORY_WEBSERVER",
  "configDescription": "DESC_ETAGENABLED",
  "default": true,
  "propertyOrder": 8,
  "type": "boolean"
}
```

**13.1.1.6.12 Enable GZIP**

GZIP compression is used by the server and web clients to improve transfer speed and bandwidth utilization.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::GZIPENABLED
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No



**Schema**

Type	boolean
Default value	True

**JSON Schema**

```
{
  "category": "CATEGORY_WEBSERVER",
  "default": true,
  "description": "DESC_GZIPENABLED",
  "propertyOrder": 9,
  "type": "boolean"
}
```

**13.1.1.6.13 GZIP minimum size**

Prevents small data from getting zipped.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::GZIPMINSIZE
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	integer
Maximum	4294967295
Default value	800

**JSON Schema**

```
{
  "allof": [
    {
      "$ref": "tchmi:general#/definitions/UINT32"
    },
    {
      "category": "CATEGORY_WEBSERVER",
      "configDescription": "DESC_GZIP_MIN_SIZE",
      "default": 800,
      "displayClass": "byte",
      "propertyOrder": 11
    }
  ]
}
```

**13.1.1.6.14 GZIP compression level**

GZIP compression is used by the server and web clients to improve transfer speed and bandwidth utilization.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DEFLATECOMPRESSIONLEVEL
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Enumeration type	integer
Minimum	0
Maximum	9
Default value	5

**Options**

Value	Label
1	Best Speed
5	Medium
9	Best Size

**JSON Schema**

```
{
  "category": "CATEGORY_WEBSERVER",
  "default": 5,
  "description": "DESC_DEFLATECOMPRESSIONLEVEL",
  "maximum": 9,
  "minimum": 0,
  "options": [
    {
      "label": "GZIP_BEST_SPEED",
      "value": 1
    },
    {
      "label": "GZIP_MEDIUM",
      "value": 5
    },
    {
      "label": "GZIP_BEST_SIZE",
      "value": 9
    }
  ],
  "propertyOrder": 12,
  "type": "integer"
}
```

**13.1.1.6.15 Enable PerMessageDeflate**

Try to enable compression for all WebSocket requests. Compression is not enabled for clients that don't support it.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::PERMESSAGEDEFLATEENABLED
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	boolean
Default value	True

**JSON Schema**

```
{
  "category": "CATEGORY_WEBSERVER",
  "default": true,
  "description": "DESC_PERMESSAGEDEFLATEENABLED",
}
```

```
{
  "propertyOrder": 10,
  "type": "boolean"
}
```

### 13.1.1.6.16 Enable cache

If enabled, the web-server stores frequently requested data such as web pages, images, and similar media content in RAM to improve response times.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CACHEENABLED
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	boolean
Default value	True

#### JSON Schema

```
{
  "category": "CATEGORY_WEBSERVER",
  "default": true,
  "description": "DESC_CACHEENABLED",
  "propertyOrder": 3,
  "type": "boolean"
}
```

### 13.1.1.6.17 Cache max entry size

Server restart required.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CACHEMAXENTRYSIZE
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Maximum	4294967295
Default value	1048576

#### JSON Schema

```
{
  "allof": [
    {
      "$ref": "tchmi:general#/definitions/UINT32"
    },
    {
      "category": "CATEGORY_WEBSERVER",
      "configDescription": "DESC_CACHE",
      "default": 1048576,
      "displayClass": "byte",
      "propertyOrder": 5
    }
  ]
}
```

```

    }
  ]
}

```

### 13.1.1.6.18 Cache max size

Server restart required.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CACHEMAXSIZE
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Maximum	4294967295
Default value	2097152

#### JSON Schema

```

{
  "allOf": [
    {
      "$ref": "tchmi:general#/definitions/UINT32"
    },
    {
      "category": "CATEGORY_WEBSERVER",
      "configDescription": "DESC_CACHE",
      "default": 2097152,
      "displayClass": "byte",
      "propertyOrder": 6
    }
  ]
}

```

### 13.1.1.6.19 Cache max age

Server restart required.

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CACHEMAXAGE
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	string
Format	timespan
Default value	"P30D"

#### JSON Schema

```

{
  "category": "CATEGORY_WEBSERVER",
  "configDescription": "DESC_CACHE",
  "default": "P30D",

```

```
{  "format": "timespan",  "propertyOrder": 4,  "type": "string"}
```

### 13.1.1.6.20 Enable remote administration

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::REMOTEADMINISTRATIONENABLED
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	boolean
Default value	True

#### JSON Schema

```
{  "category": "CATEGORY_WEBSERVER",  "default": true,  "type": "boolean"}
```

### 13.1.1.6.21 Enable plain administration

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::PLAINADMINISTRATIONENABLED
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	boolean
Default value	True

#### JSON Schema

```
{  "category": "CATEGORY_WEBSERVER",  "default": true,  "type": "boolean"}
```

### 13.1.1.6.22 Global HTTP(S) Headers

These headers will be added to all HTTP responses.

## General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::GLOBALHTTPHEADERS
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

## Schema

Type	string
Format	multiline

## Default value

```
{LASTMODIFIED}  
Strict-Transport-Security: max-age=31536000; includeSubDomains  
X-Content-Type-Options: nosniff  
Content-Security-Policy: frame-ancestors 'self'
```

## JSON Schema

```
{  
  "category": "CATEGORY_WEBSERVER",  
  "configDescription": "DESC_GLOBAL_HTTP_HEADERS",  
  "default": "{LASTMODIFIED}\nStrict-Transport-Security: max-age=31536000; includeSubDomains\nX-Content-Type-Options: nosniff\nContent-Security-Policy: frame-ancestors 'self'",  
  "format": "multiline",  
  "propertyOrder": 16,  
  "type": "string"  
}
```

### 13.1.1.6.23 Force Revalidation

by setting proper Cache-Control, Pragma and Expire header

## General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::REVALIDATION
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

## Schema

Type	boolean
Default value	True

## JSON Schema

```
{  
  "category": "CATEGORY_WEBSERVER",  
  "configDescription": "DESC_REFORCE_REVALIDATION",  
  "default": true,  
  "type": "boolean"  
}
```

### 13.1.1.6.24 Mime

#### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::MIME
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	object
------	--------

#### Default value

```
{
  "bin": {
    "MIME_TYPE": "application/octet-stream"
  },
  "bmp": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "image/bmp"
  },
  "cer": {
    "MIME_ENABLE_CACHE": false,
    "MIME_ENABLE_CHUNKING": false,
    "MIME_TYPE": "application/x-x509-ca-cert"
  },
  "config": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "text/xml"
  },
  "content": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "text/plain"
  },
  "css": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "text/css"
  },
  "dll": {
    "MIME_TYPE": "application/octet-stream"
  },
  "ear": {
    "MIME_TYPE": "application/java-archive"
  },
  "eot": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "vnd.ms-fontobject"
  },
  "exe": {
    "MIME_TYPE": "application/octet-stream"
  },
  "gif": {
    "MIME_TYPE": "image/gif"
  },
  "htm": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "text/html"
  },
  "html": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "text/html"
  },
  "ico": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "image/x-icon"
  },
  "img": {
    "MIME_TYPE": "application/octet-stream"
  },
  "iso": {
    "MIME_TYPE": "application/octet-stream"
  }
```

```

},
"jar": {
  "MIME_TYPE": "application/java-archive"
},
"jpeg": {
  "MIME_TYPE": "image/jpeg"
},
"jpg": {
  "MIME_TYPE": "image/jpeg"
},
"js": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/javascript"
},
"json": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/json"
},
"jsonp": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/javascript"
},
"localization": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/json"
},
"lp": {
  "MIME_ENABLE_CACHE": false,
  "MIME_HTTP_HEADERS": "no-store",
  "MIME_TYPE": "application/lp"
},
"lua": {
  "MIME_ENABLE_CACHE": false,
  "MIME_HTTP_HEADERS": "no-store",
  "MIME_TYPE": "application/lua"
},
"map": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/json"
},
"mp3": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_CHUNKING": false,
  "MIME_TYPE": "audio/mpeg"
},
"mp4": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_CHUNKING": false,
  "MIME_TYPE": "video/mp4"
},
"ogg": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_CHUNKING": false,
  "MIME_TYPE": "video/ogg"
},
"ogv": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_CHUNKING": false,
  "MIME_TYPE": "video/ogg"
},
"otf": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/font-sfnt"
},
"pdf": {
  "MIME_TYPE": "application/pdf"
},
"pem": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_CHUNKING": false,
  "MIME_TYPE": "application/x-pem-file"
},
"png": {
  "MIME_TYPE": "image/png"
},
"shtml": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "text/html"
},

```



```

"svg": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "image/svg+xml"
},
"theme": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/json"
},
"ttf": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/font-sfnt"
},
"txt": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "text/plain"
},
"usercontrol": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "text/plain"
},
"view": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "text/plain"
},
"war": {
  "MIME_TYPE": "application/java-archive"
},
"webm": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_CHUNKING": false,
  "MIME_TYPE": "video/webm"
},
"woff": {
  "MIME_TYPE": "application/font-woff"
},
"woff2": {
  "MIME_TYPE": "application/font-woff2"
},
"xml": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "text/xml"
},
"zip": {
  "MIME_TYPE": "application/zip"
}
}

```

## JSON Schema

```

{
  "additionalProperties": {
    "additionalProperties": false,
    "configDescription": "DESC_MIME",
    "properties": {
      "MIME_ENABLE_CACHE": {
        "default": true,
        "type": "boolean"
      },
      "MIME_ENABLE_CHUNKING": {
        "default": true,
        "type": "boolean"
      },
      "MIME_ENABLE_GZIP": {
        "default": false,
        "type": "boolean"
      },
      "MIME_HTTP_HEADERS": {
        "format": "multiline",
        "type": "string"
      },
      "MIME_TYPE": {
        "type": "string"
      }
    },
    "required": [
      "MIME_TYPE",
      "MIME_ENABLE_GZIP",
      "MIME_ENABLE_CACHE",
      "MIME_ENABLE_CHUNKING"
    ]
  },

```

```

    "title": "TITLE_MIME",
    "type": "object"
  },
  "category": "CATEGORY_WEBSERVER",
  "default": {
    "bin": {
      "MIME_TYPE": "application/octet-stream"
    },
    "bmp": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "image/bmp"
    },
    "cer": {
      "MIME_ENABLE_CACHE": false,
      "MIME_ENABLE_CHUNKING": false,
      "MIME_TYPE": "application/x-x509-ca-cert"
    },
    "config": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "text/xml"
    },
    "content": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "text/plain"
    },
    "css": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "text/css"
    },
    "dll": {
      "MIME_TYPE": "application/octet-stream"
    },
    "ear": {
      "MIME_TYPE": "application/java-archive"
    },
    "eot": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "vnd.ms-fontobject"
    },
    "exe": {
      "MIME_TYPE": "application/octet-stream"
    },
    "gif": {
      "MIME_TYPE": "image/gif"
    },
    "htm": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "text/html"
    },
    "html": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "text/html"
    },
    "ico": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "image/x-icon"
    },
    "img": {
      "MIME_TYPE": "application/octet-stream"
    },
    "iso": {
      "MIME_TYPE": "application/octet-stream"
    },
    "jar": {
      "MIME_TYPE": "application/java-archive"
    },
    "jpeg": {
      "MIME_TYPE": "image/jpeg"
    },
    "jpg": {
      "MIME_TYPE": "image/jpeg"
    },
    "js": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "application/javascript"
    },
    "json": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "application/json"
    },
  },

```

```
"jsonp": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/javascript"
},
"localization": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/json"
},
"lp": {
  "MIME_ENABLE_CACHE": false,
  "MIME_HTTP_HEADERS": "no-store",
  "MIME_TYPE": "application/lp"
},
"lua": {
  "MIME_ENABLE_CACHE": false,
  "MIME_HTTP_HEADERS": "no-store",
  "MIME_TYPE": "application/lua"
},
"map": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/json"
},
"mp3": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_CHUNKING": false,
  "MIME_TYPE": "audio/mpeg"
},
"mp4": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_CHUNKING": false,
  "MIME_TYPE": "video/mp4"
},
"ogg": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_CHUNKING": false,
  "MIME_TYPE": "video/ogg"
},
"ogv": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_CHUNKING": false,
  "MIME_TYPE": "video/ogg"
},
"otf": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/font-sfnt"
},
"pdf": {
  "MIME_TYPE": "application/pdf"
},
"pem": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_CHUNKING": false,
  "MIME_TYPE": "application/x-pem-file"
},
"png": {
  "MIME_TYPE": "image/png"
},
"shtml": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "text/html"
},
"svg": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "image/svg+xml"
},
"theme": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/json"
},
"ttf": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/font-sfnt"
},
"txt": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "text/plain"
},
"usercontrol": {
  "MIME_ENABLE_GZIP": true,
```

```
        "MIME_TYPE": "text/plain"
    },
    "view": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/plain"
    },
    "war": {
        "MIME_TYPE": "application/java-archive"
    },
    "webm": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "video/webm"
    },
    "woff": {
        "MIME_TYPE": "application/font-woff"
    },
    "woff2": {
        "MIME_TYPE": "application/font-woff2"
    },
    "xml": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/xml"
    },
    "zip": {
        "MIME_TYPE": "application/zip"
    }
},
"type": "object"
}
```

#### 13.1.1.6.25 Client-Cache max age

Defines how long server responses may be cached.

##### General Information

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CLIENT_CACHE_MAX_AGE
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

##### Schema

Type	integer
Minimum	0
Default value	0

##### JSON Schema

```
{
  "category": "CATEGORY_WEBSERVER",
  "configDescription": "DESC_CLIENT_CACHE_MAX_AGE",
  "default": 0,
  "displayClass": "seconds",
  "minimum": 0,
  "propertyOrder": 14,
  "type": "integer"
}
```

#### 13.1.1.6.26 Client priority list

IP addresses of preferred clients. If the client limit is reached these clients will be able to connect and clients which are not in this list will be disconnected.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::CLIENTPRIORITYLIST
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	array
------	-------

**JSON Schema**

```
{
  "category": "CATEGORY_WEBSERVER",
  "configDescription": "DESC_CLIENTPRIORITYLIST",
  "items": {
    "type": "string"
  },
  "propertyOrder": 15,
  "type": "array"
}
```

**13.1.1.6.27 Keep alive**

Timer for persistent connections.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::KEEP_ALIVE
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Format	timespan
Minimum	PT1S
Default value	"PT40S"

**JSON Schema**

```
{
  "category": "CATEGORY_WEBSERVER",
  "configDescription": "DESC_KEEP_ALIVE",
  "default": "PT40S",
  "format": "timespan",
  "formatMinimum": "PT1S",
  "propertyOrder": 13,
  "type": "string"
}
```

**13.1.1.6.28 Force Revalidation**

Works by setting proper Cache-Control, Pragma and Expire headers.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::REVALIDATION
Category	Webserver
Property is hidden	Yes
Contained in every configuration by default	No

**Schema**

Type	boolean
Default value	True

**JSON Schema**

```
{
  "category": "CATEGORY_WEBSERVER",
  "configDescription": "DESC_REFORCE_REVALIDATION",
  "default": true,
  "hidden": true,
  "propertyOrder": 7,
  "type": "boolean"
}
```

**13.1.1.6.29 MIME HTTP headers**

Mappings for internet media types.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::MIME
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	object
------	--------

**Default value**

```
{
  "bin": {
    "MIME_TYPE": "application/octet-stream"
  },
  "bmp": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "image/bmp"
  },
  "cer": {
    "MIME_ENABLE_CACHE": false,
    "MIME_ENABLE_CHUNKING": false,
    "MIME_TYPE": "application/x-x509-ca-cert"
  },
  "config": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "text/xml"
  },
  "content": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "text/plain"
  },
  "css": {
    "MIME_ENABLE_GZIP": true,
    "MIME_TYPE": "text/css"
  },
}
```

```
"dll": {
  "MIME_TYPE": "application/octet-stream"
},
"ear": {
  "MIME_TYPE": "application/java-archive"
},
"eot": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "vnd.ms-fontobject"
},
"exe": {
  "MIME_TYPE": "application/octet-stream"
},
"gif": {
  "MIME_TYPE": "image/gif"
},
"htm": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "text/html"
},
"html": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "text/html"
},
"ico": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "image/x-icon"
},
"img": {
  "MIME_TYPE": "application/octet-stream"
},
"iso": {
  "MIME_TYPE": "application/octet-stream"
},
"jar": {
  "MIME_TYPE": "application/java-archive"
},
"jpeg": {
  "MIME_TYPE": "image/jpeg"
},
"jpg": {
  "MIME_TYPE": "image/jpeg"
},
"js": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/javascript"
},
"json": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/json"
},
"jsonp": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/javascript"
},
"localization": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/json"
},
"lp": {
  "MIME_ENABLE_CACHE": false,
  "MIME_HTTP_HEADERS": "no-store",
  "MIME_TYPE": "application/lp"
},
"lua": {
  "MIME_ENABLE_CACHE": false,
  "MIME_HTTP_HEADERS": "no-store",
  "MIME_TYPE": "application/lua"
},
"map": {
  "MIME_ENABLE_CACHE": false,
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/json"
},
"mjs": {
  "MIME_ENABLE_GZIP": true,
  "MIME_TYPE": "application/javascript"
},
"mp3": {
  "MIME_ENABLE_CACHE": false,
```

```

        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "audio/mpeg"
    },
    "mp4": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "video/mp4"
    },
    "ogg": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "video/ogg"
    },
    "ogv": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "video/ogg"
    },
    "otf": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/font-sfnt"
    },
    "pdf": {
        "MIME_TYPE": "application/pdf"
    },
    "pem": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "application/x-pem-file"
    },
    "png": {
        "MIME_TYPE": "image/png"
    },
    "shtml": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/html"
    },
    "svg": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "image/svg+xml"
    },
    "theme": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/json"
    },
    "ttf": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/font-sfnt"
    },
    "txt": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/plain"
    },
    "usercontrol": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/plain"
    },
    "view": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/plain"
    },
    "war": {
        "MIME_TYPE": "application/java-archive"
    },
    "webm": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "video/webm"
    },
    "woff": {
        "MIME_TYPE": "application/font-woff"
    },
    "woff2": {
        "MIME_TYPE": "application/font-woff2"
    },
    "xml": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/xml"
    },
    "zip": {

```



```

    "MIME_TYPE": "application/zip"
  }
}

```

## JSON Schema

```

{
  "additionalProperties": {
    "additionalProperties": false,
    "properties": {
      "MIME_ENABLE_CACHE": {
        "default": true,
        "type": "boolean"
      },
      "MIME_ENABLE_CHUNKING": {
        "default": true,
        "type": "boolean"
      },
      "MIME_ENABLE_GZIP": {
        "default": false,
        "type": "boolean"
      },
      "MIME_HTTP_HEADERS": {
        "format": "multiline",
        "type": "string"
      },
      "MIME_TYPE": {
        "type": "string"
      }
    },
    "required": [
      "MIME_TYPE",
      "MIME_ENABLE_GZIP",
      "MIME_ENABLE_CACHE",
      "MIME_ENABLE_CHUNKING"
    ],
    "title": "TITLE_MIME",
    "type": "object"
  },
  "category": "CATEGORY_WEBSERVER",
  "configDescription": "DESC_MIME",
  "default": {
    "bin": {
      "MIME_TYPE": "application/octet-stream"
    },
    "bmp": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "image/bmp"
    },
    "cer": {
      "MIME_ENABLE_CACHE": false,
      "MIME_ENABLE_CHUNKING": false,
      "MIME_TYPE": "application/x-x509-ca-cert"
    },
    "config": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "text/xml"
    },
    "content": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "text/plain"
    },
    "css": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "text/css"
    },
    "dll": {
      "MIME_TYPE": "application/octet-stream"
    },
    "ear": {
      "MIME_TYPE": "application/java-archive"
    },
    "eot": {
      "MIME_ENABLE_GZIP": true,
      "MIME_TYPE": "vnd.ms-fontobject"
    },
    "exe": {
      "MIME_TYPE": "application/octet-stream"
    },
    "gif": {

```

```

        "MIME_TYPE": "image/gif"
    },
    "htm": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/html"
    },
    "html": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/html"
    },
    "ico": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "image/x-icon"
    },
    "img": {
        "MIME_TYPE": "application/octet-stream"
    },
    "iso": {
        "MIME_TYPE": "application/octet-stream"
    },
    "jar": {
        "MIME_TYPE": "application/java-archive"
    },
    "jpeg": {
        "MIME_TYPE": "image/jpeg"
    },
    "jpg": {
        "MIME_TYPE": "image/jpeg"
    },
    "js": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/javascript"
    },
    "json": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/json"
    },
    "jsonp": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/javascript"
    },
    "localization": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/json"
    },
    "lp": {
        "MIME_ENABLE_CACHE": false,
        "MIME_HTTP_HEADERS": "no-store",
        "MIME_TYPE": "application/lp"
    },
    "lua": {
        "MIME_ENABLE_CACHE": false,
        "MIME_HTTP_HEADERS": "no-store",
        "MIME_TYPE": "application/lua"
    },
    "map": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/json"
    },
    "mjs": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/javascript"
    },
    "mp3": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "audio/mpeg"
    },
    "mp4": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "video/mp4"
    },
    "ogg": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "video/ogg"
    },
    "ogv": {

```

```

        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "video/ogg"
    },
    "otf": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/font-sfnt"
    },
    "pdf": {
        "MIME_TYPE": "application/pdf"
    },
    "pem": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "application/x-pem-file"
    },
    "png": {
        "MIME_TYPE": "image/png"
    },
    "shtml": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/html"
    },
    "svg": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "image/svg+xml"
    },
    "theme": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/json"
    },
    "ttf": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "application/font-sfnt"
    },
    "txt": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/plain"
    },
    "usercontrol": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/plain"
    },
    "view": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/plain"
    },
    "war": {
        "MIME_TYPE": "application/java-archive"
    },
    "webm": {
        "MIME_ENABLE_CACHE": false,
        "MIME_ENABLE_CHUNKING": false,
        "MIME_TYPE": "video/webm"
    },
    "woff": {
        "MIME_TYPE": "application/font-woff"
    },
    "woff2": {
        "MIME_TYPE": "application/font-woff2"
    },
    "xml": {
        "MIME_ENABLE_GZIP": true,
        "MIME_TYPE": "text/xml"
    },
    "zip": {
        "MIME_TYPE": "application/zip"
    }
},
"propertyOrder": 17,
"type": "object"
}

```

### 13.1.1.6.30 Default document

This default page is served when a web client requests a URL that points to a directory structure instead of an actual web page within the directory structure.

**General Information**

Domain	TcHmiSrv
Full symbol path	TcHmiSrv.Config::DEFAULTDOCUMENT
Category	Webserver
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	array
Unique items	Yes

**Default value**

```
[  
  "Default.html"  
]
```

**JSON Schema**

```
{  
  "category": "CATEGORY_WEBSERVER",  
  "default": [  
    "Default.html"  
  ],  
  "description": "DESC_DEFAULTDOCUMENT",  
  "items": {  
    "format": "filename",  
    "type": "string"  
  },  
  "type": "array",  
  "uniqueItems": true  
}
```

## 13.1.2 ADS

**Type Definitions**

Name	Description
------	-------------

## General Properties

Symbol name	Text	Description
<a href="#">TIMEOUT [► 1385]</a>	Timeout	Default timeout for ADS requests
<a href="#">RUNTIME STATE CHECK TIMEOUT [► 1386]</a>	Maximum timeout for determining the runtime status	A configured runtime is considered unreachable if a request takes longer than this timeout.
<a href="#">RUNTIME STATE CHECK INTERVAL [► 1386]</a>	Runtime state check interval	The state of each configured runtime is checked periodically.
<a href="#">RUNTIMES [► 1387]</a>	Runtimes	An ADS connection is established to all enabled runtimes.
<a href="#">IGNORED PLC ATTRIBUTES [► 1388]</a>	Ignored PLC attributes	Attribute pragmas are added to the JSON schema. The attributes configured here are hidden.
<a href="#">VISIBLE RUNTIME PORTS [► 1389]</a>	Visible runtime ports	Target systems might have many ADS ports. Most of them are rarely used in HMI projects.
<a href="#">RESPONSE SIZE LIMIT [► 1390]</a>	Limit response size of ADS requests	The PLC task is locked for every request. If the request is too large, the PLC cycle time might be exceeded.
<a href="#">SUM REQUEST LIMIT [► 1391]</a>	Limit the number of ADS requests that can be bundled in one sum request	The PLC task is locked for every request. If a sum request contains too many requests, the PLC cycle time might be exceeded.
<a href="#">NEW HANDLES PER SUM REQUEST LIMIT [► 1391]</a>	Limit the number of ADS handles created by a sum request	TwinCAT's handle buffer is not resized in the middle of a sum request. Creating too many ADS handles in a single sum request causes errors if TwinCAT's handle buffer is full.
<a href="#">ENABLE READ BEFORE WRITE [► 1392]</a>	Support incomplete writes by reading before writing	Variables that are hidden or not set in the write request will be overwritten with an old value. Disable this setting to prevent side-effects and improve performance.

### 13.1.2.1 General Properties

#### 13.1.2.1.1 Timeout

Default timeout for ADS requests

#### General Information

Domain	ADS
Full symbol path	ADS.Config::TIMEOUT
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	string
Format	timespan
Minimum	PT0.1S
Default value	"PT1S"

## JSON Schema

```
{
  "configDescription": "DESC_TIMEOUT",
  "default": "PT1S",
  "format": "timespan",
  "formatMinimum": "PT0.1S",
  "propertyOrder": 2,
  "type": "string"
}
```

### 13.1.2.1.2 Maximum timeout for determining the runtime status

A configured runtime is considered unreachable if a request takes longer than this timeout.

#### General Information

Domain	ADS
Full symbol path	ADS.Config::RUNTIME_STATE_CHECK_TIMEOUT
Property is hidden	Yes
Contained in every configuration by default	No

#### Schema

Type	string
Format	timespan
Minimum	PT1S
Maximum	PT30S
Default value	"PT5S"

## JSON Schema

```
{
  "default": "PT5S",
  "description": "DESC_RUNTIME_STATE_CHECK_TIMEOUT",
  "format": "timespan",
  "formatMaximum": "PT30S",
  "formatMinimum": "PT1S",
  "hidden": true,
  "propertyOrder": 3,
  "type": "string"
}
```

### 13.1.2.1.3 Runtime state check interval

The state of each configured runtime is checked periodically.

#### General Information

Domain	ADS
Full symbol path	ADS.Config::RUNTIME_STATE_CHECK_INTERVAL
Property is hidden	Yes
Contained in every configuration by default	No

#### Schema

Type	string
Format	timespan
Minimum	PT1S
Maximum	PT30S
Default value	"PT2S"

## JSON Schema

```
{
  "default": "PT2S",
  "description": "DESC_RUNTIME_STATE_CHECK_INTERVAL",
  "format": "timespan",
  "formatMaximum": "PT30S",
  "formatMinimum": "PT1S",
  "hidden": true,
  "propertyOrder": 4,
  "type": "string"
}
```

### 13.1.2.1.4 Runtimes

An ADS connection is established to all enabled runtimes.

#### General Information

Domain	ADS
Full symbol path	ADS.Config::RUNTIMES
Property is hidden	No
Contained in every configuration by default	Yes

#### Schema

Type	object
------	--------

#### Default value

```
{
  "PLC1": {
    "ENABLED": true,
    "NETID": "127.0.0.1.1.1",
    "PORT": 851,
    "SYMBOLS": {},
    "USE_WHITELISTING": false
  }
}
```

## JSON Schema

```
{
  "additionalProperties": {
    "additionalProperties": false,
    "configDescription": "DESC_RUNTIME",
    "properties": {
      "ENABLED": {
        "default": true,
        "propertyOrder": 1,
        "type": "boolean"
      },
      "NETID": {
        "allOf": [
          {
            "$ref": "tchmi:server#/definitions/adsRoute"
          },
          {
            "propertyOrder": 2
          }
        ]
      },
      "PORT": {
        "default": 851,
        "minimum": 0,
        "optionMethod": {
          "symbol": "RuntimePorts",
          "writeValue": {
            "NETID": {
              "$data": "#/properties/RUNTIMES/additionalProperties/NETID"
            }
          }
        }
      }
    }
  }
}
```

```

        "propertyOrder": 3,
        "type": "integer"
    },
    "SYMBOLS": {
        "additionalProperties": {
            "configDescription": "DESC_SYMBOL",
            "properties": {
                "INDEXGROUP": {
                    "$ref": "tchmi:general#/definitions/UINT32"
                },
                "INDEXOFFSET": {
                    "$ref": "tchmi:general#/definitions/UINT32"
                },
                "TYPENAME": {
                    "configDescription": "DESC_TYPENAME",
                    "optionMethod": {
                        "symbol": "ListCommonTypes"
                    },
                    "type": "string"
                }
            }
        },
        "required": [
            "INDEXGROUP",
            "INDEXOFFSET",
            "TYPENAME"
        ],
        "type": "object"
    },
    "default": {},
    "propertyOrder": 5,
    "type": "object"
},
"USE_WHITELISTING": {
    "default": false,
    "propertyOrder": 4,
    "type": "boolean"
}
},
"required": [
    "PORT",
    "USE_WHITELISTING",
    "NETID",
    "ENABLED",
    "SYMBOLS"
],
"type": "object"
},
"configDescription": "DESC_RUNTIMES",
"default": {
    "PLC1": {
        "ENABLED": true,
        "NETID": "127.0.0.1.1.1",
        "PORT": 851,
        "SYMBOLS": {},
        "USE_WHITELISTING": false
    }
},
"defaultConfigurable": true,
"propertyOrder": 1,
"type": "object"
}

```

### 13.1.2.1.5 Ignored PLC attributes

Attribute pragmas are added to the JSON schema. The attributes configured here are hidden.

#### General Information

Domain	ADS
Full symbol path	ADS.Config::IGNORED_PLC_ATTRIBUTES
Property is hidden	Yes
Contained in every configuration by default	No



**Schema**

Type	array
------	-------

**Default value**

```
[
  "DisplayMinValue",
  "DisplayMaxValue",
  "LowerBorder",
  "UpperBorder",
  "TcRpcEnable",
  "TcHmiSymbol.ReadOnly",
  "TcHmiSymbol.AddSymbol",
  "TcHmiSymbol.AddSymbol.UserGroups",
  "TcHmiSymbol.AddSymbol.Hidden"
]
```

**JSON Schema**

```
{
  "default": [
    "DisplayMinValue",
    "DisplayMaxValue",
    "LowerBorder",
    "UpperBorder",
    "TcRpcEnable",
    "TcHmiSymbol.ReadOnly",
    "TcHmiSymbol.AddSymbol",
    "TcHmiSymbol.AddSymbol.UserGroups",
    "TcHmiSymbol.AddSymbol.Hidden"
  ],
  "description": "DESC_IGNORED_PLC_ATTRIBUTES",
  "hidden": true,
  "items": {
    "type": "string"
  },
  "propertyOrder": 5,
  "type": "array"
}
```

**13.1.2.1.6 Visible runtime ports**

Target systems might have many ADS ports. Most of them are rarely used in HMI projects.

**General Information**

Domain	ADS
Full symbol path	ADS.Config::VISIBLE_RUNTIME_PORTS
Property is hidden	Yes
Contained in every configuration by default	No

**Schema**

Type	array
------	-------

**Default value**

```
[
  301,
  302,
  303,
  304,
  350,
  351,
  352,
  353,
  354,
  355,
  501,
  801,
  811,
```

```
821,  
831,  
851,  
852,  
853,  
854,  
10000,  
19800  
]
```

### JSON Schema

```
{  
  "default": [  
    301,  
    302,  
    303,  
    304,  
    350,  
    351,  
    352,  
    353,  
    354,  
    355,  
    501,  
    801,  
    811,  
    821,  
    831,  
    851,  
    852,  
    853,  
    854,  
    10000,  
    19800  
  ],  
  "description": "DESC_VISIBLE_RUNTIME_PORTS",  
  "hidden": true,  
  "items": {  
    "allof": [  
      {  
        "$ref": "tchmi:general#/definitions/UINT16"  
      },  
      {  
        "minimum": 1  
      }  
    ]  
  },  
  "propertyOrder": 6,  
  "type": "array"  
}
```

#### 13.1.2.1.7 Limit response size of ADS requests

The PLC task is locked for every request. If the request is too large, the PLC cycle time might be exceeded.

#### General Information

Domain	ADS
Full symbol path	ADS.Config::RESPONSE_SIZE_LIMIT
Property is hidden	Yes
Contained in every configuration by default	No

#### Schema

Type	integer
Minimum	2048
Default value	2097152

**JSON Schema**

```
{
  "allof": [
    {
      "$ref": "tchmi:general#/definitions/INT32"
    },
    {
      "default": 2097152,
      "description": "DESC_RESPONSE_SIZE_LIMIT",
      "displayClass": "byte",
      "hidden": true,
      "minimum": 2048,
      "propertyOrder": 7,
      "type": "integer"
    }
  ]
}
```

### 13.1.2.1.8 Limit the number of ADS requests that can be bundled in one sum request

The PLC task is locked for every request. If a sum request contains too many requests, the PLC cycle time might be exceeded.

**General Information**

Domain	ADS
Full symbol path	ADS.Config::SUM_REQUEST_LIMIT
Property is hidden	Yes
Contained in every configuration by default	No

**Schema**

Type	integer
Minimum	1
Maximum	1000
Default value	500

**JSON Schema**

```
{
  "default": 500,
  "description": "DESC_SUM_REQUEST_LIMIT",
  "hidden": true,
  "maximum": 1000,
  "minimum": 1,
  "propertyOrder": 8,
  "type": "integer"
}
```

### 13.1.2.1.9 Limit the number of ADS handles created by a sum request

TwinCAT's handle buffer is not resized in the middle of a sum request. Creating too many ADS handles in a single sum request causes errors if TwinCAT's handle buffer is full.

**General Information**

Domain	ADS
Full symbol path	ADS.Config::NEW_HANDLES_PER_SUM_REQUEST_LIMIT
Property is hidden	Yes
Contained in every configuration by default	No

**Schema**

Type	integer
Minimum	1
Maximum	1000
Default value	100

**JSON Schema**

```
{
  "default": 100,
  "description": "DESC_NEW_HANDLES_PER_SUM_REQUEST_LIMIT",
  "hidden": true,
  "maximum": 1000,
  "minimum": 1,
  "propertyOrder": 9,
  "type": "integer"
}
```

**13.1.2.1.10 Support incomplete writes by reading before writing**

Variables that are hidden or not set in the write request will be overwritten with an old value. Disable this setting to prevent side-effects and improve performance.

**General Information**

Domain	ADS
Full symbol path	ADS.Config::ENABLE_READ_BEFORE_WRITE
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	boolean
Default value	True

**JSON Schema**

```
{
  "default": true,
  "description": "DESC_ENABLE_READ_BEFORE_WRITE",
  "propertyOrder": 10,
  "type": "boolean"
}
```

**13.1.2.2 Type Definitions****13.1.2.2.1 adsState**

ADS state

**General Information**

Domain	ADS
--------	-----

**Schema**

Enumeration type	integer
------------------	---------

## Options

Value	Label
0	Invalid
1	Idle
2	Reset
3	Init
4	Start
5	Run
6	Stop
7	Save Configuration
8	Load Configuration
9	Power Failure
10	Power Good
11	Error
12	Shutdown
13	Suspend
14	Resume
15	Config
16	Reconfiguring
17	Stopping
18	Incompatible
19	Exception

## JSON Schema

```
{
  "enum": [
    0,
    1,
    2,
    3,
    4,
    5,
    6,
    7,
    8,
    9,
    10,
    11,
    12,
    13,
    14,
    15,
    16,
    17,
    18,
    19
  ],
  "options": [
    {
      "label": "adsStateInvalid",
      "value": 0
    },
    {
      "label": "adsStateIdle",
      "value": 1
    },
    {
      "label": "adsStateReset",
      "value": 2
    },
    {
      "label": "adsStateInit",
      "value": 3
    },
    {
```

```

        "label": "adsStateStart",
        "value": 4
    },
    {
        "label": "adsStateRun",
        "value": 5
    },
    {
        "label": "adsStateStop",
        "value": 6
    },
    {
        "label": "adsStateSaveCfg",
        "value": 7
    },
    {
        "label": "adsStateLoadCfg",
        "value": 8
    },
    {
        "label": "adsStatePowerFailure",
        "value": 9
    },
    {
        "label": "adsStatePowerGood",
        "value": 10
    },
    {
        "label": "adsStateError",
        "value": 11
    },
    {
        "label": "adsStateShutdown",
        "value": 12
    },
    {
        "label": "adsStateSuspend",
        "value": 13
    },
    {
        "label": "adsStateResume",
        "value": 14
    },
    {
        "label": "adsStateConfig",
        "value": 15
    },
    {
        "label": "adsStateReconfig",
        "value": 16
    },
    {
        "label": "adsStateStopping",
        "value": 17
    },
    {
        "label": "adsStateIncompatible",
        "value": 18
    },
    {
        "label": "adsStateException",
        "value": 19
    }
    ],
    "type": "integer"
}

```

### 13.1.3 TcHmiAlarm

#### General Properties

Symbol name	Text	Description
<a href="#">limitEventCount</a> [► 1396]	Limit Event Count	Active alarms will always be imported, even if this limit is thereby exceeded.
<a href="#">alarmSymbols</a> [► 1397]	Alarm Symbols	This list contains all configured alarm symbols.

### 13.1.3.1 General Properties

#### 13.1.3.1.1 Alarm list

This list contains all configured alarms

##### General Information

Domain	TcHmiAlarm
Full symbol path	TcHmiAlarm.Config::alarmList
Property is hidden	No
Contained in every configuration by default	No

##### Schema

Type	object
------	--------

##### JSON Schema

```
{
  "additionalProperties": {
    "configDescription": "DESC_ALARM_SYMBOL",
    "optionMethod": {
      "symbol": "ListSymbolNames"
    },
  },
  "properties": {
    "enabled": {
      "default": true,
      "type": "boolean"
    },
    "onError": {
      "default": true,
      "type": "boolean"
    },
    "rangeList": {
      "additionalProperties": {
        "additionalProperties": false,
        "configDescription": "DESC_RANGE",
        "properties": {
          "alarmName": {
            "propertyOrder": 9,
            "type": "string"
          },
          "enabled": {
            "default": true,
            "propertyOrder": 1,
            "type": "boolean"
          },
          "eventType": {
            "default": 0,
            "enum": [
              0,
              1
            ],
            "options": [
              {
                "label": "enum_0_alarm",
                "value": 0
              },
              {
                "label": "enum_1_message",
                "value": 1
              }
            ],
            "propertyOrder": 2,
            "type": "integer"
          },
          "filterString": {
            "configDescription": "DESC_FILTER",
            "propertyOrder": 8,
            "type": "string"
          },
          "interval": {
```

```

        "default": "PT1S",
        "format": "timespan",
        "propertyOrder": 4,
        "type": "string"
    },
    "severity": {
        "$ref": "tchmi:server#/definitions/severity",
        "propertyOrder": 3
    }
},
"required": [
    "severity",
    "interval",
    "filterString",
    "eventType",
    "enabled"
],
"title": "range",
"type": "object"
},
"type": "object"
}
},
"required": [
    "rangeList",
    "enabled",
    "onError"
],
"title": "titleAlarmSymbol",
"type": "object"
},
"configDescription": "DESC_ALARM_LIST",
"type": "object"
}

```

### 13.1.3.1.2 Limit Event Count

Active alarms will always be imported, even if this limit is thereby exceeded.

#### General Information

Domain	TcHmiAlarm
Full symbol path	TcHmiAlarm.Config::limitEventCount
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Minimum	1
Default value	1000

#### JSON Schema

```

{
  "allOf": [
    {
      "$ref": "tchmi:general#/definitions/UINT32"
    },
    {
      "configDescription": "DESC_LIMIT_EVENT_COUNT",
      "default": 1000,
      "minimum": 1,
      "propertyOrder": 1,
      "type": "integer"
    }
  ]
}

```



### 13.1.3.1.3 Alarm Symbols

This list contains all configured alarm symbols.

#### General Information

Domain	TcHmiAlarm
Full symbol path	TcHmiAlarm.Config::alarmSymbols
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	object
------	--------

#### JSON Schema

```
{
  "additionalProperties": {
    "configDescription": "DESC_ALARM_SYMBOL",
    "optionMethod": {
      "symbol": "ListSymbolNames"
    },
    "properties": {
      "alarmSettings": {
        "additionalProperties": {
          "additionalProperties": false,
          "configDescription": "alarmSetting",
          "properties": {
            "alarmTextKey": {
              "propertyOrder": 9,
              "type": "string"
            },
            "condition": {
              "allOf": [
                {
                  "$ref": "tchmi:server#/definitions/filter"
                },
                {
                  "minItems": 1
                },
                {
                  "configDescription": "DESC_CONDITION",
                  "propertyOrder": 8
                }
              ]
            },
            "enabled": {
              "default": true,
              "propertyOrder": 1,
              "type": "boolean"
            },
            "notificationType": {
              "default": 1,
              "enum": [
                0,
                1,
                2
              ],
              "options": [
                {
                  "label": "enum_0_message",
                  "value": 0
                },
                {
                  "label": "enum_1_alarm_with_confirmation",
                  "value": 1
                },
                {
                  "label": "enum_2_alarm",
                  "value": 2
                }
              ]
            },
            "propertyOrder": 2,

```

```

        "type": "integer"
    },
    "severity": {
        "$ref": "tchmi:server#/definitions/severity",
        "propertyOrder": 3
    }
},
"required": [
    "severity",
    "condition",
    "notificationType",
    "enabled"
],
"type": "object"
},
"propertyOrder": 3,
"type": "object"
},
"enabled": {
    "default": true,
    "propertyOrder": 0,
    "type": "boolean"
},
"interval": {
    "default": "PT1S",
    "format": "timespan",
    "formatMinimum": "PT0.01S",
    "propertyOrder": 2,
    "type": "string"
},
"onError": {
    "configDescription": "DESC_ON_ERROR",
    "default": false,
    "hidden": true,
    "propertyOrder": 1,
    "type": "boolean"
}
},
"required": [
    "alarmSettings",
    "enabled",
    "onError",
    "interval"
],
"title": "titleAlarmSymbol",
"type": "object"
},
"configDescription": "DESC_ALARM_SYMBOLS",
"propertyOrder": 2,
"type": "object"
}

```

## 13.1.4 TcHmiEventLogger

### General Properties

Symbol name	Text	Description
LIMIT_EVENT_COUNT ▶ 1400	Limit event count	Active alarms are always imported, even if this limit is exceeded as a result.
TARGET_SYSTEMS ▶ 1399	Target Systems	Target systems from which events and alarms are collected.

### 13.1.4.1 General Properties

#### 13.1.4.1.1 Limit initial event import

When a target system is initialized, the newest existing events are imported. Active alarms will always be imported, even if this limit is thereby exceeded.

**General Information**

Domain	TcHmiEventLogger
Full symbol path	TcHmiEventLogger.Config::LIMIT_INITIAL_EVENT_IMPORT
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	integer
Maximum	4294967295
Default value	1000

**JSON Schema**

```
{
  "allOf": [
    {
      "$ref": "tchmi:general#/definitions/UINT32"
    },
    {
      "configDescription": "DESC_LIMIT_INITIAL_EVENT_IMPORT",
      "default": 1000,
      "propertyOrder": 2
    }
  ]
}
```

**13.1.4.1.2 Target Systems**

Target systems from which events and alarms are collected.

**General Information**

Domain	TcHmiEventLogger
Full symbol path	TcHmiEventLogger.Config::TARGET_SYSTEMS
Property is hidden	No
Contained in every configuration by default	Yes

**Schema**

Type	object
------	--------

**Default value**

```
{
  "Local": {
    "ADDRESS": "127.0.0.1.1.1",
    "ENABLED": true
  }
}
```

**JSON Schema**

```
{
  "additionalProperties": {
    "additionalProperties": false,
    "configDescription": "DESC_TARGET_SYSTEM",
    "properties": {
      "ADDRESS": {
        "$ref": "tchmi:server#/definitions/adsRoute"
      },
      "ENABLED": {
        "default": true,
        "type": "boolean"
      }
    }
  },
}
```

```

    "required": [
      "ADDRESS",
      "ENABLED"
    ],
    "type": "object"
  },
  "configDescription": "DESC_TARGET_SYSTEMS",
  "default": {
    "Local": {
      "ADDRESS": "127.0.0.1.1.1",
      "ENABLED": true
    }
  },
  "defaultConfigurable": true,
  "propertyOrder": 1,
  "type": "object"
}

```

### 13.1.4.1.3 Limit event count

Active alarms are always imported, even if this limit is exceeded as a result.

#### General Information

Domain	TcHmiEventLogger
Full symbol path	TcHmiEventLogger.Config::LIMIT_EVENT_COUNT
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Maximum	4294967295
Default value	1000

#### JSON Schema

```

{
  "allof": [
    {
      "$ref": "tchmi:general#/definitions/UINT32"
    },
    {
      "configDescription": "DESC_LIMIT_EVENT_COUNT",
      "default": 1000,
      "propertyOrder": 2
    }
  ]
}

```

## 13.1.5 TcHmiLua

#### General Properties

Symbol name	Text	Description
<a href="#">HTML_ERRORS [► 1401]</a>	Show errors in HTML	For security reasons, this error output should be disabled.
<a href="#">SCRIPT_TIMEOUT [► 1401]</a>	Script timeout	Timeout after which the execution of a Lua script is aborted.

### 13.1.5.1 General Properties

#### 13.1.5.1.1 Show errors in HTML

For security reasons, this error output should be disabled.

##### General Information

Domain	TcHmiLua
Full symbol path	TcHmiLua.Config::HTML_ERRORS
Property is hidden	No
Contained in every configuration by default	No

##### Schema

Type	boolean
Default value	False

##### JSON Schema

```
{
  "configDescription": "DESC_HTML_ERRORS",
  "default": false,
  "type": "boolean"
}
```

#### 13.1.5.1.2 Script timeout

Timeout after which the execution of a Lua script is aborted.

##### General Information

Domain	TcHmiLua
Full symbol path	TcHmiLua.Config::SCRIPT_TIMEOUT
Property is hidden	No
Contained in every configuration by default	No

##### Schema

Type	string
Format	timespan
Minimum	PT5S
Default value	"PT10S"

##### JSON Schema

```
{
  "configDescription": "DESC_SCRIPT_TIMEOUT",
  "default": "PT10S",
  "format": "timespan",
  "formatMinimum": "PT5S",
  "type": "string"
}
```

### 13.1.6 TcHmiOpcUa

Type Definitions

Name	Description
<a href="#">UA.LocalizedText [► 1402]</a>	Localized text
<a href="#">UA.QualifiedName [► 1402]</a>	Qualified name
<a href="#">namespace [► 1403]</a>	OPC-UA namespace
<a href="#">connection [► 1404]</a>	Connection settings
<a href="#">advanced [► 1405]</a>	Advanced settings

General Properties

Symbol name	Text	Description
<a href="#">advancedSettings [► 1411]</a>	Advanced Settings	Advanced settings for datatype name translation, etc.
<a href="#">connectionSettings [► 1409]</a>	Connection Settings	Connection details for the OPC-UA server.
<a href="#">namespaces [► 1408]</a>	Namespaces	OPC-UA namespaces.
<a href="#">securitySettings [► 1410]</a>	Security Settings	Certificates, Security policies, etc.

#### 13.1.6.1 Type Definitions

##### 13.1.6.1.1 UA.LocalizedText

Localized text

General Information

Domain	TcHmiOpcUa
--------	------------

Schema

Type	object
------	--------

JSON Schema

```
{
  "description": "descUaLocalizedText",
  "properties": {
    "Locale": {
      "type": "integer"
    },
    "Text": {
      "type": "string"
    }
  },
  "required": [
    "Locale",
    "Text"
  ],
  "type": "object"
}
```

##### 13.1.6.1.2 UA.QualifiedName

Qualified name

**General Information**

Domain	TcHmiOpcUa
--------	------------

**Schema**

Type	object
------	--------

**JSON Schema**

```
{
  "description": "descUaQualifiedName",
  "properties": {
    "Name": {
      "type": "string"
    },
    "NamespaceIndex": {
      "type": "integer"
    }
  },
  "required": [
    "NamespaceIndex",
    "Name"
  ],
  "type": "object"
}
```

**13.1.6.1.3 namespace**

OPC-UA namespace

**General Information**

Domain	TcHmiOpcUa
--------	------------

**Schema**

Type	object
------	--------

**JSON Schema**

```
{
  "additionalProperties": false,
  "description": "descNamespace",
  "properties": {
    "advanced": {
      "optionMethod": {
        "symbol": "Config::advancedSettings"
      },
      "type": "string"
    },
    "connection": {
      "optionMethod": {
        "symbol": "Config::connectionSettings"
      },
      "type": "string"
    },
    "endpoint": {
      "type": "string"
    },
    "security": {
      "optionMethod": {
        "symbol": "Config::securitySettings"
      },
      "type": "string"
    }
  },
  "required": [
    "advanced",
    "connection",
    "endpoint",
    "security"
  ]
}
```

```
    },
    "type": "object"
}
```

13.1.6.1.4 connection

Connection settings

General Information

Domain	TcHmiOpcUa
--------	------------

Schema

Type	object
------	--------

JSON Schema

```
{
  "additionalProperties": false,
  "description": "descConnection",
  "properties": {
    "connectionTimeout": {
      "default": "PT1S",
      "format": "timespan",
      "formatMaximum": "PT10S",
      "formatMinimum": "PT0.1S",
      "type": "string"
    },
    "readTimeout": {
      "default": "PT10S",
      "format": "timespan",
      "formatMaximum": "PT30S",
      "formatMinimum": "PT0.1S",
      "type": "string"
    },
    "reconnectMode": {
      "default": 0,
      "enum": [
        0,
        1,
        2
      ],
      "options": [
        {
          "label": "none",
          "value": 0
        },
        {
          "label": "auto",
          "value": 1
        },
        {
          "label": "onRequest",
          "value": 2
        }
      ],
      "type": "integer"
    },
    "reconnectTries": {
      "type": "integer"
    }
  },
  "required": [
    "reconnectMode",
    "reconnectTries",
    "connectionTimeout",
    "readTimeout"
  ],
  "type": "object"
}
```



13.1.6.1.5      **advanced**

Advanced settings

**General Information**

Domain	TcHmiOpcUa
--------	------------

**Schema**

Type	object
------	--------

**JSON Schema**

```
{
  "additionalProperties": false,
  "description": "descAdvanced",
  "properties": {
    "arrayCloseReplacement": {
      "type": "string"
    },
    "arrayOpenReplacement": {
      "type": "string"
    },
    "browseValueSubelements": {
      "type": "boolean"
    },
    "definitionNameMode": {
      "configDescription": "DESC_DEFINITIONNAMEMODE",
      "default": 0,
      "enum": [
        0,
        1,
        2
      ],
      "options": [
        {
          "label": "useReferenceTypesAsDefinitionNames",
          "value": 0
        },
        {
          "label": "useNodeTypesAsDefinitionNames",
          "value": 1
        },
        {
          "label": "useNodeIdsAsDefinitionNames",
          "value": 2
        }
      ],
      "type": "integer"
    },
    "doublePointReplacement": {
      "type": "string"
    },
    "forbiddenReferenceNodes": {
      "configDescription": "DESC_FORBIDDENREFERENCENODES",
      "properties": {
        "binaryNodes": {
          "items": {
            "format": "base64",
            "type": "string"
          },
          "type": "array"
        },
        "guidNodes": {
          "items": {
            "type": "string"
          },
          "type": "array"
        },
        "integerNodes": {
          "items": {
            "type": "number"
          },
          "type": "array"
        }
      }
    }
  }
}
```

```

        "stringNodes": {
            "items": {
                "type": "string"
            },
            "type": "array"
        },
        "type": "object"
    },
    "ignoreNodes": {
        "configDescription": "DESC_IGNORENODES",
        "properties": {
            "binaryNodes": {
                "items": {
                    "format": "base64",
                    "type": "string"
                },
                "type": "array"
            },
            "guidNodes": {
                "items": {
                    "type": "string"
                },
                "type": "array"
            },
            "integerNodes": {
                "items": {
                    "type": "number"
                },
                "type": "array"
            },
            "stringNodes": {
                "items": {
                    "type": "string"
                },
                "type": "array"
            }
        },
        "type": "object"
    },
    "startPoint": {
        "configDescription": "DESC_STARTPOINT",
        "default": {
            "binaryIdentifier": "",
            "guidIdentifier": "",
            "identifierType": 0,
            "integerIdentifier": 85,
            "namespaceIndex": 0,
            "stringIdentifier": ""
        },
        "properties": {
            "binaryIdentifier": {
                "format": "base64",
                "type": "string"
            },
            "guidIdentifier": {
                "type": "string"
            },
            "identifierType": {
                "type": "number"
            },
            "integerIdentifier": {
                "type": "number"
            },
            "namespaceIndex": {
                "type": "number"
            },
            "stringIdentifier": {
                "type": "string"
            }
        },
        "type": "object"
    },
    "required": [
        "arrayCloseReplacement",
        "arrayOpenReplacement",
        "browseValueSubelements",
        "doublePointReplacement",
        "definitionNameMode",

```

```
        "ignoreNodes",
        "forbiddenReferenceNodes",
        "startPoint"
    ],
    "type": "object"
}
```

13.1.6.1.6 security

Security Settings

General Information

Domain	TcHmiOpcUa
--------	------------

Schema

Type	object
------	--------

JSON Schema

```
{
  "additionalProperties": false,
  "properties": {
    "acceptAllServerCertificates": {
      "default": true,
      "type": "boolean"
    },
    "acceptSelfSignedCertificates": {
      "default": true,
      "type": "boolean"
    },
    "authEnabled": {
      "default": false,
      "type": "boolean"
    },
    "certificateTrust": {
      "default": "",
      "format": "certificate",
      "type": "string"
    },
    "clientCertificate": {
      "default": "",
      "format": "certificate",
      "type": "string"
    },
    "clientPrivateKey": {
      "default": "",
      "format": "base64",
      "type": "string"
    },
    "globalPassword": {
      "default": "",
      "format": "encrypted",
      "type": "string"
    },
    "globalUser": {
      "default": "",
      "type": "string"
    },
    "policyMode": {
      "enum": [
        "http://opcfoundation.org/UA/SecurityPolicy#None",
        "http://opcfoundation.org/UA/SecurityPolicy#Basic128Rsa15",
        "http://opcfoundation.org/UA/SecurityPolicy#Basic256",
        "http://opcfoundation.org/UA/SecurityPolicy#Basic256Sha256"
      ],
      "options": [
        {
          "label": "none",
          "value": "http://opcfoundation.org/UA/SecurityPolicy#None"
        },
        {
          "label": "Basic128Rsa15",
          "value": "http://opcfoundation.org/UA/SecurityPolicy#Basic128Rsa15"
        }
      ]
    }
  }
}
```

```

        },
        {
            "label": "Basic256",
            "value": "http://opcfoundation.org/UA/SecurityPolicy#Basic256"
        },
        {
            "label": "Basic256Sha256",
            "value": "http://opcfoundation.org/UA/SecurityPolicy#Basic256Sha256"
        }
    ],
    "type": "string"
},
"securityMode": {
    "default": 1,
    "enum": [
        1,
        2,
        3
    ],
    "options": [
        {
            "label": "none",
            "value": 1
        },
        {
            "label": "sign",
            "value": 2
        },
        {
            "label": "signAndEncrypt",
            "value": 3
        }
    ],
    "type": "integer"
},
"useGlobalUaUser": {
    "configDescription": "USEGLOBALUAUSER_DESC",
    "default": true,
    "type": "boolean"
},
"useHmiServerCertificate": {
    "default": false,
    "type": "boolean"
}
},
"required": [
    "acceptAllServerCertificates",
    "acceptSelfSignedCertificates",
    "authEnabled",
    "certificateTrust",
    "clientCertificate",
    "clientPrivateKey",
    "globalPassword",
    "globalUser",
    "policyMode",
    "securityMode",
    "useGlobalUaUser",
    "useHmiServerCertificate"
],
"type": "object"
}

```

### 13.1.6.2 General Properties

#### 13.1.6.2.1 Namespaces

OPC-UA namespaces.

**General Information**

Domain	TcHmiOpcUa
Full symbol path	TcHmiOpcUa.Config::namespaces
Property is hidden	No
Contained in every configuration by default	Yes

**Schema**

Type	object
------	--------

**Default value**

```
{
  "basic": {
    "advanced": "basic",
    "connection": "basic",
    "endpoint": "opc.tcp://127.0.0.1:4840",
    "security": "basic"
  }
}
```

**JSON Schema**

```
{
  "additionalProperties": {
    "$ref": "#/definitions/namespace"
  },
  "default": {
    "basic": {
      "advanced": "basic",
      "connection": "basic",
      "endpoint": "opc.tcp://127.0.0.1:4840",
      "security": "basic"
    }
  },
  "defaultConfigurable": true,
  "description": "descNamespaces",
  "propertyOrder": 3,
  "type": "object"
}
```

**13.1.6.2.2 Connection Settings**

Connection details for the OPC-UA server.

**General Information**

Domain	TcHmiOpcUa
Full symbol path	TcHmiOpcUa.Config::connectionSettings
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	object
------	--------

**Default value**

```
{
  "basic": {
    "reconnectMode": 0,
    "reconnectTries": 0
  }
}
```

## JSON Schema

```
{
  "additionalProperties": {
    "$ref": "#/definitions/connection"
  },
  "default": {
    "basic": {
      "reconnectMode": 0,
      "reconnectTries": 0
    }
  },
  "description": "descConnectionSettings",
  "propertyOrder": 2,
  "type": "object"
}
```

### 13.1.6.2.3 Security Settings

Certificates, Security policies, etc.

#### General Information

Domain	TcHmiOpcUa
Full symbol path	TcHmiOpcUa.Config::securitySettings
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	object
------	--------

#### Default value

```
{
  "basic": {
    "acceptAllServerCertificates": true,
    "acceptSelfSignedCertificates": true,
    "certificateTrust": "",
    "clientCertificate": "",
    "clientPrivateKey": "",
    "globalPassword": "",
    "globalUser": "",
    "policyMode": "http://opcfoundation.org/UA/SecurityPolicy#None",
    "securityMode": 1,
    "useGlobalUaUser": true,
    "useHmiServerCertificate": false
  }
}
```

## JSON Schema

```
{
  "additionalProperties": {
    "$ref": "#/definitions/security"
  },
  "default": {
    "basic": {
      "acceptAllServerCertificates": true,
      "acceptSelfSignedCertificates": true,
      "certificateTrust": "",
      "clientCertificate": "",
      "clientPrivateKey": "",
      "globalPassword": "",
      "globalUser": "",
      "policyMode": "http://opcfoundation.org/UA/SecurityPolicy#None",
      "securityMode": 1,
      "useGlobalUaUser": true,
      "useHmiServerCertificate": false
    }
  },
  "description": "descSecuritySettings",
}
```

```
{
  "propertyOrder": 4,
  "type": "object"
}
```

### 13.1.6.2.4 Advanced Settings

Advanced settings for datatype name translation, etc.

#### General Information

Domain	TcHmiOpcUa
Full symbol path	TcHmiOpcUa.Config::advancedSettings
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	object
------	--------

#### Default value

```
{
  "basic": {
    "arrayCloseReplacement": "_HMI_RESERVED_ARRAYCLOSE_",
    "arrayOpenReplacement": "_HMI_RESERVED_ARRAYOPEN_",
    "browseValueSubelements": false,
    "doublePointReplacement": "_HMI_RESERVED_DOUBLECOLON_"
  }
}
```

#### JSON Schema

```
{
  "additionalProperties": {
    "$ref": "#/definitions/advanced"
  },
  "default": {
    "basic": {
      "arrayCloseReplacement": "_HMI_RESERVED_ARRAYCLOSE_",
      "arrayOpenReplacement": "_HMI_RESERVED_ARRAYOPEN_",
      "browseValueSubelements": false,
      "doublePointReplacement": "_HMI_RESERVED_DOUBLECOLON_"
    }
  },
  "description": "descAdvancedSettings",
  "propertyOrder": 1,
  "type": "object"
}
```

## 13.1.7 TcHmiRecipeManagement

#### Type Definitions

Name	Description
<a href="#">folderRecipe</a> [► 1412]	Folder for recipes and/or folders
<a href="#">folderRecipeType</a> [► 1412]	Folder for recipe types and/or folders
<a href="#">recipe</a> [► 1413]	Recipes are based on recipe types
<a href="#">recipeType</a> [► 1413]	Recipe type is a general description of a set of symbols





### 13.1.7.1.3 recipe

Recipes are based on recipe types

#### General Information

Domain	TcHmiRecipeManagement
--------	-----------------------

#### Schema

Type	object
------	--------

#### JSON Schema

```
{
  "additionalProperties": false,
  "configDescription": "DESC_RECIPE",
  "properties": {
    "recipeTypeName": {
      "type": "string"
    },
    "values": {
      "additionalProperties": {},
      "type": "object"
    }
  },
  "required": [
    "recipeTypeName",
    "values"
  ],
  "type": "object"
}
```

### 13.1.7.1.4 recipeType

Recipe type is a general description of a set of symbols

#### General Information

Domain	TcHmiRecipeManagement
--------	-----------------------

#### Schema

Type	object
------	--------

#### JSON Schema

```
{
  "additionalProperties": false,
  "configDescription": "DESC_RECIPETYPE",
  "properties": {
    "members": {
      "additionalProperties": {
        "anyOf": [
          {
            "properties": {
              "comment": {
                "default": "",
                "type": "string"
              },
              "defaultValue": {},
              "enabled": {
                "default": false,
                "type": "boolean"
              },
              "group": {
                "default": "",
                "type": "string"
              },
              "order": {
                "type": "integer"
              }
            }
          }
        ]
      }
    }
  }
}
```

```

        },
        "schema": {
            "$ref": "tchmi:server#/definitions/schemaRef"
        },
        "symbol": {
            "default": "",
            "type": "string"
        },
        "unit": {
            "default": "",
            "type": "string"
        }
    },
    "required": [
        "symbol",
        "defaultValue"
    ],
    "type": "object"
},
{
    "properties": {
        "comment": {
            "default": "",
            "type": "string"
        },
        "enabled": {
            "default": true,
            "type": "boolean"
        },
        "group": {
            "default": "",
            "type": "string"
        },
        "order": {
            "type": "integer"
        },
        "recipeType": {
            "type": "string"
        },
        "unit": {
            "default": "",
            "type": "string"
        }
    },
    "required": [
        "recipeType"
    ],
    "type": "object"
}
    ]
},
    "type": "object"
},
"options": {
    "additionalProperties": {},
    "properties": {
        "comment": {
            "default": "",
            "type": "string"
        },
        "enabled": {
            "enum": [
                "None",
                "Disabled"
            ],
            "type": "string"
        }
    },
    "type": "object"
},
"recipeTypeNames": {
    "items": {
        "type": "string"
    },
    "uniqueItems": true
}
},
"required": [
    "members"

```

```

    },
    "type": "object"
}

```

### 13.1.8 TcHmiSqliteHistorize

#### Type Definitions

Name	Description
<a href="#">stringTypeArray</a> [► 1415]	Width of the XAxis in milliseconds.

#### General Properties

Symbol name	Text	Description
<a href="#">historizedSymbolList</a> [► 1416]	Historized symbols	List containing all historized symbols.
<a href="#">enableBackup</a> [► 1417]	Enable database backups	Creates database backups continuously.
<a href="#">maxBackups</a> [► 1417]	Maximal amount of database backups	Once the maximum number of backups is reached, oldest backups will be deleted.
<a href="#">inMemory</a> [► 1418]	In memory database	Active option will save to volatile RAM. Server restart is required.
<a href="#">vacuumOnStartup</a> [► 1418]	Vacuum at start	Tries to reduce database size. This might take a while on big databases.
<a href="#">commitInterval</a>	Commit interval	The time between writing each transaction into the database.
<a href="#">mode</a> [► 1419]	Mode	A stricter synchronization mode lowers the chance that the database is corrupted in case of a crash or power failure. The memory journaling mode can also corrupt the database.

### 13.1.8.1 Type Definitions

#### 13.1.8.1.1 stringTypeArray

Width of the XAxis in milliseconds.

#### General Information

Domain	TcHmiSqliteHistorize
--------	----------------------

#### Schema

Enumeration type	string
Format	timespan

Enumeration value
Null
First
Latest

#### JSON Schema

```

{
  "configDescription": "descStringTypeArray",
  "oneOf": [
    {
      "description": "descStringTypeArrayTimespan",
      "format": "timespan",

```

```

        "type": "string"
    },
    {
        "description": "descStringTypeArrayTimestamp",
        "format": "date-time",
        "type": "string"
    },
    {
        "description": "descStringTypeArrayStartPoint",
        "enum": [
            "Null",
            "First",
            "Latest"
        ],
        "type": "string"
    }
]
}

```

### 13.1.8.2 General Properties

#### 13.1.8.2.1 Historized symbols

List containing all historized symbols.

##### General Information

Domain	TcHmiSqliteHistorize
Full symbol path	TcHmiSqliteHistorize.Config::historizedSymbolList
Property is hidden	No
Contained in every configuration by default	Yes

##### Schema

Type	object
------	--------

##### JSON Schema

```

{
  "additionalProperties": {
    "additionalProperties": false,
    "configDescription": "descHistorizedSymbol",
    "optionMethod": {
      "symbol": "ListSymbolNames"
    },
  },
  "properties": {
    "interval": {
      "default": "PT1S",
      "format": "timespan",
      "formatMinimum": "PT0.01S",
      "type": "string"
    },
    "maxEntries": {
      "default": 10000,
      "minimum": 1,
      "type": "integer"
    },
    "recordingEnabled": {
      "default": true,
      "type": "boolean"
    },
    "rowLimit": {
      "default": 100000,
      "hidden": true,
      "minimum": 1,
      "type": "integer"
    }
  },
  "required": [
    "maxEntries",
    "interval",
    "recordingEnabled",
  ]
}

```

```
        "rowLimit"  
      ],  
      "title": "TITLE_HISTORIZE_SYMBOL",  
      "type": "object"  
    },  
    "configDescription": "descHistorizedSymbolList",  
    "defaultConfigurable": true,  
    "propertyOrder": 1,  
    "type": "object"  
  }  
}
```

### 13.1.8.2.2 Enable database backups

Creates database backups continuously.

#### General Information

Domain	TcHmiSqliteHistorize
Full symbol path	TcHmiSqliteHistorize.Config::enableBackup
Property is hidden	No
Contained in every configuration by default	Yes

#### Schema

Type	boolean
Default value	False

#### JSON Schema

```
{  
  "configDescription": "descEnableBackup",  
  "default": false,  
  "defaultConfigurable": true,  
  "propertyOrder": 2,  
  "type": "boolean"  
}
```

### 13.1.8.2.3 Maximal amount of database backups

Once the maximum number of backups is reached, oldest backups will be deleted.

#### General Information

Domain	TcHmiSqliteHistorize
Full symbol path	TcHmiSqliteHistorize.Config::maxBackups
Property is hidden	No
Contained in every configuration by default	Yes

#### Schema

Type	integer
Minimum	1
Default value	1

#### JSON Schema

```
{  
  "configDescription": "descMaxBackup",  
  "default": 1,  
  "defaultConfigurable": true,  
  "minimum": 1,  
  "propertyOrder": 3,  
  "type": "integer"  
}
```

### 13.1.8.2.4 In memory database

Active option will save to volatile RAM. Server restart is required.

#### General Information

Domain	TcHmiSqliteHistorize
Full symbol path	TcHmiSqliteHistorize.Config::inMemory
Property is hidden	No
Contained in every configuration by default	Yes

#### Schema

Type	boolean
Default value	False

#### JSON Schema

```
{
  "configDescription": "descInMemory",
  "default": false,
  "defaultConfigurable": true,
  "propertyOrder": 4,
  "type": "boolean"
}
```

### 13.1.8.2.5 Vacuum at start

Tries to reduce database size. This might take a while on big databases.

#### General Information

Domain	TcHmiSqliteHistorize
Full symbol path	TcHmiSqliteHistorize.Config::vacuumOnStartup
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	boolean
Default value	False

#### JSON Schema

```
{
  "configDescription": "descVacuumOnStartup",
  "default": false,
  "propertyOrder": 5,
  "type": "boolean"
}
```

### 13.1.8.2.6 Commit interval

The time between writing each transaction into the database.

#### General Information

Domain	TcHmiSqliteHistorize
Full symbol path	TcHmiSqliteHistorize.Config::commitInterval
Property is hidden	Yes
Contained in every configuration by default	No

## Schema

Type	string
Format	timespan
Minimum	PT1S
Default value	PT10S

## JSON Schema

```
{
  "configDescription": "descCommitInterval",
  "default": "PT10S",
  "format": "timespan",
  "formatMinimum": "PT1S",
  "hidden": true,
  "propertyOrder": 6,
  "type": "string"
}
```

### 13.1.8.2.7 Mode

A stricter synchronization mode lowers the chance that the database is corrupted in case of a crash or power failure. The memory journaling mode can also corrupt the database.

## General Information

Domain	TcHmiSqliteHistorize
Full symbol path	TcHmiSqliteHistorize.Config::mode
Property is hidden	Yes
Contained in every configuration by default	No

## Schema

Enumeration type	integer
Default value	3

## Options

Value	Label
0	Synchronous extra, journal mode persist
1	Synchronous full, journal mode persist
2	Synchronous full, journal mode memory
3	Synchronous normal, journal mode persist
4	Synchronous off, journal mode persist
5	Synchronous off, journal mode memory

## JSON Schema

```
{
  "configDescription": "descMode",
  "default": 3,
  "enum": [
    0,
    1,
    2,
    3,
    4,
    5
  ],
  "hidden": true,
  "options": [
    {
      "label": "ENUM_SYNCHRONOUS_EXTRA_PERSIST",
      "value": 0
    }
  ]
}
```

```

    },
    {
      "label": "ENUM_SYNCHRONOUS_FULL_PERSIST",
      "value": 1
    },
    {
      "label": "ENUM_SYNCHRONOUS_FULL_MEMORY",
      "value": 2
    },
    {
      "label": "ENUM_SYNCHRONOUS_NORMAL_PERSIST",
      "value": 3
    },
    {
      "label": "ENUM_SYNCHRONOUS_OFF_PERSIST",
      "value": 4
    },
    {
      "label": "ENUM_SYNCHRONOUS_OFF_MEMORY",
      "value": 5
    }
  ],
  "propertyOrder": 7,
  "type": "integer"
}

```

## 13.1.9 TcHmiSqliteLogger

### General Properties

Symbol name	Text	Description
<a href="#">MAXENTRIES</a> [ <a href="#">▶ 1422</a> ]	Maximum number of Entries	To limit the database size, the oldest database entries are permanently deleted when this limit is exceeded.
<a href="#">MAXENTRYLENGTH</a> [ <a href="#">▶ 1421</a> ]	Maximum length of an Entry	Entries that exceed this limit will be truncated before being stored.
<a href="#">DEFAULT LIST LIMIT</a> [ <a href="#">▶ 1422</a> ]	Default limit for entry lists	This limit is used for all requests for which no other limit has been specified.
<a href="#">VACUUM ON STARTUP</a> [ <a href="#">▶ 1422</a> ]	Vacuum at start	Tries to reduce database size. This might take a while on big databases.
<a href="#">MODE</a> [ <a href="#">▶ 1423</a> ]	Mode	Synchronous off mode is fast but can corrupt the database in case of a power failure.
<a href="#">REDIRECT DIAGNOSTICS MESSAGES TO FILE</a> [ <a href="#">▶ 1424</a> ]	Redirect diagnostics messages to file	Reduces the chance that a flood of diagnostics messages will overwhelm the system. Especially useful when diagnosing problems on smaller devices. Only supported on windows.

### 13.1.9.1 General Properties

#### 13.1.9.1.1 Maximum number of Entries

To limit the database size, the oldest database entries are permanently deleted when this limit is exceeded

### General Information

Domain	TcHmiSqliteLogger
Full symbol path	TcHmiSqliteLogger.Config::MAXENTRIES
Property is hidden	No
Contained in every configuration by default	No



**Schema**

Type	integer
Minimum	1
Default value	15000

**JSON Schema**

```
{
  "configDescription": "DESC_MAXENTRIES",
  "default": 15000,
  "minimum": 1,
  "type": "integer"
}
```

**13.1.9.1.2 Maximum length of an Entry**

Entries that exceed this limit will be truncated before being stored.

**General Information**

Domain	TcHmiSqliteLogger
Full symbol path	TcHmiSqliteLogger.Config::MAXENTRYLENGTH
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	integer
Minimum	80
Default value	1024

**JSON Schema**

```
{
  "configDescription": "DESC_MAXENTRYLENGTH",
  "default": 1024,
  "displayClass": "byte",
  "minimum": 80,
  "type": "integer"
}
```

**13.1.9.1.3 Default limit for entry lists**

This limit is used for all requests for which no other limit has been specified

**General Information**

Domain	TcHmiSqliteLogger
Full symbol path	TcHmiSqliteLogger.Config::DEFAULT_LIST_LIMIT
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	integer
Minimum	1
Default value	1000

## JSON Schema

```
{
  "configDescription": "DESC_DEFAULT_LIST_LIMIT",
  "default": 1000,
  "minimum": 1,
  "type": "integer"
}
```

### 13.1.9.1.4 Vacuum at start

Tries to reduce database size. This might take a while on big databases.

#### General Information

Domain	TcHmiSqliteLogger
Full symbol path	TcHmiSqliteLogger.Config::VACUUM_ON_STARTUP
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	boolean
Default value	False

## JSON Schema

```
{
  "configDescription": "DESC_VACUUM_ON_STARTUP",
  "default": false,
  "type": "boolean"
}
```

### 13.1.9.1.5 Maximum number of Entries

To limit the database size, the oldest database entries are permanently deleted when this limit is exceeded.

#### General Information

Domain	TcHmiSqliteLogger
Full symbol path	TcHmiSqliteLogger.Config::MAXENTRIES
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	integer
Minimum	1
Default value	15000

## JSON Schema

```
{
  "configDescription": "DESC_MAXENTRIES",
  "default": 15000,
  "minimum": 1,
  "type": "integer"
}
```

### 13.1.9.1.6 Default limit for entry lists

This limit is used for all requests for which no other limit has been specified.

**General Information**

Domain	TcHmiSqliteLogger
Full symbol path	TcHmiSqliteLogger.Config::DEFAULT_LIST_LIMIT
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	integer
Minimum	1
Default value	1000

**JSON Schema**

```
{
  "configDescription": "DESC_DEFAULT_LIST_LIMIT",
  "default": 1000,
  "minimum": 1,
  "type": "integer"
}
```

**13.1.9.1.7 Mode**

Synchronous off mode is fast but can corrupt the database in case of a power failure.

**General Information**

Domain	TcHmiSqliteLogger
Full symbol path	TcHmiSqliteLogger.Config::MODE
Property is hidden	Yes
Contained in every configuration by default	No

**Schema**

Enumeration type	integer
Default value	1

**Options**

Value	Label
0	Synchronous extra
1	Synchronous full
3	Synchronous normal
4	Synchronous off

**JSON Schema**

```
{
  "configDescription": "DESC_MODE",
  "default": 1,
  "enum": [
    0,
    1,
    3,
    4
  ],
  "hidden": true,
  "options": [
    {
      "label": "ENUM_SYNCHRONOUS_EXTRA_PERSIST",
      "value": 0
    }
  ],
}
```

```

    {
      "label": "ENUM_SYNCHRONOUS_FULL_PERSIST",
      "value": 1
    },
    {
      "label": "ENUM_SYNCHRONOUS_NORMAL_PERSIST",
      "value": 3
    },
    {
      "label": "ENUM_SYNCHRONOUS_OFF_PERSIST",
      "value": 4
    }
  ],
  "type": "integer"
}

```

### 13.1.9.1.8 Redirect diagnostics messages to file

Reduces the chance that a flood of diagnostics messages will overwhelm the system. Especially useful when diagnosing problems on smaller devices. Only supported on windows.

#### General Information

Domain	TcHmiSqliteLogger
Full symbol path	TcHmiSqliteLogger.Config::REDIRECT_DIAGNOSTICS_MESSAGES_TO_FILE
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	boolean
Default value	True

#### JSON Schema

```

{
  "configDescription": "DESC_REDIRECT_DIAGNOSTICS_MESSAGES_TO_FILE",
  "default": true,
  "type": "boolean"
}

```

## 13.1.10 TcHmiUserManagement

### General Properties

Symbol name	Text	Description
<a href="#">USERS [► 1424]</a>	Users	Contains the information about all managed user accounts.

### 13.1.10.1 General Properties

#### 13.1.10.1.1 Users

Contains the information about all managed user accounts.

**General Information**

Domain	TcHmiUserManagement
Full symbol path	TcHmiUserManagement.Config::USERS
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	object
------	--------

**Default value**

```
{
  "__SystemAdministrator": {
    "ENABLED": false,
    "PASSWORD": "",
    "SALT": ""
  },
  "__SystemGuest": {
    "ENABLED": true,
    "PASSWORD": "",
    "SALT": ""
  }
}
```

**JSON Schema**

```
{
  "additionalProperties": {
    "additionalProperties": false,
    "configDescription": "DESC_USER",
    "properties": {
      "ALGORITHM": {
        "default": 0,
        "enum": [
          0,
          1
        ],
        "options": [
          {
            "label": "SHA256",
            "value": 0
          },
          {
            "label": "PBKDF2-HMAC-64-SHA512-1000",
            "value": 1
          }
        ],
        "type": "integer"
      },
      "ENABLED": {
        "default": true,
        "type": "boolean"
      },
      "PASSWORD": {
        "default": "",
        "type": "string"
      },
      "SALT": {
        "default": "",
        "format": "base64",
        "type": "string"
      }
    },
    "required": [
      "PASSWORD",
      "SALT",
      "ALGORITHM",
      "ENABLED"
    ],
    "type": "object"
  },
  "default": {
    "__SystemAdministrator": {
```

```

        "ENABLED": false,
        "PASSWORD": "",
        "SALT": ""
    },
    "__SystemGuest": {
        "ENABLED": true,
        "PASSWORD": "",
        "SALT": ""
    }
},
"description": "DESC_USERS",
"required": [
    "__SystemAdministrator",
    "__SystemGuest"
],
"type": "object"
}

```

## 13.1.11 TcHmiEcDiagnostics

### Type Definitions

Name	Description
<a href="#">slave</a> [► 1426]	EtherCAT slave
<a href="#">EcDiagnosticsProcessDataObjectEntryID</a> [► 1430]	Process data (Object entry ID)
<a href="#">EcDiagnosticsProcessDataObjectEntryValue</a> [► 1430]	Process data (Object entry value)
<a href="#">EcDiagnosticsProcessDataInOutValues</a> [► 1431]	Process data (IN-OUT values)

### General Properties

Symbol name	Text	Description
<a href="#">devices</a> [► 1432]	EtherCAT Devices	EtherCAT Devices
<a href="#">vendorsOverwrite</a> [► 1433]	Vendors overwrite	Add vendor ID

## 13.1.11.1 Type Definitions

### 13.1.11.1.1 slave

EtherCAT slave

#### General Information

Domain	TcHmiEcDiagnostics
--------	--------------------

#### Schema

Type	object
------	--------

#### JSON Schema

```

{
  "description": "descSlave",
  "properties": {
    "EtherCAT": {
      "properties": {
        "identity": {

```

```

        "properties": {
            "addrs": {
                "properties": {
                    "autoInc": {
                        "type": "integer"
                    },
                    "phys": {
                        "type": "integer"
                    }
                },
                "required": [
                    "autoInc",
                    "phys"
                ],
                "type": "object"
            },
            "name": {
                "type": "string"
            },
            "product": {
                "type": "integer"
            },
            "revision": {
                "type": "integer"
            },
            "serial": {
                "type": "integer"
            },
            "type": {
                "type": "string"
            },
            "vendor": {
                "properties": {
                    "id": {
                        "type": "integer"
                    },
                    "memberNameLong": {
                        "type": "string"
                    },
                    "memberNameShort": {
                        "type": "string"
                    }
                },
                "required": [
                    "id",
                    "memberNameLong",
                    "memberNameShort"
                ],
                "type": "object"
            }
        },
        "required": [
            "addrs",
            "name",
            "product",
            "revision",
            "serial",
            "type",
            "vendor"
        ],
        "type": "object"
    },
    "syncUnitsAssignment": {
        "items": [
            {
                "type": "integer"
            }
        ],
        "type": "array"
    }
},
"required": [
    "identity",
    "syncUnitsAssignment"
],
"type": "object"
},
"hotConnect": {
    "properties": {
        "isHotConnectHead": {

```

```

        "type": "boolean"
    },
    "isHotConnectSlave": {
        "type": "boolean"
    },
    "slaveCountActual": {
        "type": "integer"
    },
    "slaveCountConfig": {
        "type": "integer"
    }
},
"required": [
    "isHotConnectHead",
    "isHotConnectSlave",
    "slaveCountActual",
    "slaveCountConfig"
],
"type": "object"
},
"ports": {
    "items": [
        {
            "properties": {
                "autoIncAddr": {
                    "type": "integer"
                },
                "configured": {
                    "type": "boolean"
                },
                "configuredSlave": {
                    "$ref": "#/definitions/slave"
                },
                "physAddr": {
                    "type": "integer"
                },
                "physic": {
                    "type": "integer"
                },
                "redundancy": {
                    "type": "boolean"
                },
                "redundancyPath": {
                    "type": "boolean"
                }
            },
            "required": [
                "autoIncAddr",
                "configured",
                "physAddr",
                "physic"
            ],
            "type": "object"
        }
    ],
    "type": "array"
},
"processData": {
    "properties": {
        "in": {
            "items": [
                {
                    "properties": {
                        "entries": {
                            "items": [
                                {
                                    "properties": {
                                        "bitLength": {
                                            "type": "integer"
                                        },
                                        "index": {
                                            "type": "string"
                                        },
                                        "name": {
                                            "type": "string"
                                        },
                                        "subIndex": {
                                            "type": "string"
                                        }
                                    },
                                    "type": {

```



```

        "type": "string"
      }
    },
    "required": [
      "bitLength",
      "index",
      "name",
      "subIndex",
      "type"
    ],
    "type": "object"
  },
  ],
  "type": "array"
},
"index": {
  "type": "string"
},
"name": {
  "type": "string"
}
},
"required": [
  "entries",
  "index",
  "name"
],
"type": "object"
}
],
"type": "array"
},
"out": {
  "items": [
    {
      "properties": {
        "entries": {
          "items": [
            {
              "properties": {
                "bitLength": {
                  "type": "integer"
                },
                "index": {
                  "type": "string"
                },
                "name": {
                  "type": "string"
                },
                "subIndex": {
                  "type": "string"
                },
                "type": {
                  "type": "string"
                }
              },
              "required": [
                "bitLength",
                "index",
                "name",
                "subIndex",
                "type"
              ],
              "type": "object"
            }
          ],
          "type": "array"
        },
        "index": {
          "type": "string"
        },
        "name": {
          "type": "string"
        }
      },
      "required": [
        "entries",
        "index",
        "name"
      ],

```

```

        "type": "object"
      },
    ],
    "type": "array"
  },
  },
  "required": [
    "in",
    "out"
  ],
  "type": "object"
},
"required": [
  "EtherCAT",
  "hotConnect",
  "ports",
  "processData"
],
"type": "object"
}

```

### 13.1.11.1.2 EcDiagnosticsProcessDataObjectEntryID

Process data (Object entry ID)

#### General Information

Domain	TcHmiEcDiagnostics
--------	--------------------

#### Schema

Type	object
------	--------

#### JSON Schema

```

{
  "description": "descEcDiagnosticsProcessDataObjectEntryID",
  "properties": {
    "entryIndex": {
      "type": "string"
    },
    "entrySubIndex": {
      "type": "string"
    },
    "io": {
      "type": "string"
    },
    "objectIndex": {
      "type": "string"
    }
  },
  "required": [
    "io",
    "objectIndex",
    "entryIndex",
    "entrySubIndex"
  ],
  "type": "object"
}

```

### 13.1.11.1.3 EcDiagnosticsProcessDataObjectEntryValue

Process data (Object entry value)

#### General Information

Domain	TcHmiEcDiagnostics
--------	--------------------

**Schema**

Type	object
------	--------

**JSON Schema**

```
{
  "description": "descEcDiagnosticsProcessDataObjectEntryValue",
  "properties": {
    "entryValue": {}
  },
  "required": [
    "entryValue"
  ],
  "type": "object"
}
```

**13.1.11.1.4 EcDiagnosticsProcessDataInOutValues**

Process data (IN-OUT values)

**General Information**

Domain	TcHmiEcDiagnostics
--------	--------------------

**Schema**

Type	object
------	--------

**JSON Schema**

```
{
  "description": "descEcDiagnosticsProcessDataInOutValues",
  "properties": {
    "entries": {
      "items": [
        {
          "properties": {
            "error": {
              "properties": {
                "code": {
                  "type": "number"
                },
                "message": {
                  "type": "string"
                },
                "reason": {
                  "type": "string"
                }
              }
            },
            "type": "object"
          },
          "forced": {
            "type": "boolean"
          },
          "index": {
            "type": "string"
          },
          "subIndex": {
            "type": "string"
          },
          "value": {}
        },
        "required": [
          "index",
          "subIndex"
        ],
        "type": "object"
      ],
      "type": "array"
    },
    "index": {
      "type": "string"
    }
  }
}
```

```

    }
  },
  "required": [
    "in",
    "out"
  ],
  "type": "object"
}

```

### 13.1.11.2 General Properties

#### 13.1.11.2.1 EtherCAT Devices

EtherCAT Devices

##### General Information

Domain	TcHmiEcDiagnostics
Full symbol path	TcHmiEcDiagnostics.Config::devices
Property is hidden	No
Contained in every configuration by default	Yes

##### Schema

Type	object
------	--------

##### Default value

```

{
  "Device1": {
    "enabled": true,
    "masterNetId": "0.0.0.0.2.1",
    "targetNetId": "0.0.0.0.1.1"
  }
}

```

##### JSON Schema

```

{
  "additionalProperties": {
    "properties": {
      "enabled": {
        "default": true,
        "propertyOrder": 1,
        "type": "boolean"
      },
      "masterNetId": {
        "format": "amsnetid",
        "optionMethod": {
          "symbol": "TcHmiEcDiagnostics.ListMastersOfRoute",
          "writeValue": {
            "$data": "#/properties/devices/additionalProperties/targetNetId"
          }
        },
        "propertyOrder": 3,
        "type": "string"
      },
      "targetNetId": {
        "format": "amsnetid",
        "optionMethod": {
          "symbol": "ADS.ListRoutes"
        },
        "propertyOrder": 2,
        "type": "string"
      }
    },
    "required": [
      "enabled",
      "targetNetId",
      "masterNetId"
    ]
  }
}

```

```
    "type": "object"
  },
  "default": {
    "Device1": {
      "enabled": true,
      "masterNetId": "0.0.0.0.2.1",
      "targetNetId": "0.0.0.0.1.1"
    }
  },
  "defaultConfigurable": true,
  "description": "devices",
  "propertyOrder": 1,
  "type": "object"
}
```

13.1.11.2.2 Vendors overwrite

Add vendor ID

General Information

Domain	TcHmiEcDiagnostics
Full symbol path	TcHmiEcDiagnostics.Config::vendorsOverwrite
Property is hidden	No
Contained in every configuration by default	No

Schema

Type	object
------	--------

Default value

```
{
  "1": {
    "longName": "EtherCAT Technology Group",
    "shortName": "ETG"
  },
  "2": {
    "longName": "Beckhoff Automation GmbH & Co. KG",
    "shortName": "Beckhoff"
  }
}
```

JSON Schema

```
{
  "additionalProperties": {
    "additionalProperties": false,
    "properties": {
      "devices": {
        "items": {
          "additionalProperties": false,
          "properties": {
            "longName": {
              "type": "string"
            },
            "pattern": {
              "type": "string"
            },
            "shortName": {
              "type": "string"
            }
          },
          "required": [
            "pattern"
          ],
          "type": "object"
        },
        "type": "array"
      },
      "longName": {
        "type": "string"
      }
    }
  }
}
```

```

        "shortName": {
            "type": "string"
        },
    },
    "required": [
        "devices"
    ],
    "type": "object"
},
"default": {
    "1": {
        "longName": "EtherCAT Technology Group",
        "shortName": "ETG"
    },
    "2": {
        "longName": "Beckhoff Automation GmbH & Co. KG",
        "shortName": "Beckhoff"
    }
},
"description": "descVendorsOverwrite",
"propertyOrder": 2,
"type": "object"
}

```

### 13.1.12 TcHmiLdap

#### General properties

Symbol name	Text	Description
<u>HOST</u> [► 1436]	Host	A host name, a domain name or an IP address. IPv6 is currently not supported.
<u>PORT</u> [► 1437]	Port	The most common ports are 636 for TLS and 389 for unencrypted connections.
<u>USE TLS</u> [► 1437]	Use TLS	Strongly recommended, especially when using the 'Simple' authentication mechanism.
<u>TRUST ALL CERTIFICATES</u> [► 1438]	Trust all certificates	If 'false', the system checks whether the server certificate was issued by a certification authority that the operating system trusts.
<u>TIMEOUT</u> [► 1438]	Timeout	This timeout is used for all LDAP requests, including search requests.
<u>BASE DN</u> [► 1438]	Base DN	Entry point for LDAP search queries. If empty, the domain components of the host are used.
<u>LDAP_OPT_REFERRALS</u> [► 1439]	Follow referrals	Specifies whether the referrals returned by the LDAP server should be followed automatically.
<u>CASE SENSITIVE ATTRIBUTE VALUE COMPARISON</u> [► 1439]	Attribute values compared taking upper/lower case into account	DNs and attributes are not case-sensitive by default. It is possible to change this setting in the LDAP schema of the attribute, but this is rare.

**HMI authentication**

Symbol name	Text	Description
<a href="#">AUTHENTICATION_MECHANISM [► 1440]</a>	Authentication mechanism	The most common mechanism is 'Simple'. 'Digest-MD5' is recommended if TLS is not available.
<a href="#">USER_FILTER [► 1441]</a>	User filter	Is used to search for user entries. {input} which is replaced by what the user enters in the registration form. {username_attribute} is a placeholder that is replaced by the configured username attribute.
<a href="#">USERNAME_ATTRIBUTE [► 1441]</a>	User name attribute	Attribute used to identify the user.
<a href="#">IGNORE_DOMAIN_SUFFIX_DURING_LOGIN [► 1442]</a>	Ignore the domain during login	Ignore anything after the first @ in the name you enter during login. For example, if the 'userPrincipalName' is used on ActiveDirectory, this setting must be disabled as the 'userPrincipalName' contains an @.
<a href="#">APPEND_DOMAIN_DURING_LOGIN [► 1442]</a>	Append the domain during login	If, for example, the 'email' or 'userPrincipalName' is used for login, the domain suffix can be added automatically with this setting so that it does not have to be entered during login. A case-insensitive check is carried out to find out whether the domain already exists.
<a href="#">USE_LDAP_SEARCH_FOR_LISTUSERS [► 1443]</a>	Use LDAP search request for ListUsers	Depending on the size of the directory, the search may take too long or return too many results. If disabled, the user names from the TcHmiSrv configuration are collected.

**LDAP authentication**

Symbol name	Text	Description
<a href="#">BIND_USER_AUTHENTICATION_MECHANISM [► 1443]</a>	Authentication mechanism for the bind user. 'None' indicates that there is no bind user.	'None' means that there is no bind user. In this case, the bind request is made with what the user enters in the registration form.
<a href="#">BIND_USER_DN [► 1444]</a>	Bind user DN	The full DN of the bind user, which is used to search for the DN of the user attempting to log in. This setting is ignored if the authentication mechanism is 'Anonymous', 'Kerberos Credential Cache' or 'None'.
<a href="#">BIND_USER_PASSWORD [► 1445]</a>	Bind user password	Is saved as plain text in the configuration database.

**Group mappings**

Symbol name	Text	Description
<a href="#">GROUP_MAPPINGS [► 1445]</a>	Group mappings	Set HMI user groups based on the attributes of an LDAP user.
<a href="#">BLOCK_USERS [► 1446]</a>	Block specific users	Blocked users cannot log in, even if they have logged in successfully in the past.

**13.1.12.1 Type Definitions****13.1.12.1.1 IdapAttributeValue**

Attribute value

## General Information

Domain	TcHmiLdap
--------	-----------

## Schema

Type	string
------	--------

## JSON Schema

```
{
  "pattern": "#(?:[\\dA-Fa-f]{2})+|(?:[^\r,=\<+>#;\\\\\\\\"]|\\\\\\\\[,=\<+>#;\\\\\\\\"]|\\\\\\\\[\\dA-Fa-f]{2})*|\"(?:[^\r\\\\\\\\"]|\\\\\\\\[,=\<+>#;\\\\\\\\"]|\\\\\\\\[\\dA-Fa-f]{2})*\\\"",
  "type": "string"
}
```

### 13.1.12.1.2 IdapDistinguishedName

Distinguished Name

## General Information

Domain	TcHmiLdap
--------	-----------

## Schema

Type	string
------	--------

## JSON Schema

```
{
    "pattern": "^(?:[A-Za-z][\\w-]*|\\d+(?:\\.\\d+)*)=(?:#(?:[\\dA-Fa-f]{2})+|(?:[^,=\\+<>#;\\\\\\\\\" | \\\\[,=\\+<>#;\\\\\\\\\" | \\\\[[\\dA-Fa-f]{2}]*|\"(?:^\\\\\\\\\\\\\\\\\" | \\\\[,=\\+<>#;\\\\\\\\\" | \\\\[[\\dA-Fa-f]{2}]*\"))*(?:,[A-Za-z][\\w-]*|\\d+(?:\\.\\d+)*)=(?:#(?:[\\dA-Fa-f]{2})+|(?:[^,=\\+<>#;\\\\\\\\\" | \\\\[,=\\+<>#;\\\\\\\\\" | \\\\[[\\dA-Fa-f]{2}]*|\"(?:^\\\\\\\\\\\\\\\\\" | \\\\[,=\\+<>#;\\\\\\\\\" | \\\\[[\\dA-Fa-f]{2}]*\"))*(?:,[A-Za-z][\\w-]*|\\d+(?:\\.\\d+)*)=(?:#(?:[\\dA-Fa-f]{2})+|(?:[^,=\\+<>#;\\\\\\\\\" | \\\\[,=\\+<>#;\\\\\\\\\" | \\\\[[\\dA-Fa-f]{2}]*|\"(?:^\\\\\\\\\\\\\\\\\" | \\\\[,=\\+<>#;\\\\\\\\\" | \\\\[[\\dA-Fa-f]{2}]*\"))*)*$",
    "type": "string"
}
```

### 13.1.12.2 General Properties

### 13.1.12.2.1 Host

A host name, a domain name or an IP address. IPv6 is currently not supported.

## General Information

Domain	TcHmiLdap
Complete symbol path	TcHmiLdap.Config::HOST
Property is hidden	No
Included by default in every configuration	Yes

## Schema

Type	string
Default value	""



**JSON schema**

```
{
  "default": "",
  "defaultConfigurable": true,
  "description": "DESC_HOST",
  "propertyOrder": 1,
  "type": "string"
}
```

**13.1.12.2.2 Port**

The most common ports are 636 for TLS and 389 for unencrypted connections.

**General Information**

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::PORT
Property is hidden	No
Contained in every configuration by default	Yes

**Schema**

Type	integer
Minimum	1
Default value	389

**JSON Schema**

```
{
  "default": 389,
  "defaultConfigurable": true,
  "description": "DESC_PORT",
  "minimum": 1,
  "propertyOrder": 2,
  "type": "integer"
}
```

**13.1.12.2.3 Use TLS**

Strongly recommended, especially when using the 'Simple' authentication mechanism.

**General Information**

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::USE_TLS
Property is hidden	No
Contained in every configuration by default	Yes

**Schema**

Type	boolean
Default value	False

**JSON Schema**

```
{
  "configDescription": "DESC_USE_TLS",
  "default": false,
  "defaultConfigurable": true,
  "propertyOrder": 3,
  "type": "boolean"
}
```

### 13.1.12.2.4 Trust all certificates

If 'false', check whether the server certificate was issued by a certificate authority trusted by the operating system.

#### General Information

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::TRUST_ALL_CERTIFICATES
Property is hidden	No
Contained in every configuration by default	Yes

#### Schema

Type	boolean
Default value	False

#### JSON Schema

```
{
  "configDescription": "DESC_TRUST_ALL_CERTIFICATES",
  "default": false,
  "defaultConfigurable": true,
  "propertyOrder": 4,
  "type": "boolean"
}
```

### 13.1.12.2.5 Timeout

This timeout is used for all LDAP requests, including search requests.

#### General Information

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::TIMEOUT
Property is hidden	Yes
Contained in every configuration by default	No

#### Schema

Type	string
Format	timespan
Minimum	PT1S
Default value	"PT10S"

#### JSON Schema

```
{
  "default": "PT10S",
  "description": "DESC_TIMEOUT",
  "format": "timespan",
  "formatMinimum": "PT1S",
  "hidden": true,
  "propertyOrder": 5,
  "type": "string"
}
```

### 13.1.12.2.6 Base DN

Entry point for LDAP search requests. If empty, the domain components of the host are used.

**General Information**

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::BASE_DN
Property is hidden	No
Contained in every configuration by default	No

**JSON Schema**

```
{
  "allOf": [
    {
      "configDescription": "DESC_BASE_DN",
      "default": "",
      "optionMethod": {
        "symbol": "ListNamingContexts"
      },
      "propertyOrder": 10
    },
    {
      "anyOf": [
        {
          "const": "",
          "type": "string"
        },
        {
          "$ref": "tchmi:server#/definitions/ldapDistinguishedName"
        }
      ]
    }
  ]
}
```

**13.1.12.2.7 Follow referrals**

Specifies whether to automatically follow referrals returned by the LDAP server.

**General Information**

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::LDAP_OPT_REFERRALS
Property is hidden	Yes
Contained in every configuration by default	No

**Schema**

Type	boolean
Default value	False

**JSON Schema**

```
{
  "configDescription": "DESC_LDAP_OPT_REFERRALS",
  "default": false,
  "hidden": true,
  "propertyOrder": 16,
  "type": "boolean"
}
```

**13.1.12.2.8 Case-sensitive comparison of attribute values**

DNs and attributes are case-insensitive by default. It is possible to define an attribute as case-sensitive in the schema, but this is rare.

**General Information**

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::CASE_SENSITIVE_ATTRIBUTE_VALUE_COMPARISON
Property is hidden	Yes
Contained in every configuration by default	No

**Schema**

Type	boolean
Default value	False

**JSON Schema**

```
{
  "default": false,
  "description": "DESC_CASE_SENSITIVE_ATTRIBUTE_VALUE_COMPARISON",
  "hidden": true,
  "propertyOrder": 17,
  "type": "boolean"
}
```

**13.1.12.3 HMI Authentication****13.1.12.3.1 Authentication mechanism**

The most common mechanism is 'Simple'. 'Digest-MD5' is recommended when TLS is unavailable.

**General Information**

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::AUTHENTICATION_MECHANISM
Category	HMI Authentication
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Enumeration type	string
Default value	"Simple"

**Enumeration value**

Simple
Digest-MD5

**JSON Schema**

```
{
  "category": "CATEGORY_AUTHENTICATION",
  "default": "Simple",
  "description": "DESC_AUTHENTICATION_MECHANISM",
  "enum": [
    "Simple",
    "Digest-MD5"
  ],
  "propertyOrder": 6,
  "type": "string"
}
```

### 13.1.12.3.2 User filter

Used to search for the user entry. {input} is a placeholder replaced by what the user inputs in the login form. {username\_attribute} is a placeholder replaced by the configured username attribute.

#### General Information

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::USER_FILTER
Category	HMI Authentication
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Enumeration type	string
Default value	"(&({username_attribute}={input}))(objectClass=person)"

Enumeration value
(&({username_attribute}={input}))(objectCategory=person)(objectClass=user))
(&({username_attribute}={input}))(objectClass=person))
(&({username_attribute}={input}))(objectClass=inetOrgPerson))

#### JSON Schema

```
{
  "category": "CATEGORY_AUTHENTICATION",
  "configDescription": "DESC_USER_FILTER",
  "default": "(&({username_attribute}={input})) (objectClass=person) ",
  "enum": [
    "(&({username_attribute}={input})) (objectCategory=person) (objectClass=user) ",
    "(&({username_attribute}={input})) (objectClass=person) ",
    "(&({username_attribute}={input})) (objectClass=inetOrgPerson) "
  ],
  "propertyOrder": 11,
  "type": "string"
}
```

### 13.1.12.3.3 Username attribute

Attribute used to identify the user.

#### General Information

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::USERNAME_ATTRIBUTE
Category	HMI Authentication
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Enumeration type	string
Default value	"userPrincipalName"

Enumeration value
userPrincipalName
sAMAccountName
uid
mail

## JSON Schema

```
{
  "category": "CATEGORY_AUTHENTICATION",
  "configDescription": "DESC_USERNAME_ATTRIBUTE",
  "default": "userPrincipalName",
  "enum": [
    "userPrincipalName",
    "sAMAccountName",
    "uid",
    "mail"
  ],
  "propertyOrder": 12,
  "type": "string"
}
```

### 13.1.12.3.4 Ignore the domain suffix during login

Ignore everything after the first @ in the username submitted by the user. If you are for example using 'userPrincipalName' on ActiveDirectory you need to disable this setting, because the userPrincipalName contains an @.

#### General Information

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::IGNORE_DOMAIN_SUFFIX_DURING_LOGIN
Category	HMI Authentication
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	boolean
Default value	False

## JSON Schema

```
{
  "category": "CATEGORY_AUTHENTICATION",
  "configDescription": "DESC_IGNORE_DOMAIN_SUFFIX_DURING_LOGIN",
  "default": false,
  "propertyOrder": 13,
  "type": "boolean"
}
```

### 13.1.12.3.5 Append the domain during login

For example, if the 'email' or 'userPrincipalName' is used for login, this setting can be used to automatically add the domain suffix so that it does not need to be specified at login. The extension does a case-insensitive check to find out if the domain suffix is already present.

#### General Information

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::APPEND_DOMAIN_DURING_LOGIN
Category	HMI Authentication
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	string
Default value	""

**JSON Schema**

```
{
  "category": "CATEGORY_AUTHENTICATION",
  "configDescription": "DESC_APPEND_DOMAIN_DURING_LOGIN",
  "default": "",
  "propertyOrder": 14,
  "type": "string"
}
```

**13.1.12.3.6 Use LDAP search for ListUsers**

Depending on the size of the directory, the search might take too long or return too many results. If disabled, the usernames are collected from the TcHmiSrv configuration.

**General Information**

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::USE_LDAP_SEARCH_FOR_LISTUSERS
Category	HMI Authentication
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Type	boolean
Default value	False

**JSON Schema**

```
{
  "category": "CATEGORY_AUTHENTICATION",
  "configDescription": "DESC_USE_LDAP_SEARCH_FOR_LISTUSERS",
  "default": false,
  "propertyOrder": 15,
  "type": "boolean"
}
```

**13.1.12.4 LDAP Authentication****13.1.12.4.1 Authentication mechanism for bind user**

'None' means that there is no bind user, in which case, the bind request is done with what the user inputs in the login form.

**General Information**

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::BIND_USER_AUTHENTICATION_MECHANISM
Category	LDAP Authentication
Property is hidden	No
Contained in every configuration by default	No

**Schema**

Enumeration type	string
Default value	"None"

Enumeration value
None
Anonymous
Simple
Digest-MD5
Kerberos-Credential-Cache

**JSON Schema**

```
{
  "category": "CATEGORY_BIND_USER",
  "configDescription": "DESC_BIND_USER_AUTHENTICATION_MECHANISM",
  "default": "None",
  "enum": [
    "None",
    "Anonymous",
    "Simple",
    "Digest-MD5",
    "Kerberos-Credential-Cache"
  ],
  "propertyOrder": 7,
  "type": "string"
}
```

**13.1.12.4.2 Bind user DN**

The full DN of the admin user that is used to search for the DN of the user that is trying to sign in. This setting is ignored if the authentication mechanism is 'Anonymous', 'Kerberos-Credential-Cache' or 'None'.

**General Information**

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::BIND_USER_DN
Category	LDAP Authentication
Property is hidden	No
Contained in every configuration by default	No

**JSON Schema**

```
{
  "allof": [
    {
      "category": "CATEGORY_BIND_USER",
      "configDescription": "DESC_BIND_USER_DN",
      "default": "",
      "propertyOrder": 8
    },
    {
      "anyOf": [
        {
          "const": "",
          "type": "string"
        },
        {
          "$ref": "tchmi:server#/definitions/ldapDistinguishedName"
        },
        {
          "$ref": "tchmi:server#/definitions/ldapAttributeValue"
        }
      ]
    }
  ]
}
```



### 13.1.12.4.3 Bind user password

Stored as plaintext in the configuration database.

#### General Information

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::BIND_USER_PASSWORD
Category	LDAP Authentication
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	string
Format	encrypted

#### JSON Schema

```
{
  "category": "CATEGORY_BIND_USER",
  "description": "DESC_BIND_USER_PASSWORD",
  "format": "encrypted",
  "propertyOrder": 9,
  "type": "string"
}
```

### 13.1.12.5 Group mappings

#### 13.1.12.5.1 Group mappings

Set HMI user groups based on an LDAP user's attributes.

#### General Information

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::GROUP_MAPPINGS
Category	Group mappings
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	array
------	-------

#### Default value

```
[]
```

#### JSON Schema

```
{
  "category": "CATEGORY_INTEGRATION",
  "configDescription": "DESC_GROUP_MAPPINGS",
  "default": [],
  "items": {
    "properties": {
      "HMI_GROUP": {
        "optionMethod": {
          "symbol": "TcHmiSrv.Config::USERGROUPS"
        },
        "propertyOrder": 3,
        "type": "string"
      }
    }
  }
}
```

```

    "LDAP_ATTRIBUTE_NAME": {
      "default": "memberOf",
      "propertyOrder": 1,
      "type": "string"
    },
    "LDAP_ATTRIBUTE_VALUE": {
      "allof": [
        {
          "propertyOrder": 2
        },
        {
          "$ref": "tchmi:server#/definitions/ldapAttributeValue"
        }
      ]
    },
    "required": [
      "LDAP_ATTRIBUTE_NAME",
      "LDAP_ATTRIBUTE_VALUE",
      "HMI_GROUP"
    ],
    "type": "object"
  },
  "propertyOrder": 18,
  "type": "array"
}

```

### 13.1.12.5.2 Block specific users

Blocked users are not able to log in, even if they logged in successfully in the past.

#### General Information

Domain	TcHmiLdap
Full symbol path	TcHmiLdap.Config::BLOCK_USERS
Category	Group mappings
Property is hidden	No
Contained in every configuration by default	No

#### Schema

Type	object
------	--------

#### Default value

```

{
  "LIST": [],
  "USE_WHITELISTING": false
}

```

#### JSON Schema

```

{
  "category": "CATEGORY_INTEGRATION",
  "configDescription": "DESC_BLOCK_USERS",
  "default": {
    "LIST": [],
    "USE_WHITELISTING": false
  },
  "properties": {
    "LIST": {
      "default": [],
      "items": {
        "properties": {
          "LDAP_ATTRIBUTE_NAME": {
            "default": "memberOf",
            "propertyOrder": 1,
            "type": "string"
          },
          "LDAP_ATTRIBUTE_VALUE": {
            "allof": [
              {

```

```

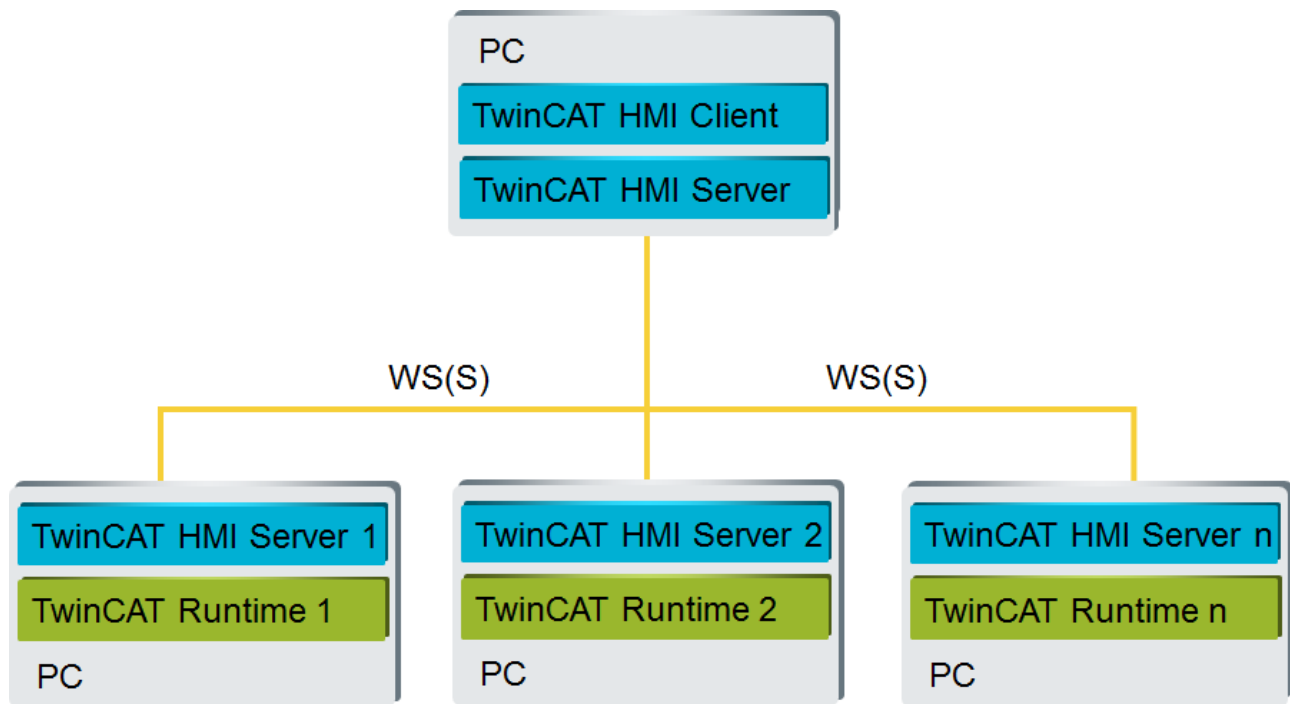
        "propertyOrder": 2
      },
      {
        "$ref": "tchmi:server#/definitions/ldapAttributeValue"
      }
    ]
  },
  "required": [
    "LDAP_ATTRIBUTE_NAME",
    "LDAP_ATTRIBUTE_VALUE"
  ],
  "type": "object"
},
"propertyOrder": 3,
"type": "array"
},
"USE_WHITELISTING": {
  "configDescription": "DECS_USE_WHITELISTING",
  "default": false,
  "propertyOrder": 1,
  "type": "boolean"
},
"WHITELIST_ACCOUNTS_AFFECTED_BY_GROUP_MAPPINGS": {
  "default": false,
  "description": "DESC_WHITELIST_ACCOUNTS_AFFECTED_BY_GROUP_MAPPINGS",
  "propertyOrder": 2,
  "type": "boolean"
}
},
"propertyOrder": 19,
"required": [
  "USE_WHITELISTING",
  "WHITELIST_ACCOUNTS_AFFECTED_BY_GROUP_MAPPINGS",
  "LIST"
],
"type": "object"
}

```

## 13.2 Server-to-server communication

Server-to-server communication enables communication between TwinCAT HMI servers via WebSockets. Using server-to-server communication, any data points can be exchanged between the servers. The prerequisite for this is that the symbols are mapped on the target server. [\[► 79\]](#)

Server-to-server communication can be used in different scenarios. For example, it is possible for a server to tap the data points of any number of subordinate servers. It is also possible for one server to pass the data points on to another server, which in turn passes the data on to the next server.



Server-to-server communication requires a client license (TF2010 - TF2040) on the server to which another server wants to connect. In the scenario shown above, TwinCAT HMI Server 1, TwinCAT HMI Server 2 and TwinCAT HMI Server n require a client license if the higher-level TwinCAT HMI Server connects to them.



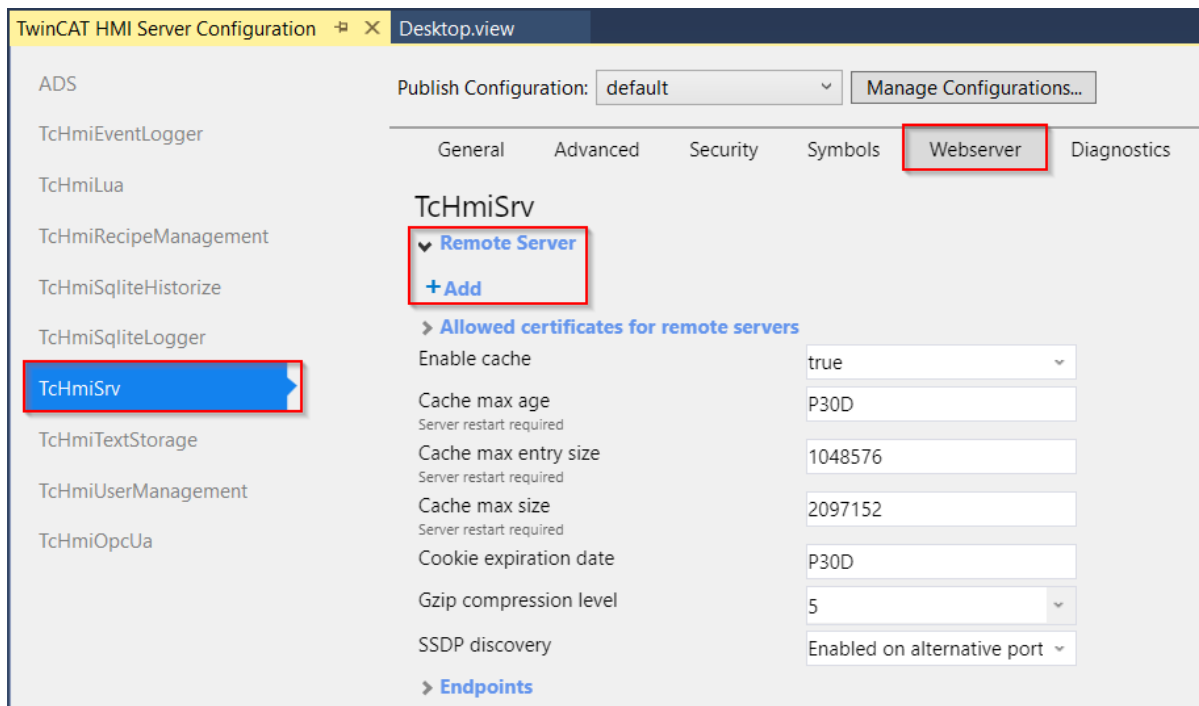
Available since version 1.10.1336.0

### 13.2.1 Configure connection

Server-to-server communication is set up on the [configuration page](#) [► 956] of the TwinCAT HMI server.

## Add Remote Server

1. Open the configuration page of the server and navigate to the subpage **TcHmiSrv** → **Webserver**:



2. Under **Remote Server**, you can add a server that you want to connect to. Click on the entry **+ Add**.

## Configuring the Remote Server

The connection to the remote server can be configured as follows:

**Add HMI Server**

**Domain**  **1**

**Remote URL**  **2**

**Username**  ☒ **3**

**Password**  ☒ **4**

**Timeout**  ☐ **5**

**Enabled**  **6**

**Add** **7**

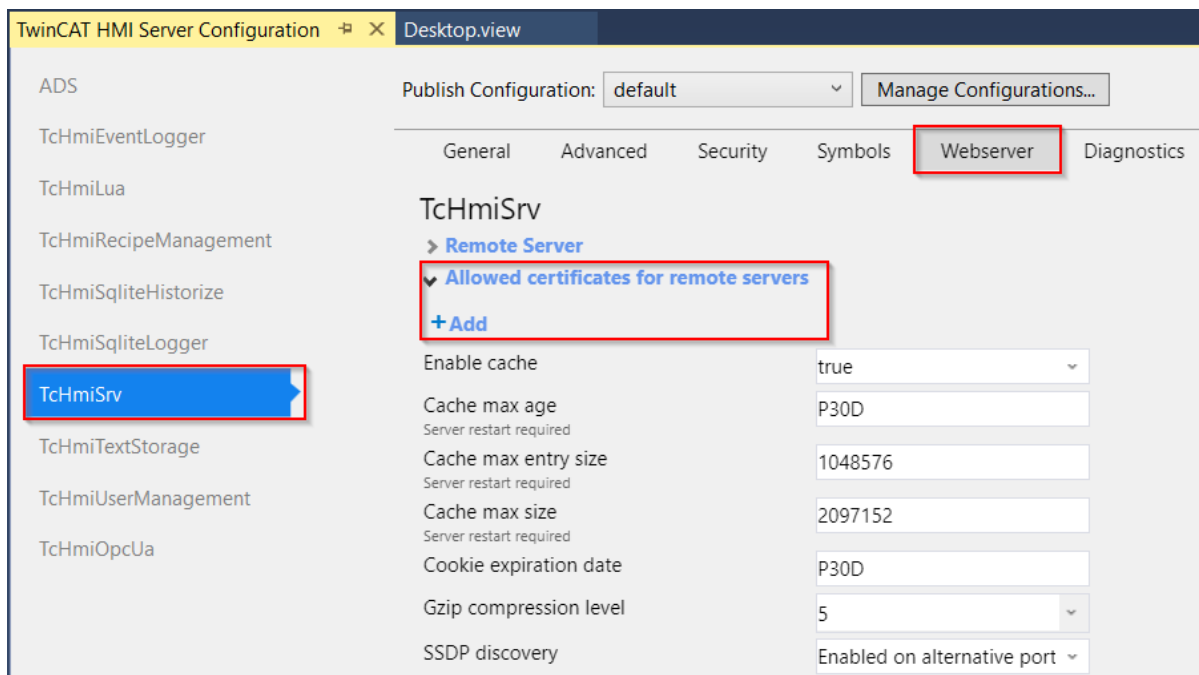
1. **Domain**: The domain can be chosen freely. The remote server is listed in TwinCAT HMI under this name.
2. **Remote URL**: URL of the remote server. The complete address of the remote server must be specified here, including the protocol to be used. Using encrypted communication requires adding the certificate [▶ 1450] of the remote server.
3. **Username (optional)**: The user name is required if authentication [▶ 963] is active on the remote server. Depending on the configured symbol rights [▶ 973], the different users have different access rights to the symbols. It is possible to log another user on to the remote server at runtime [▶ 1450]. If authentication is disabled on the remote server, the user does not need to enter anything.
4. **Password (optional)**: Password of the user logged on to the remote server.

5. **Timeout (optional):** WebSocket timeout for communication with the remote server.
6. **Enabled:** Enables or disables the connection to the remote server.
7. **Add:** Adds the connection to the remote server.

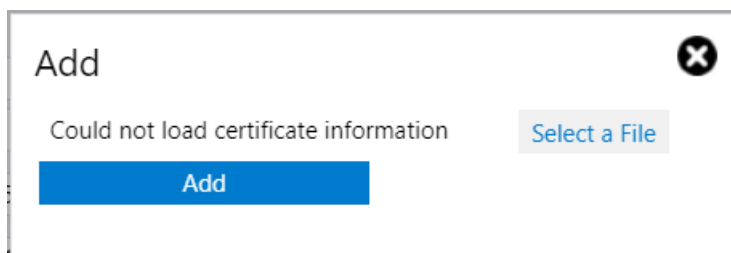
### 13.2.1.1 Add remote server certificate

Communication with the remote server can be encrypted. In this case, the SSL certificate of the remote server must be exported and imported to the server that wants to connect to the remote server.

1. Export the certificate of the remote server. Open the configuration page of the remote server and click on "Export SSL Certificate".
2. Open the configuration page of the server you want to connect to the remote server.
3. Navigate under "TcHmiSrv" to the tab "Webserver" and click on the entry "Allowed certificates for remote servers".



4. Add a new certificate by clicking on the entry "+ Add".
5. Select the certificate of the remote server you want to import.



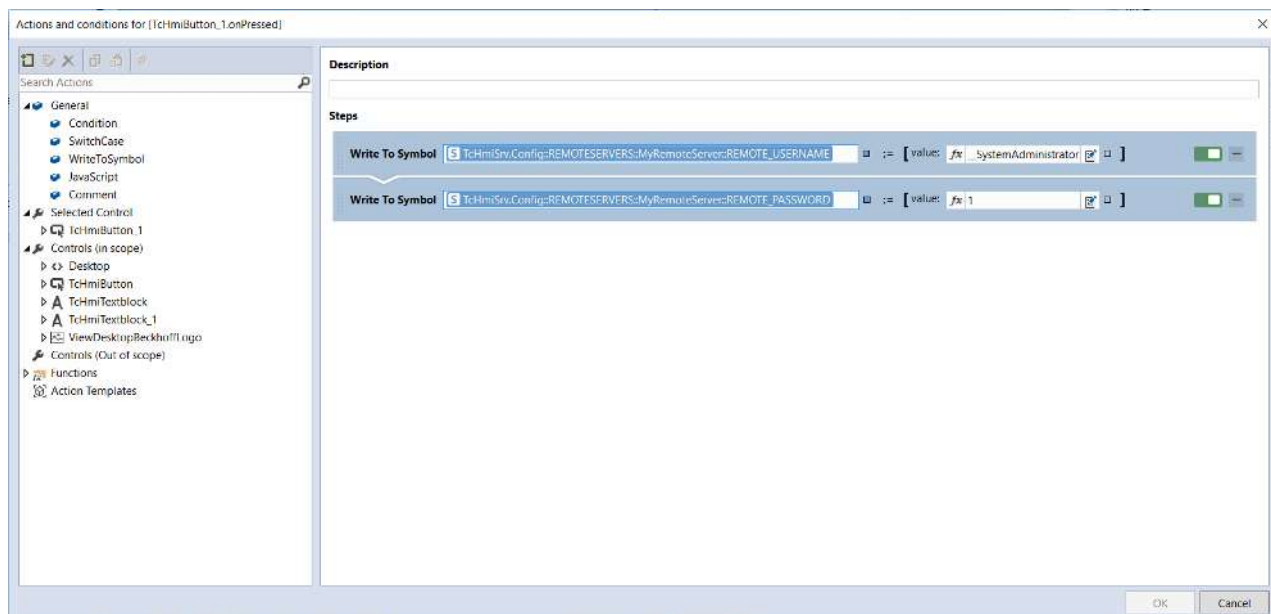
6. Confirm the dialog by clicking on "Add".

### 13.2.1.2 Changing the Configuration at Runtime

The configuration of the remote server can be changed at runtime. This makes it possible, for example, to log on to the remote server with another user and thus obtain different access rights to the symbols of the remote server. Access at runtime is via the Config symbol of the TwinCAT HMI server. Under the Config symbol you will find the configuration of the remote server, which contains the same options as the configuration page of the server.

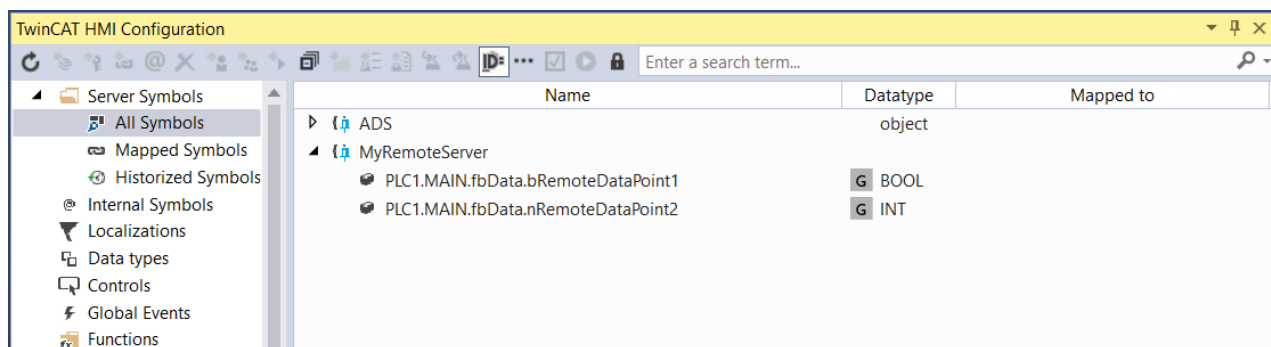
REMOTESERVERS	object	TcHmiSrv.Config::REMOTESERVERS
[<key>]	object (map)	TcHmiSrv.Config::REMOTESERVERS[<key>]
REMOTE_CONNECT_TIMEOUT	string	TcHmiSrv.Config::REMOTESERVERS[<key>]::REMOTE_CONNECT_TIMEOUT
REMOTE_ENABLED	boolean	TcHmiSrv.Config::REMOTESERVERS[<key>]::REMOTE_ENABLED
REMOTE_PASSWORD	string	TcHmiSrv.Config::REMOTESERVERS[<key>]::REMOTE_PASSWORD
REMOTE_URL	string	TcHmiSrv.Config::REMOTESERVERS[<key>]::REMOTE_URL
REMOTE_USERNAME	string	TcHmiSrv.Config::REMOTESERVERS[<key>]::REMOTE_USERNAME

When mapping the symbols [► 79], the domain must be specified (e.g. MyRemoteServer). The symbols can then be described and read in the Actions and Conditions editor [► 65].



## 13.2.2 Use data points

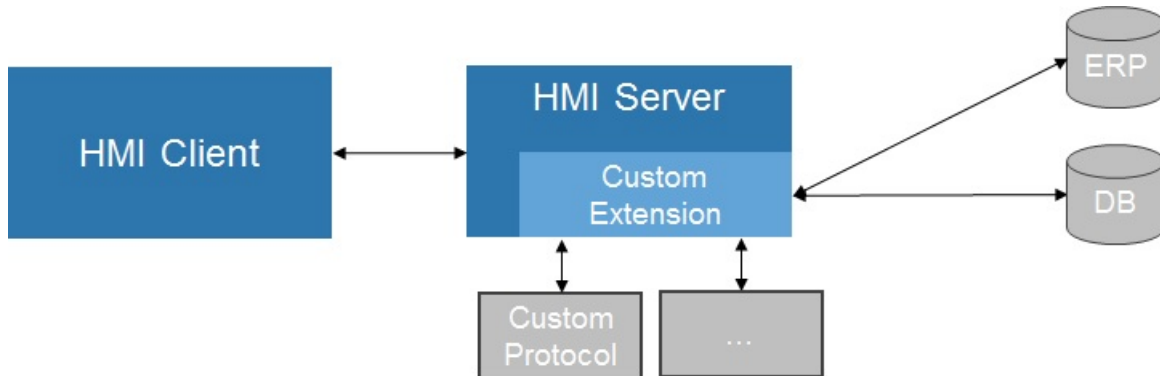
After the connection has been configured, the mapped symbols of the remote server can be accessed. Access is via the TwinCAT HMI Configuration window [► 77] via the domain of the remote server. There the symbols can be used in the same way as with the other extensions [► 108].



The symbols can be mapped via the TwinCAT HMI Configuration window. Activating the extended view [► 77] (button "...") displays the extended mapped symbols of the remote server.

## 13.3 Extensions

The TwinCAT HMI Server has a modular structure and encapsulates individual functionalities in server extensions. This enables a flexible expandability of the server. This can be used, for example, to integrate business logic centrally in the server and to protect know-how. Possible application scenarios are, for example, the connection to a user-specific database or the implementation of communication protocols.



The development of server extensions is done in C#. The development takes place in a separate project type within the Visual Studio. A corresponding project template is available for this purpose.

The execution of a server extension on the TwinCAT HMI server (TF2000) requires a license for the extension SDK (TF2200).



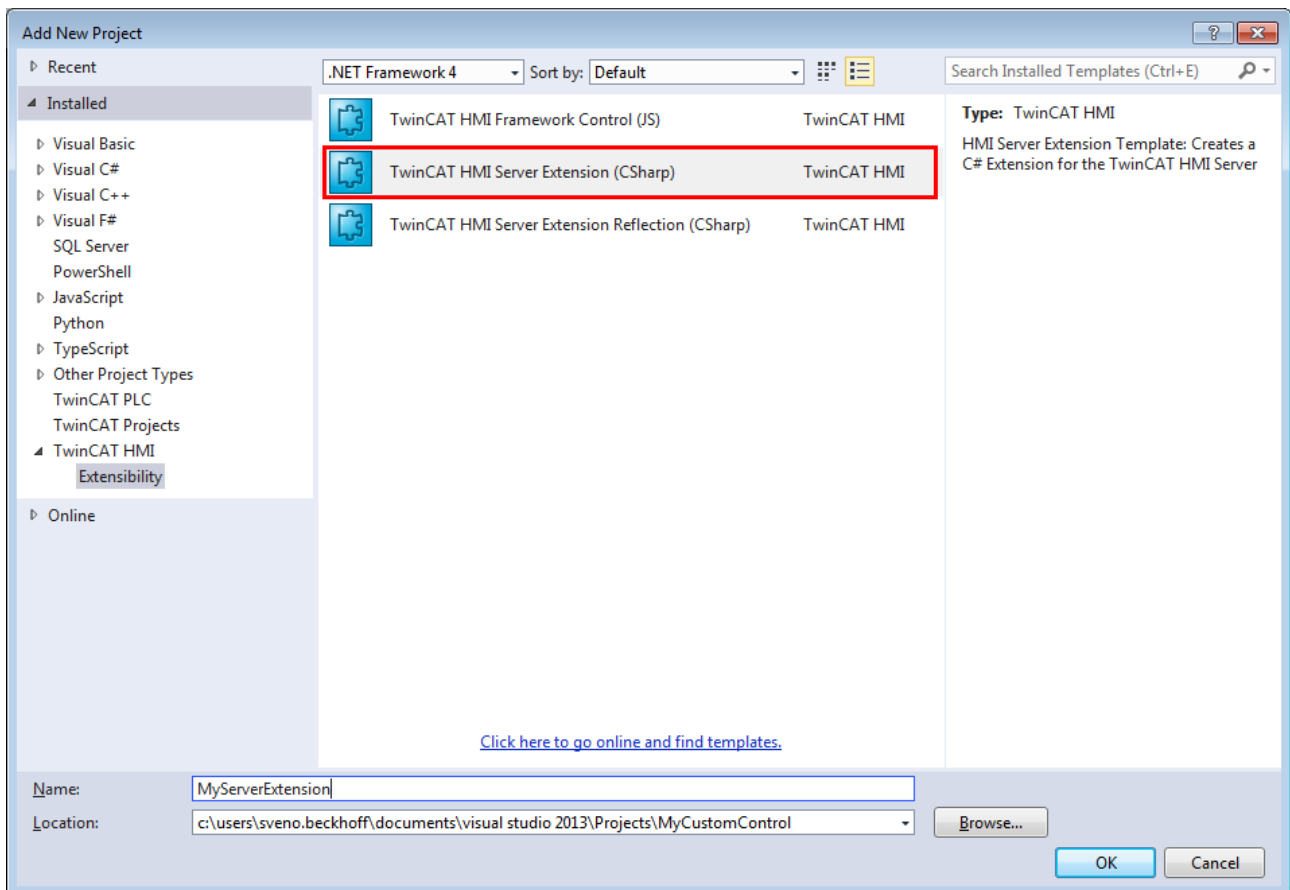
The development of a server extension requires a full version [► 20] of Visual Studio.

---

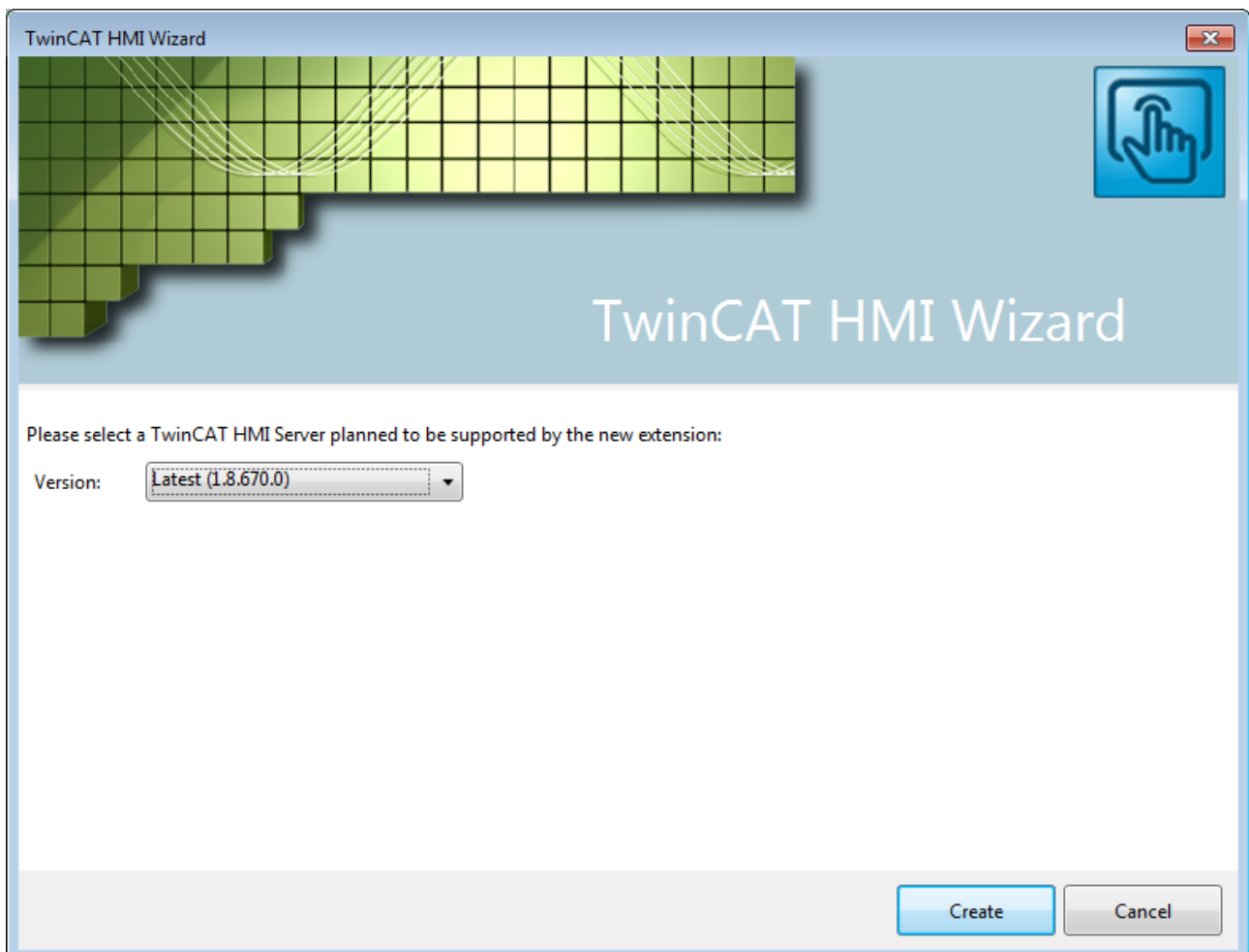
### 13.3.1 First steps

In addition to the TwinCAT HMI project, add another Server Extension project to your solution:

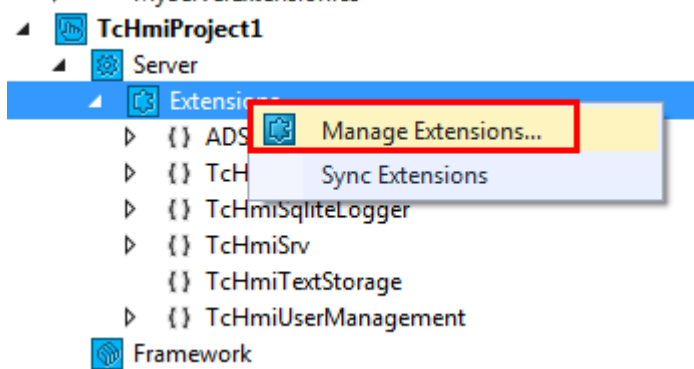




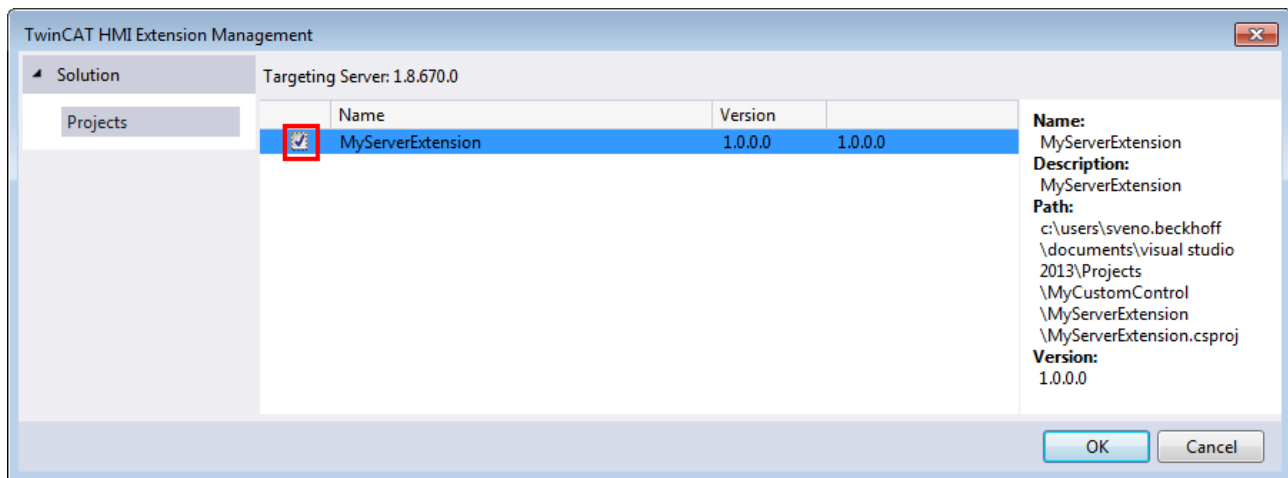
In the following dialog you can choose which server version should be used for development:



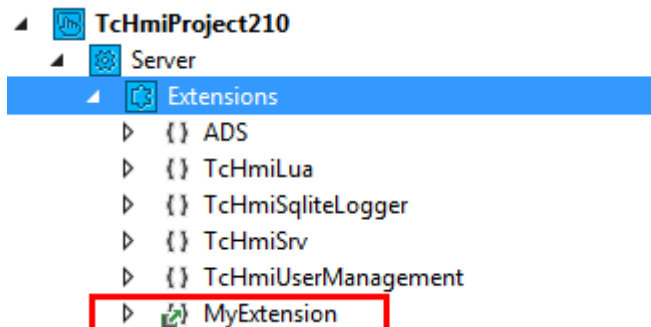
If the project was compiled successfully, the extension can be loaded from the server. Open the context menu in the TwinCAT HMI project under Server/Extensions:



Activate the respective extension to be loaded from the Engineering Server:

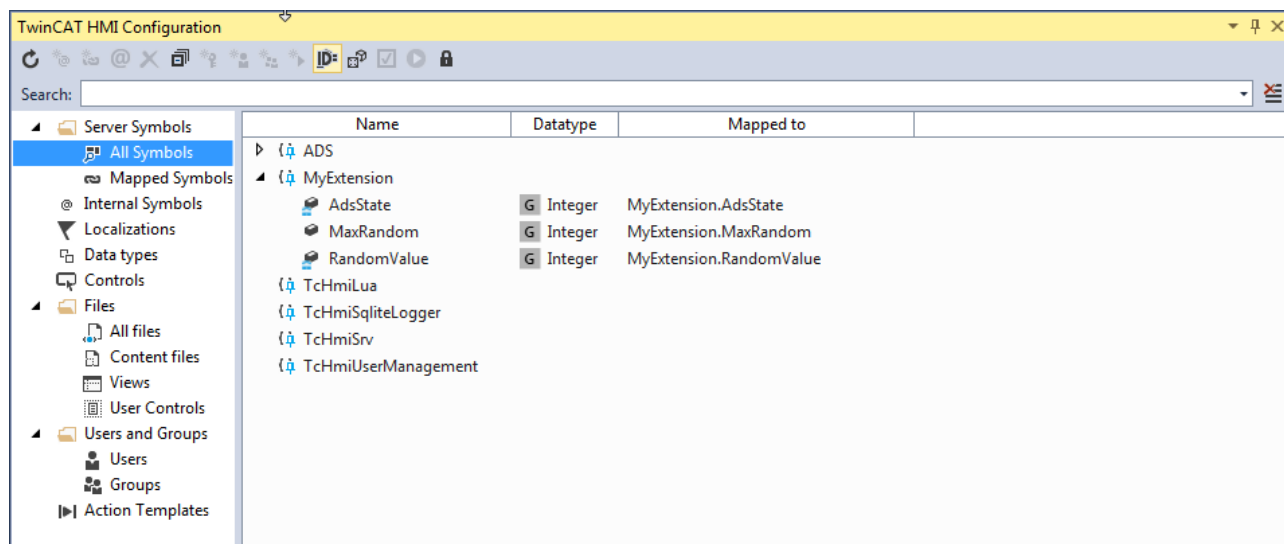


The server tries to load the extension. The state of the loaded extension is symbolized in the project node Server/Extensions:



If a problem has occurred during loading, the error list or log from the server can help with error analysis.

After loading the extension, the extension symbols are available in the TwinCAT HMI Config window:



## 13.4 Automap Symbols

Variables from the PLC can be automatically mapped in the human-machine interface using the automap function. To do this, attributes must be set on the relevant variables in the PLC. The HMI searches the existing ADS symbols and creates them automatically if the relevant attribute is present.

### Available attributes:

Attributes	Description	Version
'TcHmiSymbol.AddSymbol'	Mapping the variables in the HMI using the automap function.	>= 1.12.756.1
'TcHmiSymbol.AddSymbol.Ignore'	Ignore the variables; underlying variables with AddSymbol attribute are still mapped.	>= 1.14.x.x
'TcHmiSymbol.AddSymbol.IgnoreRecursively'	Ignore the variables and the underlying variables.	>= 1.14.x.x
'TcHmiSymbol.AddSymbol.Hidden'	Hides the mapping (only visible when extended symbols are displayed).	>= 1.12.756.1
'TcHmiSymbol.AddSymbol.UserGroups'	Creates a read/write authorization for user groups.	>= 1.12.756.1
'TcHmiSymbol.AddSymbol.UserGroups.Read'	Creates a read authorization for user groups.	>= 1.14.x.x

### Example – ST (variable declaration in the PLC)

#### Adding a variable

```
{ attribute 'TcHmiSymbol.AddSymbol' }
_i      : INT;
```

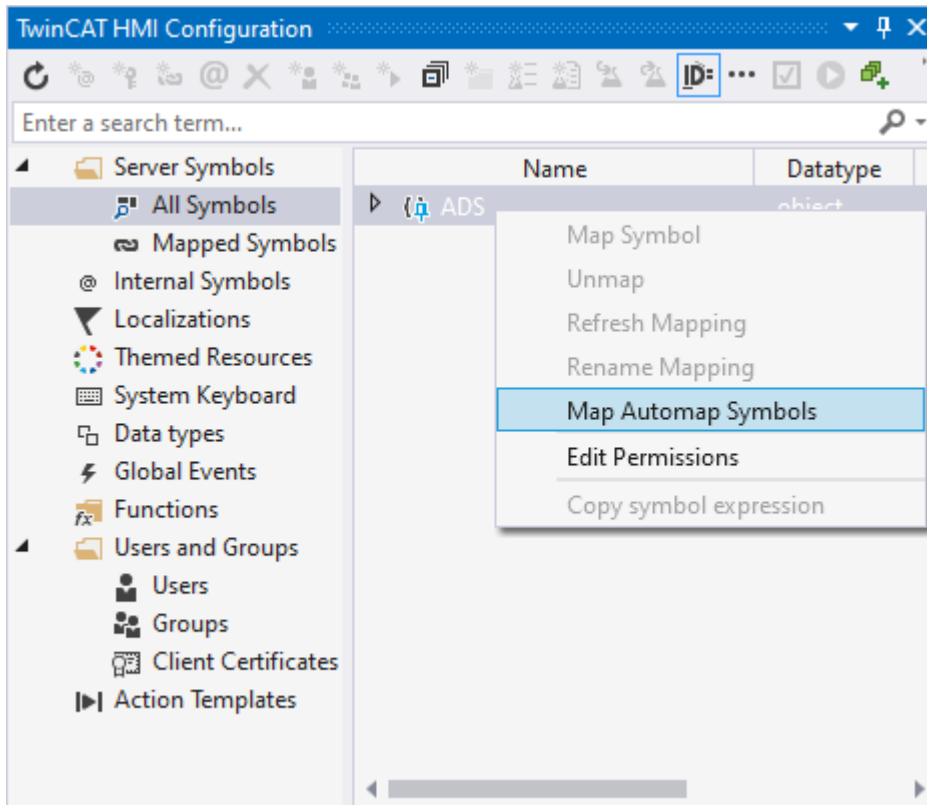
#### Adding a variable that is hidden in the human-machine interface

```
{ attribute 'TcHmiSymbol.AddSymbol' }
{ attribute 'TcHmiSymbol.AddSymbol.Hidden' }
_i      : INT;
```

#### Adding a variable, with read/write authorization for two user groups

```
{ attribute 'TcHmiSymbol.AddSymbol' }
{ attribute 'TcHmiSymbol.AddSymbol.UserGroups' := '__SystemAdministrators,Operators' }
_i      : INT;
```

## Adding the automap symbols in Visual Studio/TcXaeShell



1. Open the **TwinCAT HMI Configuration** window.
  2. Go to the **Server Symbols / All Symbols** tab.
  3. Right-click on **ADS**.
  4. Start the automatic mapping via **Map Automap Symbols**.
- ⇒ After adding, a message about the number of symbols added or an error message appears.



A maximum of 1000 symbols are currently mapped via Visual Studio/TcXaeShell.

## Adding the automap symbols via JavaScript

1. Add a new JavaScript file to the project.
  2. Open the JavaScript file you have created.
  3. Call up the writeEx function and describe the **AddSymbols** symbol.
- ⇒ Automatic mapping of symbols is started by describing the symbol.

## Parameter – AddSymbols

Name	Type	Description	Version
domain	string	Server domain that <b>AddSymbols</b> will be executed on.	>= 1.12.756.1
path	string	Move the search entry point to sub-levels. "PLC1::MAIN::_fbMachine" The search starts from <b>_fbMaschine</b> .	>= 1.14.x.x
namePrefix	string	Adds the defined prefix to the beginning of the symbol name.	>= 1.14.x.x
dryRun	boolean	Only searches for symbols without creating them.	>= 1.12.756.1
ignoreProblems	boolean	Continues the request if problems occur.	>= 1.12.756.1
Ignore	string []	Specified symbols are not taken into account during creation. ["ADS.PLC1.MAIN._axis"]	>= 1.12.756.1
skipExisting	boolean	Only symbols that do not yet exist are created.	>= 1.12.756.1
limit	int32	Limits the number of symbols that are searched for.	>= 1.14.x.x

## Example – JavaScript (start Automap Symbols, minimal data for request):

```
TcHmi.Symbol.writeEx('%s%AddSymbols|Timeout=5000%/s%', {domain: "ADS"}, function (data) {
    // callback value
    console.log(data);
    // number of found symbols
    console.log(Object.keys(data?.value).length);
});
```

## Example – JavaScript (start Automap Symbols):

```
let config = {
    domain: "ADS",
    path: "PLC1::MAIN::_fbMachine",
    namePrefix: "AutoMapp.",
    dryRun: false,
    ignoreProblems: false,
    ignore: [
        "ADS.PLC1.MAIN._axis"
    ],
    skipExisting: true,
    limit: 3000
}
TcHmi.Symbol.writeEx('%s%AddSymbols|Timeout=5000%/s%', config, function (data) {
    // callback value
    console.log(data);
    // number of found symbols
    console.log(Object.keys(data?.value).length);
});
```



This functionality is available since version 1.12.756.1.



This functionality is only available with an ADS connection and not with a TMC file.




The attributes do not currently work for methods or properties.

# 13.5 Appendix

## 13.5.1 TcHmiAds return codes

### Enumerations

	Enumeration	Description
	<u>HMI_ADS_CONSTANTS</u> <u>NTS [► 1458]</u>	Return codes of the TcHmiAds extension.

### 13.5.1.1 HMI\_ADS\_CONSTANTS Enumeration

Return codes of the TcHmiAds extension.

**Namespace:** TcHmiAds [► 1458]

**Assembly:** TcHmiAds (in TcHmiAds.dll) Version: 1.0.0.0 (1.0.0.0)

**Members**

	Hex	Dec	Member name	Value	Description
	0x0	0	HMI_ADS_SUCCE SS	0	No error, everything fine
	0x100000	1048576	HMI_ADS_E_OFF SET	1048576	Offset of TcHmiAds specific error codes
	0x100010	1048592	HMI_ADS_E_TCDI R	1048592	TwinCAT directory not found on local system
	0x100011	1048593	HMI_ADS_E_TCV ERSION	1048593	TwinCAT version invalid
	0x100012	1048594	HMI_ADS_E_CON FIGDIR	1048594	TwinCAT configuration directory not found
	0x100013	1048595	HMI_ADS_E_STA TE	1048595	TwinCAT Router is in invalid state no port could be opened
	0x100020	1048608	HMI_ADS_E_PAR SE_BASETYPES	1048608	Error while parsing ADS base types
	0x100021	1048609	HMI_ADS_E_PAR SE_DATA	1048609	Error while parsing ADS data
	0x100022	1048610	HMI_ADS_E_NOT _IMPLEMENTED	1048610	Function not implemented (trying to write a reference value)
	0x100030	1048624	HMI_ADS_E_INVA LID_DATA	1048624	Invalid data written to server or an ADS datatype can not be parsed
	0x100031	1048625	HMI_ADS_E_UPL OAD_DATA	1048625	No upload data provided by configured ADS runtime
	0x100032	1048626	HMI_ADS_E_UNE XPECTED	1048626	Should not happen contact support
	0x100033	1048627	HMI_ADS_E_INVA LID_RUNTIME	1048627	Runtime name is empty or invalid
	0x100034	1048628	HMI_ADS_E_INVA LID_PARAMETER	1048628	A parameter of the requested function is invalid
	0x100035	1048629	HMI_ADS_E_NO_ OFFLINE_DATA	1048629	No offline data available
	0x100036	1048630	HMI_ADS_E_INVA LID_SYMBOL	1048630	The requested symbol is not available
	0x100037	1048631	HMI_ADS_E_MISS ING_PARAMETER	1048631	A parameter is missing in the requested function
	0x100038	1048632	HMI_ADS_E_ADD _ROUTE	1048632	An ADS route could not be added
	0x100039	1048633	HMI_ADS_E_EMP TY	1048633	No ADS symbols found
	0x10003A	1048634	HMI_ADS_E_DISA BLED	1048634	The requested runtime is disabled in the HMI configuration
	0x10003B	1048635	HMI_ADS_E_LICE NSE	1048635	A license error occurred
	0x10003C	1048636	HMI_ADS_E_INVA LID_SYMBOL_TY PE	1048636	A type from ADS could not be interpreted



	Hex	Dec	Member name	Value	Description
	0x10003D	1048637	HMI_ADS_E_INVALID_SYMBOL_HANDLE	1048637	A handle to an ADS symbol has become invalid
	0x10003E	1048638	HMI_ADS_E_ABORTED	1048638	A TCP/IP error occurred

Reference

[TcHmiAds Namespace \[► 1458\]](#)

## 14 Framework

TwinCAT HMI can be extended in the client via script language. The client is implemented via web technology (see [Web Technology Reference at MDN](#)). Besides the TwinCAT HMI API, the application developer can also use the other browser APIs. The main API that is required is the [JavaScript DOM API](#).

JavaScript tutorials:

- <https://developer.mozilla.org/en-US/docs/Web/Tutorials>
- <https://developer.mozilla.org/en-US/docs/Learn>

### 14.1 Script languages in the HMI project

Scripting languages enable the client-side extension of a TwinCAT HMI project with complex logics that cannot be mapped using the engineering functions. The scripting languages provide the developer with all options and functions of the respective scripting language. In addition, the scripting languages provide access to the framework API.

In addition to the JavaScript script language, version 1.12 makes the TypeScript programming language available for development purposes. TypeScript code is converted to JavaScript code by the TypeScript transpiler. TypeScript offers many advantages over JavaScript thanks to typification and the TypeScript syntax. This enables many errors to be detected at an early stage during development, making source code development easier and faster.

A distinction is made between three types of usage:

1. [Action \[► 1462\]](#): An action consists of JavaScript code that can only be used within the [Actions and Conditions Editor \[► 61\]](#).  
**Application:** Execution of simple JavaScript functionalities.  
**Info:** No TypeScript support.
2. [Functions \[► 1466\]](#): A function consists of TypeScript/JavaScript code and an associated description and is added separately to a project.  
**Application:** Execution of TypeScript/JavaScript in the [Actions and Conditions Editor \[► 61\]](#) and in the [Properties \[► 60\]](#) window.
3. [Code-Behind \[► 1473\]](#): Code-Behind consists of TypeScript/JavaScript code and is added to a project as a separate file.  
**Application:** Execution of complex TypeScript/JavaScript code.



JavaScript is supported from version 1.8, TypeScript from version 1.12.

---

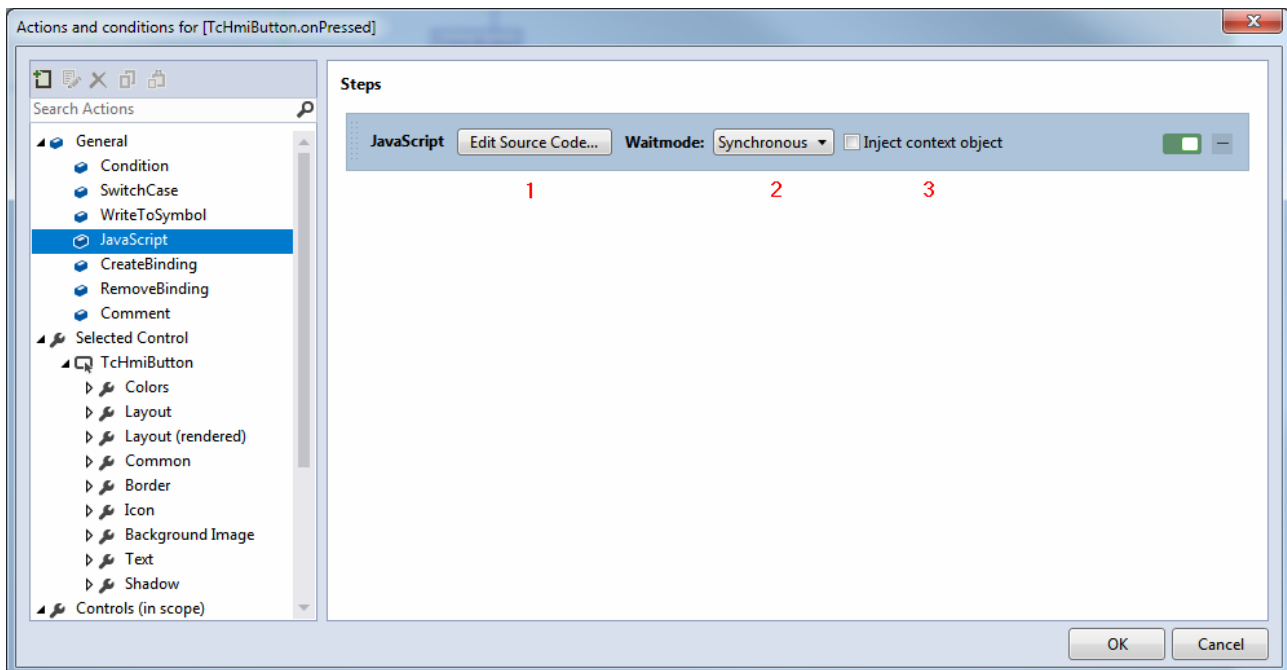
#### See also

[TypeScript documentation](#)

#### 14.1.1 Action

##### 14.1.1.1 Create

An action is configured in the [Actions and Conditions Editor \[► 61\]](#) for an event. To do this, open any event and insert a JavaScript action in the Actions and Conditions Editor using drag & drop.



A JavaScript action consists of the following elements:

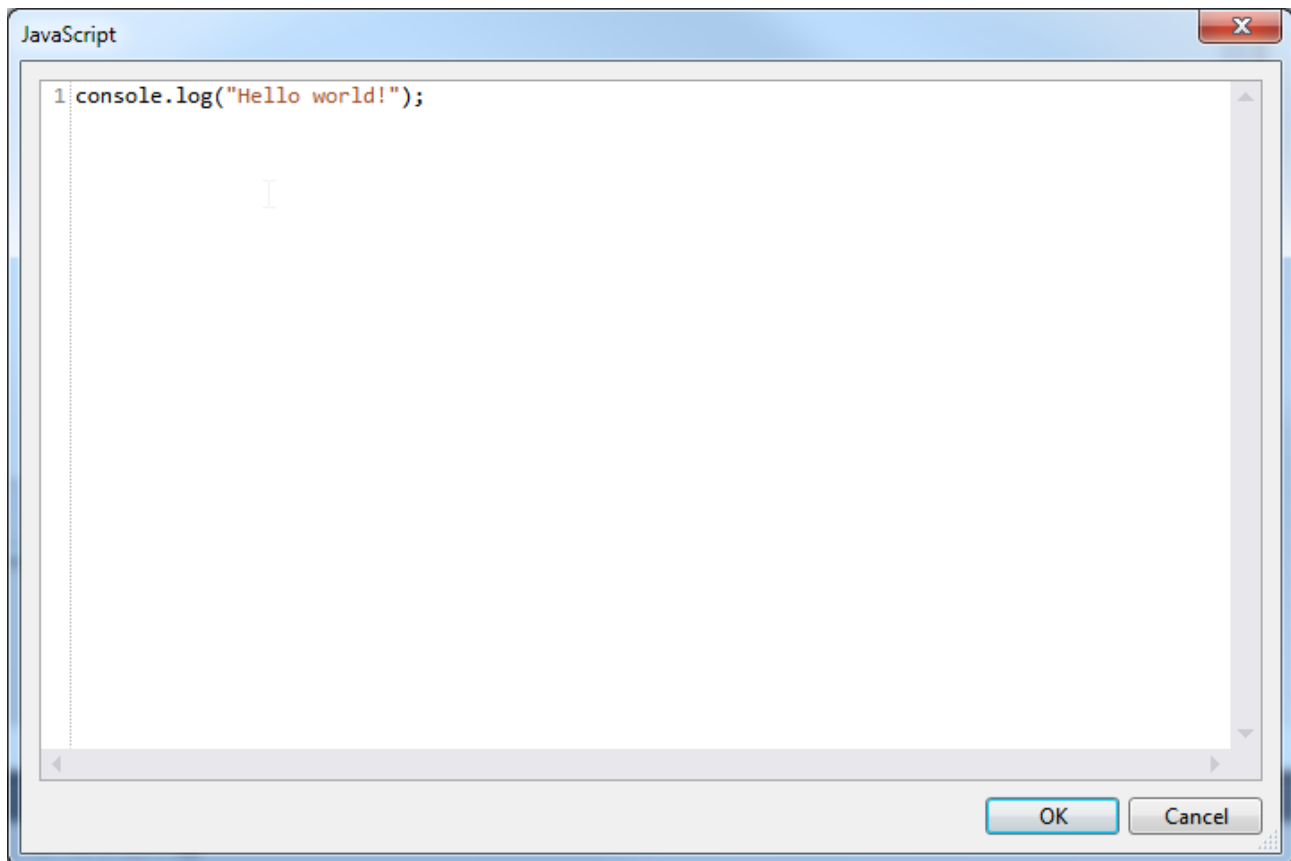
**1 Edit Source Code:** Clicking this button opens the Embedded JavaScript Editor, where the JavaScript statements can be programmed.

**2 Wait mode:** In this combo box you can select whether the JavaScript block is executed synchronously or asynchronously [► 1464].

**3 Inject context object:** When selecting the checkbox a context object (ctx) [► 1465] is available within the JavaScript code, which can be used to provide feedback about the end of an action. The context object is evaluated via a success branch or an error branch [► 1464], which can be shown or hidden by right-clicking on the action.

### 14.1.1.2 Editor

The editor for JavaScript actions offers the option to program and edit the JavaScript code. After programming, save the JavaScript code by clicking the **OK** button.



The JavaScript code within the JavaScript action is interpreted when the action is executed. Depending on the event, the action can be executed several times. Variables and functions declared in an action are only available within the action. [Internal variables](#) [► 87] can be read via the framework API.

### 14.1.1.3 Use

JavaScript actions are typically used for simple JavaScript logics that have no major connection to other functionalities in the project. The use of a [Code-Behind file](#) [► 1473] is recommended in cases where several JavaScript actions are configured, since the code is available centrally in one place, i.e. not distributed across several places.

#### Typical use cases

- Logging messages to the browser console
- Output of info messages in popup windows for debugging purposes
- Calling simple framework API functions

#### Special statements

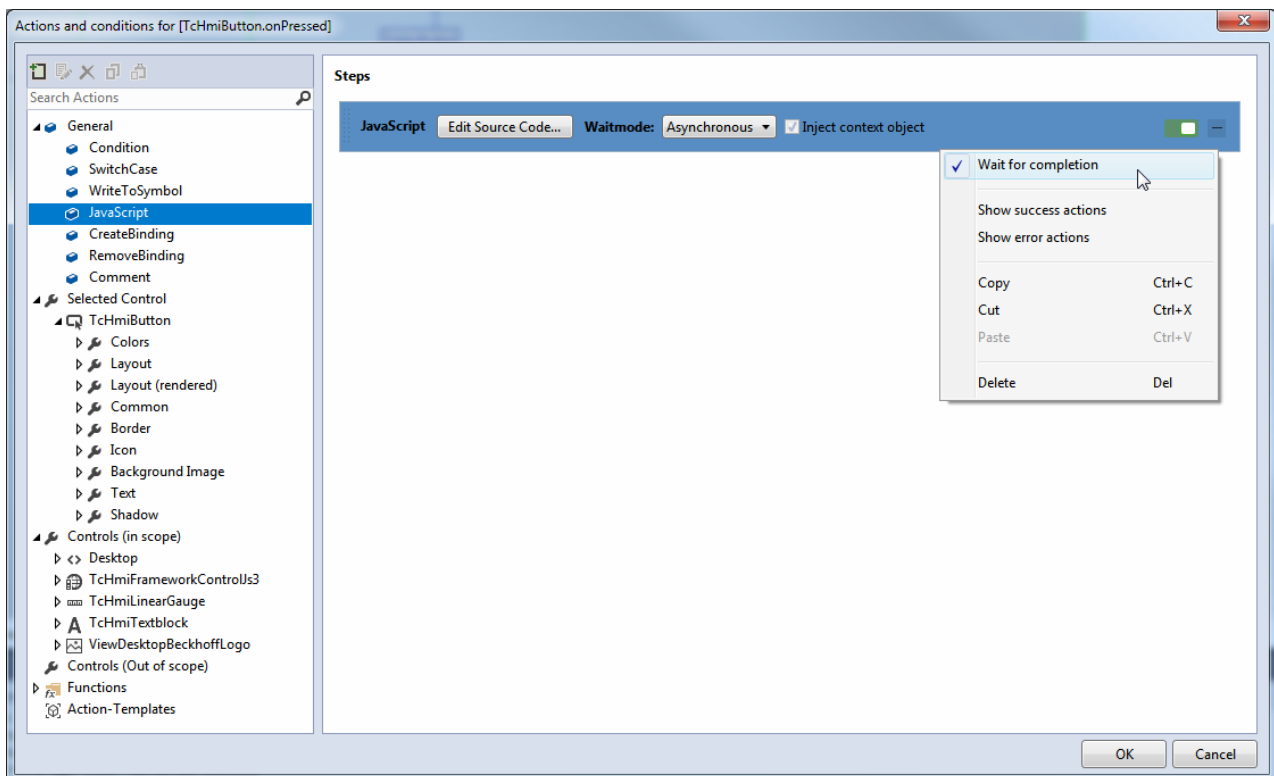
- Breakpoint:

```
debugger;
```

This statement sets a breakpoint at the current location and stops the program when the [development tools of the browser](#) [► 1595] are open.

### 14.1.1.4 Wait mode

Via the wait mode options of the JavaScript action, the TwinCAT HMI framework can be informed whether the stored logic works synchronously or asynchronously; it is used to determine when the TwinCAT HMI framework considers execution to be finished.



## Synchronous

The execution of the action is considered finished when the last line of JavaScript source code has been processed synchronously. If an exception occurs during execution, the error branch of the JavaScript action is executed. If the execution completed without errors, the success branch of the JavaScript action is executed.

The **Wait for completion** option has no effect for a synchronous logic. "Parallel" execution of synchronous logic, even in parts, is not possible.

## Asynchronous

The execution of the action is considered completed if this has been signaled using the corresponding functions of a context object. If **Inject context object** is checked, an object with the name "ctx [▶ 1465]" is inserted into the context of the JavaScript block. This object contains functions for communicating the execution result.

If the **success** function is called, the success branch of the JavaScript action is executed. If the **error** function is called, the error branch of the JavaScript action is executed. The error branch of the JavaScript action is also executed if an exception occurs during execution.

With asynchronous logic, the **Wait for completion** option can be used to control whether the execution result is to be awaited when the subsequent actions are executed or whether they are to be executed in parallel with the JavaScript action.

### 14.1.1.4.1 Context

An asynchronous JavaScript [▶ 1462] trigger action must notify the context object (ctx) of success or failure of the execution. The context object has appropriate functions for this.

#### success

Indicates successful execution.

```
ctx.success("Result");
```

**error**

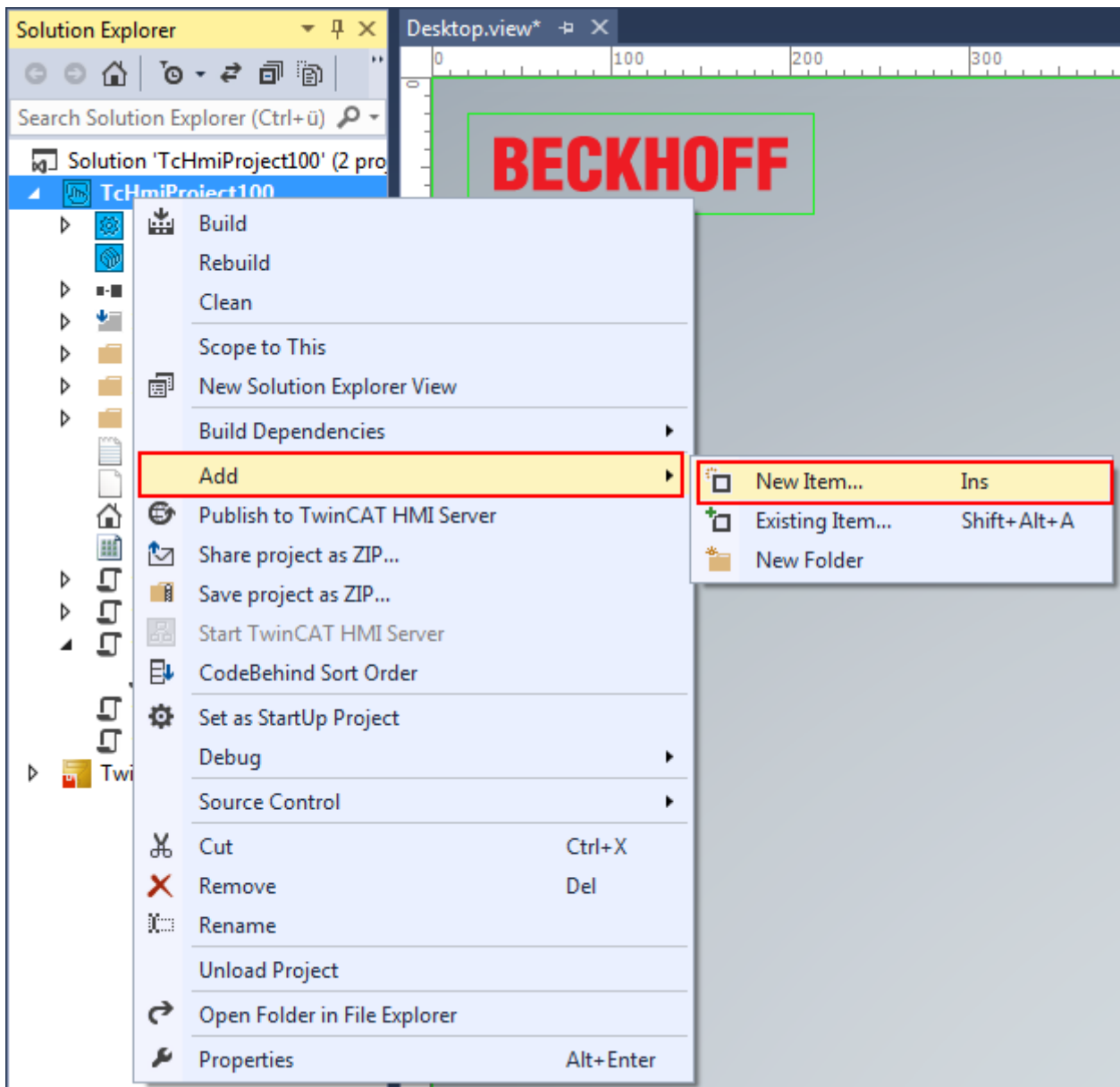
Indicates unsuccessful execution.

```
ctx.error(TcHmi.Errors.ERROR);
```

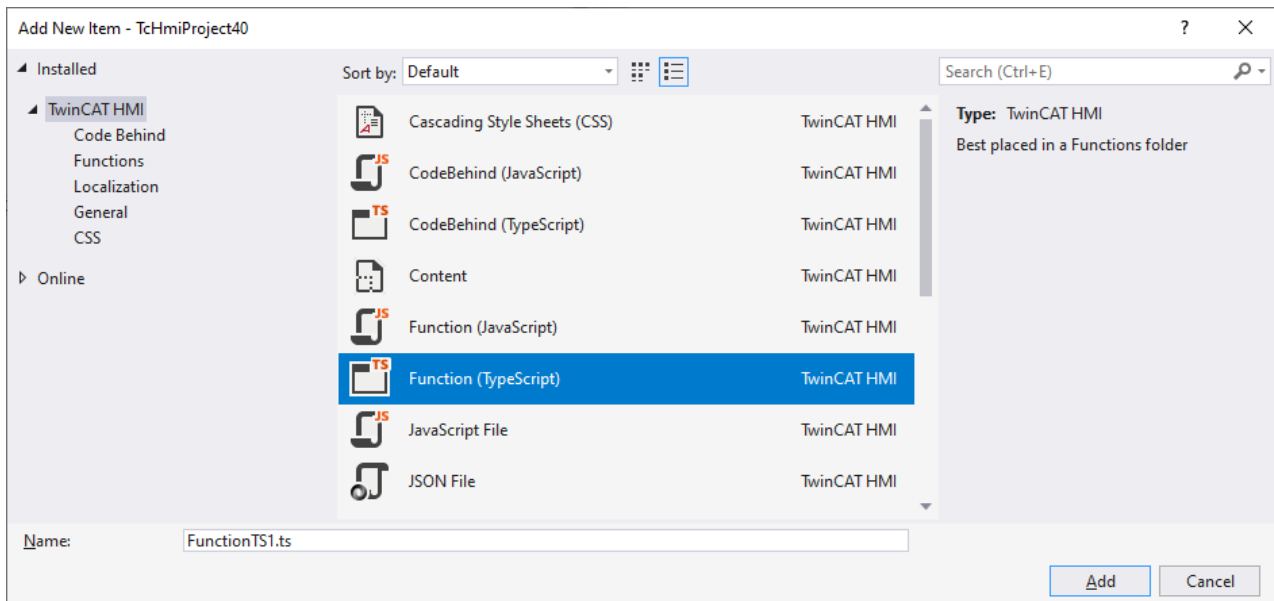
## 14.1.2 Function

### 14.1.2.1 Create

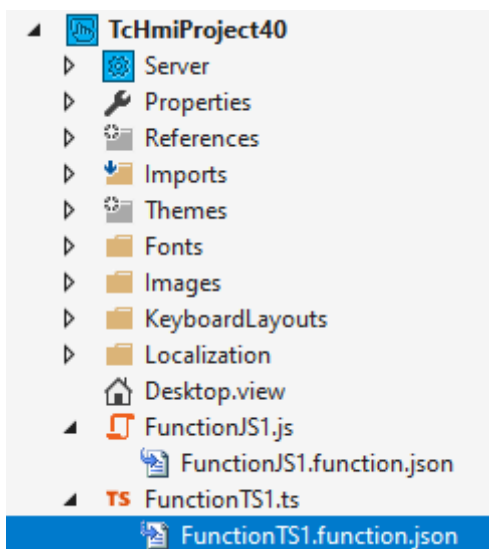
Create a new function via the project node of the TwinCAT HMI project.



A function can be created based on TypeScript or JavaScript. Both have the same technical options and are very similar in terms of programming. Due to the better Visual Studio programming support offered by Visual Studio, TypeScript should be selected for new functions. Enter a name for the file.



A function consists of a TypeScript/JavaScript file and an associated JSON file, which defines engineering properties. Double-click the JSON file in the Solution Explorer to [configure](#) [► 1467] the function and its parameters.



### 14.1.2.2 Editor

The function and parameter editor is divided into a function and parameter area.

**Edit/Define Function Metadata**

**Properties**

1 Display Name: FahrenheitToCelsius      5 Internal Name: FahrToCel

2 Description: Convert Fahrenheit to Celsius      6 Category: Measurement

3 Return Type:       7 Return Value Description: Temperature in Celsius

4 Context:

DisplayName	Internal Name	Description	Datatype	Default Value	Required	Bindable	Rest
TempInFahreinh	TempInFahr	Temperature in Fahrenheit	<input checked="" type="checkbox"/> FLOAT	0.0	<input checked="" type="checkbox"/>	Yes, pass value	<input type="checkbox"/>

8      9      10      11      12      13      14      15

New Edit Remove Up Down

OK Cancel

### Function area:

**1 Display name:** Name of the function [used \[► 1469\]](#) in the Actions and Conditions Editor or in the Properties window.

**2 Description:** Description of the function that is displayed as a tooltip during mouseover in the engineering.

**3 Return type:** Return value of the function that is transferred to the calling point in the engineering.

**4 Context:** The context defines whether the function [synchronous \(None\)](#) or [asynchronous \(Asynchronous\)](#) [► 1464] is executed. Asynchronous automatically adds a [context object \[► 1473\]](#) as a parameter value to the function.

**5 Internal name:** Internal name of the function used in the JavaScript file.

**6 Category:** The category determines under which category the function is displayed in the Actions and Conditions Editor.

**7 Return value description:** Description of the return value that is displayed as a tooltip during mouseover in the engineering.

### Parameter area:

**8 Display name:** Name of the parameter [used \[► 1469\]](#) in the Actions and Conditions Editor or in the Properties window.

**9 Internal name:** Internal name of the parameter used in the JavaScript file.

**10 Description:** Description of the parameter that is displayed as a tooltip during mouseover in the engineering.

**11 Data type:** Data type of the parameter.

**12 Default value:** Default value of the parameter that is used if no parameter is transferred.

**13 Required:** Indicates whether the parameter is required or can be transferred optionally. If the parameter is required and is not transferred, an error message is issued in the browser console.

**14 Bindable:** Bindable indicates whether the parameter can be bound to a symbol via the [Select Binding Source window \[► 108\]](#). The following options are available:

- **No:** The parameter cannot be bound to a symbol.

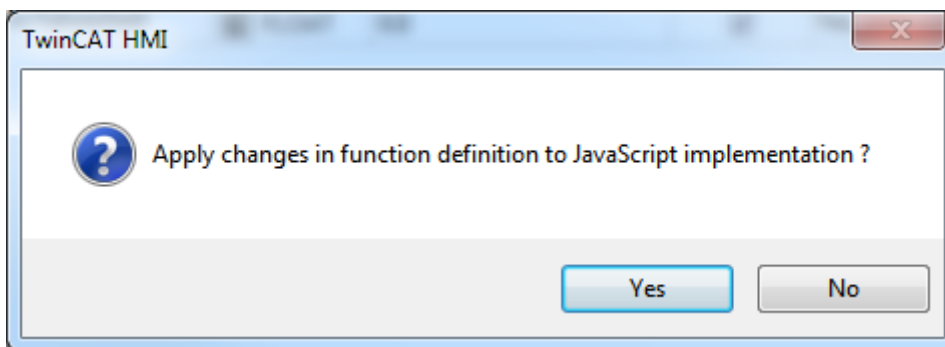


- **Yes, pass value:** The parameter can be bound to a symbol. During binding, the value of the symbol is passed to the function (e.g. "20" for an integer).
- **Yes, pass symbol reference:** The parameter can be bound to a symbol. During binding, the reference to the symbol is passed to the function. The symbol can be read (.read()) and written (.write()) via the framework API "TcHmi.Symbol".

**15 Rest:** Rest indicates whether the last parameter is a rest parameter (var nNumber,...) and can therefore contain a variable list of arguments (cf. va\_arg / va\_list in C / C++).



Changes (e.g. newly added parameters) in the function and parameter editor can be automatically applied to the corresponding JavaScript file. The automatic application can be confirmed or rejected via a dialog.



### 14.1.2.3 Use

Functions allow the execution of JavaScript code that can be linked directly from the [Properties window](#) [► 60] in the engineering component or used within the [Actions and Conditions Editor](#) [► 61]. This makes it possible to pass parameters to the function via the engineering.

#### Typical use cases

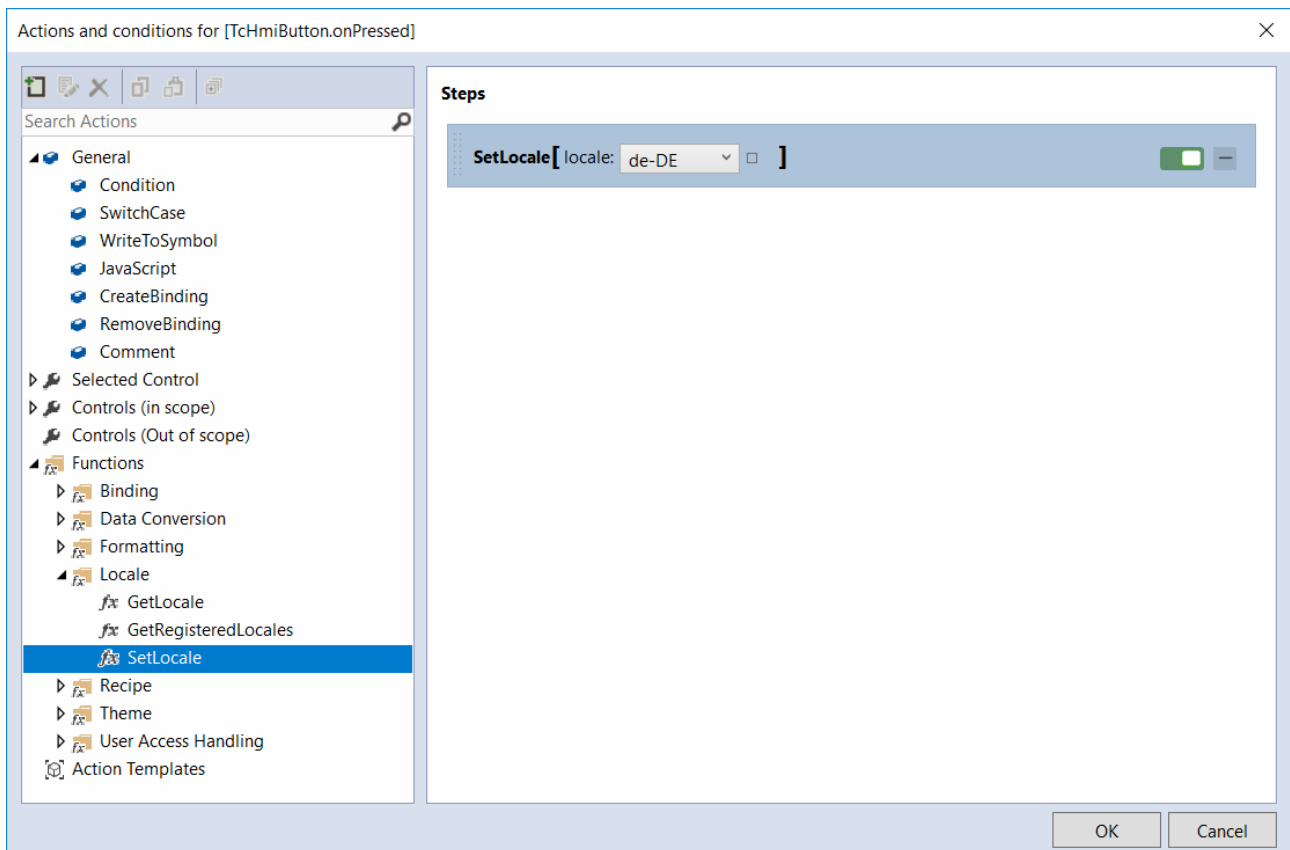
- Conversion: Conversion of values within a function, e.g. conversion of units.
- Validation: Checking of values within a function and feedback on the validity of the value.



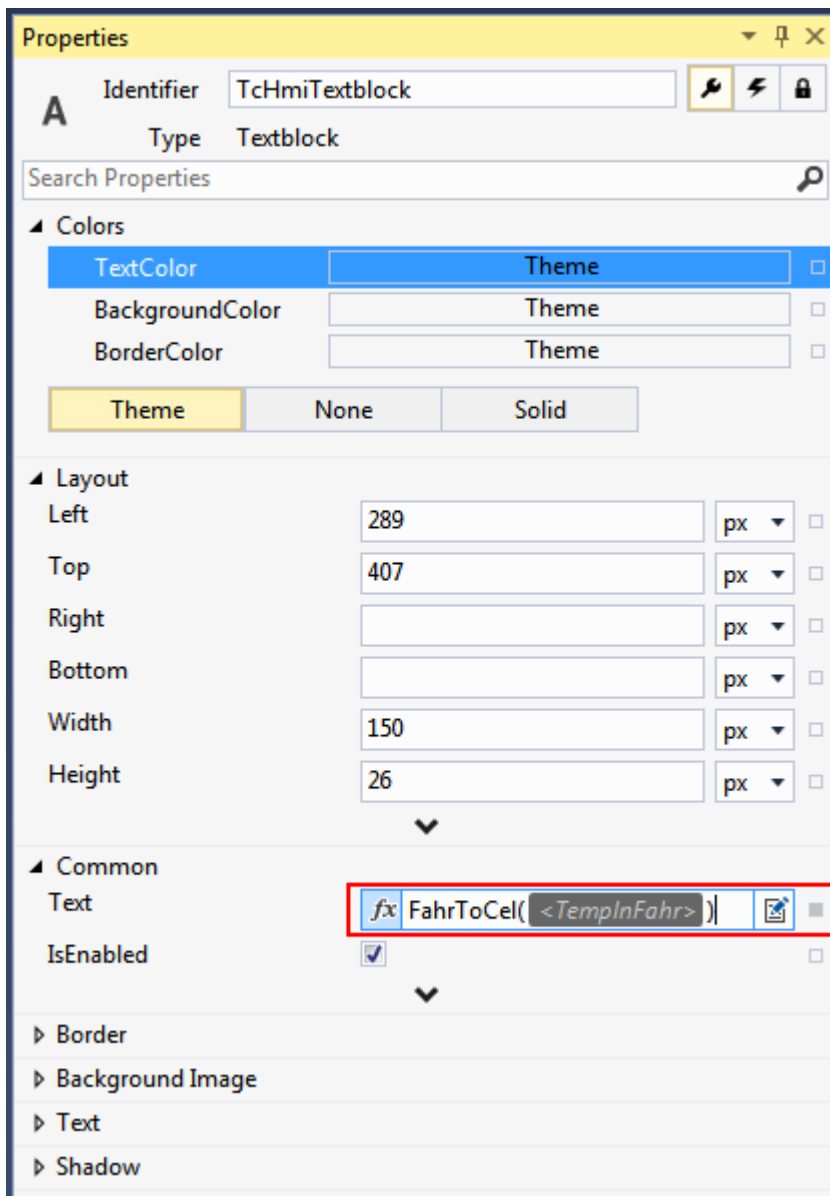
Several functions are already available [► 70] in the TwinCAT HMI engineering. To obtain an overview of the functions, open the "Functions" folder in the Actions and Conditions Editor.

### 14.1.2.3.1 Using HMI functions

Functions that have been created are available for graphical programming in the [Actions and Conditions Editor](#) [► 61] under **Functions**.



In addition, the Control Properties functions can be used directly in the Properties window [► 60]. They can be found via IntelliSense.



#### 14.1.2.4 Structure

A function is implemented within the "TcHmi" namespace. Implementation outside the namespace is not possible, since otherwise the function would not be available in the TwinCAT HMI framework. The function is registered in the framework via the framework API function "registerFunctionEx" (since version 1.12) or "registerFunction" so that it is available at runtime.

The following sample implements the conversion of a temperature from Fahrenheit to Celsius and returns the calling point.

#### Basic structure of a TypeScript function

```
namespace TcHmi {
    export namespace Functions {
        export namespace TcHmiProject41 {
            export function FahrToCels(TempInFahr: number | string) {
                // variable for the return value
                var value = TempInFahr;

                // check the type of the parameter
                if (typeof TempInFahr === 'number') {
                    // parameter is already a number

                    // convert the parameter value to Celsius
                    value = ((TempInFahr - 32) * (5 / 9));
                } else if (typeof TempInFahr === 'string') {
```

```

        // parameter is a string

        // convert the parameter type and the parameter value
        value = ((parseFloat(TempInFahr) - 32) * (5 / 9));
    }

    // return the converted parameter
    return value;
}
}
registerFunctionEx('FahrToCels', 'TcHmi.Functions.TcHmiProject40', TcHmiProject41.FahrToCels);
}
}

```

### Basic structure of a JavaScript function (since version 1.12)

```

(function (/** @type {globalThis.TcHmi} */ TcHmi) {
    var Functions;
    (function (/** @type {globalThis.TcHmi.Functions} */ Functions) {
        var TcHmiProject40;
        (function (TcHmiProject40) {
            /**
             * @param {string|number} TempInFahr
             */
            function FahrToCels(TempInFahr) {
                // variable for the return value
                var value = TempInFahr;

                // check the type of the parameter
                if (typeof TempInFahr === 'number') {

                    // parameter is already a number

                    // convert the parameter value to celsius
                    value = ((TempInFahr - 32) * (5 / 9));
                } else if (typeof TempInFahr === 'string') {
                    // parameter is a string

                    // convert the parameter type and the parameter value
                    value = ((parseFloat(TempInFahr) - 32) * (5 / 9));
                }

                // return the converted parameter
                return value;
            }
            TcHmiProject40.FahrToCels = FahrToCels;
        }) (TcHmiProject40 = Functions.TcHmiProject40 || (Functions.TcHmiProject40 = {}));
        Functions.registerFunctionEx('FahrToCels', 'TcHmi.Functions.TcHmiProject40',
TcHmiProject40.FahrToCels);
    }) (Functions = TcHmi.Functions || (TcHmi.Functions = {}));
})(TcHmi);

```

### Basic structure of a JavaScript function (since version 1.8)

```

// required namespace TcHmi
(function (/** @type {globalThis.TcHmi} */ TcHmi) {
    // name and parameters of the function defined in json
    var FahrToCels = function (TempInFahr) {
        // variable for the return value
        var value = TempInFahr;

        // check the type of the parameter
        if (typeof TempInFahr === 'number') {
            // parameter is already a number

            // convert the parameter value to celsius
            value = ((TempInFahr - 32) * (5 / 9));
        }
        else if (typeof TempInFahr === 'string') {
            // parameter is a string

            // convert the parameter type and the parameter value
            value = ((parseFloat(TempInFahr) - 32) * (5 / 9));
        }

        // return the converted parameter
        return value;
    };
}

```

```
// register the function in the framework
TcHmi.Functions.registerFunction('FahrToCels', FahrToCels);
})(TcHmi);
```

References to the framework and jQuery within the function's JavaScript file are created to enhance IntelliSense support. This is not necessary with TypeScript.

```
// TcHmi Version 1.12
/// <reference path="../../Packages/Beckhoff.TwinCAT.HMI.Framework.12.742.1/runtimes/native1.12-tchmi/TcHmi.d.ts" />

// TcHmi Version 1.8
// Provider for a best effort Intellisense of Visual Studio 2017/2019.
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-Engineering\Infrastructure\TcHmiFramework\Latest\Lib\jquery.d.ts" />
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-Engineering\Infrastructure\TcHmiFramework\Latest\TcHmi.d.ts" />
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-Engineering\Infrastructure\TcHmiFramework\Latest\Controls\System\TcHmiControl\Source.d.ts" />

// Provider for a best effort Intellisense of Visual Studio 2013/2015.
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-Engineering\Infrastructure\TcHmiFramework\Latest\Lib\jquery\jquery.js" />
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-Engineering\Infrastructure\TcHmiFramework\Latest\TcHmi.js" />
```

#### 14.1.2.4.1 Context

An [asynchronous](#) [ID 1467](#) TypeScript/JavaScript function must report execution success or error to the context object (`ctx`). The context object has appropriate functions for this.

##### success

Indicates successful execution.

```
ctx.success("Result");
```

##### error

Indicates unsuccessful execution.

```
ctx.error(TcHmi.Errors.ERROR);
```

#### 14.1.2.4.2 Using a function within a function

Within a JavaScript function, the TwinCAT HMI can use another JavaScript function. To do this, a reference to the function must be created via the framework API. The function can be used once its validity has been verified.

```
// get user function
var myCustomFunction1 = TcHmi.Functions.getFunction('MyCustomFunction1');
// check if the reference is valid
if (myCustomFunction1)
{
    var myParameter = "Sample";
    // function call
    var output = myCustomFunction1(myParameter);
    // ...
}
```

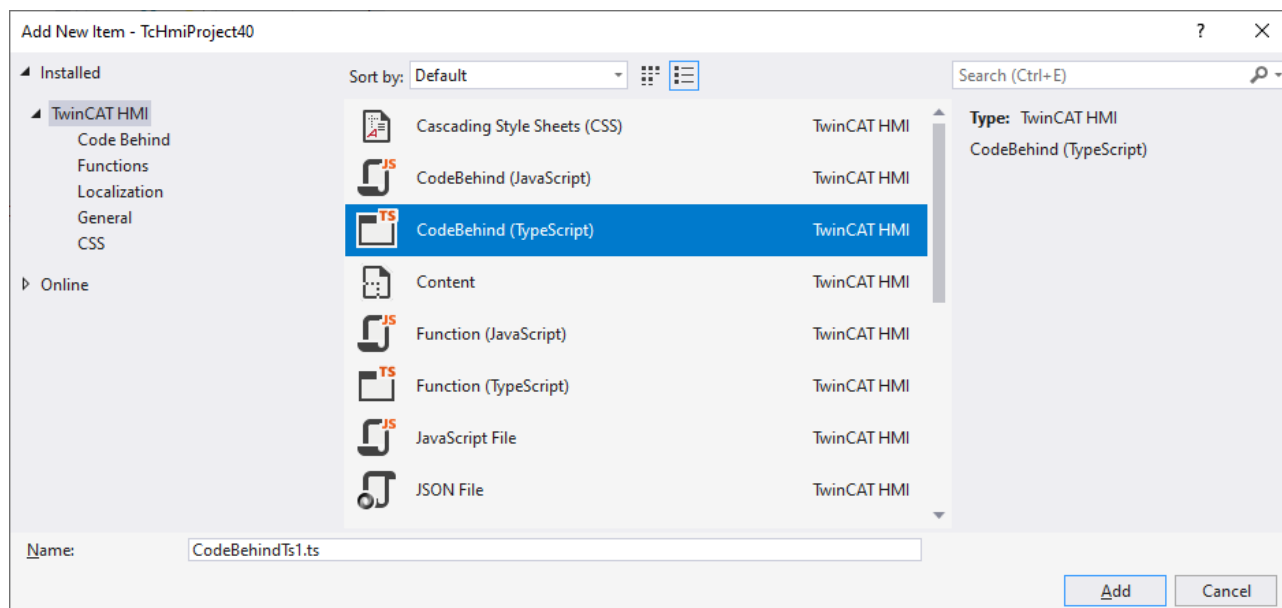
### 14.1.3 Code-behind

#### 14.1.3.1 Create

A code-behind file can be added at the project level or in a project folder. Any number of code-behind files can be added to the project.

A Code-Behind file can be created based on TypeScript or JavaScript. Both have the same technical options and are very similar in terms of programming. Due to the better Visual Studio programming support offered by Visual Studio, TypeScript should be selected for new functions.

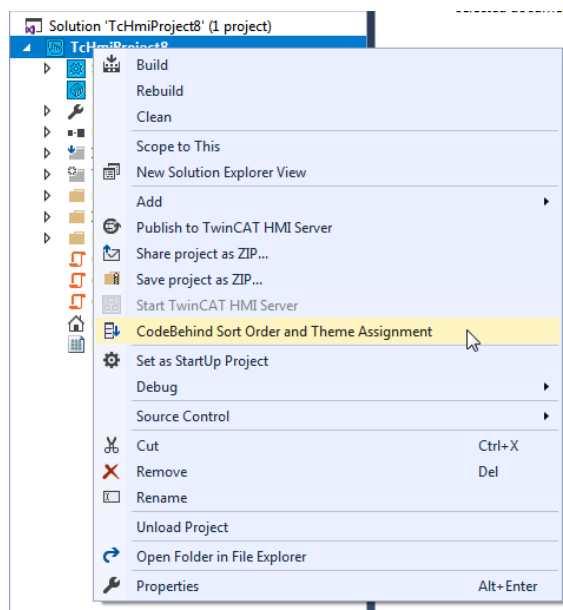
Right-click the target node and click **Add New Item**. Select a code-behind file. The Code-Behind file can be opened by double-clicking in the source code editor.



### Code-behind sort order

If you have added several code-behind files to the project, it is possible to specify the order in the build process and thus during inclusion within the HTML file of the HMI. This is necessary if dependencies exist within the individual files.

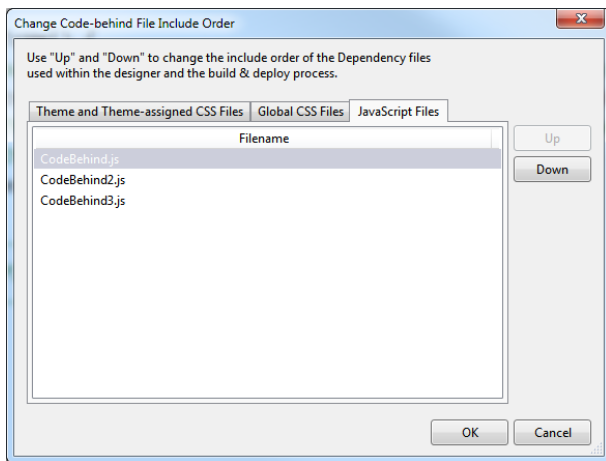
Right-click on the project node of the HMI project and select **CodeBehind Sort Order and Theme Assignment**.



Within the editor, the sort order can be defined under the **JavaScript Files** tab. The order can be changed using the **Up** and **Down** buttons.



The browsers only support JavaScript files. The generated JavaScript file is therefore displayed in this window.



### 14.1.3.2 Use

A code-behind file can be used for JavaScript functionalities that are to apply globally to the entire project. Control events can be registered independently of the HMI side, based on the control ID. Therefore, a code-behind file is particularly suitable for mapping complex functionalities with JavaScript that cannot be performed using the graphical engineering.

#### Typical applications

- Summary of functionalities: Identical event configurations can be combined in a code-behind file and stored in functions to avoid redundancies (see [Action Templates \[► 71\]](#) in the Actions and Conditions Editor).
- Global variables: Saving of data used in multiple events to a global variable (see [internal symbols \[► 87\]](#) in the Configuration window).
- Evaluation of complex objects (e.g. JSON): Processing, validating and evaluating objects.
- Using the framework API: Access to the framework API functions, which cannot be executed via the graphical engineering.
- Dynamic elements: Adding or removing dynamic elements at runtime (e.g. dynamically generate controls at runtime, see ControlFactory).
- Responsive design: Querying the current browser width, switching of grid configurations and loading of different pages depending on the browser width.
- Evaluating URL parameters: Loading different views depending on the browser URL.
- Disabling client interactions: Disabling interactions with other clients via the session ID of the browser.

### 14.1.3.3 Structure

A newly added code-behind file contains pre-configured JavaScript code.

The commentary lines (triple slash directives) are required for enhanced support of IntelliSense in JavaScript:

```
// TcHmi Version 1.12
/// <reference path="../../Packages/Beckhoff.TwinCAT.HMI.Framework.12.742.1/runtimes/native1.12-tchmi/
TcHmi.d.ts" />

// TcHmi Version 1.8
// Provider for a best effort Intellisense of Visual Studio 2017/2019.
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-
Engineering\Infrastructure\TcHmiFramework\Latest\Lib\jquery.d.ts" />
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-
Engineering\Infrastructure\TcHmiFramework\Latest\TcHmi.d.ts" />
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-
Engineering\Infrastructure\TcHmiFramework\Latest\Controls\System\TcHmiControl\Source.d.ts" />

// Provider for a best effort Intellisense of Visual Studio 2013/2015.
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-
```

```
Engineering\Infrastructure\TcHmiFramework\Latest\Lib\jquery\jquery.js" />
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-
Engineering\Infrastructure\TcHmiFramework\Latest\TcHmi.js" />
```

The JavaScript code that is implemented within a code-behind file must be implemented within the TcHmi namespace.

```
(function ( /** @type {globalThis.TcHmi} */ TcHmi) {
    // code
})(TcHmi);
```



The TwinCAT HMI framework is not available outside the namespace!

In a new code-behind file the global `onInitialized` event is registered by the framework as an example. Here you can place actions that are to be executed after the initialization of the framework.

```
// If you want to unregister an event outside the event code you need to use the return value of the
method register()
var destroyOnInitialized = TcHmi.EventProvider.register('onInitialized', function (e, data) {
    // This event will be raised only once, so we can free resources.
    // It's best practice to use destroy function of the event object within the callback function to
    avoid conflicts.
    e.destroy();

    // -----
    // Place your code here!
    // -----
});
```

Within the code-behind file any events can be registered and deregistered. The registration of TwinCAT HMI framework events is realized via the EventProvider framework API. Registration via the EventProvider registers a callback to the event and returns a function for deregistering the event. The function for deregistering the event should be called to release system resources when the event is no longer needed (for example, Event Listener for a MouseOver event).

```
destroyOnInitialized();
```

Control events are registered using the Control ID (e.g. `TcHmiButton.onPressed`). A control event can be registered in several places. If an event is registered in the code-behind file, it is not displayed in the Designer under Events. It is therefore advisable to either register an event in a code-behind file or to configure it in the Designer for enhanced clarity.

## 14.2 Extensions

### 14.2.1 obsolete syntax (version 1.8 and 1.10)

#### 14.2.1.1 Controls



JavaScript is supported from version 1.8.

##### 14.2.1.1.1 Introduction

Framework controls are user-specific controls that are not created with the graphical [WYSIWYG editor](#) [► 36]. Framework controls are used if the desired behavior cannot be mapped with the standard controls or a user control. Unlike a [Code Behind file](#) [► 1473], a framework control can be used independently of the HMI project, so that the source code can be reused.

#### Technology

Framework controls are developed using web development tools.



- HTML: Type and structure of the elements of the framework control
- CSS: Design of the elements of the framework control
- JavaScript: Logic behind the elements of the framework control

Developers are no longer bound to the TwinCAT HMI controls and can use all the elements and functionalities they are already familiar with from web development within a framework control. The standard TwinCAT HMI controls are implemented on the same basis as a framework control. It is also possible to reuse the TwinCAT HMI controls in the framework control or to add user-specific properties.

## Application scenarios

Framework controls can map customer-specific and application-specific requirements. The following use cases can be implemented with a framework control:

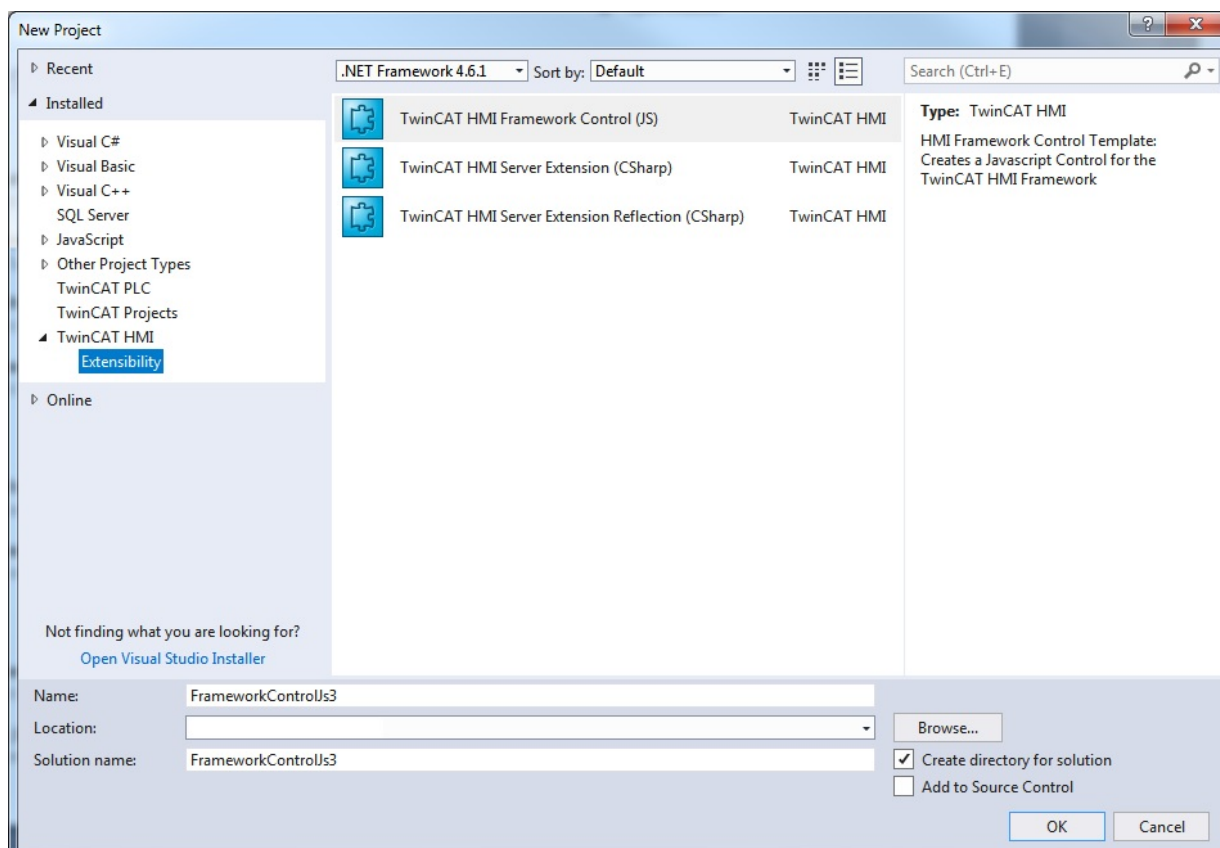
- Implementation of complex JavaScript logic
- Reusing HTML, JS and CSS in a control
- Integration of external libraries and realization of own libraries
- Dynamic elements: Adding and removing HTML elements and controls at runtime
- Developing responsive controls
- Realizing and integrating 3D models

## Use

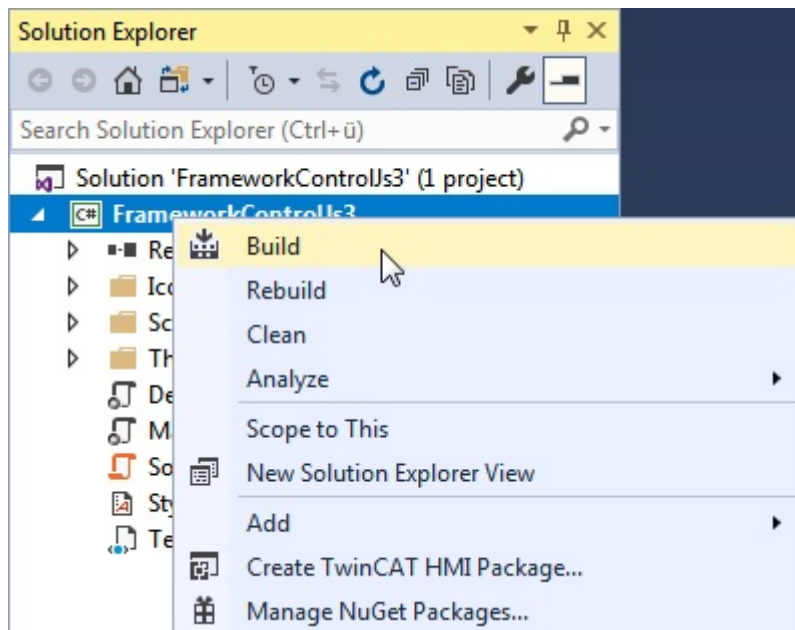
The framework controls can be integrated directly as references in a TwinCAT HMI project if both projects are in the same solution. Furthermore, it is possible to export the framework control as a [package \[1021\]](#) and install it in different HMI projects. In this way, it is possible to implement application-specific control libraries. Within the HMI project, a framework control is used like a standard TwinCAT HMI control.

### 14.2.1.1.2 First steps

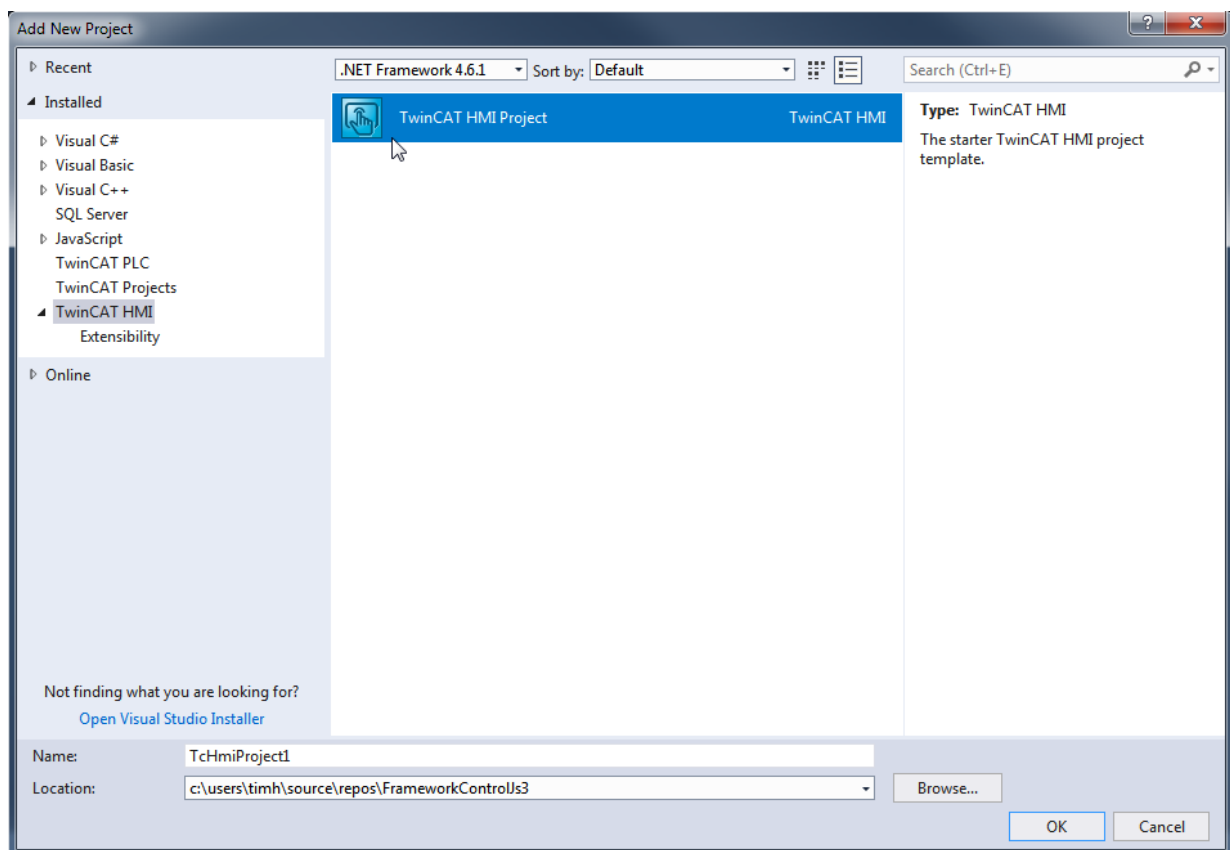
1. Open Visual Studio and click **Add new project**. Select the **Extensibility** category under TwinCAT HMI as the project type.



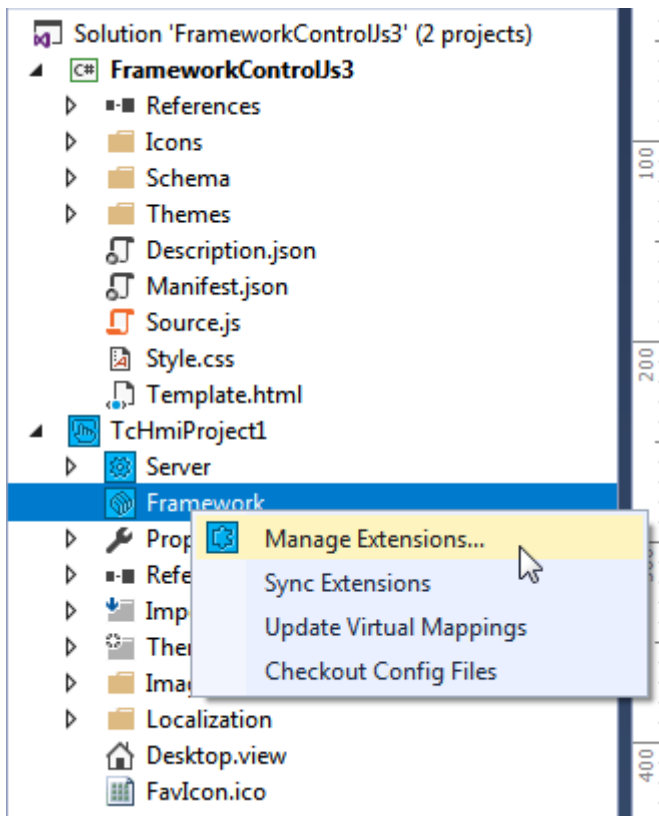
2. Right-click on the project and execute a project build (Build Project).



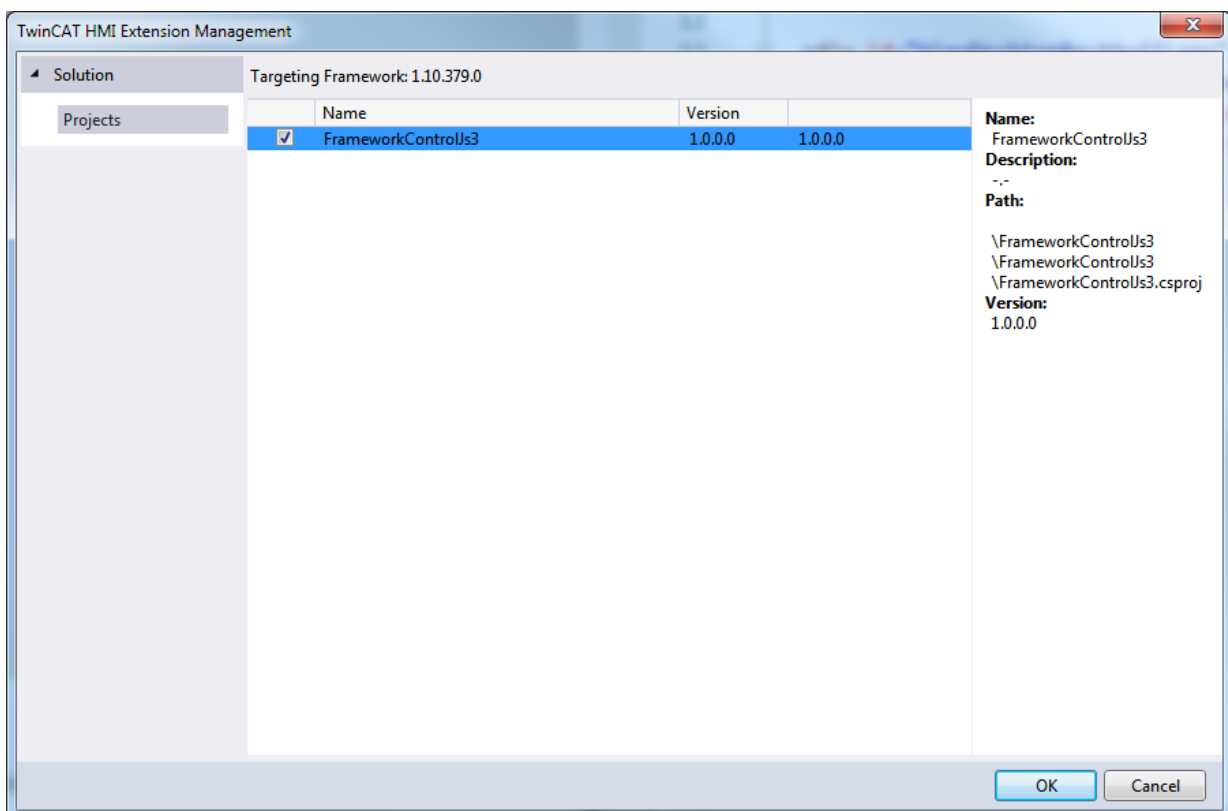
3. Add a new HMI project to the existing solution by right-clicking the **Add new project** solution. Select an HMI project.



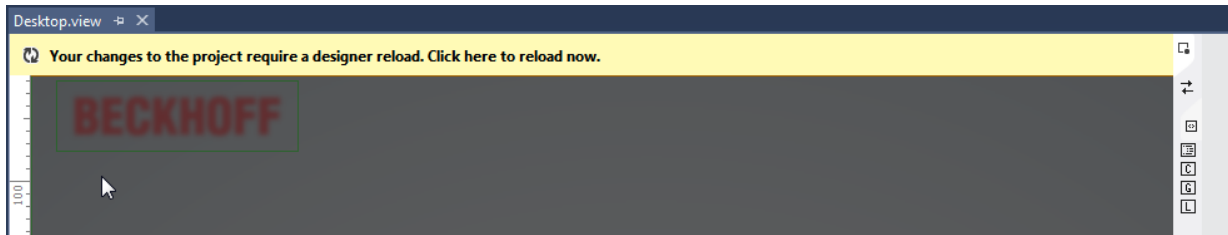
4. Right-click on the "Framework" node in the HMI project and select "Manage Extensions...".



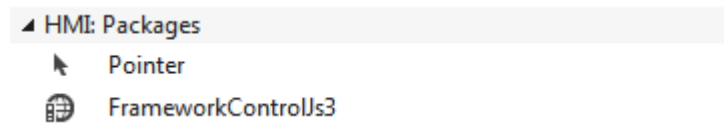
5. Select **Framework Control** in the **TwinCAT HMI Extension Management** window and confirm the dialog with **OK**.



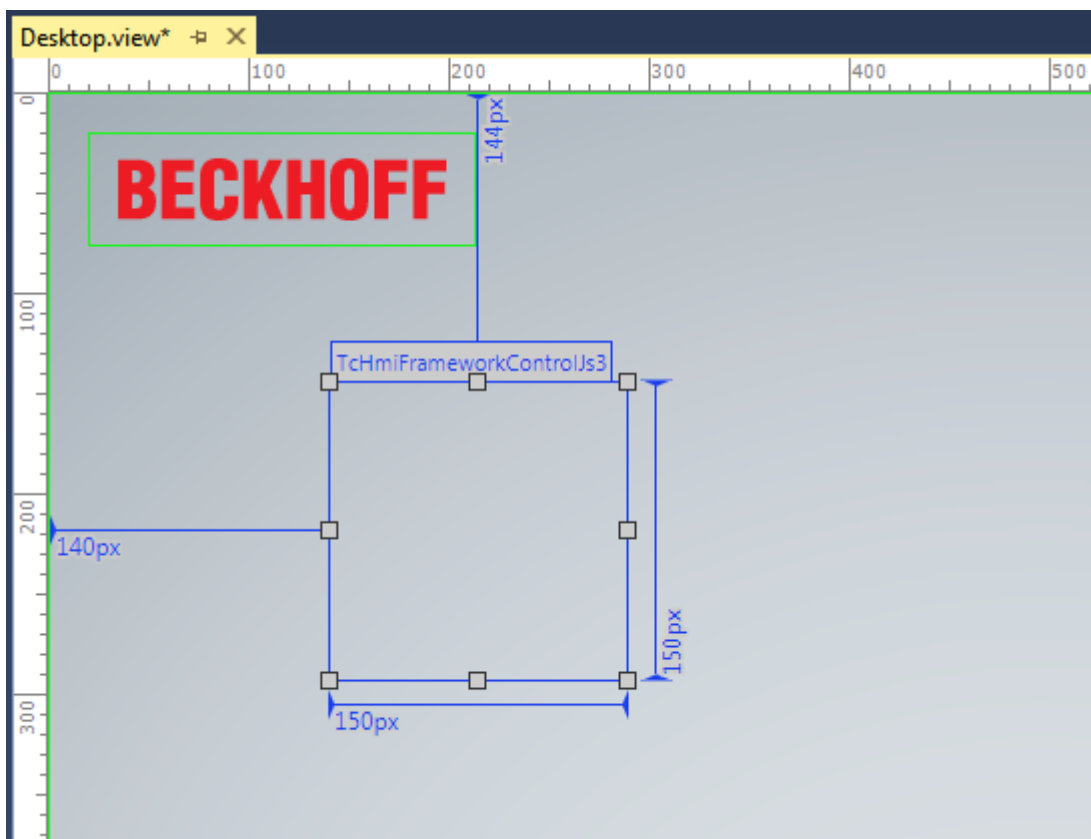
6. If you have opened a View/Content/UserControl file, you have to reload the page. This is illustrated by a note. Click Reload.



⇒ The framework control is now available in the toolbox.



7. Use drag & drop to add the framework control to an open View/Content/UserControl file.



⇒ You can now use the framework control like a normal control.

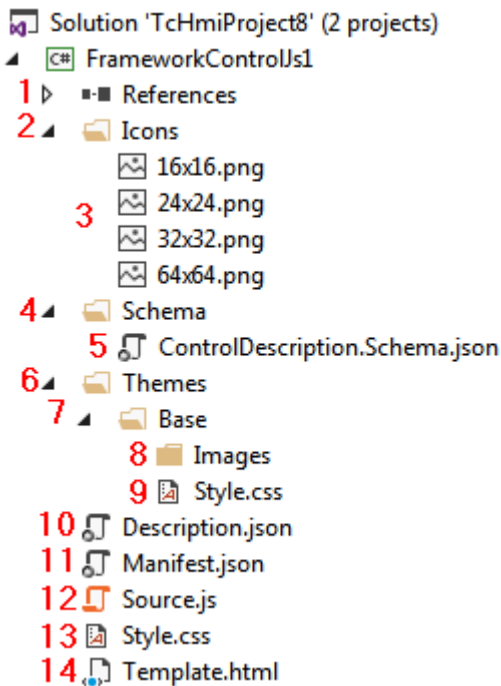


All changes in the source code of the framework control require a project build (see step 2) to ensure that the changes are adopted in the Engineering.

#### 14.2.1.1.3 Development environment

A framework control project is created within a solution in Visual Studio. Multiple framework control projects and associated HMI projects can be placed in a solution. A framework control project can be configured using the standard Visual Studio functions (for example, Build Solution).

A framework control project contains the following elements when it is created:



1. **References:** This project node is not required and is automatically provided by the project type in Visual Studio.
2. **Icons:** This folder contains all icons relating to the control.
3. **Icon:** The .png elements are control icons in different sizes.
4. **Schema** [▶ 1511]: This folder contains JSON schema files that are required for the control. Additional JSON schema files for project-specific data types can be added to this folder.
5. **ControlDescription.Schema.json:** [Standard schema](#) [▶ 1482] describing [Description.json](#) [▶ 1481].
6. **Themes** [▶ 1499]: This folder contains all themes relating to the control. New themes can be added to this folder.
7. **Base:** This folder contains the base theme of the control. Additional theme-based files can be added to this folder.
8. **Image:** This folder serves as a container for images that are assigned to the base theme.
9. [Style.css](#) [▶ 1499]: This stylesheet file contains the properties for the base theme.
10. [Description.json](#) [▶ 1481]: This file contains all Engineering interfaces for the TwinCAT HMI
11. [Manifest.json](#) [▶ 1521]: This file describes control data required for creating a TwinCAT HMI package.
12. [Source.js](#) [▶ 1502]: This file contains the JavaScript logic required for the control.
13. [Style.css](#) [▶ 1499]: This file contains all style properties that are to apply to the control regardless of the theme.
14. [Template.html](#) [▶ 1498]: This file contains the static HTML framework of the control and is included in the HMI as HTML code for the control during subsequent instantiation on the HMI.



#### Please note from version 1.8

To program framework controls, a full version of Visual Studio is required for editing the HTML, CSS, and JavaScript code. The Visual Studio shell is not sufficient.

### 14.2.1.1.4 Properties

#### 14.2.1.1.4.1 Description.json

This section describes the structure of the description file [Description.json](#).



Any changes in Description.json must be followed by a project build (see [First Steps \[► 1477\]](#)).

#### 14.2.1.1.4.1.1 Introduction

TwinCAT HMI Engineering reads all properties of the control from the Description.json file. The properties allow you to transfer data to the control and vice versa. In TwinCAT HMI Engineering, the control can be configured via the [Properties window \[► 60\]](#) or via the Actions and Conditions editor. The developer can define additional attributes, besides the standard attributes of each framework control.

Description.json must correspond to a given JSON schema. The schema is located in the framework control project under Schema/Control/Description.json. The schema must not be changed. It is used to describe the syntax in Description.json.

In many cases the following user-specific properties are defined in Description.json:

- [Attributes \[► 1487\]](#) (data interfaces)
- [Functions \[► 1493\]](#)
- [Events \[► 1495\]](#)
- [Access rights \[► 1496\]](#)
- [User-specific data types \[► 1496\]](#)

#### 14.2.1.1.4.1.2 Properties

**Type:** Specifies the data type of the property.

**Required:** Specifies whether the property is required for the framework control (yes) or is optional (no).

##### 14.2.1.1.4.1.2.1 \$schema

**Type:** String (relative path)

**Required:** No

```
"$schema": "../Schema/ControlDescription.Schema.json"
```

This property references the JSON schema that describes the structure of Description.json. The schema is located in the framework control project and does not have to be changed. Including the JSON schema enables Intellisense in Visual Studio for each property.

##### 14.2.1.1.4.1.2.2 name

**Type:** String

**Required:** Yes

```
"name": "framework-control-js1"
```

This property is the name of the framework control, which is automatically generated based on the project name. The name is added to the control as a CSS class and can be used within the [CSS files \[► 1499\]](#) in the framework control project to describe the styles.

##### 14.2.1.1.4.1.2.3 classNameNamespace

**Type:** String

**Required:** Yes

```
"classNameNamespace": "TcHmi.Controls.Custom"
```

This property is the namespace in which the control is added to the controls. Framework controls are added to the "Custom" namespace by default. The namespace is also used in Source.js.

#### 14.2.1.1.4.1.2.4 className

**Type:** String

**Required:** Yes

```
"className": "FrameworkControlJs1"
```

This property is the internal name of the JavaScript object that defines the control. This name is used in Source.js.

#### 14.2.1.1.4.1.2.5 displayName

**Type:** String

**Required:** Yes

```
"displayName": "FrameworkControlJs1"
```

This property is the name of the control that is displayed as the control name in the Engineering.

#### 14.2.1.1.4.1.2.6 version

**Type:** JSON object

**Required:** Yes

```
"version": {  
  "full": "1.0.0.0",  
  "major": 1,  
  "minor": 0,  
  "revision": 0,  
  "build": 0  
}
```

This property is the version number of the framework control that is used for versioning a framework control. The version number is subdivided into the major release number, minor release number, revision number and build number.

For [creating a package](#) [► 1021], the version number must match the version number in [Manifest.json](#) [► 1521].

#### 14.2.1.1.4.1.2.7 visible

**Type:** Boolean

**Required:** Yes

```
"visible": true
```

This property makes the control visible or hides it in the toolbox in the Engineering. By default, a control is always displayed in the toolbox.

#### 14.2.1.1.4.1.2.8 themeable

**Type:** Enum string

**Required:** No

```
"themeable": "Standard"
```

This property determines whether the control is displayed in the [theme editor](#) [► 1007] within in the TwinCAT HMI Engineering.

Permissible values:

- **Standard:** The control is displayed in the theme editor.
- **None:** The control is not displayed in the theme editor.
- **Advanced:** The control is only displayed in the theme editor if the "Advanced" property is enabled in the theme editor.

#### 14.2.1.1.4.1.2.9 base

**Type:** String

**Required:** Yes

```
"base": "tchmi-control"
```

This property determines whether the control inherits the properties of another control. By default, a framework control inherits all properties of Description.json of the base control `tchmi-control`, which defines a base framework for all TwinCAT HMI controls. The control can be made to inherit from other controls, such as a button, if a particular control is to be extended. The control name to be specified here corresponds to the control type or control name [defined in Description.json \[► 1482\]](#).



##### Validity

This property must refer to a valid control and must not have the value `null`, otherwise the control can no longer be used in the Engineering.

#### 14.2.1.1.4.1.2.10 uses

**Type:** Array of strings

**Required:** No

```
"uses": []
```

This property defines a list of controls that are used in this control (static or dynamic at runtime). This property references the JavaScript and stylesheet files of the controls used in this control. By default, no other controls are used. The [base control \[► 1484\]](#) does not have to be referenced again.

If other controls are used in this control, the control type or [name of the control \[► 1482\]](#) defined in Description.json must be specified.

The following listing shows an example of a framework control that uses the `TcHmiButton` and a user-specific control:

```
"uses": [  
  "tchmi-button",  
  "tchmi-my-framework-control"  
]
```

For more information about using controls in a framework control, see Examples.

#### 14.2.1.1.4.1.2.11 description

**Type:** String

**Required:** Yes

```
"description": "This description text will be used as a Tooltip in Visual Studio."
```

This property is the description of the control and is displayed as a tooltip when the mouse is moved over the control in the toolbox.

#### 14.2.1.1.4.1.2.12 defaultDesignerEvent

**Type:** String

**Required:** No

```
"defaultDesignerEvent": ""
```

This property determines which event is to be configured in the Actions and Conditions Editor when the control is double-clicked. By default (no entry or empty entry), no event is executed on double-clicking.

All standard and custom events defined in Description.json can be used here. The following listing shows an example of a custom event:

```
"defaultDesignerEvent": ".onMyCustomEvent"
```

Custom events are defined under [events \[► 1495\]](#).



#### 14.2.1.1.4.1.2.13 properties

**Type:** JSON object

**Required:** Yes

```
"properties": {  
  "containerControl": false,  
  "geometry": {  
    "width": 150,  
    "height": 150  
  }  
}
```

This property defines the engineering properties required for each framework control and describes general control properties.

- `containerControl` {Boolean}, *not required*: Specifies whether the control is a container control and can include additional controls using drag and drop. In this case, the control must also be derived [\[1484\]](#) (directly or indirectly) from `TcHmiContainerControl`.
- `geometry` {JSON object}: Defines the default geometry properties (width and height) of the control, which are set after dropping the control from the toolbox.

#### 14.2.1.1.4.1.2.14 icons

**Type:** Array of JSON objects

**Required:** Yes

```
"icons": [  
  {  
    "name": "Icons/16x16.png",  
    "width": 16,  
    "height": 16  
  },  
  {  
    "name": "Icons/24x24.png",  
    "width": 24,  
    "height": 24  
  },  
  {  
    "name": "Icons/32x32.png",  
    "width": 32,  
    "height": 32  
  },  
  {  
    "name": "Icons/64x64.png",  
    "width": 64,  
    "height": 64  
  }  
]
```

This property defines the icon of the control in different dimensions. The array contains JSON objects, where each object corresponds to a control icon in a different resolution. The control icon is used to display the control in the toolbox of the Engineering and the Actions and Conditions Editor.

The name is specified as a relative project path. The dimensions (width/height) are specified in pixels.

#### 14.2.1.1.4.1.2.15 dependencyFiles

**Type:** Array of JSON objects

**Required:** Yes

```
"dependencyFiles": [  
  {  
    "name": "Source.js",  
    "type": "JavaScript",  
    "description": ""  
  },  
  {  
    "name": "Style.css",  
    "type": "Stylesheet",  
    "description": "Theme independent style"  
  }  
]
```

This property contains all files of the framework control that must be included in the HTML file of the HMI. By default, the Source.js and Style.css files are included. If additional JavaScript or stylesheet files are included in the control, they must be referenced under "dependencyFiles".

**Caution:** Theme-dependent stylesheet files are not included under "dependencyFiles", but under "[themes](#) [\[► 1486\]](#)".

The array contains JSON objects that contain information about the file:

- `name {string}`: file name and file extension with the relative project path to the file.
- `type {string}`: File type (JavaScript or stylesheet).
- `description {string}`: Optional file description.

#### 14.2.1.1.4.1.2.16 themes

**Type:** JSON object of JSON objects

**Required:** No

```
"themes": {
  "Base": {
    "resources": [
      {
        "name": "Themes/Base/Style.css",
        "type": "Stylesheet",
        "description": ""
      }
    ]
  }
}
```

This property contains all themes that are included in the control. By default, the basic theme is included with a stylesheet file. A theme is an object containing the array "resources". The array "resources" contains all the files that are allocated to a theme.

A "resource" object contains the same properties as a "[dependencyFile](#)" object [\[► 1485\]](#), with other allowed values for "type":

- `name {string}`: File name and file extension with the relative project path to the file.
- `type {string}`: File type (Stylesheet or ThemedValues, see [Theming](#) [\[► 1005\]](#)).
- `description {string}`: Optional file description.



Images and fonts etc. are not included under the theme resources, but referenced via the stylesheet file (see [Theming](#) [\[► 1005\]](#)).

The following listing illustrates the inclusion of another theme with associated files:

```
"themes": {
  "Base": {
    "resources": [
      {
        "name": "Themes/Base/Style.css",
        "type": "Stylesheet",
        "description": ""
      }
    ]
  },
  "Custom": {
    "resources": [
      {
        "name": "Themes/Custom/Style.css",
        "type": "Stylesheet",
        "description": ""
      },
      {
        "name": "Themes/Custom/MyTheme.theme",
        "type": "ThemedValues",
        "description": "This is theme file created by the theme editor."
      }
    ]
  }
}
```

```

    ]
  }
}

```

#### 14.2.1.1.4.1.2.17 attributes

**Type:** Array of JSON objects (attributes)

**Required:** Yes

```

"attributes": [
  {
    "name": "data-tchmi-value",
    "propertyName": "Value",
    "propertySetterName": "setValue",
    "propertyGetterName": "getValue",
    "displayName": "Value",
    "visible": true,
    "themeable": "Standard",
    "displayPriority": 10,
    "type": "tchmi:general#/definitions/Boolean",
    "category": "Value",
    "description": "",
    "readOnly": false,
    "bindable": true,
    "heritable": true,
    "defaultValue": false,
    "defaultValueInternal": false
  }
]

```

The attributes define the data interfaces to the TwinCAT HMI Engineering. The attributes of the control are displayed in the Properties window of the Engineering under "ShowProperties". Any number of attributes can be defined in a control.

By default, the attribute array contains the type attribute that is required for each control and must not be removed. This attribute specifies that the control is of type `tchmi-framework-control-js1`:

```

{
  "name": "data-tchmi-type",
  "displayName": "",
  "propertyName": "type",
  "propertySetterName": "",
  "propertyGetterName": "getType",
  "visible": false,
  "type": "tchmi:framework#/definitions/ControlType",
  "category": "None",
  "description": "Type of the control.",
  "requiredOnCompile": true,
  "readOnly": true,
  "bindable": false,
  "heritable": false,
  "defaultValue": "framework-control-js1",
  "defaultValueInternal": null
}

```

The individual properties of an attribute are described on the following pages.

**Type:** Specifies the data type of the property.

**Required:** Specifies whether the property is required for the attribute (yes) or is optional (no).

##### 14.2.1.1.4.1.2.17.1 name

**Type:** String

**Required:** Yes

```

"name": "data-tchmi-value"

```

Name of the attribute. The name is written into the HTML code of the control as a "data-\*" attribute. Therefore, the "data-" prefix is mandatory. The subsequent prefix "tchmi-" before the attribute is recommended for standardizing attributes, but it is not obligatory. An attribute name may only be used once for each control, otherwise unambiguous assignment cannot be guaranteed.

#### 14.2.1.1.4.1.2.17.2 propertyName

**Type:** String

**Required:** Yes

```
"propertyName": "Value"
```

Internal attribute name of the control. The internal attribute name is formed from the attribute name without prefix in Pascal case.

Example:

```
"name": "data-tchmi-my-custom-value"
```

becomes: „MyCustomValue“.

For better mapping between JavaScript variables and attributes, it is recommended to name the attribute variable in the JavaScript code of Source.js according to the "propertyName".

#### 14.2.1.1.4.1.2.17.3 propertySetterName

**Type:** String

**Required:** Yes

```
"propertySetterName": "setValue"
```

This property creates the reference to the setter function in Source.js. The setter function allows a new value to be set. For the reference between Description.json and Source.js, the setter function must have the same name as the "propertySetterName". If the names in Description.json and Source.js are different, an error message appears in the browser console and the setter function cannot be used.

The recommended notation for the setter name is the "propertyName" plus the prefix "set" in Camel case.

If an attribute is read only [► 1491], the empty string should be entered as propertySetterName.

#### 14.2.1.1.4.1.2.17.4 propertyGetterName

**Type:** String

**Required:** Yes

```
"propertyGetterName": "getValue"
```

This property creates the reference to the getter function in Source.js. The getter function returns the attribute value when called. For the reference between Description.json and Source.js, the getter function must have the same name as the "propertyGetterName". If the names in Description.json and Source.js are different, an error message appears in the browser console and the getter function cannot be used.

The recommended notation for the getter name is the "propertyName" plus the prefix "get" in Camel case.

#### 14.2.1.1.4.1.2.17.5 displayName

**Type:** String

**Required:** Yes

```
"displayName": "Value"
```

The property is the name of the attribute displayed in the Engineering Properties window for the attribute. The "displayName" can be selected as desired, but it is recommended that it should be based on the "propertyName".

#### 14.2.1.1.4.1.2.17.6 refTo

**Type:** String

**Required:** No

```
"refTo": "basePropertyName"
```

Name of a `PropertyName` of the control. This attribute references another attribute.

This is used to write the physical unit (pixel or percent) in the development environment next to the numeric value.

Before the introduction of `refTo` the "Unit" suffix was checked.



Available from version 1.10.1337.10

#### 14.2.1.1.4.1.2.17.7 searchTerms

**Type:** Array of strings

**Required:** No

```
"searchTerms": [  
  "Shortcut1",  
  "ShortCut2",  
  "Shortcut3"  
]
```

This property defines a list of search terms for Engineering to optimize the search function within the Actions and Conditions Editor and the Properties window. This makes it possible to find the attribute using terms other than the attribute name.

#### 14.2.1.1.4.1.2.17.8 visible

**Type:** Boolean

**Required:** No

```
"visible": true
```

This property determines whether the attribute is to be displayed in the Engineering. If the property is set to "false", the attribute is not available in the Engineering. By default, all attributes are displayed in the Engineering.

#### 14.2.1.1.4.1.2.17.9 themeable

**Type:** Enum string

**Required:** No

```
"themeable": "Standard"
```

This property determines whether the attribute is displayed in the theme editor in the Engineering.

Permissible values:

- **Standard:** The attribute is displayed in the theme editor.
- **None:** The attribute is not displayed in the theme editor.
- **Advanced:** The attribute is only displayed in the theme editor if the "Advanced" property is activated in the theme editor.

#### 14.2.1.1.4.1.2.17.1 type

0

**Type:** String (TcHmi data type)

**Required:** Yes

```
"type": "tchmi:general#/definitions/Boolean"
```

This property indicates the data types of the attribute. All [data types of the TwinCAT HMI \[► 92\]](#) are available. Further user-specific data types can be defined (see [dataTypes \[► 1496\]](#)). The data type determines the display of the attribute in the Engineering Properties window (e.g. checkbox for a Boolean value).

#### 14.2.1.1.4.1.2.17.1 displayPriority

1

**Type:** Number

**Required:** No

```
"displayPriority": 10
```

This property determines the priority with which the attribute is displayed within the category in the Engineering Properties window. User-specific sorting of attributes is possible based on the priority. Attributes with the same priority are displayed according to the order in which they are defined. The prioritization of the attribute categories is set via the property "[attributCategories](#) [[► 1492](#)]".

- Values less than 10 have high priority and are displayed higher up in the category, according to the value.
- Values that equal 10 have main attributes like top, left etc.
- Values greater than 10 have low priority and are displayed lower down in the category, according to the value.
- Values greater than 50 are collapsed by default and have to be expanded using the arrow.

#### 14.2.1.1.4.1.2.17.1 allowedFunctions

2

**Type:** JSON object

**Required:** No

```
"allowedFunctions": {
  "returnType": "tchmi:general#/definitions/String",
  "requiredArguments": [
    {
      "type": "tchmi:general#/definitions/Number"
    }
  ],
  "requiredWaitMode": "Synchronous"
}
```

For attributes with the [data type](#) [[► 1489](#)]:

```
"type": "tchmi:framework#/definitions/Function"
```

These properties can only be used for "Function" type attributes. This property determines which functions are allowed for the attribute. This means that when configuring the attribute, only those functions are displayed that meet the defined criteria.

Further parameters are possible and can be specified per instance in the engineering.

Attributes:

- `returnType {string}`: Determines which TwinCAT HMI data type may be returned by the function.
- `requiredArguments {array of JSON objects}`: Determines which TwinCAT HMI data types the functions may have as parameter values. The parameters mentioned here are set by the control.
- `requiredWaitMode {enum string}`: Determines in which mode (synchronous, asynchronous) the function may be executed (`Synchronous`, `Asynchronous`).

For example, one the Beckhoff controls that uses this property is [LinearGauge](#) [[► 432](#)], namely for the [ValueFormat](#) [[► 454](#)] in order to restrict the functions that can format the values of the gauge.

#### 14.2.1.1.4.1.2.17.1 category

3

**Type:** String

**Required:** No

```
"category": "Value"
```

This property indicates the category to which the attribute is assigned in the Engineering Properties window. New category names can be assigned or standard category names (e.g. Common) can be used. A new category name does not have to exist under the [Attribute categories](#) [► 1492], since the category is created independently of the attribute categories. The attribute categories are used to prioritize different attribute categories.

#### 14.2.1.1.4.1.2.17.1 description

4

**Type:** String

**Required:** No

```
"description": "This description text will be used as a Tooltip in Visual Studio."
```

This property contains the description of the attribute, which is displayed as a tooltip when the mouse is moved over the attribute.

#### 14.2.1.1.4.1.2.17.1 requiredOnCompile

5

**Type:** Boolean

**Required:** No

```
"requiredOnCompile": false
```

This property determines whether the attribute of the control is required when the HMI is compiled. If the attribute is required for the control and the property is not set, an error message is issued and the control is not valid. This property is normally not required for attributes of a framework control. An example for "requiredOnCompile" is `id` and `data-tchmi-type` of a control.

#### 14.2.1.1.4.1.2.17.1 readOnly

6

**Type:** Boolean

**Required:** No

```
"readOnly": false
```

This property indicates whether the Engineering has write access to the attribute or only read access. By default, write access to an attribute is available. If `readOnly` is set to `true`, the attribute is no longer displayed in the Engineering Properties window, but it can still be used via the Actions and Conditions Editor.



For read only attributes, the [propertySetterName](#) [► 1488] is not required and can be replaced by an empty string.

#### 14.2.1.1.4.1.2.17.1 bindable

7

**Type:** Boolean

**Required:** No

```
"bindable": true
```

This property indicates whether a [data Binding](#) [► 108] to the attribute can be created in the Engineering. By default, the property is `true`.

If the property is set to `false`, it is not possible to link symbols to the attribute. Nevertheless, this attribute can be used and read at another location.

#### 14.2.1.1.4.1.2.17.1 heritable

8

**Type:** Boolean**Required:** No

```
"heritable": true
```

This property indicates whether the attribute can be passed on to other control. By default, the property is `true`. If the property is set to `false`, it is not available in the derived control classes.

#### 14.2.1.1.4.1.2.17.1 defaultValue

9

**Type:** Data type of the attribute**Required:** No

```
"defaultValue": false
```

This property indicates the default value for the attribute that is used in the Engineering Properties window when instantiating the control and written to the HTML code.

If `null` is entered here, no attribute is set.

#### 14.2.1.1.4.1.2.17.2 defaultValueInternal

0

**Type:** Data type of the attribute**Required:** No

```
"defaultValueInternal": false
```

This property indicates the internal default value for the attribute that can be used in Source.js. The internal default value may differ from the normal default value [► 1492].

#### 14.2.1.1.4.1.2.18 attributeCategories

**Type:** Array of JSON objects**Required:** No

```
"attributeCategories": [  
  {  
    "name": "Value",  
    "displayPriority": 500,  
    "defaultCollapsed": false,  
    "description": ""  
  }  
]
```

The property is used to prioritize new attribute categories that are assigned under Attributes [► 1490]. Prioritization is used to determine the displayed order of the categories in the Engineering Properties window. The attribute categories are described within a JSON object.

The following properties can be defined:

- `name` {String}: The name of the attribute category. The attribute name must be assigned to at least one control attribute.
- `displayPriority` {Number}: The priority determines the order in which the various attribute categories are displayed within the Engineering Properties window.
  - Values less than 10 mean high priority and are displayed at the top of the Properties window (e.g. colors).
  - Values less than 500 have standard categories (e.g. Common = 100, Layout = 200, Border = 300, Background Image = 400).
  - Values greater than 500 should be assigned user-specific categories so that they are listed below the standard categories.



- Values greater than 800 have low priority and are rarely configured.
- `defaultCollapsed` {Boolean}, *not required*: This property determines whether the category is collapsed by default (`true`) or expanded (`false`).
- `description` {String}, *not required*: Optional description of the attribute category that is displayed as a tooltip for the mouseover event in the Engineering.

#### 14.2.1.1.4.1.2.19 themedResources

**Type:** Array of JSON objects

**Required:** No

```
"themedResources": [
  {
    "name": "MyCustomThemedResource",
    "displayName": "MyCustomThemedResource",
    "description": "This is a custom themed resource. Look at theming of framework controls.",
    "type": "tchmi:framework#/definitions/MyThemedDefinition"
  }
]
```

This property contains all user-specific theme definitions that are not defined as attributes in the Engineering Properties window and can only be changed using the theme editor. An example of a "ThemedResource" are images within a control that cannot be exchanged via the Properties window (e.g. KnobConfigHorizontal and KnobConfigVertical for the [LinearGauge](#) [► 432]). A control developer can access these resources via the theme API.

A "themedResources" object contains the following properties:

- `name` {String}: Name of the property to be changed.
- `displayName` {String}: Name displayed in the Engineering theme editor.
- `description` {String}: Optional description of the property that is displayed in the theme editor on mouseover.
- `type` {string of a framework data type}: Data type of the property. The data type can be either a TwinCAT HMI data type or a user-specific data type defined under "[dataTypes](#) [► 1496]". Usually, user-specific data types are used (see Theming).

#### 14.2.1.1.4.1.2.20 functions

**Type:** Array of JSON objects

**Required:** No

```
"functions": [
  {
    "name": "customFunction",
    "displayName": "customFunction",
    "visible": true,
    "description": "This is a sample for a function that can be called.",
    "category": "Actions",
    "params": [],
    "type": null,
    "heritable": true,
    "searchTerms": []
  }
]
```

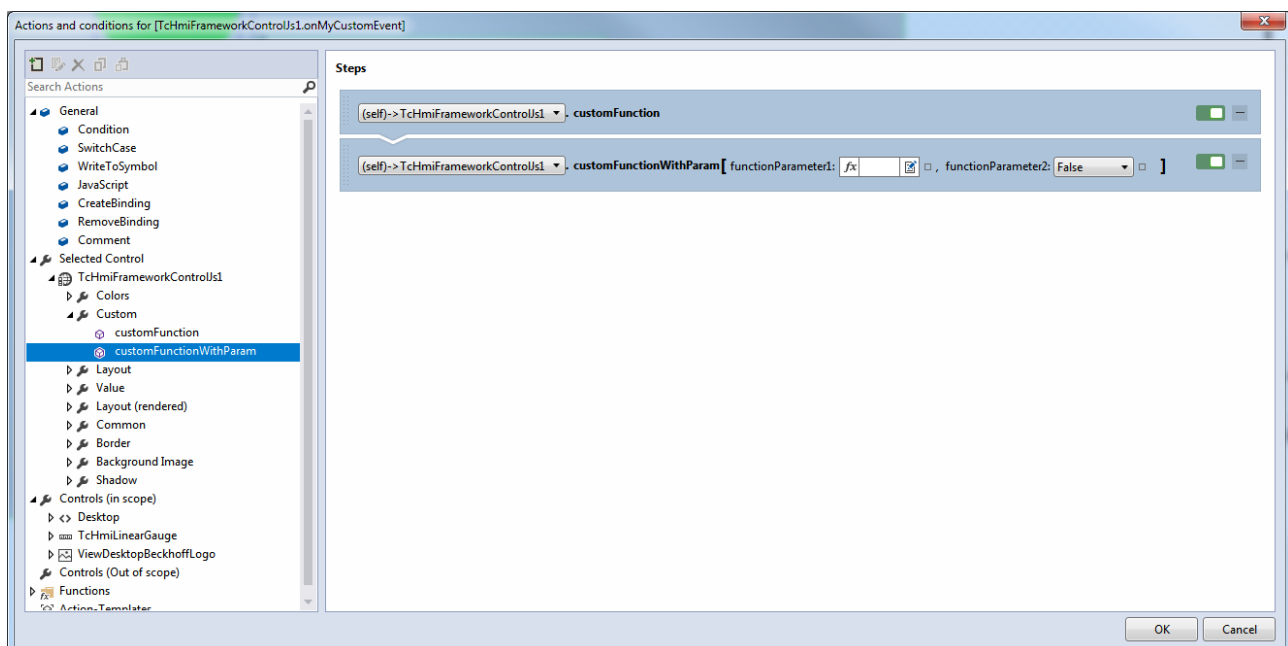
This property defines functions of the control that are independent of attributes. The functions can optionally have parameter values or a return value. Each function must have the same name in Source.js, otherwise an error message appears in the browser console and the function is not executed.

A JSON object for a function contains the following properties:

- `name` {String}: Internal name of the function.
- `displayName` {String}: Name of the function that is displayed in the Engineering.
- `description` {String}: Description of the function that is displayed as a tooltip during mouseover in the engineering.

- `category {String}`: Category of the function under which the function is displayed in the Actions and Conditions Editor in the Engineering.
- `params [1494]` {JSON object}, *not required*: Parameter values of the function.
- `type {string, TwinCAT HMI data type}`: Return value of the function. The return value must have a TwinCAT HMI data type.
- `heritable {Boolean}`: This property defines whether the function is to be passed on to derived classes.
- `searchTerms {array of strings}`, *not required*: This property defines search terms for the Engineering that are to optimize the search function within the Actions & Conditions Editor. This makes it possible to find the function using terms other than the function name. For example, if the strings "MyFunction" and "1234" are added to the array, the function can also be found under these terms.

The following figure shows an example of two framework control functions in the Engineering, both of which have no return value and contain an optional parameter value function.



#### 14.2.1.1.4.1.2.20.1 params

**Type:** JSON object

**Required:** No

```
"params": [
  {
    "name": "functionParameter1",
    "displayName": "functionParameter1",
    "description": "This is a sample for a function parameter.",
    "type": "tchmi:general#/definitions/Number",
    "visible": true
  },
  {
    "name": "functionParameter2",
    "displayName": "functionParameter2",
    "description": "This is a sample for a function parameter.",
    "type": "tchmi:general#/definitions/Boolean",
    "bindable": false
    "visible": true
  }
]
```

This property defines the optional parameters values of a function. The parameter values can be transferred via Engineering.

A parameter object contains the following properties:

- `name {String}`: Internal name of the parameter value.

- `displayName` {String}: Name of the parameter value that is displayed in the Engineering.
- `description` {String}: Description of the parameter value that is displayed as a tooltip during mouseover in the Engineering.
- `bindable` {Boolean}: Determines whether a [binding](#) [► 108] can be set to this parameter. This is allowed by default.
- `visible` {Boolean}: Visibility of the parameter value. The visibility determines whether the parameter is to be displayed or hidden in the Engineering.

#### 14.2.1.1.4.1.2.21 events

**Type:** Array of JSON objects

**Required:** No

```
"events": [
  {
    "name": ".onMyCustomEvent",
    "displayName": ".onMyCustomEvent",
    "visible": true,
    "displayPriority": 30,
    "category": "Control",
    "description": "This is a sample for a framework control event.",
    "heritable": true
    "allowsPreventDefault": false
  }
]
```

This property defines events that can be configured through the Engineering and are triggered in this framework control. An event is used to notify the Engineering that a specific event has occurred in the control. The HMI developer can respond to this event accordingly in the Engineering. Triggering of an event is implemented in `Source.js`.

An event object contains the following properties:

- `name` {String}: Internal name of the event.
- `displayName` {String}: Name of the function that is displayed in the Engineering.
- `visible` {Boolean}: Visibility of the event. If "visible" is set to "false", the event is not displayed in the Engineering.
- `displayPriority` {number}, *not required*: The priority determines the order in which the various events are displayed within the category.
  - Values = 10 correspond to frequently used events such as ".onPressed".
  - Values = 15 correspond to standard events such as ".onClick" or ".onRightClick".
  - Values = 50 correspond to rarely used events such as ".onMouseUp".
  - No value assigned: The event is collapsed by default and has to be expanded using the arrow.
- `category` {String}: The category determines under which category the event is listed in the Engineering. Existing categories such as "Operator" can be used, or new category names can be assigned.
- `description` {String}: Optional description of the event, which is displayed as a tooltip on mouseover in the Engineering.
- `heritable` {Boolean}: This property defines whether the event is to be passed on to derived classes. By default, this value is "true", so that the event is inherited.
- `allowsPreventDefault` {Boolean}, *not required*: This property specifies that a user can explicitly select `preventDefault`. See also [Events](#) [► 1510]

The event configured above is displayed in the Engineering as follows:

Properties

Identifier: TcHmiFrameworkControlJs1

Type: FrameworkControlJs1

**Custom**

**Framework**

.onAttached

.onDetached

**Operator**

.onPressed

.onMouseClicked

.onMouseRightClick

.onMouseDoubleClick

.onMouseEnter

.onMouseDown

.onMouseUp

.onMouseLeave

**Control**

.onMyCustomEvent: Configured...

#### 14.2.1.1.4.1.2.22 dataTypes

**Type:** Array of JSON objects

**Required:** No

```
"dataTypes": [
  {
    "name": "tchmi:framework#/definitions/CustomDatatype",
    "schema": "Schema/TypeDefinitions/CustomDatatype.Schema.json"
  }
]
```

This property contains a list of all user-specific data types defined in the control. Developer can define their own data types in a JSON schema. The definition usually takes place under "Schema\TypeDefinitions [► 1480]". In order for the Engineering to know and be able to process the user-specific data types, they must be referenced in Description.json.

A dataType object contains the following properties:

- **name** {String}: Name of the new data type. Framework data types are always user-specific and have to start with "tchmi:framework#/definitions/{MyName}". For each data type an individual name must be assigned.
- **schema** {string, relative path}: Relative path to the JSON schema file describing the data type.

#### 14.2.1.1.4.1.2.23 access

**Type:** Array of JSON objects

**Required:** No

```

"access": [
  {
    "name": "myCustomRight",
    "displayName": "myCustomRight",
    "description": "This is a sample for access rights in the framework control.",
    "visible": true,
    "defaultValueInternal": null
  }
]

```

This property contains a list of user-specific access rights that can be configured via the Engineering. Access rights restrict user groups in their activities (see [authorization system](#) [► 969]). A user-specific access right must be evaluated in Source.js with corresponding [user-specific logic](#) [► 1511].

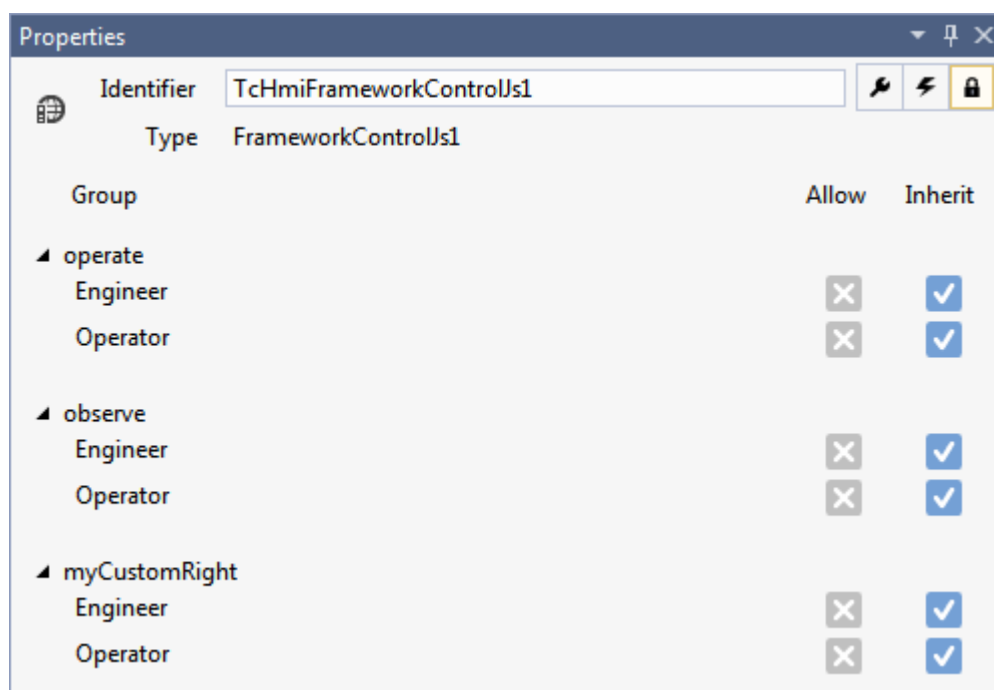
An access right object contains the following properties:

- **name** {String}: Internal name of the access right.
- **displayName** {String}: Name of the access right that is displayed in the Engineering.
- **description** {String}: Description of the access right, which is displayed as a tooltip in the Engineering on mouseover.
- **visible** {Boolean}: This property switches the visibility of the access right. If "visible" is set to "false", the access right is not displayed in the Engineering.
- **defaultValueInternal** {Boolean}: This property defines the internal default value that is to apply if the access right is not configured via the Engineering. "true" means access is granted by default. "false" means access is not granted. If "zero" is set, the default value is not defined at this control.  
For a detailed description of the behavior of defaultValueInternal see [authorization system](#) [► 969].

Various user groups are assigned to an access right via the Engineering, which are structured according to the following schema: `tchmi:framework#/definitions/ControlAccessRight`

This schema defines the type of access (Allow, Deny, Inherit) the respective user group has to the access right.

In the Engineering, the access right is displayed in the Properties window as follows (for two different user groups):



### 14.2.1.1.4.2 Template.html

Like every control in the TwinCAT HMI, a framework control is based on HTML code. As soon as a framework control is instantiated in the Engineering of the TwinCAT HMI, an HTML div element is automatically created for the control. The developer of the framework control can define additional HTML code for the control within the control div element.

#### HTML code

The definition of the HTML code is implemented in the "Template.html" file. The use of this file is optional. The Template.html file is only used, if this is referenced in the [Source.js](#) of the Control [► 1503]. The Template.html file defines the base structure of a framework control.

```
<div class="framework-control-js1-template tchmi-box">
  <!--Place your code here-->
</div>
```

The HTML code defined within this file is automatically inserted in within the control div element (if the file is used) in the Engineering. The code can be viewed in the browser during debugging, for example.

```
<div id="TcHmiFrameworkControlJs1" data-tchmi-type="framework-control-js1" data-tchmi-height="150"
data-tchmi-height-unit="px" data-tchmi-left="137" data-tchmi-left-unit="px" data-tchmi-top="140"
data-tchmi-top-unit="px" data-tchmi-value="True" data-tchmi-width="150" data-tchmi-width-unit="px"
class="tchmi-box tchmi-control framework-control-js1" title="" style="left: 137px; top: 140px;
width: 150px; height: 150px; z-index: 0; border-width: 0px;">
  <div class="framework-control-js1-template tchmi-box">
    <!--Place your code here-->
  </div>
</div>
```

Within the Template.html file any number of HTML elements can be defined. All standard HTML elements are available to the developer. In addition to the standard HTML elements, TwinCAT HMI controls can also be used in the Template.html file. The user-specific HTML code should be placed within the template div ("Place your code here").



#### Do not assign fixed IDs

No fixed IDs may be assigned within the Template.html file. The assignment of IDs within the Template.html file would contradict the concept of multiple instantiation of a framework control, since an ID may only occur once within the HTML document. The outer control div element is automatically assigned a unique ID through the Engineering.

#### CSS classes

Within the elements in the Template.html file, [CSS classes](#) [► 1499] can be assigned, which are described via cascading style sheets files, either detached from the theme or depending on the theme. By default, the template class in the Style.css file is used at project level.

#### Access via JavaScript

The HTML elements defined within the Template.html file can be further processed in the [Source.js](#) file [► 1502]. The elements can be changed during runtime or used as placeholders for dynamically created elements, for example. Processing of the HTML elements in the Source.js file is optional. Static use within the Template.html file is also possible.

If the HTML elements are to be processed further in the Source.js file, references to the HTML elements must be created there. References to the Template.html file are created within the PrevInit function in the Source.js file.

```
/** Handle template elements. Should be done before call to __previnit of super class. */
this.__elementTemplateRoot = this.getElement().find('.framework-control-js1-template');
```

The listing shows the access to the template div within Template.html. A search for the template div is initiated using the ".find()" JQuery function within the main JQuery object of the control. The reference to the JQuery object of the control can be reached via ".getElement()". If additional elements are placed within the template div, they can also be found using the ".find()" JQuery function. For performance reasons, we recommend to avoid using the outer JQuery object for the search in cases with many nested elements, but to use the inner elements that are already referenced instead.

Example:

```
<div class="framework-control-js1-template tchmi-box">
  <div class="framework-control-js1-inner-div">
    <div class="framework-control-js1-inner-div-my-element">

      </div>
    </div>
  </div>
</div>
```

The following references result from this HTML code:

```
/** Handle template elements. Should be done before call to __previnit of super class. */
this.__elementTemplateRoot = this.getElement().find('.framework-control-js1-template');
this.__innerDiv = this.__elementTemplateRoot.find('.framework-control-js1-inner-div');
this.__myElement = this.__innerDiv.find('.framework-control-js1-inner-div-my-element');
```

### 14.2.1.1.4.3 Style.css

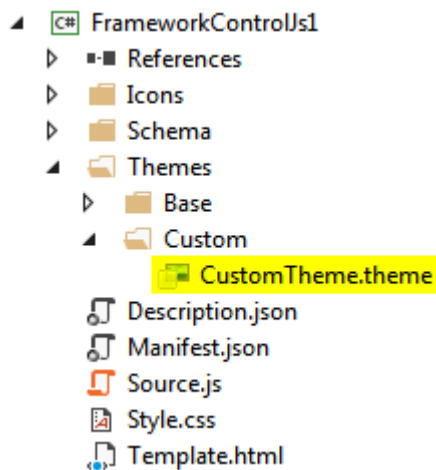
Within a framework control, the appearance of individual elements is described using cascading style sheets. The default design of the control is defined in the Style.css file at the project level and in the Style.css file, the base theme of the control. In addition to the standard design, further themes can be defined for the framework control. The appearance of a framework control can be changed at four [different levels](#) [► 1016] according to the theme system of the TwinCAT HMI.

#### 14.2.1.1.4.3.1 Theme levels

The appearance of a framework control can be described at different levels of the [theme system](#) [► 1016].

**Level 4:** Attribute definition per control type

Control themes [► 1011] can be defined at level 4 of the theme system. Control themes allow individual attributes of the framework control to be overwritten. A control theme is defined within a theme file and can be created using the theme editor in Engineering or directly as JSON code. The theme file must be assigned to a specific theme within the project:



The theme file must then be referenced as "ThemedValues" under "[themes](#) [► 1486]" in the Description.json file.

**Level 5:** Attribute definition by DefaultValueInternal

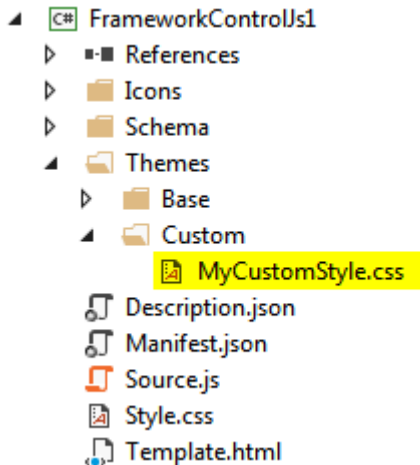
At level 5 of the theme system, it is possible to set the properties of the attribute via [DefaultValueInternal](#) [► 1492]. DefaultValueInternal can be set in the Description.json file of the framework control.

Example of a color attribute:

```
"defaultValueInternal": {
  "color": "rgba(255, 0, 0, 1)"
}
```

**Level 8:** Cascading Style Sheets per theme

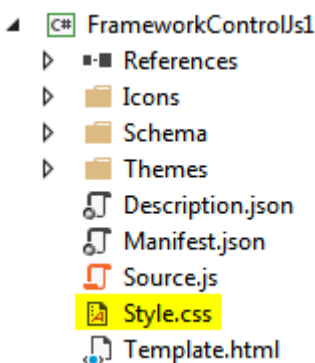
Cascading style sheet files can be added to a theme at level 8 of the theme system. Within the CSS file any element properties can be defined.



The CSS file "Stylesheet" must then be referenced under "[themes](#) [[1486](#)]" in the Description.json file of the framework control.

#### Level 9: Cascading Style Sheets on project level in the control

At level 9 of the theme system, Cascading Style Sheet files can be added independently of a theme at project level in the control. By default, each framework control project contains a Style.css file at project level. Within this file, element properties are defined that are to apply independently of a theme (e.g. sizes of a div).



All CSS files at the project level in the control must be referenced under [dependencyFiles](#) [[1485](#)] in the Description.json file of the framework control.

#### 14.2.1.1.4.3.2 Using CSS classes

The CSS class selectors are used within the cascading style sheet files of a framework control.

##### Permitted selectors

The following CSS selectors can be used conditionally within a CSS file of a framework control:

- [Type selectors](#)
- [Attribute selectors](#)
- [Class selectors](#)

**i** With class selectors, new CSS classes are defined for a framework control, which means that CSS styles are not overwritten outside the framework control. If type or attribute selectors are to be used, you must ensure that they are only used for the class of the framework control and do not overwrite any styles outside the framework control ([descendant selector](#)):



```
.tchmi-framework-control-js2 a {
  color: red;
}
```

The following CSS selectors should not be used within a CSS file of a framework control:

- ID selectors: Due to multiple instantiation, you cannot assign fixed IDs within a framework control.
- Universal selector: A framework control should not overwrite any styles outside the control during instantiation.

### Using the class selectors

CSS classes can be used in the Template.html file, or they can be added dynamically at runtime within the Source.js file.

```
.tchmi-framework-control-js1-template
{
  width: 100%;
  height: 100%;
}
```

Within the Template.html file, a CSS class is assigned via the HTML attribute "class":

```
<div class="tchmi-framework-control-js1-template tchmi-box">
</div>
```



The class "tchmi-box" sets CSS properties to facilitate element positioning and can be used with all positioned HTML elements.

The dynamic use of a CSS class within Source.js can be realized via the jQuery function ".addClass()", for example:

```
this.__elementTemplateRoot.addClass('tchmi-framework-control-js1-my-custom-class');
```

### 14.2.1.1.4.3.3 Overwriting CSS of controls

Within the CSS files it is possible to overwrite the appearance of embedded TwinCAT HMI controls. For example, if you want to change the appearance of an embedded button within a control, you can do this by applying the CSS styles of the button.

Please ensure that all buttons are not inadvertently assigned this appearance and that the CSS file of the general button does not overwrite that of the embedded control. Both can be achieved by so-called descendant selectors (spaces in CSS):

```
.framework-control-js1 .tchmi-button {
  background-image: linear-gradient(135deg, #eff1f3, #aeb9c2);
  color: #4794da;
  box-shadow: 0px 0px 5px 0px rgba(0,0,0,0.6);
}

.framework-control-js1 .tchmi-button.down {
  background-image: linear-gradient(135deg, #aeb9c2, #eff1f3);
  color: #000000;
  box-shadow: inset 0px 0px 5px 0px rgba(0,0,0,0.6);
}
```

All main elements of a control are assigned the control name as CSS class name (in this case `framework-control-js1`). If this is attached before the style of the control to be overwritten, the new appearance in the example only applies to buttons below the framework control.

CSS selectors are always read from right to left:

- First example: Main element of the button (".tchmi-button") if it is below (" ") FrameworkControls1 (".framework-control-js1").
- Second example: Element with class down (".down") if it is the main element of the button (".tchmi-button"), if it is below (" ") FrameworkControls1 (".framework-control-js1").

#### 14.2.1.1.4.4 Source.js

A framework control requires JavaScript code. The JavaScript code is defined in the Source.js file at project level, which is included in each framework control project. The Source.js file defines the base framework for the implementation of a framework control and can be flexibly extended.

##### Programming conventions:

The programming conventions provide a basis for standardizing framework controls. They are used to distinguish between internal and external access.

- Member variables are marked with the prefix "\_\_" and in Camel case:

```
this.__myVar = ...;
```

- Functions with external access (Engineering: setter/getter functions) are identified without prefix and in Camel case:

```
MyControl.prototype.setMyVar = ...
```

- Internal functions are marked with the prefix "\_\_" and in Camel case:

```
MyControl.prototype.__processMyVar = ...
```

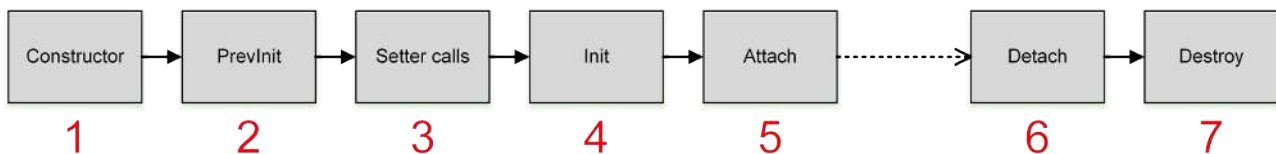


If you make changes in the Source.js file and the framework control is already associated with an HMI project, you must then carry out a [project build](#) [► 1482] of the framework control to apply the changes.

##### 14.2.1.1.4.4.1 Control life cycle

The control life cycle describes which system function of the control is called by the system at which time. In the control life cycle, a distinction is made as to whether the control is on an HMI page for which preloading is activated.

The base control life cycle is described in the following diagram:



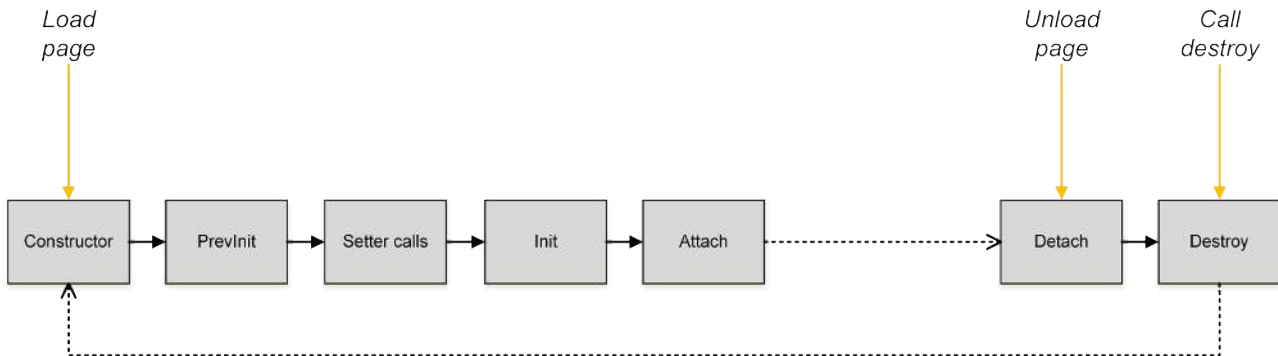
##### Explanations:

1. The constructor is called during control instantiation.
2. The PrevInit function is called after the constructor and before the attribute setter functions are called.
3. The attribute setter functions are called after the PrevInit function.
4. The init function is called after the attribute setter functions. At this point, the control attributes are initialized by the attribute setter functions and have valid values.
5. The Attach function is called after the Init function, once the control has been added to the DOM on the HMI page.
6. The Detach function is called after a control has been removed from the DOM of the HMI page (e.g. during page switching).
7. The Destroy function is called after the control has been removed from the DOM of the HMI page, so that the system can destroy the controls. In addition, the Destroy function can be called explicitly at another point (for example, when subordinate controls elements are destroyed).

##### HMI page: Preloading disabled

Normally, preloading of an HMI page is disabled (Preload this partial: false), which means that the controls are not stored in the browser cache. This increases the speed of the initial HMI loading process, but it can lead to a reduction in the loading speed of individual HMI pages on which many controls are instantiated.

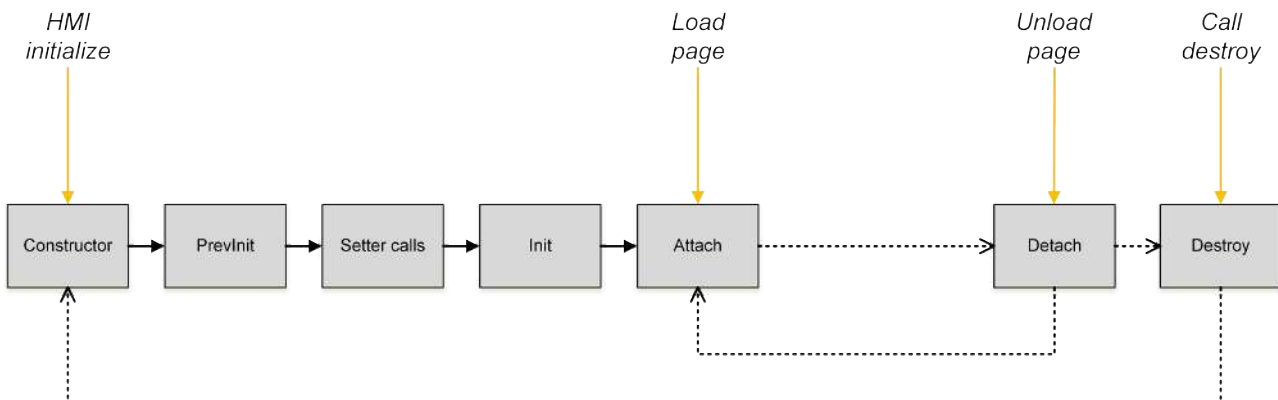
In this case, the constructor of the control is called when the page is loaded (for example, when switching to the page or when loading the start page). This is followed by the PrevInit function, the attribute setter functions, the Init function and the Attach function. As soon as the page is unloaded (e.g. when switching to another page), the Detach function is called, followed by the Destroy function. The life cycle of the controls starts again when the HMI page is loaded.



### HMI page: Preloading enabled

If preloading is enabled for an HMI page (preload this partial: true), the controls are stored in the browser cache. This increases the loading speed of a single HMI page, but it can lead to a reduction in the initial loading process of the HMI.

In this case, the constructor of the control is called as soon as the HMI is initially loaded. This is followed by the PrevInit function, the attribute setter functions and the init function. The Attach function of the control is not called until the HMI page on which the control is instantiated is loaded. The Detach function is called as soon as the HMI page is unloaded. The Destroy function is not called automatically subsequently. The control remains in the browser cache. When the HMI page is reloaded, the Attach function is called directly.



#### 14.2.1.1.4.4.2 Base framework

The Source.js file already contains preconfigured source code that is required for various functions of the framework control and may not be modified in some cases. In JavaScript, a framework control is a JavaScript object that is described by various properties and methods. In other programming languages, the framework control would correspond to a class from which concrete instances (objects) are created at a later point in time.

### Project information

Better support for IntelliSense in JavaScript:

```
// Provider for a best effort Intellisense of Visual Studio 2017/2019.
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-
Engineering\Infrastructure\TcHmiFramework\Latest\Lib\jquery.d.ts" />
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-
Engineering\Infrastructure\TcHmiFramework\Latest\TcHmi.d.ts" />
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-
Engineering\Infrastructure\TcHmiFramework\Latest\Controls\System\TcHmiControl\Source.d.ts" />

// Provider for a best effort Intellisense of Visual Studio 2013/2015.
```

```

/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-
Engineering\Infrastructure\TcHmiFramework\Latest\Lib\jquery\jquery.js" />
/// <reference path="C:\TwinCAT\Functions\TE2000-HMI-
Engineering\Infrastructure\TcHmiFramework\Latest\TcHmi.js" />

```

These comment lines include different files, allowing better IntelliSense support within the Source.js file. These lines are not required for using the control.

Information about the framework control:

```

/*
 * Generated 2/15/2018 10:57:13 AM
 * Copyright UserXY 2018
 * .....
 */

```

These comment lines contain information about the creation of the framework control, which is generated automatically when the framework control project is created. These lines are not required for using the control.

### Base structure of a framework control

```

/**
 * Namespace: TcHmi
 * [REQUIRED]
 */
(function (/** @type {globalThis.TcHmi} */ TcHmi) {
  /**
   * Namespace: TcHmi.Controls
   * [REQUIRED]
   */
  (function (/** @type {globalThis.TcHmi.Controls} */ Controls) {
    /**
     * Namespace: TcHmi.Controls.Custom
     * [CUSTOM]
     */
    var Custom;
    (function (Custom) {
      /** FrameworkControlJs1 object */
      var FrameworkControlJs1 = (function (_super) {
        __extends(FrameworkControlJs1, _super);

        /** Control specific logic */

        return FrameworkControlJs1;
      })(TcHmi.Controls.System.TcHmiControl);
      Custom.FrameworkControlJs1 = FrameworkControlJs1;
    })(Custom = Controls.Custom || (Controls.Custom = {}));
    /**
     * Register control...
     */
    Controls.register('framework-control-js1', Custom.FrameworkControlJs1, 'Custom/
FrameworkControlJs1/', 'Custom/FrameworkControlJs1/Template.html');
  })(Controls = TcHmi.Controls || (TcHmi.Controls = {}));
})(TcHmi);

```

This code defines the base structure of a framework control and is required for using the control at runtime. In the event of invalid changes, the control can no longer be used properly.



Do not change the base structure of the framework control within Source.js. There is a risk that the control can no longer be used.

### Definition of the namespaces

Within Source.js, various namespaces are referenced and defined, which are required for the framework.

#### TcHmi

```
(function (TcHmi) { }) (TcHmi);
```

This function makes the control known within the "TcHmi" namespace. The framework cannot be accessed outside this namespace.

#### Controls

```
(function (Controls) { })(Controls = TcHmi.Controls || (TcHmi.Controls = {}));
```

This function makes the control known within the "Controls" namespace. This namespace contains all TwinCAT HMI controls ([System](#) [► 753], [Beckhoff](#) [► 123], Custom).

The control is registered in the control namespace which is required for the Engineering of the TwinCAT HMI. The transfer of the [Template](#) [► 1498] parameter is optional.

```
Controls.register('framework-control-js1', Custom.FrameworkControlJs1, 'Custom/  
FrameworkControlJs1/', 'Custom/FrameworkControlJs1/Template.html');
```

## Custom

```
var Custom;  
(function (Custom) { })(Custom = Controls.Custom || (Controls.Custom = {}));
```

This function defines the namespace for user-specific controls and makes the control known within the namespace. The concrete framework control object is defined in the custom namespace (prototypical control object) and then assigned to the custom namespace:

```
Custom.FrameworkControlJs1 = FrameworkControlJs1;
```

## Prototypical control object

A framework control is defined by a JavaScript object within the custom namespace. The logic is implemented in this section ([Constructor](#) [► 1505], [System functions](#) [► 1506], [Attributes](#) [► 1507], [Functions](#) [► 1509], [Events](#) [► 1510], [Access rights](#) [► 1511]).

```
var FrameworkControlJs1 = (function (_super) {  
    __extends(FrameworkControlJs1, _super);  
  
    /** Control specific logic */  
  
    return FrameworkControlJs1;  
})(TcHmi.Controls.System.TcHmiControl);
```

The object (`_super`) of the [base control](#) [► 1484] defined in [Description.json](#) [► 1481] (usually `TcHmiControl` [► 753]) is passed to the framework control. The framework control inherits all properties of the defined base control.

The framework control is defined by a function, in which the user-specific code of the framework control is implemented. A function in JavaScript always links a prototypical object. Access to the prototypical object of this function is indicated by the property "prototype". All properties (other functions) of the framework control are stored in the function object via the prototype.

```
MyControlName.prototype.myProperty = function () {...};
```

When a specific instance (JavaScript object) is created by the function, the instance has all the properties of the prototypical object of the function.

### 14.2.1.1.4.4.3 Constructor

Each framework control contains a constructor that is structured as follows:

```
function FrameworkControlJs1(element, pcElement, attrs) {  
    /** Call base constructor */  
    __super.call(this, element, pcElement, attrs);  
  
    /** Attribute variables are initialized with undefined. The System will call the setter later.  
    See "Attribute philosophy" above. */  
    this.__value = undefined;  
}
```

Within the constructor, the internal variables of the control (member variables) are initialized with "undefined". Initialization at this point is not necessary, but is recommended for better clarity.

The parameter values of the constructor are only used internally and forwarded to the base constructor call.

#### 14.2.1.1.4.4.4 System functions

Framework controls have functions that are called by the system at different times. Each system function calls the respective system function of the basic class ([TcHmiControl](#) [► 753]) via the "\_super" object and passes a reference to the current control object.

##### Previnit function

```
FrameworkControlJs1.prototype.__previnit = function () {
    /** Handle template elements. Should be done before call to __previnit of super class. */
    this.__elementTemplateRoot = this.getElement().find('.framework-control-js1-template');

    /** Call __previnit of super class. */
    _super.prototype.__previnit.call(this);
};
```

The Previnit function is automatically called after the system calls the [constructor](#) [► 1505] and before the attribute setters of each attribute are called. Accordingly, the member variables of the attributes have the value "undefined" when the Previnit function is called. Within the Previnit function, the [references](#) [► 1498] to the HTML elements are created from the Template.html file.



This function may only be called by the system and not explicitly by the developer.

---

##### Init function

```
FrameworkControlJs1.prototype.__init = function () {
    _super.prototype.__init.call(this);
};
```

The Init function is called automatically by the system after the attribute setters of the individual attributes have been called. Accordingly, when the Init function is called, the member variables of the attributes already have the values that were passed to the control or defined internally as default values.



This function may only be called by the system and not explicitly by the developer.

---

##### Attach function

```
FrameworkControlJs1.prototype.__attach = function () {
    /**
     * Enable everything which was disabled while __detach function was called!
     */
    /**
     * Initialize everything which is only available while the control is part of the active dom.
     */
    /** Call base __attach function */
    _super.prototype.__attach.call(this);
};
```

The Attach function is automatically called by the system after the current control instance has been added to the DOM of the HTML document. Within the Attach function, all calculations should be performed that are only available while the control instance is in the DOM (e.g. `.getBoundingClientRect()` of DOM elements or `.width()` of jQuery elements). The opposite of the Attach function is the Detach function.



This function may only be called by the system and not explicitly by the developer.

---

##### Detach function

```
FrameworkControlJs1.prototype.__detach = function () {
    /**
     * Disable everything which is not needed while the control is not part of the active dom.
     * No need to listen to events for example!
     */
};
```

```
/** Call base __detach function */
_super.prototype.__detach.call(this);
};
```

The system automatically calls the Detach function after the current control instance has been removed from the DOM of the HTML document. In the Detach function, all functions that are no longer required after the control instance has been removed from the DOM are to be disabled. The opposite of the Detach function is the Attach function.



This function may only be called by the system and not explicitly by the developer.

## Destroy function

```
FrameworkControlJs1.prototype.destroy = function () {
  /**
   * Free resources
   */
  /** Call base __destroy function */
  _super.prototype.destroy.call(this);
};
```

The system automatically calls the Destroy function when the control instance is no longer used (after the Detach function). If the control is on an HTML page where "Preload Partial" is enabled, the Destroy function is not called because the page is still saved in the browser cache. Within the Destroy function, the elements that were created during runtime are to be destroyed.



This function can also be called explicitly (for example when child controls are destroyed).

### 14.2.1.1.4.4.5 Attributes

Framework control [attributes](#) [► 1487] defined in Description.json must be initialized within Source.js, and the corresponding setter, getter and process methods must be implemented. The setter and getter methods provide central access to the attribute.

The following examples refer to the following attribute, which is defined in Description.json under "[attributes](#) [► 1487]":

```
"attributes": [
  {
    "name": "data-tchmi-value",
    "propertyName": "Value",
    "propertySetterName": "setValue",
    "propertyGetterName": "getValue",
    "displayName": "Value",
    "visible": true,
    "themeable": "Standard",
    "displayPriority": 10,
    "type": "tchmi:general#/definitions/Boolean",
    "category": "Value",
    "description": "",
    "readOnly": false,
    "bindable": true,
    "heritable": true,
    "defaultValue": false,
    "defaultValueInternal": false
  }
]
```

## Initialization

The attributes are initialized in the constructor of the framework control. Initialization is not required here (variables without keywords are automatically initialized in JavaScript when used), but is recommended for better clarity.

```
this.__value = undefined;
```



Member variables and functions that cannot be accessed from outside are prefixed with "\_\_".

## Setter method

The setter method of an attribute is only required for attributes that are not set to "[readOnly \[► 1491\]](#)" (all attributes that can be set via Engineering). Like the definition, the setter method must be named in the "[propertySetterName \[► 1488\]](#)".

```
/**
 * @description Setter function for 'data-tchmi-value' attribute.
 * @param {Boolean} valueNew the new value or null
 * @returns {void}
 */
FrameworkControlJs1.prototype.setValue = function (valueNew) {
    // convert the value with the value converter
    var convertedValue = TcHmi.ValueConverter.toBoolean(valueNew);

    // check if the converted value is valid
    if (convertedValue === null) {
        // if we have no value to set we have to fall back to the defaultValueInternal from
        description.json
        convertedValue = this.getAttributeDefaultValueInternal('Value');
    }

    if (tchmi_equal(convertedValue, this.__value)) {
        // skip processing when the value has not changed
        return;
    }

    // remember the new value
    this.__value = convertedValue;

    // inform the system that the function has a changed result.
    TcHmi.EventProvider.raise(this.__id + ".onFunctionResultChanged", ["getValue"]);

    // call process function to process the new value
    this.__processValue();
};
```

Within the setter method, the parameter that was passed is first converted into the expected data type by Engineering using the framework API function "ValueConverter". If an invalid value is passed to the ValueConverter or if the conversion of the value fails, the function returns "null". In this case the [DefaultValueInternal \[► 1492\]](#) from Description.json is used. The system then checks whether a value change to the last stored value of the attribute on the member variable has taken place. If no value change has taken place, the setter is exited. If a value change has taken place, the value of the member variable for the attribute is overwritten and the system is notified that a value change has taken place. Finally, the Process method is called for the value in which the response to the value change takes place.



The function "tchmi\_equal" should be used to check for a change in value. The JS comparison operator "===" can only check the base JavaScript data types but not complex JSON objects.

## Getter method

The getter method of an attribute returns the current value of the attribute and is required for each attribute. Like the definition, the getter method must be named in the "[propertyGetterName \[► 1488\]](#)".

```
/**
 * @description Getter function for 'data-tchmi-value' attribute.
 * @returns {Boolean}
 */
FrameworkControlJs1.prototype.getValue = function () {
    return this.__value;
};
```



## Process-Method

The Process method is always called when the attribute value has been changed. The response to the value changes is to be implemented in the process method. For example, depending on a Boolean value elements can be switched visible or invisible, or a list can be created dynamically based on a transferred JSON object.

```
/**
 * @description Processor function for 'data-tchmi-value' attribute.
 * @returns {void}
 */
FrameworkControlJs1.prototype.__processValue = function () {
    // process actions with Value
    // ...
};
```

### 14.2.1.1.4.4.6 Functions

Framework control [functions](#) [► 1493] defined in Description.json must be defined and implemented in Source.js. The function must be named like the ["name"](#) [► 1493] of the function in Description.json.

#### Function without parameter values

A function without parameter values is defined in Description.json as follows:

```
"functions": [
  {
    "name": "customFunction",
    "displayName": "customFunction",
    "visible": true,
    "description": "This is a sample for a function that can be called.",
    "category": "Actions",
    "params": [],
    "type": null,
    "heritable": true,
    "searchTerms": []
  }
]
```

This results in the following code for Source.js:

```
/**
 * @description This is the call of the api function 'customFunction'.
 * @returns {void}
 */
FrameworkControlJs1.prototype.customFunction = function () {
    /**
     * customFunction is defined in the description.json and called from outside.
     * The api functions are shown in the graphical user interface of the engineering in Visual Studio
     */
    // implement function logic here
};
```

Within the function, any execution logic of the function can be implemented.

#### Function with return value

The functions enables a return value to be returned the calling point in Engineering. The return value is defined in Description.json under "type".

```
"type": "tchmi:general#/definitions/Boolean"
```

Within the function in Source.js it is then possible to return a value of the corresponding type.

```
/**
 * @description This is the call of the api function 'customFunction'.
 * @returns {Boolean}
 */
FrameworkControlJs1.prototype.customFunction = function () {
    /**
     * customFunction is defined in the description.json and called from outside.
     * The api functions are shown in the graphical user interface of the engineering in Visual Studio
     */
    // implement function logic here
    return true;
};
```

```
// implement function logic here
return true;
};
```

## Function with parameter values

A function with [parameter values \[► 1494\]](#) is defined in Description.json as follows:

```
"functions": [
  {
    "name": "customFunction",
    "displayName": " customFunction ",
    "visible": true,
    "description": "This is a sample for a function that can be called by the engineering.",
    "category": "Actions",
    "params": [
      {
        "name": "functionParameter1",
        "displayName": "functionParameter1",
        "description": "This is a sample for a function parameter.",
        "type": "tchmi:general#/definitions/Number",
        "visible": true
      },
      {
        "name": "functionParameter2",
        "displayName": "functionParameter2",
        "description": "This is a sample for a function parameter.",
        "type": "tchmi:general#/definitions/Boolean",
        "visible": true
      }
    ],
    "type": null,
    "heritable": false,
    "searchterms": []
  }
]
```

The function is implemented in Source.js like a normal function. The parameter values are passed with the function call. The parameters must be checked for validity before they are used, similar to the [attribute setters \[► 1507\]](#).

```
/**
 * @description This is the call of the api function 'customFunction'.
 * @returns {void}
 */
FrameworkControlJs1.prototype.customFunction = function (functionParameter1, functionParameter2) {
  /**
   * customFunction is defined in the description.json and called from outside.
   * The api functions are shown in the graphical user interface of the engineering in the twincat
   */
  var convertedParameter1 = TcHmi.ValueConverter.toNumber(functionParameter1);
  if (convertedParameter1 === null) {
    // parameter is null: define what to do in this case

    // exit function call if the execution without this parameter is not possible
    return;
  }

  var convertedParameter2 = TcHmi.ValueConverter.toBoolean(functionParameter2);
  if (convertedParameter2 === null) {
    // parameter is null: define what to do in this case

    // exit function call if the execution without this parameter is not possible
    return;
  }

  // implement function logic with the evaluation of the parameters here
};
```

### 14.2.1.1.4.4.7 Events

Framework control events defined in Description.json should be triggered in Source.js. The name of the event must be named like the ["name \[► 1495\]"](#) of the event in Description.json. An event can be triggered in different situations, e.g. when a certain record changes (see [".onDataChanged \[► 250\]"](#) in the [data grid \[► 218\]](#)).

An event is triggered in Source.js via the EventProvider of the framework. The framework API function "EventProvider.raise()" is used for this purpose. When the event is triggered, the concrete control instance must be identified with "this.\_\_id".

```
// raise .onMyCustomEvent event
TcHmi.EventProvider.raise(this.__id + '.onMyCustomEvent');
```

Optionally, parameters can be passed to the event callbacks when the event is triggered.

```
// declare parameter: type anything
var myParameterObject = 42;
// raise .onMyCustomEvent event with event parameters
TcHmi.EventProvider.raise(this.__id + '.onMyCustomEvent', myParameterObject);
```

The response to the triggered events can take place in Engineering via the [Properties window \[► 60\]](#) or via the registration of the event in a [Code Behind file \[► 1475\]](#).

**i** If `allowPreventDefault` is allowed in the [event definition \[► 1495\]](#), the `myParameterObject` should offer `preventDefault` as a function. All DOM and jQuery event objects meet this requirement, for example. This function is called if the user has set the option for this event in Engineering.

#### 14.2.1.1.4.4.8 Access rights

User-specific access rights [\[► 1496\]](#) defined in Description.json and configured in Engineering [\[► 60\]](#) should be checked and evaluated in Source.js. Depending on the user-specific [access rights \[► 963\]](#), specific elements can be switched visible or invisible or enabled or disabled, for example.

The evaluation of the configured access rights is performed via the framework API function "TcHmi.Access.checkAccess()". The current instance of the control is passed to the function (this) and the name of the right to be checked, which must correspond to the definition in Description.json.

```
// check user access of "myCustomRight" that is defined in the description.json
if (TcHmi.Access.checkAccess(this, 'myCustomRight') === true) {
    // current user has the rights to do this

    // process actions with the right
    // show elements, enable buttons, etc.
}
else {
    // Current user has no rights to do this

    // process actions without the rights
    // hide elements, disable buttons, etc.
}
```

**i** Since user management only works when authentication is active, the configured functions are not available in live view.

#### 14.2.1.1.4.4.5 CustomDatatype.Schema.json

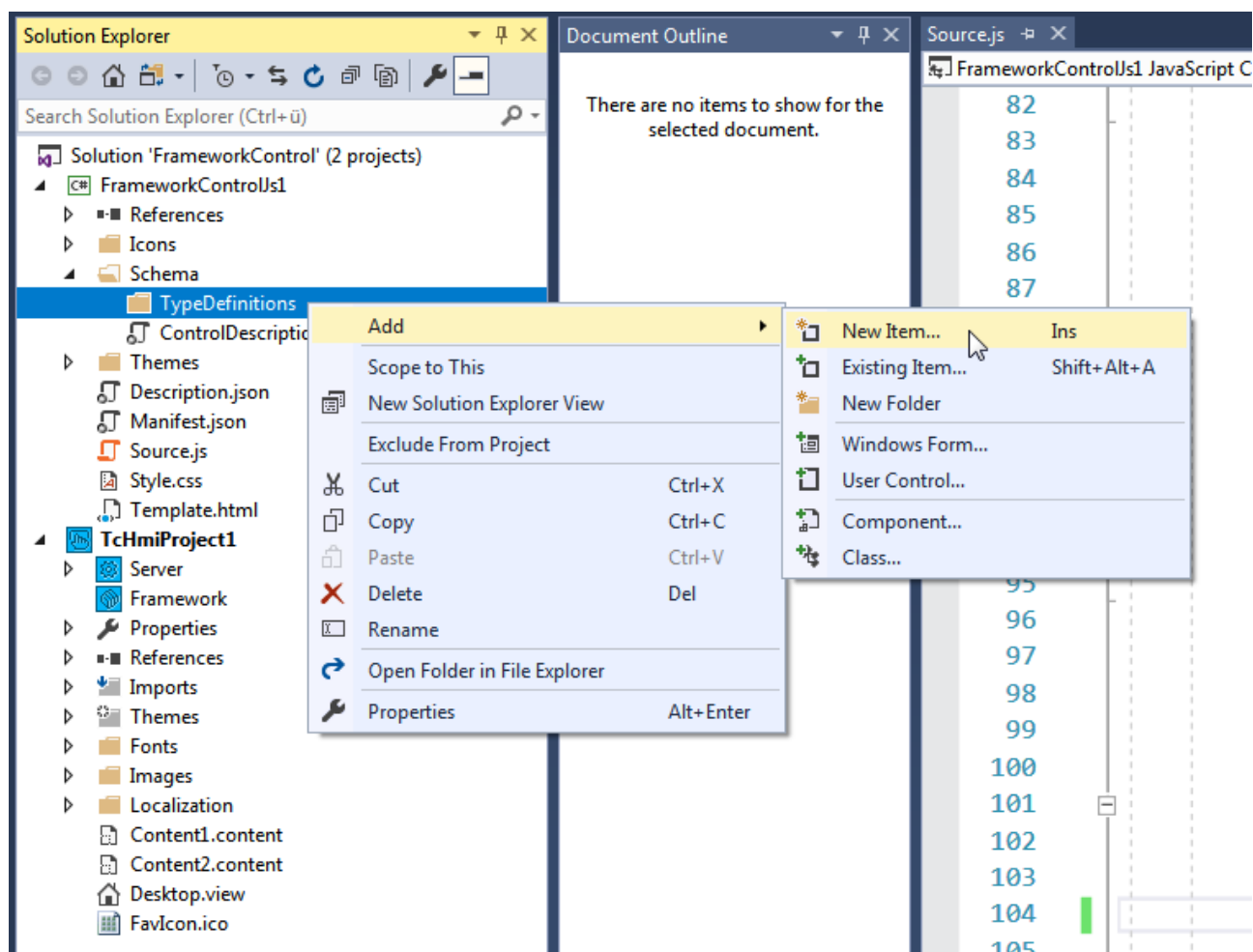
Within a framework control project, user-specific and complex data types can be implemented if the data type is not covered by a standard data type. In principle, any data structures can be transferred as objects without the need for a user-specific data type. A user-specific data type is required if an editor is to be provided for generating the data in Engineering. The data editor is generically based on a given JSON schema.

The following user-specific data types can be implemented:

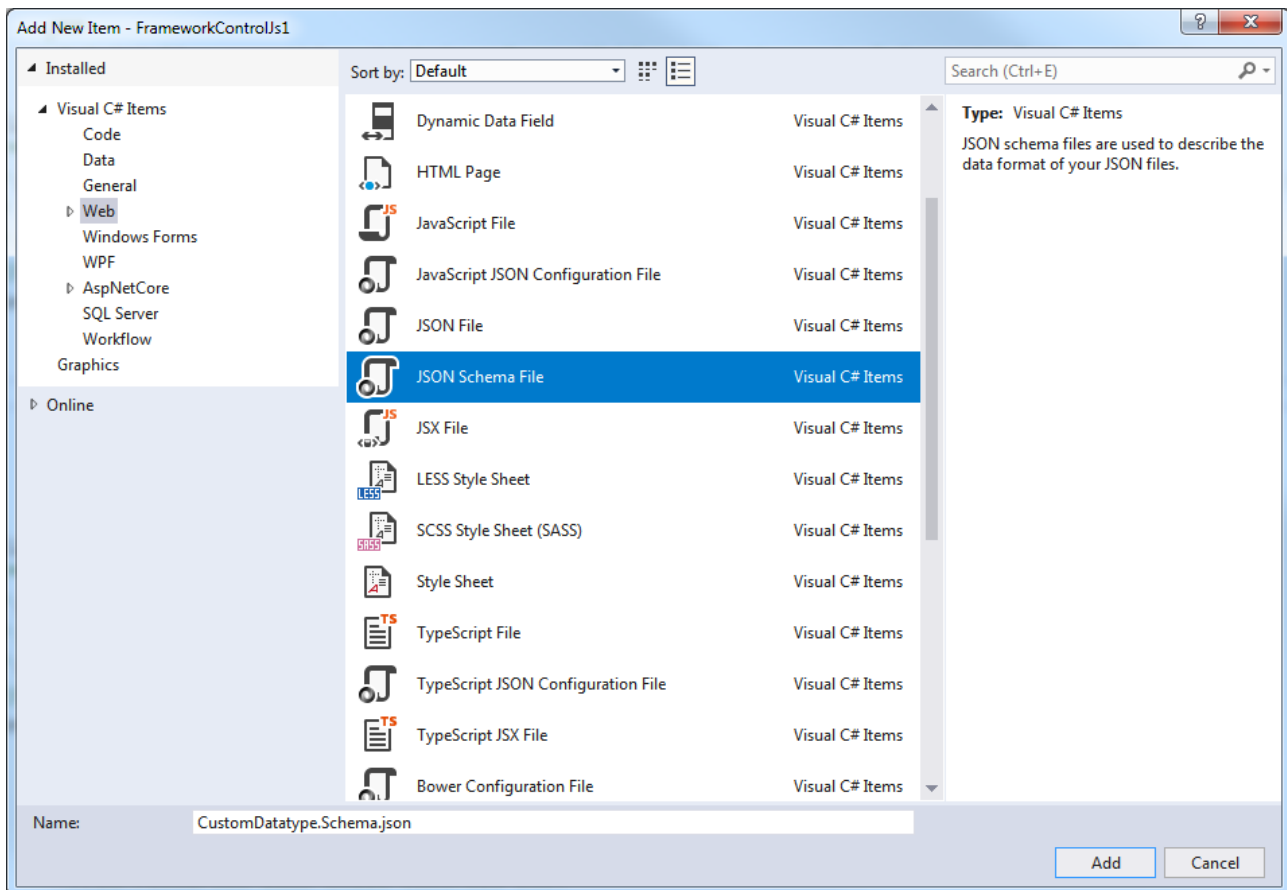
- [Objects \[► 1515\]](#) with fixed properties
- [Array \[► 1517\]](#) of any data types
- [Enumerations \[► 1519\]](#)
- [Limitation \[► 1520\]](#) of several allowed data types

#### 14.2.1.1.4.5.1 Creating a custom data type

Add a new item in the "TypeDefinitions" folder under "Schema".



Add a new JSON file or JSON schema file to the project.



Reference the schema file in Description.json under "[dataTypes](#) [[▶ 1496](#)]". Note that user-specific data types are assigned to the "Framework" category.

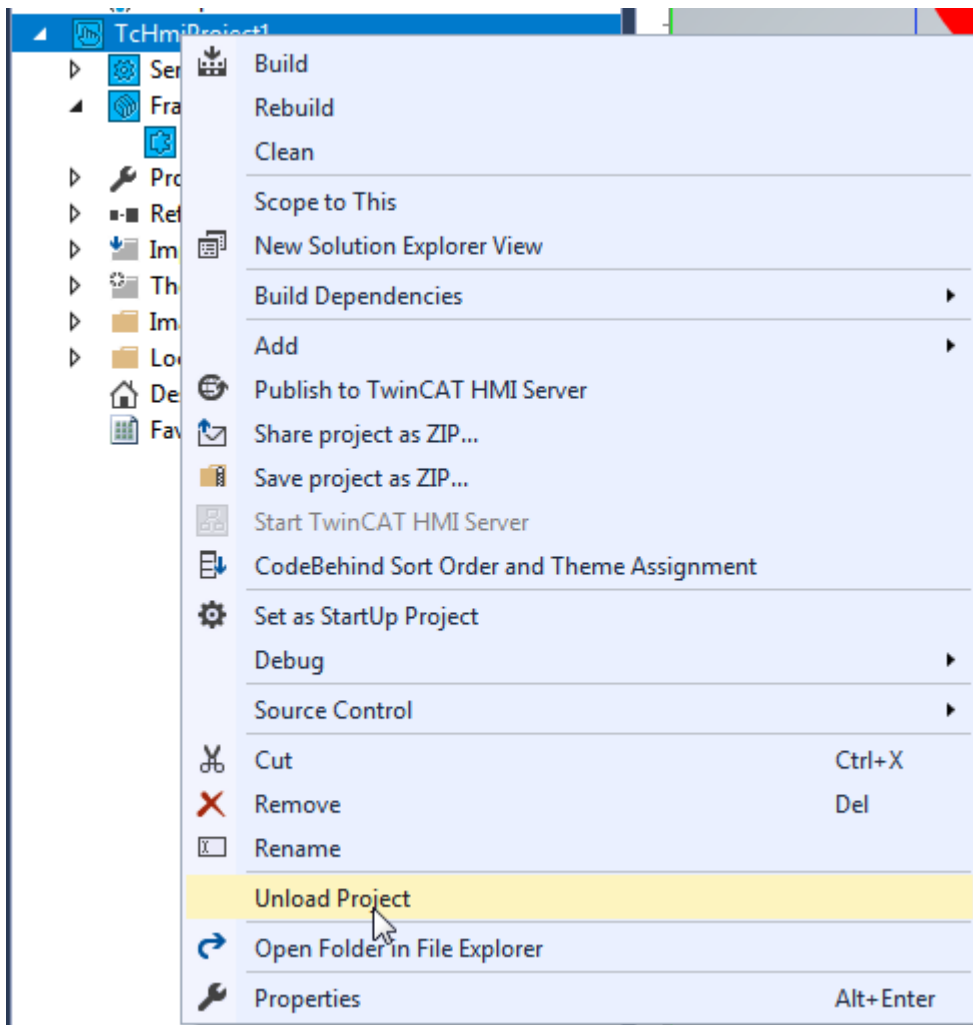
```
"dataTypes": [
  {
    "name": "tchmi:framework#/definitions/CustomDatatype",
    "schema": "Schema/TypeDefinitions/CustomDatatype.Schema.json"
  }
]
```

You can then use the user-specific data type within Description.json.

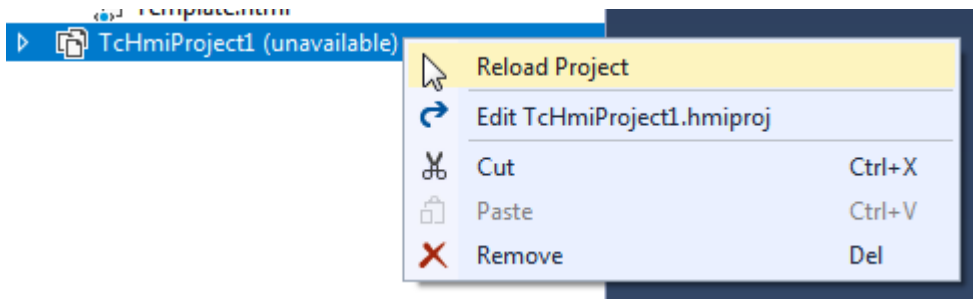
```
"type": "tchmi:framework#/definitions/CustomDatatype"
```

**i** If the framework control is already referenced in an HMI project, a project build (see [First Steps](#) [[▶ 1477](#)]) must then be executed and the HMI project reloaded so that the new data type is included in the type descriptions of the HMI project.

To reload the project, right-click on the HMI project and select "Unload project".



Then select "Reload project" to reload the project. You can then use all the functions as usual.



#### 14.2.1.1.4.5.2 Implementing a custom data type

The configuration of a JSON schema for the framework follows a certain structure.

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "{DatatypeName}": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "title": " {DatatypeName} ",
      "type": "array",
      //...
    }
  }
}
```

Each JSON schema contains a definition that describes the data type ({DatatypeName}). The definition of the data type contains the specification (type) and the description of the data type through attributes depending on the respective data type.

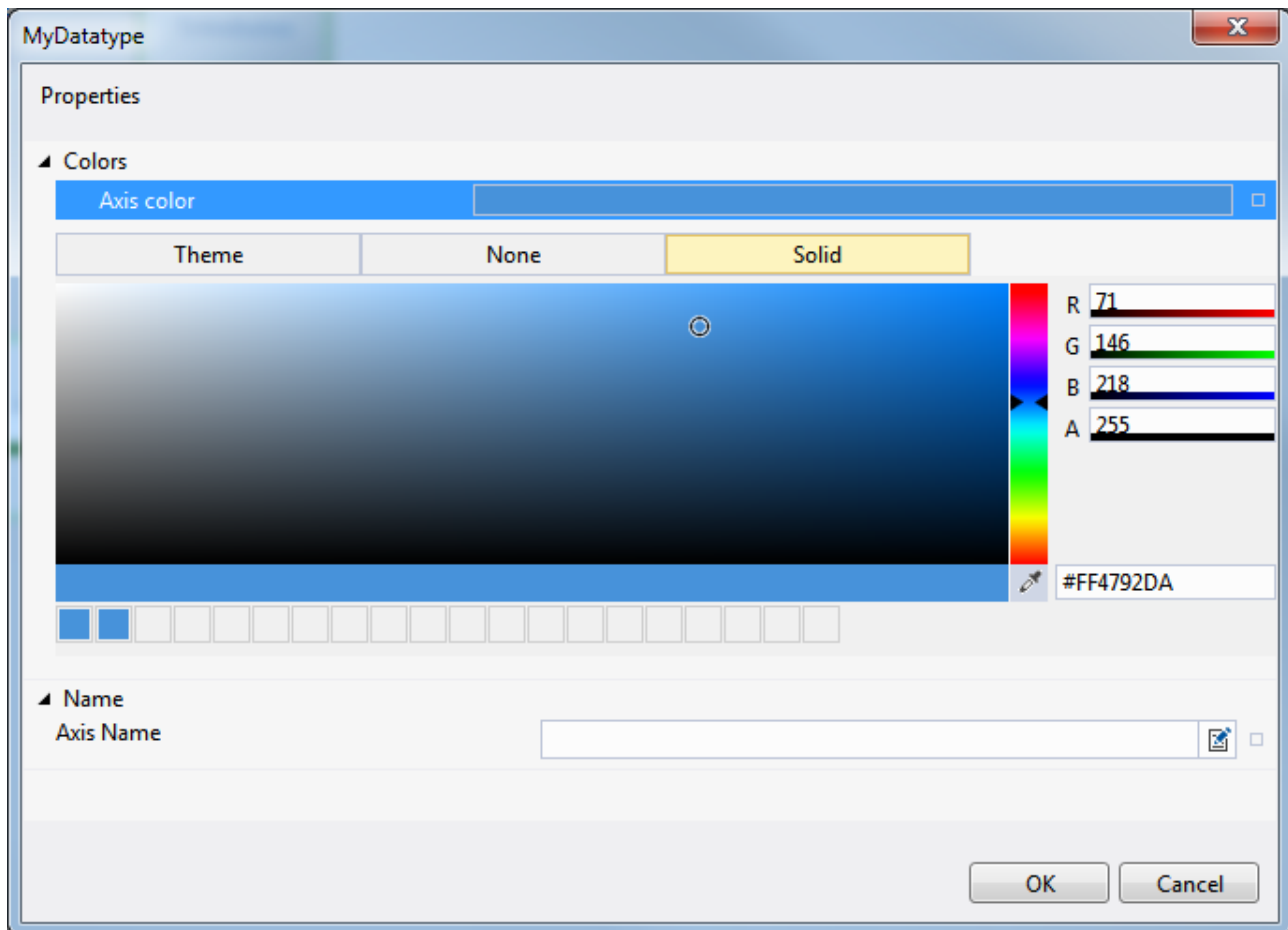
#### 14.2.1.1.4.5.2.1 Objects

Objects can contain any properties. A property is described under Properties and can be refined through optional metadata (propertiesMeta).

The following JSON schema describes an object with two properties.

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "CustomDatatype": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "title": "CustomDatatype",
      "type": "object",
      "propertiesMeta": [
        {
          "name": "axisName",
          "category": "Name",
          "displayName": "Axis Name",
          "displayPriority": 10,
          "description": "",
          "defaultValue": null,
          "defaultValueInternal": null
        },
        {
          "name": "axisColor",
          "category": "Colors",
          "displayName": "Axis color",
          "displayPriority": 10,
          "description": "",
          "defaultValue": null,
          "defaultValueInternal": {
            "color": "#4794da"
          }
        }
      ],
      "properties": {
        "axisName": {
          "type": "string"
        },
        "axisColor": {
          "$ref": "tchmi:framework#/definitions/SolidColor"
        }
      },
      "required": [ "axisName" ]
    }
  }
}
```

This results in the following generic data editor in Engineering.



## Explanations

### propertiesMeta:

The metadata of the properties are optional. They describe the display within the generic data editor. The metadata are described by the following properties:

- `name` {String}: Internal name of the property, see "[name \[► 1487\]](#)" in Description.json.  
**Info:** The name must match the name under the properties.
- `category` {String}: Name of the category under which the property is displayed in the generic data editor, see "[category \[► 1490\]](#)" in Description.json.
- `displayName` {String}: Name of the property displayed in the generic data editor, see "[displayName \[► 1488\]](#)" in Description.json.
- `displayPriority` {Number}: Priority of the display, see "[displayPriority \[► 1490\]](#)" in Description.json.
- `description` {String}: Description of the property, see "[description \[► 1491\]](#)" in Description.json.
- `defaultValue`: Default value used initially in engineering, see "[defaultValue \[► 1492\]](#)" in Description.json.
- `defaultValueInternal`: Internal default value, see "[defaultValueInternal \[► 1492\]](#)" in Description.json.

### properties:

The name and data type of the object properties are described under Properties. The name is determined by the name of the property. The data type can be described as follows:

- `type` {String}: Default JSON data type of the property, or
- `$ref` {String, reference}: Reference to a framework data type. This can be implemented within the project or taken from the existing data type descriptions of the framework.



**required:**

The required properties are listed under "required". The list is based on the internal name. If a property of the object that is set to required is not set in Engineering, the generic data editor displays a warning.

**14.2.1.1.4.5.2.2 Arrays**

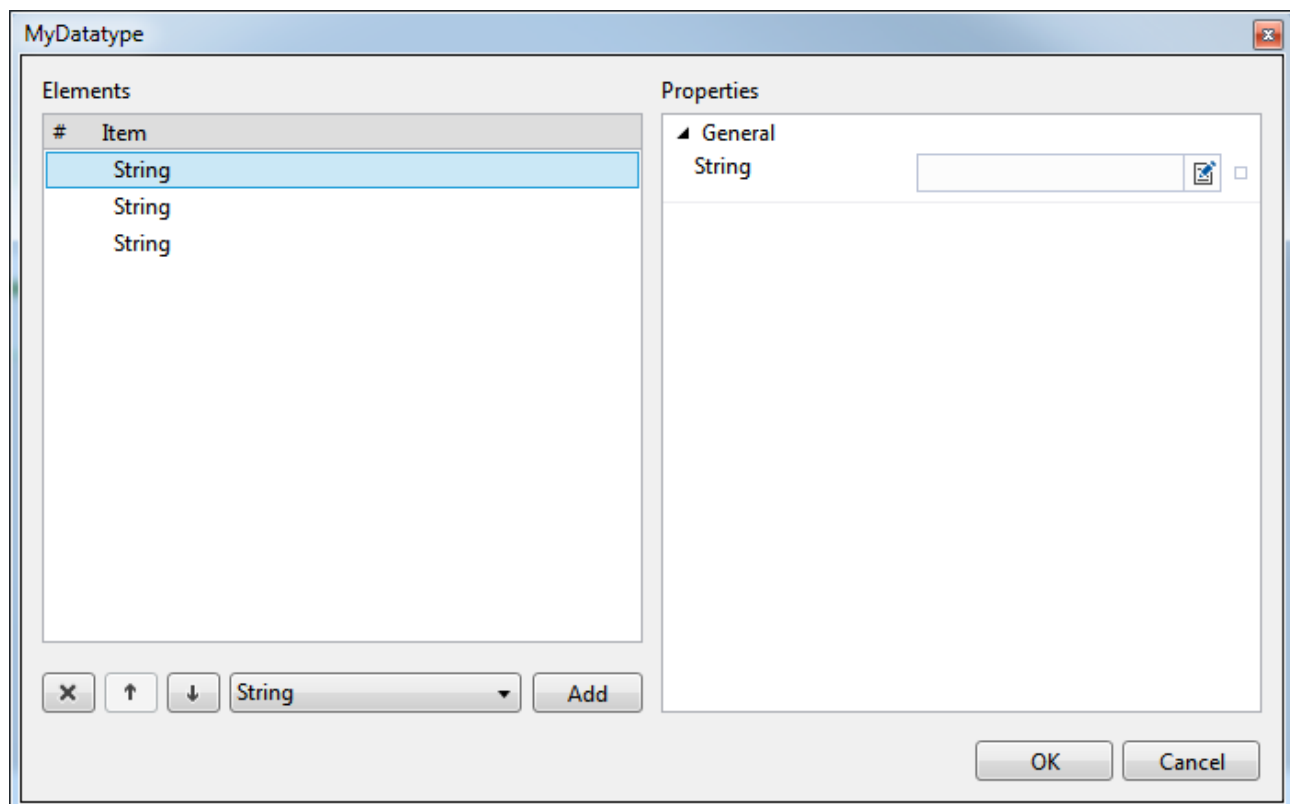
Arrays can be created from simple data types and complex objects.

**Array of simple data types**

Simple data types are specified within the "items" property under the "type" data type property. The following schema defines an array of strings.

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "CustomDatatype": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "title": "CustomDatatype",
      "type": "array",
      "items": {
        "type": "string"
      }
    }
  }
}
```

This schema generates the following generic data editor in Engineering.



The generic data editor displays the array elements on the left-hand side under the name of the respective data type (in the example: string). If a self-defined name is to be displayed instead, an object with a property of the type of the data type must be selected instead of the simple data type, and the "displayName" of the property must be set in the metadata.

**Array of complex data types**

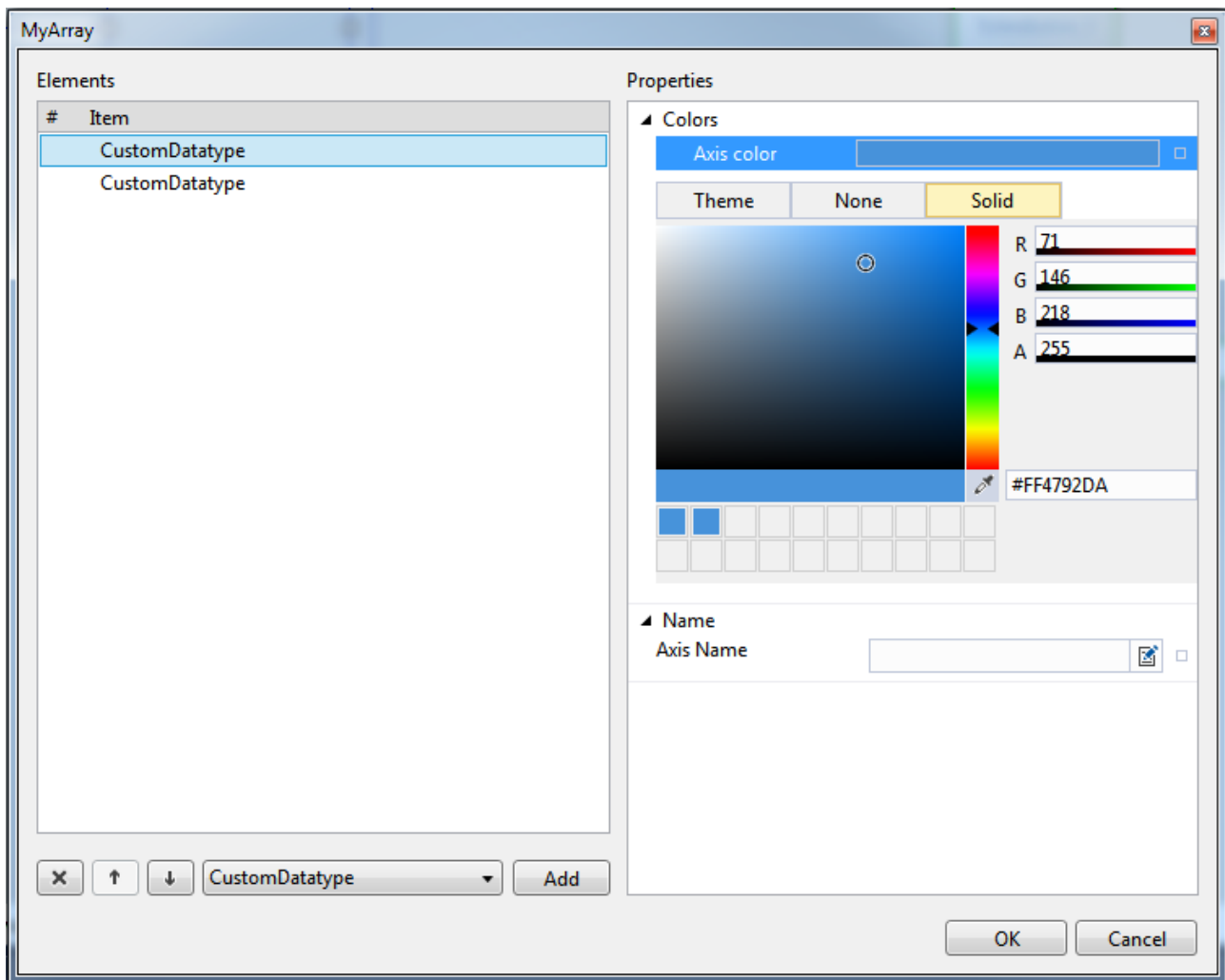
Complex data types are specified in the property "items" under the reference property "\$ref". The following schema defines an array of objects of data type "CustomDatatype". This data type was previously implemented as [Object \[► 1515\]](#).

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "MyArray": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "title": "MyArray",
      "type": "array",
      "items": {
        "$ref": "tchmi:framework#/definitions/CustomDatatype"
      }
    }
  }
}
```

Furthermore, it is possible to describe the object directly within the array definition. The following schema describes the same array with the definition of the object within the property "items".

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "MyArrayInlineObject": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "title": "MyArrayInlineObject",
      "type": "array",
      "items": {
        "type": "object",
        "title": "CustomObject",
        "description": "Defines a custom object in the array.",
        "propertiesMeta": [
          {
            "name": "axisName",
            "category": "Name",
            "displayName": "Axis Name",
            "displayPriority": 10,
            "description": "",
            "defaultValue": null,
            "defaultValueInternal": null
          },
          {
            "name": "axisColor",
            "category": "Colors",
            "displayName": "Axis color",
            "displayPriority": 10,
            "description": "",
            "defaultValue": null,
            "defaultValueInternal": {
              "color": "#4794da"
            }
          }
        ],
        "properties": {
          "axisName": {
            "type": "string"
          },
          "axisColor": {
            "$ref": "tchmi:framework#/definitions/SolidColor"
          }
        },
        "required": [ "axisName" ]
      }
    }
  }
}
```

Both schema files generate the following generic data editor in Engineering.

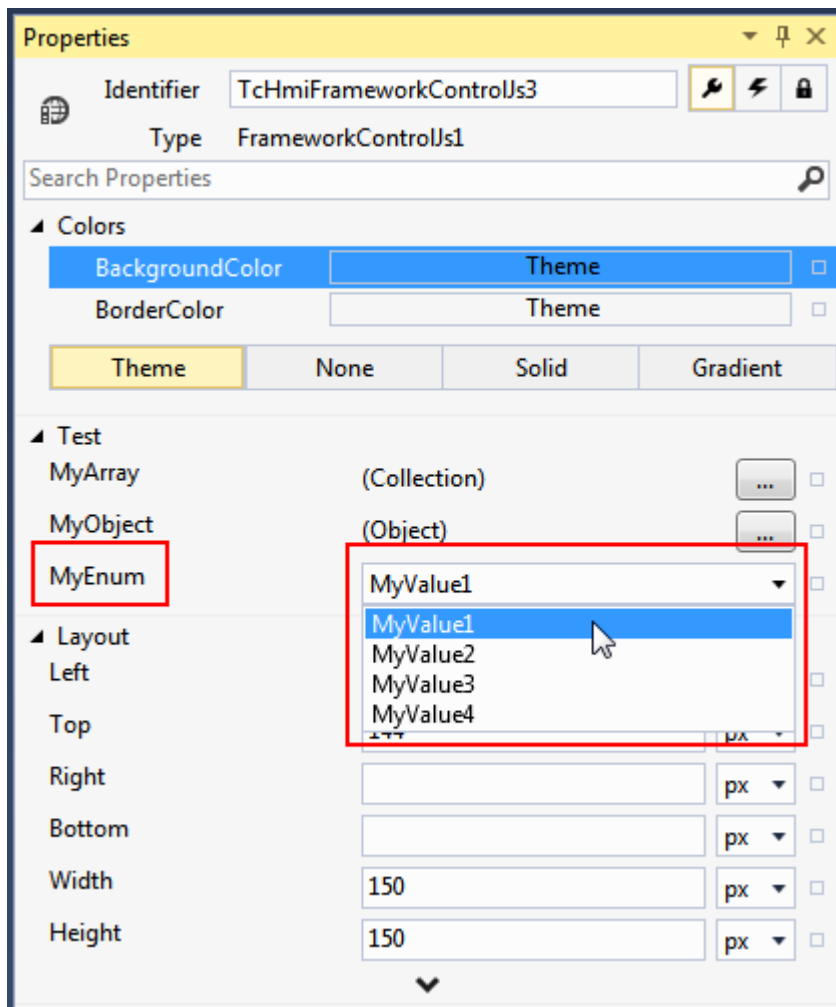


#### 14.2.1.1.4.5.2.3 Enumerations

Enumerations can contain any elements for the data type string. In the Engineering, enumerations are not displayed in the generic data editor, but in the combo box in the Properties window. The permissible values of the enumeration are defined in the property "enum" in an array. The following schema defines an exemplary enumeration.

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "MyEnum": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "title": "MyEnum",
      "type": "string",
      "enum": [ "MyValue1", "MyValue2", "MyValue3", "MyValue4" ]
    }
  }
}
```

This results in the following display in Engineering.



#### 14.2.1.1.4.5.2.4 Restrict permitted data types

User-specific data types can be restricted so that only certain data types can be transferred. As a result, when creating a [binding](#) ([▶ 108](#)) only the symbols corresponding to the permitted data types are displayed.

The following schema defines an exemplary restriction of permissible values (`oneOf`). Only values that have the data type "Time" or "TimeSpan" are permitted.

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "MyConstrainedDatatype": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "oneOf": [
        {
          "title": "Time",
          "$ref": "tchmi:general#/definitions/DateTime"
        },
        {
          "title": "Timespan",
          "$ref": "tchmi:general#/definitions/TimeSpan"
        }
      ]
    }
  }
}
```

The display in Engineering is normally an attribute. However, only bindings to symbols that correspond to the permitted data types can be created.

#### 14.2.1.1.4.6 Manifest.json

The Manifest.json file contains optional information that can be set to create a TwinCAT HMI package. The information is placed under the metadata and generated automatically when the project is created.

```
"metadata": {
  "industrialField": "",
  "packageType": "FrameworkExtPrj",
  "id": "FrameworkControlJs1",
  "version": "1.0.0.0",
  "guid": "7001c40b-7081-4c53-8496-f416efe212b9",
  "configurationName": "",
  "platformName": "",
  "creationTime": 1520610054,
  "authors": "",
  "owners": "",
  "summary": "",
  "licenseUrl": "",
  "projectUrl": "",
  "iconUrl": "",
  "requireLicenseAcceptance": false,
  "description": "",
  "releaseNotes": "",
  "copyright": "",
  "tags": "",
  "dependencies": [],
  "references": []
}
```



For creating a package, the version number must match the [version number \[► 1483\]](#) in [Description.json \[► 1481\]](#).

### 14.2.2 current version



Note that there may be small differences in behavior between different versions.

#### Differences between version 1.10 and version 1.12

From version 1.12, multiple control classes can exist with the same type name. An additional namespace has been added to differentiate between them. For example, the control types

`TcHmi.Controls.BaseTemplate.TcHmiBreadcrumb` and

`TcHmi.Controls.ResponsiveNavigation.TcHmiBreadcrumb` are supplied. All APIs that expect a control type as input (such as `TcHmi.ControlFactory.createEx`) can be called with the old or new form.

However, the API `getType` of all controls had to be changed. In version 1.8 and 1.10 a standard button returned `tchmi-button` as result whereas from version 1.12 on the full qualified name

`TcHmi.Controls.Beckhoff.TcHmiButton` is returned.

If you check for the type in your own source code, you may have to adapt it to the new format.

#### 14.2.2.1 Framework project

A framework project can combine [different contents \[► 1529\]](#) such as controls, functions, JavaScript libraries, CSS files or even images to form a package. This can be used as [NuGet package \[► 1522\]](#) (once or multiple times) or passed on.



Available from version 1.12.742.0

### 14.2.2.1.1 Introduction

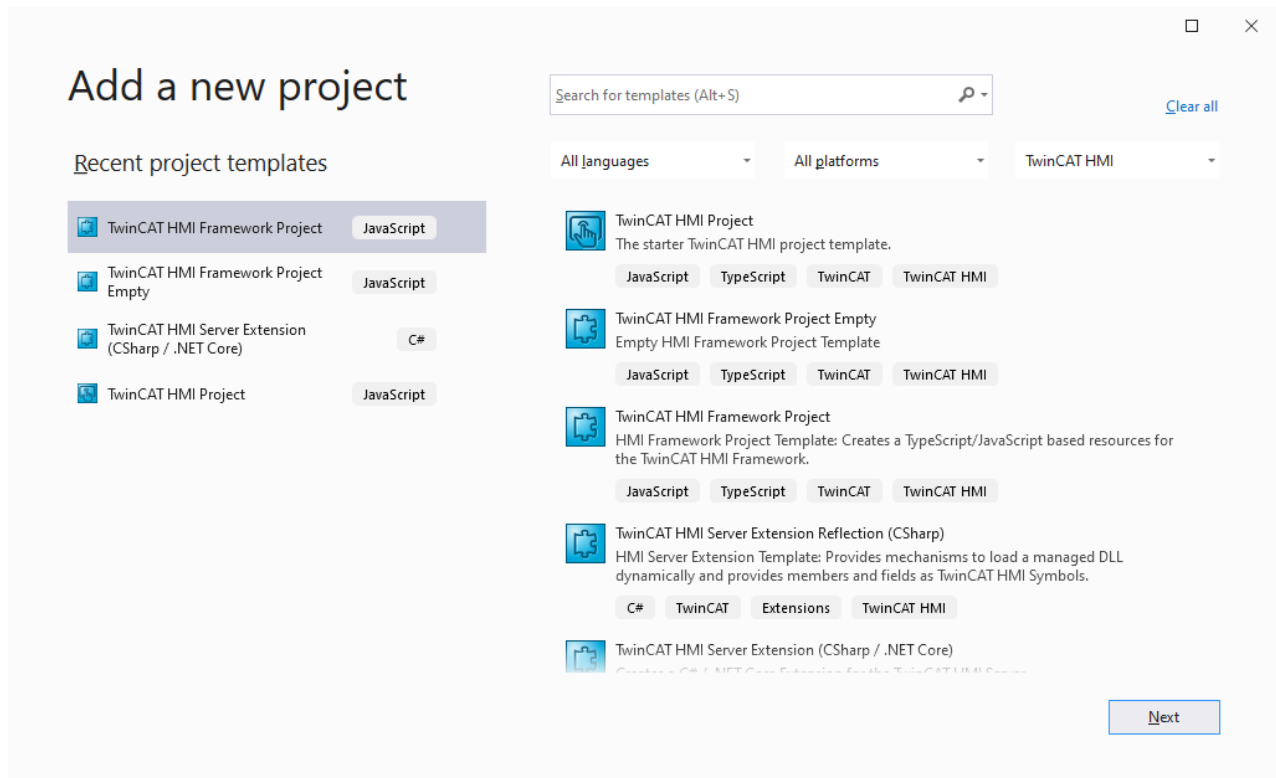
An HMI project can be extended with UserControls, functions and Code-Behind. However, resources defined there can only be used in one project.

The framework project offers a supplement in which many different components [► 1529] are encapsulated together. These can be full controls, functions, CSS files or JavaScript libraries.

This content can still simply be passed on. See Integrating a project [► 1522].

### 14.2.2.1.2 Build Project

Open Visual Studio and click **Add new project**.



TwinCAT HMI offers two different project templates for framework projects. The "TwinCAT HMI Framework Project" contains a control [► 1530], whereas the "TwinCAT HMI Framework Project Empty" does not.

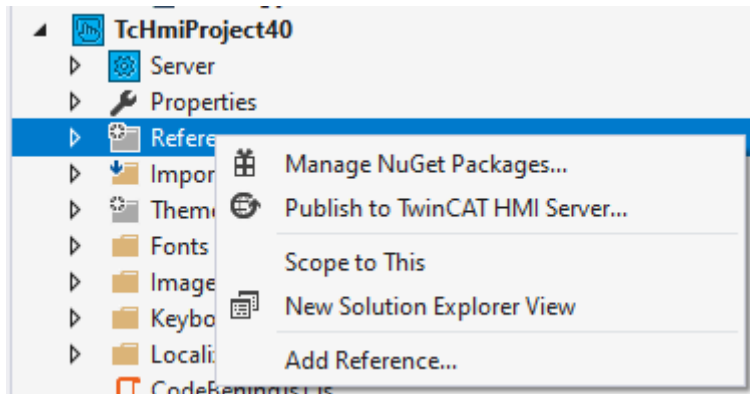
In both projects, any number of control, functions [► 1578] or other components [► 1529] can be stored and adapted to your requirements.

The project can then be integrated [► 1522] directly as a reference or as a NuGet package in a TwinCAT HMI project.

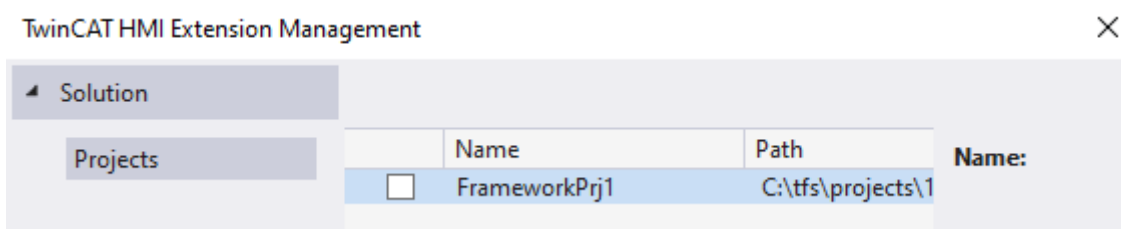
### 14.2.2.1.3 Integrating a project

The content of a framework project can be referenced in an HMI project in the same Visual Studio solution or exported as a NuGet package. As a package it can be imported several times into different projects and thus reused.

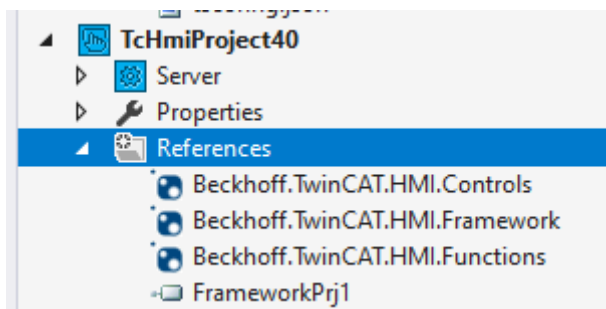
## Integration via reference



For integration via a reference select "Add Reference...". This opens a dialog in which all framework projects within the same solution are listed:



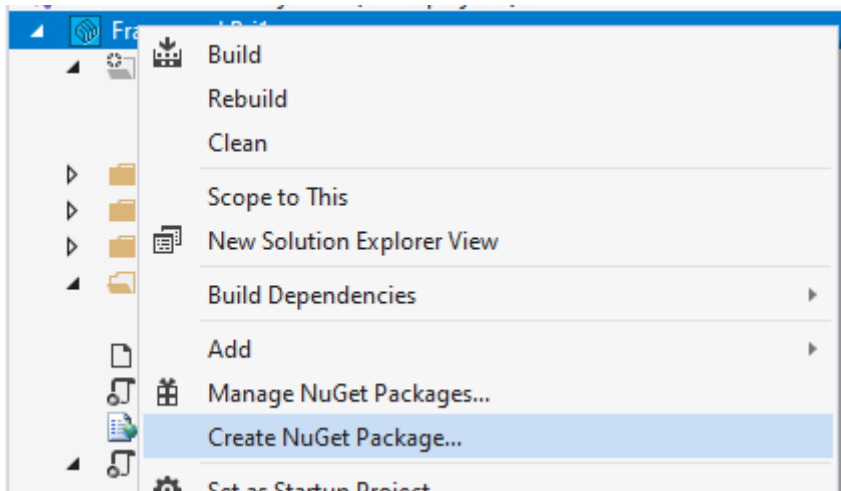
If the project was selected with the checkbox, it is shown under References in the HMI project:



When the framework project is built, the HMI project recognizes this and updates the controls and other files from the referenced project.

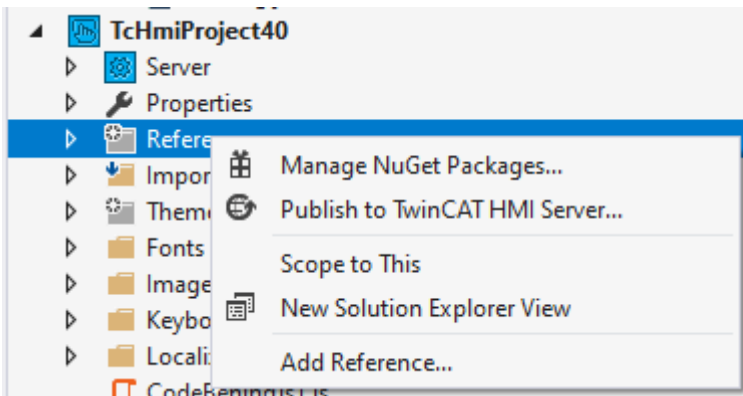
## Integration via NuGet package

Before the current content can be integrated, it must be created as a NuGet package. This can easily be done via the menu item "Create NuGet Package ...":

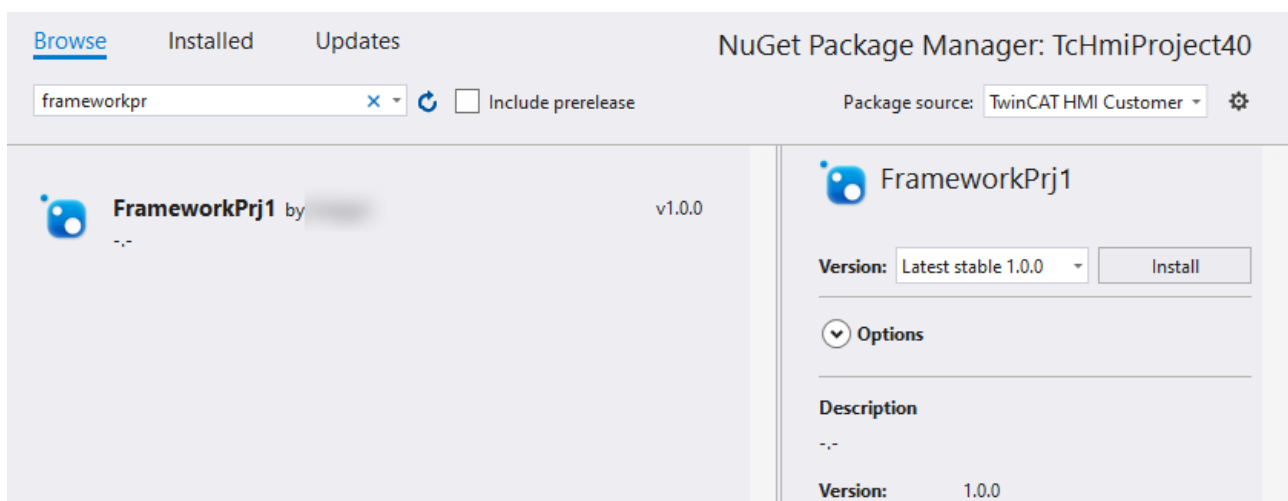


The package is created in the directory `C:\TwinCAT\Functions\TE2000-HMI-Engineering\References`. In Visual Studio this directory is known as "TwinCAT HMI Customer". The file name is generated from the package name and its version number. Both can be set in the [nuspec file](#) [p. 1526].

To integrate the created file into an HMI project, select "Manage NuGet Packages ...":

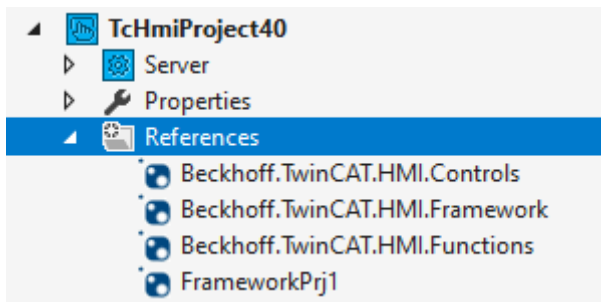


Here, "TwinCAT HMI Customer" is selected on the right-hand side of the NuGet Package Manager, and the new package can be seen in the "Browse" tab.



If the package was selected with "Install", it is shown under References in the HMI project:

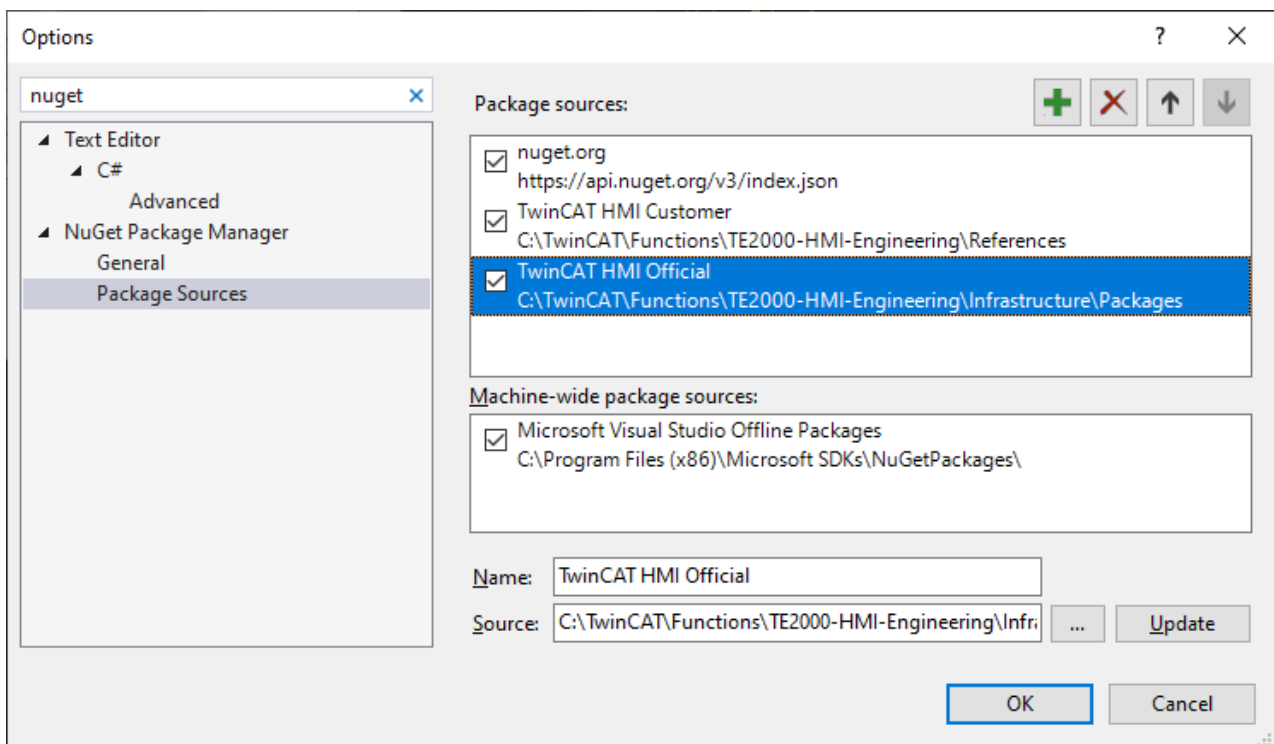




### Passing on NuGet packages

Since the package forms a closed unit, it can also be passed on as a file. Different options are available.

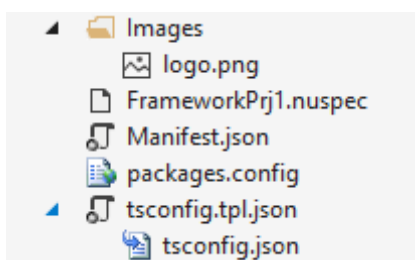
- Direct file transfer: To this end the file must be copied to the directory `C:\TwinCAT\Functions\TE2000-HMI-Engineering\References` on the target computer. It is then available for selection in the NuGet Package Manager.
- A shared directory: In applications where packages are exchanged on a regular basis, additional directories can be defined as package sources. The setting for this can be found in the Visual Studio options under NuGet Package Manager/Package Sources:



- Furthermore it is possible to make the packages available in the public NuGet gallery at [nuget.org](https://www.nuget.org).

#### 14.2.2.1.4 Structure

All framework projects need certain files. These are available by default for a new project:



- The folder `Images` [► 1526] initially contains only a logo, which is used in the NuGet package.
- The `.nuspec` file [► 1526] contains metadata for creating a NuGet package. See also the notes in the chapter on [Integrating a project](#) [► 1522]
- `Manifest.json` [► 1527] contains a list of resources stored in the framework project.
- `packages.config` [► 1528] contains information on which NuGet packages the framework project itself references.
- The file `tsconfig.tpl.json` [► 1528] configures the TypeScript compiler.

Furthermore, any number of `controls` [► 1529] are possible. These must each be created in a separate folder.

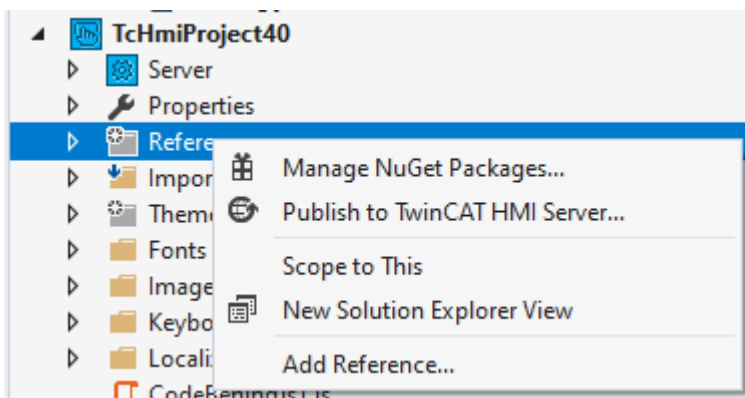
`Functions` [► 1578], `JavaScript` [► 1529] and `CSS files` [► 1529] on the other hand can be created without subfolders and simply have to be referenced accordingly in the `Manifest.json` file.

#### 14.2.2.1.4.1 References

A framework project can use content from other NuGet packages.

If, for example, an `TcHmiButton` [► 175] is to be created in a control factory, the NuGet package `Beckhoff.TwinCAT.HMI.Controls` must be integrated (and the control must be added to `tsconfig.tpl.json` [► 1528]).

Select **Manage NuGet Packages** from the context menu in the References node.



Select the required package in the **Browse** tab. It may be necessary to adapt the source in the **Package source** drop-down box. **TwinCAT HMI Official** contains a list of all packages that are provided with the TwinCAT HMI setup. **TwinCAT HMI Customer** contains all packages that were created on this computer.

#### 14.2.2.1.4.2 Images

This directory contains the logo of the NuGet package.

However, a package can also contain images for the gallery of the HMI project. This option is described for the components under [Images](#) [► 1529].

#### 14.2.2.1.4.3 Project.nuspec

This file contains metadata for creating a NuGet package. Note the following important entries:

- `id`: Denotes the full name of the package. The name must be unique in the respective repository (on the computer or at `nuget.org`, if required). Namespace-like names can be separated with a dot. To avoid conflicts, the company name can be used as the first part, for example. See example `Beckhoff.TwinCAT.HMI.PDFViewer`
- `version`: NuGet supports version numbers with three components (e.g. 1.2.1). Furthermore, a name suffix is common for pre-release versions (1.2.1-beta). If an HMI project is opened and a higher version number is found, you will be notified of the update option.

- **dependencies:** This is where package dependencies are defined. At least `Beckhoff.TwinCAT.HMI.Framework` should have an entry here. See also [References](#) [► 1526].
- **files:** This entry determines which files should be included in the package. Here you can specify single files or multiple files.

See also the official documentation:

<https://docs.microsoft.com/en-us/nuget/reference/nuspec>

#### 14.2.2.1.4.4 Manifest.json

This file is the main file of each framework project or package. All components and their dependencies are documented here.

Possible components are:

- **Package:** This entry references a specific NuGet package as a dependency by its name in `nugetId`. If, for example, a `TcHmiButton` (from `Beckhoff.TwinCAT.HMI.Controls`) is used in its own package, `Beckhoff.TwinCAT.HMI.Framework` does not have to be referenced additionally, since this is already done in the controls package.
- **Function:** This registers a [function](#) [► 1578] from this package in the system. The function directory (`basePath`) is specified for this. The name of the function description file is specified as `descriptionFile`.
- **Resource:** Two resource types can be included, [JavaScript](#) [► 1529] files and [CSS](#) [► 1529] files. The embedding process is carried out in the correct order. A CSS resource, which is located between two controls in the manifest file, is therefore also included between the CSS files of these two controls. For CSS files, a theme name can also be specified (since version 1.12.752.0). In this case, the file will only be included if a theme with the corresponding name is active, similar to what is possible with [control CSS files](#) [► 1535].
- **Control:** This registers a [control](#) [► 1529] from this package in the system. The control directory (`basePath`) is specified for this. The name of the control description file, `Description.json`, should not be changed.

Furthermore, you can use the entry `toolboxCategory` to define where a control appears in the VisualStudio toolbar.

- `Beckhoff.TwinCAT.HMI:200` is stored in the **System** category.
- `Beckhoff.TwinCAT.HMI:201` is stored in the **Beckhoff** category.
- `Beckhoff.TwinCAT.HMI:202` is stored in the **3rd party** category.
- `Beckhoff.TwinCAT.HMI:203` is stored in the **Legacy (1.10)** category.
- You can create your own entries via `provideMetadata` (also for multiple languages in Visual Studio). See example below.
- If no category is defined here, the name of the project itself is used as the category.

#### Sample

```
{
  "apiVersion": 1,
  "modules": [
    {
      "type": "Package",
      "nugetId": "Beckhoff.TwinCAT.HMI.Framework"
    },
    {
      "type": "Function",
      "basePath": "myFunction/",
      "descriptionFile": "myFunction.function.json"
    },
    {
      "type": "Resource",
      "path": "customHelpers.js"
    },
    {

```

```

        "type": "Control",
        "basePath": "Control1/",
        "descriptionFile": "Description.json",
        "toolboxCategory": "MyIdentifier:200"
    },
    {
        "type": "Resource",
        "path": "PackageStyle.css"
    },
    {
        "type": "Resource",
        "path": "PackageBaseThemeStyle.css",
        "theme": "Base",
    },
    {
        "type": "Control",
        "basePath": "Control2/",
        "descriptionFile": "Description.json",
        "toolboxCategory": "MyIdentifier:201"
    }
],
"provideMetadata": {
    "toolbox": {
        "MyIdentifier": {
            "200": "FrameworkPrj1",
            "201": {
                "default": "Bühnentechnik",
                "de-DE": "Bühnentechnik",
                "en-US": "Stagecraft",
                "it-IT": "Scenotecnica",
                "nl-NL": "Theatertechniek"
            }
        }
    }
},
"$schema": ".\\hmiframework\\Schema\\Manifest.Schema.json"
}

```

#### 14.2.2.1.4.5 packages.config

This file contains information on which NuGet packages the framework project itself references. The version number range with which the packages must comply is also specified here.

See also the official documentation:

<https://docs.microsoft.com/en-us/nuget/reference/packages-config>

#### 14.2.2.1.4.6 tsconfig.tpl.json

All options of the TypeScript compiler are set in `tsconfig.json`. This checks whether API calls are used correctly, for example.

Type definitions for jQuery, the framework and the controls are required to analyze the source code. These are provided with the NuGet packages. Since these paths are not always in the same place, the user only edits this template file. Visual Studio uses this to create the correct `tsconfig.json`.

#### compilerOptions

The default is a standard set of options in the section `compilerOptions`. These can be changed. However, it is possible that subsequently a project can no longer be built or no longer works in all browsers.

See the official documentation: <https://www.typescriptlang.org/docs/handbook/tsconfig-json.html>

#### include

Type definitions for APIs that do not come from the browser itself are integrated in the section `include`. The entry

```
"$(Beckhoff.TwinCAT.HMI.Framework).InstallPath\\TcHmi.d.ts"
```

that references jQuery, framework and the system controls is essential. If, for example, an `TcHmiButton` [► 175] is to be created in a control factory, the NuGet package `Beckhoff.TwinCAT.HMI.Controls` must be integrated and this line must be added:

```
"$(Beckhoff.TwinCAT.HMI.Controls).InstallPath/TcHmiButton/TcHmiButton.d.ts"
```

## files

Under Files, all TypeScript files to be compiled by the TypeScript compiler must be included individually and in the correct order. New files for functions or controls are automatically added here, but manual intervention may also be necessary.

The TypeScript compiler then creates JavaScript files with the same base name and the extension `.js` instead of `.ts`. This should be entered under Controls [► 1530] in description.json [► 1534], for example.

### 14.2.2.1.5 Components

A framework project/package may include a number of components. Most of these components require a reference in Manifest.json [► 1527].

Furthermore, a framework package can provide additions to the image gallery.

#### 14.2.2.1.5.1 Controls

Creating your own controls is probably the most common use case for a framework project. This is described in detail in a special section of the documentation [► 1530].

#### 14.2.2.1.5.2 Functions

The HMI can be flexibly extended with HMI functions. These can also be created in a framework project. This is described in detail in a special section of the documentation [► 1578].

#### 14.2.2.1.5.3 Stylesheets

A framework project can contain any number of stylesheet files (which may be independent of controls). This is useful for common styles of controls within a project, for example.

Any file that has its own entry in the Manifest.json [► 1527] file is integrated in the browser accordingly. The embedding process is carried out in the correct order. A CSS file, which is located between two controls [► 1530] in the manifest file, is therefore also included between the CSS files of these two controls.

#### 14.2.2.1.5.4 JS libraries / Code-Behind

A framework project can contain any number of JavaScript files (which may be independent of controls or functions). This is useful for external libraries, for example.

Any file that has a separate entry in the Manifest.json [► 1527] file is available in the browser (and therefore to all controls).

#### 14.2.2.1.5.5 Images

A NuGet package may include images that appear directly in the Gallery Explorer [► 957]. To do this, the files in the NuGet package must be stored in the special folder `{gallery}` folder. They should be stored in the `ImageLibrary` directory and then referenced in the nuspec file [► 1526]:

```
<file src="ImageLibrary\*" target="tools\native1.12-tchmi\{gallery}\"/>
```

## 14.2.2.2 Controls

Starting with version 1.12, controls are always created in a framework project. The framework project can store several controls in encapsulated form. Other options include functions and further resources. See [Framework project](#) [► 1521]

### 14.2.2.2.1 Introduction

Framework controls are user-specific controls that are not created with the graphical [WYSIWYG editor](#) [► 36]. Framework controls are used if the desired behavior cannot be mapped with the standard controls or a user control. Unlike a [Code Behind file](#) [► 1473], a framework control can be used independently of the HMI project, so that the source code can be reused.

Each control must have a reference in [Manifest.json](#) [► 1527] within a framework package in order to be able to use it.

#### Technology

Framework controls are developed using web development tools.

- HTML: Type and structure of the elements of the framework control
- CSS: Design of the elements of the framework control
- TypeScript/JavaScript: Logic behind the elements of the framework control

Developers are no longer bound to the TwinCAT HMI controls and can use all the elements and functionalities they are already familiar with from web development within a framework control. The standard TwinCAT HMI controls are implemented on the same basis as a framework control. It is also possible to reuse the TwinCAT HMI controls in the framework control or to add user-specific properties.

#### Application scenarios

Framework controls can map customer-specific and application-specific requirements. The following use cases can be implemented with a framework control:

- Mapping of complex TypeScript/JavaScript logic
- Reusing HTML, JS and CSS in a control
- Dynamic elements: Adding and removing HTML elements and controls at runtime
- Developing responsive controls
- Realizing and integrating 3D models

#### Use

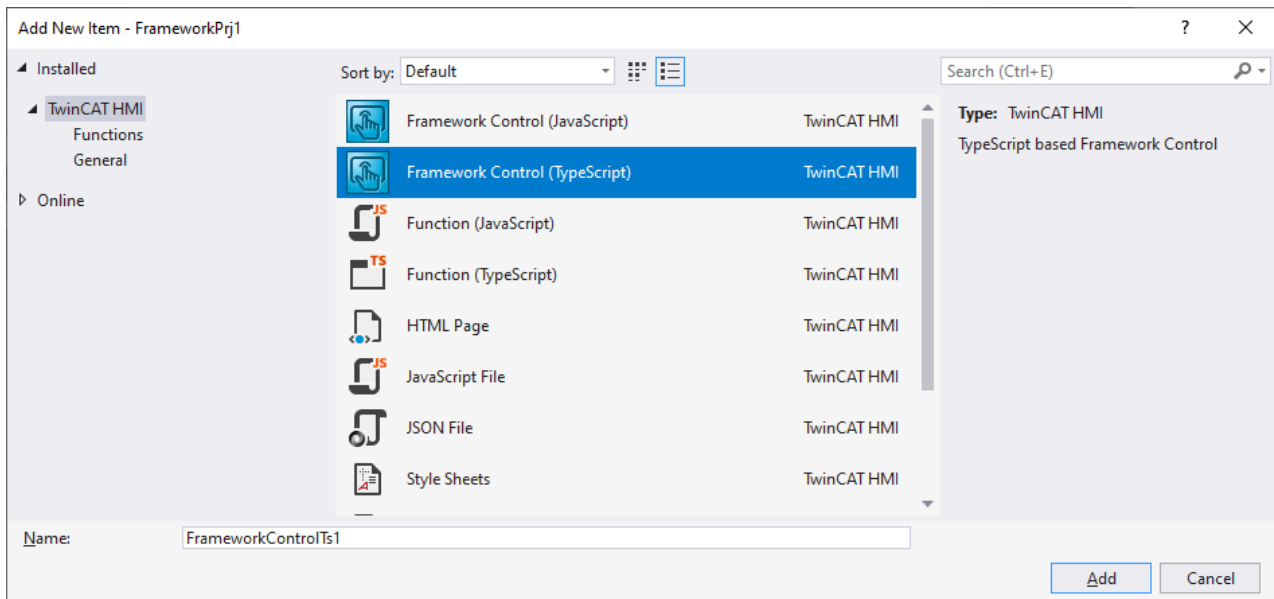
The framework controls form part of a framework project and can be integrated directly as [references](#) [► 1522] in a TwinCAT HMI project if both projects are in the same Solution. Furthermore, it is possible to export the framework project as a [NuGet package](#) [► 1522] and install it in different HMI projects. In this way, it is possible to implement application-specific control libraries. Within the HMI project, a framework control is used like a standard TwinCAT HMI control.

### 14.2.2.2.2 Creating a control

A framework project can contain any number of controls. Each control is stored in its own folder, along with all associated files.

A control can be created based on TypeScript or JavaScript. Both have the same technical options and are very similar in terms of programming. Due to the better programming support offered by Visual Studio, TypeScript should be selected for new controls.

To create a new control, right-click on the destination folder in the context menu and select **Add new Item**.



A new folder is then created with the chosen name. This folder contains all the important files of a control.

The control is still automatically entered in the [Manifest.json](#) [► 1527] file.

It then becomes part of the project and can be used as a project reference or NuGet package, for example. See [Integrating a project](#) [► 1522].

### 14.2.2.2.3 Structure

A framework control consists of a series of files. Most of these files are created automatically when a control is created and filled with a base structure.

Each usable control of a framework project must be referenced in [Manifest.json](#) [► 1527].

This section is intended to serve as a reference for these file contents.

#### 14.2.2.2.3.1 Description.json

This section describes the structure of the description file [Description.json](#).



Any changes in [Description.json](#) must be followed by a project build (see [Build Project](#) [► 1522]).

##### 14.2.2.2.3.1.1 Introduction

TwinCAT HMI Engineering reads all properties of the control from the [Description.json](#) file. The properties allow you to transfer data to the control and vice versa. In TwinCAT HMI Engineering, the control can be configured via the [Properties window](#) [► 60] or via the [Actions and Conditions Editor](#) [► 61]. The developer can define additional attributes, besides the standard attributes of each framework control.

In many cases the following user-specific properties are defined in [Description.json](#):

- [Attributes](#) [► 1536] (data interfaces)
- [Functions](#) [► 1543]
- [Events](#) [► 1544]
- [Access rights](#) [► 1546]
- [User-specific data types](#) [► 1546]

### 14.2.2.2.3.1.2 *Properties*

**Type:** Specifies the data type of the property.

**Required:** Specifies whether the property is required for the framework control (yes) or is optional (no).

#### 14.2.2.2.3.1.2.1 **\$schema**

**Type:** String (relative path)

**Required:** No

```
"$schema": "../hmiframework/Schema/ControlDescription.Schema.json"
```

This property references the JSON schema that describes the structure of Description.json. The schema is in a special folder of the framework control project. It is provided and updated by the NuGet package `Beckhoff.TwinCAT.HMI.Framework`. Including the JSON schema enables Intellisense in Visual Studio for each property.

#### 14.2.2.2.3.1.2.2 **name**

**Type:** String

**Required:** Yes

```
"name": "FrameworkPrj1Control"
```

This property is the name of the framework control, which is automatically generated. The name (extended by the [namespace](#) [► 1532]) is added to the control as CSS class and can be used within the [CSS files](#) [► 1549] in the framework control project to describe the styles.

#### 14.2.2.2.3.1.2.3 **namespace**

**Type:** String

**Required:** Yes

```
"name": "TcHmi.Controls.FrameworkPrj1"
```

This property is the namespace of the framework control, which is automatically generated based on the project name. The name (extended by the [name](#) [► 1532]) is added to the control as CSS class and can be used within the [CSS files](#) [► 1549] in the framework control project to describe the styles.

#### 14.2.2.2.3.1.2.4 **displayName**

**Type:** String

**Required:** Yes

```
"displayName": "FrameworkControlJs1"
```

This property is the name of the control that is displayed as the control name in the Engineering.

#### 14.2.2.2.3.1.2.5 **version**

**Type:** JSON object

**Required:** Yes

```
"version": {  
  "full": "1.0.0.0",  
  "major": 1,  
  "minor": 0,  
  "revision": 0,  
  "build": 0  
}
```

This property is the version number of the framework control that is used for versioning a framework control. The version number is subdivided into the major release number, minor release number, revision number and build number.



#### 14.2.2.2.3.1.2.6 visible

**Type:** Boolean

**Required:** Yes

```
"visible": true
```

This property makes the control visible or hides it in the toolbox in the Engineering. By default, a control is always displayed in the toolbox.

#### 14.2.2.2.3.1.2.7 themeable

**Type:** Enum string

**Required:** No

```
"themeable": "Standard"
```

This property determines whether the control is displayed in the [theme editor](#) [[1007](#)] within in the TwinCAT HMI Engineering.

Permissible values:

- **Standard:** The control is displayed in the theme editor.
- **None:** The control is not displayed in the theme editor.
- **Advanced:** The control is only displayed in the theme editor if the "Advanced" property is enabled in the theme editor.

#### 14.2.2.2.3.1.2.8 base

**Type:** String

**Required:** Yes

```
"base": "TcHmi.Controls.System.TcHmiControl"
```

This property determines whether the control inherits the properties of another control. By default, a framework control inherits all properties of Description.json of the base control `TcHmi.Controls.System.TcHmiControl`, which defines a base framework for all TwinCAT HMI controls. The control can be made to inherit from other controls, such as a button, if a particular control is to be extended. The control name that must be specified here corresponds to the [control type](#) [[1532](#)] including its [namespace](#) [[1532](#)], which are defined in Description.json.



##### Validity

This property must refer to a valid control and must not have the value `null`, otherwise the control can no longer be used in the Engineering.

#### 14.2.2.2.3.1.2.9 template

**Type:** String

**Required:** No

```
"base": "Template.html"
```

This property defines whether the system should automatically create an HTML subtree for the control.

For further details please refer to the [description of the template file](#) [[1547](#)].

#### 14.2.2.2.3.1.2.10 description

**Type:** String

**Required:** Yes

```
"description": "This description text will be used as a Tooltip in Visual Studio."
```

This property is the description of the control and is displayed as a tooltip when the mouse is moved over the control in the toolbox.

#### 14.2.2.2.3.1.2.11 defaultDesignerEvent

**Type:** String

**Required:** No

```
"defaultDesignerEvent": ""
```

This property determines which event is to be configured when the control is double-clicked in the [Actions and Conditions Editor](#) [► 61]. By default (no entry or empty entry), no editor is opened on double-clicking.

All standard and custom events defined in Description.json can be used here. The following listing shows an example of a custom event:

```
"defaultDesignerEvent": ".onMyCustomEvent"
```

Custom events are defined under [events](#) [► 1544].

#### 14.2.2.2.3.1.2.12 properties

**Type:** JSON object

**Required:** Yes

```
"properties": {
  "containerControl": false,
  "geometry": {
    "width": 150,
    "height": 150
  }
}
```

This property defines the engineering properties required for each framework control and describes general control properties.

- `containerControl` {Boolean}, *not required*: Specifies whether the control is a container control and can include additional controls using drag and drop. In this case, the control must also be [derived](#) [► 1533] (directly or indirectly) from `TcHmiContainerControl`.
- `geometry` {JSON object}: Defines the default geometry properties (width and height) of the control, which are set after dropping the control from the toolbox.

#### 14.2.2.2.3.1.2.13 icons

**Type:** Array of JSON objects

**Required:** Yes

```
"icons": [
  {
    "name": "Icons/16x16.png",
    "width": 16,
    "height": 16
  }
]
```

This property defines the icon of the control in different dimensions. The array contains JSON objects, where each object corresponds to a control icon in a different resolution. The control icon is used to display the control in the toolbox of the Engineering and the Actions and Conditions Editor.

The name is specified as a relative project path. The dimensions (width/height) are specified in pixels.

#### 14.2.2.2.3.1.2.14 dependencyFiles

**Type:** Array of JSON objects

**Required:** Yes

```
"dependencyFiles": [
  {
    "name": "Control.js",
    "type": "JavaScript",
    "description": ""
  },
]
```

```
{
  "name": "Style.css",
  "type": "Stylesheet",
  "description": "Theme independent style"
}
```

This property contains all files of the framework control that must be included in the HTML file of the HMI. By default, the Control.js and Style.css files are included. If additional JavaScript or stylesheet files are included in the control, they must be referenced under "dependencyFiles".

The array contains JSON objects that contain information about the file:

- name {string}: file name and file extension with the relative project path to the file.
- type {string}: File type (JavaScript or Stylesheet)
- description {string}: Optional file description.



Theme-dependent stylesheet files are not included under "dependencyFiles", but under "[themes](#) [[1535](#)]".



Even if the control is created via TypeScript, the compiled JavaScript file must be referenced here.

#### 14.2.2.2.3.1.2.15 themes

**Type:** JSON object of JSON objects

**Required:** No

```
"themes": {
  "Base": {
    "resources": [
      {
        "name": "Themes/Base/Style.css",
        "type": "Stylesheet",
        "description": ""
      }
    ]
  }
}
```

This property contains all themes that are included in the control. By default, the base theme is included with a stylesheet file. A theme is an object containing the array "resources". The array "resources" contains all the files that are allocated to a theme.

A "resource" object contains the same properties as a "[dependencyFile](#)" object [[1534](#)], with other allowed values for "type":

- name {string}: file name and file extension with the relative project path to the file.
- type {string}: file type (Stylesheet or ThemedValues, see [Theming](#) [[1005](#)]).
- description {string}: Optional file description.



Images and fonts etc. are not included under the theme resources, but referenced via the stylesheet file (see [Theming](#) [[1005](#)]).

The following listing illustrates the inclusion of another theme with associated files:

```
"themes": {
  "Base": {
    "resources": [
      {
        "name": "Themes/Base/Style.css",
        "type": "Stylesheet",
        "description": ""
      }
    ]
  }
}
```

```

    ]
  },
  "Custom": {
    "resources": [
      {
        "name": "Themes/Custom/Style.css",
        "type": "Stylesheet",
        "description": ""
      },
      {
        "name": "Themes/Custom/MyTheme.theme",
        "type": "ThemedValues",
        "description": "This is a theme file."
      }
    ]
  }
}

```

#### 14.2.2.2.3.1.2.16 attributes

**Type:** Array of JSON objects (attributes)

**Required:** Yes

```

"attributes": [
  {
    "name": "data-tchmi-value",
    "propertyName": "Value",
    "propertySetterName": "setValue",
    "propertyGetterName": "getValue",
    "displayName": "Value",
    "visible": true,
    "themeable": "Standard",
    "displayPriority": 10,
    "type": "tchmi:general#/definitions/Boolean",
    "category": "Value",
    "description": "",
    "readOnly": false,
    "bindable": true,
    "heritable": true,
    "defaultValue": null,
    "defaultValueInternal": false
  }
]

```

The attributes define the data interfaces to the TwinCAT HMI Engineering. The attributes of the control are displayed in the Properties window of the Engineering under **Show Properties**. Any number of attributes can be defined in a control.

The individual properties of an attribute are described on the following pages.

**Type:** Indicates the data type of the property.

**Required:** Indicates whether the property is required for the attribute (yes) or can be used optionally (no).

##### 14.2.2.2.3.1.2.16.1 name

**Type:** String

**Required:** Yes

```
"name": "data-tchmi-value"
```

Name of the attribute. The name is written into the HTML code of the control as a "data-\*" attribute. Therefore, the "data-" prefix is mandatory. The subsequent prefix "tchmi-" before the attribute is recommended for standardizing attributes, but it is not obligatory. An attribute name may only be used once for each control, otherwise unambiguous assignment cannot be guaranteed.

##### 14.2.2.2.3.1.2.16.2 propertyName

**Type:** String

**Required:** Yes

```
"propertyName": "Value"
```

Internal attribute name of the control. The internal attribute name is formed from the attribute name without prefix in Pascal case.

Example:

```
"name": "data-tchmi-my-custom-value"
```

becomes: „MyCustomValue“.

For better assignment between JavaScript variables and attributes, it is recommended to name the attribute variable in the JavaScript/TypeScript code of Source.js according to the "propertyName".

#### 14.2.2.2.3.1.2.16.3 propertyName

**Type:** String

**Required:** Yes

```
"propertyName": "setValue"
```

This property creates the reference to the setter function in Source.js. The setter function allows a new value to be set. For the reference between Description.json and Source.js, the setter function must have the same name as the "propertyName". If the names in Description.json and Source.js/ts are different, an error message appears in the browser console and the setter function cannot be used.

The recommended notation for the setter name is the "propertyName" plus the prefix "set" in Camel case.

If an attribute is read only [► 1540], the empty string should be entered as propertyName.

#### 14.2.2.2.3.1.2.16.4 propertyGetterName

**Type:** String

**Required:** Yes

```
"propertyGetterName": "getValue"
```

This property creates the reference to the getter function in Source.js/ts. The getter function returns the attribute value when called. For the reference between Description.json and Source.js, the getter function must have the same name as the "propertyGetterName". If the names in Description.json and Source.js/ts are different, an error message appears in the browser console and the getter function cannot be used.

The recommended notation for the getter name is the "propertyName" plus the prefix "get" in Camel case.

#### 14.2.2.2.3.1.2.16.5 displayName

**Type:** String

**Required:** Yes

```
"displayName": "Value"
```

The property is the name of the attribute displayed in the Engineering Properties window for the attribute. You can choose any "displayName".



It is recommended that the "displayName" is based on the "propertyName".

---

#### 14.2.2.2.3.1.2.16.6 refTo

**Type:** String

**Required:** No

```
"refTo": "basePropertyName"
```

Name of a PropertyName of the control. This attribute references another attribute.

This is used to write the physical unit (pixel or percent) in the development environment next to the numeric value.

#### 14.2.2.2.3.1.2.16.7 searchTerms

**Type:** Array of strings

**Required:** No

```
"searchTerms": [  
  "Shortcut1",  
  "ShortCut2",  
  "Shortcut3"  
]
```

This property defines a list of search terms for Engineering to optimize the search function within the Actions and Conditions Editor and the Properties window. This makes it possible to find the attribute using terms other than the attribute name.

#### 14.2.2.2.3.1.2.16.8 visible

**Type:** Boolean

**Required:** No

```
"visible": true
```

This property determines whether the attribute is to be displayed in the Engineering. If the property is set to "false", the attribute is not available in the Engineering. By default, all attributes are displayed in the Engineering.

#### 14.2.2.2.3.1.2.16.9 themeable

**Type:** Enum string

**Required:** No

```
"themeable": "Standard"
```

This property determines whether the attribute is displayed in the theme editor in the Engineering.

Permissible values:

- Standard: The attribute is displayed in the theme editor.
- None: The attribute is not displayed in the theme editor.
- Advanced: The attribute is only displayed in the theme editor if the "Advanced" property is activated in the theme editor.

#### 14.2.2.2.3.1.2.16.1 type

0

**Type:** String (TcHmi data type)

**Required:** Yes

```
"type": "tchmi:general#/definitions/Boolean"
```

This property indicates the data types of the attribute. All [data types of the TwinCAT HMI \[► 92\]](#) are available. Further user-specific data types can be defined (see [dataTypes \[► 1546\]](#)). The data type determines the display of the attribute in the Engineering Properties window (e.g. checkbox for a Boolean value).

#### 14.2.2.2.3.1.2.16.1 displayPriority

1

**Type:** Number

**Required:** No

```
"displayPriority": 10
```

This property determines the priority with which the attribute is displayed within the category in the Engineering Properties window. User-specific sorting of attributes is possible based on the priority. Attributes with the same priority are displayed according to the order in which they are defined. The prioritization of the attribute categories is set via the property "[attributCategories](#) [[► 1542](#)]".

- Values less than 10 have high priority and are displayed higher up in the category, according to the value.
- Values that equal 10 have main attributes like top, left etc.
- Values greater than 10 have low priority and are displayed lower down in the category, according to the value.
- Values greater than 50 are collapsed by default and have to be expanded using the arrow.

#### 14.2.2.2.3.1.2.16.1 allowedFunctions

2

**Type:** JSON object

**Required:** No

```
"allowedFunctions": {
  "returnType": "tchmi:general#/definitions/String",
  "requiredArguments": [
    {
      "type": "tchmi:general#/definitions/Number"
    }
  ],
  "requiredWaitMode": "Synchronous"
}
```

For attributes with the [data type](#) [[► 1538](#)]:

```
"type": "tchmi:framework#/definitions/Function"
```

These properties can only be used for "Function" type attributes.

This property determines which functions are allowed for the attribute. This means that when configuring the attribute, only those functions are displayed that meet the defined criteria.

A selected function may allow additional parameters. These parameters can be specified for each instance in engineering.

Attributes:

- `returnType` {string}: Determines which TwinCAT HMI data type may be returned by the function.
- `requiredArguments` {array of JSON objects}: Determines which TwinCAT HMI data types the functions may have as parameter values. The parameters mentioned here are set by the control.
- `requiredWaitMode` {enum string}: Determines in which mode (synchronous, asynchronous) the function may be executed (`Synchronous`, `Asynchronous`).

For example, one the Beckhoff controls that uses this property is [LinearGauge](#) [[► 432](#)], namely for the [ValueFormat](#) [[► 454](#)] in order to restrict the functions that can format the values of the gauge.

#### 14.2.2.2.3.1.2.16.1 category

3

**Type:** String

**Required:** No

```
"category": "Value"
```

This property indicates the category to which the attribute is assigned in the Engineering Properties window. New category names can be assigned or standard category names (e.g. Common) can be used. A new category name does not have to exist under the [Attribute categories](#) [[► 1542](#)], since the category is created independently of the attribute categories. The attribute categories are used to prioritize different attribute categories.

#### 14.2.2.2.3.1.2.16.1 description

4

**Type:** String**Required:** No

```
"description": "This description text will be used as a Tooltip in Visual Studio."
```

This property contains the description of the attribute, which is displayed as a tooltip when the mouse is moved over the attribute.

#### 14.2.2.2.3.1.2.16.1 requiredOnCompile

5

**Type:** Boolean**Required:** No

```
"requiredOnCompile": false
```

This property determines whether the attribute of the control is required when the HMI is compiled. If the attribute is required for the control and the property is not set, an error message is issued and the control is not valid. This property is normally not required for attributes of a framework control. An example of "requiredOnCompile" is the id of a control.

#### 14.2.2.2.3.1.2.16.1 readOnly

6

**Type:** Boolean**Required:** No

```
"readOnly": false
```

This property indicates whether the Engineering has write access to the attribute or only read access. By default, write access to an attribute is available. If `readOnly` is set to `true`, the attribute is no longer displayed in the Engineering Properties window, but it can still be used via the Actions and Conditions Editor.



For read only attributes, the [propertyName](#) [► 1537] is not required and can be replaced by an empty string.

#### 14.2.2.2.3.1.2.16.1 bindable

7

**Type:** Boolean**Required:** No

```
"bindable": true
```

This property indicates whether a [data Binding](#) [► 108] to the attribute can be created in the Engineering. By default, the property is `true`.

If the property is set to `false`, it is not possible to link symbols to the attribute. Nevertheless, this attribute can be used and read at another location.

#### 14.2.2.2.3.1.2.16.1 heritable

8

**Type:** Boolean**Required:** No

```
"heritable": true
```

This property indicates whether the attribute can be passed on to other control. By default, the property is `true`. If the property is set to `false`, it is not available in the derived control classes.



#### 14.2.2.2.3.1.2.16.1 allowSymbolExpressionsInObject

9

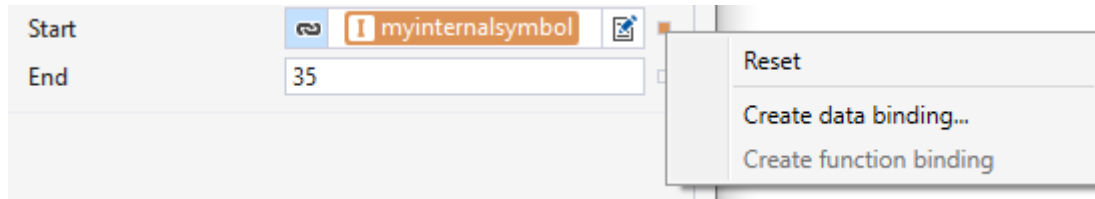
**Type:** Boolean

**Required:** No

```
"allowSymbolExpressionsInObject": false
```

This property specifies whether the [attribute setter \[► 1559\]](#) can process symbol expressions within an object. This setting is not relevant if the values of an attribute are not objects (e.g. string, Boolean, number). By default, the property is `false`.

If this setting is `true`, engineering allows a selection of symbols in the editor.



The control receives such an object at runtime, for example:

```
{
  "start": "%i%myinternalsymbol%/i%",
  "end": 35.0
}
```

For step-by-step instructions on how these data types are processed, see [Handling of symbol expressions in objects \[► 1575\]](#)

#### 14.2.2.2.3.1.2.16.2 defaultBindingMode

0

**Type:** Boolean

**Required:** No

```
"defaultBindingMode": "OneWay"
```

This property specifies how a binding to this attribute should be handled.

Permissible values:

- `OneWay`: By default, a binding to the attribute is only valid for writing to the control. This is the default.
- `TwoWay`: By default, a binding to the attribute is valid for reading to and writing from the control. The new value is written to the binding each time the respective attribute is changed. See also [Configure binding \[► 111\]](#)

#### 14.2.2.2.3.1.2.16.2 defaultValue

1

**Type:** Data type of the attribute

**Required:** No

```
"defaultValue": false
```

This property indicates the default value for the attribute that is used in the Engineering Properties window when instantiating the control and written to the HTML code.

If `null` is entered here, no attribute is set.

### 14.2.2.2.3.1.2.16.2 defaultValueInternal

2

**Type:** Data type of the attribute

**Required:** No

```
"defaultValueInternal": false
```

This property specifies the internal default value for the attribute. This value is passed to the [Setter function \[► 1537\]](#) when the control is initialized. The internal default may differ from the [normal default \[► 1541\]](#) ("drop default").

### 14.2.2.2.3.1.2.17 attributeCategories

**Type:** Array of JSON objects

**Required:** No

```
"attributeCategories": [
  {
    "name": "Value",
    "displayPriority": 500,
    "defaultCollapsed": false,
    "description": ""
  }
]
```

The property is used to prioritize new attribute categories that are assigned under [Attributes \[► 1539\]](#). Prioritization is used to determine the displayed order of the categories in the Engineering Properties window. The attribute categories are described within a JSON object.

The following properties can be defined:

- `name` {String}: The name of the attribute category. The attribute name must be assigned to at least one control attribute.
- `displayPriority` {Number}: The priority determines the order in which the various attribute categories are displayed within the Engineering Properties window.
  - Values less than 10 mean high priority and are displayed at the top of the Properties window (e.g. colors).
  - Values less than 500 have standard categories (e.g. Common = 100, Layout = 200, Border = 300, Background Image = 400).
  - Values greater than 500 should be assigned user-specific categories so that they are listed below the standard categories.
  - Values greater than 800 have low priority and are rarely configured.
- `defaultCollapsed` {Boolean}, *not required*: This property determines whether the category is collapsed by default (`true`) or expanded (`false`).
- `description` {String}, *not required*: Optional description of the attribute category that is displayed as a tooltip for the mouseover event in the Engineering.

### 14.2.2.2.3.1.2.18 themedResources

**Type:** Array of JSON objects

**Required:** No

```
"themedResources": [
  {
    "name": "MyCustomThemedResource",
    "displayName": "MyCustomThemedResource",
    "description": "This is a custom themed resource. Look at theming of framework controls.",
    "type": "tchmi:framework#/definitions/MyThemedDefinition"
  }
]
```

This property contains all user-specific theme definitions that are not defined as attributes in the Engineering Properties window and can only be changed using the theme editor. An example of a "ThemedResource" are images within a control that cannot be exchanged via the Properties window (e.g. KnobConfigHorizontal and KnobConfigVertical for the [LinearGauge](#) [► 432]). A control developer can access these resources via the `TcHmi.Theme.get` API.

A "themedResources" object contains the following properties:

- `name` {String}: Name of the property to be changed.
- `displayName` {String}: Name displayed in the Engineering theme editor.
- `description` {String}: Optional description of the property that is displayed in the theme editor on mouseover.
- `type` {String of a [framework data type](#) [► 92]}: Data type of the property. The data type can be either a TwinCAT HMI data type or a user-specific data type defined under "[dataTypes](#) [► 1546]". Usually, user-specific data types are used (see Theming).

#### 14.2.2.2.3.1.2.19 functions

**MType:** Array of JSON objects

**Required:** No

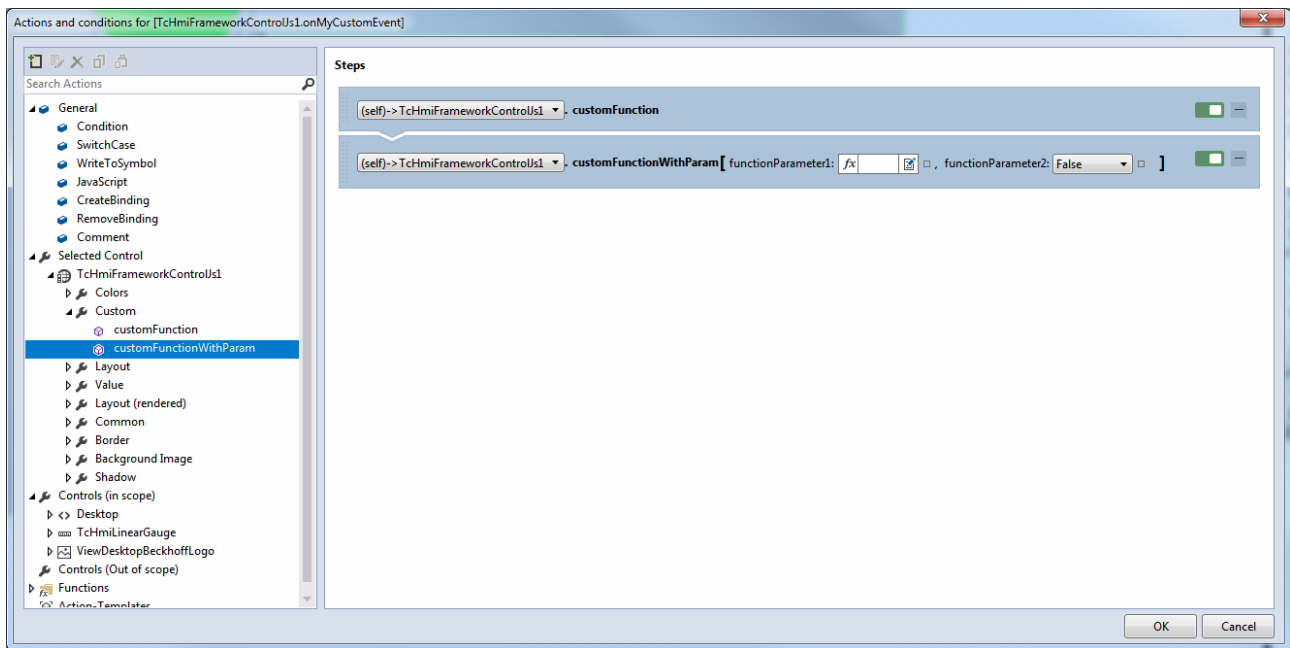
```
"functions": [
  {
    "name": "customFunction",
    "displayName": "customFunction",
    "visible": true,
    "description": "This is a sample for a function that can be called.",
    "category": "Actions",
    "params": [],
    "type": null,
    "heritable": true,
    "searchTerms": []
  }
]
```

This property defines functions of the control that are independent of attributes. The functions can optionally have parameter values or a return value. Each function must have the same name in `Source.js`, otherwise an error message appears in the browser console and the function is not executed.

A JSON object for a function contains the following properties:

- `name` {String}: Internal name of the function.
- `displayName` {String}: Name of the function that is displayed in the Engineering.
- `description` {String}: Description of the function that is displayed as a tooltip during mouseover in the engineering.
- `category` {String}: Category of the function under which the function is displayed in the Actions and Conditions Editor in the Engineering.
- `params` [► 1544] {JSON object}, *not required*: Parameter values of the function.
- `type` {string, TwinCAT HMI data type}: Return value of the function. The return value must have a TwinCAT HMI data type.
- `heritable` {Boolean}: This property defines whether the function is to be passed on to derived classes.
- `searchTerms` {array of strings}, *not required*: This property defines search terms for the Engineering that are to optimize the search function within the Actions & Conditions Editor. This makes it possible to find the function using terms other than the function name. For example, if the strings "MyFunction" and "1234" are added to the array, the function can also be found under these terms.

The following diagram shows an example of two framework control functions in engineering, neither of which has a return value. A function contains optional parameter values.



#### 14.2.2.2.3.1.2.19.1 params

**Type:** JSON object

**Required:** No

```
"params": [
  {
    "name": "functionParameter1",
    "displayName": "functionParameter1",
    "description": "This is a sample for a function parameter.",
    "type": "tchmi:general#/definitions/Number",
    "visible": true
  },
  {
    "name": "functionParameter2",
    "displayName": "functionParameter2",
    "description": "This is a sample for a function parameter.",
    "type": "tchmi:general#/definitions/Boolean",
    "bindable": false
    "visible": true
  }
]
```

This property defines the optional parameter values of a function. The parameter values can be transferred via Engineering.

A parameter object contains the following properties:

- **name** {String}: Internal name of the parameter values.
- **displayName** {String}: Name of the parameter value that is displayed in the Engineering.
- **description** {String}: Description of the parameter value that is displayed as a tooltip during mouseover in the Engineering.
- **bindable** {Boolean}: Determines whether a [binding](#) [► 108] can be set to this parameter. This is allowed by default.
- **visible** {Boolean}: Visibility of the parameter value. The visibility determines whether the parameter is to be displayed or hidden in the Engineering.

#### 14.2.2.2.3.1.2.20 events

**Type:** Array of JSON objects

**Required:** No

```
"events": [
  {
    "name": ".onMyCustomEvent",
    "displayName": ".onMyCustomEvent",
    "visible": true,
    "displayPriority": 30,
    "category": "Control",
    "description": "This is a sample for a framework control event.",
    "heritable": true,
    "allowsPreventDefault": false
  }
]
```

This property defines events that can be configured through the Engineering and are triggered in this framework control. An event is used to notify engineering that a specific event has occurred in the control. The HMI developer in engineering has the option to respond to this event accordingly. Triggering of an event is implemented in `Source.js`.

An event object contains the following properties:

- `name` {String}: internal name of the event.
- `displayName` {String}: name of the function that is displayed in the Engineering.
- `visible` {Boolean}: visibility of the event. If "visible" is set to "false", the event is not displayed in the Engineering.
- `displayPriority` {Number}, *not required*: the priority determines the order in which the various events are displayed within the category.
  - Values = 10 correspond to frequently used events such as ".onPressed".
  - Values = 15 correspond to standard events such as ".onClick" or ".onRightClick".
  - Values = 50 correspond to rarely used events such as ".onMouseUp".
  - No value assigned: the event is collapsed by default and has to be expanded using the arrow.
- `category` {String}: the category determines under which category the event is listed in the Engineering. Existing categories such as "Operator" can be used, or new category names can be assigned.
- `description` {String}: optional description of the event, which is displayed as a tooltip on mouseover in the Engineering.
- `heritable` {Boolean}: this property defines whether the event is to be inherited to derived classes. By default, this value is "true", so that the event is inherited.
- `allowsPreventDefault` {Boolean}, *not required*: this property specifies that a user can explicitly select preventDefault. See also [Events](#) [► 1565]

The event configured above is displayed in the Engineering as follows:

Properties

Identifier: TcHmiFrameworkControlJs1

Type: FrameworkControlJs1

Custom

Framework

.onAttached

.onDetached

Operator

.onPressed

.onMouseClicked

.onMouseRightClick

.onMouseDoubleClick

.onMouseEnter

.onMouseDown

.onMouseUp

.onMouseLeave

Control

.onMyCustomEvent: Configured...

#### 14.2.2.2.3.1.2.21 dataTypes

**Type:** Array of JSON objects

**Required:** No

```
"dataTypes": [
  {
    "schema": "Schema/TypeDefinitions/CustomDatatype.Schema.json"
  }
]
```

This property contains a list of files in which all user-specific data types of the control are defined. Each file can describe any number of data types. Developer can define their own data types in a JSON schema. The definition usually takes place under "Schema\TypeDefinitions [► 1480]". In order for the Engineering to know and be able to process the user-specific data types, they must be referenced in Description.json.

A dataType object contains the following properties:

- schema {String, relative path}: relative path to the JSON schema file describing the data type.

#### 14.2.2.2.3.1.2.22 access

**Type:** Array of JSON objects

**Required:** No

```
"access": [
  {
    "name": "myCustomRight",
    "displayName": "myCustomRight",
    "description": "This is a sample for access rights in the framework control.",
    "visible": true,
  }
]
```

```

    "defaultValueInternal": null
  }
}

```

This property contains a list of user-specific access rights that can be configured via the Engineering. Access rights restrict user groups in their activities (see [authorization system](#) [► 969]). A user-specific access right must be evaluated in Source.js with corresponding [user-specific logic](#) [► 1565].

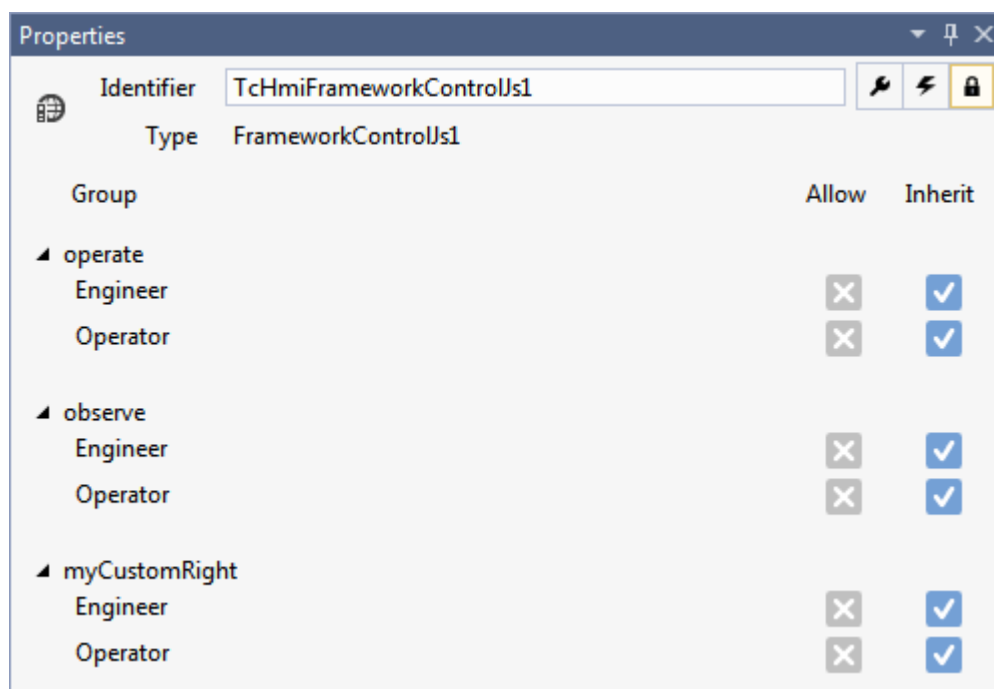
An access right object contains the following properties:

- **name** {String}: Internal name of the access right.
- **displayName** {String}: Name of the access right that is displayed in the Engineering.
- **description** {String}: Description of the access right, which is displayed as a tooltip in the Engineering on mouseover.
- **visible** {Boolean}: This property switches the visibility of the access right. If "visible" is set to "false", the access right is not displayed in the Engineering.
- **defaultValueInternal** {Boolean}: This property defines the internal default value that is to apply if the access right is not configured via engineering. "true" means access is granted by default. "false" means access is not granted. "null" means access is not defined and the parent control is queried. If the parent control does not know this right, the value set here applies. For a detailed description of the behavior of defaultValueInternal see [authorization system](#) [► 969].

Various user groups are assigned to an access right via the Engineering, which are structured according to the following schema: `tchmi:framework#/definitions/ControlAccessRight`

This schema defines the type of access (`Allow`, `Deny`, `Inherit`) the respective user group has to the access right.

In the Engineering, the access right is displayed in the Properties window as follows (for two different user groups):



For more information, see section [Access rights](#) [► 1565].

#### 14.2.2.2.3.2 Template.html

Like every control in the TwinCAT HMI, a framework control is based on HTML code. As soon as a framework control is instantiated in the Engineering of the TwinCAT HMI, an HTML div element is automatically created for the control. The developer of the framework control can define additional HTML code for the control within the control div element.

## HTML/SVG code

The definition of the HTML/SVG code is implemented in the "Template.html" file. The use of this file is optional. The Template.html file is only used if it is referenced in [Description.json \[► 1533\]](#) of the control. The Template.html file defines the basic structure of a framework control.

```
<div class="TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-Template tchmi-box">
  <!--Place your code here-->
</div>
```

The HTML/SVG code defined within this file is automatically inserted in the control div element (if the file is used) in the engineering. The code can be viewed in the browser during debugging, for example.

```
<div id="TcHmiFrameworkControlJs1" data-tchmi-type="
TcHmi.Controls.FrameworkPrj1.FrameworkControlJs1" data-tchmi-height="150" data-tchmi-height-
unit="px" data-tchmi-left="137" data-tchmi-left-unit="px" data-tchmi-top="140" data-tchmi-top-
unit="px" data-tchmi-value="True" data-tchmi-width="150" data-tchmi-width-unit="px" class="tchmi-box
tchmi-control framework-control-js1" title="" style="left: 137px; top: 140px; width: 150px; height:
150px; z-index: 0; border-width: 0px;">
  <div class="TcHmi_Controls_FrameworkPrj1_FrameworkControlTs1-Template tchmi-box">
    <!--Place your code here-->
  </div>
</div>
```

SVG elements can also be embedded directly.

```
<div class="TcHmi_Controls_FrameworkPrj1_FrameworkControlTs1-Template tchmi-box">
  <div class="TcHmi_Controls_FrameworkPrj1_FrameworkControlTs1-Template-div1 tchmi-box"></div>
  <svg class=" TcHmi_Controls_FrameworkPrj1_FrameworkControlTs1-Template-svg1 tchmi-box"
version="1.1" xmlns="http://www.w3.org/2000/svg" x="0px" y="0px" width="30px" height="100%"
viewBox="0 0 30 30" enable-background="new 0 0 30 30" xml:space="preserve">
    <polyline class="TcHmi_Controls_FrameworkPrj1_FrameworkControlTs1-Template-svg1-arrow" stroke-
width="2" stroke-linecap="round" stroke-linejoin="round" points="22.865,12.5 15,20.366
7.135,12.5"></polyline>
  </svg>
  <div class="TcHmi_Controls_FrameworkPrj1_FrameworkControlTs1-Template-div2 tchmi-box"></div>
```

Within the Template.html file any number of HTML/SVG elements can be defined. All standard HTML/SVG elements are available to the developer.

In addition to the standard HTML elements, TwinCAT HMI controls can also be used in the Template.html file. See [Dynamic control generation \[► 1577\]](#).

The user-specific HTML code should be placed within the template div ("Place your code here").

### ● Do not assign fixed IDs

**I** No fixed IDs may be assigned within the Template.html file. The assignment of IDs within the Template.html file would contradict the concept of multiple instantiations of a framework control, since an ID may only occur once within the HTML document. The outer control div element is automatically assigned a unique ID through the Engineering.

This ID is made available via the placeholder {Id}. A div element may be created in this way: <div id="{Id}-subDiv"></div>

## CSS classes

Within the elements in the Template.html file, [CSS classes \[► 1549\]](#) can be assigned, which are described via cascading style sheets files, either detached from the theme or depending on the theme. By default, the template class in the Style.css file is used at project level.

## Access via JavaScript/TypeScript

The HTML elements defined within the Template.html file can be further processed in the [Source.js/ts file \[► 1552\]](#). The elements can be changed during runtime or used as placeholders for dynamically created elements, for example. Processing of the HTML elements in the Source.js/ts file is optional. Static use within the Template.html file is also possible.

If the HTML elements are to be processed further in the Source.js/ts file, references to the HTML elements must be created there. References to the Template.html file are created within the PrevInit function in the Source.js file.



```
/** Handle template elements. Should be done before call to __previnit of super class. */
this.__elementTemplateRoot =
this.getElement().find('.TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-Template');
```

The listing shows the access to the template div within Template.html. A search for the template div is initiated using the ".find()" JQuery function within the main JQuery object of the control. The reference to the JQuery object of the control can be reached via ".getElement()". If additional elements are placed within the template div, they can also be found using the ".find()" JQuery function. For performance reasons, we recommend to avoid using the outer JQuery object for the search in cases with many nested elements, but to use the inner elements that are already referenced instead.

Sample:

```
<div class="TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-Template tchmi-box">
  <div class="TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-inner-div">
    <div class="TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-inner-div-my-element">

      </div>
    </div>
  </div>
```

The following references result from this HTML code:

```
/** Handle template elements. Should be done before call to __previnit of super class. */
this.__elementTemplateRoot =
this.getElement().find('.TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-template');
this.__innerDiv =
this.__elementTemplateRoot.find('.TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-inner-div');
this.__myElement = this.__innerDiv.find('.TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-inner-
div-my-element');
```

### 14.2.2.2.3.3 Style.css

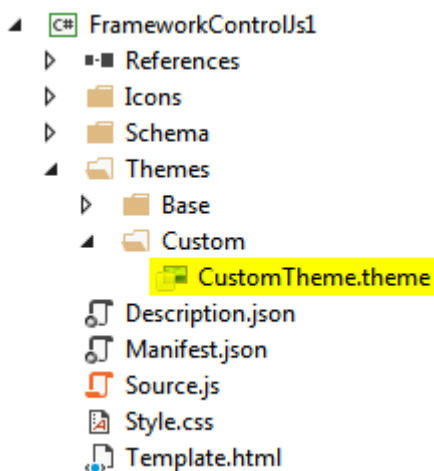
Within a framework control, the appearance of individual elements is described using cascading style sheets. The default design of the control is defined in the Style.css file at the project level and in the Style.css file, the base theme of the control. In addition to the standard design, further themes can be defined for the framework control. The appearance of a framework control can be changed at four [different levels](#) [► 1016] according to the theme system of the TwinCAT HMI.

#### 14.2.2.2.3.3.1 Theme levels

The appearance of a framework control can be described at different levels of the [theme system](#) [► 1016].

**Level 4:** Attribute definition per control type

[Control themes](#) [► 1011] can be defined at level 4 of the theme system. Control themes allow individual attributes of the framework control to be overwritten. A control theme is defined within a theme file and can be created using the theme editor in Engineering or directly as JSON code. The theme file must be assigned to a specific theme within the project:



The theme file must then be referenced as "ThemedValues" under "[themes](#) [► 1535]" in the Description.json file.

**Level 5:** Attribute definition by `DefaultValueInternal`

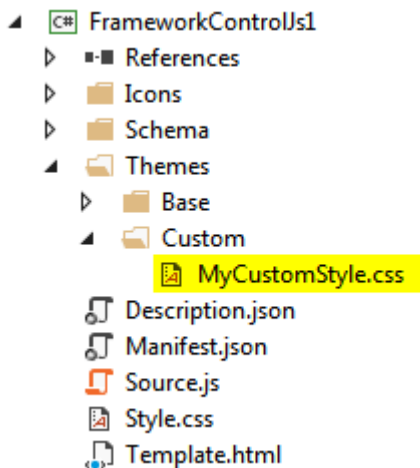
At level 5 of the theme system, it is possible to set the properties of the attribute via `DefaultValueInternal` [► 1542]. `DefaultValueInternal` can be set in the `Description.json` file of the framework control.

Example of a color attribute:

```
"defaultValueInternal": {
  "color": "rgba(255, 0, 0, 1)"
}
```

**Level 8:** Cascading Style Sheets per theme

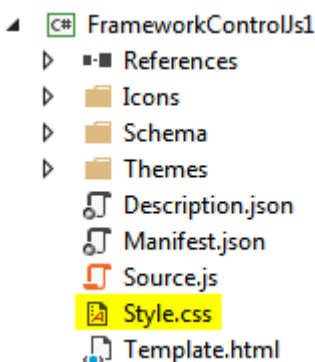
Cascading style sheet files can be added to a theme at level 8 of the theme system. Within the CSS file any element properties can be defined.



The CSS file "Stylesheet" must then be referenced under "`themes` [► 1535]" in the `Description.json` file of the framework control.

**Level 9:** Cascading Style Sheets on project level in the control

At level 9 of the theme system, Cascading Style Sheet files can be added independently of a theme at project level in the control. By default, each framework control project contains a `Style.css` file at project level. Within this file, element properties are defined that are to apply independently of a theme (e.g. sizes of a div).



All CSS files at the project level in the control must be referenced under `dependencyFiles` [► 1534] in the `Description.json` file of the framework control.

**14.2.2.2.3.3.2 Using CSS classes**

The CSS class selectors are used within the cascading style sheet files of a framework control.

**Permitted selectors**

The following CSS selectors can be used conditionally within a CSS file of a framework control:

- Type selectors
- Attribute selectors
- Class selectors



With class selectors, new CSS classes are defined for a framework control, which means that CSS styles are not overwritten outside the framework control. If type or attribute selectors are to be used, you must ensure that they are only used for the class of the framework control and do not overwrite any styles outside the framework control (descendant selector):

```
.TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1 a {
    color: red;
}
```

The following CSS selectors should not be used within a CSS file of a framework control:

- ID selectors: Due to multiple instantiation, you cannot assign fixed IDs within a framework control.
- Universal selector: A framework control should not overwrite any styles outside the control during instantiation.

### Using the class selectors

CSS classes can be used in the Template.html file, or they can be added dynamically at runtime within the Source.js/ts file.

```
.TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-template
{
    width: 100%;
    height: 100%;
}
```

Within the Template.html file, a CSS class is assigned via the HTML attribute "class":

```
<div class="TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-template tchmi-box">
</div>
```



The class "tchmi-box" sets CSS properties to facilitate element positioning and can be used with all positioned HTML elements.

The dynamic use of a CSS class within Source.js can be realized via the jQuery function ".addClass()", for example:

```
this._elementTemplateRoot.addClass('TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-my-custom-class');
```

### 14.2.2.2.3.3.3 Overwriting CSS of controls

Within the CSS files it is possible to overwrite the appearance of embedded TwinCAT HMI controls. For example, if you want to change the appearance of an embedded button within a control, you can do this by applying the CSS styles of the button.

Please ensure that all buttons are not inadvertently assigned this appearance and that the CSS file of the general button does not overwrite that of the embedded control. Both can be achieved by so-called descendant selectors (spaces in CSS):

```
.TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1 .TcHmi_Controls_Beckhoff_TcHmiButton {
    background-image: linear-gradient(135deg, #eff1f3, #aeb9c2);
    color: #4794da;
    box-shadow: 0px 0px 5px 0px rgba(0,0,0,0.6);
}

.TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1 .TcHmi_Controls_Beckhoff_TcHmiButton.down {
    background-image: linear-gradient(135deg, #aeb9c2, #eff1f3);
    color: #000000;
    box-shadow: inset 0px 0px 5px 0px rgba(0,0,0,0.6);
}
```

All main elements of a control are assigned the control name (extended by the namespace) as CSS class name (here `TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1`). If this is attached before the style of the control to be overwritten, the new appearance in the example only applies to buttons below the framework control.

CSS selectors are always read from right to left:

- First example: Main element of the button (`".TcHmi_Controls_Beckhoff_TcHmiButton"`) if it is located under (`" "`) of `FrameworkControlJs1` (`".TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1"`).
- Second example: Element with class down (`".down"`) if it is the main element of the button (`".TcHmi_Controls_Beckhoff_TcHmiButton"`), if it is below (`" "`) of `FrameworkControlJs1` (`".TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1"`).

#### 14.2.2.2.3.4 Control.ts/js

A framework control requires JavaScript code or TypeScript code.

Browsers cannot execute TypeScript, so an additional compilation step turns TypeScript code into corresponding JavaScript code. TypeScript extends the syntax of JavaScript with information about data type and access rights.

JavaScript code is written directly in the `Control.js` file.

Both file types (`Control.js` and `Control.ts`) define the base framework for the implementation of a framework control and can be extended flexibly. See also [Creating a control](#) [► 1530].

#### Programming conventions

The programming conventions provide a base for standardizing framework controls. They are used to distinguish between internal and external access.

- Member variables are marked with the prefix `__` and in Camel case:

```
this.__myVar = ...;
```

- Functions with external access (Engineering: setter/getter functions) are identified without prefix and in Camel case:

```
setMyVar() { /* ... */ }
```

- Internal functions are marked with the prefix `__` and in Camel case:

```
__processMyVar() { /* ... */ }
```

#### Source code analysis with eslint

The project directory contains a file `.eslintrc.json`. This can be used to enter rules for the source code analysis tool eslint for all JavaScript and also TypeScript files. By default a few rules are already active there, which can detect actual program errors. The documentation under <https://eslint.org/docs/rules/> lists all possible rules in detail.

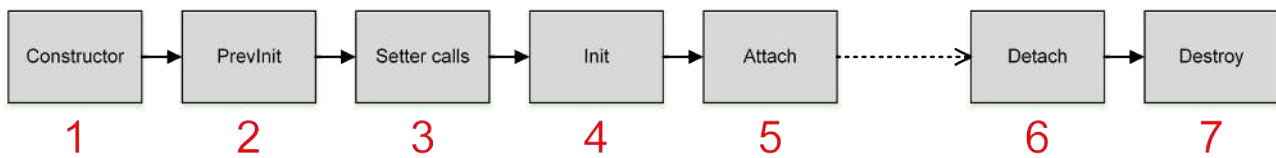


If you make changes in the `Control.js` file and the framework control is already associated with an HMI project, you must then carry out a [project build](#) [► 1531] of the framework control to apply the changes. A corresponding JavaScript file is automatically created from the TypeScript files.

#### 14.2.2.2.3.4.1 Control life cycle

The control life cycle describes which system function of the control is called by the system at which time. In the control life cycle, a distinction is made as to whether the control is on an HMI page for which preloading is activated.

The basic control life cycle is described in the following diagram:



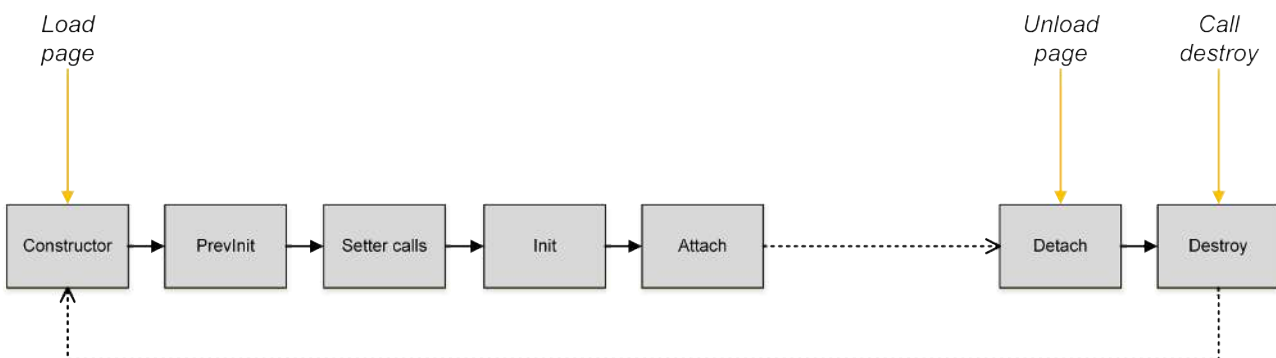
### Explanations:

1. The constructor is called during control instantiation.
2. The PrevInit function is called after the constructor and before the attribute setter functions are called.
3. The attribute setter functions are called after the PrevInit function.
4. The Init function is called after the attribute setter functions. At this point, the control attributes are initialized by the attribute setter functions and have valid values.
5. The Attach function is called after the Init function, once the control has been added to the DOM on the HMI page.
6. The Detach function is called after a control has been removed from the DOM of the HMI page (e.g. during page switching).
7. The Destroy function is called after the control has been removed from the DOM of the HMI page, so that the system can destroy the controls. In addition, the Destroy function can be called explicitly at another point (for example, when subordinate controls are destroyed).

### HMI page: Preload disabled

Normally, preloading of an HMI page is disabled ("Preload this partial: false" as setting for a [Content file \[► 795\]](#)), which means that the controls are not stored in the browser cache. This increases the speed of the initial HMI loading process, but it can lead to a reduction in the loading speed of individual HMI pages on which many controls are instantiated. Memory consumption is also reduced because the pages are no longer in memory when they are not active.

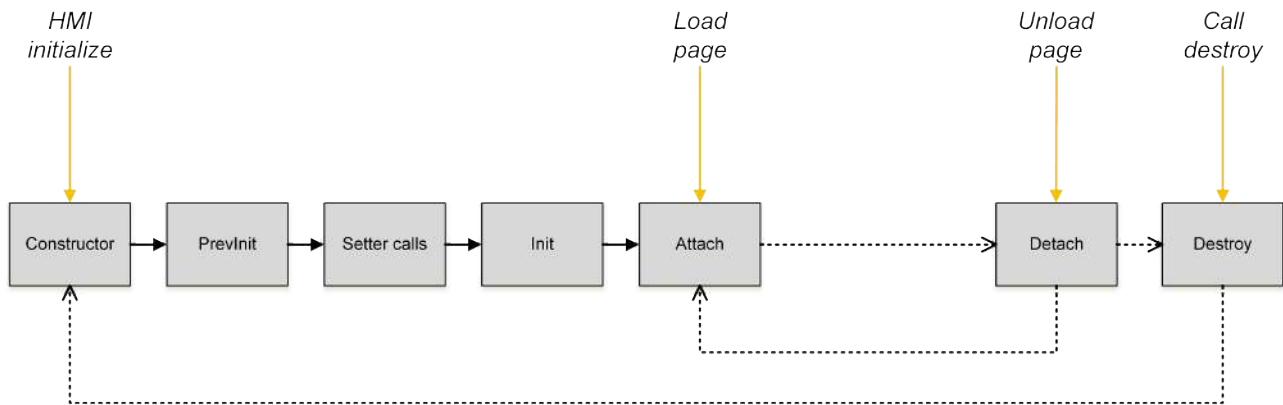
In this case, the constructor of the control is called when the page is loaded (for example, when switching to the page or when loading the start page). This is followed by the PrevInit function, the attribute setter functions, the Init function and the Attach function. As soon as the page is unloaded (e.g. when switching to another page), the Detach function is called, followed by the Destroy function. The life cycle of the controls starts again when the HMI page is loaded.



### HMI page: Preload enabled

If preloading is enabled for an HMI page ("Preload this partial: true" as setting for a [Content file \[► 795\]](#)), the controls are stored in the browser cache. This increases the loading speed of a single HMI page, but it can lead to a reduction in the initial loading process of the HMI. Furthermore, memory consumption is increased because all preloaded pages are always in memory, even if they are never activated.

In this case, the constructor of the control is called as soon as the HMI is initially loaded. This is followed by the PrevInit function, the attribute setter functions and the Init function. The Attach function of the control is not called until the HMI page on which the control is instantiated is loaded. The Detach function is called as soon as the HMI page is unloaded. The Destroy function is not called automatically subsequently. The control remains in the browser cache. When the HMI page is reloaded, the Attach function is called directly.

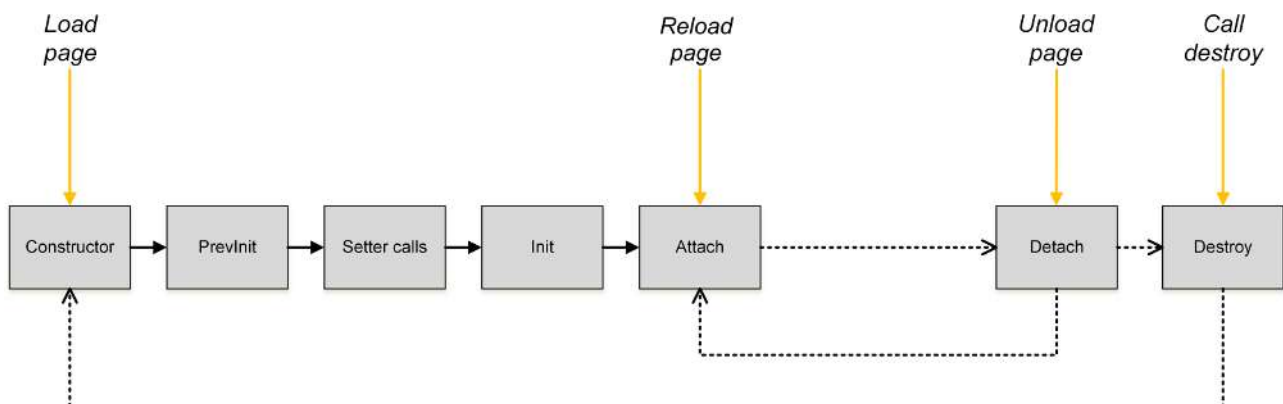


### HMI page: KeepAlive enabled

If KeepAlive is enabled for an HMI page ("KeepAlive this partial: true" as setting for a [Content file](#) [► 795]), the controls are kept in the browser cache. This increases the loading speed of a single HMI page if it is called several times. The controls of a page are created when the page is accessed for the first time. They are retained when the page is exited. This only slightly increases memory consumption, since only those pages remain in memory that were enabled once.

Pages with KeepAlive are therefore kept in memory similar to Preload when they are no longer needed. In contrast, these pages are not loaded initially. This ensures fast loading of the entire application.

In this case, the constructor of the control is called when the page is loaded (for example, when switching to the page or when loading the start page). This is followed by the PrevInit function, the attribute setter functions and the Init function. The Attach function of the control is not called until the HMI page on which the control is instantiated is loaded. The Detach function is called as soon as the HMI page is unloaded. The Destroy function is not called automatically subsequently. The control remains in the browser cache. When the HMI page is reloaded, the Attach function is called directly.



### 14.2.2.2.3.4.2 Base framework

The Control.js/ts file already contains preconfigured source code that is required for various functions of the framework control and may not be modified in some cases. A framework control corresponds to a class, of which concrete instances (objects) are created at a later time.

### Project information

Better support of IntelliSense in JavaScript (not necessary when using TypeScript):

```

/// <reference path="../../../Packages/Beckhoff.TwinCAT.HMI.Framework.12.742.0/runtimes/native1.12-
tchmi/TcHmi.d.ts" />

```

This comment line includes files, allowing better IntelliSense support within the Control.js file. These lines are not required for using the control.

Information about the framework control:

```
/*
 * Generated 2/15/2020 10:57:13 AM
 * Copyright UserXY 2020
 * .....
 */
```

These comment lines contain information about the creation of the framework control, which is generated automatically when the framework control project is created. These lines are not required for using the control.



Do not change the basic structure of the framework control within Control.js/ts. There is a risk that the control can no longer be used.

## Basic structure of a TypeScript framework control

**Note:** In old templates, modules `TcHmi` was used instead of namespace `TcHmi`. The resulting JavaScript code is exactly the same. However, this syntax is outdated and is therefore no longer used in newer templates.

```
namespace TcHmi.Controls {
    export namespace FrameworkPrj1 {
        export class FrameworkPrj1Control extends TcHmi.Controls.System.TcHmiControl {
            constructor(element: JQuery, pcElement: JQuery, attrs: TcHmi.Controls.ControlAttributeList) {
                super(element, pcElement, attrs);
            }

            /** Control specific logic */
        }
    }
}

TcHmi.Controls.registerEx('FrameworkPrj1Control', 'TcHmi.Controls.FrameworkPrj1',
TcHmi.Controls.FrameworkPrj1.FrameworkPrj1Control);
```

## Basic structure of a JavaScript framework control



The basic structure of version 1.8 and 1.10 controls [► 1503] is still supported. However, it is recommended to use TypeScript or this Javascript syntax for new controls:

```
(function (/** @type {globalThis.TcHmi} */ TcHmi) {
    let Controls;
    (function (/** @type {globalThis.TcHmi.Controls} */ Controls) {
        let FrameworkPrj1;
        (function (FrameworkPrj1) {
            class FrameworkControlJs1 extends TcHmi.Controls.System.TcHmiControl {
                constructor(element, pcElement, attrs) {
                    super(element, pcElement, attrs);
                }

                /** Control specific logic */
            }

            FrameworkPrj1.FrameworkControlJs1 = FrameworkControlJs1;
        })(FrameworkPrj1 = Controls.FrameworkPrj1 || (Controls.FrameworkPrj1 = {}));
        Controls.registerEx('FrameworkControlJs1', 'TcHmi.Controls.FrameworkPrj1',
FrameworkPrj1.FrameworkControlJs1);
    })(Controls = TcHmi.Controls || (TcHmi.Controls = {}));
})(TcHmi || (TcHmi = {}));
```

This code defines the basic structure of a framework control and is required for using the control at runtime. In the event of invalid changes, the control can no longer be used properly.

## Definition of the namespaces

Within Control.js, various namespaces are referenced and defined, which are required for the framework. Many of these definitions are unnecessary in TypeScript.

## TcHmi

```
(function (/** @type {globalThis.TcHmi} */ TcHmi) { }) (TcHmi);
```

This function makes the control known within the "TcHmi" namespace. The framework cannot be accessed outside this namespace.

## Controls

```
(function (/** @type {globalThis.TcHmi.Controls} */ Controls) { }) (Controls = TcHmi.Controls || (TcHmi.Controls = {}));
```

This function makes the control known within the "Controls" namespace. This namespace contains all TwinCAT HMI controls ([System](#) [▸ 753], [Beckhoff](#) [▸ 123], Custom).

The control is registered in the control namespace which is required for the Engineering of the TwinCAT HMI.

```
Controls.registerEx('FrameworkControlJs1', 'TcHmi.Controls.FrameworkPrj1', FrameworkPrj1.FrameworkControlJs1);
```

## Own namespace

```
var FrameworkPrj1;
(function (FrameworkPrj1) { }) (FrameworkPrj1= Controls.FrameworkPrj1 || (Controls.FrameworkPrj1 = {}));
```

This function defines the namespace for user-specific controls and makes the control known within the namespace. The concrete framework control object is defined in the FrameworkPrj1 namespace and then assigned to the FrameworkPrj1 namespace:

```
FrameworkPrj1.FrameworkControlJs1 = FrameworkControlJs1;
```

## Control class

A framework control is defined by a JavaScript class within the FrameworkPrj1 namespace. The logic is implemented in this section ([Constructor](#) [▸ 1556], [System functions](#) [▸ 1557], [Attributes](#) [▸ 1559], [Functions](#) [▸ 1562], [Events](#) [▸ 1565], [Access rights](#) [▸ 1565]).

```
let FrameworkPrj1;
(function (FrameworkPrj1) {
  class FrameworkControlJs1 extends TcHmi.Controls.System.TcHmiControl {
    constructor(element, pcElement, attrs) {
      super(element, pcElement, attrs);
    }

    /** Control specific logic */
  }
})
```

For the framework control the class of the [base control](#) [▸ 1533] (usually [TcHmiControl](#) [▸ 753]) defined in [Description.json](#) [▸ 1531] is specified. The framework control inherits all properties of the defined base control.

The framework control is defined by a class within which the user-specific code of the framework control is implemented.

When a specific instance (JavaScript object) is created by the class, the instance has all the properties of the class.

### 14.2.2.2.3.4.3 Constructor

Each TypeScript framework control contains a constructor that is structured as follows:

```
export class FrameworkPrj1Control extends TcHmi.Controls.System.TcHmiControl {
  constructor(element: JQuery, pcElement: JQuery, attrs: TcHmi.Controls.ControlAttributeList) {
    super(element, pcElement, attrs);
  }
}
```

Each JavaScript framework control contains a constructor that is structured as follows:



```
class FrameworkControlJs1 extends TcHmi.Controls.System.TcHmiControl {
    constructor(element, pcElement, attrs) {
        super(element, pcElement, attrs);
    }
}
```

The parameter values of the constructor are only used internally and forwarded to the base constructor call.

With JavaScript controls, the internal variables of the control (member variables) are initialized with "undefined" within the constructor. Initialization at this point is not necessary, but is recommended for better clarity.

#### 14.2.2.2.3.4.4 System functions

Framework controls have functions that are called by the system at different times. Each system function calls the respective system function of the base class ([TcHmiControl](#) [► 753]) via the "super" object.

##### PrevInit function

TypeScript:

```
protected __elementTemplateRoot!: JQuery;
public __previnit() {
    /** Handle template elements. Should be done before call to __previnit of super class. */
    this.__elementTemplateRoot =
this.getElement().find('.TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-Template');

    /** Call __previnit of super class. */
    super.__previnit();
}
```

If variables (such as `__elementTemplateRoot`) are written with the final value in `PrevInit`, they do not need the type `undefined`. In this case the type `JQuery` is sufficient. To notify TypeScript that these variables are still not used uninitialized, the [Definite Assignment Assertion operator](#) must be used with an exclamation mark.

JavaScript:

```
__previnit() {
    /** Handle template elements. Should be done before call to __previnit of super class. */
    this.__elementTemplateRoot =
this.getElement().find('.TcHmi_Controls_FrameworkPrj1_FrameworkControlJs1-Template');

    /** Call __previnit of super class. */
    super.__previnit();
}
```

The `PrevInit` function is automatically called after the system calls the [constructor](#) [► 1556] and before the attribute setters of each attribute are called. Accordingly, the member variables of the attributes have the value "undefined" when the `PrevInit` function is called. Within the `PrevInit` function, the [references](#) [► 1547] to the HTML elements are created from the `Template.html` file.



This function may only be called by the system and not explicitly by the developer.

---

##### Init function

TypeScript:

```
public __init() {
    super.__init();
}
```

JavaScript:

```
__init() {
    super.__init();
}
```

The Init function is called automatically by the system after the attribute setters of the individual attributes have been called. Accordingly, when the Init function is called, the member variables of the attributes already have the values that were passed to the control or defined internally as default values.



This function may only be called by the system and not explicitly by the developer.

## Attach function

TypeScript:

```
public __attach() {  
    /**  
     * Enable everything which was disabled while __detach function was called!  
     */  
    /**  
     * Initialize everything which is only available while the control is part of the active dom.  
     */  
    /** Call base __attach function */  
    super.__attach();  
}
```

JavaScript:

```
__attach() {  
    /**  
     * Enable everything which was disabled while __detach function was called!  
     */  
    /**  
     * Initialize everything which is only available while the control is part of the active dom.  
     */  
    /** Call base __attach function */  
    super.__attach();  
}
```

The Attach function is automatically called by the system after the current control instance has been added to the DOM of the HTML document. Within the Attach function, all calculations should be performed that are only available while the control instance is in the DOM (e.g. `.getBoundingClientRect()` of DOM elements or `.width()` of jQuery elements). The opposite of the Attach function is the Detach function.



This function may only be called by the system and not explicitly by the developer.

## Detach function

TypeScript:

```
public __detach() {  
    /**  
     * Disable everything which is not needed while the control is not part of the active dom.  
     * No need to listen to events for example!  
     */  
    /** Call base __detach function */  
    super.__detach();  
}
```

JavaScript:

```
__detach() {  
    /**  
     * Disable everything which is not needed while the control is not part of the active dom.  
     * No need to listen to events for example!  
     */  
    /** Call base __detach function */  
    super.__detach();  
}
```

The system automatically calls the Detach function after the current control instance has been removed from the DOM of the HTML document. In the Detach function, all functions that are no longer required after the control instance has been removed from the DOM are to be disabled. The opposite of the Detach function is the Attach function.



This function may only be called by the system and not explicitly by the developer.

## Destroy function

TypeScript:

```
public destroy() {
    if (this.__keepAlive) {
        return;
    }
    /**
     * Free resources
     */
    /** Call base __destroy function */
    super.destroy();
}
```

JavaScript:

```
destroy() {
    if (this.__keepAlive) {
        return;
    }
    /**
     * Free resources like events etc.
     */
    /** Call base __destroy function */
    super.destroy();
}
```

The system automatically calls the Destroy function when the control instance is no longer used (after the Detach function). If the control is on an HTML page where "Preload Partial" is enabled, the Destroy function is not called because the page is still saved in the browser cache. Within the Destroy function, the elements that were created during runtime are to be destroyed.



This function can also be called explicitly (for example when child controls are destroyed).

### 14.2.2.2.3.4.5 Attributes

Framework control [attributes](#) [► 1536] defined in Description.json must be initialized within Control.js, and the corresponding setter, getter and process methods must be implemented. The setter and getter methods provide central access to the attribute.

The following samples refer to the following attribute, which is defined in Description.json under "[attributes](#) [► 1536]":

```
"attributes": [
  {
    "name": "data-tchmi-value",
    "propertyName": "Value",
    "propertySetterName": "setValue",
    "propertyGetterName": "getValue",
    "displayName": "Value",
    "visible": true,
    "themeable": "Standard",
    "displayPriority": 10,
    "type": "tchmi:general#/definitions/Boolean",
    "category": "Value",
    "description": "",
    "readOnly": false,
    "bindable": true,
    "heritable": true,
    "defaultValue": null,
    "defaultValueInternal": false
  }
]
```

## Initialization (TypeScript)

The declaration of the attributes is implemented as a separate line in TypeScript. Note that the data type must be defined for these attributes. Attributes are set late in the life cycle, so they should have `undefined` as a possible additional data type. The keyword `protected` specifies that only derived controls may access these variables, but not foreign controls.

```
protected __value: boolean | undefined;
```

## Initialization (JavaScript)

The attributes are initialized in the constructor of the framework control. Initialization is not required here (variables without keywords are automatically initialized in JavaScript when used), but is recommended for better clarity.

```
this.__value = undefined;
```



Member variables and functions that cannot be accessed from outside are prefixed with "`__`".

## Setter method

The setter method of an attribute is only required for attributes that are not set to "`readOnly [► 1540]`" (all attributes that can be set via Engineering). Like the definition, the setter method must be named in the "`propertySetterName [► 1537]`".

TypeScript:

```
/**
 * Setter function for 'data-tchmi-value' attribute.
 * @param valueNew the new value or null
 */
public setValue(valueNew: boolean | null): void {
    // convert the value with the value converter
    let convertedValue = TcHmi.ValueConverter.toBoolean(valueNew);

    // check if the converted value is valid
    if (convertedValue === null) {
        // if we have no value to set we have to fall back to the defaultValueInternal from
        // description.json
        convertedValue = this.getAttributeDefaultValueInternal('Value') as boolean;
    }

    if (tchmi_equal(convertedValue, this.__value)) {
        // skip processing when the value has not changed
        return;
    }

    // remember the new value
    this.__value = convertedValue;

    // inform the system that the function has a changed result.
    TcHmi.EventProvider.raise(this.__id + '.onPropertyChanged', { propertyName: 'Value' });

    // call process function to process the new value
    this.__processValue();
}
```

JavaScript:

```
/**
 * Setter function for 'data-tchmi-value' attribute.
 * @param {boolean} valueNew the new value or null
 * @returns {void}
 */
setValue(valueNew) {
    // convert the value with the value converter
    var convertedValue = TcHmi.ValueConverter.toBoolean(valueNew);

    // check if the converted value is valid
    if (convertedValue === null) {
        // if we have no value to set we have to fall back to the defaultValueInternal from
        // description.json
    }
}
```

```

    convertedValue = this.getAttributeDefaultValueInternal('Value');
}

if (tchmi_equal(convertedValue, this.__value)) {
    // skip processing when the value has not changed
    return;
}

// remember the new value
this.__value = convertedValue;

// inform the system that the function has a changed result.
Tchmi.EventProvider.raise(this.__id + '.onPropertyChanged', { propertyName: 'Value' });

// call process function to process the new value
this.__processValue();
}

```

Within the setter method, the parameter that was passed is first converted into the expected data type by Engineering using the framework API function "ValueConverter". If an invalid value is passed to the ValueConverter or if the conversion of the value fails, the function returns "null". In this case the [DefaultValueInternal \[► 1542\]](#) from Description.json is used. The system then checks whether a value change to the last stored value of the attribute on the member variable has taken place. If no value change has taken place, the setter is exited. If a value change has taken place, the value of the member variable for the attribute is overwritten and the system is notified that a value change has taken place. Finally, the Process method is called for the value in which the response to the value change takes place.



If the attribute contains an object (i.e. no basic data type such as string, Boolean, number), it can optionally contain symbol expressions.

A detailed description of the adjustments for this case can be found in the article [Handling of symbol expressions in objects \[► 1575\]](#).



The function "tchmi\_equal" should be used to check for a change in value. The JS comparison operator "===" can only check the basic JavaScript data types but not complex JSON objects.

## Getter method

The getter method of an attribute returns the current value of the attribute and is required for each attribute. Like the definition, the getter method must be named in the "[propertyGetterName \[► 1537\]](#)".

TypeScript:

```

/**
 * Getter function for 'data-tchmi-value' attribute.
 */
public getValue () {
    return this.__value;
}

```

JavaScript:

```

/**
 * Getter function for 'data-tchmi-value' attribute.
 * @returns {boolean}
 */
getValue () {
    return this.__value;
}

```

## Process method

The Process method is always called when the attribute value has been changed. The response to the value changes is to be implemented in the process method. For example, depending on a Boolean value elements can be switched visible or invisible, or a list can be created dynamically based on a transferred JSON object.

TypeScript:

```
/**
 * Processor function for 'data-tchmi-value' attribute.
 */
protected __processValue() {
    // process actions with Value
    // ...
}
```

#### JavaScript:

```
/**
 * Processor function for 'data-tchmi-value' attribute.
 * @returns {void}
 */
__processValue() {
    // process actions with Value
    // ...
}
```

### 14.2.2.2.3.4.6 Functions

Framework control functions [► 1543] defined in Description.json must be defined and implemented in Control.js/ts. The function must be named like the "name [► 1543]" of the function in Description.json.

#### Function without transfer parameters

A function without transfer parameters is defined in Description.json as follows:

```
"functions": [
  {
    "name": "customFunction",
    "displayName": "customFunction",
    "visible": true,
    "description": "This is a sample for a function that can be called.",
    "category": "Actions",
    "params": [],
    "type": null,
    "heritable": true,
    "searchTerms": []
  }
]
```

This results in the following code:

#### TypeScript:

```
/**
 * This is the call of the api function 'customFunction'.
 */
public customFunction(): void {
    /**
     * customFunction is defined in the description.json and called from outside.
     * The api functions are shown in the graphical user interface of the engineering in Visual Studio
     */

    // implement function logic here
}
```

#### JavaScript:

```
/**
 * This is the call of the api function 'customFunction'.
 * @returns {void}
 */
customFunction() {
    /**
     * customFunction is defined in the description.json and called from outside.
     * The api functions are shown in the graphical user interface of the engineering in Visual Studio
     */

    // implement function logic here
}
```

Within the function, any execution logic of the function can be implemented.

## Function with return value

The functions enables a return value to be returned to the calling point in Engineering. The [data type \[► 92\]](#) of the return value is defined in Description.json under "type".

```
"functions": [
  {
    "name": "customFunction2",
    "displayName": "customFunction2",
    "visible": true,
    "description": "This is a sample for a function that can be called by the engineering.",
    "category": "Actions",
    "params": [ ],
    "type": "tchmi:general#/definitions/Boolean",
    "heritable": false,
    "searchterms": [ ]
  }
]
```

Within the function in Control.js/ts it is then possible to return a value of the corresponding type.

### TypeScript:

```
/**
 * This is the call of the api function 'customFunction2'.
 */
public customFunction2 (): boolean {
  /**
   * customFunction is defined in the description.json and called from outside.
   * The api functions are shown in the graphical user interface of the engineering in the twincat
   */

  // implement function logic here
  return true;
}
```

### JavaScript:

```
/**
 * This is the call of the api function 'customFunction2'.
 * @returns {Boolean}
 */
customFunction2 () {
  /**
   * customFunction is defined in the description.json and called from outside.
   * The api functions are shown in the graphical user interface of the engineering in the twincat
   */

  // implement function logic here
  return true;
}
```

## Function with transfer parameters

A function with [transfer parameters \[► 1544\]](#) is defined in Description.json as follows:

```
"functions": [
  {
    "name": "customFunction3",
    "displayName": "customFunction3",
    "visible": true,
    "description": "This is a sample for a function that can be called by the engineering.",
    "category": "Actions",
    "params": [
      {
        "name": "functionParameter1",
        "displayName": "functionParameter1",
        "description": "This is a sample for a function parameter.",
        "type": "tchmi:general#/definitions/Number",
        "visible": true
      },
      {
        "name": "functionParameter2",
        "displayName": "functionParameter2",
        "description": "This is a sample for a function parameter.",
        "type": "tchmi:general#/definitions/Boolean",
        "visible": true
      }
    ]
  },
]
```

```

    "type": null,
    "heritable": false,
    "searchterms": []
  }
]

```

The function is implemented in Control.js/ts like a normal function. The transfer parameters are transferred with the function call. The parameters must be checked for validity before they are used, similar to the attribute setters [▶ 1559](#).

### TypeScript:

```

/**
 * This is the call of the api function 'customFunction3'.
 */
public customFunction3(functionParameter1: number, functionParameter2: boolean): void {
  /**
   * customFunction is defined in the description.json and called from outside.
   * The api functions are shown in the graphical user interface of the engineering in the twincat
   */
  let convertedParameter1 = TcHmi.ValueConverter.toNumber(functionParameter1);
  if (convertedParameter1 === null) {
    // parameter is null: define what to do in this case

    // exit function call if the execution without this parameter is not possible
    return;
  }

  let convertedParameter2 = TcHmi.ValueConverter.toBoolean(functionParameter2);
  if (convertedParameter2 === null) {
    // parameter is null: define what to do in this case

    // exit function call if the execution without this parameter is not possible
    return;
  }

  // implement function logic with the evaluation of the parameters here
}

```

### JavaScript:

```

/**
 * This is the call of the api function 'customFunction3'.
 * @param {number} functionParameter1
 * @param {boolean} functionParameter2
 * @returns {void}
 */
customFunction3(functionParameter1, functionParameter2) {
  /**
   * customFunction is defined in the description.json and called from outside.
   * The api functions are shown in the graphical user interface of the engineering in Visual Studio
   */
  var convertedParameter1 = TcHmi.ValueConverter.toNumber(functionParameter1);
  if (convertedParameter1 === null) {
    // parameter is null: define what to do in this case

    // exit function call if the execution without this parameter is not possible
    return;
  }

  var convertedParameter2 = TcHmi.ValueConverter.toBoolean(functionParameter2);
  if (convertedParameter2 === null) {
    // parameter is null: define what to do in this case

    // exit function call if the execution without this parameter is not possible
    return;
  }

  // implement function logic with the evaluation of the parameters here
}

```



### 14.2.2.2.3.4.7 Events

Framework control events defined in Description.json should be triggered in Control.js/ts. The name of the event must be named like the "[name \[► 1544\]](#)" of the event in Description.json. An event can be triggered in different situations, e.g. when a certain record changes (see "[.onDataChanged \[► 250\]](#)" in the [data grid \[► 218\]](#)).

An event is triggered in Control.js/ts via the EventProvider of the framework. The framework API function "EventProvider.raise()" is used for this purpose. When the event is triggered, the concrete control instance must be identified with "this.\_\_id".

```
// raise .onMyCustomEvent event
TcHmi.EventProvider.raise(this.__id + '.onMyCustomEvent');
```

Optionally, parameters can be passed to the event callbacks when the event is triggered.

```
// declare parameter: type anything
var myParameterObject = 42;
// raise .onMyCustomEvent event with event parameters
TcHmi.EventProvider.raise(this.__id + '.onMyCustomEvent', myParameterObject);
```

The response to the triggered events can take place in Engineering via the [Properties window \[► 60\]](#) or via the registration of the event in a [Code Behind file \[► 1475\]](#).



If `allowPreventDefault` is allowed in the [event definition \[► 1544\]](#), the `myParameterObject` should offer `preventDefault` as a function. All DOM and jQuery event objects meet this requirement, for example. This function is called if the user has set the option for this event in Engineering.

### 14.2.2.2.3.4.8 Access rights

[User-specific access rights \[► 1546\]](#) defined in Description.json and [configured in engineering \[► 60\]](#) should be checked and evaluated in Control.js/ts. Depending on the user-specific [access rights \[► 963\]](#), specific elements can be switched visible or invisible or enabled or disabled, for example.

The evaluation of the configured access rights is performed via the framework API function "TcHmi.Access.checkAccess()". The current instance of the control is passed to the function (this) and the name of the right to be checked, which must correspond to the definition in Description.json.

```
// check user access of "myCustomRight" that is defined in the description.json
if (TcHmi.Access.checkAccess(this, 'myCustomRight') === true) {
    // current user has the rights to do this

    // process actions with the right
    // show elements, enable buttons, etc.
} else {
    // Current user has no rights to do this

    // process actions without the rights
    // hide elements, disable buttons, etc.
}
```



Since user management only works when authentication is active, the configured functions are not available in normal live view. From version 1.12 a live view with authentication is offered.

### 14.2.2.2.3.5 CustomDatatype.Schema.json

Within a framework control project, user-specific and complex data types can be implemented if the data type is not covered by a standard data type. In principle, any data structures can be transferred as objects without the need for a user-specific data type. A user-specific data type is required if an editor is to be provided for generating the data in Engineering. The data editor is generically based on a given JSON schema.

The following user-specific data types can be implemented:

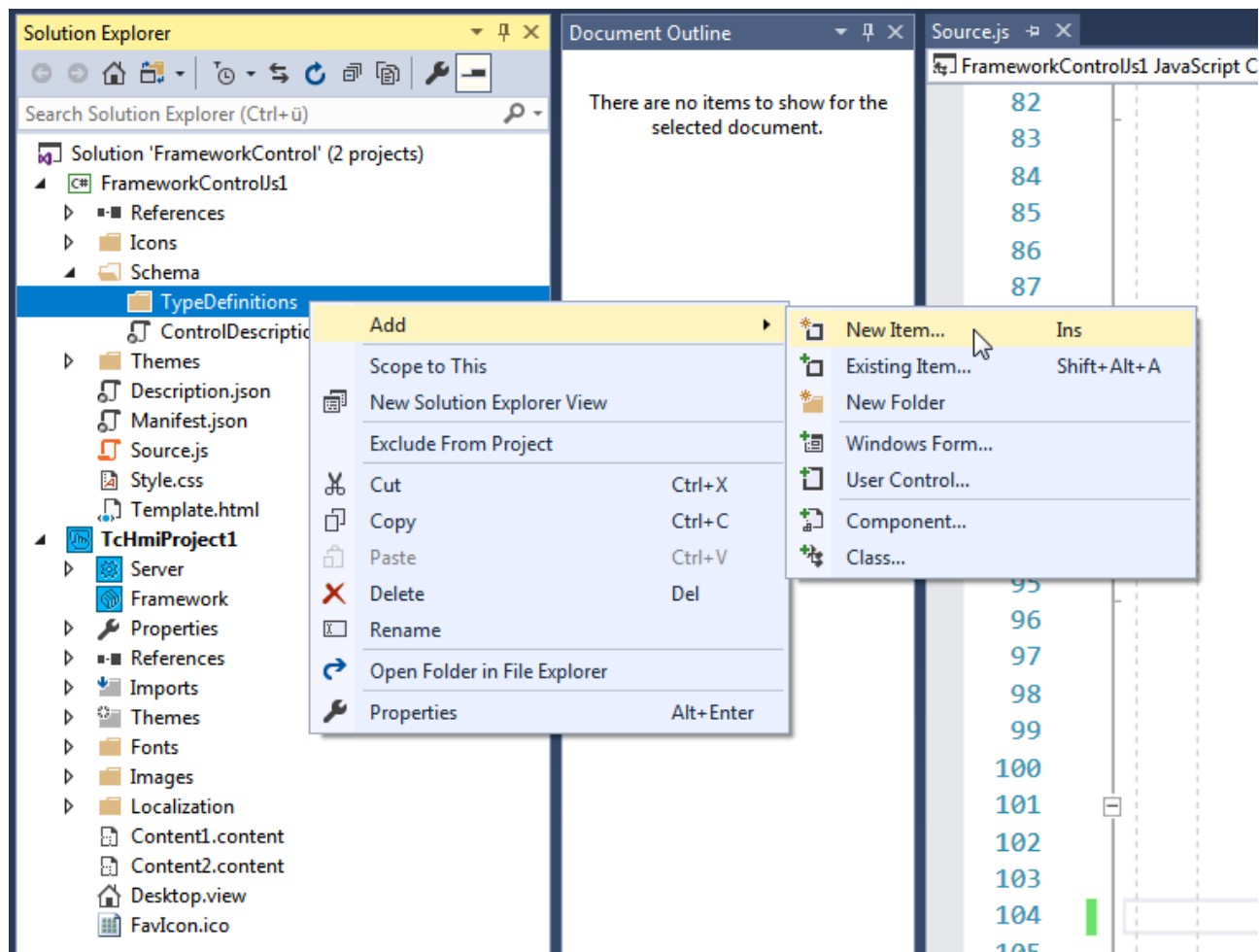
- [Objects \[► 1568\]](#) with fixed properties

- Array [► 1570] of any data types
- Enumerations [► 1572]
- Limitation [► 1573] of several allowed data types

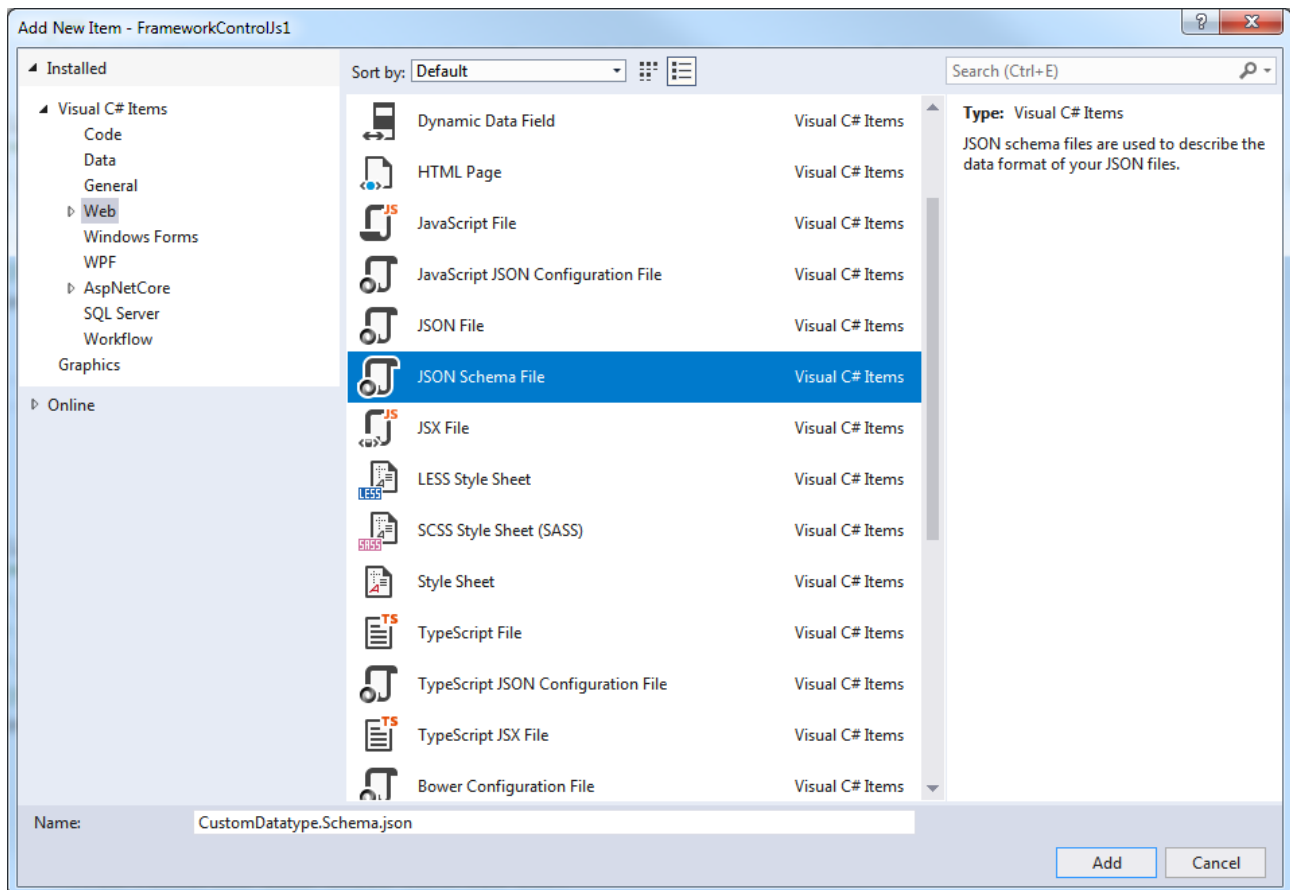
The usage within the TypeScript/JavaScript file is described in a separate [documentation section](#) [► 1574].

#### 14.2.2.2.3.5.1 Creating a custom data type

Add a new element (**New item...**) in the **TypeDefinitions** folder under **Schema**.



Add a new **JSON file** or **JSON schema file** to the project.



Reference the schema file in Description.json under "[dataTypes](#) [[1546](#)]". Note that user-specific data types are assigned to the "Framework" category.

```
"dataTypes": [
  {
    "schema": "Schema/TypeDefinitions/CustomDatatype.Schema.json"
  }
]
```

You can then use the user-specific data type within Description.json.

```
"type": "tchmi:framework#/definitions/CustomDatatype"
```

**i** If the framework control is already referenced in an HMI project, a project build (see [First Steps](#) [[1477](#)]) must then be executed and the HMI project reloaded so that the new data type is included in the type descriptions of the HMI project.

#### 14.2.2.2.3.5.2 Implementing a custom data type

The configuration of a JSON schema for the framework follows a certain structure.

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "{DatatypeName}": {
      "title": " {DatatypeName} ",
      "type": "array",
      //...
    }
  }
}
```

Each JSON schema contains a definition that describes the data type ({DatatypeName}). The definition of the data type contains the specification (type) and the description of the data type through attributes depending on the respective data type.

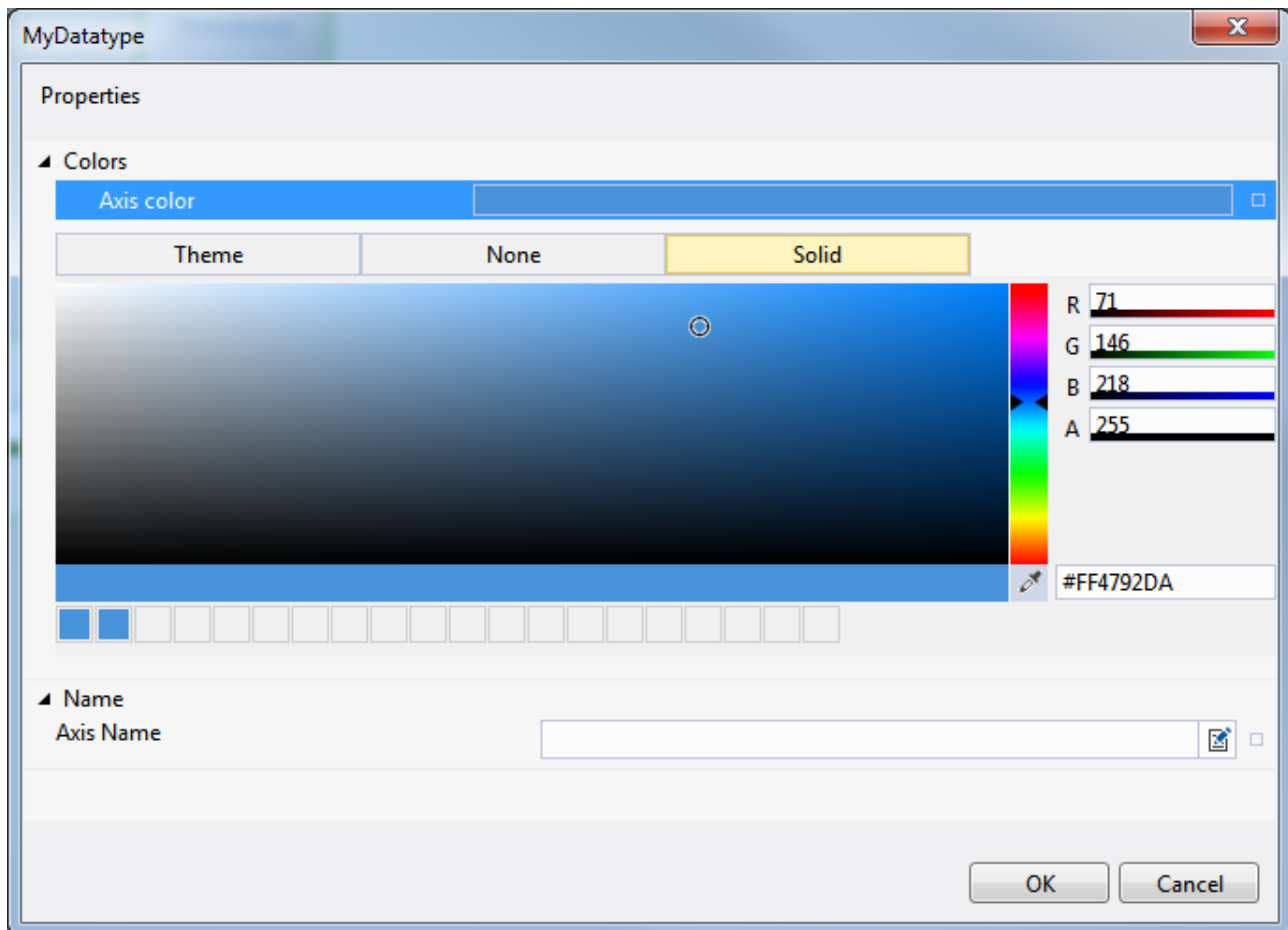
### 14.2.2.2.3.5.2.1 Objects

Objects can contain any properties. A property is described under Properties and can be refined through optional metadata (propertiesMeta).

The following JSON schema describes an object with two properties.

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "CustomDatatype": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "title": "CustomDatatype",
      "type": "object",
      "engineeringColumns": ["axisName"],
      "propertiesMeta": [
        {
          "name": "axisName",
          "category": "Name",
          "displayName": "Axis Name",
          "displayPriority": 10,
          "description": "",
          "defaultValue": null,
          "defaultValueInternal": null
        },
        {
          "name": "axisColor",
          "category": "Colors",
          "displayName": "Axis color",
          "displayPriority": 10,
          "description": "",
          "defaultValue": null,
          "defaultValueInternal": {
            "color": "#4794da"
          }
        }
      ],
      "properties": {
        "axisName": {
          "type": "string"
        },
        "axisColor": {
          "$ref": "tchmi:framework#/definitions/SolidColor"
        }
      },
      "required": [ "axisName" ]
    }
  }
}
```

This results in the following generic data editor in Engineering.



## Explanations

### propertiesMeta:

The metadata of the properties are optional. They describe the display within the generic data editor. The metadata are described by the following properties:

- `name` {String}: Internal name of the property, see "[name \[► 1536\]](#)" in Description.json.  
**Info:** The name must match the name under the properties.
- `category` {String}: Name of the category under which the property is displayed in the generic data editor, see "[category \[► 1539\]](#)" in Description.json.
- `displayName` {String}: Name of the property displayed in the generic data editor, see "[displayName \[► 1537\]](#)" in Description.json.
- `displayPriority` {Number}: Priority of the display, see "[displayPriority \[► 1538\]](#)" in Description.json.
- `description` {String}: Description of the property, see "[description \[► 1540\]](#)" in Description.json.
- `defaultValue`: Default value used initially in engineering, see "[defaultValue \[► 1541\]](#)" in Description.json.
- `defaultValueInternal`: Internal default value, see "[defaultValueInternal \[► 1542\]](#)" in Description.json.

### properties:

The name and data type of the object properties are described under Properties. The name is determined by the name of the property. The data type can be described as follows:

- `type` {String}: Default JSON data type of the property, or
- `$ref` {String, reference}: Reference to a framework data type. This can be implemented within the project or taken from the existing data type descriptions of the framework.

**required:**

The required properties are listed under "required". The list is based on the internal name. If a property of the object that is set to required is not set in Engineering, the generic data editor displays a warning.

**engineeringColumns:**

If this object is used as part of an [array](#) [▶ 1570], the values of these properties are displayed in the array overview.

**14.2.2.2.3.5.2.2 Arrays**

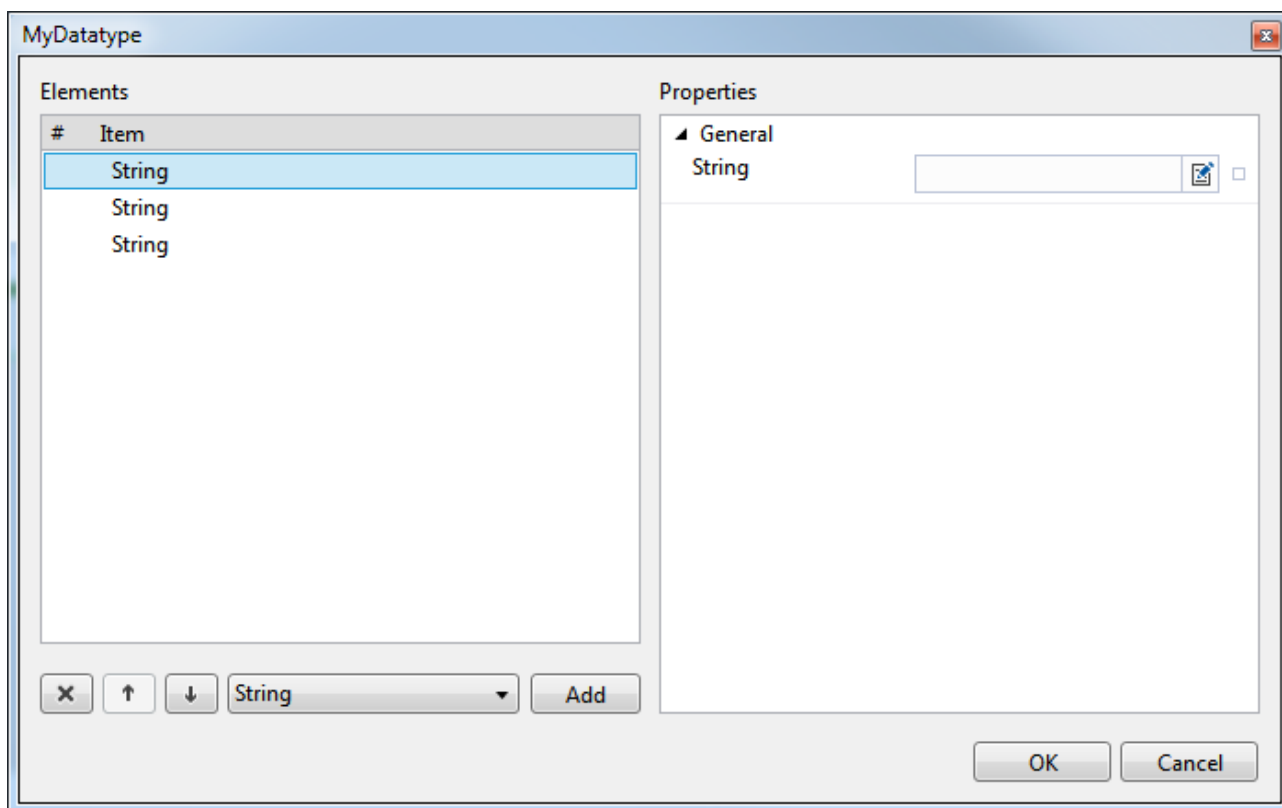
Arrays can be created from simple data types and complex objects.

**Array of simple data types**

Simple data types are specified within the "items" property under the "type" data type property. The following schema defines an array of strings.

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "CustomDatatype": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "title": "CustomDatatype",
      "type": "array",
      "items": {
        "type": "string"
      }
    }
  }
}
```

This schema generates the following generic data editor in Engineering.



The generic data editor displays the array elements on the left-hand side under the name of the respective data type (in the sample: string). If a self-defined name is to be displayed instead, an object with a property of the type of the data type must be selected instead of the simple data type, and the "displayName" of the property must be set in the metadata.

## Array of complex data types

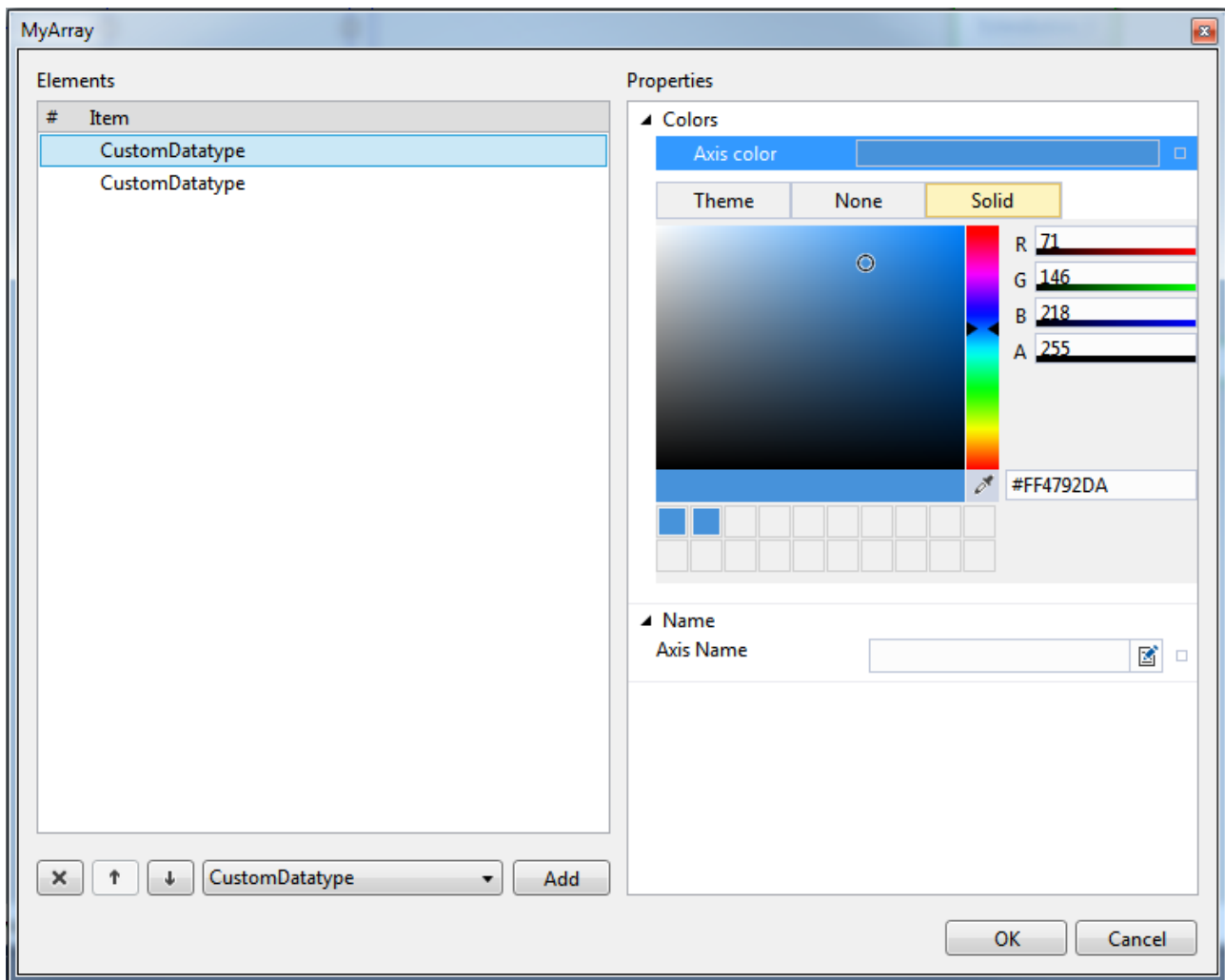
Complex data types are specified in the property "items" under the reference property "\$ref". The following schema defines an array of objects of data type "CustomDatatype". This data type was previously implemented as [Object \[► 1568\]](#).

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "MyArray": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "title": "MyArray",
      "type": "array",
      "items": {
        "$ref": "tchmi:framework#/definitions/CustomDatatype"
      }
    }
  }
}
```

Furthermore, it is possible to describe the object directly within the array definition. The following schema describes the same array with the definition of the object within the property "items".

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "MyArrayInlineObject": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "title": "MyArrayInlineObject",
      "type": "array",
      "items": {
        "type": "object",
        "title": "CustomObject",
        "description": "Defines a custom object in the array.",
        "engineeringColumns": ["axisName"],
        "propertiesMeta": [
          {
            "name": "axisName",
            "category": "Name",
            "displayName": "Axis Name",
            "displayPriority": 10,
            "description": "",
            "defaultValue": null,
            "defaultValueInternal": null
          },
          {
            "name": "axisColor",
            "category": "Colors",
            "displayName": "Axis color",
            "displayPriority": 10,
            "description": "",
            "defaultValue": null,
            "defaultValueInternal": {
              "color": "#4794da"
            }
          }
        ],
        "properties": {
          "axisName": {
            "type": "string"
          },
          "axisColor": {
            "$ref": "tchmi:framework#/definitions/SolidColor"
          }
        },
        "required": [ "axisName" ]
      }
    }
  }
}
```

Both schema files generate the following generic data editor in Engineering.



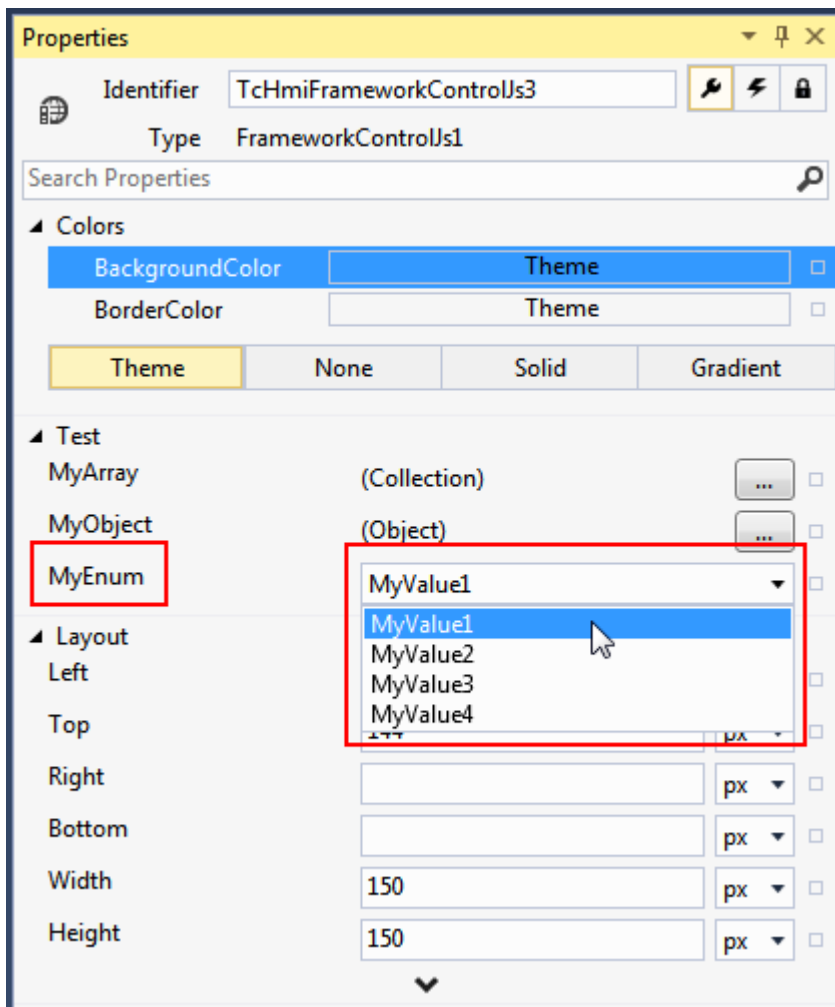
#### 14.2.2.3.5.2.3 Enumerations

Enumerations can contain any elements for the data type string. In the Engineering, enumerations are not displayed in the generic data editor, but in the combo box in the Properties window. The permissible values of the enumeration are defined in the property "enum" in an array. The following schema defines an exemplary enumeration.

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "MyEnum": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "title": "MyEnum",
      "type": "string",
      "enum": [ "MyValue1", "MyValue2", "MyValue3", "MyValue4" ]
    }
  }
}
```

This results in the following display in Engineering.





#### 14.2.2.2.3.5.2.4 Restrict permitted data types

User-specific data types can be restricted so that only certain data types can be transferred. As a result, when creating a [binding](#) [► 108] only the symbols corresponding to the permitted data types are displayed.

The following schema defines an exemplary restriction of permissible values (`oneOf`). Only values that have the data type "Time" or "TimeSpan" are permitted.

```
{
  "$schema": "http://json-schema.org/draft-04/schema",
  "definitions": {
    "MyConstrainedDatatype": {
      "$schema": "http://json-schema.org/draft-04/schema",
      "oneOf": [
        {
          "title": "Time",
          "$ref": "tchmi:general#/definitions/DateTime"
        },
        {
          "title": "Timespan",
          "$ref": "tchmi:general#/definitions/TimeSpan"
        }
      ]
    }
  }
}
```

The display in Engineering is normally an attribute. However, only bindings to symbols that correspond to the permitted data types can be created.

#### 14.2.2.2.4 Extended functionalities

Some advanced features and tips for developing controls are explained here.

#### 14.2.2.2.4.1 Handling of complex data types

In many cases a control is intended to work with a complex data type, e.g. from the PLC. Alternatively, control configurations are to be created as an object or array. To do this, a [JSON schema](#) [► 1565] must be created and [referenced](#) [► 1546] accordingly in description.json.

However, the information in the schemas cannot be used directly in TypeScript. To do this, a [TypeScript interface](#) must be defined manually in your own source code.

**Note:** In old templates, `modules TcHmi` was used instead of `namespace TcHmi`. The resulting JavaScript code is exactly the same. However, this syntax is outdated and is therefore no longer used in newer templates.

The TypeScript interface should be defined within the `namespace` area of the project name.

```
namespace TcHmi.Controls {
  export namespace FrameworkPrjDatatype {
    export class FrameworkPrj1Control extends TcHmi.Controls.System.TcHmiControl {
      constructor(element: JQuery, pcElement: JQuery, attrs:
TcHmi.Controls.ControlAttributeList) {
        super(element, pcElement, attrs);
        // more here

      }
    }
    export interface plcValue {
      /** Count Down on rising edge */
      CountDown: boolean;
      /** Load Start Value */
      LOAD: boolean;
      /** Start Value */
      PV: number;
    }
  }
}
TcHmi.Controls.registerEx('FrameworkPrj1Control', 'TcHmi.Controls.FrameworkPrjDatatype',
TcHmi.Controls.FrameworkPrjDatatype.FrameworkPrj1Control);
```

If the control still has the old `module` syntax, this can simply be changed. To do this, simply replace the keyword `module` with `namespace`. If you do not want to do this, a new `namespace` must be added in parallel to `module` of the project name. The TypeScript interface can then be defined here.

```
module TcHmi {
  export module Controls {
    export module FrameworkPrjDatatypeOld {
      export class FrameworkPrj1Control extends TcHmi.Controls.System.TcHmiControl {
        // more here

      }
    }

    export namespace FrameworkPrjDatatypeOld {
      export interface plcValue {
        /** Count Down on rising edge */
        CountDown: boolean;
        /** Load Start Value */
        LOAD: boolean;
        /** Start Value */
        PV: number;
      }
    }

    registerEx('FrameworkPrjTsDatatypes', 'TcHmi.Controls.FrameworkPrjDatatypeOld',
FrameworkPrjDatatypeOld.FrameworkPrj1Control);
  }
}
```

The data type is now known as `TcHmi.Controls.FrameworkPrjDatatype.plcValue`. As the control class is in the same scope, the type can be accessed with the identifier `FrameworkPrjDatatype.plcValue`.

An [attribute setter and process function](#) [► 1559] can look like the following, for example:

```
protected __value: FrameworkPrjDatatype.plcValue | undefined;

public setValue(valueNew: FrameworkPrjDatatype.plcValue | null) {
    // convert the value with the value converter
    let convertedValue = TcHmi.ValueConverter.toObject<typeof valueNew>(valueNew);
    // check if the converted value is valid
    if (convertedValue === null) {
        // if we have no value to set we have to fall back to the defaultValueInternal from
        description.json
        convertedValue = this.getAttributeDefaultValueInternal('Value') as
        FrameworkPrjDatatype.plcValue;
    }

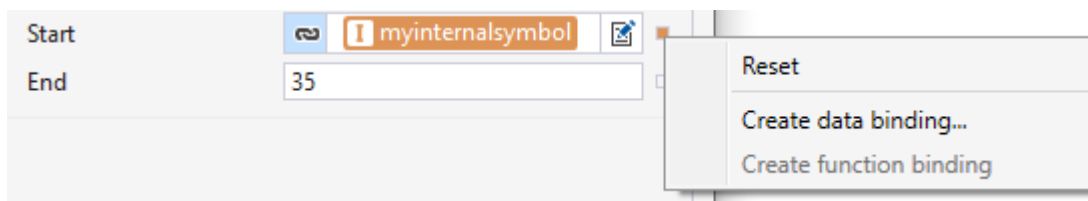
    if (tchmi_equal(convertedValue, this.__value)) {
        // skip processing when the value has not changed
        return;
    }
    // remember the new value
    this.__value = convertedValue;
    // inform the system that the function has a changed result.
    TcHmi.EventProvider.raise(this.__id + '.onPropertyChanged', { propertyName: 'Value' });
    // call process function to process the new value
    this.__processValue();
}

protected __processValue() {
    if (this.__value) {
        this.__value.CountDown; // known to TypeScript
        this.__value.PV; // even tooltip "Start Value" is shown
    }
}
```

Custom control administration objects can be defined and used in the same way.

#### 14.2.2.2.4.2 Handling of symbol expressions in objects

A control setter can contain objects that contain symbol expressions. The control must enable this for each attribute individually via the property `allowSymbolExpressionsInObject` [► 1541]. In this case this is shown in Visual Studio as follows:



For this purpose, the source code that deals with `attribute handling` [► 1559] must be adapted accordingly.

First an existing `ObjectResolver` has to be located. If successful, this will be destroyed. Then a new `ObjectResolver` with the new object (which may contain the symbol expression) is created and saved. At the same time a `watch` function is linked, which is called initially and when changes in referenced symbols occur.

This `watch` function checks whether the control is currently visible. If this is not the case, the `ObjectResolver` is put into a waiting state. If the control is made visible later, all `ObjectResolvers` are reactivated by the system. If an error occurs, processing is aborted with an error message.

Processing is terminated when the new value is identical to the old value. If the value is changed, the new value is saved, and the system is notified about the change and responds to it.

Instead of the generic type `object`, a more specific TypeScript type definition [► 1574] can be used.

```
protected __value: object | undefined;

/**
 * @description Setter function for 'data-tchmi-value' attribute.
 * @param valueNew the new value or null
 */
public setValue(valueNew: object | null): void {
    // convert the value with the value converter
    let convertedValue = TcHmi.ValueConverter.toObject<object>(valueNew);

    // check if the converted value is valid
```

```

    if (convertedValue === null) {
        // if we have no value to set we have to fall back to the defaultValueInternal from description.json
        convertedValue = this.getAttributeDefaultValueInternal('Value') as object;
    }

    let resolverInfo = this.__objectResolvers.get('value');

    if (resolverInfo) {
        if (resolverInfo.watchDestroyer) {
            resolverInfo.watchDestroyer();
        }
        resolverInfo.resolver.destroy();
    }

    let resolver = new Symbol.ObjectResolver(convertedValue);

    this.__objectResolvers.set('value', {
        resolver: resolver,
        watchCallback: this.__onResolverForMyAttributeWatchCallback,
        watchDestroyer: resolver.watch(this.__onResolverForMyAttributeWatchCallback)
    });
}

/**
 * The watch callback for the value object resolver.
 */
protected __onResolverForMyAttributeWatchCallback = (data: Symbol.ObjectResolver.IWatchResultObject<Transform[]>) => {
    if (this.__isAttached === false) { // While not attached attribute should only be processed once during initializing phase.
        this.__suspendObjectResolver('value');
    }

    if (data.error !== TcHmi.Errors.NONE) {
        TcHmi.Log.error('[Source=Control, Module=TcHmi.Controls.System.TcHmiControl, Id=' + this.getId() + ', Attribute=Value] Resolving symbols from object failed with error: ' + TcHmi.Log.buildMessage(data.details));
    }

    return;
}

if (tchmi_equal(data.value, this.__value)) {
    return;
}

this.__value = data.value;

TcHmi.EventProvider.raise(this.__id + '.onPropertyChanged', { propertyName: 'Value' });

this.__processValue();
};

public __processValue() {
    // process actions with Value
    // ...
}

```

#### 14.2.2.4.3 Handling of control inheritance

If several of your own controls require an identical part of the source code, it is advisable to put them on a common inheritance basis. In this way, common attributes could be implemented in a base class and then used in all derived controls.

Each custom control can be seen in the context of inheritance. All controls are at least derived from the base control `TcHmiControl`. From this, each control inherits the base functionality such as positioning (including [Left](#) [▸ 760], [Top](#) [▸ 761], [Width](#) [▸ 761], [Height](#) [▸ 762]) and the handling of the [life cycle](#) [▸ 1552].

Inheritance is defined in two places in a control. First in the attribute [base](#) [▸ 1533] in the metadata of `description.json`. This inheritance is also defined in the TypeScript/JavaScript source code in the [Base framework](#) [▸ 1554] of the control.

Methods and properties within the source code are marked in TypeScript either as `public`, `protected` or `private`. `Public` resources can be used/accessed from any location. These are therefore part of the public interface (API) of a control. `Protected` resources, on the other hand, are only intended for derived classes. In contrast, `private` resources are really only accessible to the class itself.

#### 14.2.2.2.4.4 Dynamic control generation

Controls can create additional foreign controls and use them in their own context. This enables the system to respond to events of these child controls.

##### Example using the ControlFactory API

In this example the API of the ControlFactory is used. When the control is created, the child control is created and attached to its own representation.

By defining the parent, the child control is embedded in its own life cycle, so that the child control is automatically managed at the same time.

In addition, an event handler is registered to respond to events of the child control. Note that this event registry must be cleaned up in a dedicated Destroy action in order to fix a memory leak.

See also [Control life cycle \[► 1552\]](#)

```
protected __childOnPressedDestroyEvent: DestroyFunction | undefined;

public __init() {
    super.__init();

    let childName = this.__id + '_startAction';
    let myButton = TcHmi.ControlFactory.createEx<TcHmi.Controls.Beckhoff.TcHmiButton> (
        'TcHmi.Controls.Beckhoff.TcHmiButton',
        childName,
        {
            'data-tchmi-top': 25,
            'data-tchmi-left': 250,
            'data-tchmi-width': 200,
            'data-tchmi-height': 50,
            'data-tchmi-text': 'Start Action',
            'data-tchmi-background-color': {
                'color': 'rgba(55, 55, 55, 1)'
            },
            'data-tchmi-state-symbol': '%s%PLC1.MAIN.testBool%/s%' // Binding a symbol to an attribute
        },
        this // marks our control as the parent
    );
    if (myButton) {
        // Append to our DOM. This will be detected by the framework and its __attach function will
        // be called automatically.
        this.__element.append(myButton.getElement());
        this.__childOnPressedDestroyEvent = TcHmi.EventProvider.register(childName + '.onPressed', ()
=> {
            // do something
        });

        // Binding a symbol to an attribute after control creation
        Binding.createEx2('%s%PLC1.MAIN.anotherBool%/s%', 'StateSymbol', myButton);
    }
}

public destroy() {
    if (this.__keepAlive) {
        return;
    }
    if (this.__childOnPressedDestroyEvent) {
        this.__childOnPressedDestroyEvent();
    }
    super.destroy();
}
```

### Example of a child control embedded in the template

Child controls can also be embedded directly in the [Template \[► 1547\]](#) of a control. The same syntax is used for this as is used in engineering to represent a control in code. The only difference is the {Id} placeholder, which is replaced by the actual ID when the control is compiled.

It is mandatory to use the {Id} placeholder, otherwise it would be impossible to create more than one instance of the control. The compilation of the second instance would run into an error because it would try to create a control with a name already assigned.

```
<div class="TcHmi_Controls_Example-template">
  <div id="{Id}_startAction" data-tchmi-type="TcHmi.Controls.Beckhoff.TcHmiButton"
    data-tchmi-top="25" data-tchmi-left="250"
    data-tchmi-width="200" data-tchmi-height="50"
    data-tchmi-text="Start Action" data-tchmi-state-symbol="%s%PLC1.MAIN.testBool%/s%"
  >
    <script data-tchmi-target-attribute="data-tchmi-background-color" type="application/json">
      {
        "color": "rgba(55, 55, 55, 1)"
      }
    </script>
  </div>
</div>
```

The instance of the child control can then be accessed in `__previnit` or `__init` of the control:

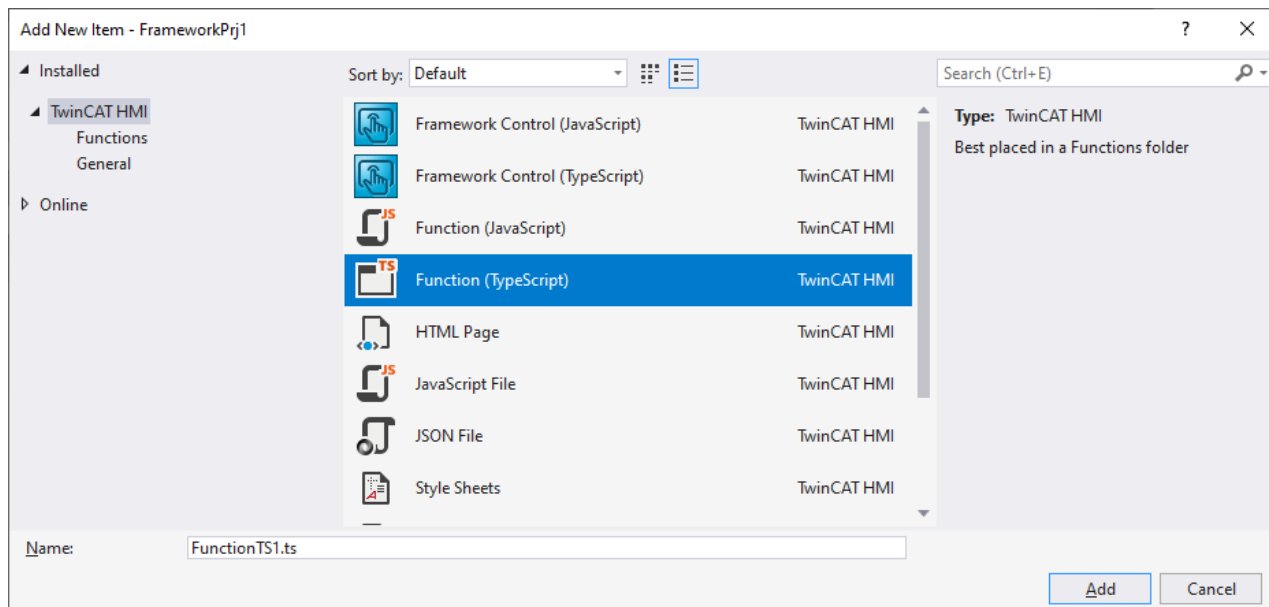
```
let button = Controls.get<TcHmi.Controls.Beckhoff.Button>(this.getId() + '_startAction');
```

### 14.2.2.3 Functions

A function consists of the file containing the source code and a JSON file with corresponding metadata. These two files do not necessarily have to be created in a separate folder. Depending on the number of functions, it may be useful to group them together in a folder.

A function can be created based on TypeScript or JavaScript. Both have the same technical options and are very similar in terms of programming. Due to the better Visual Studio programming support offered by Visual Studio, TypeScript should be selected for new functions.

To create a new function, right-click on the destination folder in the context menu and select **Add new Item**.



A file for TypeScript/JavaScript is now created, along with a file containing the matching metadata.

The files are identical to functions that can be created within an HMI project. We therefore refer to the [documentation for these functions \[► 1471\]](#) here.

The metadata file must have a reference in [Manifest.json](#) [► 1527] within a framework package in order to be able to use it.

# 15 Samples

Some projects are made available for free use on the GitHub platform.

These illustrate the functionality of the product so that it can easily be understood.

## GitHub:

TE2000 Client provides some examples of simple to complex TwinCAT HMI controls and the build infrastructure

TF2000 Server provides some examples of how TwinCAT HMI server extensions are created.

## 15.1 Controls

### 15.1.1 Barchart

#### 15.1.1.1 Version 1.10

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9692152075.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9692152075.zip)

#### 15.1.1.2 Version 1.12

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9716767627.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9716767627.zip)

### 15.1.2 Combobox

#### 15.1.2.1 Version 1.10

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9692154379.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9692154379.zip)

#### 15.1.2.2 Version 1.12

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9716769931.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9716769931.zip)

### 15.1.3 Datagrid

#### 15.1.3.1 Version 1.10

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9692412683.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9692412683.zip)

#### 15.1.3.2 Version 1.12

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9716772235.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9716772235.zip)

### 15.1.4 Event Grid

#### 15.1.4.1 Version 1.10

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9692414987.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9692414987.zip)



**15.1.4.2      Version 1.12**

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9716774539.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9716774539.zip)

**15.1.5      Grid****15.1.5.1      Version 1.10**

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9692417291.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9692417291.zip)

**15.1.5.2      Version 1.12**

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9716776843.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9716776843.zip)

**15.1.6      Linechart****15.1.6.1      Version 1.10**

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9692419595.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9692419595.zip)

**15.1.6.2      Version 1.12**

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9716779147.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9716779147.zip)

**15.1.7      Scope****15.1.7.1      Version 1.12**

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/10739569675.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/10739569675.zip)  
[1.12.748.0]

**15.1.8      Trend Line Chart****15.1.8.1      Version 1.10**

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9692421899.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9692421899.zip)

**15.1.8.2      Version 1.12**

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9716794251.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9716794251.zip)

**15.2      Recipe management****15.2.1      Version 1.10**

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9692516107.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9692516107.zip)

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9692424203.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9692424203.zip)

## **15.2.2      Version 1.12**

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9716798859.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9716798859.zip)

[https://infosys.beckhoff.com/content/1033/TE2000\\_TC3\\_HMI\\_Engineering/Resources/9716796555.zip](https://infosys.beckhoff.com/content/1033/TE2000_TC3_HMI_Engineering/Resources/9716796555.zip)

## 16 FAQ

### 16.1 General

#### Which system requirements do I need for the TwinCAT HMI?

An overview of the system requirements can be found [in the system requirements](#). [[▶ 20](#)]

#### Which browser can I use for the TwinCAT HMI client?

An overview of the recommended HTML5-capable browsers can be found [in the system requirements](#) [[▶ 20](#)].

#### Can I use projects from the TC3 PLC HMI (TF1800) in the TwinCAT HMI?

The use of projects created with the TC3 PLC HMI is not possible.

#### Is there a tutorial that will help me get started with TwinCAT HMI?

The [QuickStart](#) [[▶ 31](#)] offers a good introduction to the TwinCAT HMI.

#### Is there a training course for the TwinCAT HMI?

There are three different training courses for the TwinCAT HMI:

1. TR7050: Basics TwinCAT HMI (3 days).
2. TR7060: Extension of TwinCAT HMI [Controls](#) [[▶ 1530](#)] (1 day).
3. TR7065: Extension of TwinCAT HMI [Server Extensions](#) [[▶ 1452](#)] (1 day).

You will find an overview of the training courses and upcoming dates [on our website](#).

#### Are there sample projects for the TwinCAT HMI?

An overview of the sample projects can be found [in the chapter Samples](#) [[▶ 1580](#)].

### 16.2 Server

#### How do I transfer the project to my target system?

Carry out the following steps to transfer the project to the target system:

1. Install the TwinCAT HMI Server ([install TF2000](#)) on the target system.
2. Start the TwinCAT HMI Server on the target system and assign an administrator password on the [configuration page of the server](#).
3. Perform a [project publish](#) [[▶ 949](#)] to the target system.

#### I have no access to the target system. Can I transfer the project offline?

A transfer of the project without access to the target system is possible. To do this, perform the following steps:

4. Install the TwinCAT HMI Server ([install TF2000](#)) on the target system and on your engineering system.
5. Perform a [project publish](#) [[▶ 949](#)] on the TF2000 TwinCAT HMI Server on your engineering system.
6. Copy the entire contents of the folder:

Version 1.10: *C:\ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server*

Version 1.12: *C:\ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server\service\{TcHmiInstanceName}*

7. Transfer the folder content to the target system (e.g. via USB stick).
8. Add the folder content to the following folder on the target system:  
  
Version 1.10: `C:\ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server`  
  
Version 1.12: `C:\ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server\service\{TcHmiInstanceName}`
9. Start the TwinCAT HMI Server on the target system.
10. To use encrypted communication via HTTPS, it is necessary for the server to issue a new certificate, as this is created with a local system hash. To do this, open the configuration page from the server and navigate to TcHmiSrv ▢ Security.
11. Delete the existing entry at **Certificate**:

The screenshot shows the TcHmiSrv configuration window with the 'Security' tab selected. A red arrow points from the 'Security' tab to the 'Certificate' section. The 'Certificate' section is expanded, showing a table of certificate details. The 'Select a file' button is highlighted with a red arrow and a mouse cursor.

TcHmiSrv				
General	Advanced	Security	Symbols	Webserver

**TcHmiSrv**

Only client certificates allowed to authenticate

Approved certificate necessary to establish a https connection

Lockout Protection

Enabling client certificate requires a local endpoint

> Client Certificates

Login user automatically

Auto logoff

▼ Certificate

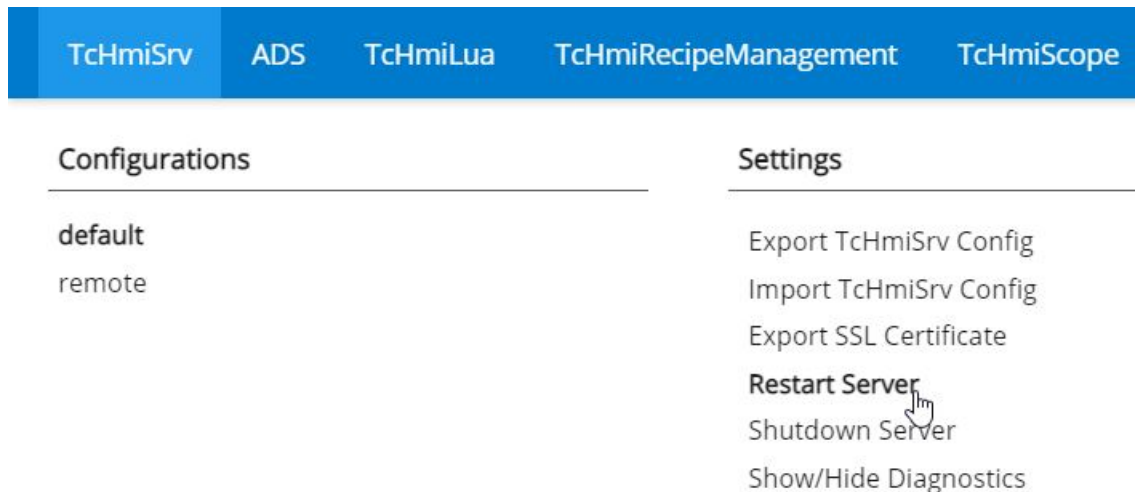
PEM formatted certificate

Version	3
Subject	
Issuer	
Valid to	
Valid from	
Serial Number	
Thumbprint	
Signature Algorithm	RSA-SHA256

Select a file

12. Confirm with OK.

13. The server must then be restarted so that a new certificate can be generated. To do this, restart the TcHmiSrv service or restart the current server instance via the configuration page.



⇒ You can now use the project.

### The publish process failed due to a version difference. What can I do?

For a project publish, the server version (TF2000) on the target system must match the engineering version (TE2000) (versions 1.8 and 1.10). Please observe the [version overview](#) [► 22].

### I forgot the password of the user "\_\_SystemAdministrator". What can I do?

If you have forgotten the password of the user "\_\_SystemAdministrator", there are the following possibilities:

1. You have another user who is a member of the "\_\_SystemAdministrators" group. Log in with this user on the configuration page of the server and reset the password of the user "\_\_SystemAdministrator".
2. Reset the server.

### How can I reset the server?

To reset the server, perform the following steps:

1. Stop the server via the SysTray icon by clicking on "Shutdown".
2. Start the "TwinCAT HMI Server Factory reset" shortcut. Confirm the confirmation prompt with "Yes". The server starts up briefly and performs a reset.
3. Restart the TwinCAT HMI Server. The server is now reset. The password of the user "\_\_SystemAdministrator" must be initialized again.

### I cannot find the target server with the Discovery function in the Publish dialog. What can I do?

This can have the following causes:

1. The password of the user "\_\_SystemAdministrator" was not initialized. For security reasons, the server cannot be found using the discovery function.
  - **Solution 1:** Enter the IP address of the destination server under connection settings. Click "Validate Connection". In this case, the dialog for initializing the "\_\_SystemAdministrator" password in engineering opens.
  - **Solution 2:** Initialize the user "\_\_SystemAdministrator" on the target server.
2. The password of the user "\_\_SystemAdministrator" has not been initialized and the server has been starting for more than five minutes. The server must be restarted for security reasons.
  - **Solution:** Connect to the target system, restart the server and initialize the user "\_\_SystemAdministrator".
3. There are connection problems. Check the steps in the question below.

## I can't connect to my target server. What can I do?

This can have the following causes:

1. There is no network connection to the system.
  - Check the network connection to the system (e.g. using a ping command).
2. The system's firewall is blocking access.
  - Check the firewall settings on the target system and enable the port on which the TwinCAT HMI Server is running (e.g. port 1010 for http or 1020 for https).
3. The port that you want to use to access the server has not been released in the server.
  - Add Port on the [configuration page of the server](#).

## How can I share an additional port on the server?

How to share additional ports on the server can be found [here](#).

## The server reports "License error". What can I do?

The TwinCAT HMI Server can only be started if a valid license is available on the target system. [Activate a license](#) [► 26] on the target system.

## How can I start the TwinCAT HMI Server automatically?

A recommendation on this topic can be found in the chapter [Autostart Client](#) [► 953].



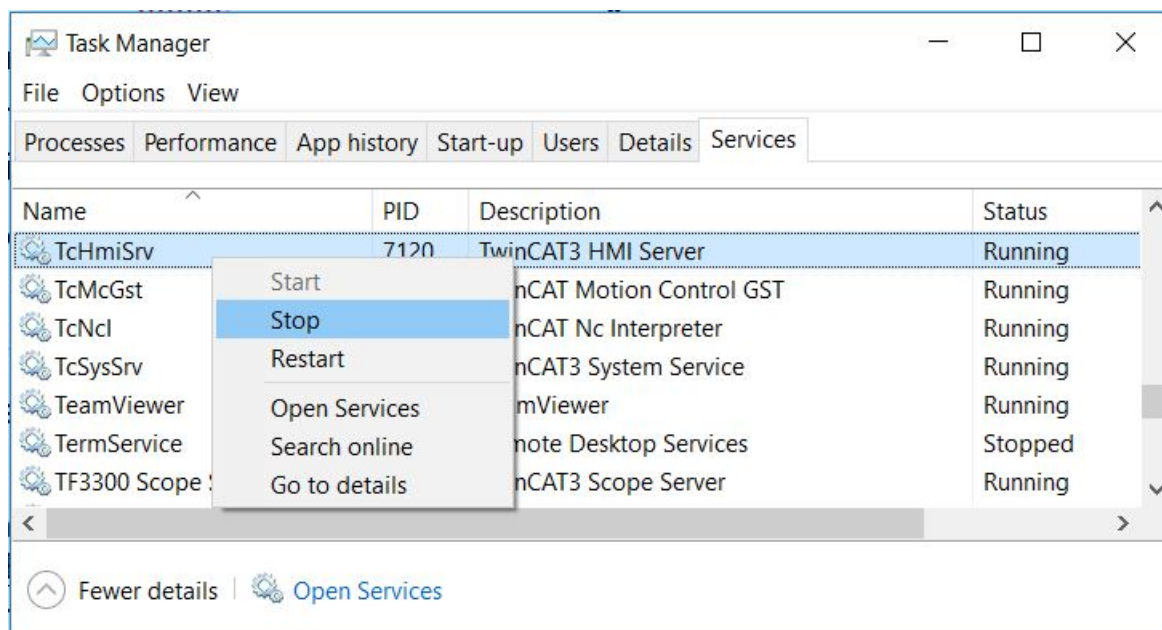
With version 1.12 the TwinCAT HMI Server is automatically started with the system startup via the service *TcHmiSrv*.

## How can I start multiple instances of the TwinCAT HMI Server on one system?

Since version 1.12, multiple server instances can be started on one system. This function is included in the basic TF2000 license. The target and client licenses are shared among the server instances, so you need licenses for the sum of all connected targets or clients.

To start another server instance, proceed as follows:

1. Stop the service from the TwinCAT HMI Server (**TcHmiSrv**). You can do this in the Task Manager under the services:



- Navigate to the following folder on the system hard disk:  
`C:\ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server\service.`
- Create a new folder for the additional server instance. The folder name specifies the name of the instance. The default instance has the name "*TcHmiProject*".
- Start the service again via the Task Manager.
  - ⇒ There are now multiple server instances initially running on the same port. Since this is not allowed, the ports must be changed.
- Open the configuration page of the default server instance at **TcHmiSrv - Web server** and change the ports to free ports.

**TcHmiSrv**

Running as service with project TcHmiProject

[Remote Server](#)  
[Allowed certificates for remote servers](#)

Enable cache: true

Cache max age: P30D

Cache max entry size: 1048576

Cache max size: 2097152

[Client priority list](#)  
 Ip addresses of preferred clients. If client limit is reached this clients will be able to connect and clients which are not in this list will be disconnected.

Client-Cache max age: 0

Cookie expiration date: P30D

Gzip compression level: GZIP\_MEDIUM

SSDP discovery: Enabled on alternative port

**Endpoints**  
**https://0.0.0.0:1020**  
 https://0.0.0.0:1021

**http://127.0.0.1:1010**  
 http://127.0.0.1:1011

[+ Add](#)

- Confirm the changes by clicking **Accept** at the bottom of the page.



7. Change the name of the instance at **TcHmiSrv - General** and confirm the changes by clicking on **Accept**. Enter the name you used for the folder name here.

TcHmiSrv

Running as service with project TcHmiProject

> Configurations

> Default document

Default Locale

Leave empty to use client locale

Default Time Locale

Leave empty to use client locale

Default timezone

Leave empty to use client timezone

> Extensions

> Files

Project name

Project version

Authentication required

> Usergroups

> UsergroupUsers

> Virtual directories

Accept

8. Repeat the procedure from steps 3 to 7 for additional server instances.

⇒ The server instances are now accessible via different ports.



In the future, a service management page will be provided in the TwinCAT HMI server which will make it easy to create further instances.

## 16.3 Client

### How can I access the HMI with a client?

After you have published a project on the server, you can access the system from any client. Open a browser and enter the URL of the server. This usually consists of the IP address and the port number.

- http: <http://127.0.0.1:1010>
- https: <https://127.0.0.1:1020>

### How can I access the HMI from a mobile end device?

You can access the HMI from mobile end devices in the same way as from desktop PCs.

### How can I establish an encrypted connection to a mobile end device?

Some mobile browsers block connections with self-signed certificates. In this case, you can install the certificate on the device:

1. Export the self-signed certificate of the server.



2. Transfer the certificate to the mobile device. You can, for example, send it to the device by email.
  3. Install the certificate on the mobile end device (click on the certificate and follow the wizard).
- ⇒ You can now access the HMI.

If you do not want to install the certificate on the device and want to provide a general secure access from mobile end devices, you can issue an official certificate of a CA and import it into the server.

### Can I start the client automatically?

The client can be started automatically. Some browsers also support starting in full screen mode. Information on this topic can be found in the Autostart Client [► 954] chapter.

## 16.4 Communication

### Which communication protocols does TwinCAT HMI support?

The TwinCAT HMI supports communication via ADS to TwinCAT systems [► 1109] and communication via OPC UA to OPC UA servers [► 1126]. In addition, the TwinCAT HMI servers can exchange data with each other via server-to-server communication [► 1447].

A server extension [► 1452] offers further communication options.

### How do I use the ADS extension?

You can configure the connection to TwinCAT systems in the ADS extension. You will find instructions on how to do this in the ADS chapter [► 1109]. The data points can then be used [► 108] in TwinCAT HMI.

### How do I use the OPC UA Client Extension?

In the OPC UA Client Extension you can configure connections to OPC UA Servers. Instructions can be found in the chapter OPC UA Client [► 1126]. The data points can then be used [► 108] in TwinCAT HMI.

### How can I check the connection status to my target system?

With the ADS extension and with the OPC UA client extension you can click on "Diagnosis" on the configuration page of the server [► 956]. There you can view the current connection status.

### I cannot establish a connection to my TwinCAT system. What can I do?

Check whether a route to TwinCAT exists. The TwinCAT system must be in Run mode and the PLC must be started.

### I have transferred my project to the target server. Afterwards, no data points from the TwinCAT system are displayed. The data points were displayed on the engineering system. What could be the cause?

The following causes are possible:

1. In the TwinCAT HMI Server, a distinction is made between local profiles and remote profiles [► 956]. With a project publish, [► 949] a remote profile (selected in the Publish dialog) is transferred to the target server. Check the connection settings of the ADS extension for the remote profile.
2. There are not enough target licenses on the target server. One target license is required per TwinCAT system. Activate [► 26] additional target licenses.

### I cannot transfer my project with OPC-UA-Client-Extension to the target system. What could be the cause?

The OPC-UA-Client-Extension requires the license TF2110. Activate this license [► 26] on the target system and run the project publish [► 949] again.

**Can a TwinCAT HMI server communicate with another TwinCAT HMI server?**

TwinCAT HMI servers can communicate with each other via [server-to-server communication](#) [► 1447].

## 16.5 Framework

**How can I realize a page switching?**

Page switching can be implemented via the control [TcHmiRegion](#) [► 829]. You will find instructions on how to do this in the [chapter Creating Navigation](#) [► 43].

**Can I develop my own controls for the TwinCAT HMI?**

The development of user-specific controls in HTML5, JavaScript and CSS 3 is possible via so-called "[Framework Controls](#) [► 1530]".

**How can I integrate a Framework Control into other TwinCAT HMI projects?**

A Framework Control can be [exported as a package](#) [► 1036] via Package Management and [installed](#) [► 1030] in other TwinCAT HMI projects.

**Is there a training for the development of Framework Controls?**

The one-day training course TR7060 can be attended for the development of Framework Controls. The dates can be found on our [website](#).

**Can I integrate external libraries into the TwinCAT HMI?**

The TwinCAT HMI Framework offers an API that can be used to implement many functions. The integration of external web libraries is possible within a [Framework Control](#) [► 1530]. The external library must be integrated into the Framework Control project. In the [Description.json](#) [► 1531] a [reference](#) [► 1534] to the files of the library must be created.

**I have created a Framework Control. This is not displayed in the TwinCAT HMI Designer or in the LiveView. What could be the cause?**

JavaScript is an interpreted scripting language, therefore syntax errors etc. can only be detected at runtime. Such an error may result in the Control not being displayed in the Designer or LiveView. The [Developer Tools](#) [► 1595] of the browsers offer a possibility for diagnosis. These developer tools also allow you to debug a control.

# 17 Appendix

## 17.1 Return Codes

### 17.1.1 ADS Return Codes

Grouping of error codes:

Global error codes: 0x0000 [► 1591]... (0x9811\_0000 ...)

Router error codes: 0x500 [► 1591]... (0x9811\_0500 ...)

General ADS errors: 0x700 [► 1592]... (0x9811\_0700 ...)

RTime error codes: 0x1000 [► 1594]... (0x9811\_1000 ...)

#### Global error codes

Hex	Dec	HRESULT	Name	Description
0x0	0	0x98110000	ERR_NOERROR	No error.
0x1	1	0x98110001	ERR_INTERNAL	Internal error.
0x2	2	0x98110002	ERR_NORTIME	No real time.
0x3	3	0x98110003	ERR_ALLOCLOCKEDMEM	Allocation locked – memory error.
0x4	4	0x98110004	ERR_INSERTMAILBOX	Mailbox full – the ADS message could not be sent. Reducing the number of ADS messages per cycle will help.
0x5	5	0x98110005	ERR_WRONGRECEIVEHMSG	Wrong HMSG.
0x6	6	0x98110006	ERR_TARGETPORTNOTFOUND	Target port not found – ADS server is not started, not reachable or not installed.
0x7	7	0x98110007	ERR_TARGETMACHINENOTFOUND	Target computer not found – AMS route was not found.
0x8	8	0x98110008	ERR_UNKNOWNCMDID	Unknown command ID.
0x9	9	0x98110009	ERR_BADTASKID	Invalid task ID.
0xA	10	0x9811000A	ERR_NOIO	No IO.
0xB	11	0x9811000B	ERR_UNKNOWNAMSCMD	Unknown AMS command.
0xC	12	0x9811000C	ERR_WIN32ERROR	Win32 error.
0xD	13	0x9811000D	ERR_PORTNOTCONNECTED	Port not connected.
0xE	14	0x9811000E	ERR_INVALIDAMSLENGTH	Invalid AMS length.
0xF	15	0x9811000F	ERR_INVALIDAMSNETID	Invalid AMS Net ID.
0x10	16	0x98110010	ERR_LOWINSTLEVEL	Installation level is too low –TwinCAT 2 license error.
0x11	17	0x98110011	ERR_NODEBUGINTAVAILABLE	No debugging available.
0x12	18	0x98110012	ERR_PORTDISABLED	Port disabled – TwinCAT system service not started.
0x13	19	0x98110013	ERR_PORTALREADYCONNECTED	Port already connected.
0x14	20	0x98110014	ERR_AMSSYNC_W32ERROR	AMS Sync Win32 error.
0x15	21	0x98110015	ERR_AMSSYNC_TIMEOUT	AMS Sync Timeout.
0x16	22	0x98110016	ERR_AMSSYNC_AMSERROR	AMS Sync error.
0x17	23	0x98110017	ERR_AMSSYNC_NOINDEXINMAP	No index map for AMS Sync available.
0x18	24	0x98110018	ERR_INVALIDAMSSPORT	Invalid AMS port.
0x19	25	0x98110019	ERR_NOMEMORY	No memory.
0x1A	26	0x9811001A	ERR_TCPSEND	TCP send error.
0x1B	27	0x9811001B	ERR_HOSTUNREACHABLE	Host unreachable.
0x1C	28	0x9811001C	ERR_INVALIDAMSFRAGMENT	Invalid AMS fragment.
0x1D	29	0x9811001D	ERR_TLSSSEND	TLS send error – secure ADS connection failed.
0x1E	30	0x9811001E	ERR_ACCESSDENIED	Access denied – secure ADS access denied.

#### Router error codes

Hex	Dec	HRESULT	Name	Description
0x500	1280	0x98110500	ROUTERERR_NOLOCKEDMEMORY	Locked memory cannot be allocated.
0x501	1281	0x98110501	ROUTERERR_RESIZEMEMORY	The router memory size could not be changed.
0x502	1282	0x98110502	ROUTERERR_MAILBOXFULL	The mailbox has reached the maximum number of possible messages.
0x503	1283	0x98110503	ROUTERERR_DEBUGBOXFULL	The Debug mailbox has reached the maximum number of possible messages.
0x504	1284	0x98110504	ROUTERERR_UNKNOWNPORTTYPE	The port type is unknown.
0x505	1285	0x98110505	ROUTERERR_NOTINITIALIZED	The router is not initialized.
0x506	1286	0x98110506	ROUTERERR_PORTALREADYINUSE	The port number is already assigned.
0x507	1287	0x98110507	ROUTERERR_NOTREGISTERED	The port is not registered.
0x508	1288	0x98110508	ROUTERERR_NOMOREQUEUES	The maximum number of ports has been reached.
0x509	1289	0x98110509	ROUTERERR_INVALIDPORT	The port is invalid.
0x50A	1290	0x9811050A	ROUTERERR_NOTACTIVATED	The router is not active.
0x50B	1291	0x9811050B	ROUTERERR_FRAGMENTBOXFULL	The mailbox has reached the maximum number for fragmented messages.
0x50C	1292	0x9811050C	ROUTERERR_FRAGMENTTIMEOUT	A fragment timeout has occurred.
0x50D	1293	0x9811050D	ROUTERERR_TOBEREMOVED	The port is removed.

### General ADS error codes

Hex	Dec	HRESULT	Name	Description
0x700	1792	0x98110700	ADSERR_DEVICE_ERROR	General device error.
0x701	1793	0x98110701	ADSERR_DEVICE_SRVNOTSUPP	Service is not supported by the server.
0x702	1794	0x98110702	ADSERR_DEVICE_INVALIDGRP	Invalid index group.
0x703	1795	0x98110703	ADSERR_DEVICE_INVALIDOFFSET	Invalid index offset.
0x704	1796	0x98110704	ADSERR_DEVICE_INVALIDACCESS	Reading or writing not permitted. Several causes are possible. For example, an incorrect password was entered when creating routes.
0x705	1797	0x98110705	ADSERR_DEVICE_INVALIDSIZE	Parameter size not correct.
0x706	1798	0x98110706	ADSERR_DEVICE_INVALIDDATA	Invalid data values.
0x707	1799	0x98110707	ADSERR_DEVICE_NOTREADY	Device is not ready to operate.
0x708	1800	0x98110708	ADSERR_DEVICE_BUSY	Device is busy.
0x709	1801	0x98110709	ADSERR_DEVICE_INVALIDCONTEXT	Invalid operating system context. This can result from use of ADS blocks in different tasks. It may be possible to resolve this through multitasking synchronization in the PLC.
0x70A	1802	0x9811070A	ADSERR_DEVICE_NOMEMORY	Insufficient memory.
0x70B	1803	0x9811070B	ADSERR_DEVICE_INVALIDPARM	Invalid parameter values.
0x70C	1804	0x9811070C	ADSERR_DEVICE_NOTFOUND	Not found (files, ...).
0x70D	1805	0x9811070D	ADSERR_DEVICE_SYNTAX	Syntax error in file or command.
0x70E	1806	0x9811070E	ADSERR_DEVICE_INCOMPATIBLE	Objects do not match.
0x70F	1807	0x9811070F	ADSERR_DEVICE_EXISTS	Object already exists.
0x710	1808	0x98110710	ADSERR_DEVICE_SYMBOLNOTFOUND	Symbol not found.
0x711	1809	0x98110711	ADSERR_DEVICE_SYMBOLVERSIONINVALID	Invalid symbol version. This can occur due to an online change. Create a new handle.
0x712	1810	0x98110712	ADSERR_DEVICE_INVALIDSTATE	Device (server) is in invalid state.
0x713	1811	0x98110713	ADSERR_DEVICE_TRANSMODENOTSUPP	AdsTransMode not supported.
0x714	1812	0x98110714	ADSERR_DEVICE_NOTIFYHNDINVALID	Notification handle is invalid.
0x715	1813	0x98110715	ADSERR_DEVICE_CLIENTUNKNOWN	Notification client not registered.
0x716	1814	0x98110716	ADSERR_DEVICE_NOMOREHDL	No further handle available.
0x717	1815	0x98110717	ADSERR_DEVICE_INVALIDWATCHSIZE	Notification size too large.
0x718	1816	0x98110718	ADSERR_DEVICE_NOTINIT	Device not initialized.
0x719	1817	0x98110719	ADSERR_DEVICE_TIMEOUT	Device has a timeout.
0x71A	1818	0x9811071A	ADSERR_DEVICE_NOINTERFACE	Interface query failed.
0x71B	1819	0x9811071B	ADSERR_DEVICE_INVALIDINTERFACE	Wrong interface requested.
0x71C	1820	0x9811071C	ADSERR_DEVICE_INVALIDCLSID	Class ID is invalid.
0x71D	1821	0x9811071D	ADSERR_DEVICE_INVALIDOBJID	Object ID is invalid.
0x71E	1822	0x9811071E	ADSERR_DEVICE_PENDING	Request pending.
0x71F	1823	0x9811071F	ADSERR_DEVICE_ABORTED	Request is aborted.
0x720	1824	0x98110720	ADSERR_DEVICE_WARNING	Signal warning.
0x721	1825	0x98110721	ADSERR_DEVICE_INVALIDARRAYIDX	Invalid array index.
0x722	1826	0x98110722	ADSERR_DEVICE_SYMBOLNOTACTIVE	Symbol not active.
0x723	1827	0x98110723	ADSERR_DEVICE_ACCESSDENIED	Access denied. Several causes are possible. For example, a unidirectional ADS route is used in the opposite direction.
0x724	1828	0x98110724	ADSERR_DEVICE_LICENSENOTFOUND	Missing license.
0x725	1829	0x98110725	ADSERR_DEVICE_LICENSEEXPIRED	License expired.
0x726	1830	0x98110726	ADSERR_DEVICE_LICENSEEXCEEDED	License exceeded.
0x727	1831	0x98110727	ADSERR_DEVICE_LICENSEINVALID	Invalid license.
0x728	1832	0x98110728	ADSERR_DEVICE_LICENSESYSTEMID	License problem: System ID is invalid.
0x729	1833	0x98110729	ADSERR_DEVICE_LICENSENOTIMELIMIT	License not limited in time.
0x72A	1834	0x9811072A	ADSERR_DEVICE_LICENSEFUTUREISSUE	Licensing problem: time in the future.
0x72B	1835	0x9811072B	ADSERR_DEVICE_LICENSETIMETOLONG	License period too long.
0x72C	1836	0x9811072C	ADSERR_DEVICE_EXCEPTION	Exception at system startup.
0x72D	1837	0x9811072D	ADSERR_DEVICE_LICENSEDUPLICATED	License file read twice.
0x72E	1838	0x9811072E	ADSERR_DEVICE_SIGNATUREINVALID	Invalid signature.
0x72F	1839	0x9811072F	ADSERR_DEVICE_CERTIFICATEINVALID	Invalid certificate.
0x730	1840	0x98110730	ADSERR_DEVICE_LICENSEOEMNOTFOUND	Public key not known from OEM.
0x731	1841	0x98110731	ADSERR_DEVICE_LICENSERESTRICTED	License not valid for this system ID.

Hex	Dec	HRESULT	Name	Description
0x732	1842	0x98110732	ADSERR_DEVICE_LICENSEDEMODENIED	Demo license prohibited.
0x733	1843	0x98110733	ADSERR_DEVICE_INVALIDFNCID	Invalid function ID.
0x734	1844	0x98110734	ADSERR_DEVICE_OUTOFRANGE	Outside the valid range.
0x735	1845	0x98110735	ADSERR_DEVICE_INVALIDALIGNMENT	Invalid alignment.
0x736	1846	0x98110736	ADSERR_DEVICE_LICENSEPLATFORM	Invalid platform level.
0x737	1847	0x98110737	ADSERR_DEVICE_FORWARD_PL	Context – forward to passive level.
0x738	1848	0x98110738	ADSERR_DEVICE_FORWARD_DL	Context – forward to dispatch level.
0x739	1849	0x98110739	ADSERR_DEVICE_FORWARD_RT	Context – forward to real-time.
0x740	1856	0x98110740	ADSERR_CLIENT_ERROR	Client error.
0x741	1857	0x98110741	ADSERR_CLIENT_INVALIDPARM	Service contains an invalid parameter.
0x742	1858	0x98110742	ADSERR_CLIENT_LISTEMPTY	Polling list is empty.
0x743	1859	0x98110743	ADSERR_CLIENT_VARUSED	Var connection already in use.
0x744	1860	0x98110744	ADSERR_CLIENT_DUPLINVOKEID	The called ID is already in use.
0x745	1861	0x98110745	ADSERR_CLIENT_SYNCTIMEOUT	Timeout has occurred – the remote terminal is not responding in the specified ADS timeout. The route setting of the remote terminal may be configured incorrectly.
0x746	1862	0x98110746	ADSERR_CLIENT_W32ERROR	Error in Win32 subsystem.
0x747	1863	0x98110747	ADSERR_CLIENT_TIMEOUTINVALID	Invalid client timeout value.
0x748	1864	0x98110748	ADSERR_CLIENT_PORTNOTOPEN	Port not open.
0x749	1865	0x98110749	ADSERR_CLIENT_NOAMSADDR	No AMS address.
0x750	1872	0x98110750	ADSERR_CLIENT_SYNCINTERNAL	Internal error in Ads sync.
0x751	1873	0x98110751	ADSERR_CLIENT_ADDHASH	Hash table overflow.
0x752	1874	0x98110752	ADSERR_CLIENT_REMOVEHASH	Key not found in the table.
0x753	1875	0x98110753	ADSERR_CLIENT_NOMORESVM	No symbols in the cache.
0x754	1876	0x98110754	ADSERR_CLIENT_SYNCRESINVALID	Invalid response received.
0x755	1877	0x98110755	ADSERR_CLIENT_SYNCPORTLOCKED	Sync Port is locked.
0x756	1878	0x98110756	ADSERR_CLIENT_REQUESTCANCELLED	The request was canceled.

### RTime error codes

Hex	Dec	HRESULT	Name	Description
0x1000	4096	0x98111000	RTERR_INTERNAL	Internal error in the real-time system.
0x1001	4097	0x98111001	RTERR_BADTIMERPERIODS	Timer value is not valid.
0x1002	4098	0x98111002	RTERR_INVALIDTASKPTR	Task pointer has the invalid value 0 (zero).
0x1003	4099	0x98111003	RTERR_INVALIDSTACKPTR	Stack pointer has the invalid value 0 (zero).
0x1004	4100	0x98111004	RTERR_PRIOEXISTS	The request task priority is already assigned.
0x1005	4101	0x98111005	RTERR_NOMORETCB	No free TCB (Task Control Block) available. The maximum number of TCBs is 64.
0x1006	4102	0x98111006	RTERR_NOMORESEMAS	No free semaphores available. The maximum number of semaphores is 64.
0x1007	4103	0x98111007	RTERR_NOMOREQUEUES	No free space available in the queue. The maximum number of positions in the queue is 64.
0x100D	4109	0x9811100D	RTERR_EXTIRQALREADYDEF	An external synchronization interrupt is already applied.
0x100E	4110	0x9811100E	RTERR_EXTIRQNOTDEF	No external sync interrupt applied.
0x100F	4111	0x9811100F	RTERR_EXTIRQINSTALLFAILED	Application of the external synchronization interrupt has failed.
0x1010	4112	0x98111010	RTERR_IRQNOTLESSOREQUAL	Call of a service function in the wrong context
0x1017	4119	0x98111017	RTERR_VMXNOTSUPPORTED	Intel VT-x extension is not supported.
0x1018	4120	0x98111018	RTERR_VMXDISABLED	Intel VT-x extension is not enabled in the BIOS.
0x1019	4121	0x98111019	RTERR_VMXCONTROLSMISSING	Missing function in Intel VT-x extension.
0x101A	4122	0x9811101A	RTERR_VMXENABLEFAILS	Activation of Intel VT-x fails.

### Specific positive HRESULT Return Codes:

HRESULT	Name	Description
0x0000_0000	S_OK	No error.
0x0000_0001	S_FALSE	No error. Example: successful processing, but with a negative or incomplete result.
0x0000_0203	S_PENDING	No error. Example: successful processing, but no result is available yet.
0x0000_0256	S_WATCHDOG_TIMEOUT	No error. Example: successful processing, but a timeout occurred.

### TCP Winsock error codes

Hex	Dec	Name	Description
0x274C	10060	WSAETIMEDOUT	A connection timeout has occurred - error while establishing the connection, because the remote terminal did not respond properly after a certain period of time, or the established connection could not be maintained because the connected host did not respond.
0x274D	10061	WSAECONNREFUSED	Connection refused - no connection could be established because the target computer has explicitly rejected it. This error usually results from an attempt to connect to a service that is inactive on the external host, that is, a service for which no server application is running.
0x2751	10065	WSAHOSTUNREACH	No route to host - a socket operation referred to an unavailable host.
More Winsock error codes: Win32 error codes			

## 17.2 Troubleshooting

The product version number can be found via the Systray icon, the Visual Studio menu **Help > About** or under **Programs** in the Windows Control Panel. Additional information is required:

- Visual Studio Version
- Operating system
- Windows error reports (if any)
- Console errors (if any)

### 17.2.1 Windows error reporting

If Visual Studio crashes, the engineering process (devenv.exe) generates a crash dump. This crash dump helps with error analysis. The crash dumps are located under the following path:  
 \User\Username\AppData\Local\CrashDumps. Please send this crash dump to Support with the product version number. Additionally, a project and instructions to recreate the problem would be very helpful.



If the Appdata folder is not visible, the hidden files are hidden.

Further information can be found via [Windows Error Reporting](#).

### 17.2.2 Client Console

Modern HTML5 browsers provide helpful developer tools for debugging and analyzing. For example, a console is provided in which errors and status messages can be displayed. The TwinCAT HMI server and framework use the console to output errors, warnings and debug information. The log level of the output can be adjusted via the [project settings](#) [► 53].

Further information can be found under these external links:

- [Chrome DevTools](#)
- [Mozilla Firefox Developer Tools](#)
- [Microsoft Edge F12 devtools](#)



### 17.2.3 Engineering server

When a TwinCAT HMI project is opened, a TwinCAT HMI Engineering server instance is started in the background. The server logs all messages in the Visual Studio output. In case of a crash, a dump of the server process is stored in the folder *TcHmiProject\engineering\_servers* . Please send this crash dump to Support with the product version number. Additionally, a project and instructions to recreate the problem would be very helpful.



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More Information:  
**[www.beckhoff.com/te2000](http://www.beckhoff.com/te2000)**

Beckhoff Automation GmbH & Co. KG  
Hülshorstweg 20  
33415 Verl  
Germany  
Phone: +49 5246 9630  
[info@beckhoff.com](mailto:info@beckhoff.com)  
[www.beckhoff.com](http://www.beckhoff.com)

