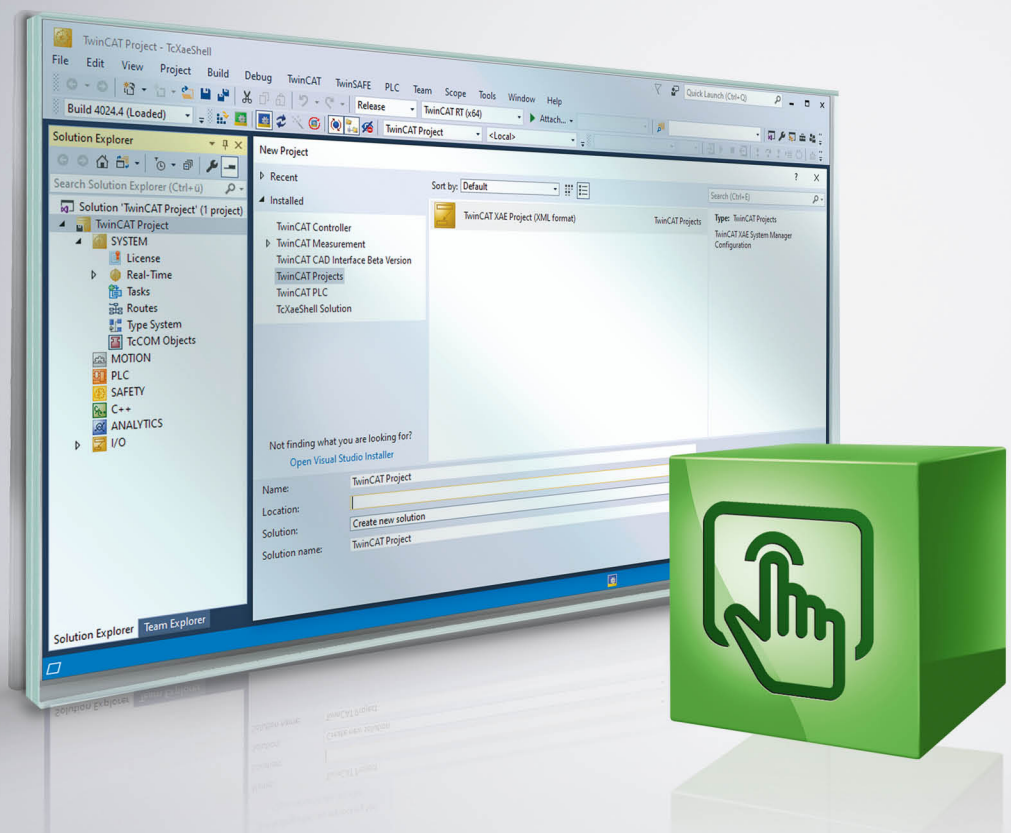
BECKHOFF New Automation Technology

Manual | EN

TF2000

TwinCAT 3 | HMI Server



2021-10-25 | Version: 1.1

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1 Foreword

1.1 Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with applicable national standards.
It is essential that the documentation and the following notes and explanations are followed when installing and commissioning the components.
It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.
We reserve the right to revise and change the documentation at any time and without prior announcement.
No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

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Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents:
EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702
with corresponding applications or registrations in various other countries.

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1.2 Safety instructions

Safety regulations

Please note the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

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

Description of symbols

In this documentation the following symbols are used with an accompanying safety instruction or note. The safety instructions must be read carefully and followed without fail!

⚠ DANGER

Serious risk of injury!

Failure to follow the safety instructions associated with this symbol directly endangers the life and health of persons.

⚠ WARNING

Risk of injury!

Failure to follow the safety instructions associated with this symbol endangers the life and health of persons.

⚠ CAUTION

Personal injuries!

Failure to follow the safety instructions associated with this symbol can lead to injuries to persons.

NOTE

Damage to the environment or devices

Failure to follow the instructions associated with this symbol can lead to damage to the environment or equipment.

Tip or pointer

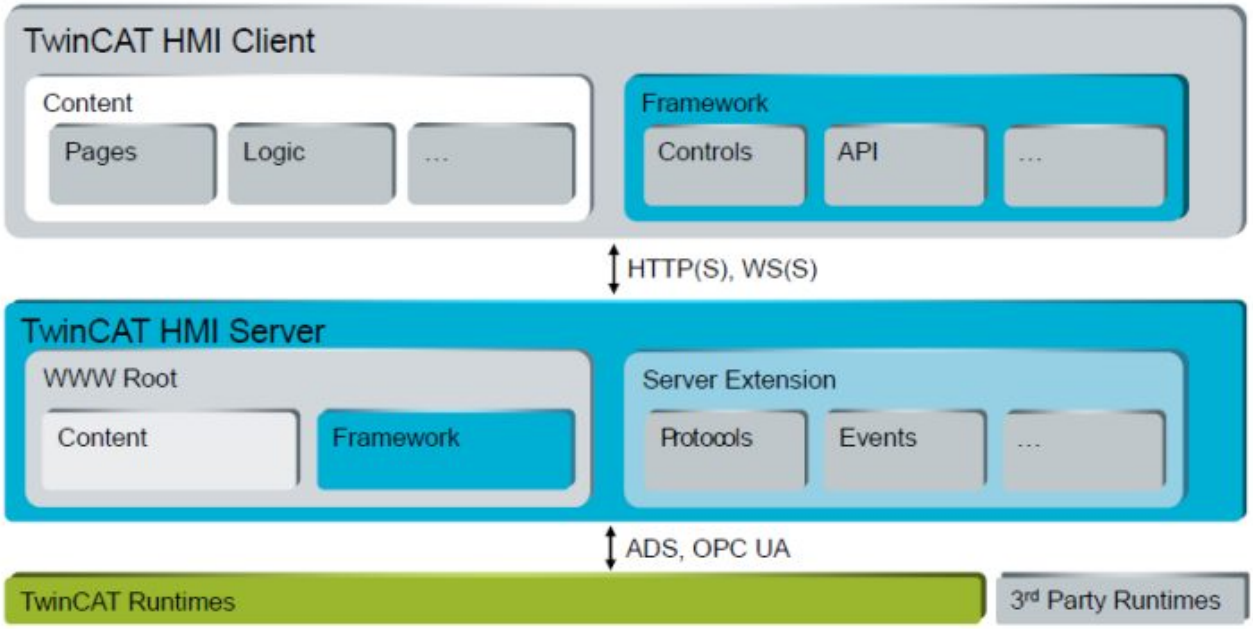
This symbol indicates information that contributes to better understanding.

2 Overview

2.1 Product description

The TwinCAT HMI server is a web server that was developed in-house by Beckhoff. It is platform-independent and not based on any web server functionalities of the operating system. The TwinCAT HMI server has a modular structure. Via server extensions it can provide additional functionalities such as a reporting system or other protocols. This enables customers to develop their own server extensions, so that their business logic can be provided centrally.

The TwinCAT HMI server supports the TwinCAT ADS protocol and can therefore communicate with all TwinCAT devices. Third-party systems can be connected via OPC UA extensions.



3 Installation

3.1 System requirements

Version 1.12

Technical data	TF2000 TC3 HMI server
Min. TwinCAT Version	3.1.4024.0
Min. TwinCAT level	TC1000 TC3 | ADS
Operating system	Windows 10 Windows CE7 TwinCAT/BSD

Version 1.10

Technical data	TF2000 TC3 HMI server
Min. TwinCAT Version	3.1.4022.0
Min. TwinCAT level	TC1000 TC3 | ADS
Operating system	Windows 7/8/10

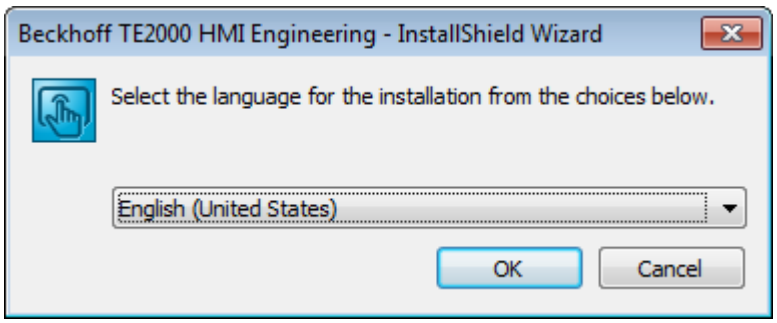
3.2 Installation

Procedure for installing the TwinCAT HMI Server for Windows-based operating systems except for Windows CE7:

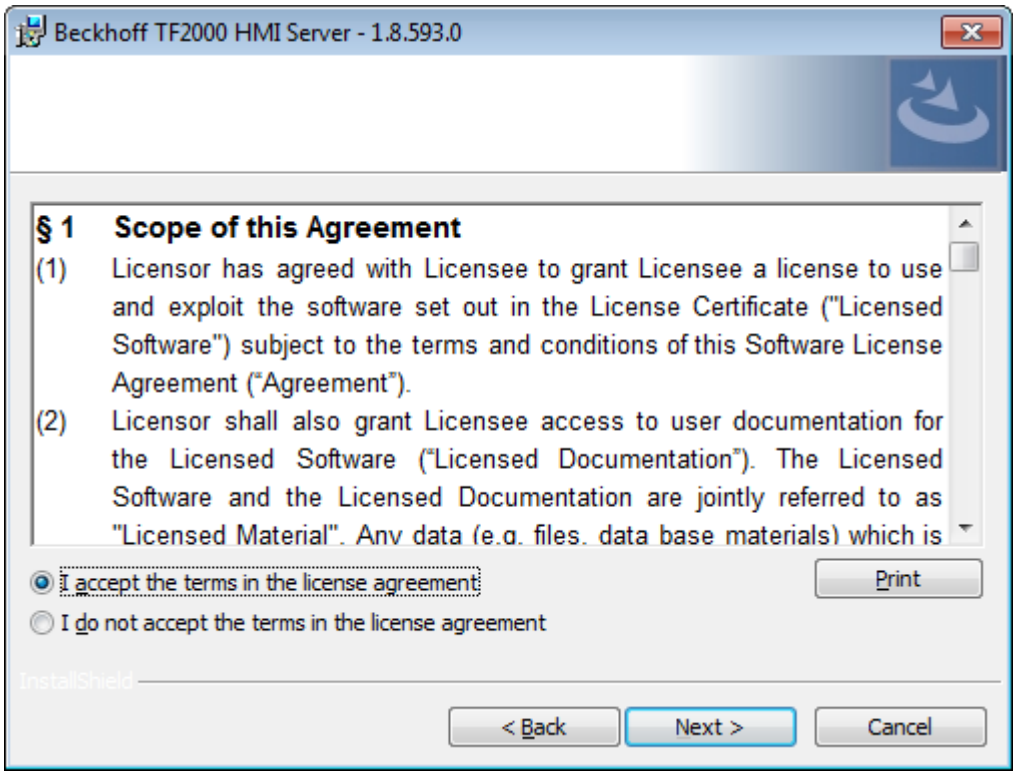
1. For an update installation, close all HMI server instances that may be running.

   This is done automatically by the setup starting with version 1.12.

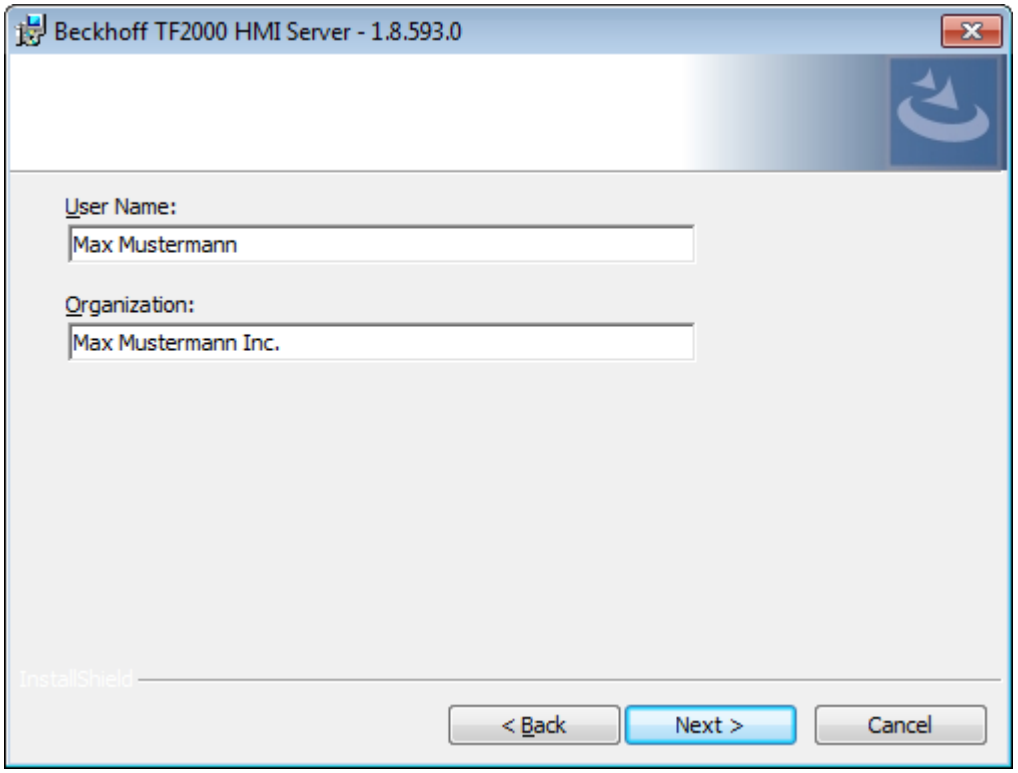
2. Double-click on the downloaded file *TF2000-HMI-Server*.
   Start the installation under Windows with **Run As Admin** by right-clicking the setup files and selecting the corresponding option in the context menu.
3. Select the language to guide you through the installation.



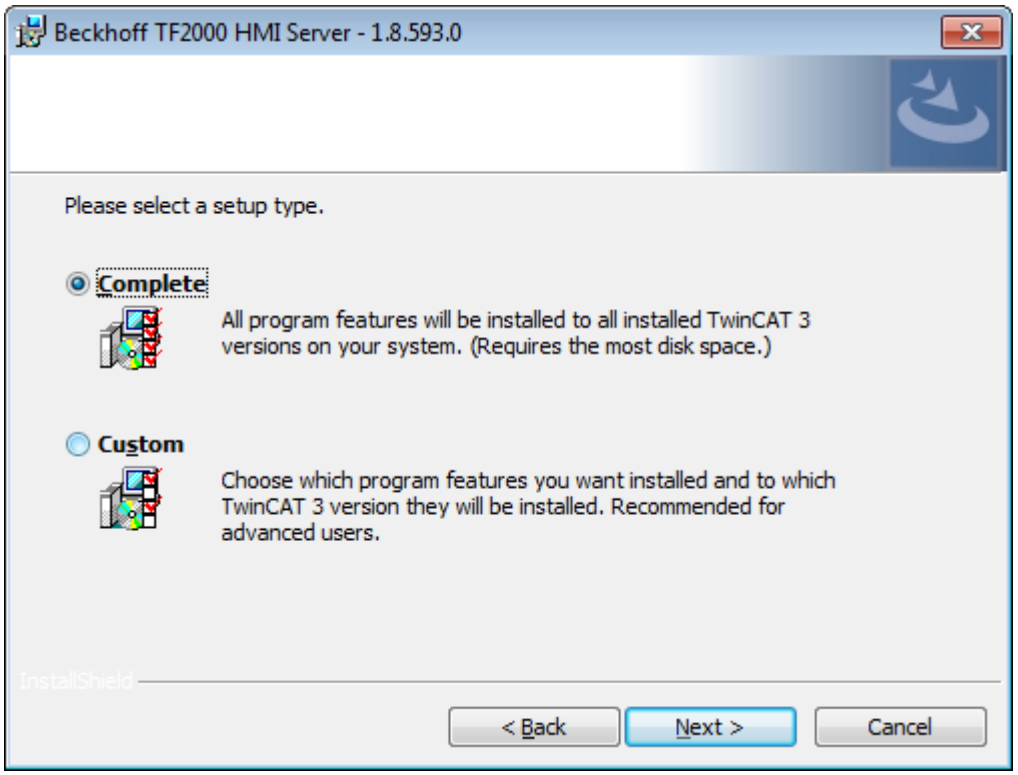
4. Click on **Next** and then accept the end user agreement.



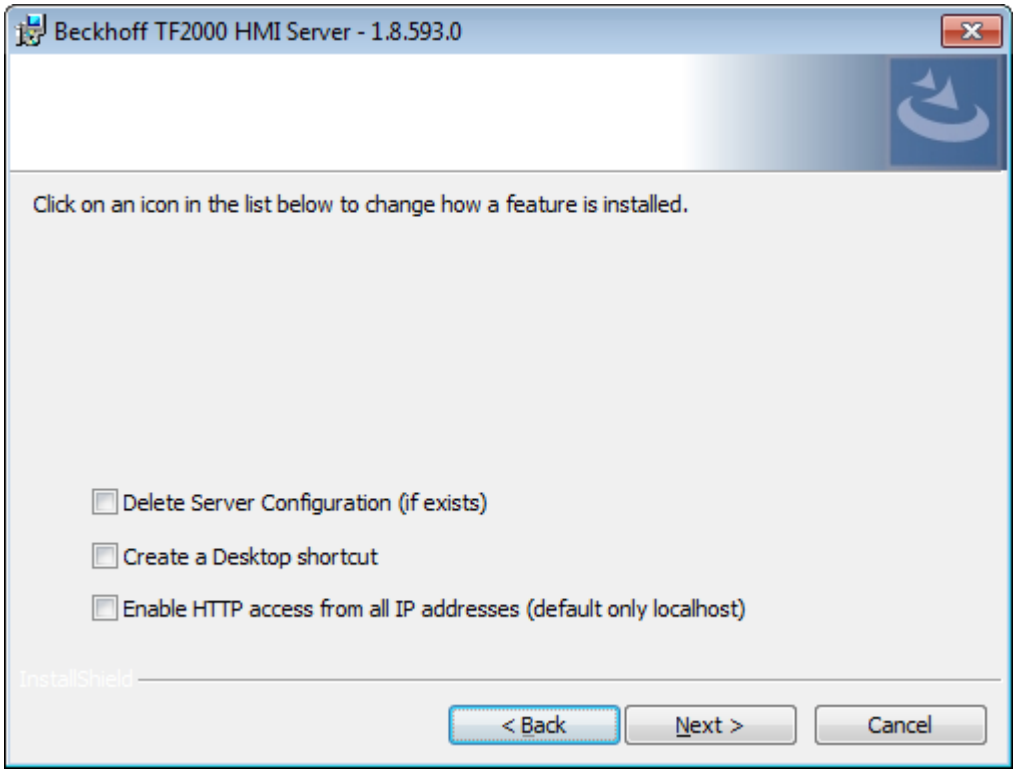
5. Enter your user data.



6. You have a choice between complete and user-specific installation. Confirm with **Next**.

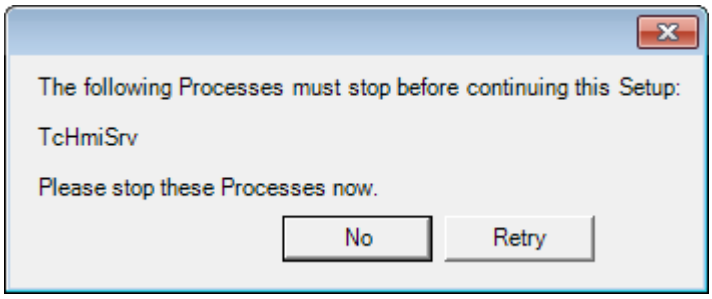


7. The user-specific installation offers the following settings:



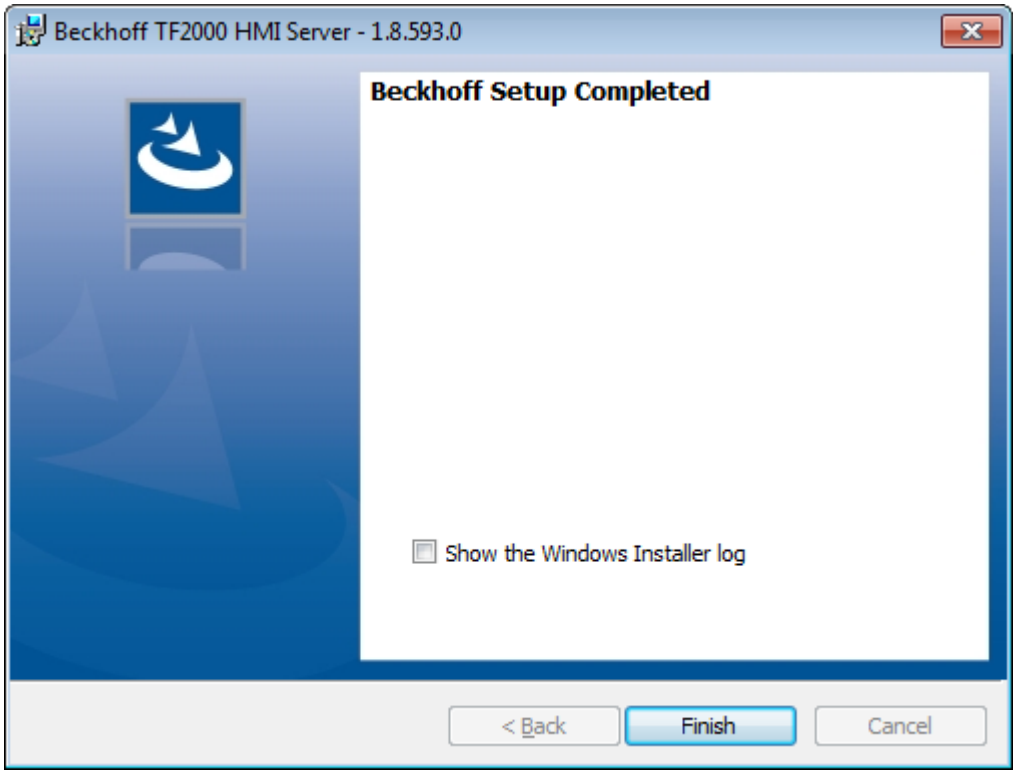
⇨ If all HMI server instances are not yet closed, the setup will pause.

8. Close all HMI server instances and click **Retry**.



This is done automatically by the setup starting with version 1.12.

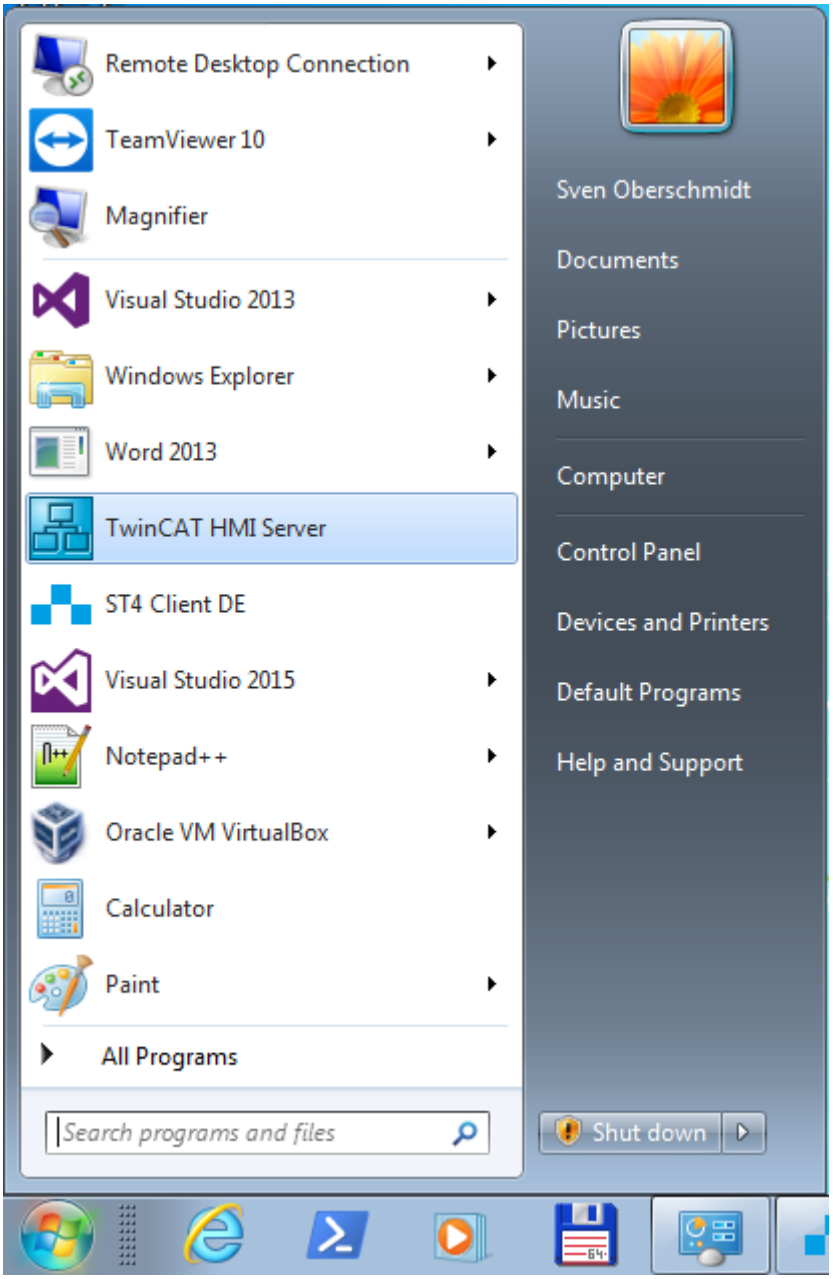
9. Select **Finish** to exit the setup.



⇨ **The installation is now completed.**

Version 1.10:

You can start the TF2000 HMI server via the optional desktop shortcut or the start menu (Programs/ Beckhoff/TF2000 HMI Server).



Version 1.12:

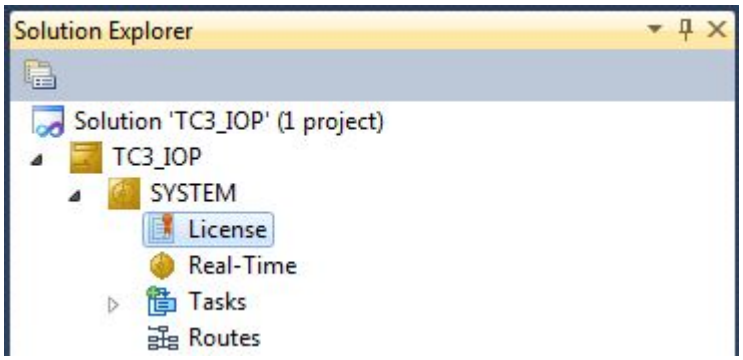
The TwinCAT HMI Server has been registered as a service. This means that the TwinCAT HMI Server starts automatically with the TwinCAT System Service and does not have to be started manually. You can manually stop or restart the service using the Task Manager.

3.3 Licensing

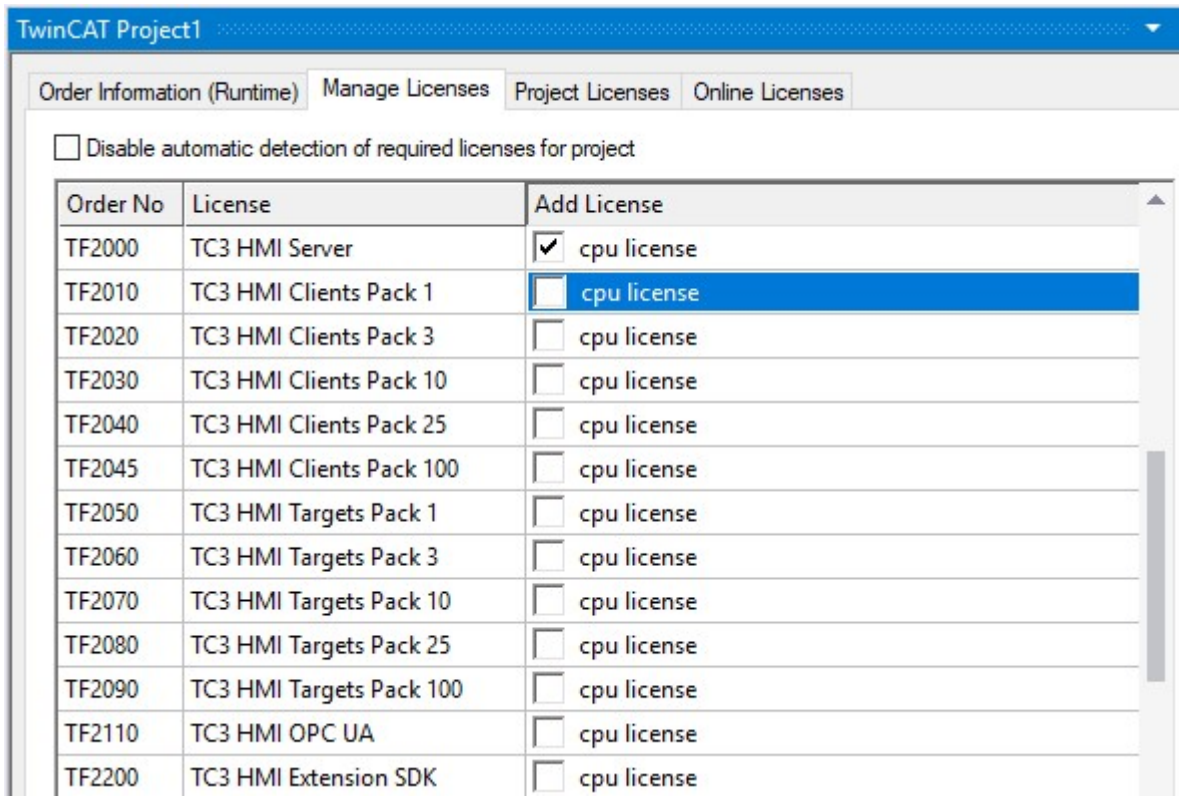
Licensing a full version

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

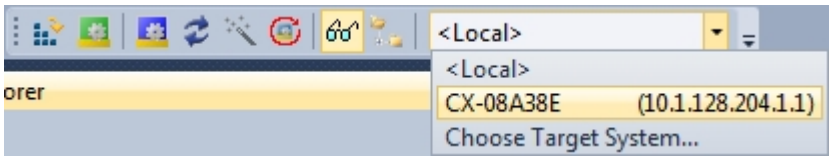
3. In the **Solution Explorer**, navigate to the entry **SYSTEM/License**



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

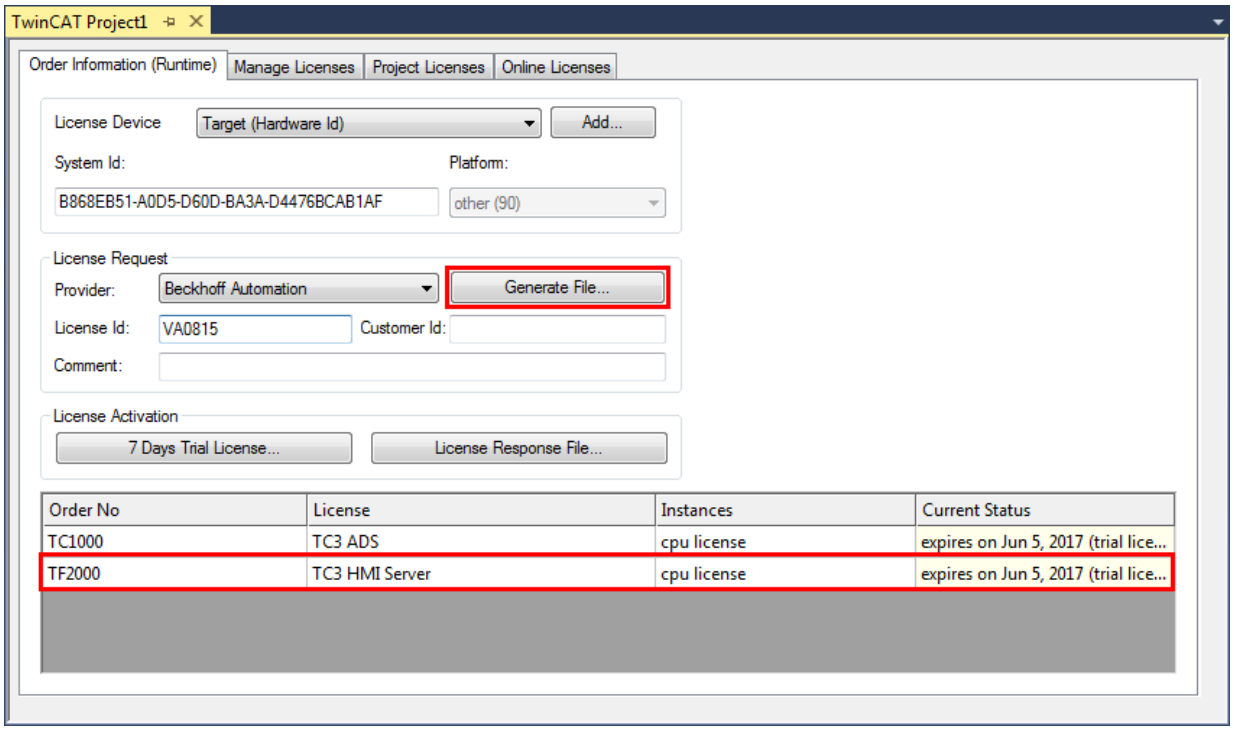


5. **Optional:** If you wish to add the license for a remote device, you must first connect to this device via the TwinCAT XAE toolbar

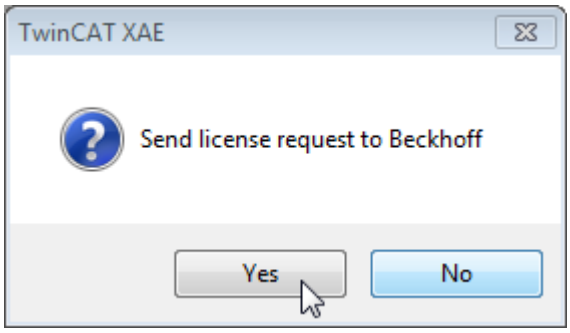


6. Open the **Order Information** tab. The **System ID** and **HW Platform** fields cannot be changed. They describe the platform to be licensed. In general, a TwinCAT 3 license is bound to two key figures:
The **System ID** uniquely identifies your device.
The **HW platform** is a key figure for the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

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



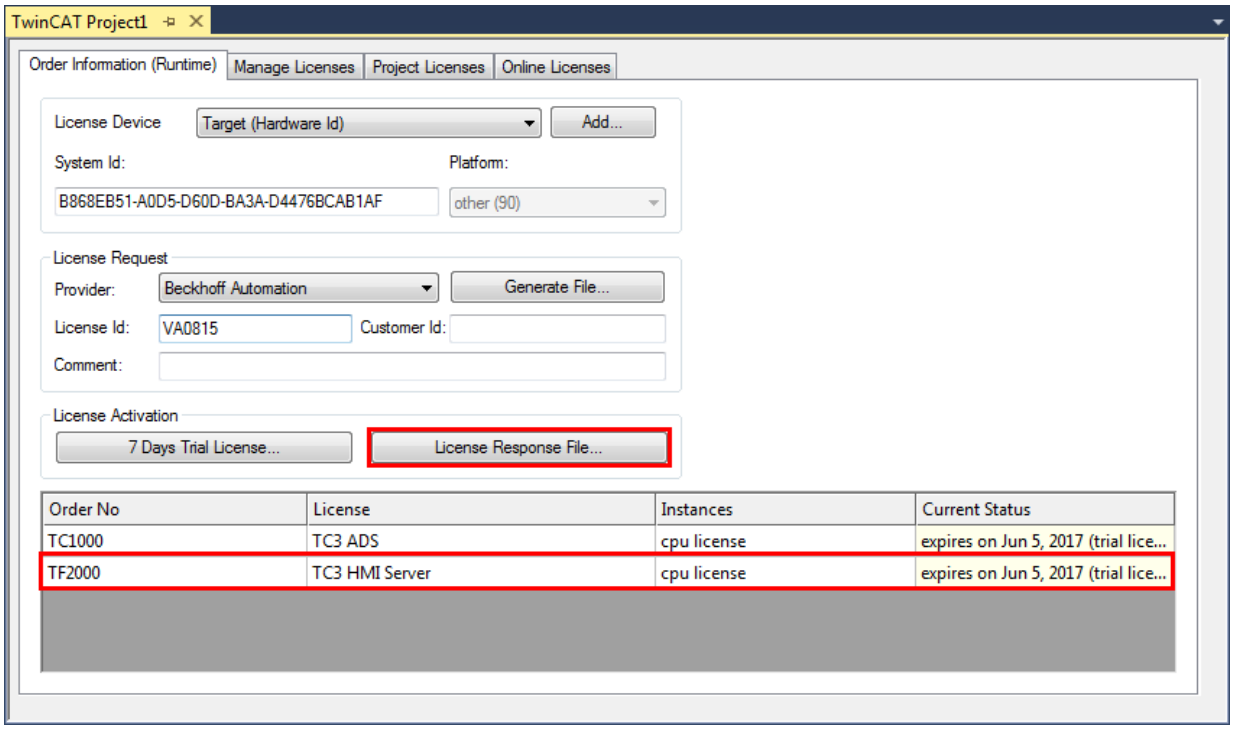
8. On the **Order Information** tab, click the **Generate License Request File...** button to generate a license request file that is validated by a Beckhoff license server (if you do not know your **Beckhoff License ID** , contact your Beckhoff sales representative).
9. After you have saved the License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



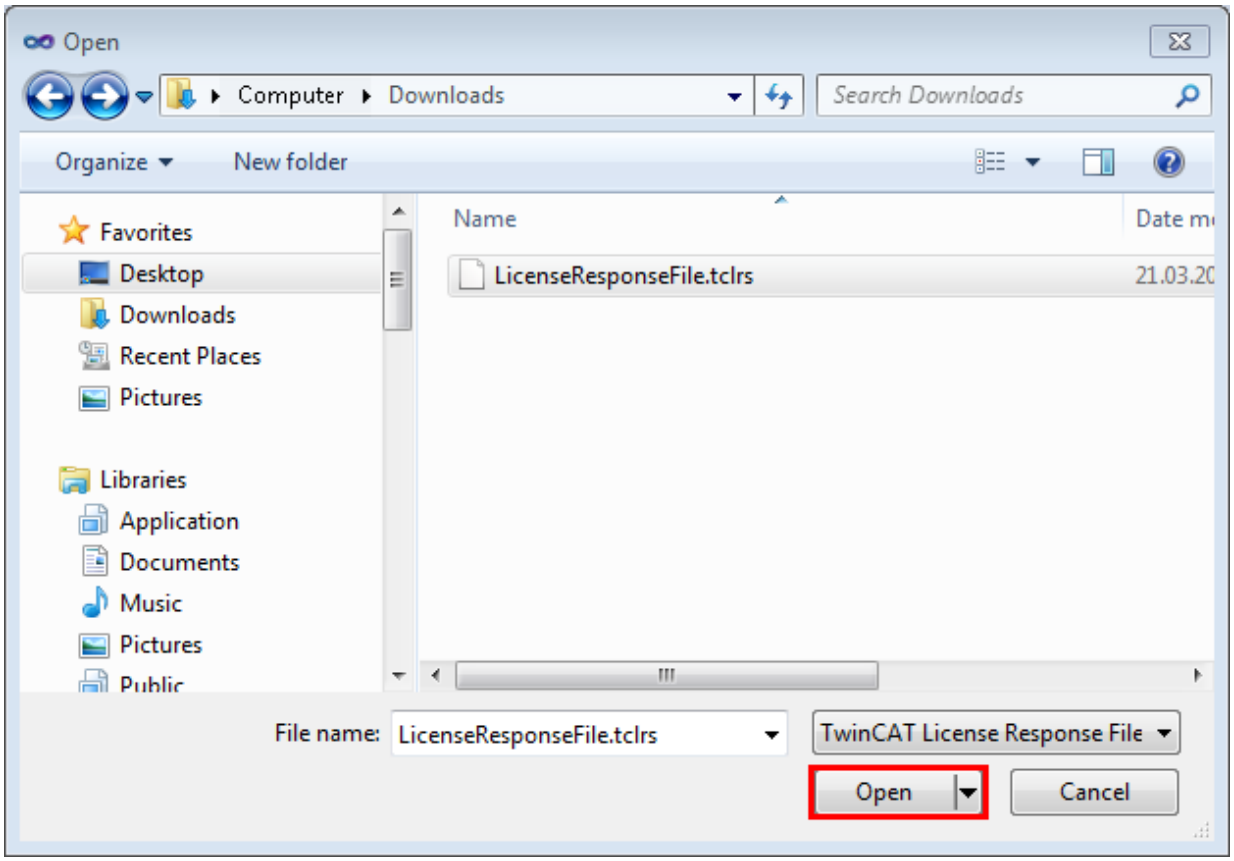
10. If you confirm the dialog with **Yes**, your default email client opens and creates a new email for tclicense@beckhoff.com containing the license request file.
11. Send this activation request to Beckhoff

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

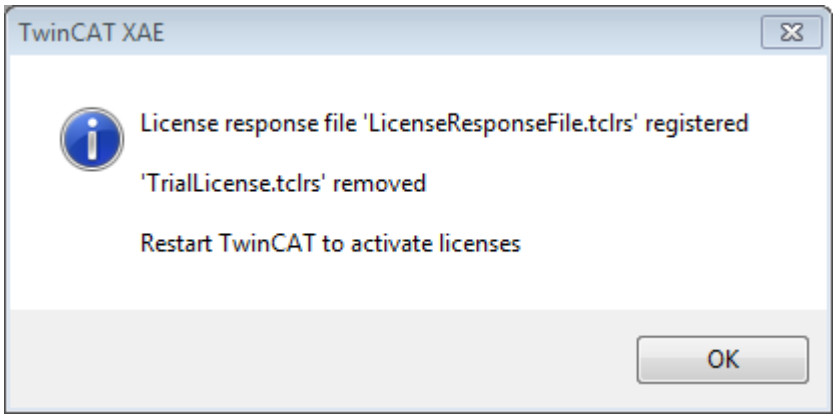


13. Select the **License Response File** you received in your folder system



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

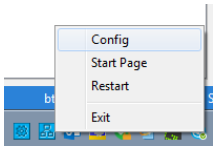


⇨ The license file is automatically copied to your local hard disk under ...\TwinCAT\3.1\Target\License.

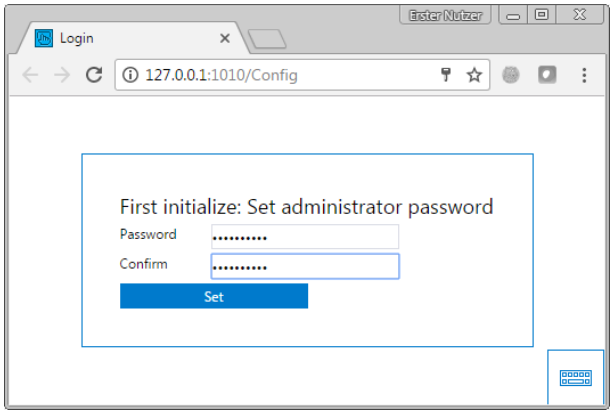
4 Configuration

After the installation, assign a default password for the system administrator so that the HMI server can be configured and the HMI engineering utility can access it.

After starting the server you can use the **system tray**  to call up the configuration page of the server.



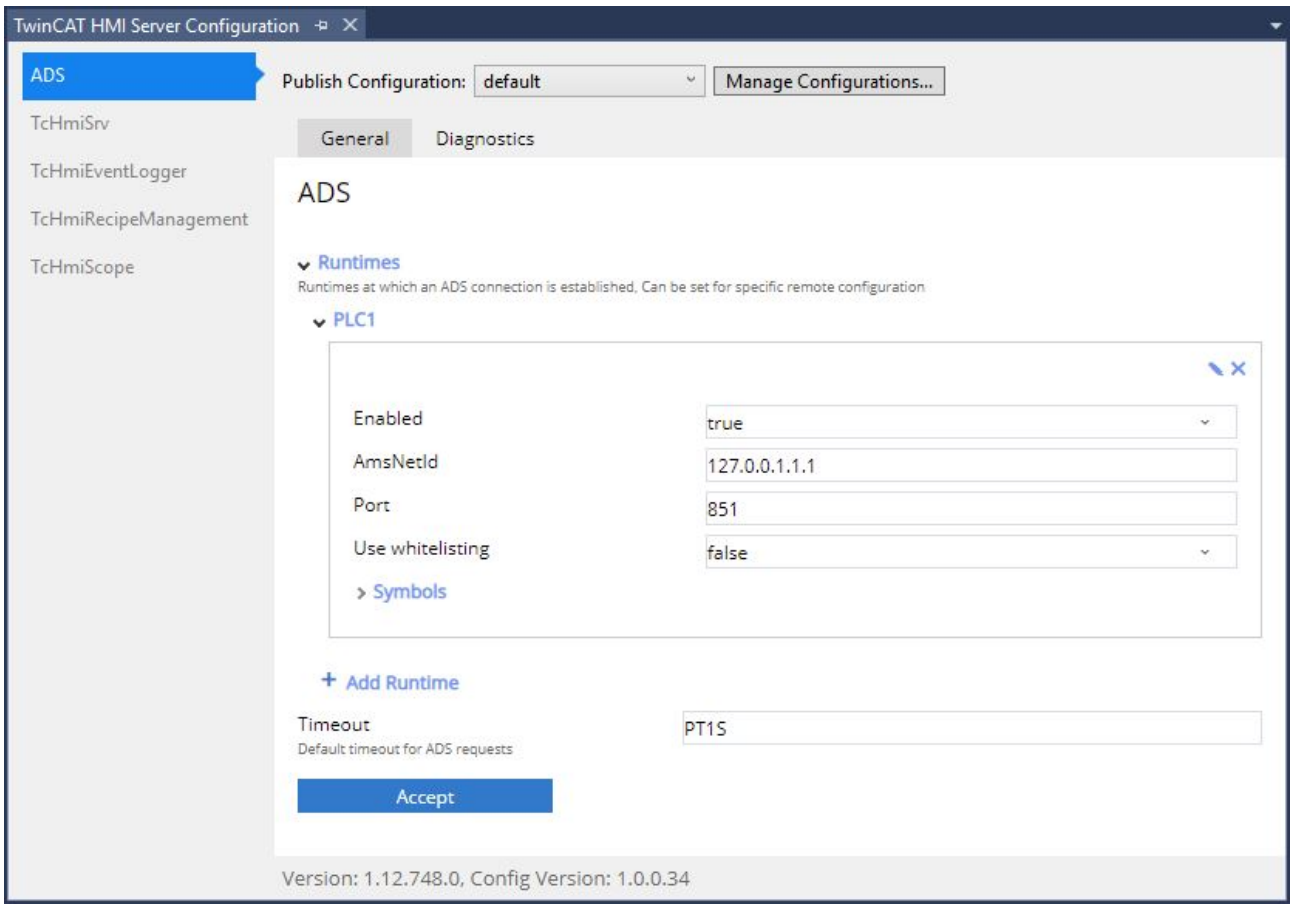
Assign a password for the system administrator when you call up the page for the first time.



The configuration and the published HMI project can be found under *\ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server*. To reset the server, you can delete the directory. To back up or delete the files, stop the server.

4.1 ADS

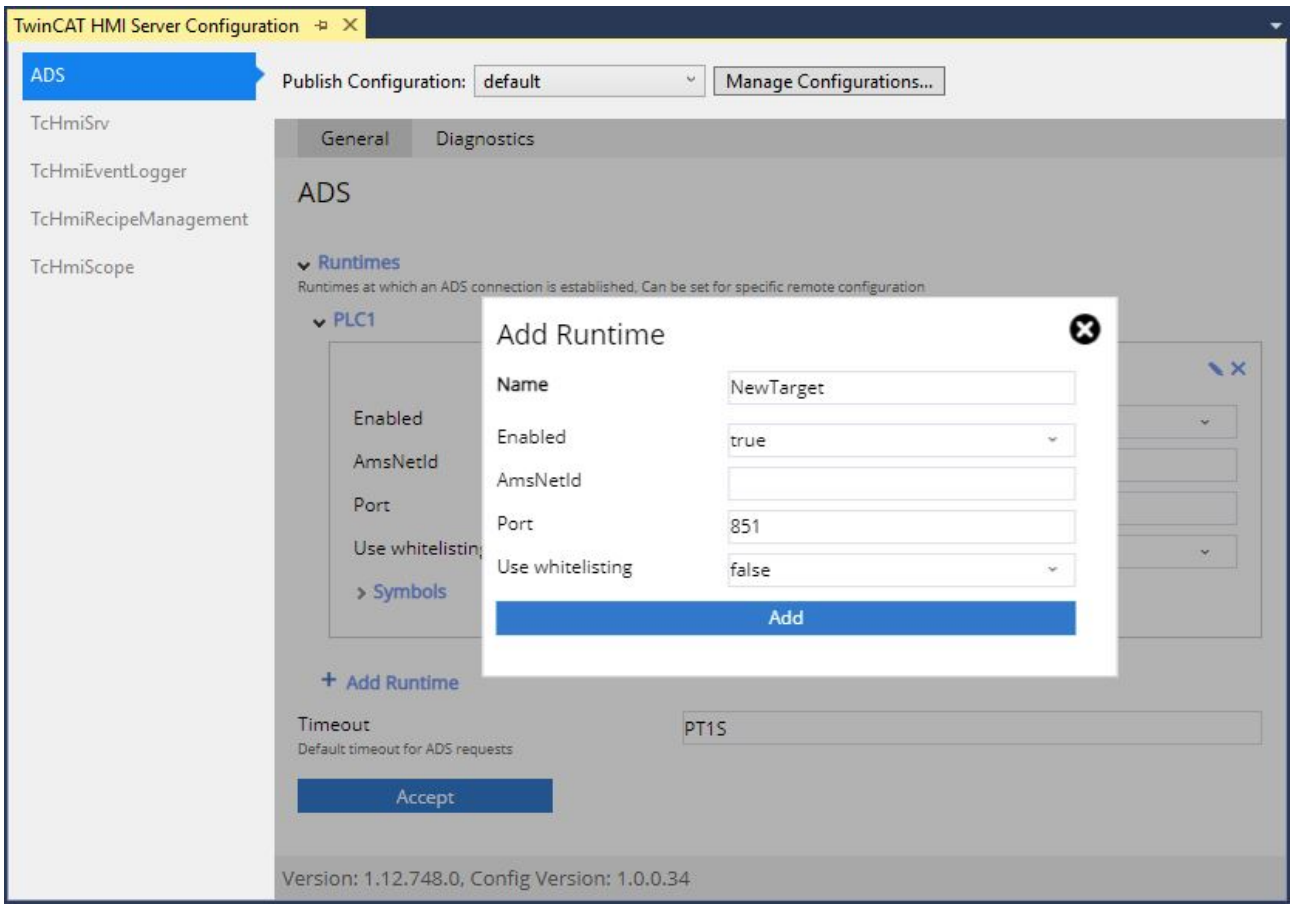
The ADS Server Extension displays the configured target systems of the selected publish configuration. You can add further devices.



- Enabled: Specifies whether the target system should be active or disabled in the HMI.
- AmsNetId: AmsNetId of the target system. An ADS route to the target system must exist.
- Port: Port on the target system that is to be accessed (e.g. 851 for PLC, 10000 for TwinCAT System Service, etc.)
- Use whitelisting: Specifies whether blacklisting (false) or whitelisting (true) [▶ 19] should apply to the configured target.
- Symbols: Manually add symbols per IndexGroup and Offset [▶ 23].
- Add Runtime: Add a new target system.
- Timeout: Timeout for ADS requests. If the target system does not respond within this time, the access is considered an error.

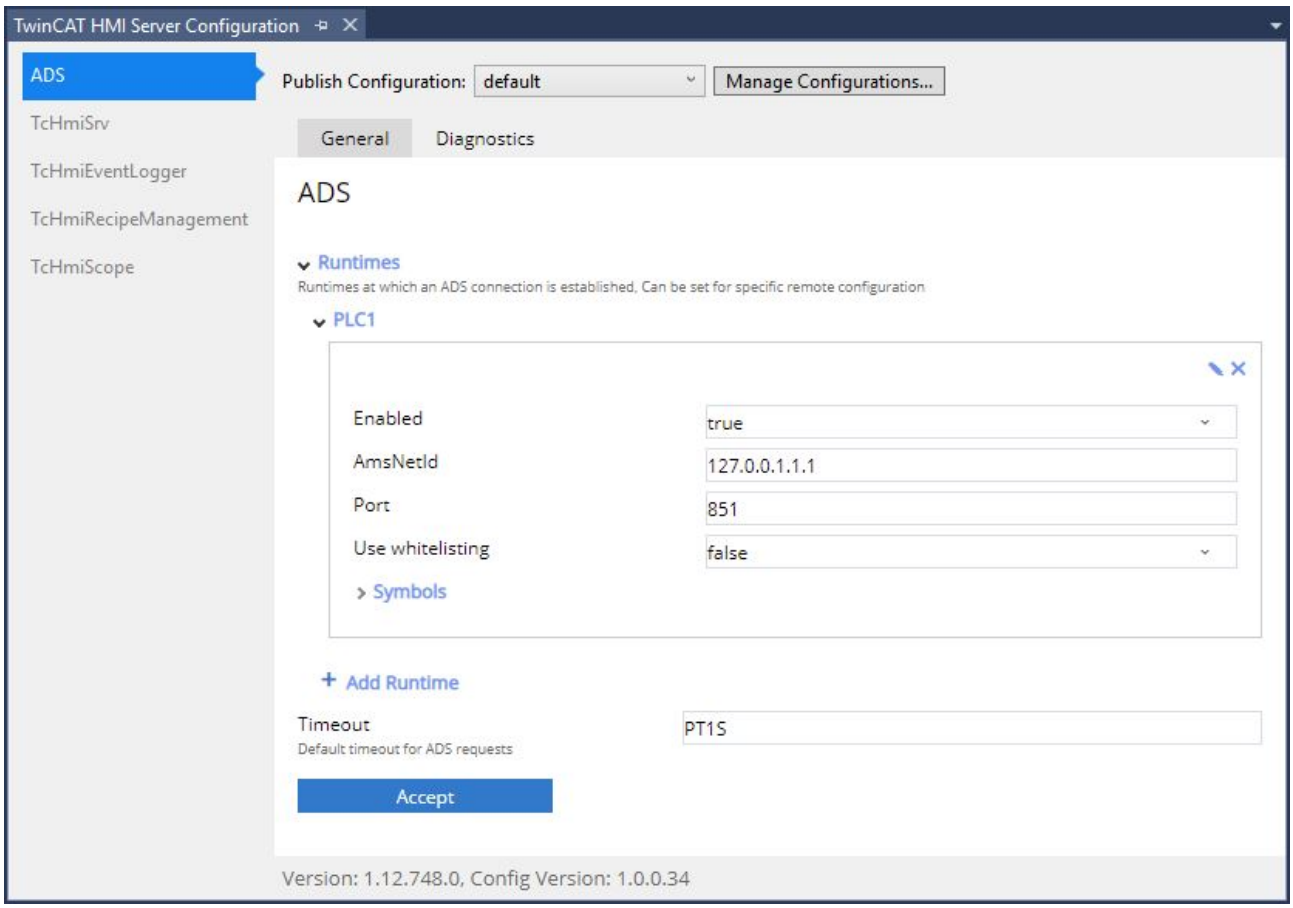
Click on **Add Runtime** to add a new target system. In the dialog you will automatically see all locally configured

All locally configured routes are displayed with their AmsNetId when adding a runtime. You can select the AmsNetId and the corresponding port to add the target system.



4.1.1 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**).



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 *TcHmi-Symbol.Hide.*

With whitelisting, no variables are visible in the HMI except variables with the attributes *TcHmiSymbol.Show* and *TcHmiSymbol.ShowRecursively*.

Available from version 1.12.

4.1.2 Methods and properties

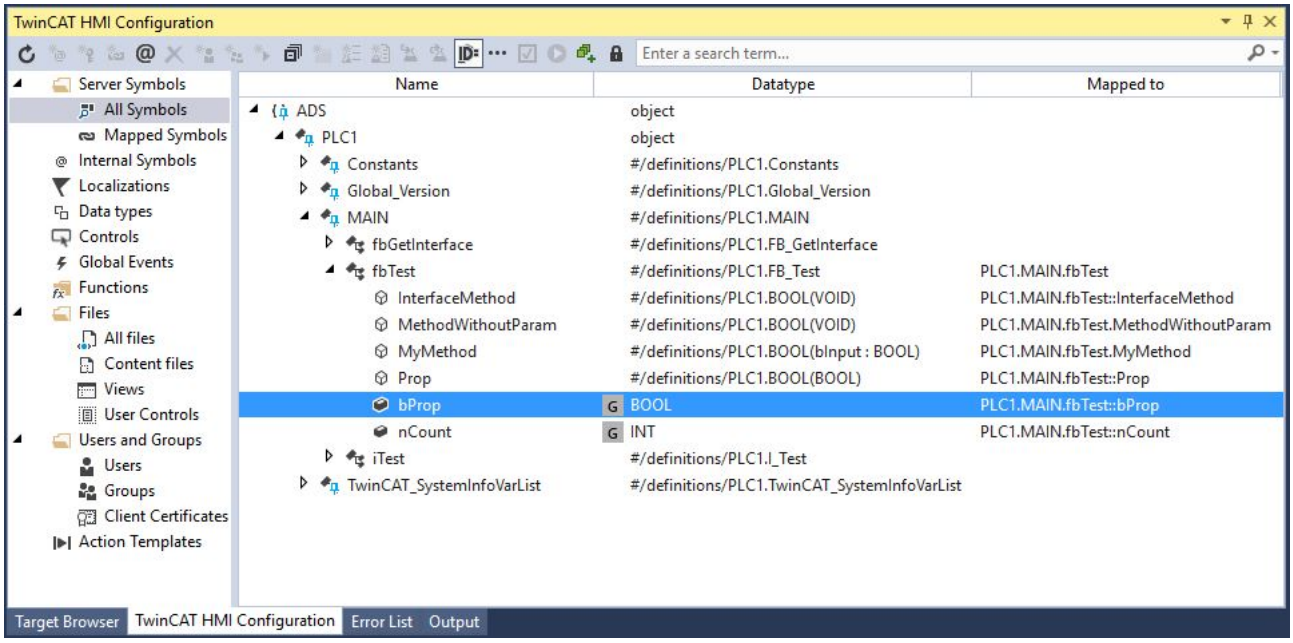
With version 1.12 it is possible to access PLC properties in the HMI and to call PLC methods in the HMI.

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.



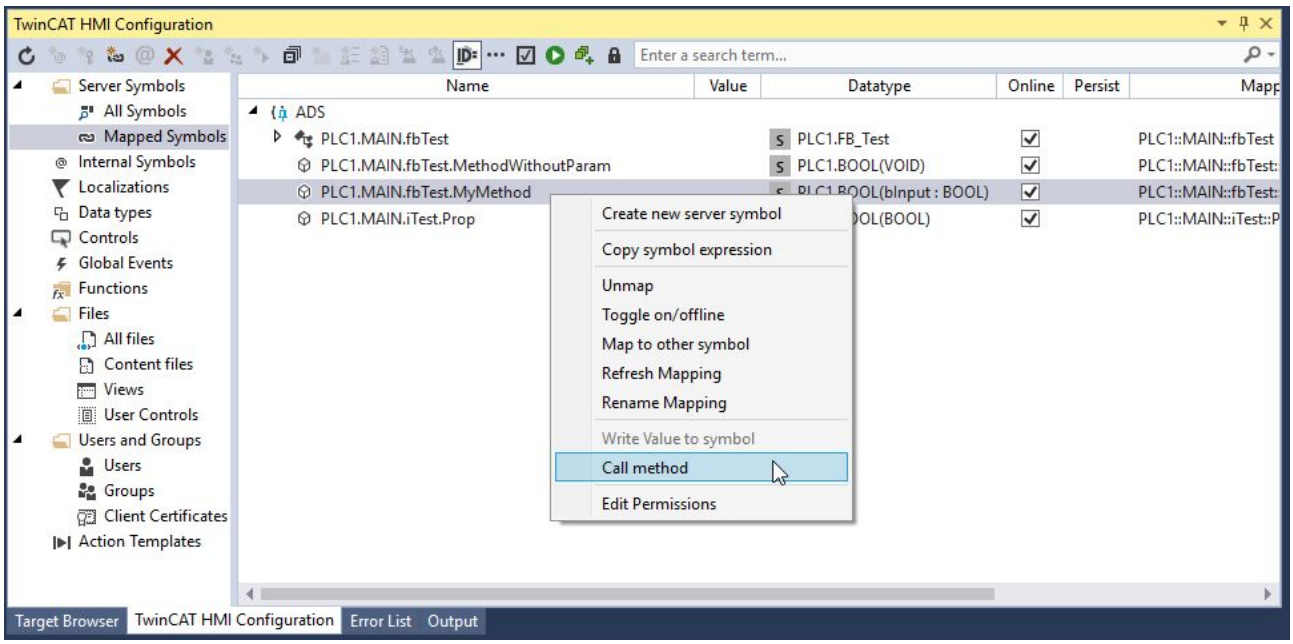
PLC properties can only be used explicitly in the HMI by linking the property individually to a control attribute. If the entire function block is linked to a control attribute, the property is not called. This is the case when a function block is used as the source data of the DataGrid or as a user 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.

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.

4.1.3 Pointers and references

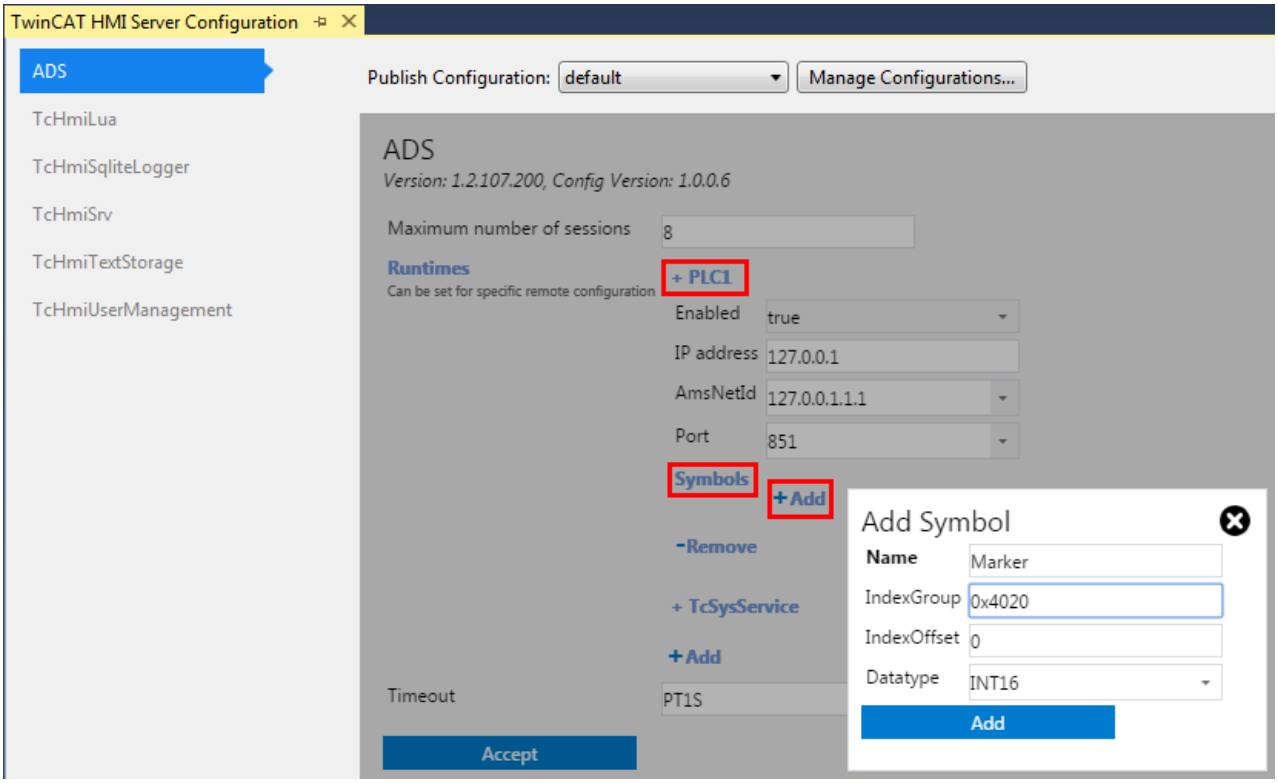
With version 1.12.748.0, references, pointers and interface pointers can be resolved in the HMI. This makes it possible to access the original variable being pointed to via the pointer or reference. This can be read and written when accessing via the pointer or reference. The resolved pointers or references 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.

4.1.4 Access by IndexGroup and Offset

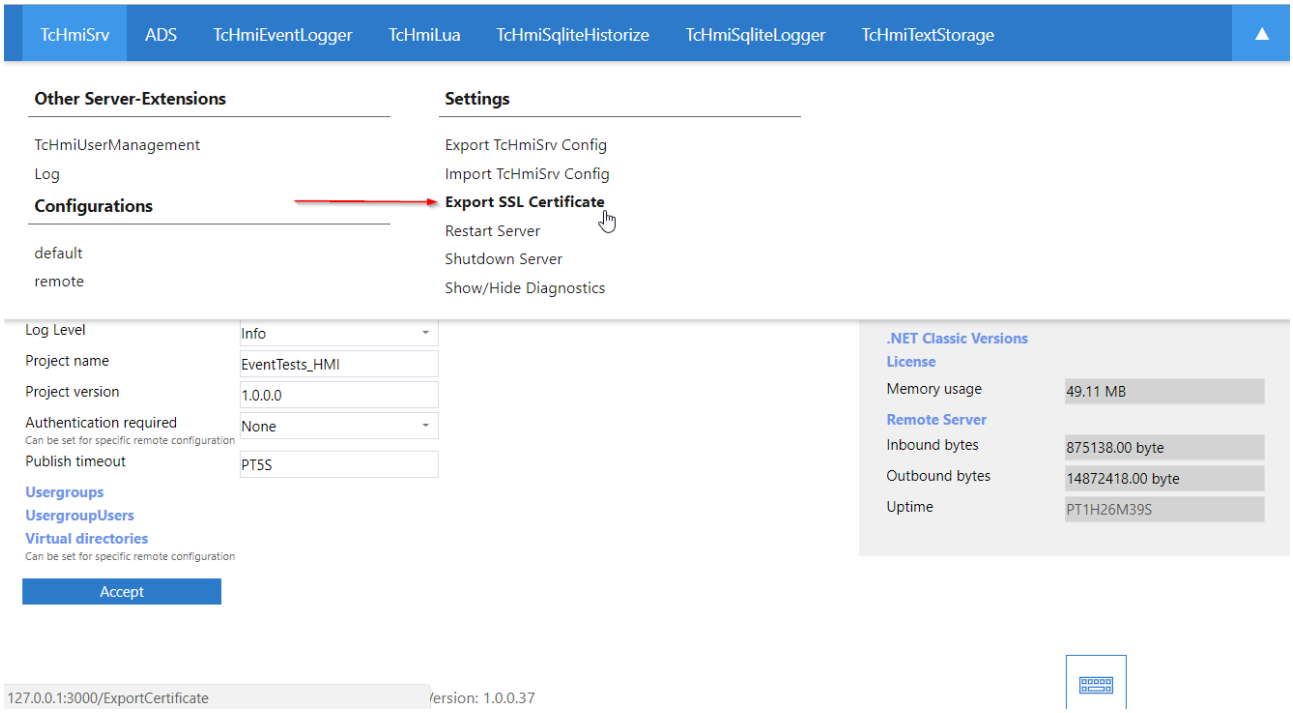
It makes most sense to access PLC variables by symbol name in order to detect changes in the symbolism (e.g. due to an OnlineChange). Small controllers (e.g. BC/BX) that have no symbolism can be addressed directly via IndexGroup and Offset. Via the configured ADS runtime you can add a new symbol that fetches the values by IndexGroup and Offset (hex values are converted to the corresponding decimal values).



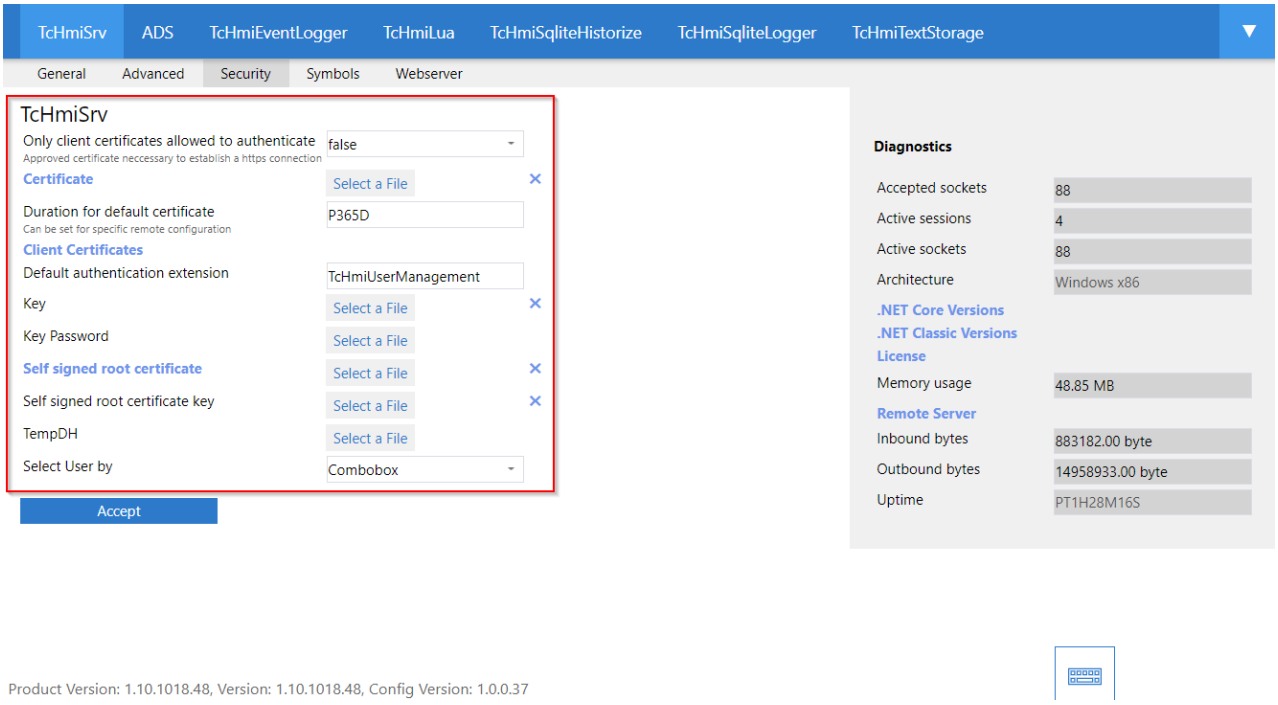
4.2 TcHmiSrv

4.2.1 Configuring certificates

The TwinCAT HMI server offers the option of issuing certificates for a secure connection. To verify the certificates, install them on the respective clients.



If an officially issued certificate is available, you can upload it on the configuration page of the server under TcHmiSrv/Security/Certificate (.crt). Save the private key in PEM format.

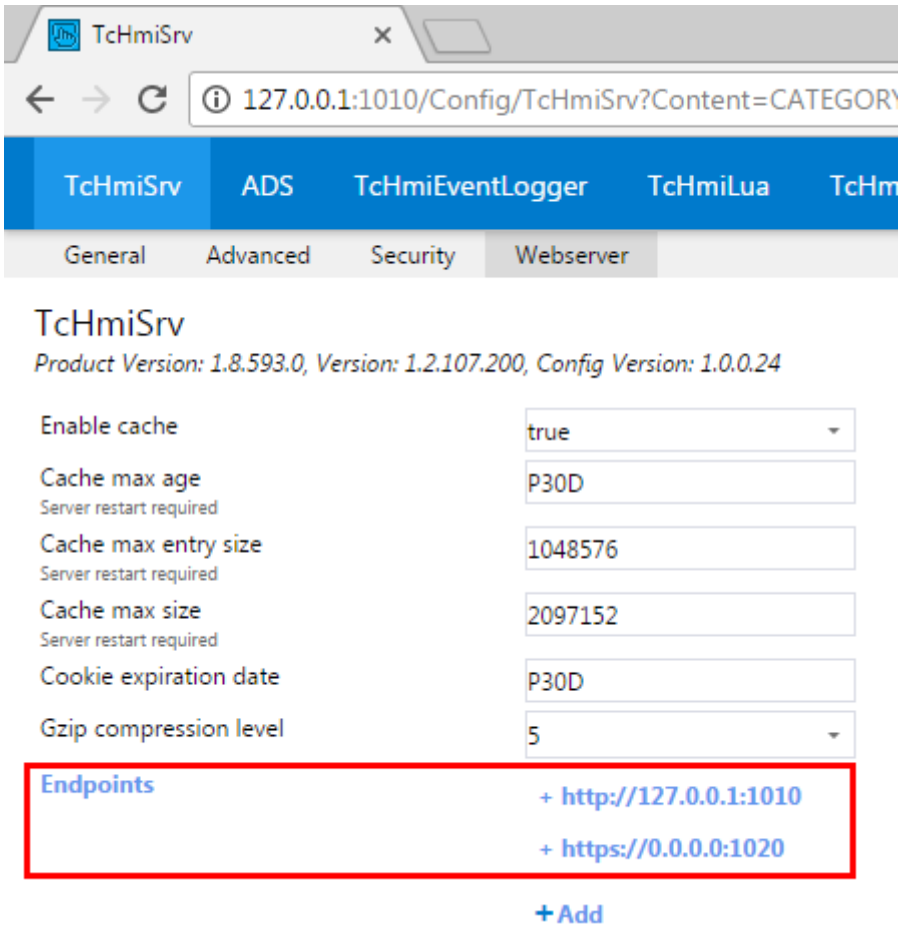


4.2.2 Configuring the network interface card

Under *TcHmiSrv/Webserver/Endpoints* you can configure under which network interface cards, port numbers and protocols the HMI server can be reached.

- Protocols supported: HTTP/HTTPS
- Binding to all network interface cards:
  Static IP address of a network card: Binding to associated cards.
  127.0.0.1: Only local access is allowed, remote connections are rejected.

- Port number: Freely selectable, should not already be accessed by the operating system.

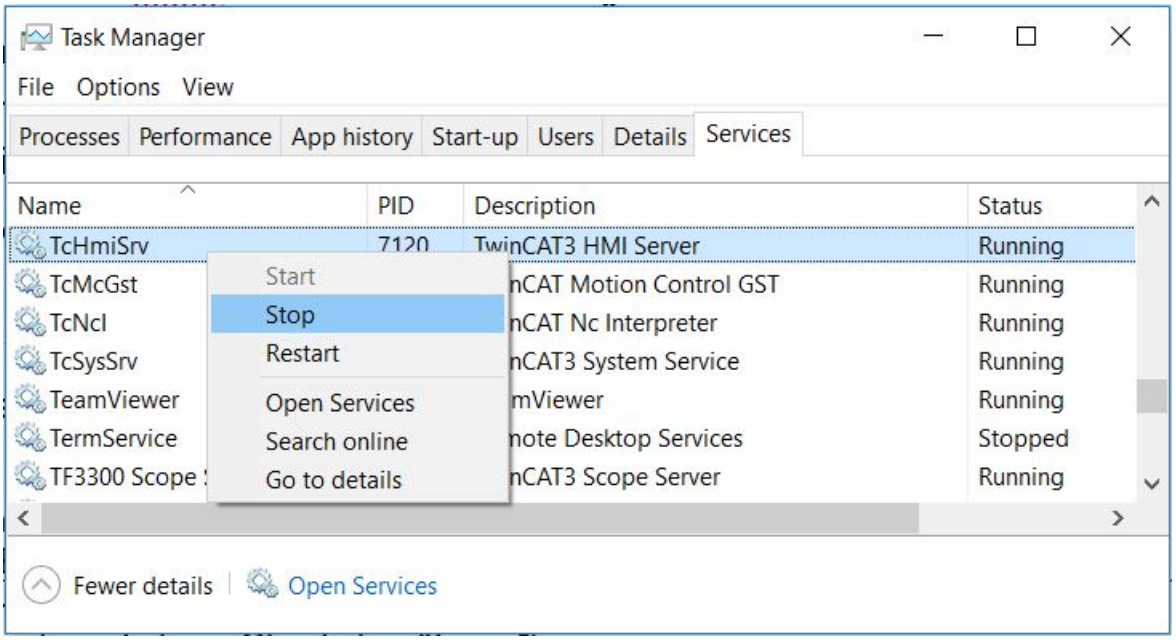


4.3 Start more instances

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.

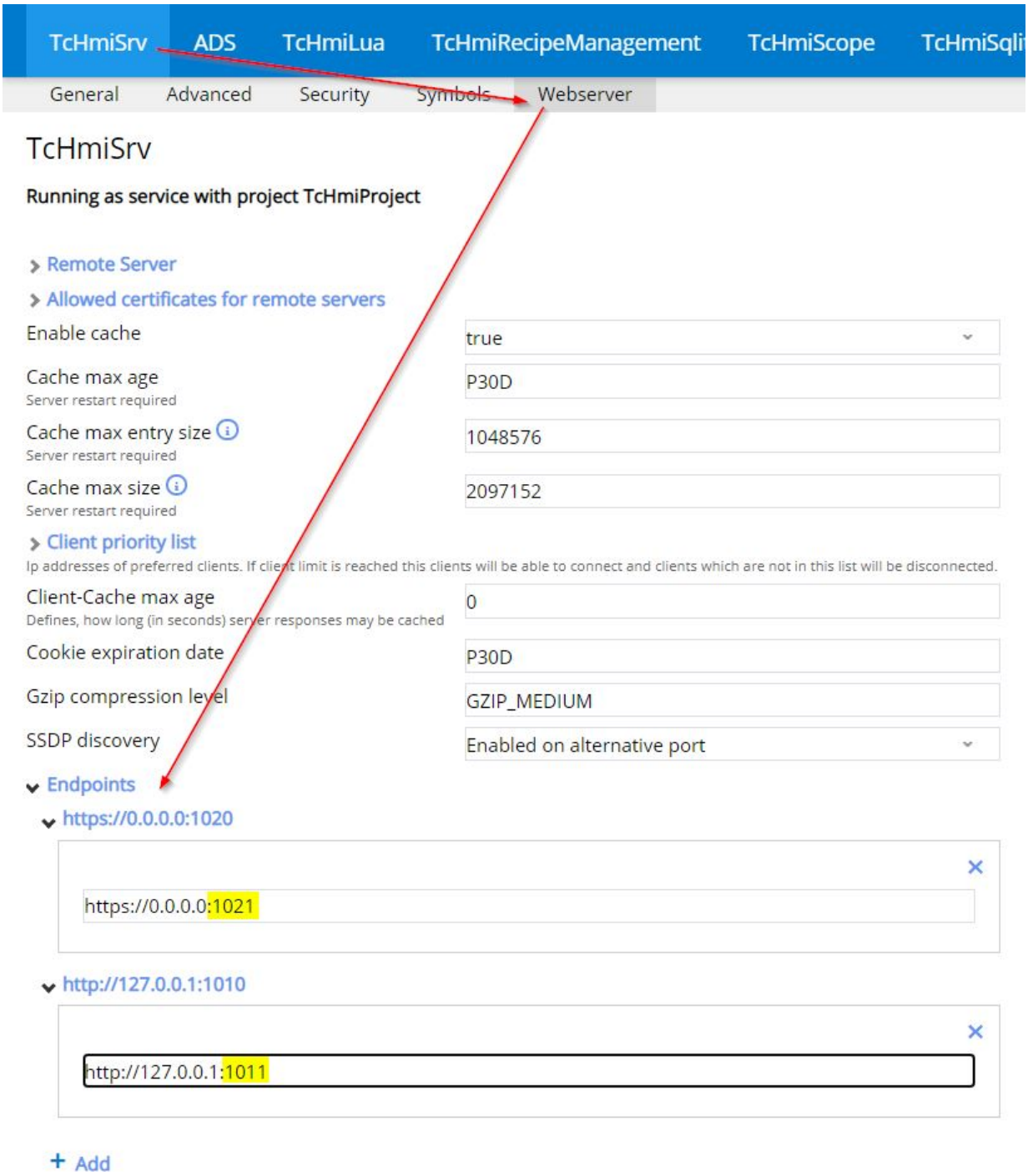
To start another server instance, proceed as follows:

1. Stop the service from the TwinCAT HMI Server (**TcHmiSrv**). You can do this in the Task Manager under the services:



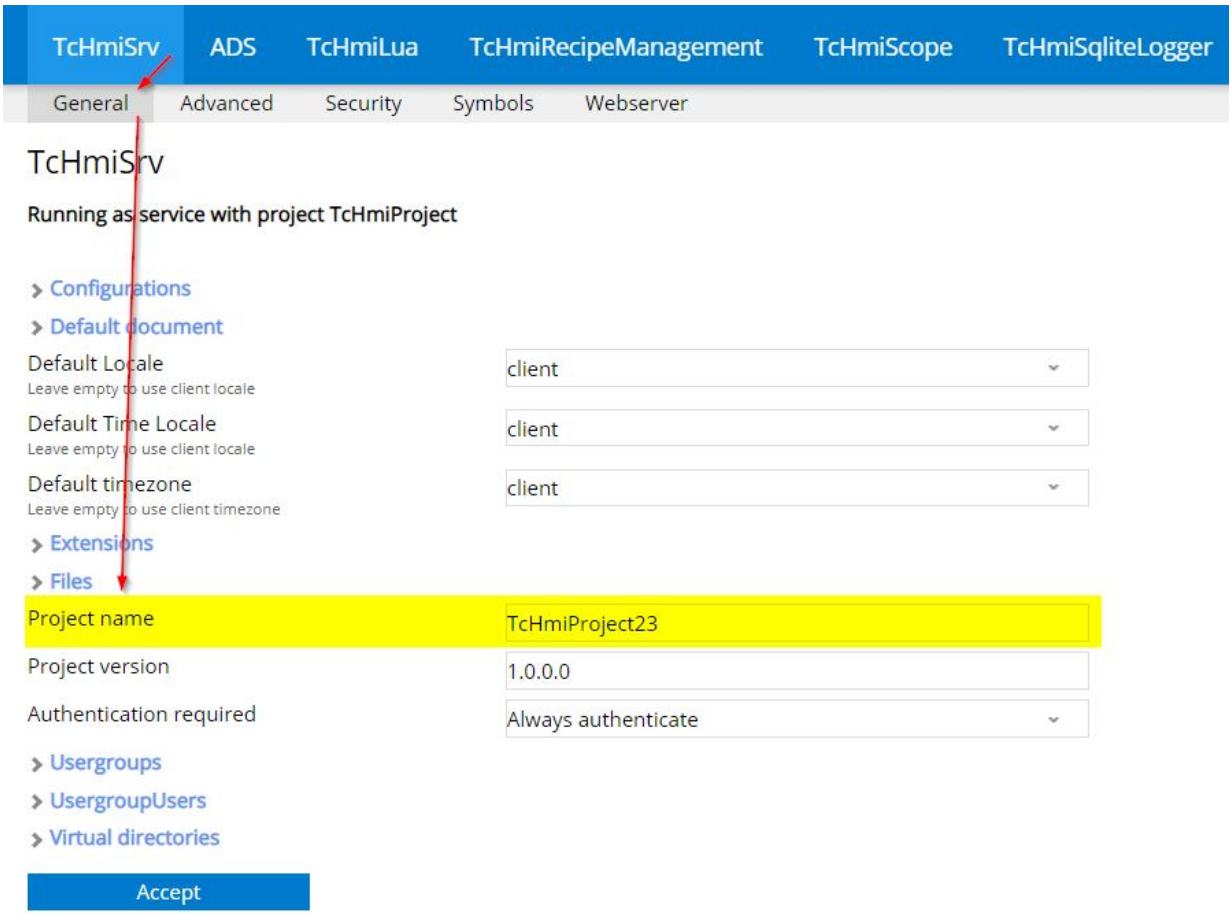
2. Navigate to the following folder on the system hard disk:
   C:\ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server\service.
3. Create a new folder for the additional server instance. The folder name specifies the name of the instance. The default instance has the name "*TcHmiProject*".
4. Start the 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.

5. Open the configuration page of the default server instance at **TcHmiSrv - Web server** and change the ports to free ports.



6. 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.



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.

Available from version 1.12.

5 Appendix

5.1 Return codes

5.1.1 ADS Return Codes

Grouping of error codes: 0x000 [▶ 29]..., 0x500 [▶ 29]..., 0x700 [▶ 30]..., 0x1000 [▶ 32]...

Global error codes

Hex	Dec	HRESULT	Name	Description
0x0	0	0x9811 0000	ERR_NOERROR	No error.
0x1	1	0x9811 0001	ERR_INTERNAL	Internal error.
0x2	2	0x9811 0002	ERR_NORTIME	No real-time.
0x3	3	0x9811 0003	ERR_ALLOCLOCKEDMEM	Allocation locked – memory error.
0x4	4	0x9811 0004	ERR_INSERTMAILBOX	Mailbox full – the ADS message could not be sent. Reducing the number of ADS messages per cycle will help.
0x5	5	0x9811 0005	ERR_WRONGRECEIVEHMSG	Wrong HMSG.
0x6	6	0x9811 0006	ERR_TARGETPORTNOTFOUND	Target port not found – ADS server is not started or is not reachable.
0x7	7	0x9811 0007	ERR_TARGETMACHINENOTFOUND	Target computer not found – AMS route was not found.
0x8	8	0x9811 0008	ERR_UNKNOWNCMDID	Unknown command ID.
0x9	9	0x9811 0009	ERR_BADTASKID	Invalid task ID.
0xA	10	0x9811 000A	ERR_NOIO	No IO.
0xB	11	0x9811 000B	ERR_UNKNOWNAMSCMD	Unknown AMS command.
0xC	12	0x9811 000C	ERR_WIN32ERROR	Win32 error.
0xD	13	0x9811 000D	ERR_PORTNOTCONNECTED	Port not connected.
0xE	14	0x9811 000E	ERR_INVALIDAMSLENGTH	Invalid AMS length.
0xF	15	0x9811 000F	ERR_INVALIDAMSNETID	Invalid AMS Net ID.
0x10	16	0x9811 0010	ERR_LOWINSTLEVEL	Installation level is too low –TwinCAT 2 license error.
0x11	17	0x9811 0011	ERR_NODEBUGINTAVAILABLE	No debugging available.
0x12	18	0x9811 0012	ERR_PORTDISABLED	Port disabled – TwinCAT system service not started.
0x13	19	0x9811 0013	ERR_PORTALREADYCONNECTED	Port already connected.
0x14	20	0x9811 0014	ERR_AMSSYNC_W32ERROR	AMS Sync Win32 error.
0x15	21	0x9811 0015	ERR_AMSSYNC_TIMEOUT	AMS Sync Timeout.
0x16	22	0x9811 0016	ERR_AMSSYNC_AMSERROR	AMS Sync error.
0x17	23	0x9811 0017	ERR_AMSSYNC_NOINDEXINMAP	No index map for AMS Sync available.
0x18	24	0x9811 0018	ERR_INVALIDAMSPORT	Invalid AMS port.
0x19	25	0x9811 0019	ERR_NOMEMORY	No memory.
0x1A	26	0x9811 001A	ERR_TCPSEND	TCP send error.
0x1B	27	0x9811 001B	ERR_HOSTUNREACHABLE	Host unreachable.
0x1C	28	0x9811 001C	ERR_INVALIDAMSFRAGMENT	Invalid AMS fragment.
0x1D	29	0x9811 001D	ERR_TLSSEND	TLS send error – secure ADS connection failed.
0x1E	30	0x9811 001E	ERR_ACCESSDENIED	Access denied – secure ADS access denied.

Router error codes

Hex	Dec	HRESULT	Name	Description
0x500	1280	0x9811 0500	ROUTERERR_NOLOCKEDMEMORY	Locked memory cannot be allocated.
0x501	1281	0x9811 0501	ROUTERERR_RESIZEMEMORY	The router memory size could not be changed.
0x502	1282	0x9811 0502	ROUTERERR_MAILBOXFULL	The mailbox has reached the maximum number of possible messages.
0x503	1283	0x9811 0503	ROUTERERR_DEBUGBOXFULL	The Debug mailbox has reached the maximum number of possible messages.
0x504	1284	0x9811 0504	ROUTERERR_UNKNOWNPORTTYPE	The port type is unknown.
0x505	1285	0x9811 0505	ROUTERERR_NOTINITIALIZED	The router is not initialized.
0x506	1286	0x9811 0506	ROUTERERR_PORTALREADYINUSE	The port number is already assigned.
0x507	1287	0x9811 0507	ROUTERERR_NOTREGISTERED	The port is not registered.
0x508	1288	0x9811 0508	ROUTERERR_NOMOREQUEUES	The maximum number of ports has been reached.
0x509	1289	0x9811 0509	ROUTERERR_INVALIDPORT	The port is invalid.
0x50A	1290	0x9811 050A	ROUTERERR_NOTACTIVATED	The router is not active.
0x50B	1291	0x9811 050B	ROUTERERR_FRAGMENTBOXFULL	The mailbox has reached the maximum number for fragmented messages.
0x50C	1292	0x9811 050C	ROUTERERR_FRAGMENTTIMEOUT	A fragment timeout has occurred.
0x50D	1293	0x9811 050D	ROUTERERR_TOBEREMOVED	The port is removed.

General ADS error codes

Hex	Dec	HRESULT	Name	Description
0x700	1792	0x9811 0700	ADSERR_DEVICE_ERROR	General device error.
0x701	1793	0x9811 0701	ADSERR_DEVICE_SRVNOTSUPP	Service is not supported by the server.
0x702	1794	0x9811 0702	ADSERR_DEVICE_INVALIDGRP	Invalid index group.
0x703	1795	0x9811 0703	ADSERR_DEVICE_INVALIDOFFSET	Invalid index offset.
0x704	1796	0x9811 0704	ADSERR_DEVICE_INVALIDACCESS	Reading or writing not permitted.
0x705	1797	0x9811 0705	ADSERR_DEVICE_INVALIDSIZE	Parameter size not correct.
0x706	1798	0x9811 0706	ADSERR_DEVICE_INVALIDDATA	Invalid data values.
0x707	1799	0x9811 0707	ADSERR_DEVICE_NOTREADY	Device is not ready to operate.
0x708	1800	0x9811 0708	ADSERR_DEVICE_BUSY	Device is busy.
0x709	1801	0x9811 0709	ADSERR_DEVICE_INVALIDCONTEXT	Invalid operating system context. This can result from use of ADS function blocks in different tasks. It may be possible to resolve this through Multi-task data access synchronization in the PLC.
0x70A	1802	0x9811 070A	ADSERR_DEVICE_NOMEMORY	Insufficient memory.
0x70B	1803	0x9811 070B	ADSERR_DEVICE_INVALIDPARM	Invalid parameter values.
0x70C	1804	0x9811 070C	ADSERR_DEVICE_NOTFOUND	Not found (files, ...).
0x70D	1805	0x9811 070D	ADSERR_DEVICE_SYNTAX	Syntax error in file or command.
0x70E	1806	0x9811 070E	ADSERR_DEVICE_INCOMPATIBLE	Objects do not match.
0x70F	1807	0x9811 070F	ADSERR_DEVICE_EXISTS	Object already exists.
0x710	1808	0x9811 0710	ADSERR_DEVICE_SYMBOLNOTFOUND	Symbol not found.
0x711	1809	0x9811 0711	ADSERR_DEVICE_SYMBOLVERSIONIN-VALID	Invalid symbol version. This can occur due to an on-line change. Create a new handle.
0x712	1810	0x9811 0712	ADSERR_DEVICE_INVALIDSTATE	Device (server) is in invalid state.
0x713	1811	0x9811 0713	ADSERR_DEVICE_TRANSMODENOTSUPP	AdsTransMode not supported.
0x714	1812	0x9811 0714	ADSERR_DEVICE_NOTIFYHNDINVALID	Notification handle is invalid.
0x715	1813	0x9811 0715	ADSERR_DEVICE_CLIENTUNKNOWN	Notification client not registered.
0x716	1814	0x9811 0716	ADSERR_DEVICE_NOMOREHDLS	No further handle available.
0x717	1815	0x9811 0717	ADSERR_DEVICE_INVALIDWATCHSIZE	Notification size too large.
0x718	1816	0x9811 0718	ADSERR_DEVICE_NOTINIT	Device not initialized.
0x719	1817	0x9811 0719	ADSERR_DEVICE_TIMEOUT	Device has a timeout.
0x71A	1818	0x9811 071A	ADSERR_DEVICE_NOINTERFACE	Interface query failed.
0x71B	1819	0x9811 071B	ADSERR_DEVICE_INVALIDINTERFACE	Wrong interface requested.
0x71C	1820	0x9811 071C	ADSERR_DEVICE_INVALIDCLSID	Class ID is invalid.
0x71D	1821	0x9811 071D	ADSERR_DEVICE_INVALIDOBJID	Object ID is invalid.
0x71E	1822	0x9811 071E	ADSERR_DEVICE_PENDING	Request pending.
0x71F	1823	0x9811 071F	ADSERR_DEVICE_ABORTED	Request is aborted.
0x720	1824	0x9811 0720	ADSERR_DEVICE_WARNING	Signal warning.
0x721	1825	0x9811 0721	ADSERR_DEVICE_INVALIDARRAYIDX	Invalid array index.
0x722	1826	0x9811 0722	ADSERR_DEVICE_SYMBOLNOTACTIVE	Symbol not active.
0x723	1827	0x9811 0723	ADSERR_DEVICE_ACCESSDENIED	Access denied.
0x724	1828	0x9811 0724	ADSERR_DEVICE_LICENSENOTFOUND	Missing license.
0x725	1829	0x9811 0725	ADSERR_DEVICE_LICENSEEXPIRED	License expired.
0x726	1830	0x9811 0726	ADSERR_DEVICE_LICENSEEXCEEDED	License exceeded.
0x727	1831	0x9811 0727	ADSERR_DEVICE_LICENSEINVALID	Invalid license.
0x728	1832	0x9811 0728	ADSERR_DEVICE_LICENSESYSTEMID	License problem: System ID is invalid.
0x729	1833	0x9811 0729	ADSERR_DEVICE_LICENSENOTIMELIMIT	License not limited in time.
0x72A	1834	0x9811 072A	ADSERR_DEVICE_LICENSEFUTUREISSUE	License problem: Time in the future.
0x72B	1835	0x9811 072B	ADSERR_DEVICE_LICENSETIMETOLONG	License period too long.
0x72C	1836	0x9811 072C	ADSERR_DEVICE_EXCEPTION	Exception at system startup.
0x72D	1837	0x9811 072D	ADSERR_DEVICE_LICENSEDUPLICATED	License file read twice.
0x72E	1838	0x9811 072E	ADSERR_DEVICE_SIGNATUREINVALID	Invalid signature.
0x72F	1839	0x9811 072F	ADSERR_DEVICE_CERTIFICATEINVALID	Invalid certificate.
0x730	1840	0x9811 0730	ADSERR_DEVICE_LICENSEOEMNOT-FOUND	Public key not known from OEM.
0x731	1841	0x9811 0731	ADSERR_DEVICE_LICENSERESTRICTED	License not valid for this system ID.
0x732	1842	0x9811 0732	ADSERR_DEVICE_LICENSEDEMODENIED	Demo license prohibited.
0x733	1843	0x9811 0733	ADSERR_DEVICE_INVALIDFNCID	Invalid function ID.
0x734	1844	0x9811 0734	ADSERR_DEVICE_OUTOFRANGE	Outside the valid range.
0x735	1845	0x9811 0735	ADSERR_DEVICE_INVALIDALIGNMENT	Invalid alignment.

Hex	Dec	HRESULT	Name	Description
0x736	1846	0x9811 0736	ADSERR_DEVICE_LICENSEPLATFORM	Invalid platform level.
0x737	1847	0x9811 0737	ADSERR_DEVICE_FORWARD_PL	Context – forward to passive level.
0x738	1848	0x9811 0738	ADSERR_DEVICE_FORWARD_DL	Context – forward to dispatch level.
0x739	1849	0x9811 0739	ADSERR_DEVICE_FORWARD_RT	Context – forward to real-time.
0x740	1856	0x9811 0740	ADSERR_CLIENT_ERROR	Client error.
0x741	1857	0x9811 0741	ADSERR_CLIENT_INVALIDPARM	Service contains an invalid parameter.
0x742	1858	0x9811 0742	ADSERR_CLIENT_LISTEMPTY	Polling list is empty.
0x743	1859	0x9811 0743	ADSERR_CLIENT_VARUSED	Var connection already in use.
0x744	1860	0x9811 0744	ADSERR_CLIENT_DUPLINVOKEID	The called ID is already in use.
0x745	1861	0x9811 0745	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	0x9811 0746	ADSERR_CLIENT_W32ERROR	Error in Win32 subsystem.
0x747	1863	0x9811 0747	ADSERR_CLIENT_TIMEOUTINVALID	Invalid client timeout value.
0x748	1864	0x9811 0748	ADSERR_CLIENT_PORTNOTOPEN	Port not open.
0x749	1865	0x9811 0749	ADSERR_CLIENT_NOAMSADDR	No AMS address.
0x750	1872	0x9811 0750	ADSERR_CLIENT_SYNCINTERNAL	Internal error in Ads sync.
0x751	1873	0x9811 0751	ADSERR_CLIENT_ADDHASH	Hash table overflow.
0x752	1874	0x9811 0752	ADSERR_CLIENT_REMOVEHASH	Key not found in the table.
0x753	1875	0x9811 0753	ADSERR_CLIENT_NOMORESYM	No symbols in the cache.
0x754	1876	0x9811 0754	ADSERR_CLIENT_SYNCRESINVALID	Invalid response received.
0x755	1877	0x9811 0755	ADSERR_CLIENT_SYNCPORTLOCKED	Sync Port is locked.

RTime error codes

Hex	Dec	HRESULT	Name	Description
0x1000	4096	0x9811 1000	RTERR_INTERNAL	Internal error in the real-time system.
0x1001	4097	0x9811 1001	RTERR_BADTIMERPERIODS	Timer value is not valid.
0x1002	4098	0x9811 1002	RTERR_INVALIDTASKPTR	Task pointer has the invalid value 0 (zero).
0x1003	4099	0x9811 1003	RTERR_INVALIDSTACKPTR	Stack pointer has the invalid value 0 (zero).
0x1004	4100	0x9811 1004	RTERR_PRIOEXISTS	The request task priority is already assigned.
0x1005	4101	0x9811 1005	RTERR_NOMORETCB	No free TCB (Task Control Block) available. The maximum number of TCBs is 64.
0x1006	4102	0x9811 1006	RTERR_NOMORESEMAS	No free semaphores available. The maximum number of semaphores is 64.
0x1007	4103	0x9811 1007	RTERR_NOMOREQUEUES	No free space available in the queue. The maximum number of positions in the queue is 64.
0x100D	4109	0x9811 100D	RTERR_EXTIRQALREADYDEF	An external synchronization interrupt is already applied.
0x100E	4110	0x9811 100E	RTERR_EXTIRQNOTDEF	No external sync interrupt applied.
0x100F	4111	0x9811 100F	RTERR_EXTIRQINSTALLFAILED	Application of the external synchronization interrupt has failed.
0x1010	4112	0x9811 1010	RTERR_IRQLNOTLESSOREQUAL	Call of a service function in the wrong context
0x1017	4119	0x9811 1017	RTERR_VMXNOTSUPPORTED	Intel VT-x extension is not supported.
0x1018	4120	0x9811 1018	RTERR_VMXDISABLED	Intel VT-x extension is not enabled in the BIOS.
0x1019	4121	0x9811 1019	RTERR_VMXCONTROLSMISSING	Missing function in Intel VT-x extension.
0x101A	4122	0x9811 101A	RTERR_VMXENABLEFAILS	Activation of Intel VT-x fails.

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	WSAEHOSTUNREACH	No route to host - a socket operation referred to an unavailable host.
More Winsock error codes: Win32 error codes			

5.1.2 HMI_ADS_CONSTANTS Enumeration

Return codes of the TcHmiAds extension.

Namespace: TcHmiAds
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_SUCCESS	0	No error, everything fine
	0x100000	1048576	HMI_ADS_E_OFFSET	1048576	Offset of TcHmiAds specific error codes
	0x100010	1048592	HMI_ADS_E_TCDIR	1048592	TwinCAT directory not found on local system
	0x100011	1048593	HMI_ADS_E_TCVERSION	1048593	TwinCAT version invalid
	0x100012	1048594	HMI_ADS_E_CONFIGDIR	1048594	TwinCAT configuration directory not found
	0x100013	1048595	HMI_ADS_E_STATE	1048595	TwinCAT Router is in invalid state no port could be opened
	0x100020	1048608	HMI_ADS_E_PARSE_BASETYPES	1048608	Error while parsing ADS base types
	0x100021	1048609	HMI_ADS_E_PARSE_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_INVALID_DATA	1048624	Invalid data written to server or an ADS datatype can not be parsed
	0x100031	1048625	HMI_ADS_E_UPLOAD_DATA	1048625	No upload data provided by configured ADS runtime
	0x100032	1048626	HMI_ADS_E_UNEXPECTED	1048626	Should not happen contact support
	0x100033	1048627	HMI_ADS_E_INVALID_RUNTIME	1048627	Runtime name is empty or invalid
	0x100034	1048628	HMI_ADS_E_INVALID_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_INVALID_SYMBOL	1048630	The requested symbol is not available
	0x100037	1048631	HMI_ADS_E_MISSING_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_EMPTY	1048633	No ADS symbols found
	0x10003A	1048634	HMI_ADS_E_DISABLED	1048634	The requested runtime is disabled in the HMI configuration
	0x10003B	1048635	HMI_ADS_E_LICENSE	1048635	A license error occurred
	0x10003C	1048636	HMI_ADS_E_INVALID_SYMBOL_TYPE	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

5.1.3 ErrorValue Enumeration

Namespace: TcHmiSrv
Assembly: TcHmiSrvExtNet (in TcHmiSrvExtNet.dll) Version: 1.0.0.0 (1.0.0.0)

Syntax

C#

```
public enum ErrorValue
```

Members

	Member name	Value	Description
	HMI_SUCCESS	0	
	HMI_FINISHED	1	
	HMI_DISCONNECTED	2	
	HMI_SHUTDOWN	3	
	HMI_RESTART	4	
	HMI_SKIP	5	
	HMI_FIRST_INIT	6	
	HMI_UPGRADE	7	
	HMI_UNCHANGED	8	
	HMI_IGNORE	9	
	HMI_E_SERVER	256	
	HMI_E_FAIL	257	
	HMI_E_UNEXPECTED	258	
	HMI_E_SCRIPT	259	
	HMI_E_REQUIRED_EXTENSION_MISSING	260	
	HMI_E_INIT	261	
	HMI_E_NO_LANGUAGE_FILE	262	
	HMI_E_SYNTAX	263	
	HMI_E_FILE_NOT_FOUND	264	
	HMI_E_FILESYSTEM	265	
	HMI_E_REQUEST_TOO_LARGE	266	
	HMI_E_DATABASE	267	
	HMI_E_INVALID_POINTER	268	
	HMI_E_INVALID_PARAMETER	269	
	HMI_E_INVALID_TYPE	270	
	HMI_E_NOT_REGISTERED	271	
	HMI_E_NOT_IMPLEMENTED	272	
	HMI_E_ID_IN_USE	273	
	HMI_E_SYMBOL_IN_USE	274	
	HMI_E_INTERRUPTED	275	
	HMI_E_FILE_LOCK	276	
	HMI_E_FILE_IN_USE	277	
	HMI_E_FILE_WRITE	278	
	HMI_E_INVALID_PATH	279	
	HMI_E_HANDLE	280	
	HMI_E_ENCODE	281	
	HMI_E_DECODE	282	
	HMI_E_NETWORK	283	
	HMI_E_LANGUAGE	284	
	HMI_E_CACHE	285	
	HMI_E_ENDPOINT_DENIED	286	
	HMI_E_ENDPOINT_BUSY	287	
	HMI_E_ENDPOINT_INVALID	288	
	HMI_E_WEBSERVER_UNEXPECTED	289	
	HMI_E_WEBSOCKET_UNEXPECTED	290	

	Member name	Value	Description
	HMI_E_LUA_EXEC	291	
	HMI_E_ENTRY_NOT_FOUND	292	
	HMI_E_INVALID_SYMBOL	293	
	HMI_E_BLACKLISTED	294	
	HMI_E_UPLOAD_TIMER_EXPIRED	295	
	HMI_E_SERVER_ALREADY_RUNNING	296	
	HMI_E_INVALID_SUBSYMBOL	512	
	HMI_E_SYMBOL_NOT_MAPPED	513	
	HMI_E_SYMBOL_SCHEMA_MISSING	514	
	HMI_E_INVALID_METHOD	515	
	HMI_E_API	768	
	HMI_E_INTERFACE_VERSION	769	
	HMI_E_INTERFACE_POINTER	770	
	HMI_E_CRT_NOT_FOUND	771	
	HMI_E_CRT_INIT	772	
	HMI_E_LICENSE	773	
	HMI_E_LICENSE_CHECK	774	
	HMI_E_LICENSE_ADS	775	
	HMI_E_LICENSE_SERVER	776	
	HMI_E_LICENSE_CLIENT	777	
	HMI_E_LICENSE_TARGET	778	
	HMI_E_LICENSE_EXPIRED	779	
	HMI_E_LICENSE_EXTENSION	780	
	HMI_E_LICENSE_HANDSHAKE	781	
	HMI_E_LICENSE_VERIFY	782	
	HMI_E_LICENSE_EMPTY	783	
	HMI_E_STORAGE	1280	
	HMI_E_STORAGE_WRITE	1281	
	HMI_E_STORAGE_VERSION	1282	
	HMI_E_STORAGE_CREATE	1283	
	HMI_E_STORAGE_STORE	1284	
	HMI_E_STORAGE_LOAD	1285	
	HMI_E_STORAGE_FILE_NOT_FOUND	1286	
	HMI_E_STORAGE_ADD_PARAMETER	1287	
	HMI_E_STORAGE_SCHEMA	1288	
	HMI_E_STORAGE_CONSTRAINT	1289	
	HMI_E_STORAGE_ADD	1290	
	HMI_E_STORAGE_EXTENSION	1291	

	Member name	Value	Description
	HMI_E_STORAGE_PARAMETER	1292	
	HMI_E_STORAGE_TYPE	1293	
	HMI_E_CONNECT	1294	
	HMI_E_STORAGE_BACKUP	1295	
	HMI_E_SCHEMA	1536	
	HMI_E_TYPE_MISMATCH	1537	
	HMI_E_RANGE_MISMATCH	1538	
	HMI_E_INVALID_FIELD	1539	
	HMI_E_REQUIRED_FIELD	1540	
	HMI_E_UNEXPECTED_FIELD	1541	
	HMI_E_ENUM_VALUE_MISMATCH	1542	
	HMI_E_ARRAY_RANGE_MISMATCH	1543	
	HMI_E_STRING_LENGTH_MISMATCH	1544	
	HMI_E_MULTIPLE_MATCHES	1545	
	HMI_E_UNIQUE	1546	
	HMI_E_FORMAT	1547	
	HMI_E_TYPE_MISSING	1548	
	HMI_E_EXCLUDED	1549	
	HMI_E_MIGRATION	1550	
	HMI_E_MIGRATION_RULE	1551	
	HMI_E_MIGRATION_PATH	1552	
	HMI_E_EXTENSION	2048	
	HMI_E_EXTENSION_LOAD	2049	
	HMI_E_INVALID_DOMAIN	2050	
	HMI_E_DOMAIN_ACTIVE	2051	
	HMI_E_LOG_EXTENSION	2052	
	HMI_E_AUTH_EXTENSION	2053	
	HMI_E_EXTENSION_CONFIG	2054	
	HMI_E_EXTENSION_HANDLER	2055	
	HMI_E_UNLOAD_FAILED	2056	
	HMI_E_AUTH_WAIT	2057	
	HMI_E_SESSION	4096	
	HMI_E_INVALID_SESSION	4097	
	HMI_E_AUTH_USER_NOT_FOUND	4098	
	HMI_E_AUTH_FAILED	4099	
	HMI_E_AUTH_GROUP_NOT_FOUND	4100	
	HMI_E_INSUFFICIENT_ACCESS	4101	
	HMI_E_CREATE_SESSION	4102	
	HMI_E_SESSION_NOT_FOUND	4103	
	HMI_E_CERTIFICATE	4104	
	HMI_E_NO_LOGIN_DATA	4105	

	Member name	Value	Description
	HMI_E_ALREADY_LOGGED_IN	4106	
	HMI_E_SESSION_TIMEOUT	4107	
	HMI_E_TOO_MANY_CONNECTIONS	4108	
	HMI_E_CHECKSUM	4608	
	HMI_E_INVALID_CHECKSUM	4609	
	HMI_E_CHECKSUM_UNEXPECTED	4610	
	HMI_E_CHECKSUM_MATCH	4611	
	HMI_E_SIGNATURE	4612	
	HMI_E_SIGNATURE_MISSING	4613	
	HMI_E_SIGNATURE_MISMATCH	4614	
	HMI_E_KEY_MISSING	4615	
	HMI_E_RESTART_REQUIRED	4616	
	HMI_E_INITIALIZE_PASSWORD	4617	

See Also

Reference

TcHmiSrv Namespace

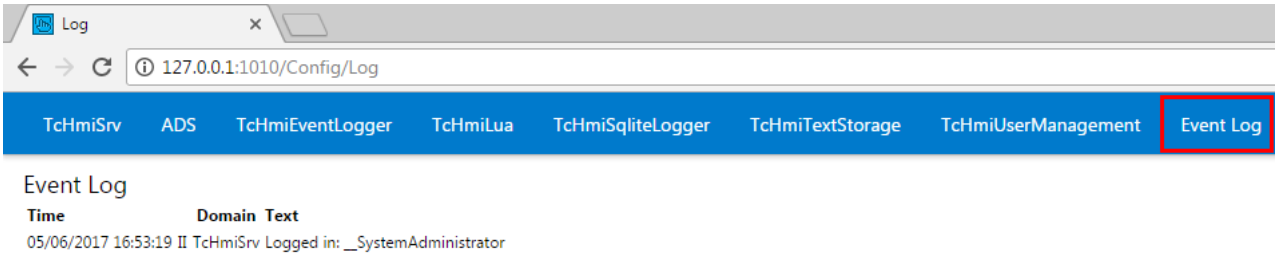
5.2 Troubleshooting

The product version number can be read via the system tray icon  . Additional information is required:

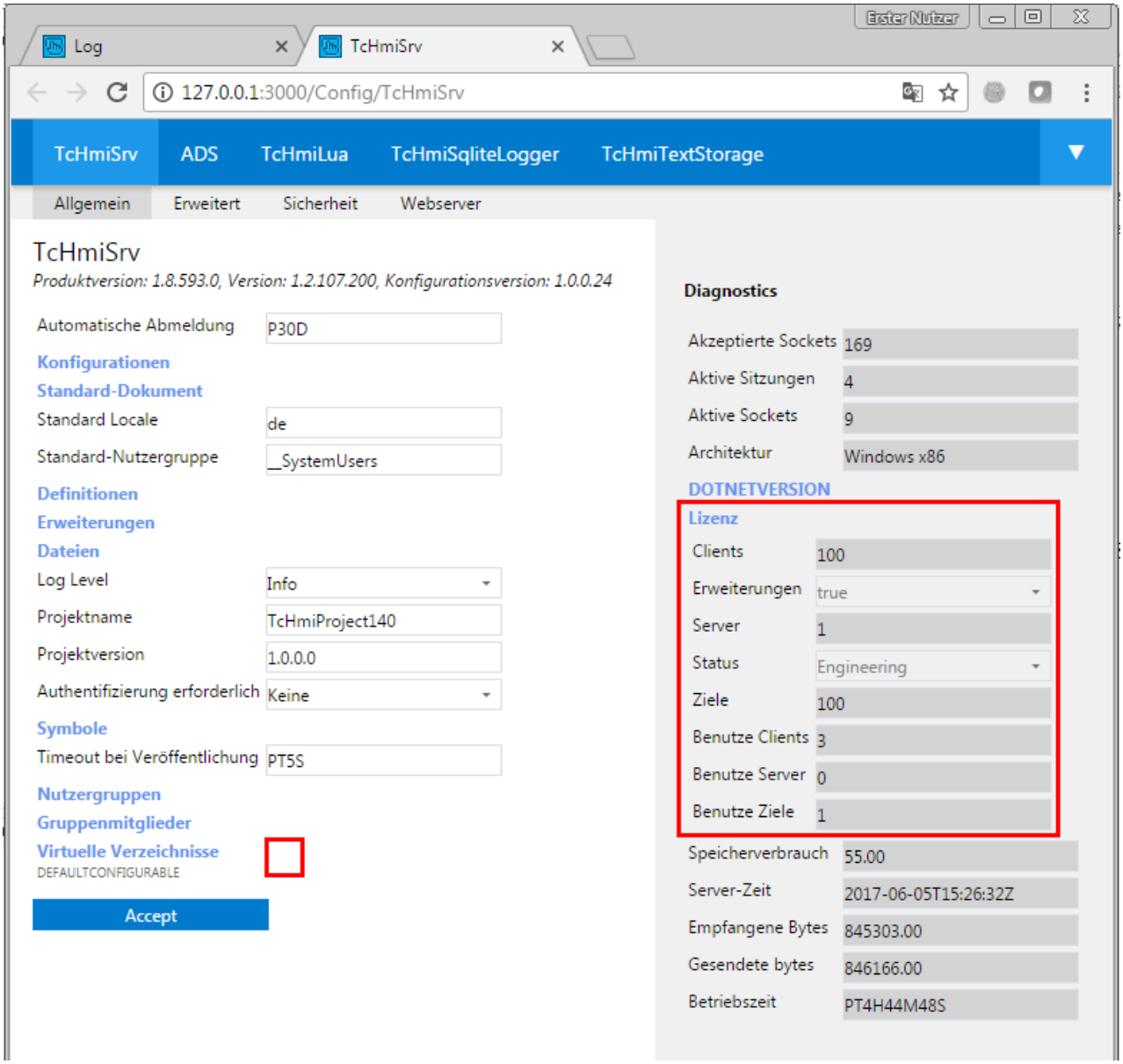
- Operating system
- Event log
- Memory images (if available)

5.2.1 Config page

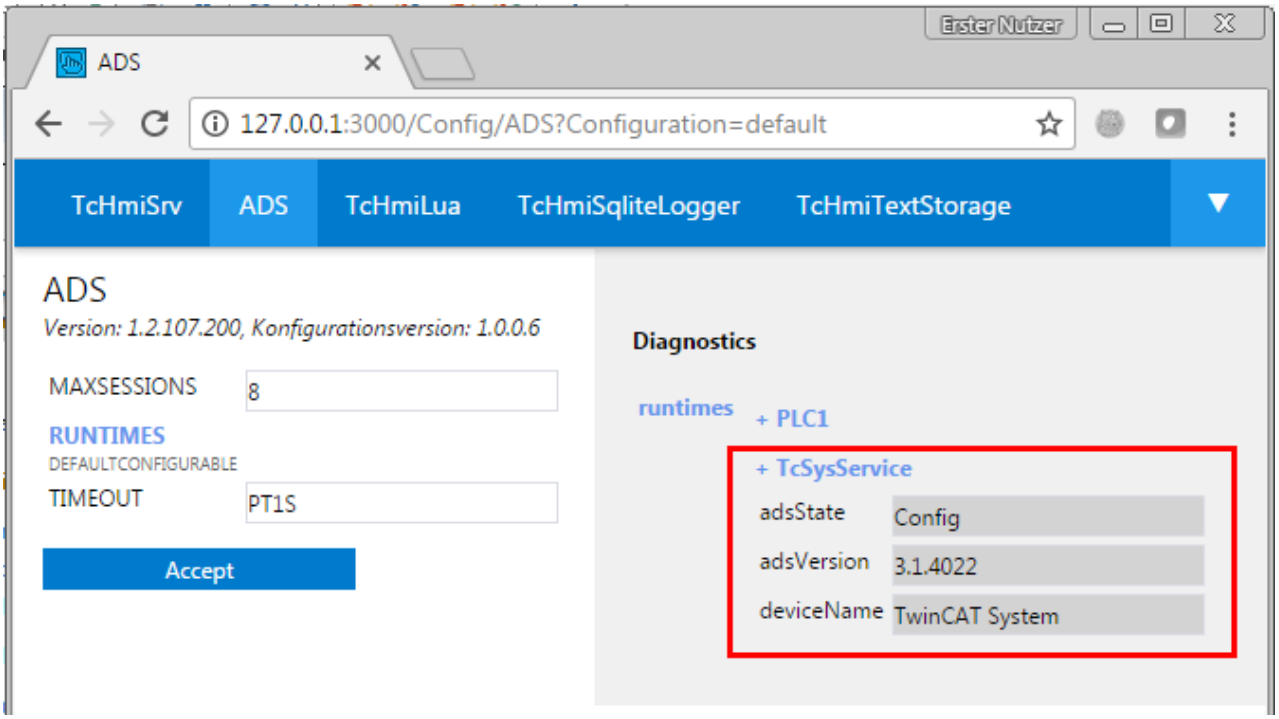
The configuration page of the TwinCAT HMI server provides access to the event log of the server, which can provide important information.



In addition, the page offers further diagnostic information. The **TcHmiSrv** category shows the supported .NET versions and the status of the licenses.



Under the **ADS** category you can read out the status of the configured TwinCAT system.



5.2.2 Crash dumps

If the server crashes, an attempt is made to write an image of the process (TcHmiSrv.exe). This can then be found in the working directory of the server under *Windows: \ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server.*

After a server restart the image is compressed (extension .tar.gz). Please send this image to support, including the product version number, the configuration (logger.db and storage.db) and, if possible, a description of the last steps you performed before the crash, so that we can reproduce the malfunction.

More Information:
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