BECKHOFF New Automation Technology

OPC UA from Beckhoff: Technology, Products, Leadership

How Automation benefits from OPC Unified Architecture

**Veronika Schmid-Lutz,
Chair of the OPC Foundation Board of Directors:**

"As a standards organization, the OPC Foundation has been committed to hardware and software interoperability in manufacturing, building automation, and other IoT-related industries for many years. To this end, the Foundation provides outstanding specifications, technologies, certifications, and processes. The latest and most groundbreaking standard is OPC UA for secure and reliable data exchange, which enables industrial communication from the sensor to the cloud without being tied to a specific manufacturer or platform. As early as 2007, Beckhoff was one of the first manufacturers to integrate OPC UA directly into its control systems. OPC UA also points to the future of SAP. Since 2008, SAP Plant Connectivity 2.0 has provided an easy, secure way of integrating machines featuring modern control systems with SAP software – all thanks to OPC UA. Beckhoff and SAP are pioneers when it comes to OPC UA. Many other companies have followed their example and also rely on this standard today.

As a company, Beckhoff combines innovation with many years of experience and high standards in quality and service. Hans Beckhoff himself defines and embodies this company culture. He is an inspiring entrepreneur and it's a real pleasure to work with him and the people in his company."

**Hans Beckhoff, Managing Director and Owner,
Beckhoff Automation:**

"Industrie 4.0 links the world of automation with the IT and Internet world and will enable the resulting synergies to be leveraged. Networking means communication, communication requires languages and associated functions and services. OPC UA offers a very powerful and adaptable standard basis that is accepted worldwide."

One of the central challenges of Industrie 4.0 and IIoT (Industrial Internet of Things) is the secure, standardized exchange of data and information between devices, machines and services – also from different industries. OPC UA is the data exchange standard for secure, reliable, manufacturer- and platform-independent communication. RAMI 4.0 (Reference Architecture Model for Industrie 4.0) listed this IEC 62541 standard as a recommendation for the implementation of the communication layer as early as April 2015.

The OPC UA standard enables cross-platform data exchange between products from different manufacturers. It combines specifica-

Stefan Hoppe, President and Executive Director, OPC Foundation:

"Beckhoff has more than 10 years of experience with OPC UA. In 2006, the company presented the world's first embedded PLC (a CX1020 with XPE) with an integrated UA server at the OPC UA Developer Conference in Munich, Germany, and successfully launched it on the market in 2007. The innovative corporate culture allows us to continually invent new ideas, it recognizes the value of important standards at an early stage and supports them in a pioneering manner – including OPC UA. This benefits Beckhoff's technology-oriented customers, as demonstrated by numerous applications in a wide variety of industries – from water management and manufacturing to renewable energies. OPC UA technology today offers an important contribution to openness and secure exchange of information between the IT and OT worlds in the context of Industrie 4.0."

Sven Goldstein, TwinCAT Product Manager, Beckhoff Automation:

"The Beckhoff product range offers customers all the possibilities to use OPC UA in a wide variety of facets and applications. Our ongoing involvement in the OPC Foundation working groups has a direct impact on product development and is an important point in the roadmap of the respective products."

tions developed in close cooperation between manufacturers, users, research institutes and consortia for exchanging information securely in heterogeneous systems. The OPC UA object model enables production data, alarms, events and historical data to be integrated in a single OPC UA server. This allows, for example, a temperature measuring device to be displayed as an object with its temperature value, alarm parameters and the corresponding alarm limits. The security mechanisms of OPC UA ensure the integrity and encryption of exchanged data and allow authentication of clients and servers. The above-mentioned mechanisms were rated very positively by the German Federal Office for Information Security (BSI).

OPC UA is not only a communication protocol, it also allows systems to be modelled and mapped in the so-called OPC UA namespace by means of an extendable information model. Functionalities such as Historical Access or Alarms & Conditions can be used as well as the extended security mechanisms. The equipment and machine manufacturer retains complete control over the data.

OPC Unified Architecture:

- standardized and secure data exchange between devices, machines and industries
- integrated communication from the sensor to the cloud
- manufacturer- and platform-independent
- recommended in RAMI 4.0 for implementation of the communication layer

Advantage in OPC implementation: with Beckhoff

Joining the OPC Foundation

Beckhoff initiates and leads PLCopen working group for OPC UA. Milestone 1: IEC 61131 mapping

First OPC COM DA product: TwinCAT OPC DA server

Prototyping of an OPC UA server to validate OPC UA specification

Beckhoff presents the first OPC UA product on the market: TwinCAT OPC UA server

First customer application: Areva offshore wind turbine with OPC UA connection to shore

OPC Foundation elects Beckhoff employee as President of OPC Europe

Beckhoff has been a pioneer in open standards for many years, so that customers can benefit from particularly extensive interoperability between Beckhoff and third-party products. The great commitment in the area of OPC standardization is an essential part of this. Interoperability workshops organized annually by the OPC Foundation, including in Europe, are a central component of the interoperability of many communication systems. This is where specification aspects are tested in practice to increase real interoperability between the OPC UA products of the participating manufacturers.

This means that an interoperability workshop leads to optimization of product development. Changes in the specification are also conceivable if deficits are discovered by different interpretations of the development. Beckhoff is one of the few companies that has its products tested for real interoperability and stability every year in the latest versions and with the latest functions. The findings are then fed into the development and into the specification working groups.

At present, Companion Specifications are defined in the different machine construction domains. These are descriptions that contain domain-specific facts, based on the language

2013

Beckhoff and Siemens promote consistent node sets at the control level

2014

First customer application for water management involving the IEC 61131 OPC UA client function blocks

Beckhoff presents the OPC UA-based SOA PLC at the Hannover Messe

OPC Foundation members elect Beckhoff to the OPC Board of Directors

Beckhoff provides Global Vice President of the OPC Foundation

PLCopen working group Milestone 2: OPC UA client IEC 61131 function blocks

Beckhoff collaborates in OPC UA Security working group

Beckhoff collaborates in OPC UA OMAC working group

2015

First customer application in building automation for connecting OPC UA servers to Microsoft Azure

Beckhoff collaborates in OPC UA Pub/Sub working group

Beckhoff collaborates in OPC UA TSN working group

Beckhoff collaborates in OPC UA I/O Link working group

2016

Beckhoff presents the world's first real-time-capable prototype for validation of Pub/Sub extension

Beckhoff hosts the OPC Day in Finland

Beckhoff sponsors the OPC Seminar Tour North America 2016

Beckhoff is co-initiator and member of the cooperation between OPC Foundation and M2M Alliance

2017

Beckhoff and Microsoft promote OPC UA for the Microsoft Azure Cloud

Beckhoff is co-host of the OPC Seminar Tour North America 2017

resources of OPC UA. The reason for this is that an OPC UA client that connects to a machine should be able to understand it as a machine of a particular type by means of the UA representation, regardless of which manufacturer has built the machine. This means that concrete machine specifications are accessed, rather than a structured list of variables, which is configured differently for each manufacturer.

Beckhoff provides comprehensive generic functions in its products. TwinCAT offers an OPC UA interface that meets the corresponding Companion Specifications of the domains. The TwinCAT OPCUA server can load such a description and automatically set up a corresponding namespace. After the customer has carried out a mapping to the symbolism of his PLC program, corresponding live data of the controller is provided according to the Companion Specifications.

Milestones

- Member of the OPC Foundation since 1998
- certified OPC UA products since 2007
- annual participation in all major interoperability events
- continuous collaboration in important working groups and Companion Specifications
- since 2014: Beckhoff employee is Global Vice President of the OPC Foundation

Service-Oriented Architecture: SOA PLC Concept

Beckhoff coined the term SOA PLC, in order to structure and present the different options of OPC UA. SOA stands for Service-Oriented Architecture. It describes the interaction of the OPC UA components. At the core is a real-time control system, e.g. TwinCAT. Data and project planning access as well as diagnostics and monitoring accesses are built manufacturer-independent around the actual real-time layer.

The next level shows Companion Specifications, i.e. interoperable, standardized machine access. OPC UA also offers the option to add manufacturer-specific extensions. Unique selling points can thus be mapped through the same communication channel. Beckhoff also offers a diagnostic model. The outermost layer represents the transport of OPC UA via the given communication channels, including the encryption mechanisms. The SOA PLC concept is supported by Beckhoff controllers.

In addition to the actual read/write access to data points, methods can be defined in the models that can be executed directly in real-time. They can be understood as service calls.

Level 1:
real-time control

Level 2:
data, project planning, diagnostics and monitoring accesses

Level 3:
modelling

Level 4:
transport of information and access rights

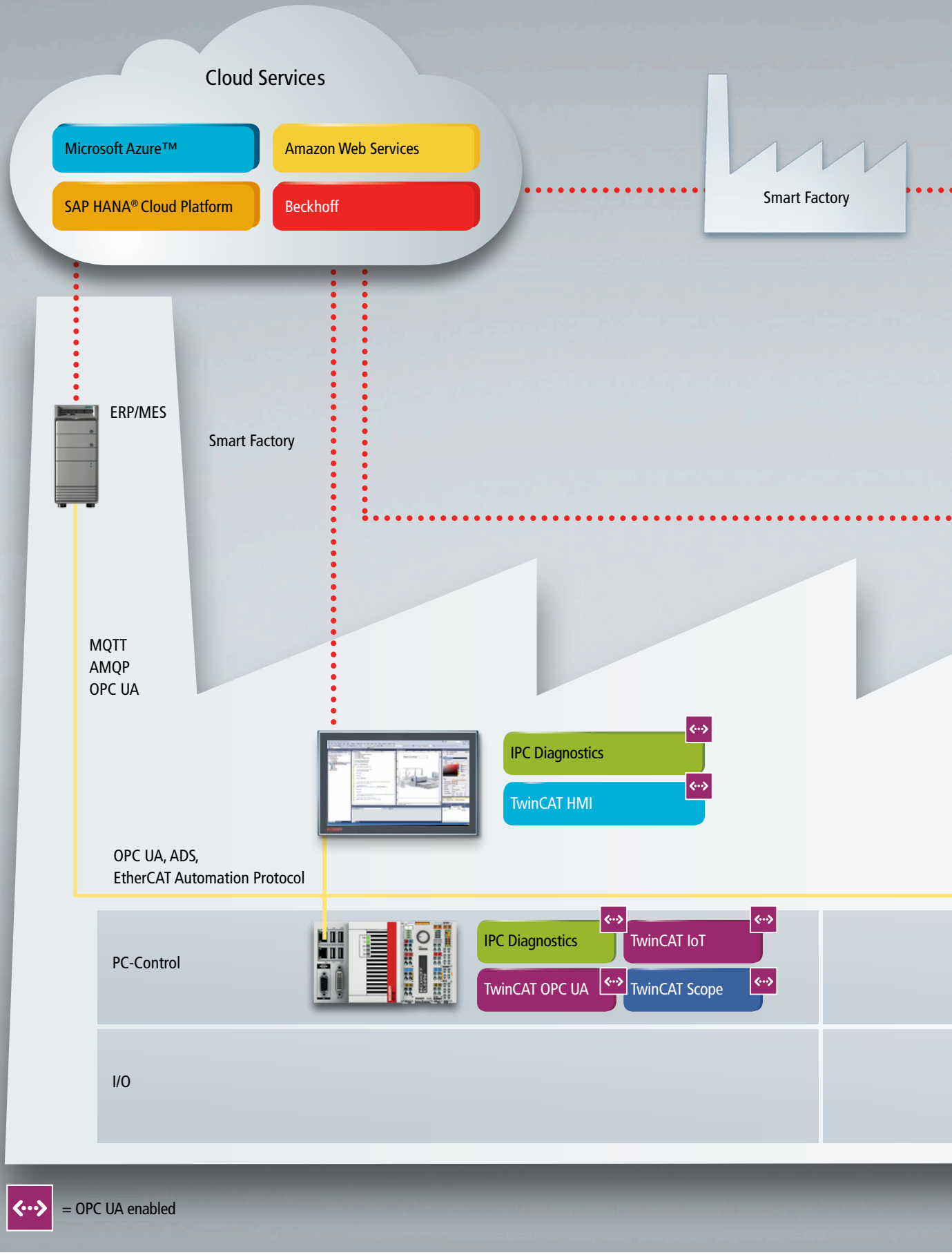
Highly scalable – from the smallest controller to the many-core system

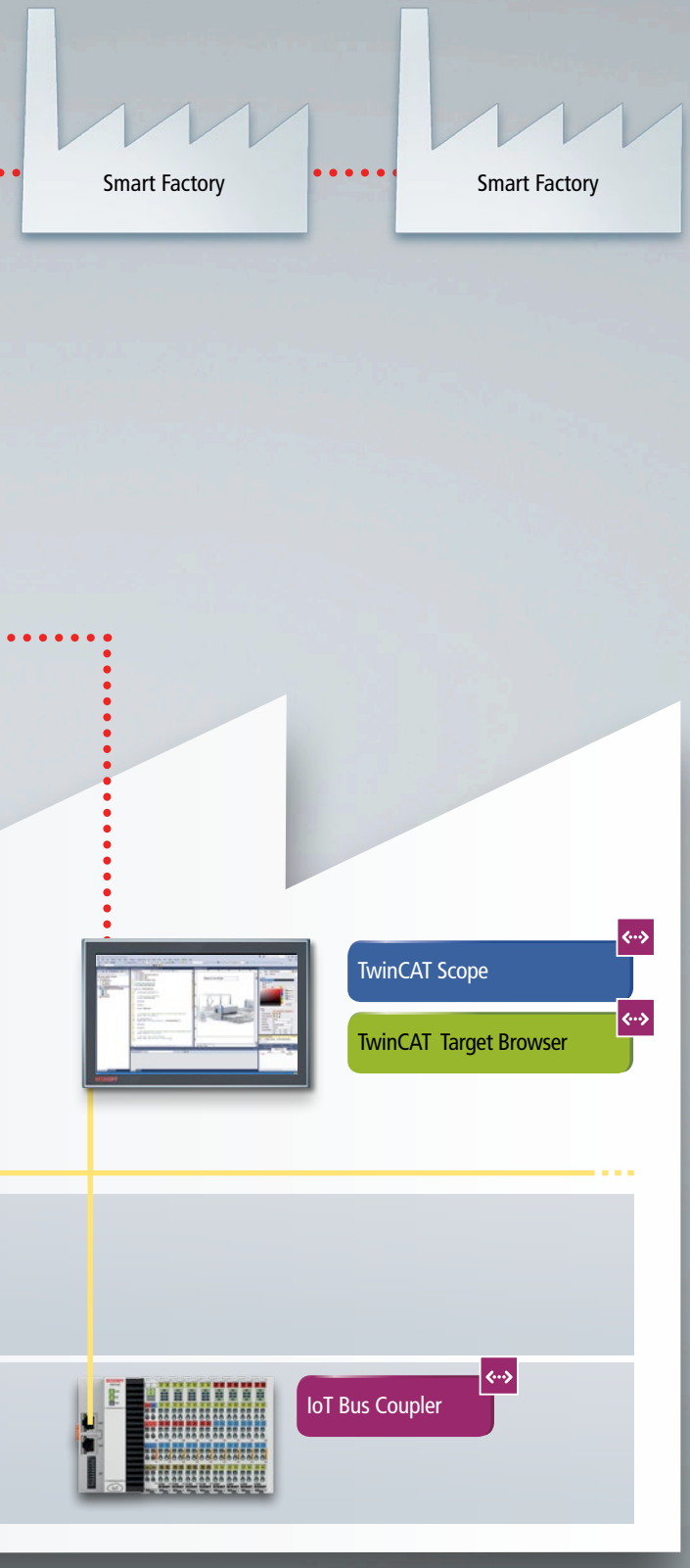
Together with associated software, PCs in different form factors are at the core of a wide range of diverse automation tasks such as control of machines, processes or logistics systems, networking of system components, data acquisition, or image processing. Beckhoff is one of the pioneers of PC-based automation: The first PC control system was delivered as early as 1986. Beckhoff Industrial PCs are characterized by a wealth of technology know-how accumulated over recent years. In combination with the TwinCAT automation software, they offer a high-performance control system for PLC, NC and CNC functionalities. In accordance with the Beckhoff product philosophy, only components and processors of the latest technologies are used in the development and design of Industrial PCs. Fine scaling is provided through processor graduations from Intel® Atom™ to Intel® Core™ i7. This scalability of Beckhoff Industrial PC hardware can also be mapped to a high degree to Beckhoff OPC UA components. The software components can be installed and used consistently on all performance classes, be it a low performance class such as the CX8000 or CX8100 Embedded PC, or a high performance class such as the C6670 industrial server.

Scalable for all applications

- powerful Industrial PCs and software for all automation tasks
- Beckhoff philosophy: the latest technological standards as a basis
- scalable hardware and software that can be used throughout

At a glance: Beckhoff products for OPC UA



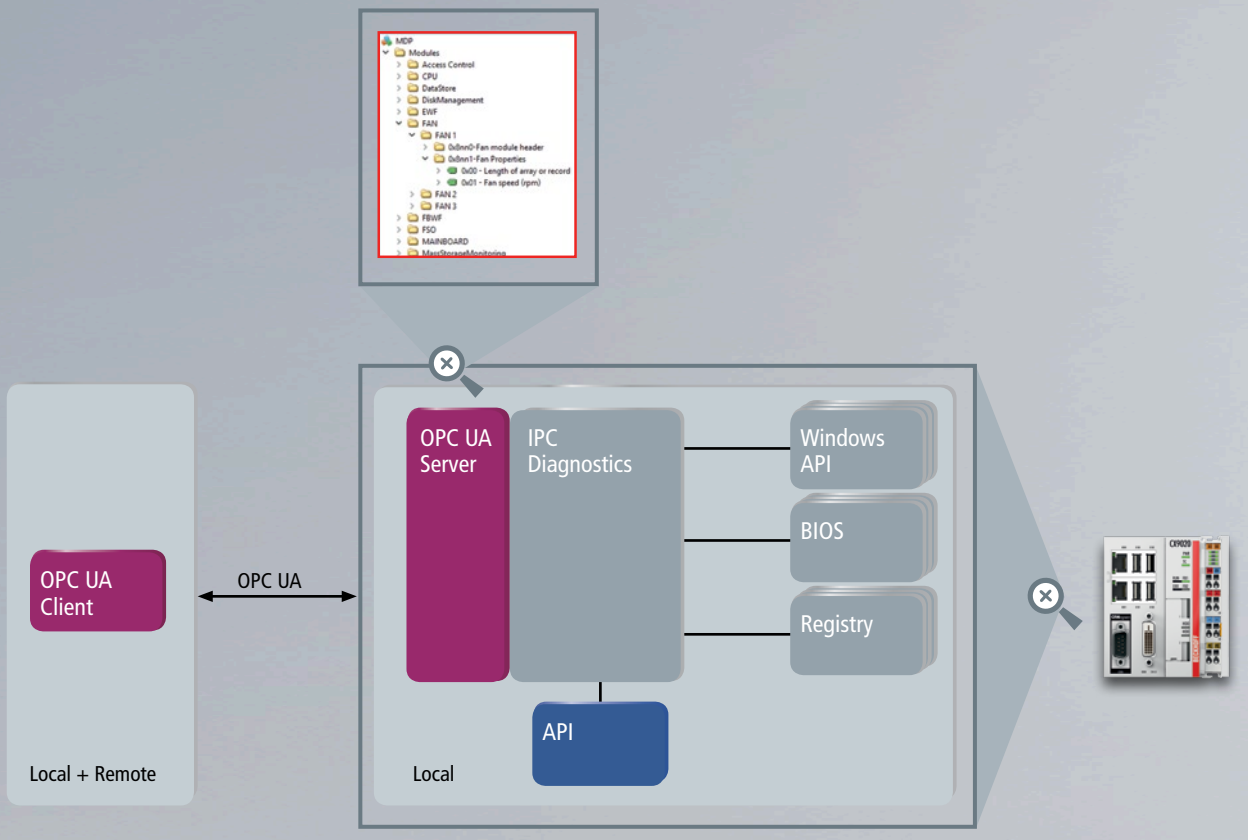


Beckhoff is a long-standing member of OPC Foundation. Beckhoff already adapted OPC UA standards in their early days and was thus able to establish the corresponding know-how at an early stage and implement it in products. The first OPC UA server was presented as early as 2006. From 2007 onwards, it was officially offered as a TwinCAT supplement and used in initial customer projects. The wide range of applications for OPC UA is thus also reflected in the Beckhoff product portfolio.

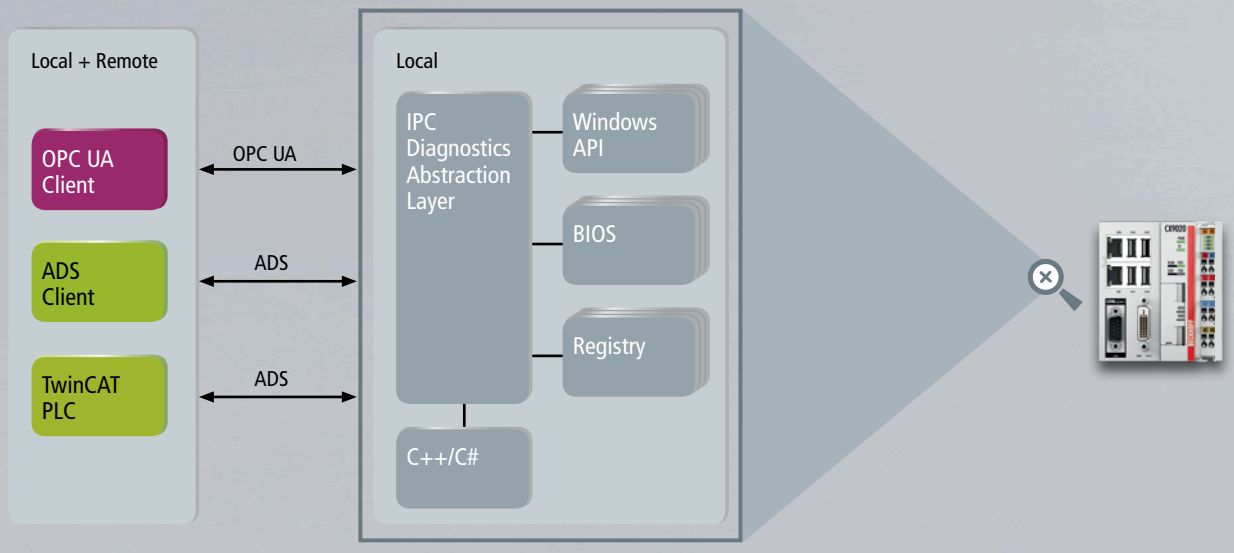
Beckhoff products offer a wide range of options for being used via OPC UA in automation projects: Industrial PC diagnostics options made available via OPC UA, access to TwinCAT real-time data, connection of OPC UA devices to the TwinCAT HMI visualization system and even the cloud. In addition, the EK9160 IoT Bus Coupler is a hardware device that enables direct, simple and secure access to I/O terminals via OPC UA.

Beckhoff OPC UA products:

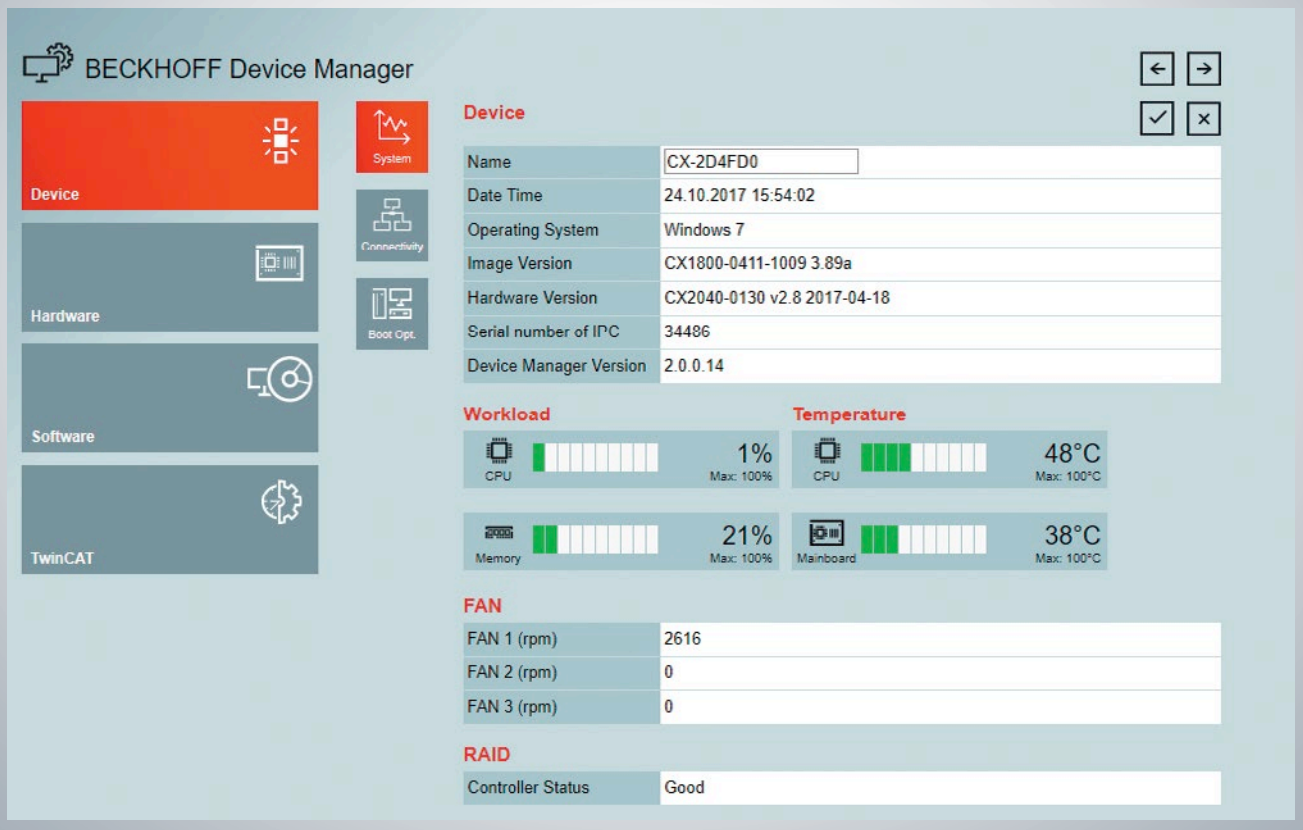
Beckhoff IPC Diagnostics: Diagnostics and Configuration via OPC UA



OPC UA server namespace with system data of the control computer



Interfaces for Beckhoff IPC Diagnostics



IPC Diagnostics website

The control computer is a central element of any PC-based machine control system. Therefore, it is important to detect critical system states, e.g. risk of overheating of the CPU or the motherboard, at an early stage. The monitoring of relevant PC parameters allows conclusions to be drawn about its availability or life expectancy. As a complimentary component of every Beckhoff Industrial or Embedded PC, Beckhoff IPC diagnostics provides this parameter data via various interfaces, such as a website or an integrated OPC UA server. These can be used to read out and, if possible, set hardware-related values such as CPU or mainboard temperature, fan speed, RAID status, and also operating system information such as CPU load or embedded write filter settings. OPC UA access can be secured via certificates.

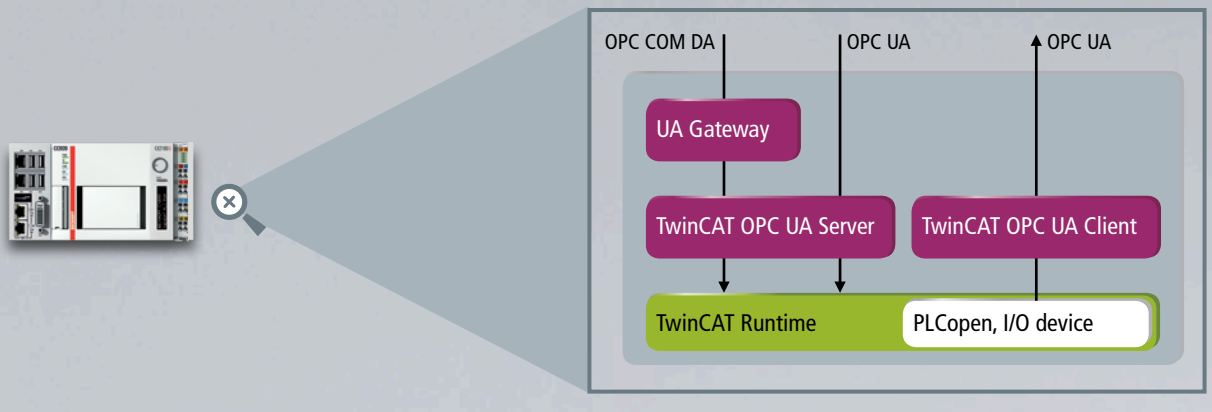
By implementing the standardized OPC UA file types, any files and directories can be released on the Industrial PC and made available via OPC UA, either for reading or writing files. This enables all OPC UA clients that support file types to securely exchange files with the controller, e.g. for downloading log or configuration files.

IPC Diagnostics

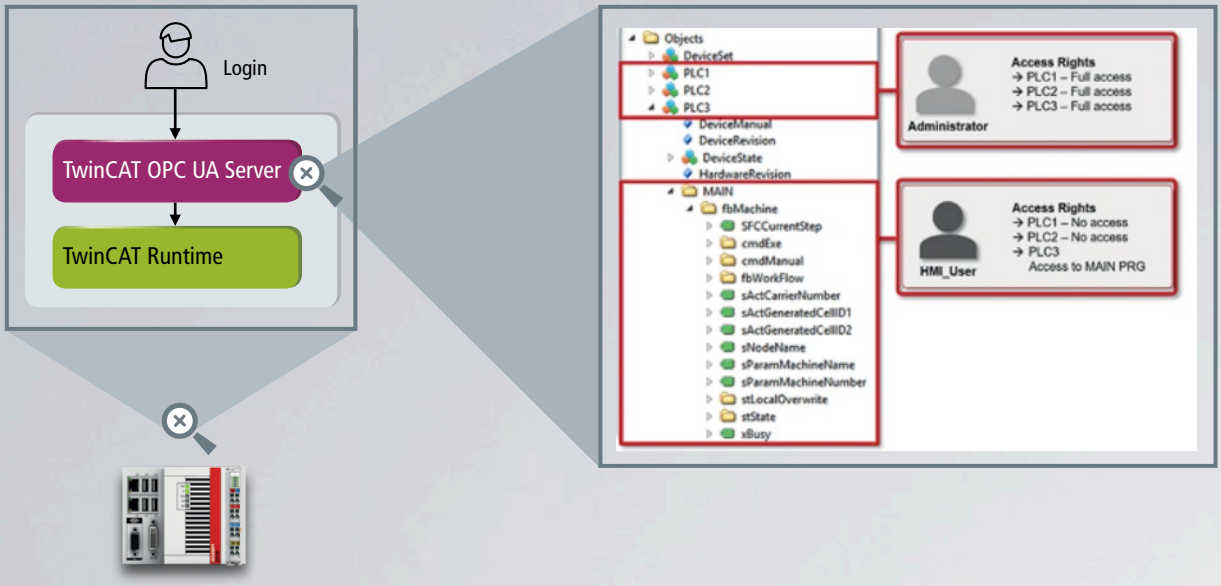
- secure access to system data of the control computer
- detection of critical states of the control computer
- OPC UA server for data access and file transfer
- APIs for integration into own applications
- integrated web page for visual and simple presentation of system data
- based on standardized IEC 61131/OPC UA mapping

TwinCAT OPC UA: Basis for SOA PLC and universal Software Interface

TwinCAT OPC UA at a glance



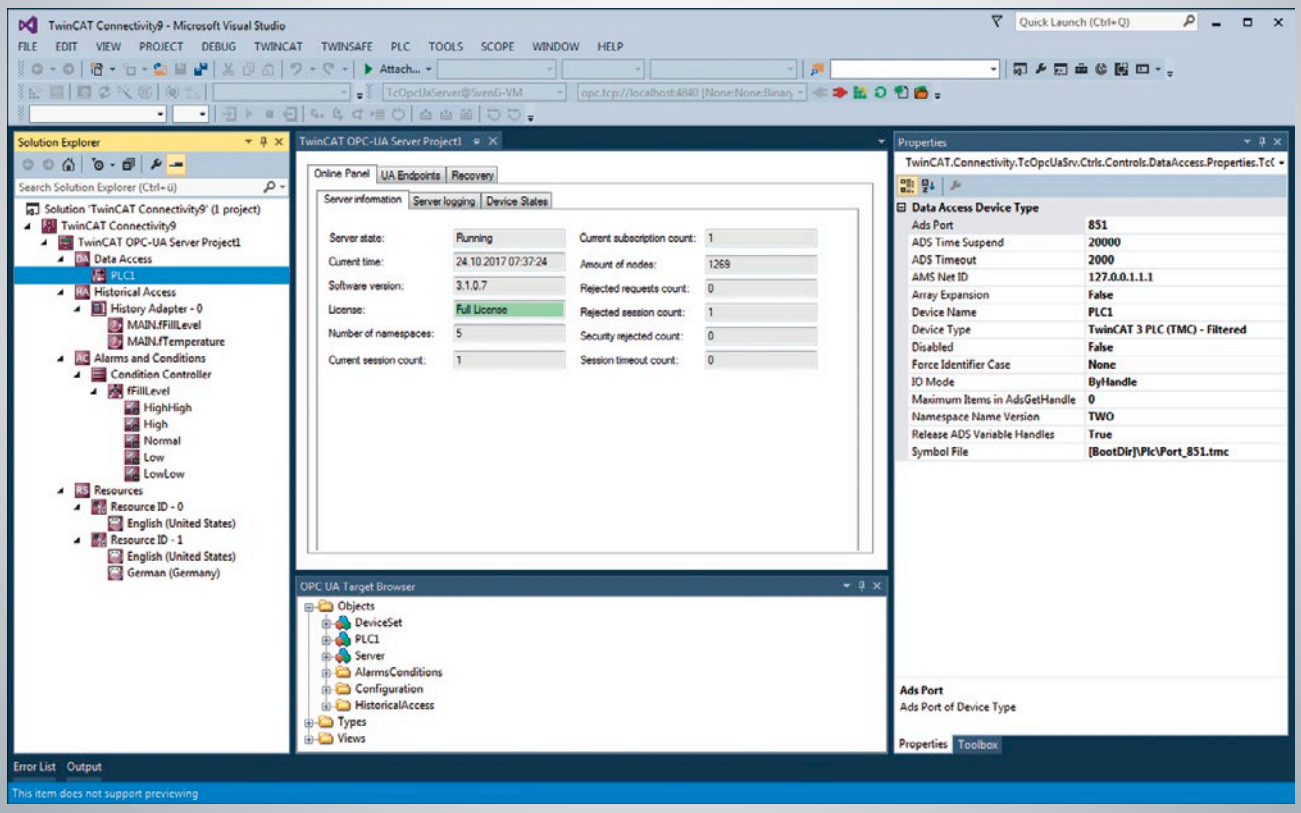
Access rights for TwinCAT OPC UA server



With the TwinCAT OPC UA product suite, Beckhoff has been providing a long-standing and established OPC UA product in the form of a TwinCAT supplement since 2007. On the one hand, this product suite with the TwinCAT OPC UA Server includes the possibility of receiving read/write access to symbols from the TwinCAT real-time environment and even of making methods callable from the real-time. On the other hand, the TwinCAT OPC UA client makes it possible to either communicate directly with other OPC UA servers via standard PLCopen IEC 61131 function blocks from the real-time logic, or to configure this via an I/O driver in a simple way. The UA gateway rounds off the product range by offering a free OPC COM DA interface for TwinCAT OPC UA server, which legacy clients can use to simplify the migration from OPC COM DA to OPC UA.

TwinCAT OPC UA server

The TwinCAT OPC UA server is the longest-running OPC UA product from Beckhoff. Beckhoff presented the first OPC UA server for accessing TwinCAT real-time at the OPC Developer Conference as early as 2006. Based on this, the TwinCAT OPC UA server was developed in 2007. It not only offers the possibility of OPC UA access to TwinCAT 2 and TwinCAT 3 Runtime, but also enables connection of Beckhoff Bus Terminal Controllers of the BC series. Supported OPC UA profiles range from simple data access to method calls and functionalities such as Historical Access and Alarms & Conditions. The extensive functionalities for configuring various security mechanisms not only enable securing of the communication channel via certificates, but also configuration of users, roles and access rights at the namespace level down to individual nodes. All configuration steps are performed using a graphical configurator integrated into Visual Studio®.



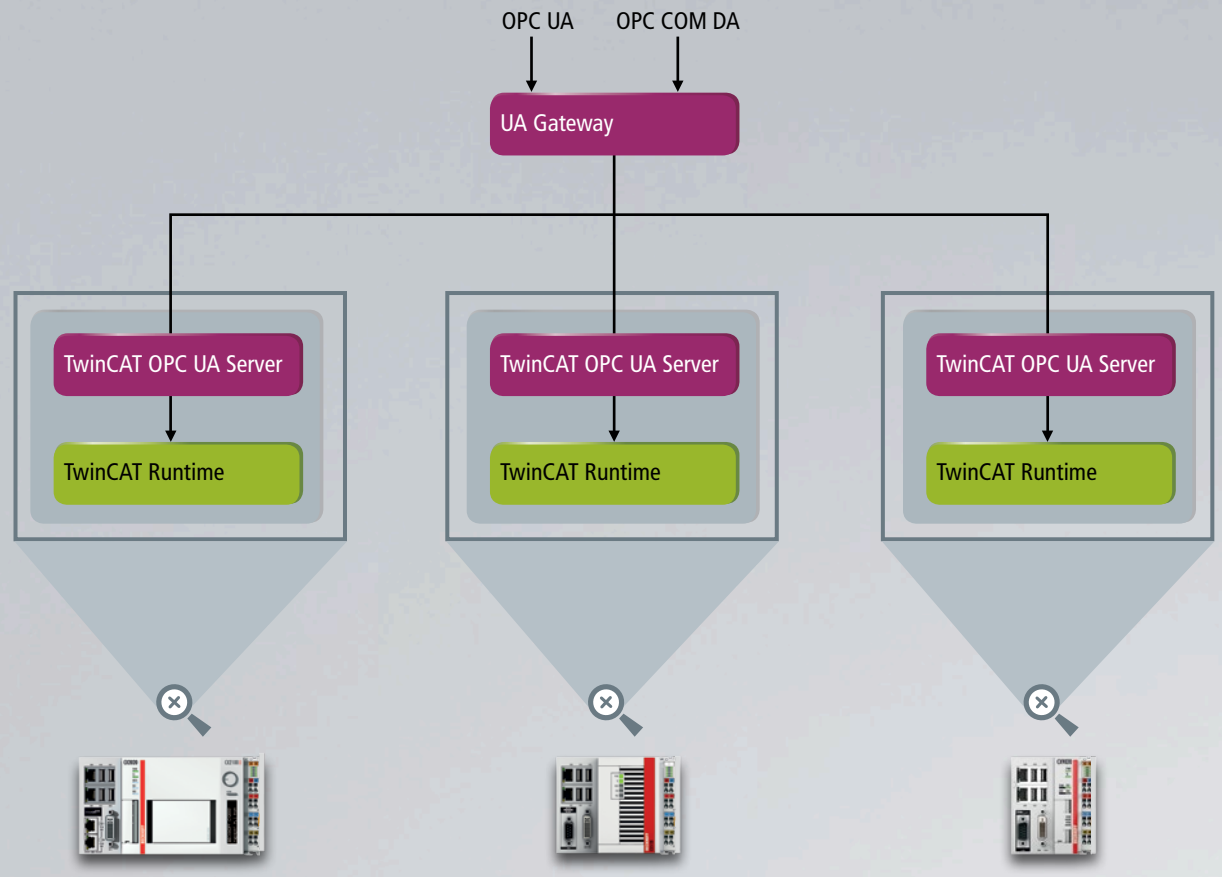
Visual Studio® integration of the OPC UA server configurator

TwinCAT OPC UA configurator
The TwinCAT OPC UA server is configured from Visual Studio® via the TwinCAT OPC UA configurator. This offers the possibility to parameterize all facets of the server, starting with Data Access, through Historical Access and Alarms & Conditions to Security Configuration. The configuration can be done either for the local system or a remote system. As a special highlight, the configurator also uses OPC UA as a communication channel between Visual Studio® and the remote system to be configured accordingly. An API for the Windows Powershell is available to extend the TwinCAT automation interface and automate the creation of OPC UA server configurations.

TwinCAT OPC UA Server
- access to real-time variables
- support of various profiles (DA, HA, AC)
- configuration of access rights
- integrated MethodCall mechanisms provide the basis for SOA PLCs

TwinCAT OPC UA configurator
- based on Visual Studio®
- local/remote configuration of a server via OPC UA
- API for automated creation of configurations

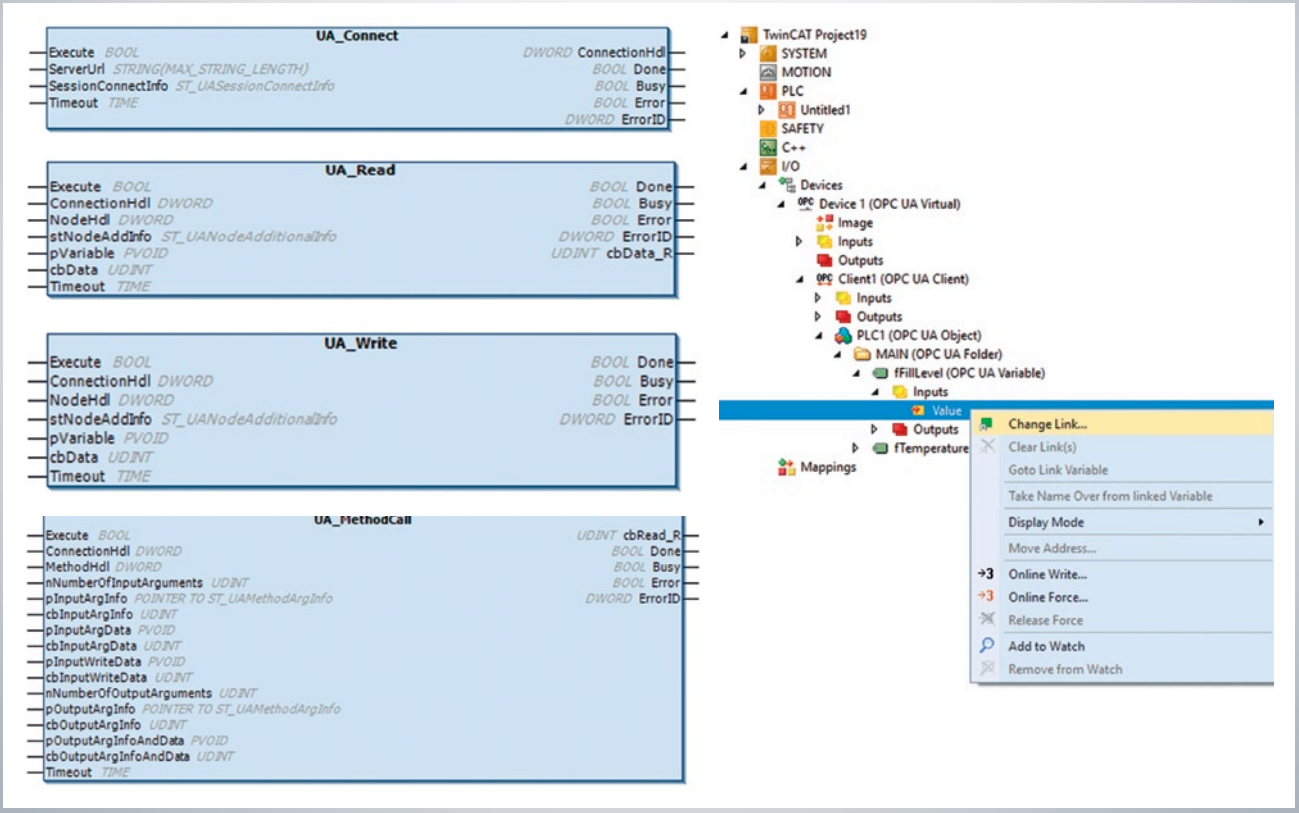
TwinCAT OPC UA: Basis for SOA PLC and universal Software Interface



Server aggregation in the UA gateway

TwinCAT OPC UA Client

The TwinCAT OPC UA client, which was created in 2012, enables communication with an OPC UA server directly via function blocks from the PLC control logic. In 2014, these PLC function blocks were standardized by PLCopen with support from Beckhoff. The implemented functionalities range from simple read/write accesses to method calls. In 2017, an I/O driver was added, which integrates the use of the TwinCAT OPC UA client functionalities directly into the TwinCAT I/O system and thus further simplifies their handling and also makes real-time available for TwinCAT 3 C++.



TwinCAT OPC UA Client over PLCopen function blocks and I/O device

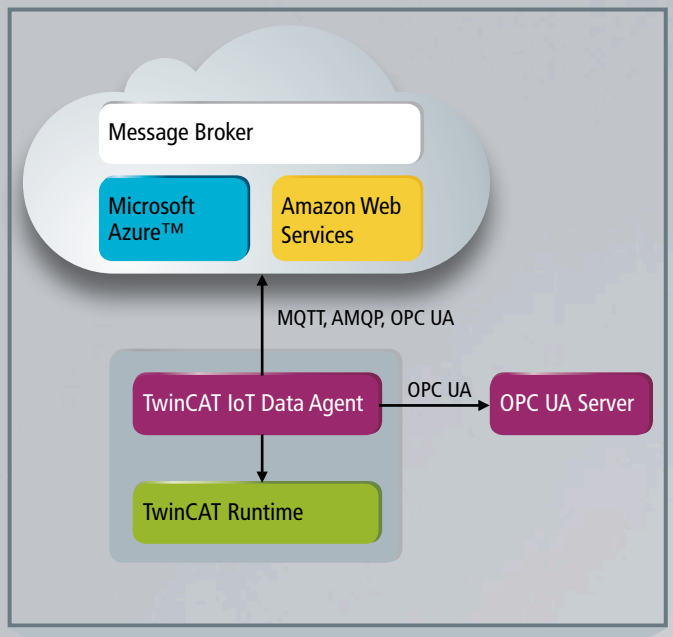
TwinCAT OPC UA Gateway
Since 2016, the TwinCAT OPC UA gateway has provided a free OPC COM DA interface in the form of wrapper technology for the TwinCAT OPC UA server. This not only makes it easier for users to switch to OPC UA, since both interfaces (OPC COM DA and OPC UA) are integrated in one package and OPC UA is already used in the background, but also offers the option of server aggregation, whereby several TwinCAT OPC UA servers can be combined in one network and made accessible via a single server endpoint.

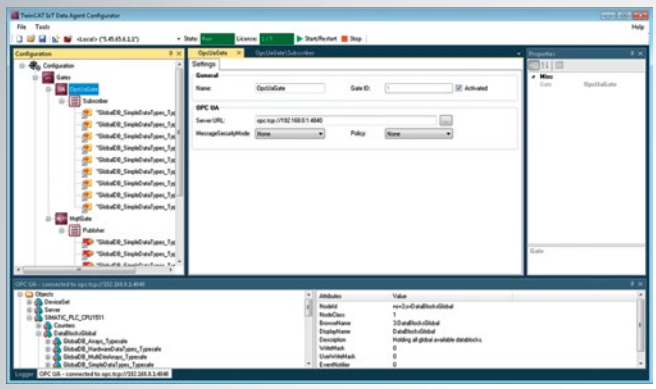
TwinCAT OPC UA Client
- support for Data Access and Historical Access
- based on PLCopen function blocks
- I/O driver for easy integration into the automation project

TwinCAT OPC UA Gateway
- integrated OPC COM DA server
- aggregation of TwinCAT OPC UA servers

▶ **www.beckhoff.com/english/twincat/tf6100**

TwinCAT IoT:
With OPC UA into the Cloud





The graphical configuration interface of the IoT Data Agent facilitates parameterization of the IoT project

TwinCAT IoT Data Agent with OPC UA connection

The increasing convergence of IT and automation technologies makes cloud-based communication services increasingly interesting for industrial control projects. Accordingly, PC-based control technology is gaining in importance.

With TwinCAT IoT, Beckhoff TwinCAT supports all relevant communication standards, such as OPC UA and MQTT, and facilitates the implementation of cloud-based production concepts. TwinCAT IoT offers various products for connecting the control system to the cloud, whereby both public cloud systems such as Microsoft Azure, Amazon Web Services or Google IoT and private cloud systems can be used via an MQTT message broker. The TwinCAT IoT Data Agent, a gateway application that is operated on an industrial PC, third-party systems can be connected to the cloud in addition to TwinCAT systems via the integrated OPC UA client.

The graphical configurator facilitates parameterization of all facets of the IoT configuration, including access data for the OPC UA server, the selection of the nodes to be used, and the settings of the cloud service and the data formats.

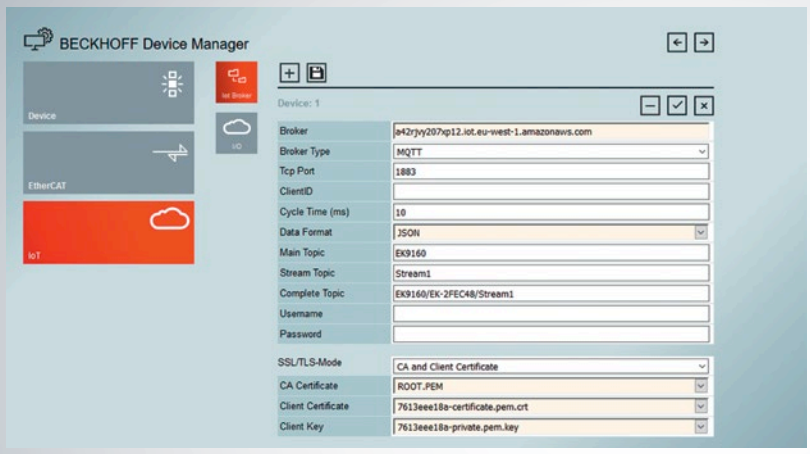
The uniform data format of the TwinCAT IoT and analytics products and the EK9160 ensures that all components are interoperable and can be combined with each other.

TwinCAT IoT Data Agent

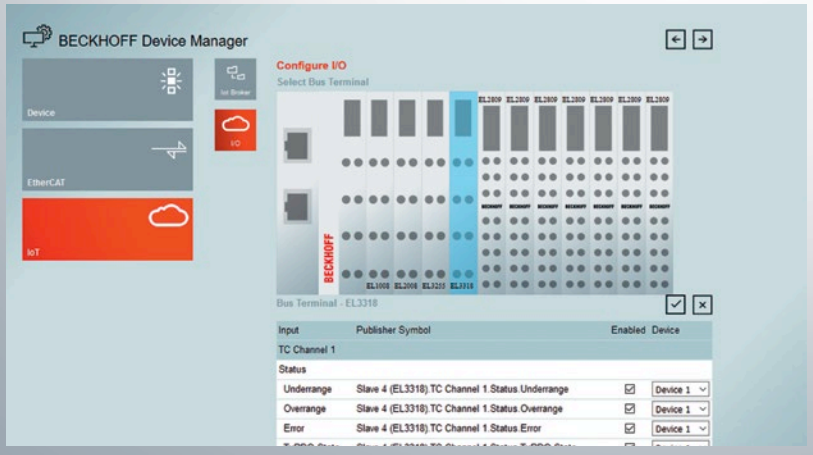
- flexible implementation of cloud-based production concepts with TwinCAT IoT
- connection of third-party systems to the public or private cloud via OPC UA
- graphical configurator simplifies connection of the control system to cloud systems
- enables retrofit: Connecting legacy systems to the cloud
- uniform data format guarantees cross-product interoperability

▶ **www.beckhoff.com/twincat-iot**

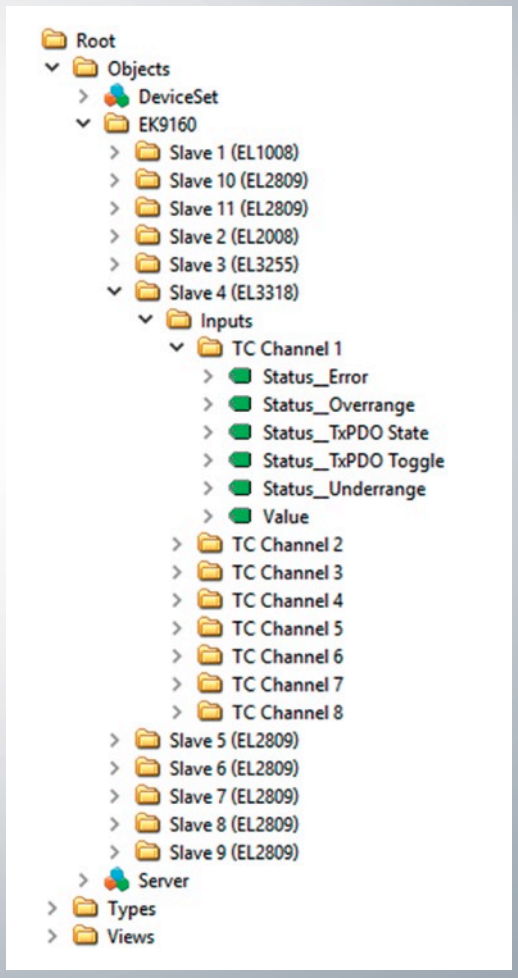
IoT Bus Coupler EK9160: Direct access to sensors and actuators via OPC UA



Configuration of cloud systems



Configuration of I/O terminals



Integrated OPC UA server of EK9160

EK9160 IoT Bus Coupler enables sensors and actuators to be transferred easily, safely and cost-effectively to all common cloud systems. With EK9160 IoT Coupler, Beckhoff offers direct connection of EtherCAT I/Os to the Internet of Things. EK9160 converts the EtherCAT signal representation of the I/Os to IoT communication protocols such as OPC UA or MQTT. It thus enables the simple and standardized integration of I/O data into cloud-based communication and data services.

Neither a controller nor programming is necessary. The I/Os are configured and parameterized in a simple configuration dialog of the integrated web server via any web browser. Settings for the respective cloud services and security mechanisms, such as authentication or encryption, can also be configured conveniently via a browser. After the parameterization, the coupler independently sends the digital or analog I/O values to the cloud service, including a timestamp. All connected I/O terminals can also be accessed automatically via the integrated OPC UA server. If required, this access can be restricted to different user roles.

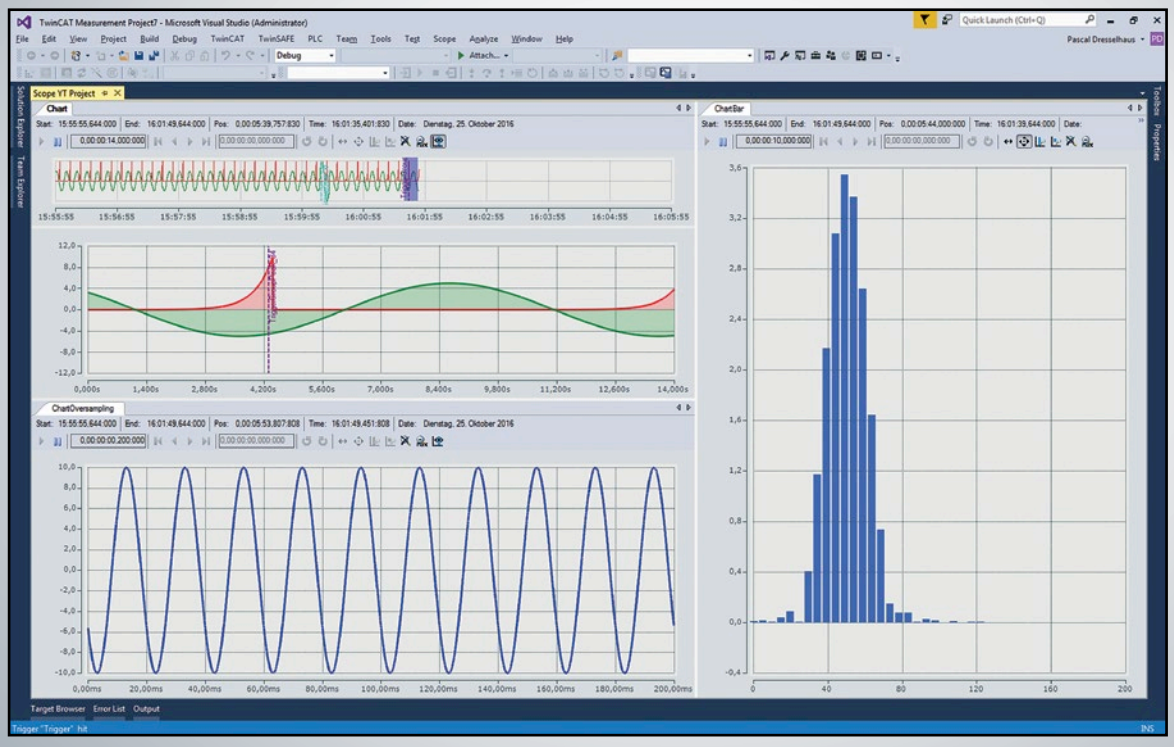
IoT Bus Coupler

- plug-and-play concept for simple and secure connection of I/Os to the cloud
- integrated OPC UA server for easy and secure access to I/Os
- access rights to I/Os can be defined via OPC UA
- integrated web page for easy configuration of cloud access and I/Os

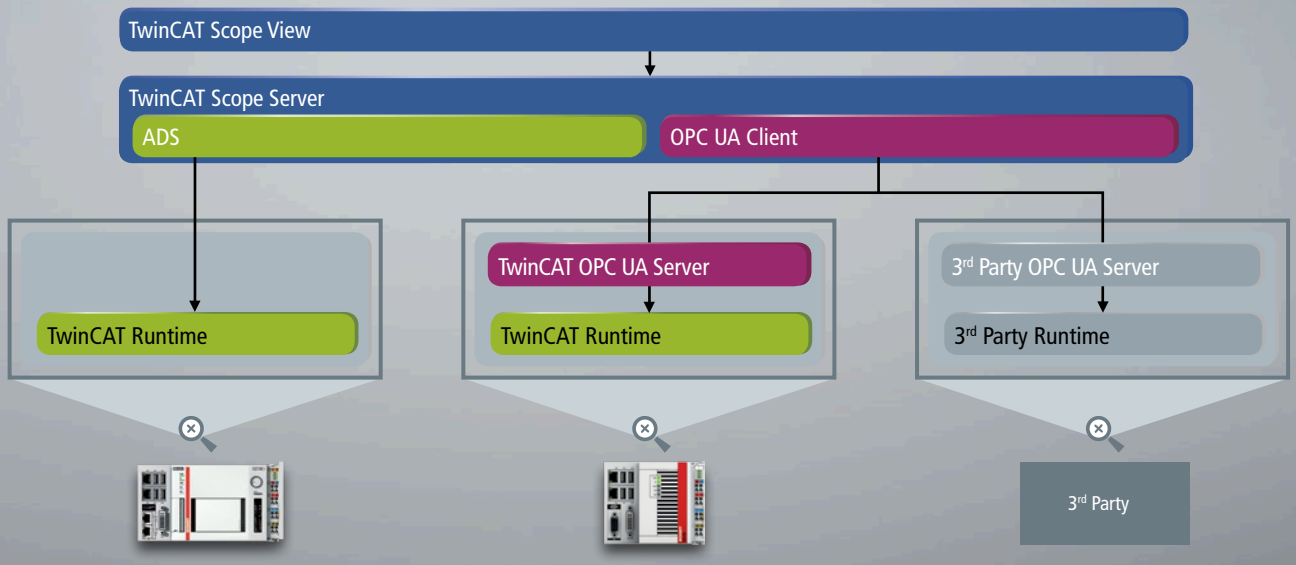
▶ www.beckhoff.com/EK9160

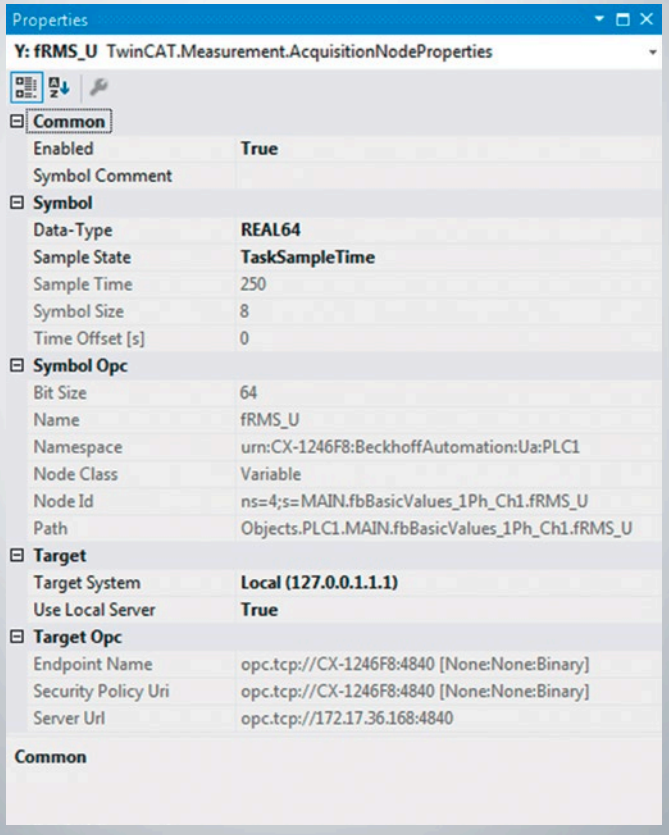
TwinCAT Scope:
OPC UA for analysis of Third-party Systems

TwinCAT Scope



TwinCAT ScopeView is an advanced charting tool for the graphical display of signals. It offers ease of operation and high performance in the presentation of line or bar charts. Significant events can be marked.





Acquisition parameters in the Visual Studio® Property window for an OPC UA node

Multi-core oscilloscope with standardized communication

The high-performance TwinCAT Scope software oscilloscope is divided into two basic components: Scope View integrated in Microsoft Visual Studio® for the graphical display of measuring signals and Scope Server for the actual data logging. Scope Server has a TwinCAT-specific and a standardized communication channel. The standardized communication channel is implemented as an OPC UA client. This enables the Scope to collect and display manufacturer-independent measurement data from heterogeneous systems. OPC UA and the use of certificates make this process reliable and secure.

The charting tool of automation specialists

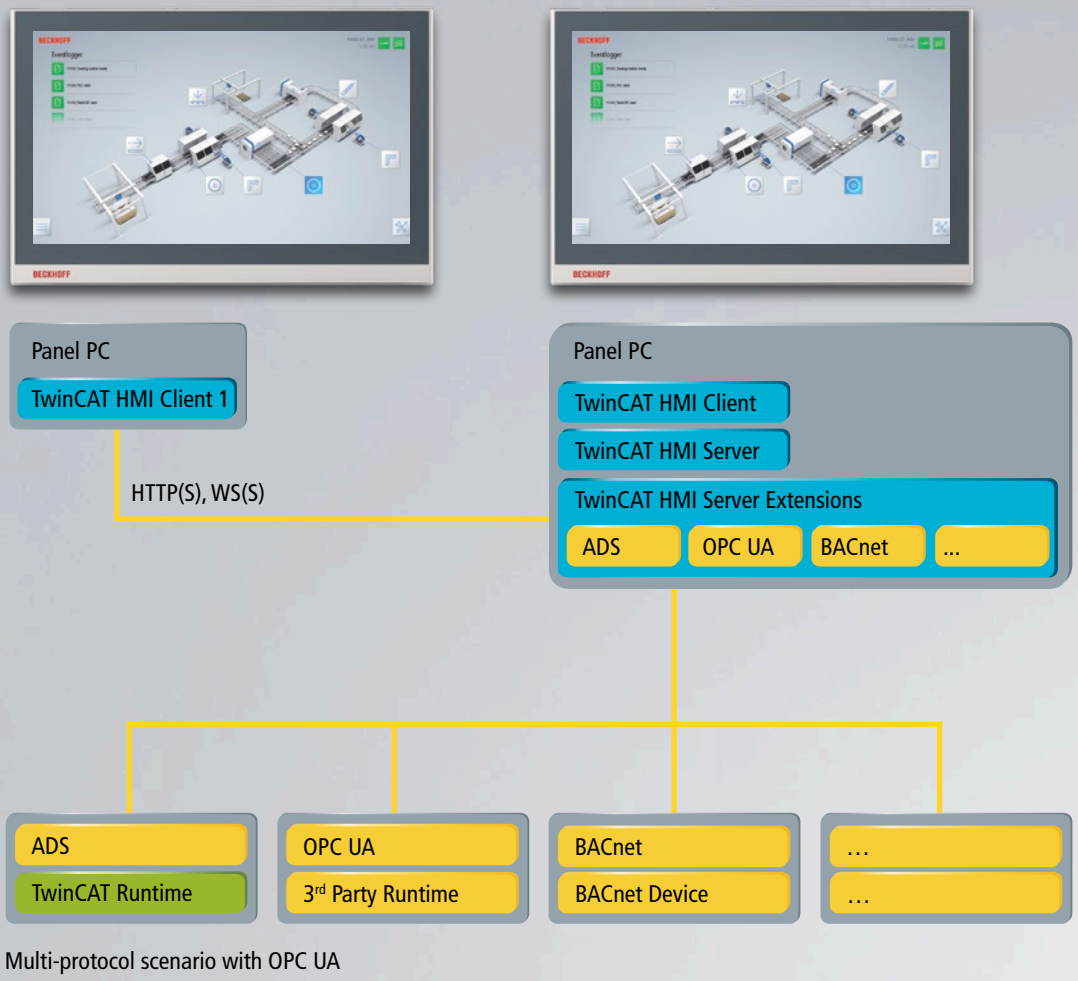
TwinCAT ScopeView offers multi-core support as well as trigger, chart synchronization, cursor, data export and many zoom functions to enable full utilization of the computing power of the system for displaying high-frequency signals. This allows different signal curves as well as complex representations such as XY plots or bar charts to be drawn. Measurement and analytical tasks, e.g. output of frequency responses, can thus be realized.

TwinCAT Scope

- intuitive operation
- high-performance data logging
- standardized communication
- different chart types
- multi-core support
- trigger functions
- data export

▶ **www.beckhoff.com/tc3-scope**

TwinCAT HMI: Open, extendable visualization solution with integrated OPC UA



Multi-protocol scenario with OPC UA

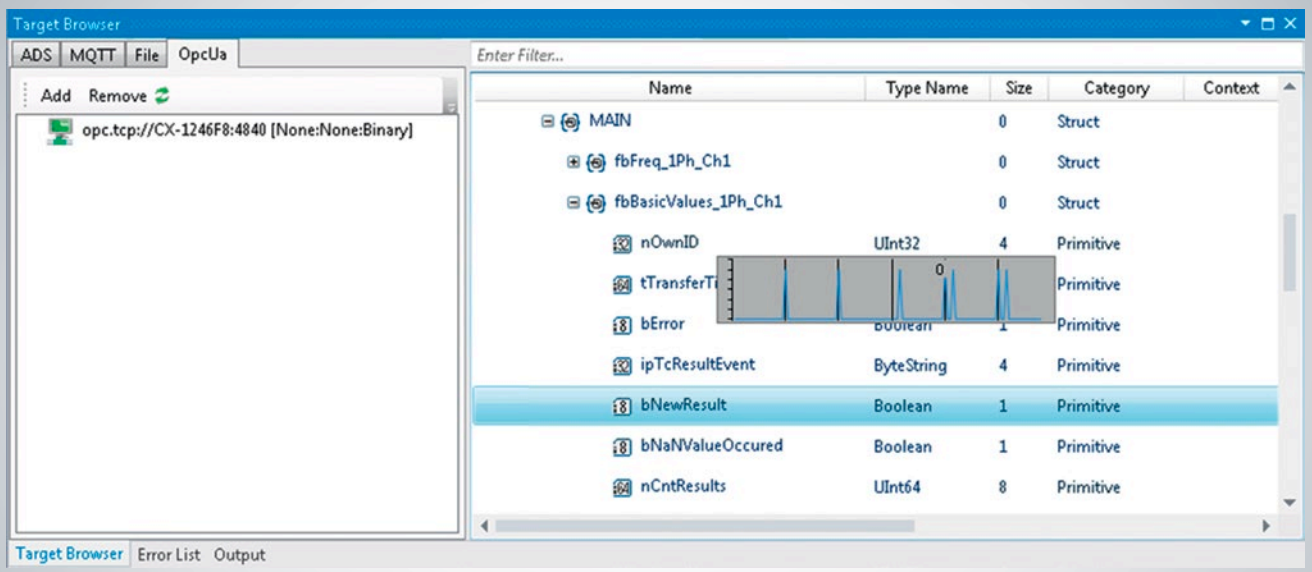
TwinCAT integrates the development of human machine interfaces directly into the familiar engineering environment of Visual Studio®. Regardless of the operating system and device, the web-based user interface is always responsive and adapts to the resolution, size and orientation. The TwinCAT HMI can be extended flexibly at all levels and enables you to develop your own controls or integrate business logics into the server. Safety and standards were at the forefront of the development of the TwinCAT HMI. The TwinCAT HMI server supports the open communication protocol ADS (Automation Device Specification) from Beckhoff, which allows access to all TwinCAT devices. For manufacturer-independent communication, an OPC UA client was integrated directly into the TwinCAT HMI server. Support for ADS and OPC UA is complementary and expands the flexible application possibilities of the TwinCAT HMI.

TwinCAT HMI

- efficient engineering
- integration in Visual Studio®
- platform-independence
- web-based (HTML5, JavaScript)
- powerful architecture
- modular expandability
- high-level language integration
- integrated OPC UA client for visualization of third-party systems

▶ **www.beckhoff.com/TwinCAT-HMI**

TwinCAT Target Browser: All communication channels centrally managed



TwinCAT target browser in Microsoft Visual Studio® with node value preview

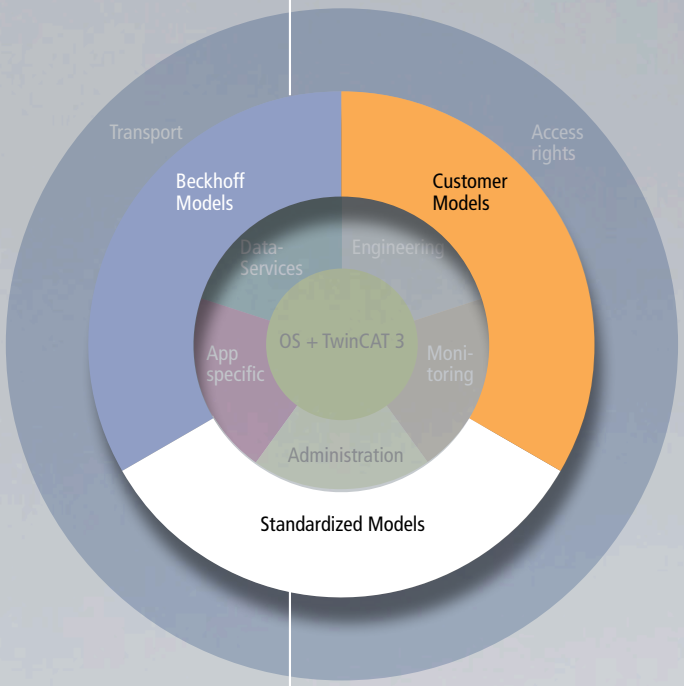
The TwinCAT target browser is the central point in TwinCAT engineering for accessing control data of distributed runtimes. The runtimes serve as data sources for various TwinCAT products such as the database server, ScopeView or the OPC UA configurator.

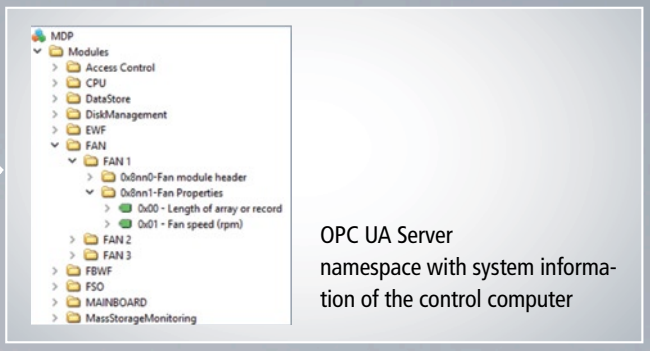
Various communication channels are available for access. Open and TwinCAT-specific communication via ADS protocol, MQTT in the field of IoT communication protocols and the OPC UA protocol, which is most widely used and standardized in the automation world. The integrated OPC UA client functionality makes it possible to use Target Browser to browse the namespace of an OPC UA server and select nodes that are made available to OPC UA-supporting tools in TwinCAT system.

TwinCAT Target Browser

- central basic tool for configurators
- support of multiple communication channels, e.g. OPC UA
- charting view for previewing live values

For different Information Models: OPC UA



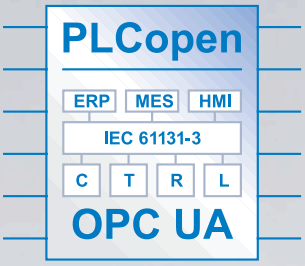


OPC UA Server
namespace with system information of the control computer

Companion Information Models
PLCopen, BACnet, AutomationML, IO-Link, AutoID, IEC 61850/61400, PackML

Built-in Information Models

OPC UA Meta Model



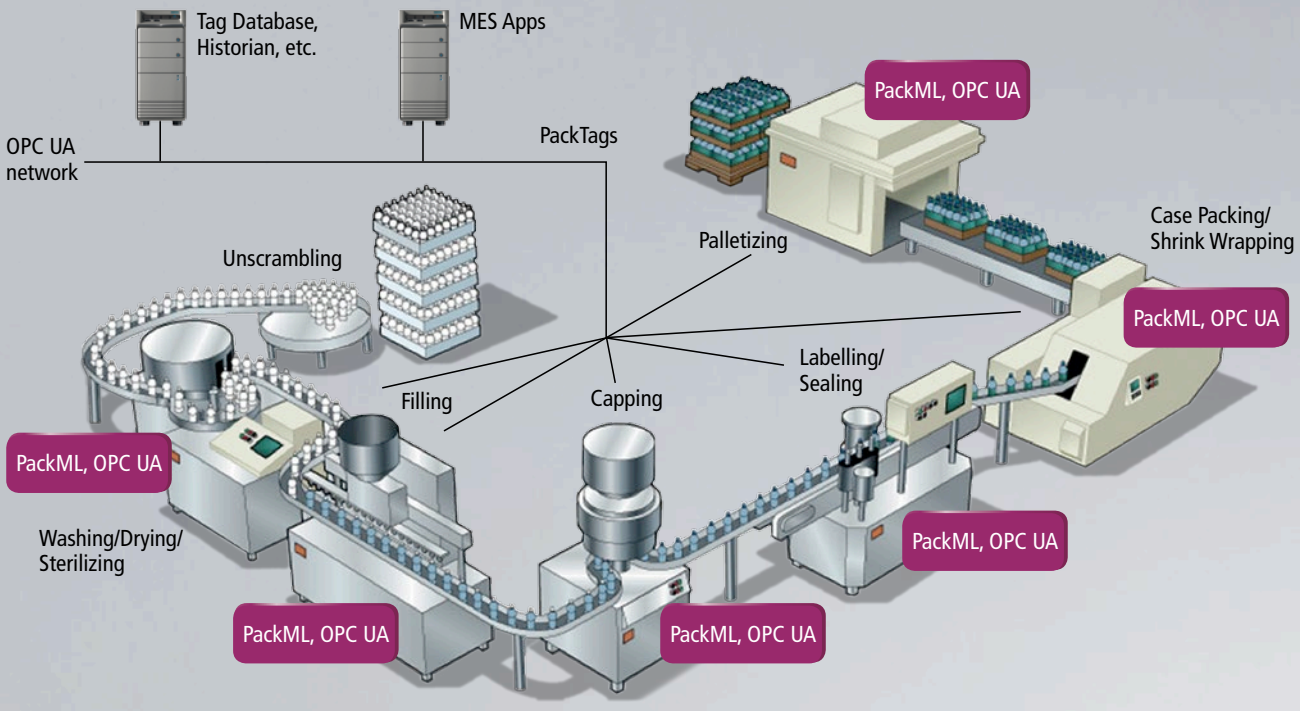
The OPC UA metamodel describes how clients access information in the server. It defines a set of uniform node types that can be used to display objects in the address space. This model represents objects with their variables, methods, events and their relationship to other objects. The properties of each node are described by OPC UA defined attributes. Attributes can have data values, which can be simple or complex. OPC UA enables modelling of any object and variable types and the relationships between them.

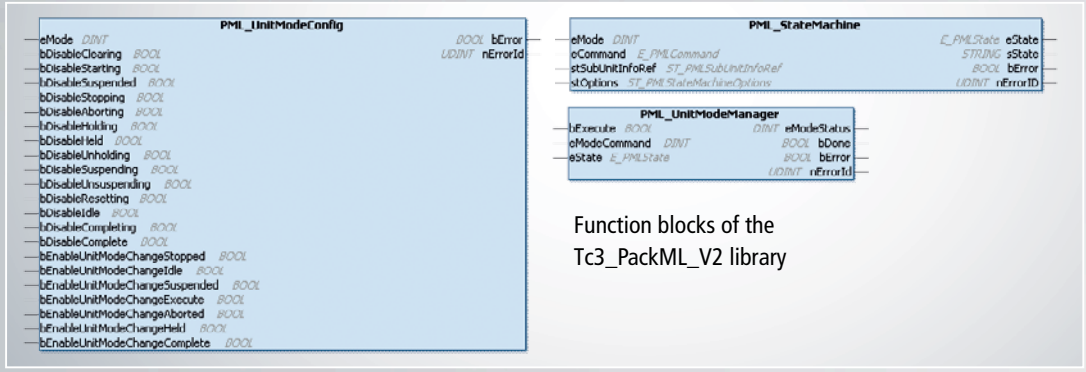
The semantics are displayed by the server in its address space and can be captured by clients. The type information can be standardized or manufacturer-specific and defined by different organizations, which then form a working group for the definition of a so-called Companion Specification. Beckhoff is represented in all working groups that are important for automation and actively supports the definition and extension of the specification, e. g. PackML, Pub/Sub, OPC UA TSN, IO-Link, IEC 61850, PLCopen, BACnet.

Information models with OPC UA

- OPC UA offers several basic information models that are already integrated
- modelling of special models is possible
- working groups on Companion Specifications define type systems for different domains

TwinCAT PackML: reduces the Engineering Effort through OPC UA integration





Function blocks of the Tc3_PackML_V2 library

In TwinCAT 3, a supplementary PLC library with PackML blocks (ISA-TR.00.02) standardized according to OMAC is now available free of charge for the packaging industry. OMAC PackML provides the definition of a state machine for use in machines and plants. In addition, a terminology for this state machine is defined and its use is documented by means of examples.

Additional structures, so-called PackTags, are provided as a central interface for the communication of machines and systems among each other and with other devices (HMI/Master Computer/ MES/SCADA). These are automatically preconfigured for use in TwinCAT OPC UA server, so that every OPC UA client can access them directly. Admin, command and status tags are available within these structures. Thus, commands and information can be communicated by each device via a standardized interface.

TwinCAT PackML

- Tc3_PackML_V2 library contains the current state of all standardized PackML function blocks
- function blocks for simple use of the PackML State Machine
- function blocks for switching between the freely configurable, application-specific PackML state machines
- structures of the PackTags included in PackML
- simple engineering: library is automatically prepared for use via the TwinCAT OPC UA server

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OPC UA from Beckhoff.
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