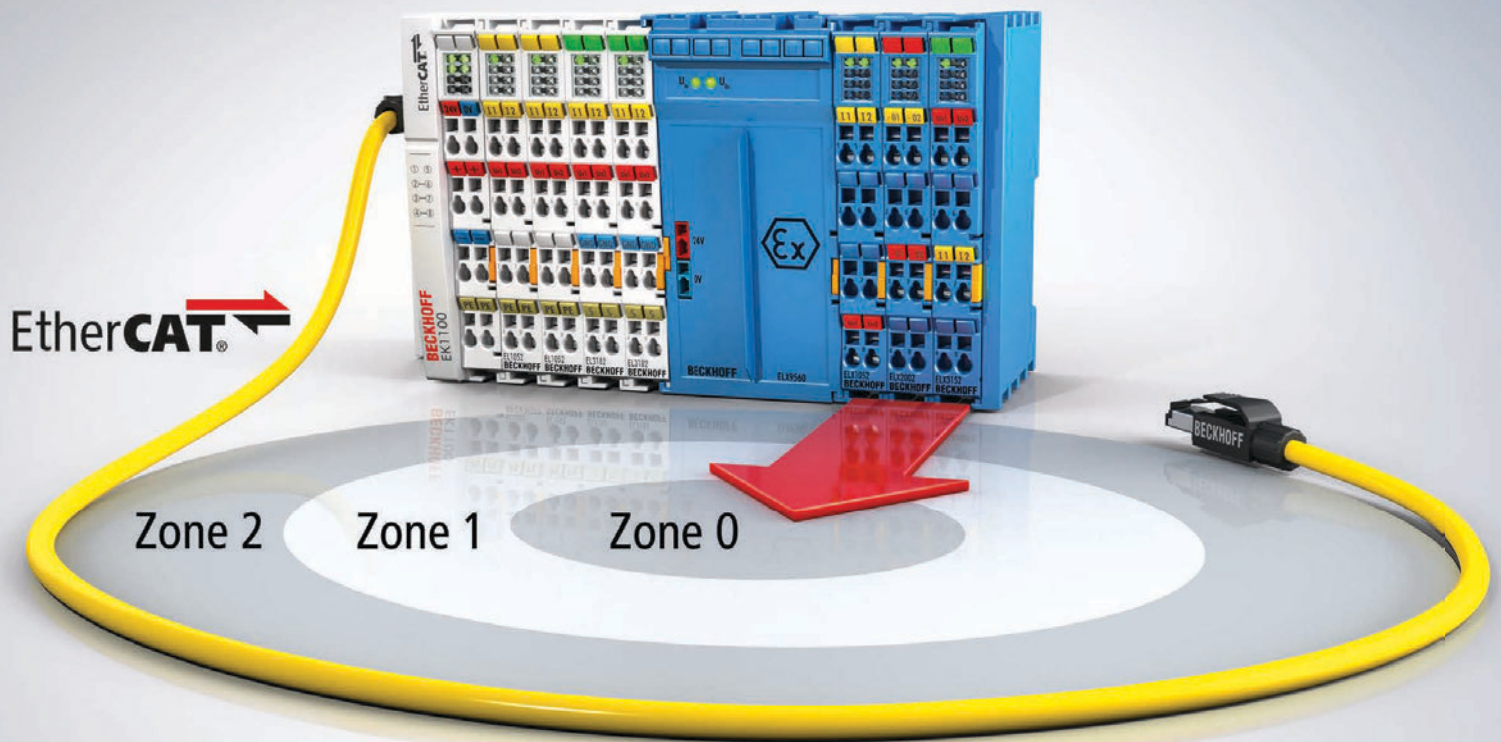


BECKHOFF New Automation Technology

Automation and process technology
in one system: with PC-based Control.



The proven PC-based control concept from Beckhoff: with process technology directly integrated into the control platform.

The system-integrated solution for explosion protection requirements: PC-based control.

With a universal toolkit of components and profound, cross-industry expertise, Beckhoff provides open automation systems for all industries on the basis of PC-based control technology. Through the consistent consolidation of control intelligence in automation software and established standard technologies from the fields of IT and automation, PC-based control combines all functions such as PLC, measurement technology and motion control into one powerful system. Beckhoff also supplies components from the controller to intrinsically safe I/Os for demanding applications in the process industries. With an extensive



The proven components of PC-based control: IPC, I/O, Motion and TwinCAT.



Oil/gas production



Minerals/metals



Pulp/paper production



Chemicals/petrochemicals

range of explosion-proof components, Beckhoff provides comprehensive solutions for barrier-free system integration right into Zone 0/20. These include EtherCAT Terminals with intrinsically safe I/O interfaces from the ELX series, along with Control Panels and Panel PCs of the highest build quality from the CPX series as well as updates to TwinCAT control software with specific process technology interfaces. For new plants, explosion protection can be directly integrated into the overall control system architecture; for existing plants, the Beckhoff PC-based control platform can simply be extended. Beckhoff also covers all common standards in the industry by connecting via process technology

protocols such as HART, NAMUR and FDT/DTM. The complete integration of these protocols and programming standards in TwinCAT provides a familiar experience for users who previously worked with other software environments. With products for explosion protection and corresponding software interfaces in TwinCAT, Beckhoff offers a lean, system-integrated alternative to traditional process industry suppliers. PC-based control is suitable for process technology applications in numerous industries: from oil and gas production, petrochemicals, water management, the food and beverage industry, metal and woodworking, through to pulp and paper production.

Beckhoff combines automation and process technology into one system:

- PC-based control technology is well-established worldwide across all industries
- Automation and process technology on a universal and scalable hardware and software platform
- Barrier-free process technology integration right into Zone 0/20
- EtherCAT Terminals with intrinsically safe I/Os, explosion-proof Control Panels and Panel PCs, plus corresponding software interfaces

The Beckhoff control architecture: Barrier-free field device integration right into Zone 0.



EtherCAT[®]



Beckhoff product portfolio for barrier-free process technology integration.

In the systematic development of a holistic control approach, Beckhoff has expanded the range of products to include explosion protection options. As a result, users can combine industrial automation and process technology on a universal and scalable hardware and software platform. In addition to an industrially proven range of Control Panels and Panel PCs, Beckhoff now supplies specific solutions for use in hazardous areas Zone 2/22 with the CPX series. With the ELX series EtherCAT Terminals from Beckhoff, which were developed entirely in-house, advanced I/O terminals for data



acquisition are now also available for explosion protection applications. Up to four intrinsically safe inputs are integrated into the 12 mm wide terminal housings, enabling the direct connection of intrinsically safe field devices located in Zones 0/20 and 1/21 to the Beckhoff control system. The development of customer-specific variants is also possible.

The universal explosion-proof range of devices moreover reduces complexities: PC-based control integrates all essential automation functions into one multitasking system. That also holds true on the software side: TwinCAT control software

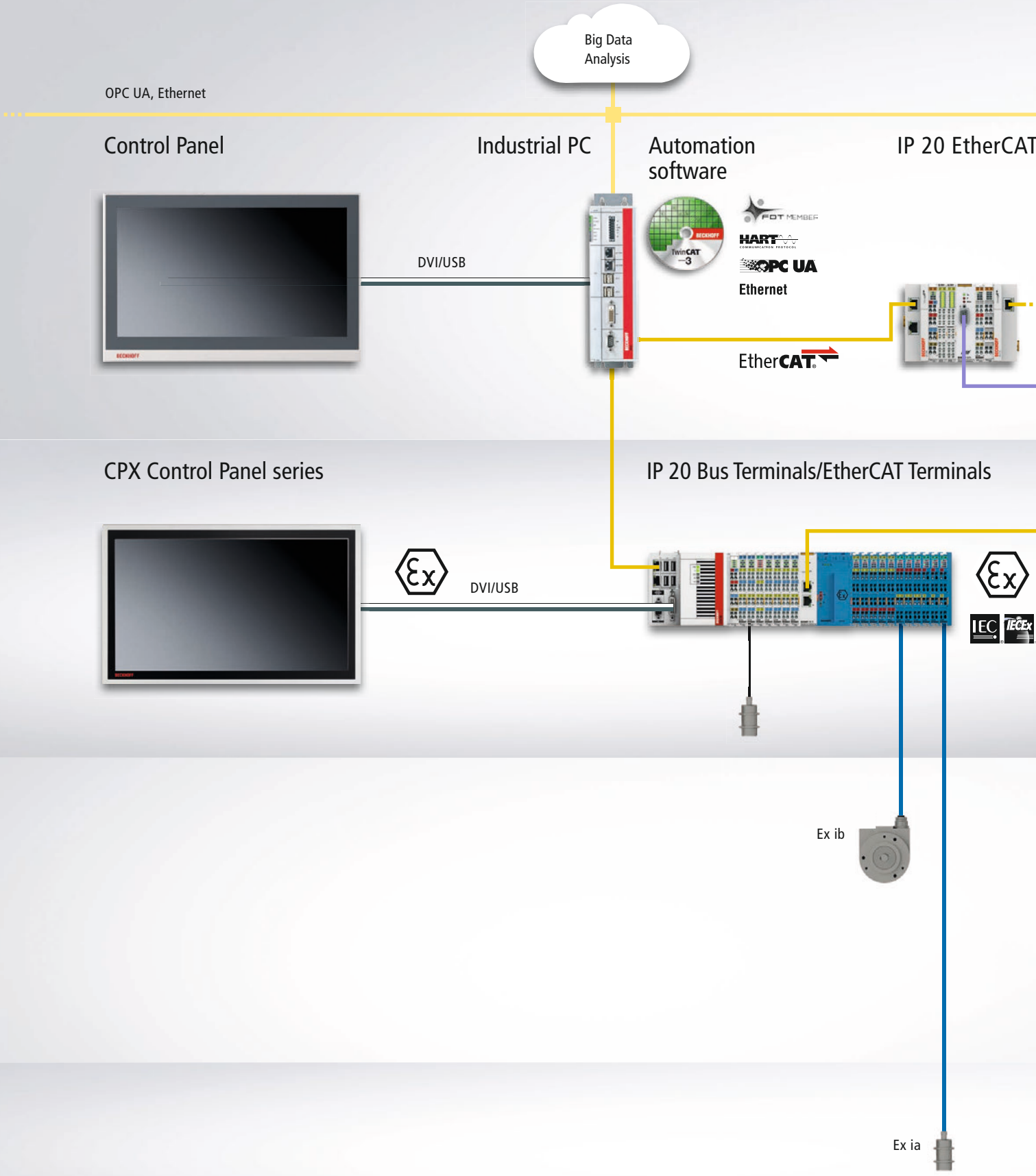
accommodates both HMI integration and the implementation of Industrie 4.0 and IoT applications. TwinCAT also complies with the NAMUR requirements for digital and analog signals and integrates both the HART protocol and FDT/DTM technologies.

In addition, all components meet the relentlessly high quality standards set for products, services, delivery and support provided by Beckhoff – first, through consistent “Made in Germany” production, and second, through compliance with extensive European and global standards for explosion protection (ATEX/IECEx).

Barrier-free system integration right into Zone 0:

- CPX series: Control Panels and Panel PCs for use in Zone 2/22
- ELX series: EtherCAT Terminals integrate safety barrier in a 12 mm wide housing
- Direct connection of intrinsically safe field devices located in Zone 0/20
- Extensive HART protocol integration
- Integration of FDT/DTM technology
- ATEX and IECEx certification

Beckhoff system solution for hazardous areas.

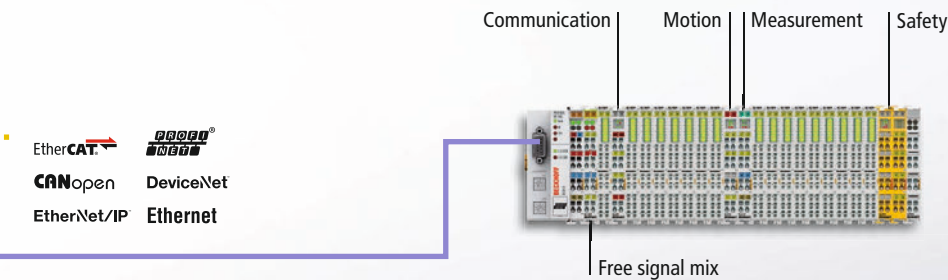


Non-hazardous area

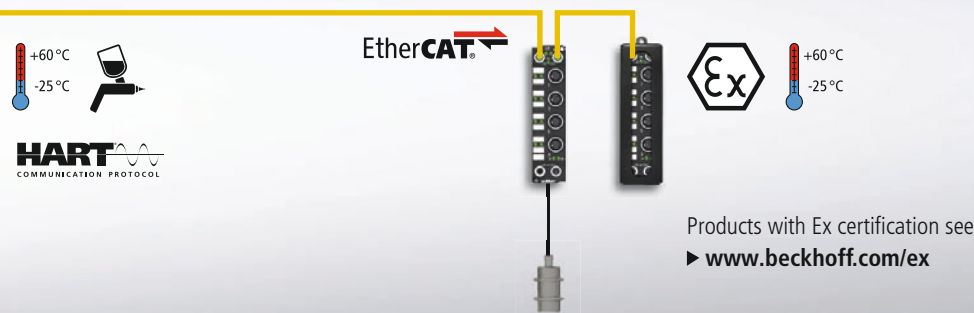
The Beckhoff product range includes all components needed for automation in your process: from the PC-based control platform to the remote I/O system for all common signal types and bus systems to high-quality IP 65 Control Panels.

Terminals

IP 20 Bus Terminals

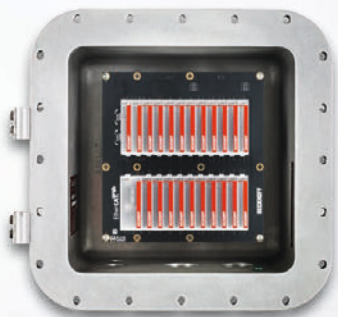


IP 67 EtherCAT Box



Zone 2/22

In addition to IP 20-rated Bus Terminals and EtherCAT Terminals for control cabinet installation, Beckhoff also supplies IP 67 I/O modules for direct installation in process environments classified Zone 2/22. Designed for use under harsh environmental conditions, Beckhoff supplies products with an increased temperature range and optional coating. All components for Zone 2/22 are tested by external certifying bodies.



IP 20 EtherCAT Plug-In Modules
Ex d Enclosure, Explosion-Proof

Zone 1/21

The connection of field devices from Zone 1/21 to the fieldbus system can be accomplished using either Ex-d or Ex-e connection technology or, in the case of intrinsically safe field devices, via direct connection to I/O terminals from the ELX series. In addition, the space-saving EJ plug-in I/O module system enclosed in compact Ex-d housings can help achieve maximum channel density.

Zone 0/20

Intrinsically safe field devices in Zone 0/20 can be directly integrated into the automation system via connection to ELX modules.

The fast, open and ideally suited fieldbus for process technology: EtherCAT.

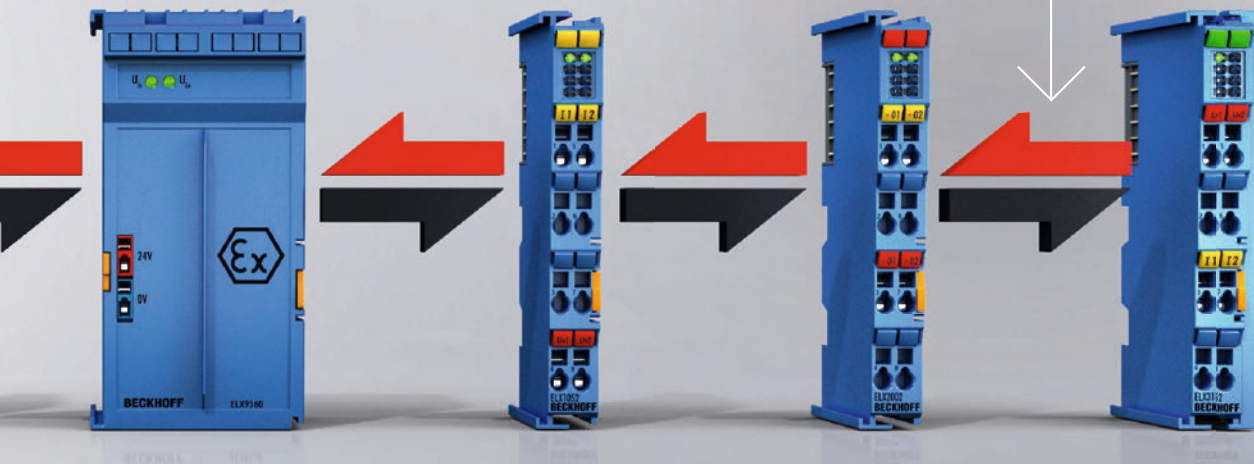


Established across all industries: the high-speed EtherCAT fieldbus system.

The EtherCAT industrial Ethernet system developed by Beckhoff has been in use around the world since 2003 and is considered to be the communication standard in many industries today. Over 4,200 members* – including more than 100 master device manufacturers – have joined forces in the EtherCAT Technology Group (ETG), the EtherCAT user organisation. As a universally applied and open high-speed fieldbus for PLC, motion control, I/O, sensors and measurement and safety technology, EtherCAT is also suitable for communication with explosion-proof devices. In

other words, users can standardise on one universal communication technology, even in hazardous areas. Users can put their trust in the profound fieldbus expertise at Beckhoff, the pioneer of EtherCAT technology, and benefit from the safety and flexibility of the all-encompassing EtherCAT architecture. EtherCAT-based control systems are flexible and open, permitting the integration of third-party EtherCAT devices as well as many other fieldbus systems. With this openness, EtherCAT optimises existing and new systems alike and ensures investment protection. This is aided by the fact that there is no need to worry about revision control: EtherCAT exists in one version only, which

EtherCAT – the global communication standard:
more than 4,200* manufacturers and users from 65 countries have joined forces in the EtherCAT Technology Group (ETG).



means that new developments based on EtherCAT are always compatible with older device generations. Users in applications involving explosion protection also benefit from the timestamp functionality built into EtherCAT, which guarantees high measurement accuracy and highly precise synchronisation – even in widely distributed systems. Moreover, the EtherCAT concept with a 100 Mbit data rate and complete diagnostics integrated, enables fast error identification in systems and plants: downtime is minimised, while maintenance is simplified and uptime is increased. Via the ELX modules, the full performance of EtherCAT communication is supported right into

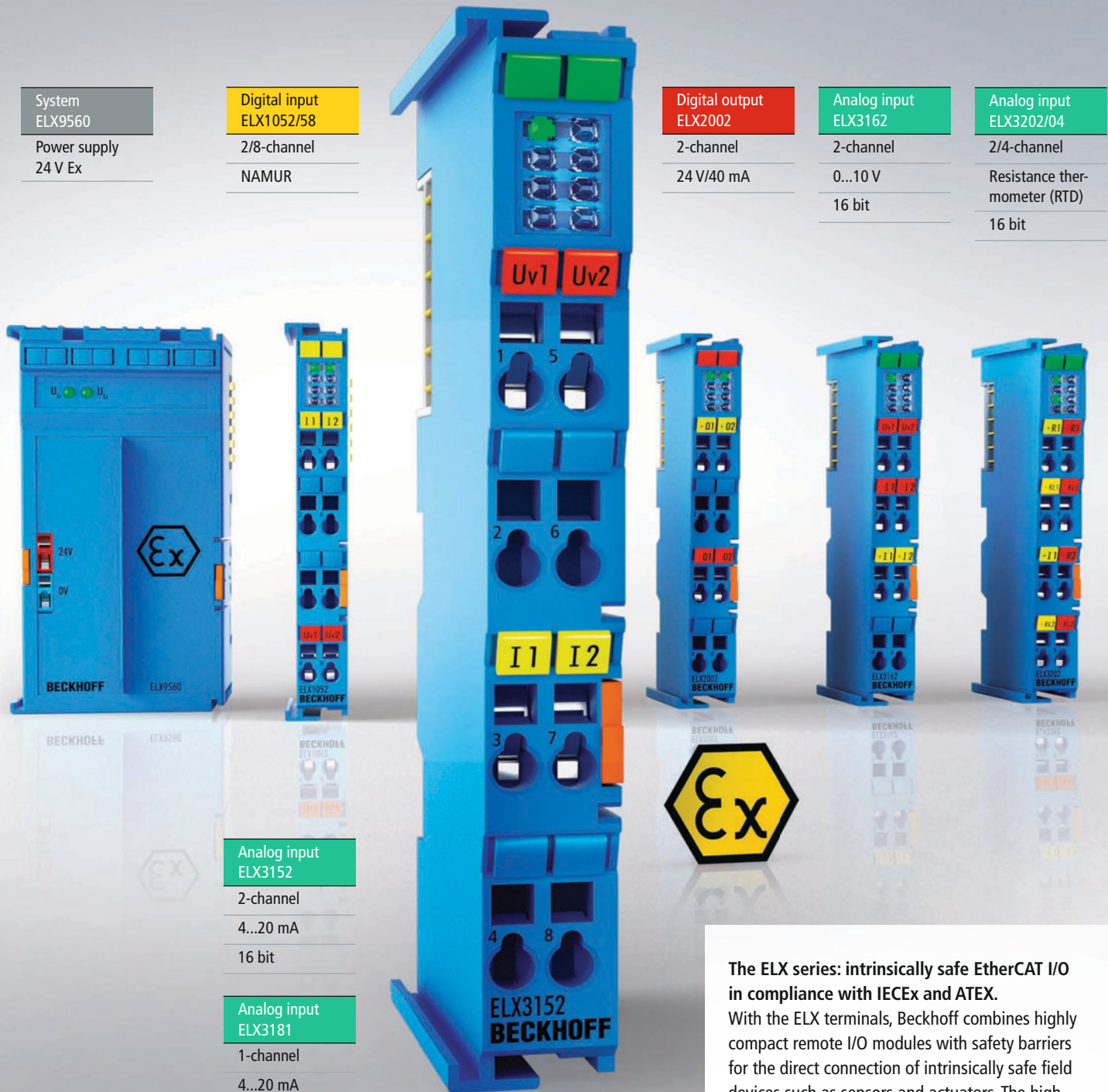
each individual I/O terminal with intrinsically safe inputs or outputs. The terminals for explosion protection enable direct connection of field devices across Zones 0/20, 1/21 and 2/22. Due to fully integrated fieldbus isolation in every single ELX terminal, the need to use external barriers and a second DIN rail in the control cabinet is eliminated, further reducing installation requirements and the footprint of the system.

*As of March 2017

EtherCAT optimises control system architectures in process technology:

- High-speed fieldbus system, well-established worldwide
- One universal communication technology for the entire system
- Flexible topology selection
- Comprehensive diagnostics capabilities
- Via the ELX modules, the EtherCAT I/O system now offers intrinsically safe inputs and outputs.

Exceptionally compact with intrinsically safe I/O: EtherCAT Terminals for explosion protection.



The ELX series: intrinsically safe EtherCAT I/O in compliance with IECEx and ATEX.

With the ELX terminals, Beckhoff combines highly compact remote I/O modules with safety barriers for the direct connection of intrinsically safe field devices such as sensors and actuators. The high resolution and accuracy of the ELX terminals guarantee the same measurement accuracy already familiar through the EtherCAT components for non-hazardous areas from Beckhoff. The compact design of the I/O terminals provides a further advantage: there are up to four intrinsically safe inputs available in a 12 mm wide housing and up to eight in the 24 mm housing type. Eliminating

Analog input ELX3312/14 2/4-channel Thermo-couple/mV 16 bit	Analog input ELX3252 2-channel Potentiometer 16 bit	Analog input ELX3351 1-channel Strain gauge 16 bit	Analog output ELX4181 1-channel 0/4...20 mA HART 16 bit	Encoder ELX5151 1-channel NAMUR 32 bit	System ELX9012 Bus end cover
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the need for external barriers enables significant space reductions inside control cabinets, and helps achieve significant cost savings at the same time. With ATEX and IECEx certification, the ELX terminals comply with all industry-specific guidelines for explosion protection and can be used in nearly all markets worldwide, which reduces the user's dependence on different suppliers for different regions. The wide range of uses is also supported by the enormous variety of signals handled by the spectrum of Beckhoff I/O solutions: a suitable I/O module is available for every application. Using the ELX terminals, process technology users can implement extremely compact,

cost-effective control system architectures and leverage the outstanding diagnostics functionality found in EtherCAT to help minimise system downtime.

The ELX terminals optimise virtually all process technology applications:

- Highly compact design with 12 mm wide housing reduces space requirements by up to 50 %.
- Safety barrier and signal terminal combined
- Direct connection of intrinsically safe field devices
- Full EtherCAT performance right to the terminal (no sub bus)
- Wide variety of supported signals
- Adheres to a wide range of certifications in the process industries
- Significant cost savings potential

Explosion-proof panel solution: the elegant CPX series with aluminium enclosures.

Robust:

All CPX models are enclosed in resilient, high-quality aluminium enclosures.

Intuitive:

All CPX models offer the advantages of multi-touch technology adapted for industry by Beckhoff.

Adaptable:

All CPX models impress with a wide variety of installation options, including cabinet or mounting-arm.



Integrated versions

CPX29xx/CPX27xx series



CPX29xx multi-touch Control Panels for control cabinet integration:

CPX2915-0000
15-inch display
1024 x 768 resolution
4:3 format

CPX2919-0000
19-inch display
1280 x 1024 resolution
5:4 format

CPX2921-0000
21.5-inch display
1920 x 1080 resolution
16:9 format

CPX27xx multi-touch Panel PCs for control cabinet integration:

CPX2715-0010
15-inch display
1024 x 768 resolution
4:3 format
Intel®Atom™

CPX2719-0010
19-inch display
1280 x 1024 resolution
5:4 format
Intel®Atom™

CPX2721-0010
21.5-inch display
1920 x 1080 resolution
16:9 format
Intel®Atom™

Stand-alone versions

CPX39xx/CPX37xx series



CPX39xx multi-touch Control Panels for mounting-arm installation:

CPX3915-0010
15-inch display
1024 x 768 resolution
4:3 format

CPX3919-0010
19-inch display
1280 x 1024 resolution
5:4 format

CPX3921-0010
21.5-inch display
1920 x 1080 resolution
16:9 format

CPX37xx multi-touch Panel PCs for mounting-arm installation:

CPX3715-0010
15-inch display
1024 x 768 resolution
4:3 format
Intel®Atom™

CPX3719-0010
19-inch display
1280 x 1024 resolution
5:4 format
Intel®Atom™

CPX3721-0010
21.5-inch display
1920 x 1080 resolution
16:9 format
Intel®Atom™

Control Panels and Panel PCs for multi-touch operating concepts in Zone 2.

With the CPX Panel series models, the proven multi-touch technology of Beckhoff Control Panels and Panel PCs is available in even more robust versions, complying with the requirements for use in hazardous areas classified Zone 2/22. The high level of functionality and excellent build quality ensure the reliability of CPX panels even under harsh environmental conditions. The capacitive touch technology provides the typical ease of operation found on all Beckhoff multi-touch panels. The aesthetically pleasing appearance of the Beckhoff panels, and the look and feel of the

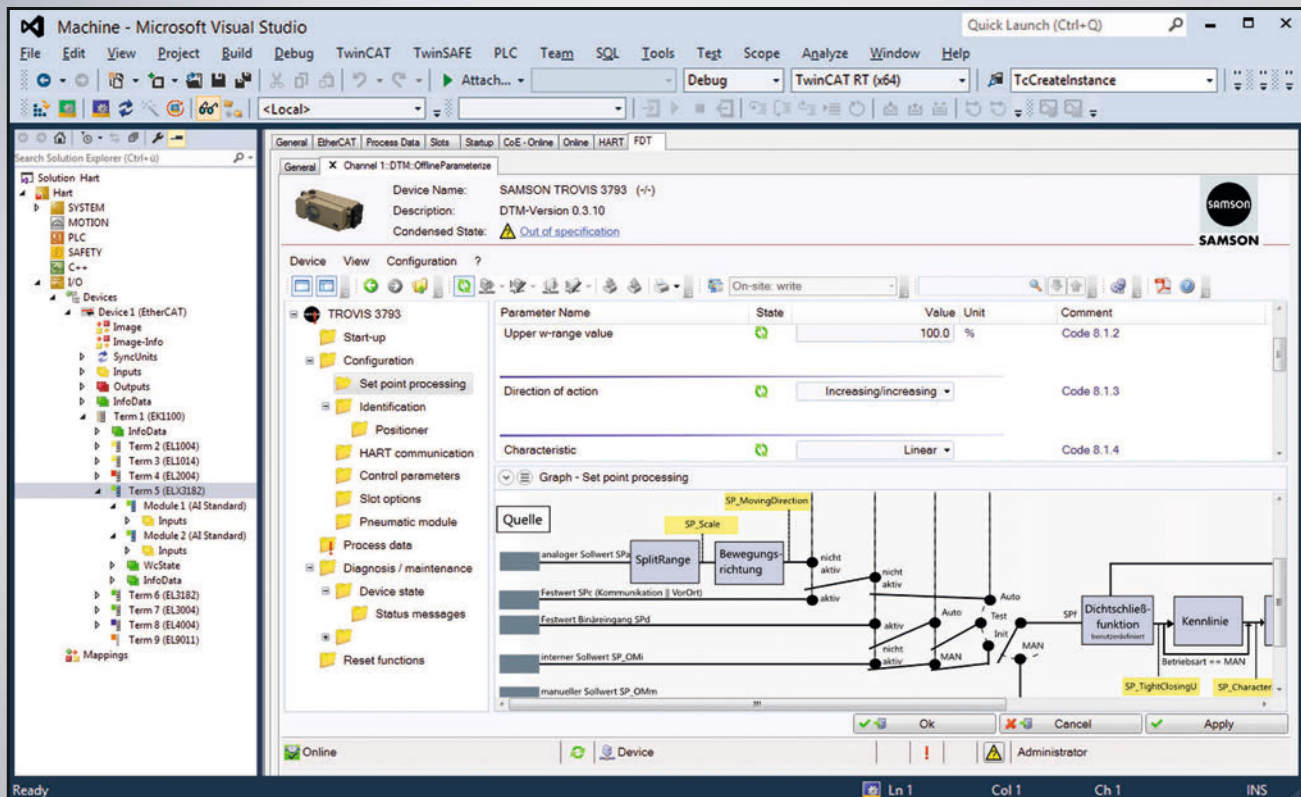
aluminium housing are maintained, making them visual highlights in explosion-proof environments. The comprehensive CPX panel range includes a large selection of display formats, sizes, installation options and features. Depending on the area of application, both the panels for control cabinet installation and stand-alone panels for flexible installation nearly anywhere in a room are available in the CPX29xx and CPX39xx series. Moreover, the fanless Panel PCs from the CPX27xx and CPX37xx series can be used for highly reliable system control.

Multi-touch panels for process technology:

- Capacitive touch technology optimises operation
- High-end design
- Robust and reliable
- Large selection of Control Panels and Panel PCs
- Flexible installation options

Full HART integration and extensive software libraries: the TwinCAT control platform.

The all-in-one software platform: TwinCAT



TwinCAT FDT plug-in

TwinCAT: the PC-based control platform for process technology.

In TwinCAT control software, Beckhoff provides a universal control platform for even highly complex systems. In addition to traditional PLC sequences, algorithms written in C++ or MATLAB®/Simulink® can also be executed in real-time using one powerful software platform. Moreover, TwinCAT also enables HMI implementation, secure cloud connectivity via TwinCAT IoT and the use of cloud-based analytical functions via TwinCAT Analytics. The areas of application for PC-based control technology have been expanded with extensive support of specific process technology protocols

OPC UA

With the aid of OPC UA (OPC Unified Architecture according to IEC 62541), the secure, reliable and vendor-neutral communication for transmission of process data to process control systems is as simple as can be. The use of Beckhoff OPC UA Servers and OPC UA Clients enables the secure and reliable exchange of process data. Data access can be controlled via user management in such a way that only authorised users are allowed to securely communicate permissible data.

HART and FDT

The full integration of the HART protocol into TwinCAT software enables the use of extensive functions directly from the engineering interface. Through the integrated FDT container, additional field device DTMs can be opened inside TwinCAT, offering all configuration options on one software platform.

Beckhoff CommDTM

The Beckhoff CommDTM enables the seamless integration of TwinCAT control systems into existing process control systems. With the help of the CommDTM, DTMs (Device Type Managers) for field devices connected to HART-capable EtherCAT Terminals can be integrated into any desired FDT (Field Device Tool) containers. This allows remote configuration and parameterisation of field devices without the requirement to access the PLC in the existing containers.

and interfaces. TwinCAT covers all application areas through support of all common protocols such as HART, NAMUR and FDT/DTM. The full integration of the HART functionality both in the remote I/O system and into TwinCAT engineering ensures simple project planning and commissioning. This integration enables users to integrate HART-compatible field devices into the PC-based control system with ease. Additionally, TwinCAT simplifies engineering requirements: the TwinCAT FDT container permits direct integration of field device DTMs into TwinCAT engineering, so users can create comprehensive HART configurations with a single tool.

The Beckhoff CommDTM makes it possible to integrate the TwinCAT controller into existing process control systems. This enables the parameterisation of field devices in the familiar FDT containers and reduces plant operation requirements to the essential. Moreover, OPC UA Server and Client software from Beckhoff permit the global distribution of process data as well as convenient system control and remote maintenance.

Automation and process technology on a single platform:

- One tool for engineering and runtime
- Control system-integrated Industrie 4.0 and IoT functionality
- Comprehensive HART integration
- TwinCAT FDT
- Beckhoff CommDTM

Maximum availability, comprehensive expertise: Beckhoff, a reliable partner for the process industry.



Trust counts: in explosion protection as well as in investment protection.

With control solutions from Beckhoff, users choose the comprehensive expertise of a globally successful and reliable partner that guarantees long-term availability. With stocks of raw materials and components lasting up to 24 weeks and finished product supply lasting up to six weeks, Beckhoff ensures short delivery times and production reliability for its customers. Sophisticated measures ensure the long-term availability of Beckhoff products and the availability of replacement devices, providing customers with high investment protection. With an extraordinarily



high level of manufacturing and testing capabilities at the global headquarters in Verl, Germany, all Beckhoff products meet the highest quality requirements for the intended use in hazardous areas. The products are tested without exception by renowned laboratories; in the interest of customers, Beckhoff does not rely on component supplier declarations. Explosion-proof products from Beckhoff are manufactured by employees with many years of experience; the entire development and production expertise is available in-house. The Beckhoff production facilities have also been tested and certified according to ATEX and IECEx guidelines for compliance with all necessary

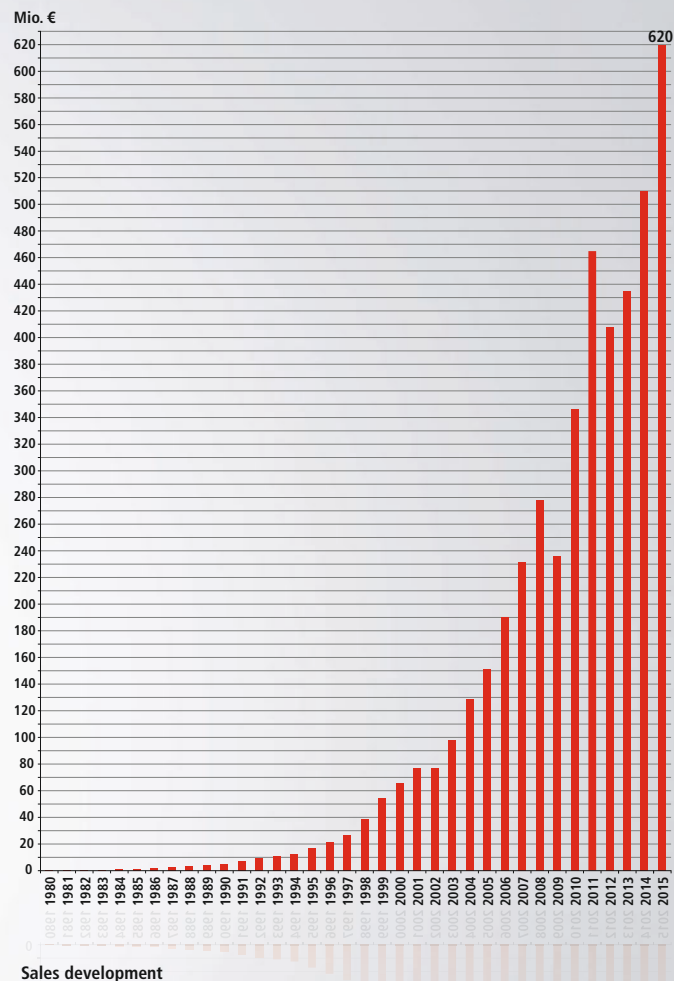
standards. Overall, Beckhoff ensures consistently high quality in production through ongoing quality management as well as internal and external audits. In addition, process technology users can count on highly responsive and competent local support from experienced specialists via a global sales and service network.

Beckhoff ensures investment protection through:

- Long-term availability of products
- Delivery reliability through extensive warehousing of products and materials
- High degree of vertical integration
- Many years of collective expertise
- Global sales and service network

Globally available: Beckhoff expertise for the process industries.





Beckhoff – New Automation Technology

Beckhoff implements open automation systems based on PC Control technology. The product portfolio covers Industrial PCs, I/O and fieldbus components, drive technology and automation software. Products that can be used as separate components or integrated into a complete and seamless control system are available for all industries. The Beckhoff "New Automation Technology" philosophy represents universal and open control and automation solutions that are used worldwide in a wide variety of different

applications, ranging from CNC-controlled machine tools to intelligent building automation.

Worldwide presence on all continents

The worldwide presence of Beckhoff in more than 75 countries ensures fast service and support for globally operating customers in their local language. Moreover, geographical proximity helps the company develop an in-depth understanding of the unique technical challenges customers are faced with around the world.

Beckhoff at a glance

- Headquarters: Verl, Germany
- Sales 2015: € 620 million (+22 %)
- Staff worldwide: more than 3350
- Branch offices Germany: 18
- Subsidiaries/branch offices worldwide: 35
- Distributors worldwide: in more than 75 countries

(as of 01/2017)

► www.beckhoff.com

Secure a leading edge with
PC-based control for the process industries:
► www.beckhoff.com/process-industries

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The certification procedure for the ELX and CPX series products was not completed at the time this flyer went to print.

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