

News

05'2023



C6040:
Ultra-compact Industrial PC

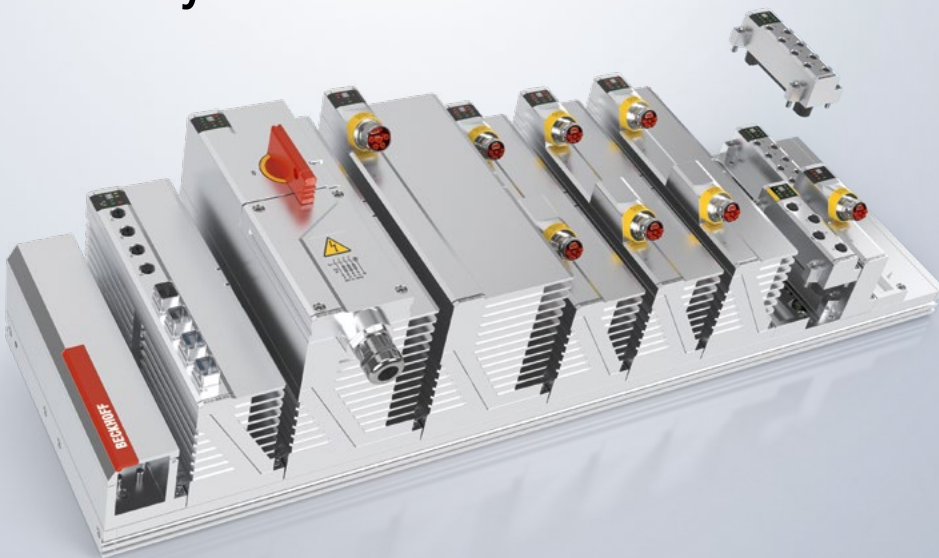


ELX6233: 2-channel communication interface,
Ethernet-APL, Ex i



ATRO: Automation Technology for Robotics –
the modular industrial robot system

MX-System



Pluggable system solution for
control cabinet-free automation



More productive control programming
with AI-assisted engineering



Vision: Complete and system-
integrated image processing



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The IPC Company

The Industrial PC (IPC) is the hardware centerpiece of PC-based control technology. Beckhoff supplies Industrial PCs suitable for any application, which are based on open standards, enabling individual configuration to meet a wide range of control requirements.

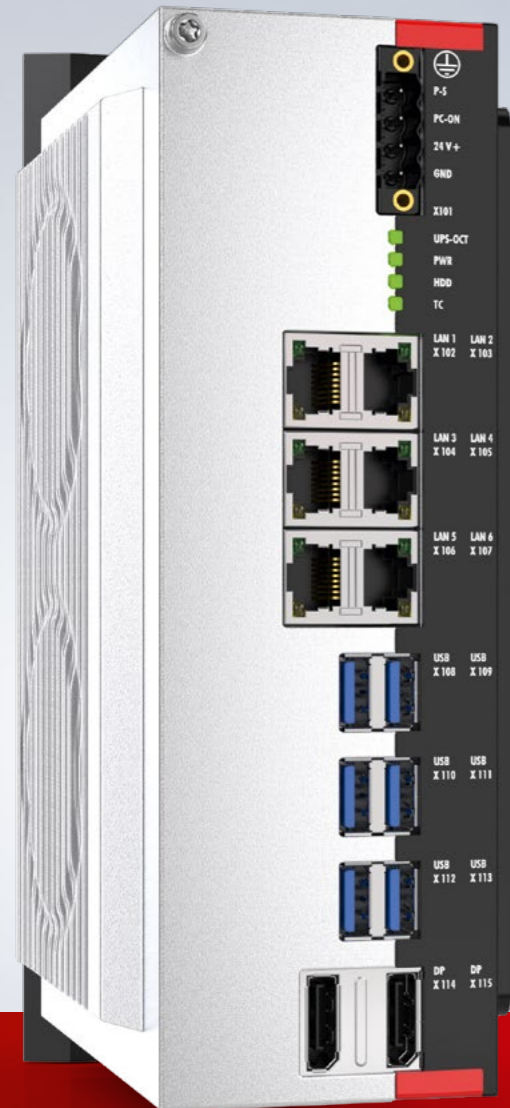
Whether in the form of an Embedded PC with a compact form-factor for DIN rail mounting, a control cabinet PC, or as a Panel PC, in-house motherboard development enables Beckhoff to respond quickly to IT trends and customer-specific requirements.

► www.beckhoff.com/ipc

- large model variety of Industrial PCs and Embedded PCs
- high-performance PCs, featuring a wide range of processors, from Intel® Celeron® to top of the line Core™ i9 processors
- long-term availability of all Industrial PCs and Embedded PCs
- As the inventor of PC-based control technology, Beckhoff closely cooperates with global technology partners Intel and Microsoft.



Ultra-compact Industrial PC with 13th generation Intel® Core™ processors



i The C6040-0090 adds an even more powerful device to the ultra-compact C60xx industrial PC series. This leap in performance is achieved through the consistent use of the latest Intel® Core™ processors, now in their 13th generation. The hybrid architecture of the Intel® Core™ i5, i7 and i9 processors with a combination of performance and efficient cores allows applications to be implemented on a total of up to 24 real cores.

The C6040 is particularly suited to sophisticated axis controls, complex HMI applications, and applications with extremely short cycle times, as well as machine learning and machine vision applications.

► www.beckhoff.com/c6040

i The 11th generation of Intel® Core™ processors in ultra-compact Industrial PCs and in Industrial PCs with a 3½-inch motherboard

As the first processor generation with Intel® Speed Shift Technology, which allows the clock frequency of the individual cores to be set individually, the 11th generation of the Intel® Core™ processors is available in CPx2xx, C5210, C65xx and C69x0 Industrial PCs with a 3½-inch motherboard as well as in the ultra-compact C602x and C603x Industrial PCs. Even at the base frequency, this new processor generation offers significantly higher computing power in PCs with a 3½-inch motherboard. With the C603x Industrial PCs, even higher CPU performance is possible than with PCs with a 3½-inch motherboard thanks to the more effective cooling. This enables individual configuration of single cores beyond the base frequency in the long term.

All industrial PCs with Intel® Core™ processors in the 11th generation offer USB 3.2 Gen. 2 interfaces with 10 Gbit/s. This makes the USB twice as fast as in previous industrial PC generations.



A modern CPU architecture and more computing power for compact controls

i With the ARM Cortex™-A53 processor, the CX82xx Embedded PC series from Beckhoff uses a modern CPU architecture with two cores, thus offering more computing power for compact controls. The CX9240, which features the 4-core version of this processor, is even more powerful. A double main memory and 1 Gbit interfaces also contribute to the significant performance boosts compared to the predecessors.

► www.beckhoff.com/cx9240
 ► www.beckhoff.com/cx82xx



i Small controllers with integrated multi-function I/Os
 The embedded PCs of the CX70xx series with an ARM Cortex™-M7 processor are supplemented by a PROFIBUS slave (CX7031), a CANopen commander (CX7050) and a CANopen responder (CX7051).

► www.beckhoff.com/cx70xx

The I/O Company

Beckhoff supplies a complete range of fieldbus components for all common I/O and bus systems. With Bus Terminals offering IP20 protection and Fieldbus Box modules in IP67, a comprehensive range of devices is available for a wide variety of signal types and fieldbus systems. In addition to components for conventional bus systems, Beckhoff offers an integrated product range optimized for EtherCAT. Invented by Beckhoff, this real-time Ethernet solution for industrial automation has global acceptance and is characterized by outstanding performance and simple handling. The result is high-precision machine and plant control and significantly increased production efficiency.

- ▶ www.beckhoff.com/io
- ▶ www.beckhoff.com/ethercat

- comprehensive, modular I/O system for all signal types and fieldbus systems
- universal product range optimized for EtherCAT
- high investment security: mature I/O technology based on more than 25 years of success in the field
- Beckhoff is the I/O pioneer, developing the Bus Terminal concept and EtherCAT.



EtherCAT communication proven in practice for two decades



The ultra-fast EtherCAT developed by Beckhoff has already been used successfully for 20 years and has long since established itself as an open, global standard for real-time Ethernet communication.

- ▶ www.beckhoff.com/ethercat
- ▶ www.ethercat.org

i Intrinsically safe EtherCAT Terminal for Ethernet APL field devices

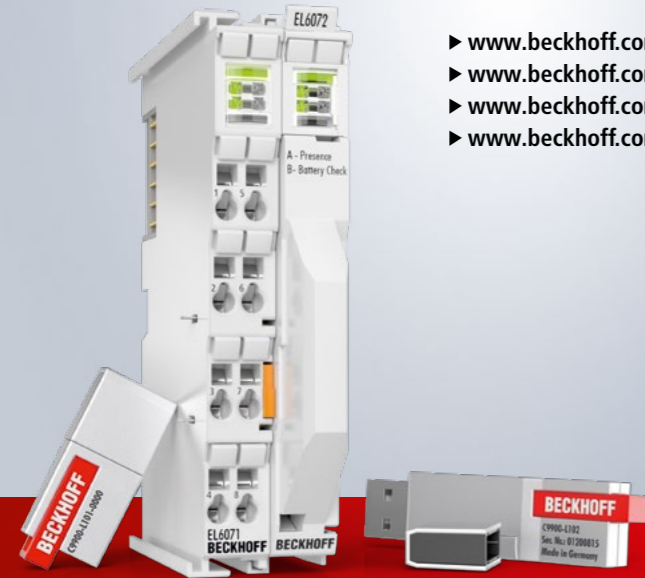
The ELX6233 EtherCAT Terminal facilitates direct connection of Ethernet-APL-capable field devices in zone 0/20 and 1/21 hazardous areas. The sensors are supplied in accordance with the SPAA (TS10186) port profile and integrated via PROFINET. The combination of flexible EtherCAT system architecture and the ELX portfolio facilitates the integration of Ethernet APL, HART, or simple digital signals in the same terminal segment.

- ▶ www.beckhoff.com/elx6233
- ▶ www.beckhoff.com/ethernet-apl



License key devices for managing TwinCAT licenses

i The 2nd generation of license key products is equipped with a local data memory for storing TwinCAT 3.1 license files and a proximity sensor for presence detection: EL6071 EtherCAT Terminal and C9900-L101 USB stick. The devices with RTC (real-time clock) provide time-based license functions and are equipped with a replaceable battery (button cell): EL6072 EtherCAT Terminal and C9900-L102 USB stick. The devices are also available with licenses pre-installed ex factory as version -0033.

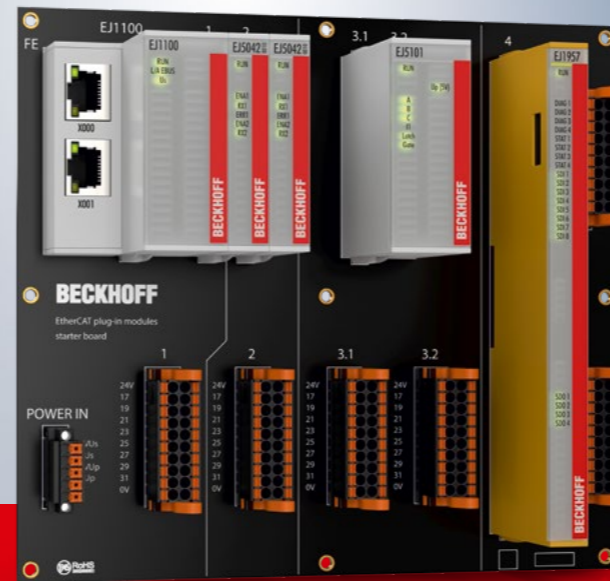


- ▶ www.beckhoff.com/el6071
- ▶ www.beckhoff.com/el6072
- ▶ www.beckhoff.com/c9900-l101
- ▶ www.beckhoff.com/c9900-l102

Quick and easy entry into the EJ system world

The EJ starter board offers an easy entry point into the system world of EtherCAT plug-in modules. With its predefined circuit board and corresponding module slots, the EJ starter board can be used to execute simple test scenarios with modules that can be freely selected from the EJ portfolio.

- ▶ www.beckhoff.com/ej8906-0005



Measurement bridge evaluation directly at the measurement location

i The ERP3504-0022 EtherCAT P Box module was developed for evaluating measuring bridges outside the control cabinet. As an IP67 product designed for use close to the measurement location and protected against interference by the metal housing, it supports potentiometer, Pt1000 (RTD), and ± 10 V measuring ranges. Like the ELM3504, it also has a sampling rate of 10,000 sps. In addition, it has the same technological properties as the ELM3x0x terminals.

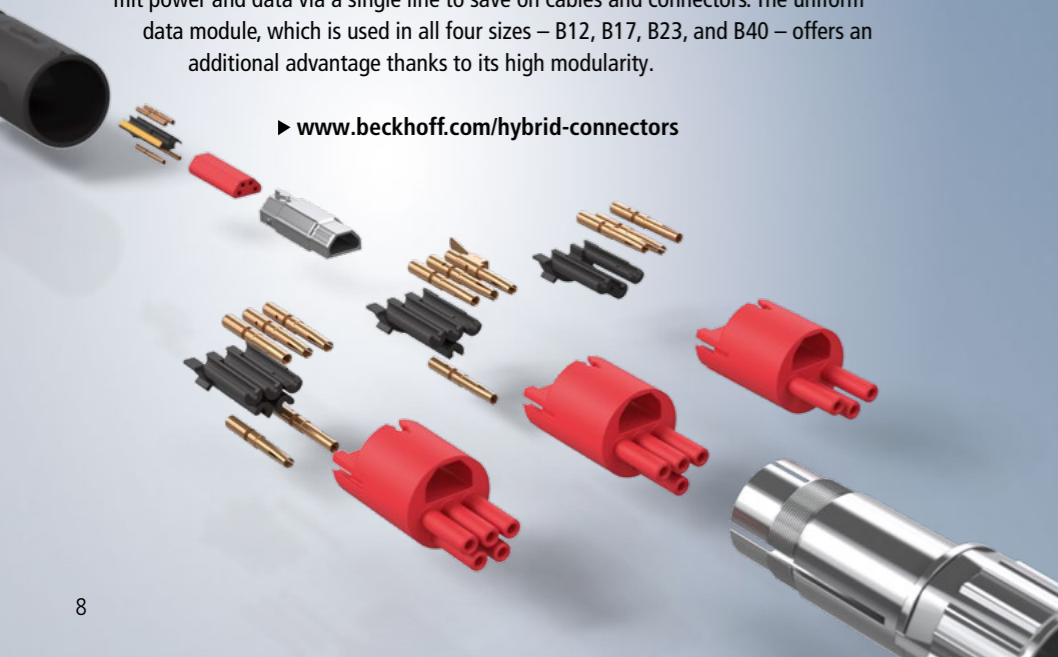
- ▶ www.beckhoff.com/erp3504-0022



IEC standardization for modular hybrid connectors promotes user safety and opens up new markets

Beckhoff hybrid connectors are among the first products to comply with the future IEC 61076-2-118 standard. This standard is expected to be published at the end of 2024. The primary aim of establishing a global standard like this is to ensure security for the customer or user, not only with regard to supply chains and second-source strategies, but also in terms of the level of product reliability defined by established and widely adopted standards. The portfolio of hybrid connectors has already proved itself thousands of times in the field. Hybrid connectors are essentially used to transmit power and data via a single line to save on cables and connectors. The uniform data module, which is used in all four sizes – B12, B17, B23, and B40 – offers an additional advantage thanks to its high modularity.

- ▶ www.beckhoff.com/hybrid-connectors



i **Running lights or animations: EtherCAT Terminal controls pixel LEDs**
The EL2574 enables the control of LEDs with an integrated chip. If these pixel LEDs are connected in a strip or matrix formation, all LEDs can be controlled differently to create effects such as running lights or animations. The EL2574 supports applications like pick-by-light, machine status display, position marking or stage and show.

- ▶ www.beckhoff.com/el2574

i **I/O multi-interfaces for universal use**
The EL8601-8411 EtherCAT Terminal and the IP67-protected EP8601-0022 EtherCAT Box are multi-interfaces and combine configurable digital and analog inputs and outputs. The digital inputs can also be used for encoders or as counters, for example, and the digital outputs can be implemented as PWM signals. The analog inputs/outputs can be configured as current or voltage signals.

The I/O multi-interfaces offer a compact solution for applications in which only a few complex signals are required. The wide range of possible applications makes it an ideal complement to the CX7000 Embedded PC.

- ▶ www.beckhoff.com/el8601-8411
- ▶ www.beckhoff.com/ep8601-0022



The Motion Company

In combination with the motion control solutions offered by the company's TwinCAT automation software, Beckhoff Drive Technology provides an advanced, all-inclusive drive system. PC-based control technology from Beckhoff is ideally suited for single- and multi-axis positioning tasks with high dynamic requirements.

The AX5000 and AX8000 Servo Drive series with high-performance EtherCAT communication offer the best-possible performance and dynamics. Servomotors with One Cable Technology (OCT), combining power and feedback systems into one standard motor cable, reduce material and commissioning costs.

► www.beckhoff.com/motion

- scalable product range of servo drive technology
- integrated safety technology in compliance with safety performance level PL e, integrated into compact drive technology up to safety performance level PL d
- As the pioneer of One Cable Technology and the eXtended Transport System, Beckhoff specializes in manufacturing efficient, space-saving motion solutions.



XPlanar.



XTS.

ATRO: Automation Technology for Robotics – the modular industrial robot system

i The ATRO system from Beckhoff is a modular industrial robot system that can be used to assemble the optimal robot structures for different applications on an individual and flexible basis. Standardized motor modules with integrated drive functionality, together with link modules in various designs and lengths, enable almost limitless combinations of mechanics. The complete integration of the control into the holistic control platform TwinCAT offers direct access to a wide range of proven automation functions.

► www.beckhoff.com/atro



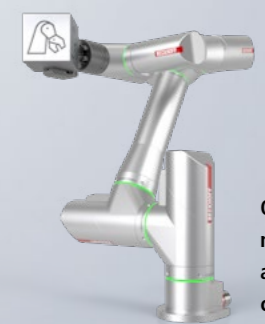
ATRO



Easily pluggable motor and link modules make it possible to create individual robot solutions.



The internal media feed allows endless rotation for all axes.



Optimally matched software and hardware components from a single source

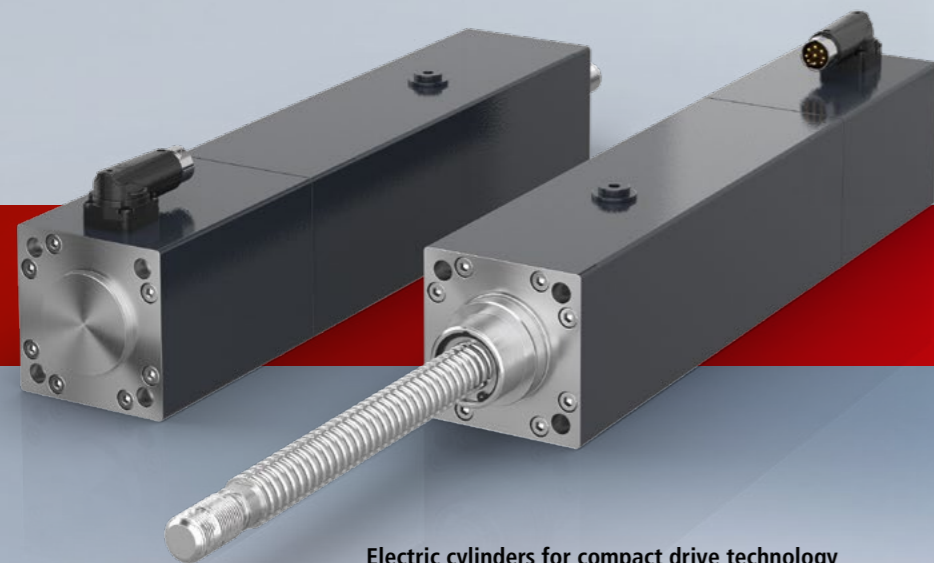
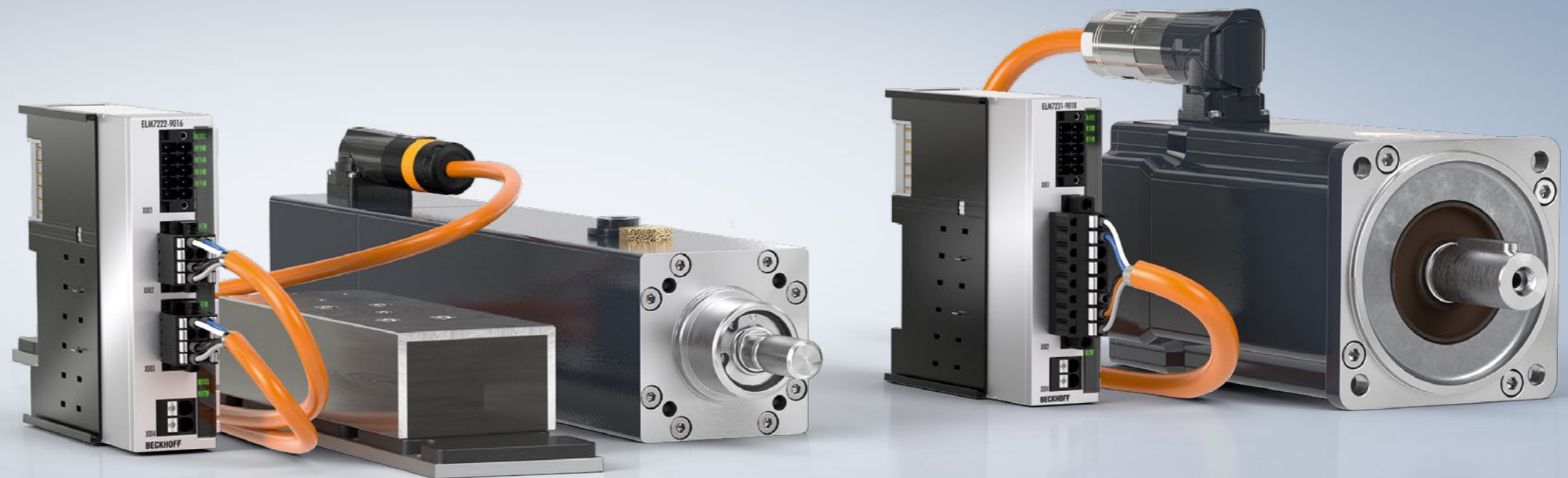
Compact drive technology for rotary and translatory motor innovations

Highly dynamic, modular linear servomotors for compact drive technology

The AL8100 linear motors complement the portfolio of translatory servomotors for compact drive technology in the low-voltage range from 24 to 48 V DC and are available in a width of 50 mm (AL812x).

The AL8100s are optimally matched to the powerful servomotor terminals in the robust ELM72xx metal housing. In addition to their wide availability and flexibility, the fact that the motors are developed and produced in Germany guarantees a consistently high level of manufacturing quality and rapid delivery times, which in turn ensures that durable and highly reliable applications can be executed with linear motor technology.

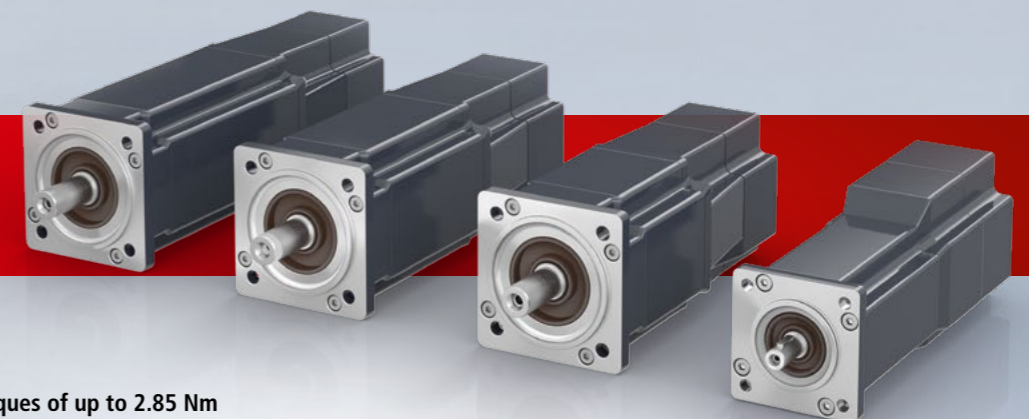
► www.beckhoff.com/al8100



Electric cylinders for compact drive technology

The AA3100 electric cylinder series designed for the ELM72xx for the extra-low voltage range from 24 to 48 V DC extends the range of applications of Beckhoff electric cylinders to include compact drive technology. These electric cylinders are ideal as direct drives for linear applications with high process forces and speeds. They combine advantages with regard to force, dynamics and compactness with the benefits of servo technology, such as controlled positioning, safe holding at standstill, and high energy efficiency. The two flange sizes offer a peak force of 2,650 to 12,000 N and a maximum speed of 0.12 to 0.56 m/s, depending on the lead.

► www.beckhoff.com/aa3100



i New F3 flange size with torques of up to 2.85 Nm for integrated servo drives

In the compact drive technology product range (up to 48 V DC), the integrated AMI8100 servo drive combines servomotor, output stage, and fieldbus connection in a space-saving design for all motion requirements with an increased torque range. As an EtherCAT slave, the AMI8100 can be placed directly on the machine without a control cabinet or upstream I/O level, allowing for compact, control cabinet-free machines.

As an extension of the series, the AMI813x is available in three lengths with standstill torques ranging from 1.25 to 2.85 Nm in flange size F3. As with flange size F2, the AMI813x is optionally available with a multi-turn absolute encoder without battery backup and with an optional backlash-free holding brake. The AMI813x can be combined with all planetary gear units of flange size F3.

► www.beckhoff.com/ami813x

The Automation Company

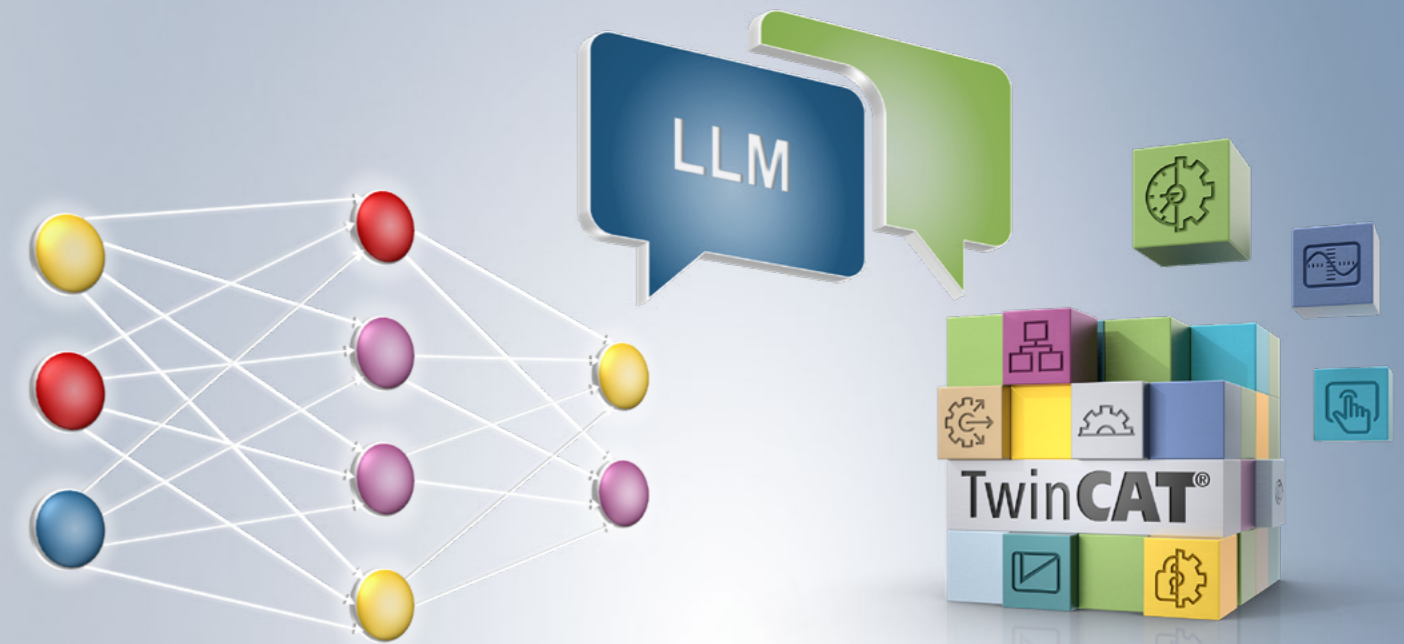
Beckhoff offers comprehensive system solutions in numerous performance classes for all areas of automation. The control technology is exceptionally scalable – from high-performance Industrial PCs to mini-PLCs – and can be adapted precisely to application-specific requirements. TwinCAT automation software integrates real-time control with PLC, NC and CNC functions in a single feature-filled package.

► www.beckhoff.com/automation

- efficient, universal engineering
- programming in different languages
- Open, hardware-independent control system gives freedom of choice in terms of automation and control components.
- scalable control platform from single- to multi-core CPUs
- all control functions on a single, centralized platform: PLC, motion control, robotics, measurement technology, a.o.



More productive control programming with AI-assisted engineering



i Beckhoff has developed the TwinCAT Chat Client for the TwinCAT XAE engineering environment. This makes it possible to use Large Language Models (LLMs), such as ChatGPT from OpenAI, conveniently in the development of a TwinCAT project for increased productivity in control programming.

Tasks such as code creation, code revision/optimization, and even code documentation can also be performed with the LLM in this way. Code created by the LLM after the chat request can be pulled directly into the actual engineering project and used immediately. What's more, programmer support is also significantly improved, as it is possible to receive immediate answers to all common questions about TwinCAT via chat request.

► www.beckhoff.com/llm



i Simplified commissioning of servo axes with TwinCAT 3 Autotuning

With TE5960 TwinCAT 3 Autotuning, optimizing drives is no longer the exclusive domain of experts. The iterative tuning procedure of the drive parameters facilitates the identification of the mechanics as well as the load inertia, controller parameters, and filter settings. The calculated parameters can be loaded directly into the servo drives via the TwinCAT 3 Drive Manager 2. In just a few seconds, the tuning process is complete, making this a much more efficient approach than the previous manual method. At the same time, experts can still rely on transparency, since the optimization results are displayed with amplitude and phase progression in the Bode plot graphic.

► www.beckhoff.com/te5960

TwinCAT 3.1: Build 4026



i With the latest version of TwinCAT 3, Build 4026, Beckhoff provides even more flexibility in automation development through increased modularization and additional extensions.

Thanks to the innovation in the new, modularized TwinCAT Package Management setup, specific software packages can be selected, installed, and updated according to preference. This results in independent installation which takes far less time. TwinCAT 3.1 Build 4026 can also support Visual Studio 2022, constituting another important developmental leap. This provides a 64-bit environment for engineering, allowing more memory to be used for larger projects. PLC programming has also been enhanced with a number of small changes, further increasing the efficiency of TwinCAT 3.

All details on the new features of TwinCAT 3.1 Build 4026:

► www.beckhoff.com/build4026

Redundant controller operation with TwinCAT 3 Controller Redundancy



i When it comes to redundant controller operation, TF1100 TwinCAT 3 Controller Redundancy with its systemintegrated software solution allows two standard industrial PCs to be operated as redundant controllers that both run the same PLC program in just a few steps. An additional, high-performance network connection between the two controllers provides the necessary data synchronization, and the fact that standard Ethernet is used means no additionally developed dedicated hardware components are required. With virtually no effort at all, this ensures that only one of the two industrial PCs addresses the fieldbus components at any given time and that the control programs are executed on both computers with the same database. If one controller fails, the second controller seamlessly takes over, preventing plant downtime and data loss.



► www.beckhoff.com/tf1100
► www.beckhoff.com/redundancy

Optimized communication with charging stations for electric cars



i With the TF6771 TwinCAT 3 IoT OCPP, the IoT product portfolio is expanded by the Open Charge Point Protocol (OCPP) on the basis of the WebSocket protocol, which has recently been introduced for the IoT driver. OCPP standardizes the communication between charging stations for all types of electric vehicles and the associated central management systems (CSMS).

The OCPP product addresses two use cases for the control: In the first use case, TwinCAT is used as a control for a charging station in conjunction with the new EL6761 terminal before being connected to a CSMS as an OCPP client. In this case, communication between the charging station and the car is executed by the EL6761 via powerline communication in accordance with ISO 15118. The second use

case, conversely, focuses on connecting other charging stations via the OCPP protocol; in this case, TwinCAT represents part of the CSMS and provides local load management for a charging station network, for example.

► www.beckhoff.com/tf6771
► www.beckhoff.com/el6761

View, customize, and create XML-based nodesets



i When the OPC UA technology is implemented in machines, it is important to establish conformity to a companion specification or a customer-specific information model so that the machine can be integrated into the existing and standardized environment as smoothly as possible.

TE6100 TwinCAT 3 OPC UA Nodeset Editor can be used to load companion specifications (or the resulting nodeset files) and use them for modeling the machine project in TwinCAT 3 OPC UA.

More information on embedding the Nodeset Editor into the OPC UA environment:

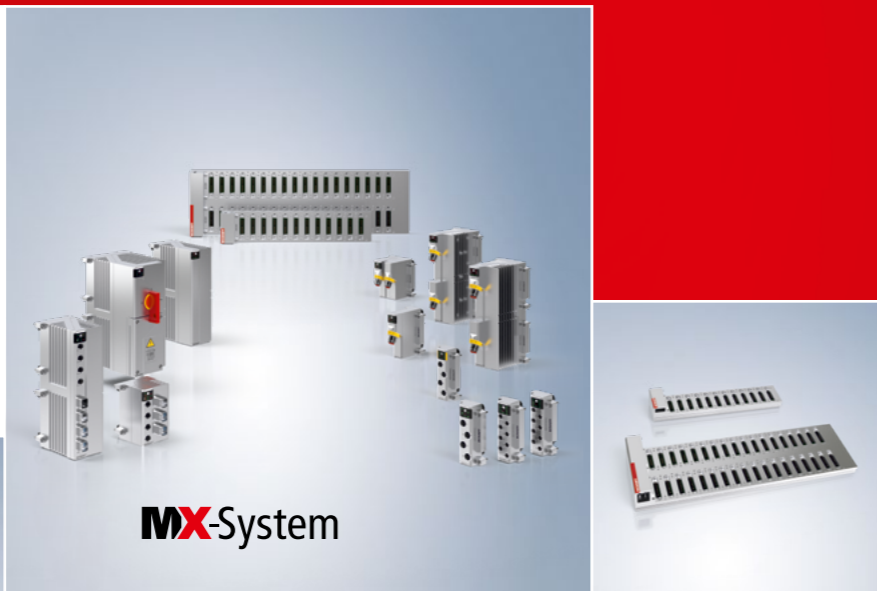
► www.beckhoff.com/opc-ua
► www.beckhoff.com/te6100

The System Company

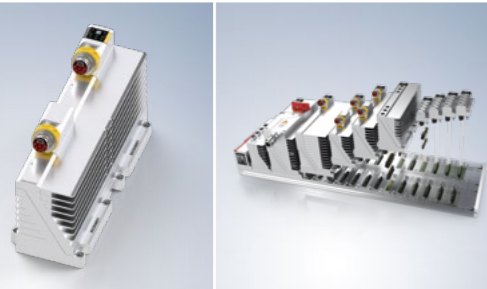
For the first time in machine and system engineering, the MX-System enables completely control cabinet-free automation solutions. By consistently combining, applying and further developing Beckhoff's expertise, a holistic, modular pluggable system has been created. The combination of MX-System baseplate and MX-System function modules resulting from the modular construction kit combines all tasks and features of a control cabinet: energy supply, fuse protection and distribution, generation and monitoring of auxiliary voltages, sequence control with the inputs and outputs, control of motors and actuators as well as the connection level for the field devices. The full system integration of all machine functionalities is achieved via freely selectable IPC, coupler, I/O, drive, relay and system modules, which can be configured and combined suitable for the specific application.

► www.beckhoff.com/mx-system

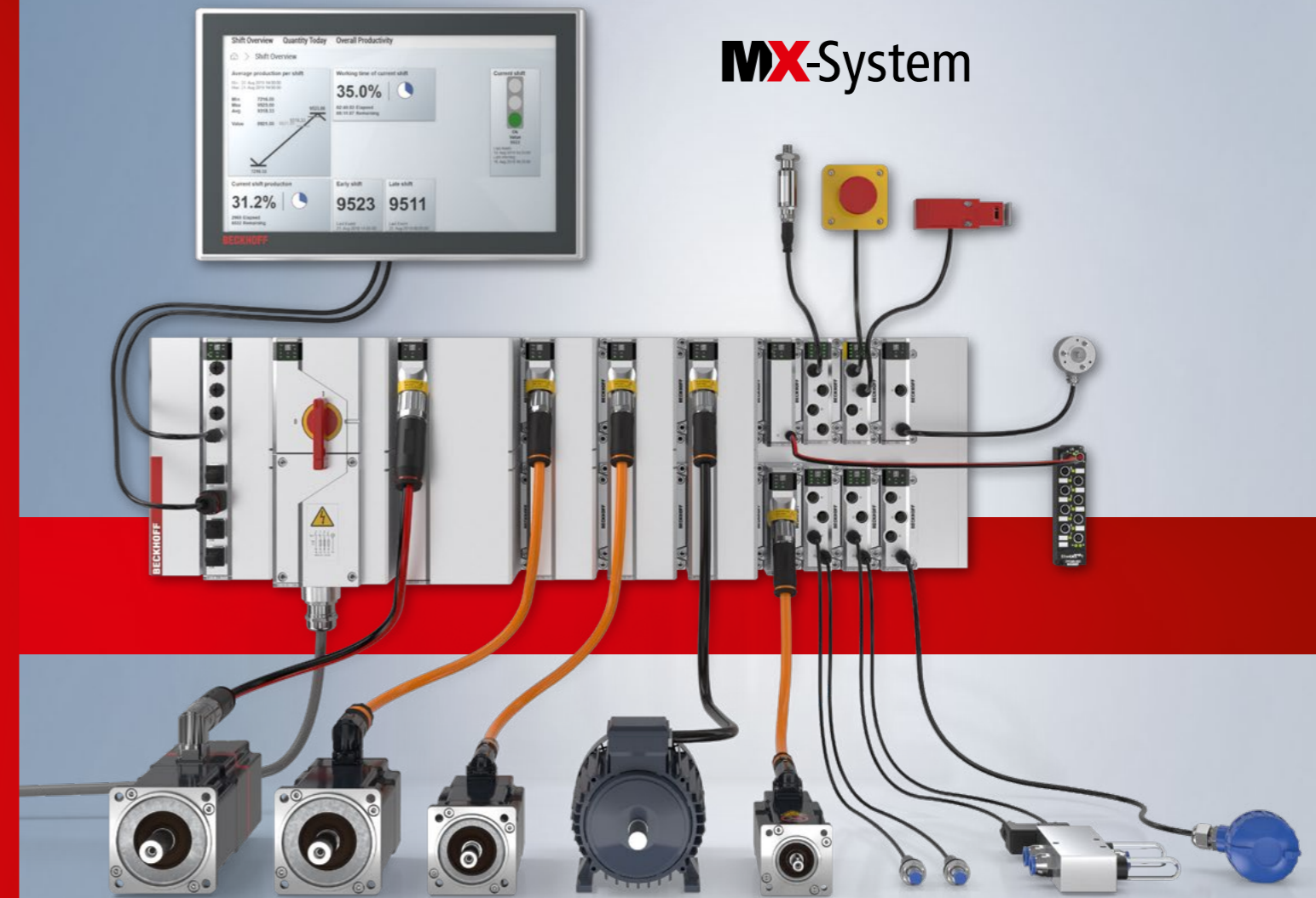
- designed for the greatest possible resistance over a long period of time
- distribution of voltage and EtherCAT via standardized connectors
- assembly and wiring in the shortest possible time thanks to the modular design principle
- flexible and precisely adaptable to production requirements
- advantages throughout the entire machine life cycle with the MX-System



MX-System



Machine and plant concepts without control cabinet in IP67



MX-System

i With the MX-System, Beckhoff is starting a revolution in the automation environment. The holistic, modular and pluggable principle makes it possible to substitute the control cabinet entirely. This means that machines and systems can now be designed and controlled entirely without control cabinets. The MX-System exemplifies system integration of all machine functionalities, as it harnesses all the advantages of PC- and EtherCAT-based control and communication technology, and provides corresponding modules for all control cabinet tasks.

All electronic functionalities of the control cabinet are provided by means of the corresponding connectors on appropriately designed backplanes. The MX-System provides a full range of function modules from the areas of IPC, bus coupler, I/O, motion, relay and system. The combination of baseplate and function modules results in an IP67-protected unit that is optimized in terms of installation space, that combines all control cabinet properties and tasks and can be mounted directly on the machine.

The Vision Company

As a specialist for PC-based control technology, Beckhoff consistently aims to integrate all machine functionalities into one control platform. With TwinCAT Vision, this has included image processing within software since 2017. The machine vision product spectrum is now complete thanks to the introduction of the comprehensive hardware range from Beckhoff. Machine builders and end users thus have a complete image processing system at their disposal that covers all the necessary components from software to illumination which, integrated into the system, provides users with significant competitive advantages.

► www.beckhoff.com/vision

- complete hardware portfolio for industrial image processing
- ultra-fast EtherCAT performance and robust design
- perfect synchronization with any process
- simple, direct integration into the control
- open and scalable machine vision system



Vision: Complete and system-integrated machine vision

i The balanced hardware portfolio for machine vision allows complete system integration from a single source. It includes area-scan cameras, the rugged C-mount lenses, multicolor LED illumination in bar, panel and ring designs and complete units consisting of camera, illumination and focusable optics. All components can be easily integrated into both new and existing control environments, as well as optimally synchronized with all machine and plant processes.

Full scalability of the vision system

All components are optimally matched to each other and can be combined according to the modular principle to suit the vision application. The flexibility and scalability make it easy for users to start their own vision applications, implement them efficiently, and expand them further. For simple integration, including into existing control systems, the unit is available as a complete solution consisting of a camera, illumination, and focusable lens.

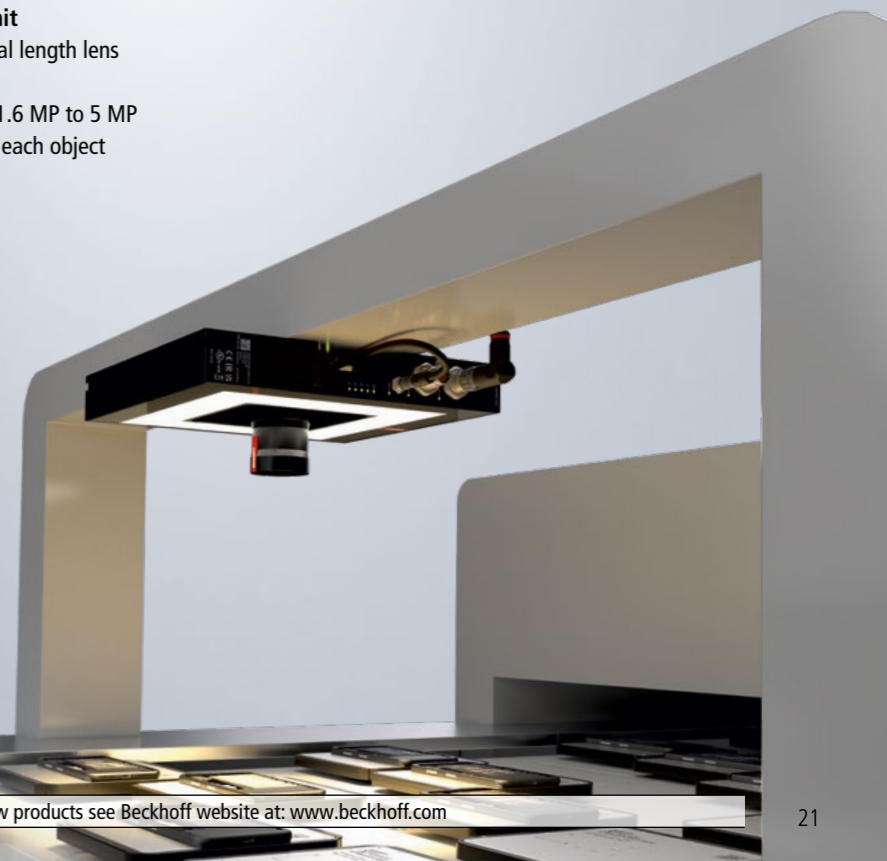


Start directly into industrial image processing with the unit

- unit consisting of camera, ring light and focusable fixed focal length lens with liquid lens
- color or monochrome image sensors with resolutions from 1.6 MP to 5 MP
- multicolor LED illumination can be individually adjusted for each object
- enclosed in elegant IP65/67 anodized aluminum housing
- laterally oriented connectors for easy assembly

Full synchronization with all EtherCAT-based machine processes via distributed clocks

- cost-effective use of the high transmission rate of 2.5 Gbit/s
- faster response times thanks to industrial LAN technology for any cable length
- optimally matched to the powerful industrial PCs
- efficient interaction of all system components for maximum productivity



New Automation Technology



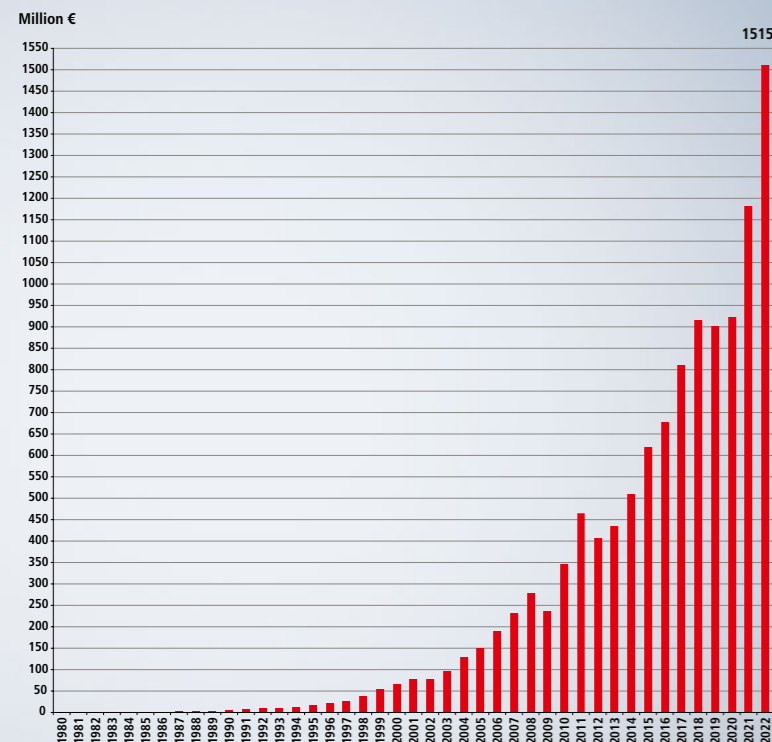
Beckhoff implements open automation systems using proven PC-based control technology. The main areas that the product range covers are industrial PCs, I/O and fieldbus components, drive technology, automation software, control cabinet-free automation, and hardware for machine vision. Product ranges that can be used as separate components or integrated into a complete and mutually compatible control system are available for all sectors. Our New Automation Technology stands for universal and industry-independent control and automation solutions that are used worldwide in a large variety of different applications, ranging from CNC-controlled machine tools to intelligent building control.

Since Beckhoff's foundation in 1980, the development of innovative products and solutions on the basis of PC-based control technology has been the foundation of the company's continued success. We recognized many standards in automation technology that are taken for granted today at an early stage and successfully introduced to the market as innovations. Beckhoff's philosophy of PC-based control as well as the invention of the Lightbus system and TwinCAT automation software are milestones in automation technology and have proven themselves as powerful alternatives to traditional control technology. EtherCAT, the real-time Ethernet solution, provides a powerful and future-oriented technology for a new generation of control concepts.

Beckhoff Automation at a glance

- 2022 global sales: €1.515 billion (+28 %)
- Headquarters: Verl, Germany
- Managing owner: Hans Beckhoff
- Employees worldwide: 5,680
- Engineers: 2,200
- Subsidiaries/representative offices worldwide: 40
- Sales offices in Germany: 24
- Representatives worldwide: > 75

Beckhoff Automation



Sales from 1980 through 2022.
Status: March 2023

Worldwide presence on all continents

The corporate headquarters of Beckhoff Automation GmbH & Co. KG in Verl, Germany, is the site of the central departments such as development, production, administration, sales, marketing, support and service. Beckhoff's presence in the international market is guaranteed by its subsidiaries. Beckhoff is represented in more than 75 countries by worldwide cooperation partners.





More about Beckhoff



Company



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presence



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Support

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We reserve the right to make technical changes.