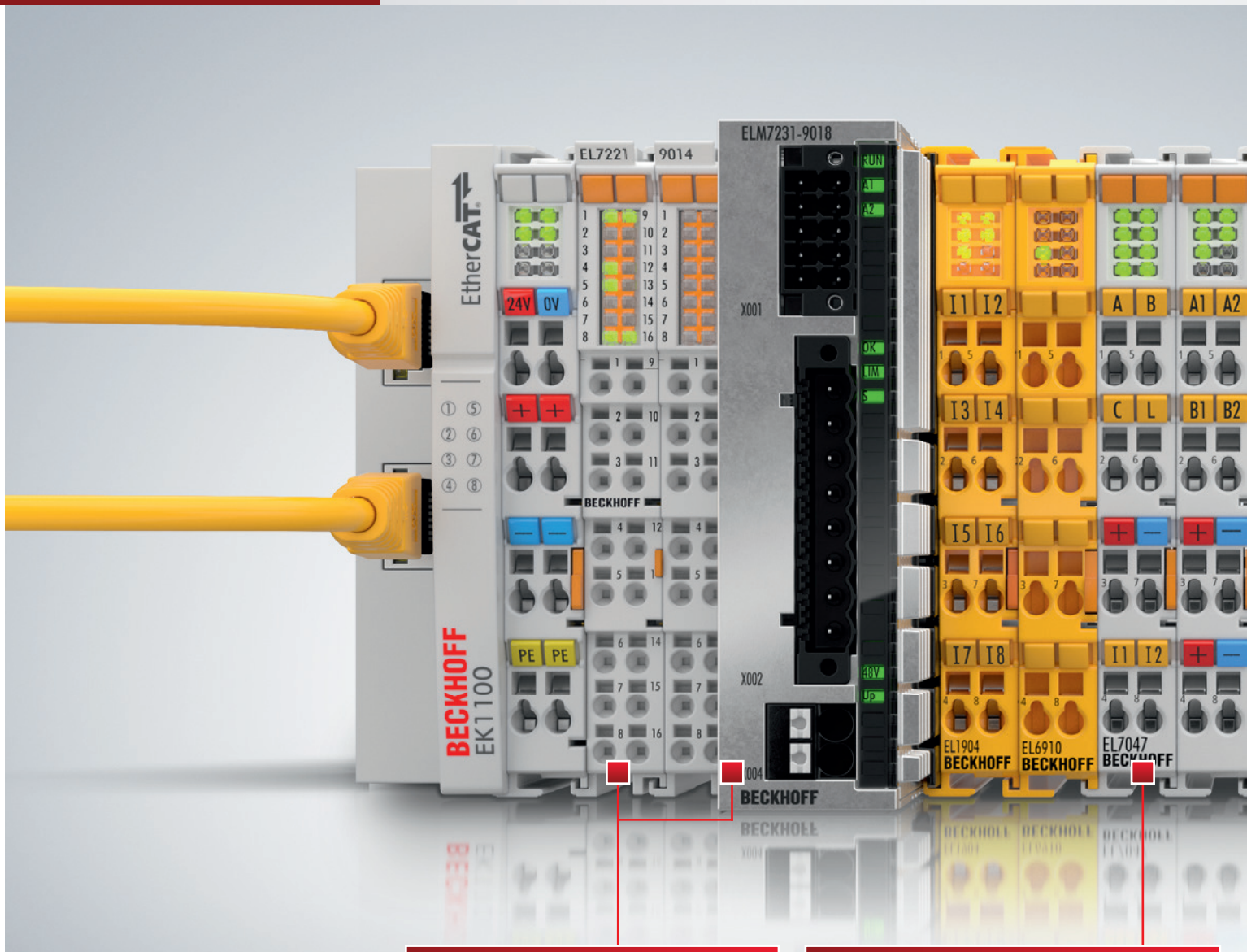
BECKHOFF New Automation Technology

Compact drive technology: system-integrated and powerful

Integrates all drive technologies: PC-based Control

With its highly scalable drive technology portfolio, Beckhoff offers the right motion solution for all automation tasks – including in the low voltage range up to 48 V, in which the technology leader for PC and EtherCAT-based control systems offers a broad range of compact and modular drive solutions (for integration at the I/O level). All common drive technologies are supported: in addition to servomotor and stepper motor controllers, BLDC, DC, and PWM output stages can be integrated directly. All technologies are available both as IP 20 variants in the familiar terminal format and as IP 67 box modules for use outside of the control cabinet. The power spectrum extends from 50 mA for controlling external power amplifiers through to 16 A for direct operation of a servomotor. Direct integration in Beckhoff's TwinCAT automation software simplifies and accelerates commissioning. This means that all drive technologies for compact drive technology are an integral part of Beckhoff's I/O system. Added to this is an extensive range of accessories, including pre-assembled connector cables and gear units as well as brake chopper terminals, braking resistors, or an external fan cartridge for increasing performance.



Servomotor terminals

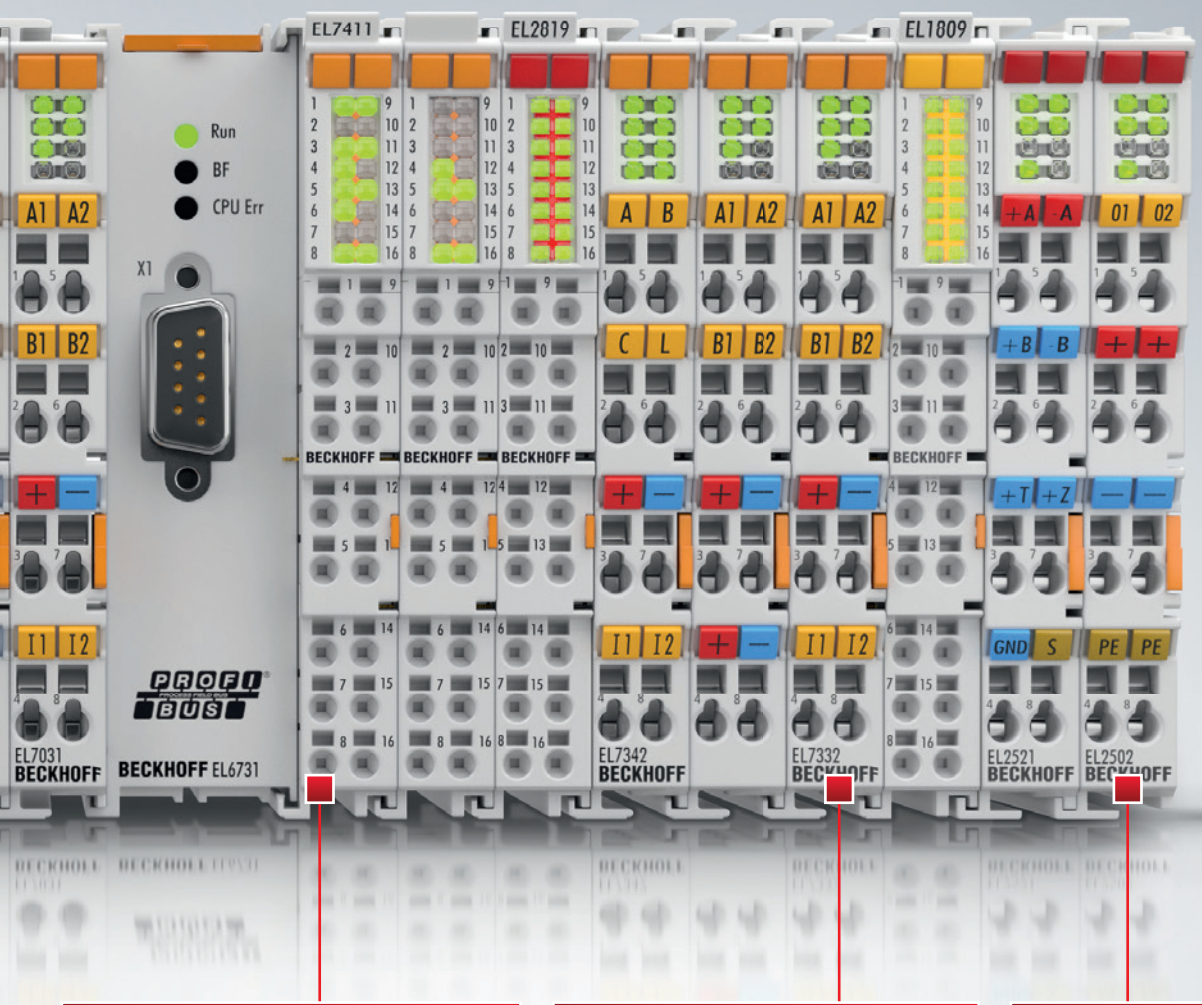
Fully functional servo amplifier in EL or ELM EtherCAT terminal format for 48 V DC. Power spectrum from 200 watts to almost 1 kW output power.

Stepper motor terminals

Control of stepper motors for the safety extra-low voltage range.

The most important advantages at a glance:

- direct integration of all motion components in the I/O system
- highly scalable portfolio of compact drive technology: different designs and performance classes to meet your special requirements, technologies, and applications
- IP 20 for solutions in the control cabinet or terminal boxes
- IP 65/67 for applications without control cabinets



BLDC motor terminals

Control of BLDC motors up to 48 V DC, with hardware-enable-input for STO applications.

DC motor terminals

Operation of DC motors for 24/48 V DC

PWM output terminals

PWM output terminals for operating valves/stepper motor output stages or for encoder simulation.

The high-performance servo drives: ELM72xx and AMI812x

With its high-performance servomotor terminals in the ELM72xx series and the integrated AMI812x servo drives, Beckhoff offers innovative and highly compact servo solutions in the area of servo drive technology. The new ELM72xx EtherCAT terminals are fully functional servo drives in a robust metal housing that deliver an output current of up to 16 A at 48 V DC for the supply voltage. The ELM72xx series allow direct connection of motor, feedback, and brake via the convenient connector front end and offers an integrated absolute value interface. Power and feedback system are combined in the standard motor cable based on One Cable Technology (OCT). Likewise integrated is the programmable TwinSAFE Logic for directly implementing the safety application in the terminal. The metal housing can be connected directly to the Beckhoff EtherCAT terminals and offers optimum heat dissipation even at high output power as well as optimal shielding against electrical interference. With the AMI812x servo drive, Beckhoff is extending its compact drive technology (up to 48 V DC) by devices that can be installed decentrally in the field. This means that servo motor, output stage, and fieldbus connection are available in a space-saving design for automation in the performance range up to 400 watts. As an EtherCAT slave, the AMI812x can be placed directly on the

machine without upstream I/O level. Especially compact machines with a reduced footprint can be implemented in the control cabinet in this way.

Highly scalable: Beckhoff servo technology

Beckhoff's servo technology portfolio includes compact, fully functional servo amplifiers for direct control of servo motors. Thanks to the high scalability in all performance classes from 2.8 A to 16 A, virtually all applications in protection classes IP 20 and IP 67 can be covered. The compact servo technology is also available as a motor-integrated variant with the AMI812x. Integrated travel path control and direct integration of motor, feedback, and brake are assured as well as the safe motion functions in the ELM series, which is also available as a 2-channel output stage.

More power, more features: the ELM series
Direct integration of the servo motor including feedback and brake via OCT (One Cable Technology): With its extremely compact design, the ELM series is one of the smallest servo drives on the market.

EL7201-0010,
EL7201-9014

AM8111: I = 2.8 A$_{RMS}$

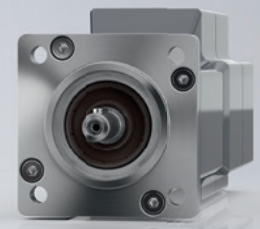
2.8 A

ELM7211-9016,
ELM7212-9018

EL7211-0010,
EL7211-9014

EP7211-0034

EJ7211-0010,
EJ7211-9414



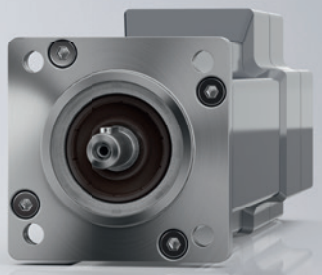
AMI8121: I = 4.5 A$_{RMS}$

AM8121: I = 4.5 A$_{RMS}$

4.5 A

ELM7221-9016,
ELM7222-9018

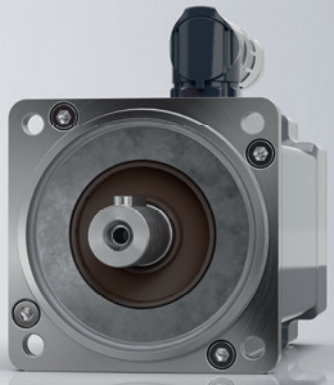
EL7221-9014



AMI8123: I = 8 A$_{RMS}$

8 A

ELM7231-9018,
ELM7231-9016



AM8141: I =16 A$_{RMS}$

16 A

Comprehensive: the portfolio for stepper motors

Output stages in different protection classes are available for stepper motors: the housing of the EtherCAT EL terminals in IP 20, the EtherCAT plug-in modules in IP 20, and the EtherCAT box modules in IP 67. The portfolio also covers two performance classes: the EL703x (EL7037, EL7031) for motors up to 1.5 A (in combination with the ZB8610 fan cartridge up to 3 A) as well as the EL704x (EL7047, EL7041) for motors up to 5 A (combined with the ZB8610 fan cartridge up to 6.5 A). Beckhoff stepper motor terminals are intended for direct integration of motors in the mid-performance class. Additional inputs support drive-related functions such as reference runs and end position monitoring.

Compact, high-performance stepper motor terminals
Motors with a performance of 6.5 A at 48 V DC for the supply voltage can be operated directly with Beckhoff's stepper motor solutions.

3 A

EL7037,
EL7031, EL7062

EP7041-1002

EJ7031

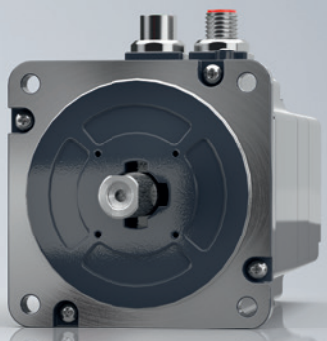
AS2021: I up to 3 A

6.5 A

EL7041-1000,
EL7047, EL7041

EP7041-3002,
EP7041-2002

EJ7047,
EJ7041-0052



AS2042: I up to 6.5 A

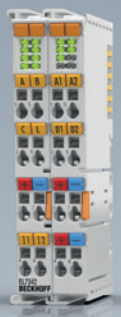
Compact drive technology completed: with BLDC, DC, and PWM

Beckhoff's compact drive technology not only includes servo and stepper motor solutions, but also familiar drive technologies such as Brushless DC (BLDC), DC, and PWM. All are available as system-integrated solutions and thus complete the PC and EtherCAT-based control architecture. The BLDC technology allows integration of servomotors with encoder feedback or Hall effect sensors for direct connection to the terminal. In conjunction with the ZB8610 fan cartridge, DC motors with power output of up to 6.5 A can be operated directly at the terminals.

PWM controllers are available for different applications and performance classes. This means, for example, that distributed output stages, which are controlled with specified pulses and direction, can be connected directly to the pulse train terminals.

Brushless DC solutions for connecting BLDC motors in IP 67
The IP 67 solution EP7402 offers two outputs with integrated controllers for direct connection of 24 V DC roller motors. Eight additional digital inputs/outputs enable connection, for example, of photoelectric switches and communication between the box modules in operation without PLC.

EL7332



EL7342

EP7342-0002

EJ7342

EL7411

EP7402-0057,
EP7402-0167

EL2521,
EL2522

EL2502

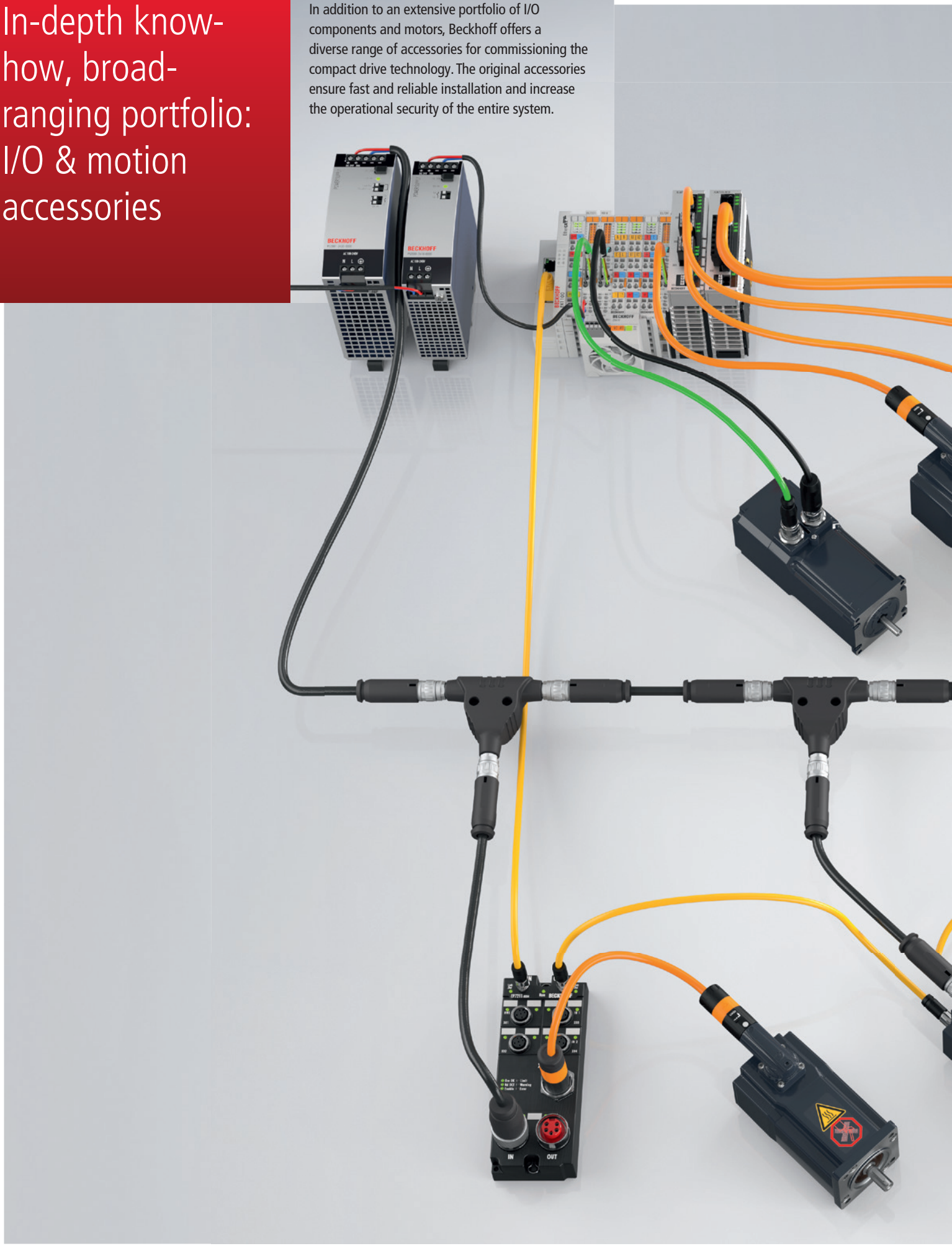
EL2535, EL2535-0005,
EL2535-0103

EJ2502

EJ2521-0224

In-depth know-how, broad-ranging portfolio: I/O & motion accessories

In addition to an extensive portfolio of I/O components and motors, Beckhoff offers a diverse range of accessories for commissioning the compact drive technology. The original accessories ensure fast and reliable installation and increase the operational security of the entire system.



In-depth know-how, broad-ranging portfolio: I/O & motion accessories

In addition to cables sold by the meter, plug connectors, and a virtually seamless portfolio of pre-assembled cables, the extensive range of accessories also includes an external fan cartridge for improving performance, braking resistors, and DIN rail supply voltage units. The cables are available with protection ratings of IP 20 or IP 65/67 and are suitable for use in the most varied environmental conditions. For use with high dynamic loads, Beckhoff offers – among other things – cables for drag chain applications as well as torsion-resistant cables for robot applications.

Motor cables

Cable ZK4704-04x1-2zzz for OCT
x = 0 fixed installation
x = 2 drag-chain suitable
x = 6 capable of torsion
▶ **www.beckhoff.com/zk4704-0401-2xxx**

Cable ZK4701-04x1-2zzz for OCT
x = 0 fixed installation
x = 2 drag-chain suitable
x = 6 capable of torsion
▶ **www.beckhoff.com/zk4701-0401-2xxx**

Cable ZK4000-6700-2zzz for motor cable AS1000, drag-chain suitable
▶ **www.beckhoff.com/zk4000-6700-2xxx**

Cable ZK4000-6768-0zzz for motor cable AS1000, drag-chain suitable
▶ **www.beckhoff.com/zk4000-6768-0xxx**

Cable ZK4000-7700-2zzz for motor cable AS2000, drag-chain suitable
▶ **www.beckhoff.com/zk4000-7700-0xxx**

Cable ZK4000-6877-0zzz for motor cable AS2000, drag-chain suitable
▶ **www.beckhoff.com/zk4000-6877-0xxx**

Cable ZK4000-5100-2zzz for resolver, drag-chain suitable
▶ **www.beckhoff.com/zk4000-5100-2xxx**

Cable ZK4000-5151-0zzz for resolver, drag-chain suitable
▶ **www.beckhoff.com/zk4000-5151-0xxx**

Input

Cable ZK205x-5y00-0zzz for power supply
x = 0 cabel structure 5 x 1,5 mm² ;
x = 1 cable structure 5 x 2,5 mm² ;
x = 3 cable structure 5 x 0,75 mm²
▶ **www.beckhoff.com/zk2050-5200-0xxx**

Cable ZK1090-3191-xzzz
EtherCAT connection cable
x = 0 drag-chain suitable
x = 3 fixed installation
x = 6 capable of torsion
▶ **www.beckhoff.com/zk1090-3191-0xxx**

Input/Output

Cable ZK2000-2122-xzzz for sensor/actuator
x = 0 drag-chain suitable
x = 3 fixed installation
x = 6 capable of torsion
▶ **www.beckhoff.com/ZK2000-2122-0xxx**

Cable ZK1090-3131-xzzz,
EtherCAT connection cable
x = 0 drag-chain suitable
x = 3 fixed installation
x = 6 capable of torsion
▶ **www.beckhoff.com/zk1090-3131-0xxx**

▶ **www.beckhoff.com/io-accessories**

Extension of the performance range

ZB8610 | Fan cartridge
Fan cartridge for forced air circulation: the improved heat dissipation, for example, allows operation of I/O components in compact drive technology with higher output currents

ZB8110
The external braking resistor for regulating the DC-link voltage when more braking power is needed is connected directly to the EL9576. The corresponding I2t model of resistance is evaluated automatically in the EL9576 brake chopper terminal.

EL9576
Brake chopper terminal with integrated high-performance capacitors for stabilizing supply voltages. If the regenerative energy exceeds the capacity of the capacitors, energy can be dissipated via an external braking resistor. The switching threshold of the terminal can be directly parameterized. The terminal has extensive diagnostic information, which is directly available to the user through the process data.

Power supply

The Beckhoff power supplies impress with high efficiencies of up to 96.3%. The low heat loss preserves all the components in the control cabinet and reduces energy costs. The higher the efficiency, the smaller the devices can be made. Beckhoff offers a portfolio of power supplies with universally space-saving and compact housing.

Power supplies in the PS series for every application

- single-phase and 3-phase DIN rail power supplies for output voltages of 24/48 V DC
- durable and reliable devices in three performance classes
- temperature-optimized design delivers high efficiency rating of up to 96.3%
- broad range of AC/DC input voltages supported
- permanently high output power and short-term peak power capability of up to 150%
- safe and precise tripping of circuit breakers

Beckhoff: the motion company

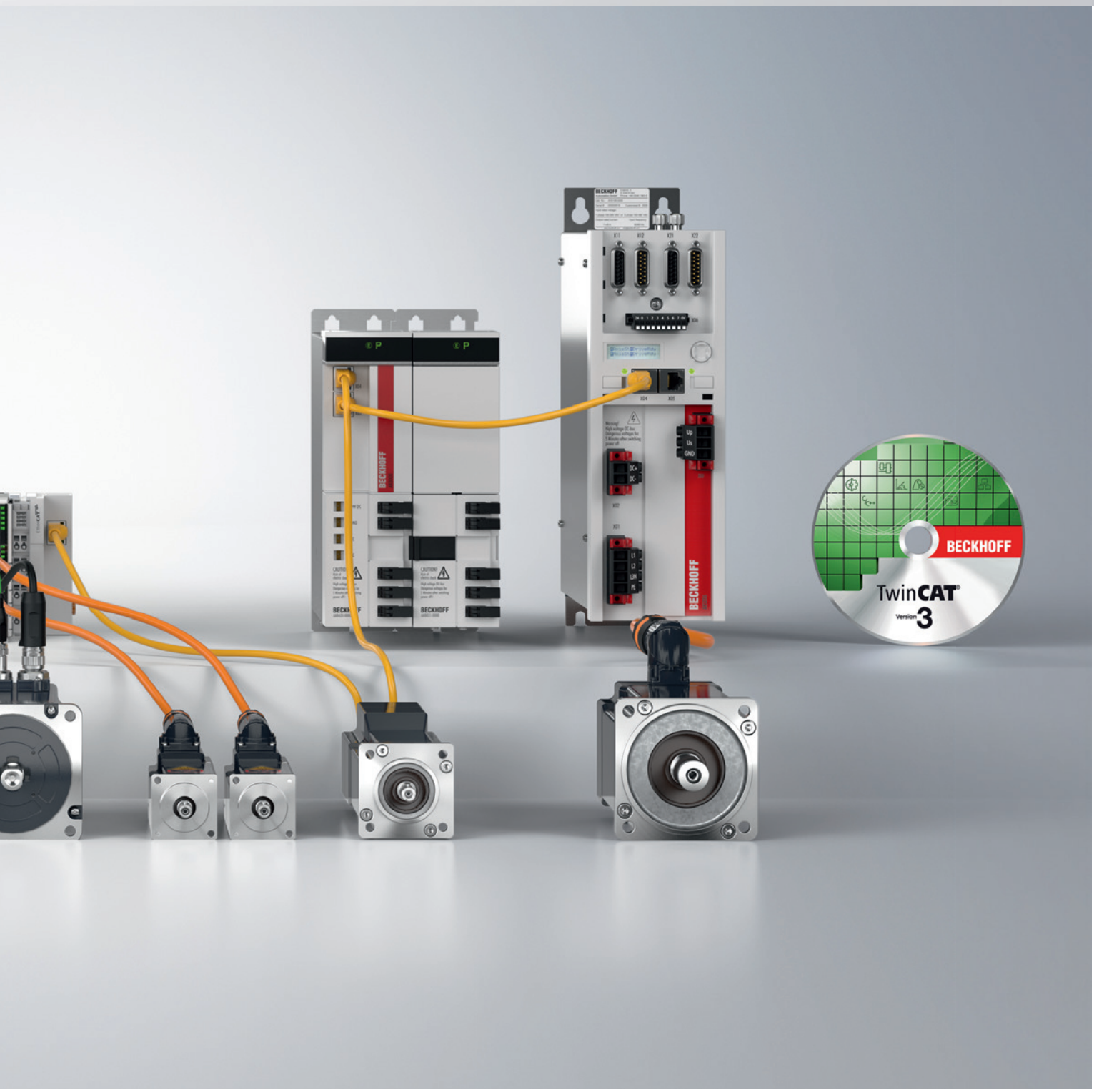
As a central component of your automation solution, Beckhoff Drive Technology not only offers drive controllers and motors for all application areas and performance classes, but also the right Industrial PC and the most varied panel solutions for visualizing your processes. With its extensive and high-performance tools such as Motion Designer, Drive Manager 2, or TwinCAT 3 Scope, TwinCAT 3 offers you an optimum development environment for implementing the requirements for drive technology quickly and efficiently.

TwinCAT 3 Motion Designer
Both the design and commissioning of the drives are straightforward and user friendly with the aid of the customary TwinCAT 3 software tools. This simplifies application calculations and the dimensioning of the drive components (motor, servo drive, and other accessories) when designing the drive system using the engineering component TwinCAT3 Motion Designer. Designers can access the technical data sheet for the motor and gear units with a simple click and the associated 3D model of the drive components for integration in their design software with just another click.

TwinCAT 3 Drive Manager 2
The proven TwinCAT 3 Drive Manager 2 engineering tool guides the user systematically through commissioning. Drive parameters can also be displayed, adjusted, and the impact on the drive response examined during operation for optimization purposes. The Drive Manager 2 supports the commissioning of the AX8000 multi-axis servo system, the AX5000 digital compact servo drive, the AMP8000 distributed servo drive system, the AMI8100 integrated servo drives, or the I/O components EL72xx, EP72xx, ELM72xx and EJ72xx.

TwinCAT 3 Scope
TwinCAT 3 Scope is Beckhoff's graphical tool for signal analysis and data collection. Due to the separation into the two main components, View and Server, it is possible to display the signal curves of several systems distributed in the field in a central TwinCAT 3 Scope. Depending on the system, it is possible to browse, for example, in the PLC, NC or directly in the connected EtherCAT I/Os, in order to select the corresponding value. Alongside the possibility of long-term recording, various trigger functionalities and cursors are available in the TwinCAT 3 Scope.

Conclusion:
Thanks to optimum compatibility of the I/O components with the Industrial PCs, the TwinCAT automation software, and the drive technology components, Beckhoff customers receive a perfectly coordinated automation solution.



Beckhoff: worldwide presence on all continents

New Automation Technology
Beckhoff is present in the international market with 38 subsidiaries and many distributors. Beckhoff is represented in all major industrial areas in over 75 countries to ensure fast service and support in the local language for its global customers. Moreover, Beckhoff's close proximity to its customers is the basis for its in-depth understanding of the technical challenges its customers face. A creative corporate culture, enthusiasm for technology, and expert knowledge characterize Beckhoff and its sales partners on all continents.

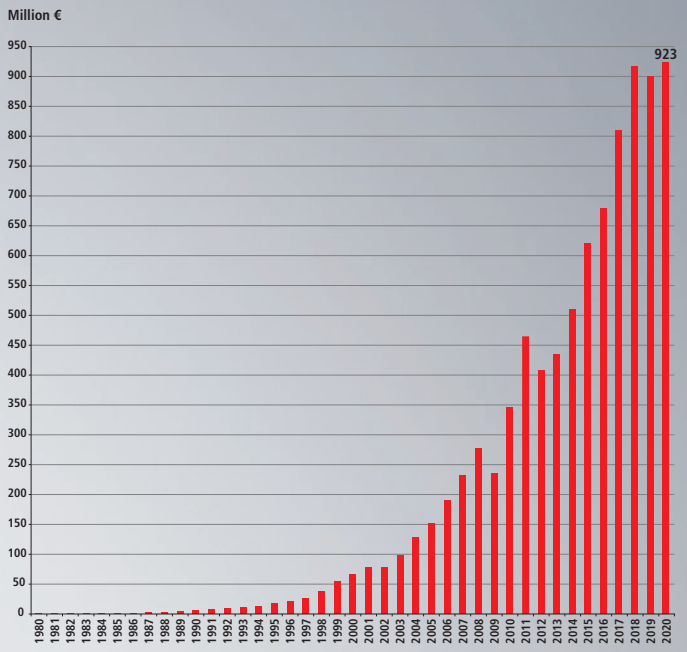
Beckhoff at a glance

- Headquarter: Verl, Germany
- 2020 sales: € 923 million
- Employees worldwide: 4,500
- Sales offices in Germany: 22
- Subsidiaries/representative offices worldwide: 39
- Representatives worldwide: > 75

(As of 04/2021)

Further information
Beckhoff's catalogs and flyers are available for downloading on the Internet.

▶ **www.beckhoff.com/information-media**



Sales development

Headquarters
Subsidiary
Distributor

How can compact drive technology optimize your machines? Talk with us.

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