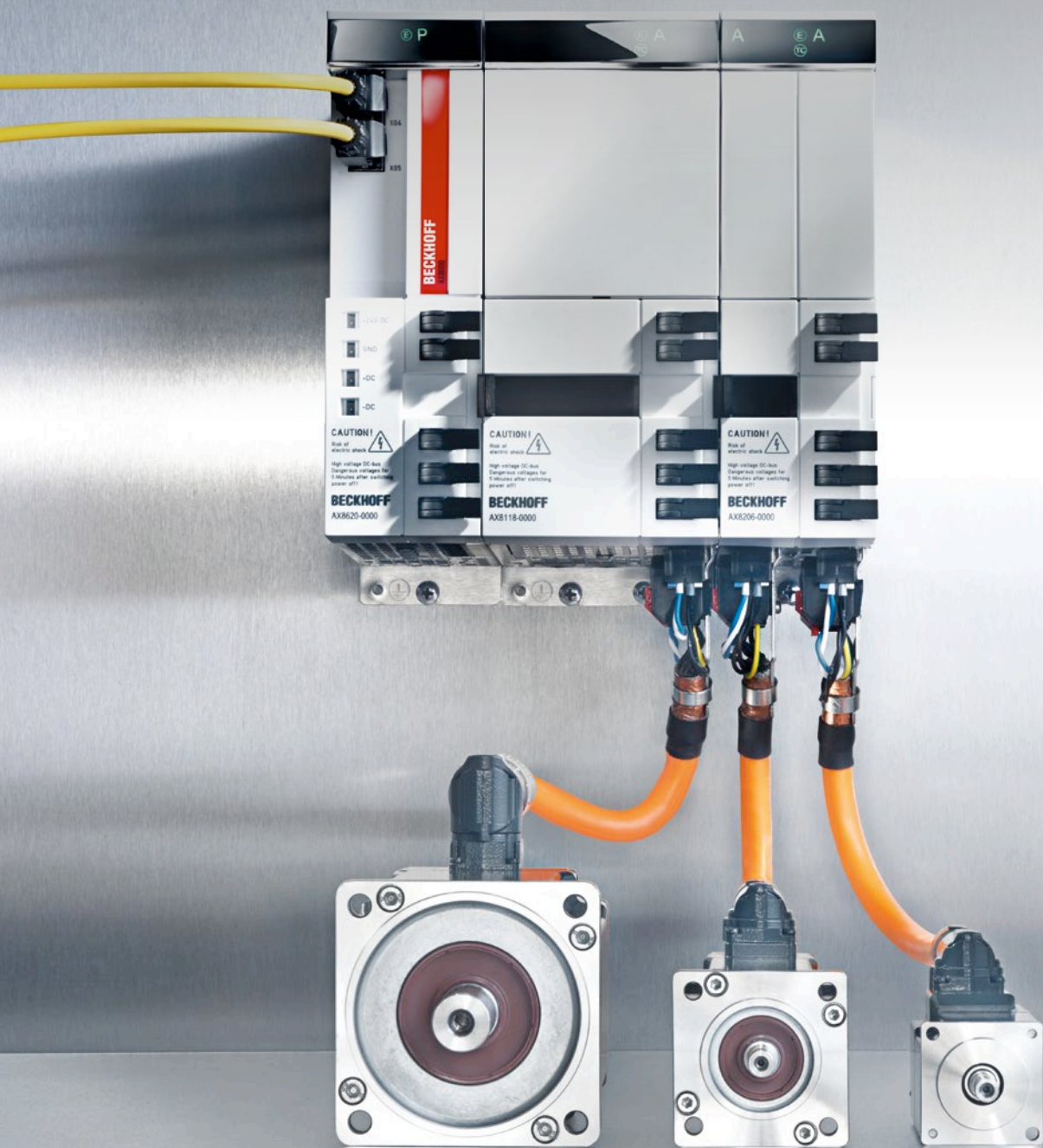


BECKHOFF New Automation Technology

Ultra-compact: The Versatile AX8000 Multi-axis Servo System



The AX8000 system completes the highly scalable Beckhoff Drive Technology portfolio.



As a provider of scalable drive technology, Beckhoff offers a comprehensive hardware and software portfolio for all requirements, price ranges and areas of application: In addition to the comprehensive motion control solutions offered in TwinCAT automation software and a scalable motor series, a wide range of drives is



Compact Drive Technology

- Solutions up to 5 A directly within the standard I/O system
- Connection of stepper, servo, DC or AC motors
- IP 20 and IP 67-rated connection options
- Matching motors, gear units and pre-assembled cables
- Powerful, compact connections in EtherCAT Terminal and EtherCAT Box formats



AX8000 | Compact multi-axis system

- Modular servo drive system
- Power supply modules: 20 A DC, 40 A DC
- 1-channel axis module: 1 x 8 A, 1 x 18 A
- 2-channel axis module: 2 x 6 A
- Simple commissioning and installation
- Exceptionally compact footprint for multi-axis systems



AX5000 | Servo Drive

- 1-channel servo drive: 1.5 A up to 170 A
- 2-channel servo drive: 2 x 1.5 A, 2 x 3 A, 2 x 6 A
- Support for third-party motors and various encoder systems
- Optimised functionality and impressive price-to-performance ratio

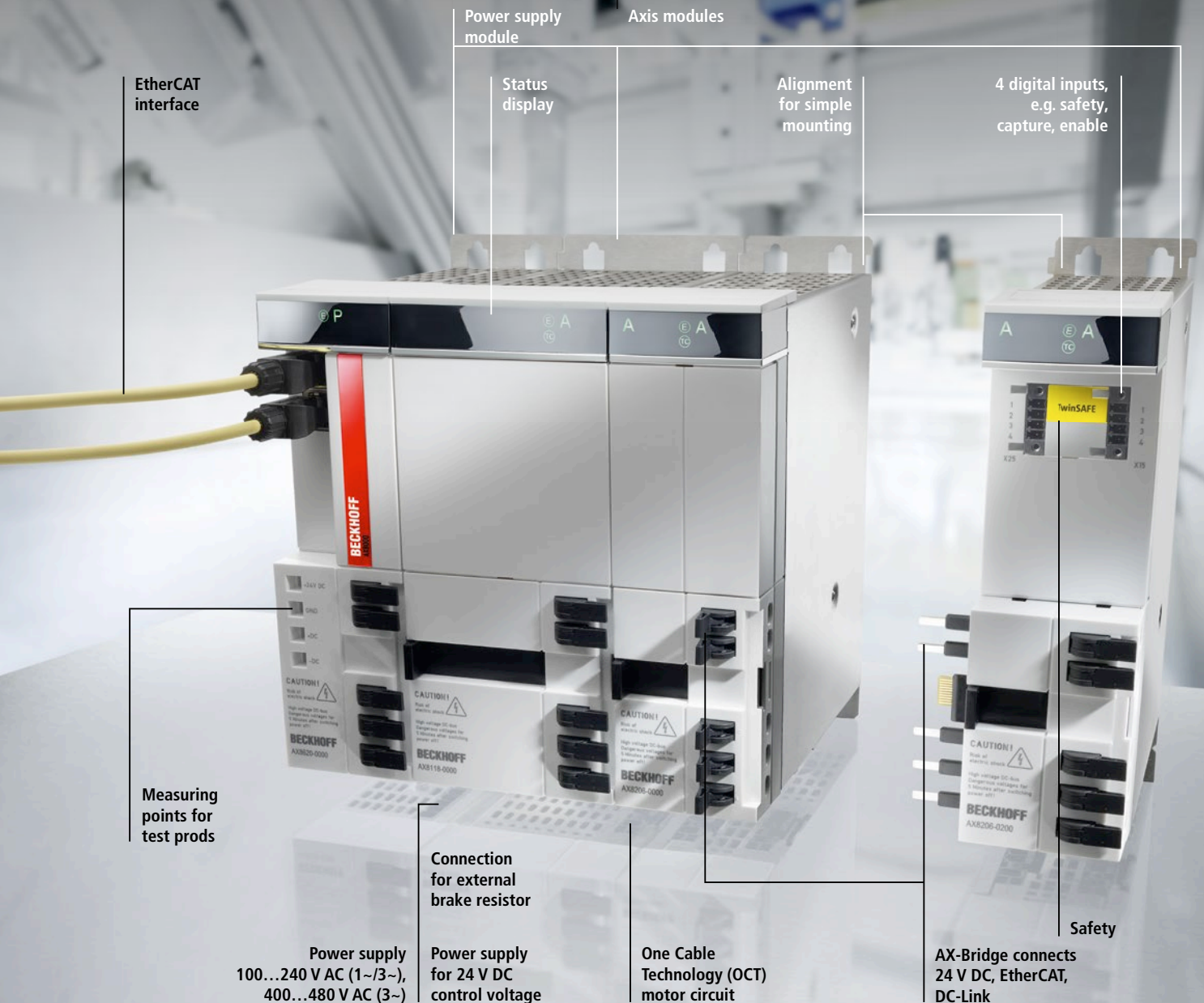
also available, from compact drive technology implemented directly at the I/O level, to the versatile AX5000 Servo Drive. The ultra-compact AX8000 servo system enhances the range: As a modular, multi-axis servo system, the AX8000 delivers high-performance drive technology with optimised space utilisation for every control

cabinet, offering precisely-scaled solutions for all motion tasks.

Highly scalable Beckhoff Drive Technology

- Drive solutions with an ideal price-to-performance ratio
- Modular AX8000 multi-axis servo system completes the drive controller portfolio.
- Scalable motor series
- Comprehensive motion control functionalities

The intelligent approach: Modules are freely combined for all voltage systems and applications.



With the AX8000 multi-axis servo system, you benefit from maximum flexibility: Power supply, axis modules and other optional modules can be combined as needed for all areas of application. All requirements are covered – without the need for further components or any hidden costs. The power supply module features an integrated

mains filter, as well as an internal brake resistor and a brake chopper. Four supply modules with 20 A or 40 A are available; two of these are designed for grid voltages between 100 and 240 V, ideal for the Asian and American markets. Beckhoff also offers high-performance AM8000 servomotors with windings that are optimised for

these voltage levels. Power supply modules with 20 or 40 A are also available for the 400 V and 480 V grids in Europe and North America. These versions offer twice the power with the same compact form factor. The single-axis modules are available in 60 mm width for motor currents up to 8 A. Automatic adaptation to the connected



AX8620-1000



AX8620-0000



AX8640-1000



AX8640-0000

AX86xx | Supply modules

AX8620 | Supply modules 20 A

- 100...240 V AC (1~), 7 A DC
- 200...240 V AC (3~), 20 A DC
- 400...480 V AC (3~), 20 A DC

AX8640 | Power supply modules 40 A

- 200...240 V AC (3~), 40 A DC
- 400...480 V AC (3~), 40 A DC



AX8108



AX8118



AX8206

AX81xx, AX82xx |

1- and 2-channel axis modules

- AX8108: 1 x 8 A
- AX8118: 1 x 18 A
- AX8206: 2 x 6 A



AX8810 | Capacitor module

AX881x | Option modules

- AX8810: Capacitor/DC-Link expansion

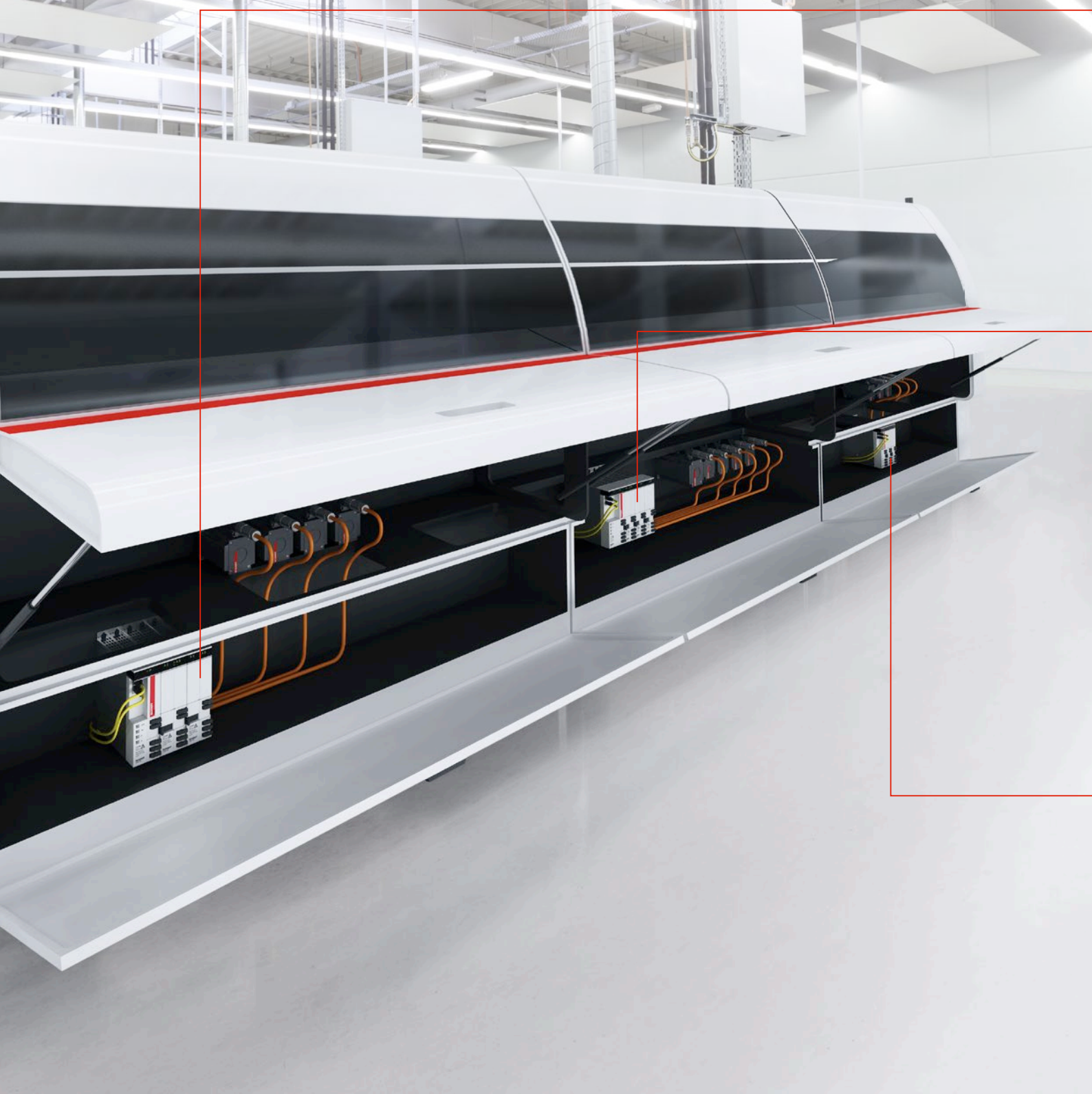
motor is assured by the special Beckhoff motor current measurement technology: This is the prerequisite for the ability to cover the whole range from 1 A to 8 A motor current with a single module. The same principle is used in the 18 A module with 90 mm width. The 60 mm wide double-axis module with 2 x 6 A rated current

particularly excels at saving space: The total current can be used flexibly, so that a 3 A motor can be operated at one channel and an 8 A motor on the other, for example. This leads to enhanced flexibility within the drive system.

The AX8000 principle of modularity

- Increased flexibility
- Application-specific configuration
- Significantly reduced system size
- Toolless connection system
- Available for all voltages worldwide

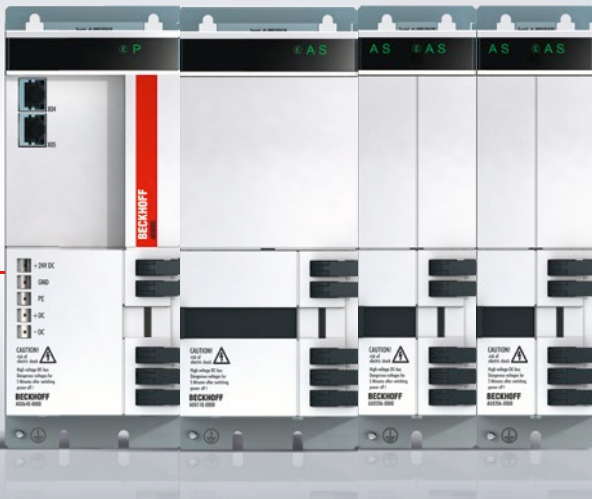
Compact design brings any multi-axis configuration required into any control cabinet: AX8000.





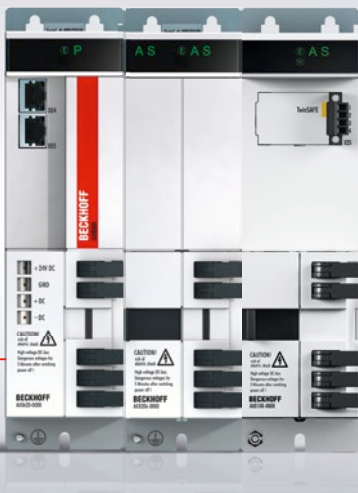
4-axis configuration

- Power supply module 10.7 kW
- 2 double-axis modules
 - For connecting four 6 A motors
- 180 mm overall width



5-axis configuration

- Power supply module 21.4 kW
- 1 single-axis module 18 A
- 2 double-axis modules, 4 x 6 A
- 300 mm overall width



3-axis configuration

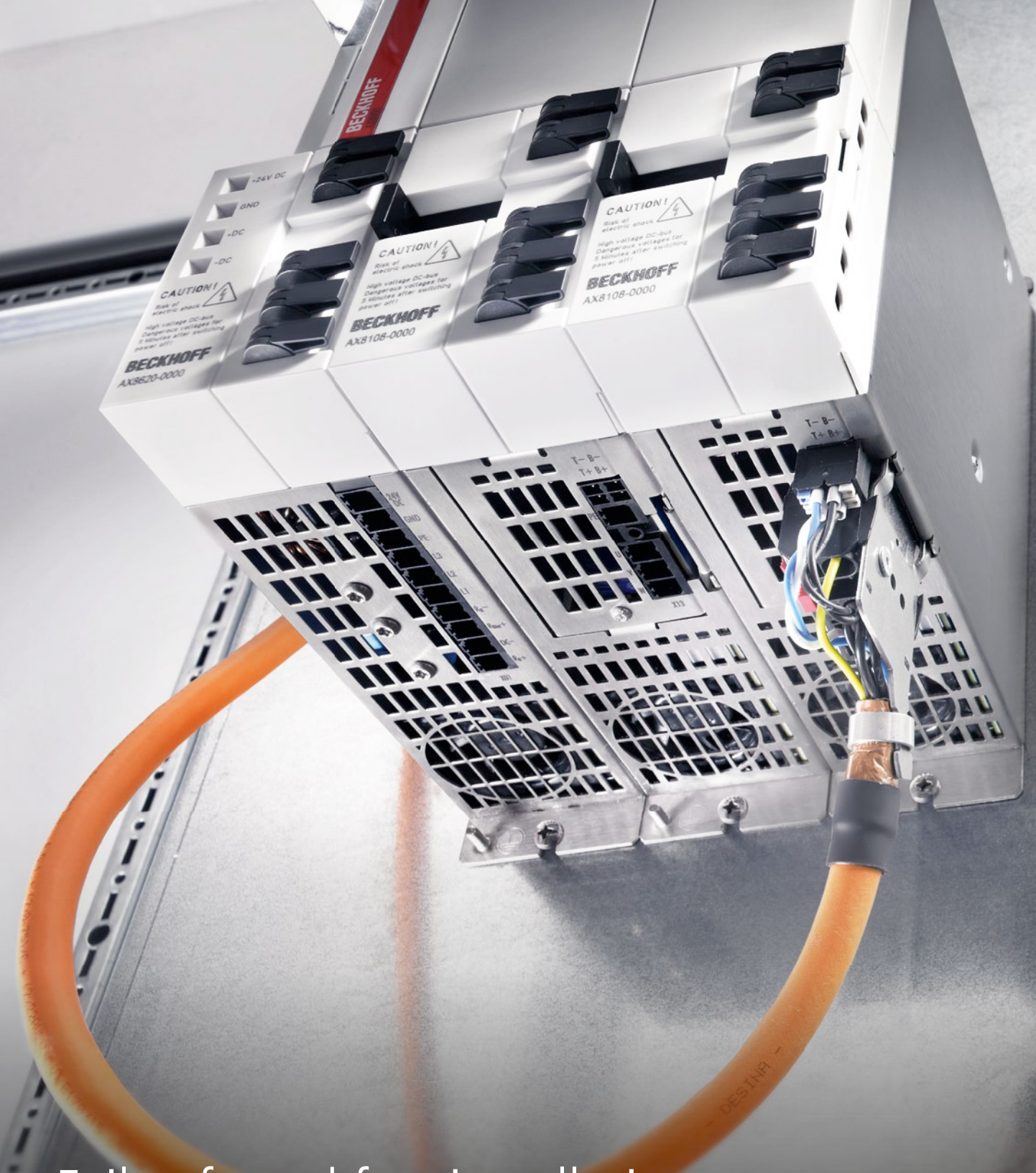
- Power supply module 10.7 kW
- Double-axis module 2 x 6 A
- Single-axis module 1 x 8 A
- Integrated TwinSAFE functionality

The AX8000 from Beckhoff is the future-ready response to current developments and trends in machine design: External control cabinets are increasingly replaced by machine-integrated solutions, which inevitably means that less space is available for the installation. With a depth of just 192 mm, the AX8000 servo system is ideal

for such compact machine control cabinets. In order to make the handling of the control cabinet especially user-friendly during machine commissioning and installation, the connection technology of the AX8000 was completely revised and designed for tool-less assembly.

Space-saving installation in control cabinets

- Many different numbers of axes possible
- Maximum freedom in system design
- Direct installation on the machine reduces installation time and costs.



Fail-safe and fast installation: with One Cable Technology and AX-Bridge.

Just as compelling as the compact design is the toolless, fast and simple installation of the AX8000 via the directly integrated AX-Bridge. A sliding mechanism links DC-Link, PE, EtherCAT and 24 V DC control voltage between the modules quickly and reliably by simply moving and latching the spring balancer connection. One easy slide of



1

AX-Bridge quick connection system

- Fail-safe axis connections
- Simple connection of 24 V DC, DC-Link and EtherCAT
- Efficient and precise installation
- Fast, safe and screwless plug connection



2

OCT – One Cable Technology

- Reduced costs
- Reduced installation time
- Reduced space requirements



3

Bayonet connector for quick installation

- Fast and simple connection technology

the AX-Bridge simplifies otherwise demanding installation situations in small control cabinets, such as those that are embedded in the machine base. The AX8000 uses a revised version of the tried and tested One Cable Technology (OCT) from Beckhoff: An optimised plug connector latches automatically to establish a secure connection that can be easily

released again as required. At the same time, the plug connector secures the shroud without an additional screw connection. On the motor side, OCT also provides a compelling solution with a sophisticated connection: the easy to handle, safe bayonet fitting for quick installation.

The AX8000 connection technology

- Directly integrated AX-Bridge for fast, toolless installation
- Fast, simple connections: AX-Bridge, bayonet fitting and space-saving One Cable Technology

Built-in safety: TwinSAFE with 17 drive-integrated safety functions.

- Safety over EtherCAT (FSoE), compliant with IEC 61784-3-12
- Drive-integrated safety functions, compliant with IEC 61800-5-2 and ETG.6100 safety drive profile
- Activation of safety functions via FSoE or digital inputs
- All drive-integrated safety functions comply with EN ISO 13849-1:2008 (Cat. 4 PL e) and IEC 61508:2010 Safety Integrity Level SIL 3.



The higher the performance level of a drive solution, the more critical the issue of safety becomes: Key risks for machine operators can potentially arise from the dynamics of any electronic drive technology. With the drive-integrated safety functions of the AX8000, industry and legal requirements can easily be taken into account

early on in the design phase of the machine. With TwinSAFE, Beckhoff offers a reliable solution, which enables users to implement 17 integrated stop, velocity, position, acceleration and torque safety functions with Performance Level e.

High performance: with fast current and position controller.

- Fast current and position controller
- High-performance FPGA/ARM processor technology
- FPGA-based control algorithms
- Multi-channel current control technology
 - Sampling and response time 1 μ s
 - Current controller cycle time 16 μ s
 - Speed controller cycle time 31.25 μ s
 - Position controller cycle time 31.25 μ s
 - EtherCAT cycle time 62.5 μ s minimum
- High-performance analysis tools



The AX8000 enables smoother movements through increased sampling rates and, therefore, optimised product quality. The current measurement takes place within 1 μ s in an FPGA; the system is able to respond to changes virtually in real-time. Device protection for drives and motors

is also assured in this way: If, for example, the motor encounters an obstruction, the drive limits the current to the rated value within 1 μ s. This prevents overload of the motor and drive. Other valuable features include the high-performance analysis tools offered by TwinCAT: the TC3

Motion Designer design tool, the TC3 Drive Manager configuration tool, the TC3 Scope software oscilloscope and the TC3 Bode Plot Base tuning tool.

The flexible approach: Freely-combined modules for all voltage systems and applications.



AX8000 | Multi-axis servo system

The AX8000 multi-axis servo system greatly simplifies the implementation of multi-channel drive

solutions. The required number of 1-channel or 2-channel axis modules are attached to the central supply module. The modules are connected without screws or tools using the built-in

AX-Bridge quick connection system, which is based on spring-loaded terminals.

| Technical data | AX8000 |
|-----------------------|---|
| Bus system | EtherCAT |
| Drive profile | CiA402 according to IEC 61800-7-201 (CoE) |
| Rated supply voltage | 100...480 V AC, 50/60Hz |
| DC-Link voltage | 140...875 V DC |
| Current control | 1 µs update time, 16 µs cycle time |
| Design form | modular system with 60 or 90 mm wide elements |
| Protection class | IP 20 |
| Operating temperature | 0...+55 °C (see documentation) |
| Approvals | CE, cULus (in preparation) |

AX8620, AX8640 | Power supply modules

A power supply module generates the DC-Link voltage (DC) for the supply of the axis modules and the option modules from the mains voltage. It already contains a mains filter, for which the

drive is tested and certified in accordance with EN 61800-3 for Category C3 use. Any regenerative energy produced, e.g. through strong braking of the motors, can be converted into heat either via the internal brake resistor or via the combination of built-in brake chopper and external brake

resistor. Alternatively, the energy can be buffered in the AX8810 capacitor module.

| Technical data | AX8620-1000 | AX8640-1000 | AX8620-0000 | AX8640-0000 |
|--|--|--|--|--|
| Rated supply voltage | 3 x 200...240 V AC 1 x 100...240 V AC | 3 x 200...240 V AC | 3 x 400...480 V AC | 3 x 400...480 V AC |
| Rated input current at 40 °C | 1~: 10 A 3~: 17.5 A | 3~: 35 A | 3~: 17.5 A | 3~: 35 A |
| Rated output current | 1~: 7 A DC 3~: 20 A DC | 3~: 40 A DC | 3~: 20 A DC | 3~: 40 A DC |
| Rated output | 1~: 2 kW 3~: 6.4 kW | 3~: 12.8 kW | 3~: 10.7 kW | 3~: 21.4 kW |
| DC-Link voltage | max. 425 V DC | | max. 875 V DC | |
| DC-Link capacitance | 1020 µF | 1240 µF | 405 µF | 625 µF |
| Max. braking power (internal/external) | 5.4 kW/9.8 kW | 10.8 kW/22 kW | 21.8 kW/21.8 kW | 43.6 kW/40.1 kW |
| Further information | www.beckhoff.com/AX8620 | www.beckhoff.com/AX8640 | www.beckhoff.com/AX8620 | www.beckhoff.com/AX8640 |

AX81xx, AX82xx | Axis modules

An axis module contains the DC-Link and the inverter for supplying the motor. Depending on the required number of axes, the axis modules are attached to the supply module to form the multi-

axis servo system. Axis modules with different ratings can be combined in order to enable an optimised design of the individual axes. Supporting a wide supply voltage range from 140 to 875 V DC, the axis modules can be operated without limitation with any of the supply modules.

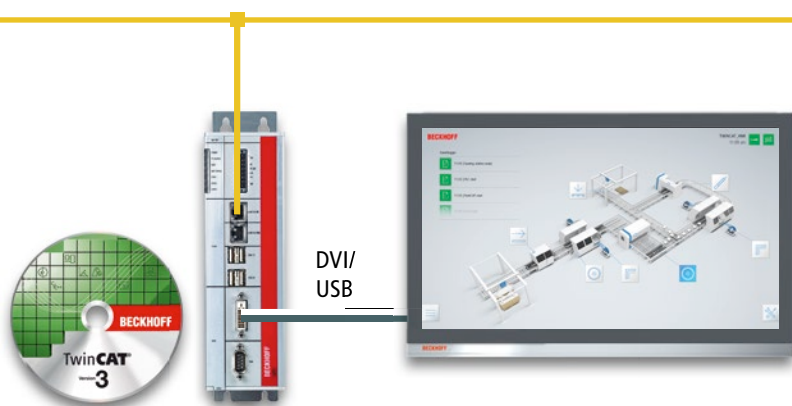
This flexibility simplifies the implementation of machine configurations for any type of mains supply. The electrical connection is established without tools via the already integrated AX-Bridge.

| Technical data | AX8108-0000 | AX8118-0000 | AX8206-0000 |
|--|--|--|--|
| Number of channels | 1 | 1 | 2 |
| Rated current | 1 x 8 A | 1 x 18 A | 2 x 6 A |
| DC-Link voltage | max. 875 V DC | | |
| DC-Link capacitance | 135 µF | 405 µF | 135 µF |
| Minimum rated channel current at full current resolution | 1 A | 5 A | 1 A |
| Peak output current | 20 A | 40 A | 14 A 20 A |
| Further information | www.beckhoff.com/AX81xx | www.beckhoff.com/AX81xx | www.beckhoff.com/AX82xx |

In detail: Drive Technology and Motion Control from Beckhoff.

Motion Control

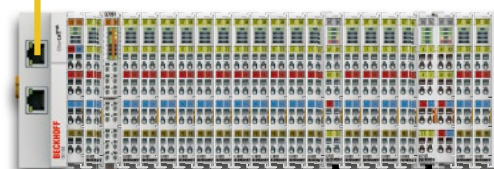
EtherCAT®



Drives 0.2 ... 120 kW

Compact drives

EtherCAT/Bus Terminals
0.5...4 A



One Cable
Technology



Synchronous
Servomotors



Stepper
motors



DC
motors

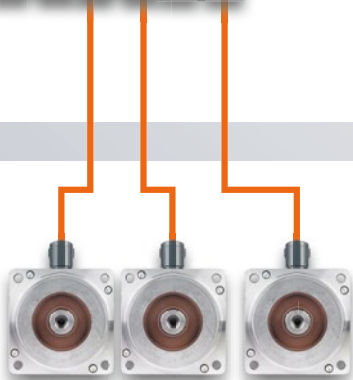
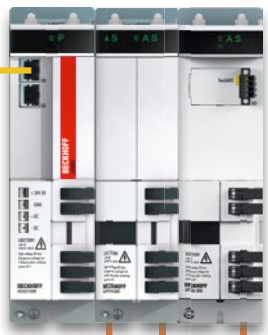


Planetary
gear units

Motors from 0.2...180 Nm

Multi-axis servo drives

AX8000 Compact Servo Drive
1.0...18 A



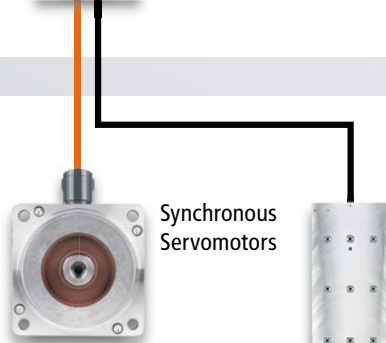
Synchronous Servomotors



Planetary gear units

Single-/Multi-axis servo drives

AX5000 Compact Servo Drives
1.5...170 A



Synchronous
Servomotors



Planetary gear units

eXtended Transport System



In combination with the motion control solutions offered in TwinCAT automation software, Beckhoff Drive Technology offers complete drive systems, covering all single- and multi-axis positioning tasks with highly dynamic requirements. This is based on the maximised scalability of the drive technology, ranging from compact drives

in the I/O system up to the AX8000 and the AX5000 Servo Drives, along with the wide range of TwinCAT functionalities. TwinCAT serves as the engineering platform as well as the runtime for all functions, including NC PTP, NC I, CNC, robotics, cam plates, "flying saw" or camshafts.

- Fully scalable motion control systems
- Integrated safety up to Performance Level PL e
- High-performance system communication via EtherCAT
- One Cable Technology for reduced hardware and commissioning costs
- XTS for space-saving motion solutions

The versatile multi-axis servo system:
AX8000. Detailed information is available at:

► www.beckhoff.com/AX8000

Beckhoff Automation GmbH & Co. KG

Huelshorstweg 20

33415 Verl

Germany

Phone: + 49 5246 963-0

info@beckhoff.com

www.beckhoff.com

Beckhoff®, TwinCAT®, EtherCAT®, EtherCAT P®, Safety over EtherCAT®, TwinSAFE®, XFC® and XTS® are registered trademarks of and licensed by Beckhoff Automation GmbH. Other designations used in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owners.

© Beckhoff Automation GmbH & Co. KG 04/2016

The information provided in this brochure contains merely general descriptions or characteristics of performance which in case of actual application do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract.