

BECKHOFF New Automation Technology

Main Catalog 2021
Volume 1 | IPC, Motion, Automation



Please find information on all Beckhoff IPC, Motion and Automation products in Volume **1**:



Please find information on all Beckhoff I/O products in Volume **2**:



IPC



24

Industrial PC, Control Panel

PC Control for all applications

I/O



192

Embedded PC

Modular DIN rail IPCs and Industrial Motherboards

Motion



282

Fieldbus Components

I/Os for all common fieldbus systems

Automation



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Drive Technology

The drive system for highly dynamic positioning tasks



512

TwinCAT

PLC and Motion Control on the PC



590

TwinSAFE

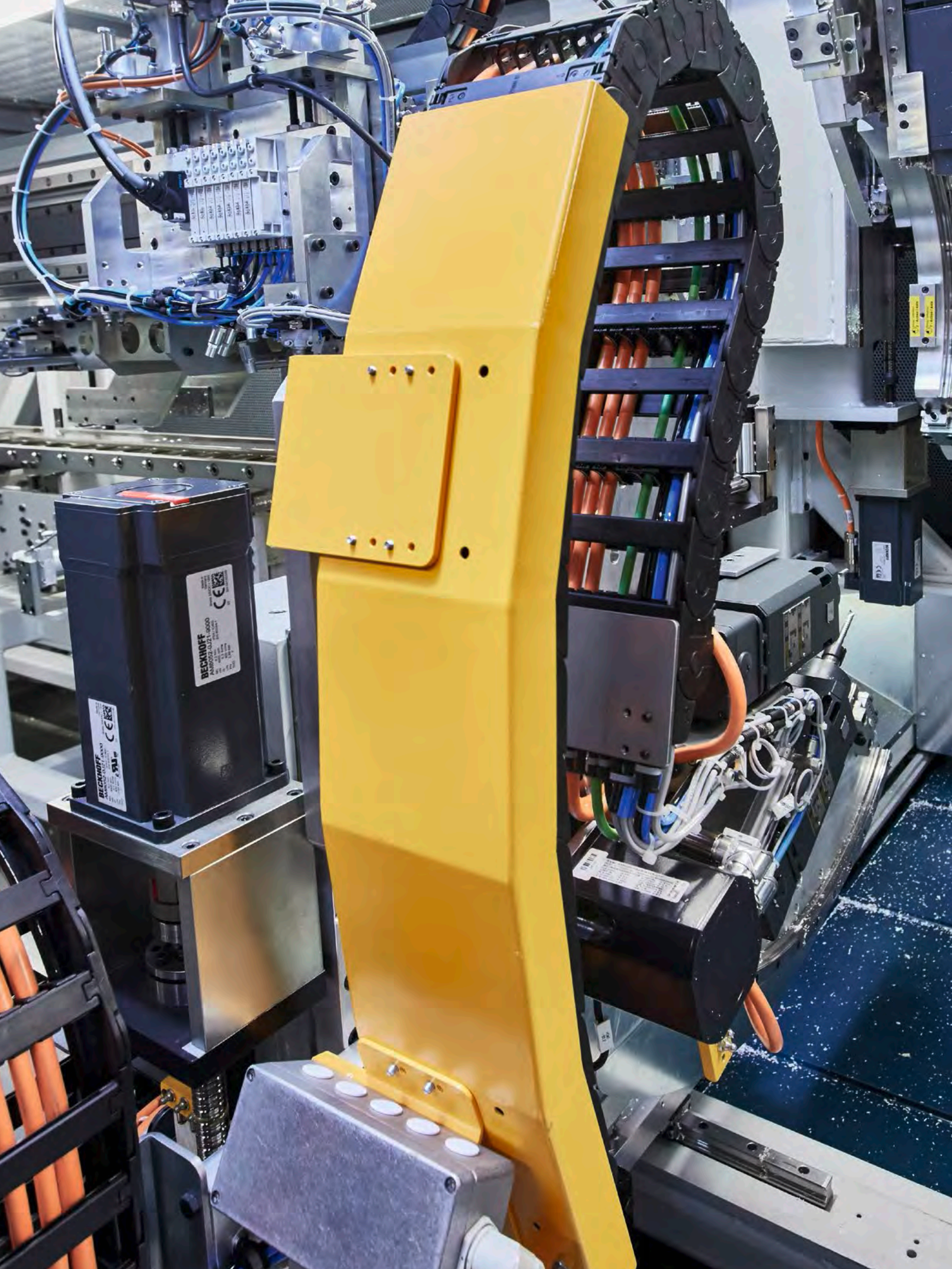
Open and scalable safety technology

622

Support, Service, Training

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New Automation Technology

Beckhoff implements open automation systems based on PC Control technology. The product range 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.

The central divisions of Beckhoff, such as development, production, administration, distribution, marketing, support and service are located at the Beckhoff Automation GmbH & Co. KG headquarters in Verl, Germany. Rapidly growing presence in the international market is taking place through subsidiaries and branch offices. Through worldwide co-operation with partners, Beckhoff is represented in more than 75 countries.



Beckhoff Automation

- Headquarters: Verl, Germany
- Sales 2019: 903 million € (-1 %)
- Staff worldwide: 4,350
- Sales offices Germany: 23
- Subsidiaries/branch offices worldwide: 39
- Distributors worldwide: 75

(as of 04/2020)

PC-based control technology

Since the foundation of the company in 1980, continuous development of innovative products and solutions using PC-based control technology has been the basis for the continued success of Beckhoff. Many automation technology standards that are taken for granted today were conceptualized by Beckhoff at an early stage and successfully introduced to the market.

The Beckhoff PC Control philosophy and the invention of the Lightbus system, the Bus Terminals and TwinCAT automation software represent milestones in automation technology and have become accepted as high-performance alternatives to traditional control technology. EtherCAT, the real-time Ethernet solution, makes forward-looking, high-performance technology available for a new generation of leading edge control concepts.



Milestones

- 1982** P1000 – single-board motion controller
- 1986** PC Control – first PC-based machine controller
- 1988** S1000 – software PLC/NC on PC (DOS)
- 1989** Lightbus – high-speed fieldbus utilizing optical fibre
- 1990** All-in-one PC motherboard
- 1995** Bus Terminal – fieldbus technology in terminal block format
- 1996** TwinCAT – real-time software package under Windows with PLC and motion control functions
- 1998** Control Panel – remote IPC Control Panels
- 1999** Fieldbus Box – the I/O system in IP 67
- 2002** CX1000 – modular Embedded PCs for DIN rail mounting
- 2003** EtherCAT – real-time Ethernet fieldbus system
- 2005** TwinSAFE – the compact safety solution
- 2005** AX5000 – EtherCAT Servo Drives
- 2007** Industrial Motherboards – made in Germany
- 2008** XFC – eXtreme Fast Control Technology
- 2009** HD Bus Terminals – 16-channel terminals in 12 mm
- 2010** TwinCAT 3 – eXtended Automation Technology
- 2011** AM8000 – Synchronous Servomotors with One Cable Technology
- 2012** 2nd generation of Control Panels – Panel PCs and Control Panels with multi-touch technology
- 2012** XTS – eXtended Transport System
- 2014** Many-core control – industrial server maximizes industrial computing power
- 2014** AX8000 – multi-axis servo system
- 2014** EtherCAT Plug-in Modules – Bus Terminals for circuit boards
- 2015** EtherCAT P – One Cable Automation
- 2015** TwinCAT HMI – for platform-independent user interfaces
- 2015** TwinCAT IoT – for simple cloud communication
- 2015** TwinCAT Analytics – recording and analysis of process data
- 2016** EtherCAT measurement modules – system-integrated high-end measurement technology
- 2017** Process technology – system-integrated solutions for explosion protection requirement
- 2017** C60xx – the generation of ultra-compact IPCs
- 2017** AMP8000 – Distributed Servo Drive system
- 2017** TwinCAT Vision – machine vision integrated into automation technology
- 2018** Embedded PCs with ARM Cortex™-M7 processor
- 2018** EtherCAT G – Ultimate I/O Performance
- 2018** XPlanar – Flying Motion
- 2019** C70xx – multi-core Industrial PCs in IP 65/67
- 2019** TwinCAT Machine Learning – scalable, open and in real time
- 2019** TwinCAT Cloud Engineering – smart engineering directly in the cloud



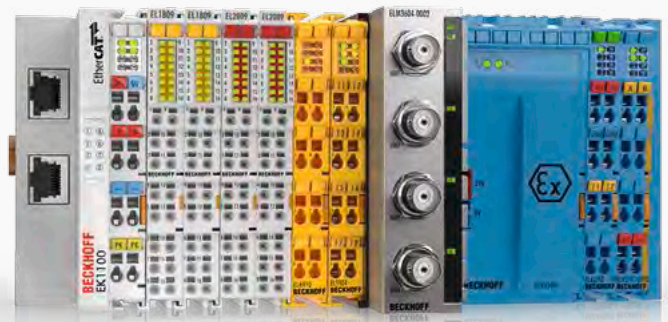
Four components, one system



The IPC Company

Beckhoff supplies the right Industrial PC for every application. High-quality components based on open standards and the rugged construction of the device housings mean that the Industrial PCs are ideally equipped for all control requirements. Embedded PCs make modular IPC technology available in miniature format for DIN rail mounting. In addition to their application in automation, Beckhoff Industrial PCs are also ideally suited to other kinds of tasks – wherever reliable and robust PC technology is required.

See page **8**



The I/O Company

Beckhoff has the right technology for every signal and every fieldbus. Beckhoff supplies a complete range of Fieldbus Components for all common I/Os and fieldbus systems. With the Bus Terminals in protection class IP 20, and the Fieldbus Box modules in IP 67, a complete range is available for all important signal types and fieldbus systems. In addition to conventional bus systems, Beckhoff offers a complete EtherCAT I/O range for the high-speed Ethernet fieldbus based on EtherCAT Terminals, the EtherCAT Box and EtherCAT Plug-in Modules.

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The Motion Company

In combination with the Motion Control solutions offered by the TwinCAT automation software, Beckhoff Drive Technology represents an advanced and complete drive system. PC-based control technology from Beckhoff is ideally suited for single and multiple axis positioning tasks with highly dynamic requirements. The AX5000 and AX8000 Servo Drive series with high-performance EtherCAT communication offer maximum performance and dynamics. Servomotors with One Cable Technology, which combines power and feedback system in a standard motor cable, reduce material and commissioning costs. The drive systems XTS (eXtended Transport System) and XPlanar replace classic mechanical systems by innovative mechatronics. They enable individual product transport applications with a continuous flow of material.

See page **12**



The Automation Company

Beckhoff offers comprehensive system solutions in different performance classes for all areas of automation. Beckhoff control technology is scalable – from high-performance Industrial PCs to mini PLCs – and can be adapted precisely to the respective application. TwinCAT automation software integrates real-time control with PLC, NC and CNC functions in a single package. All Beckhoff controllers are programmed using TwinCAT in accordance with the globally-recognised IEC 61131-3 programming standard. With TwinCAT 3, C/C++ and MATLAB®/Simulink® are available as programming languages in addition to IEC 61131-3.

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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

Multi-touch Panel PCs 40

- large model variety
- high computing power
- display sizes from 7-inch to 24-inch
- easy installation in control cabinets or on mounting arms
- special versions for explosion protection
- customer-specific implementations

► www.beckhoff.com/multi-touch

Multi-touch Control Panels 156

- large model variety
- display sizes from 7-inch to 24-inch
- landscape and portrait orientation
- easy installation in control cabinets or on mounting arms
- special versions for explosion protection
- customer-specific implementations

► www.beckhoff.com/multi-touch

Single-touch Panels 66

- Control Panels or Panel PCs
- display sizes from 5.7-inch to 19-inch
- easy installation in control cabinets or on mounting arms
- customer-specific implementations

► www.beckhoff.com/single-touch





Ultra-compact Industrial PCs

PCs 92

- high computing power
- industrial-strength housing designs
- easy installation
- high flexibility in terms of display connections

► www.beckhoff.com/PC

Embedded PCs 192

- scalable performance range
- up to 12 cores
- compact design
- direct I/O interface
- modular extension options
- DIN rail mounting

► www.beckhoff.com/Embedded-PC



- 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™ i7 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.

The I/O Company

Beckhoff supplies a complete range of fieldbus components for all common I/O and bus systems. With Bus Terminals offering IP 20 protection and Fieldbus Box modules in IP 67, 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

EtherCAT Box 2 296

- IP 67 EtherCAT I/O system
- high performance for harsh environments
- compact and robust
- can be mounted directly on machines, outside of control cabinets and terminal boxes
- integrated sensor/actuator supply directly via EtherCAT P

► www.beckhoff.com/EtherCAT-Box

EtherCAT Plug-in Modules 2 426

- very compact EtherCAT I/O system in IP 20 for plug-in into a circuit board (signal distribution board)
- optimized for high-volume production
- application-specific connector interface
- Use of cable harnesses avoids wiring errors.

► www.beckhoff.com/EtherCAT-Plug-in-Modules

Bus Terminals 2 462

- open, fieldbus-neutral IP 20 I/O system
- more than 400 different Bus Terminals
- support for more than 20 fieldbus systems
- gateways for subordinate bus systems
- system-integrated safety I/O terminals available

► www.beckhoff.com/BusTerminal





EtherCAT Terminals **2 78**

- IP 20 EtherCAT I/O system
- real-time Ethernet performance retained into each terminal
- standard digital and analog signals
- complex automation functions directly in the terminal system
- highly precise measurement technology
- condition monitoring
- drive technology
- process technology
- electronic overcurrent protection
- gateways for subordinate fieldbus systems
- TwinSAFE PLC and safety I/Os

► www.beckhoff.com/EtherCAT-Terminal

Fieldbus Box **2 606**

- open, fieldbus-neutral IP 67 I/O system
- 12 fieldbus systems, 24 signal types
- compact and robust
- can be mounted directly on machines, outside of control cabinets and terminal boxes while reducing machine footprint
- IO-Link box modules for inexpensive point-to-point connections

► www.beckhoff.com/FieldbusBox

Infrastructure Components **2 670**

- PC cards for all common fieldbus systems
- Industrial Ethernet switches
- EtherCAT junctions and media converters in IP 20 and IP 67 ratings
- EtherCAT G/G10 components

► www.beckhoff.com/Infrastructure-components



- 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.

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/DriveTechnology

Servo Drives 358

- available as multi-axis system or stand-alone version (1-/2-channel)
- high-speed EtherCAT communication
- nominal current types, up to 170 A
- flexible motor type selection
- optimized for multi-axis applications
- 17 drive-integrated safety functions

► www.beckhoff.com/Servo-Drives

Distributed Servo Drive system 384

- servo drives directly integrated into the motor
- STO/SS1 safety function as standard; optionally Safe Motion
- Advanced power electronics ensure minimal derating.
- no changes in machine design required

► www.beckhoff.com/AMP8000

Synchronous Servomotors 394

- for demanding positioning tasks
- highly dynamic behavior
- brushless three-phase motors
- permanent magnet in the rotor
- 24 bit encoder with SIL 2 safety integration

► www.beckhoff.com/Servomotors



eXtended planar motor system XPlanar 494

- free-floating movers for non-contact movement
- 6 degrees of freedom
- integrated position feedback
- highly flexible floor and track layout
- ideal for the food and pharma industry

► www.beckhoff.com/XPlanar



XPlanar®

Compact Drive Technology 454

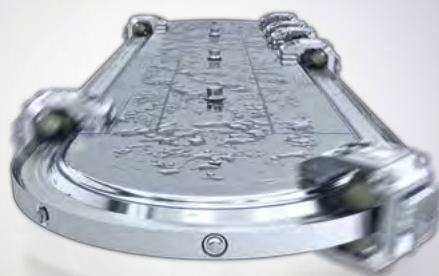
- high performance in small design
- motors and output stages for the < 48 V DC low voltage range
- servo, BLDC, stepper and DC motor output stages in IP 20 or IP 67
- smart servo drive with integrated output stage for machines without control cabinets

► www.beckhoff.com/compact-drive-technology

eXtended Transport System XTS 476

- linear motor on an endless path
- replaces traditional mechanics with advanced mechatronic solutions
- software-based functional changes
- individual product transport with continuous material flow

► www.beckhoff.com/XTS



- 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.

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 engineering

- integration into Microsoft Visual Studio®
- wide selection of programming languages: IEC 61131-3, C/C++, MATLAB®/Simulink®, Safety C/FBD
- modular software development
- automatic code generation interface
- link to source code control systems

High performance

- cycle times from 50 µs
- multi-core support
- support of 32-bit and 64-bit operating systems
- pre-emptive multitasking

Connectivity

- useable with all fieldbus systems
- open and expandable for IT trends – today and tomorrow
- adheres to industry-specific and standard protocols
- ideal for IoT and cloud computing applications

► www.beckhoff.com/TwinCAT3





TwinCAT 3 524

- one software platform for engineering and runtime
- integrated real-time support
- software modules for PLC, NC, CNC, robotics, HMI, measurement technology, analytics, safety, machine vision, machine learning

TwinCAT 2 572

- open, compatible PC hardware
- embedded IEC 61131-3 software PLC, software NC and software CNC
- connection to all common fieldbuses

TwinSAFE 590

- integrated safety system from I/Os to drives
- compact safety PLC
- certified for solutions up to IEC 61508 SIL 3 and DIN EN ISO 13849-1:2008 PL e
- safety engineering integrated into TwinCAT 3

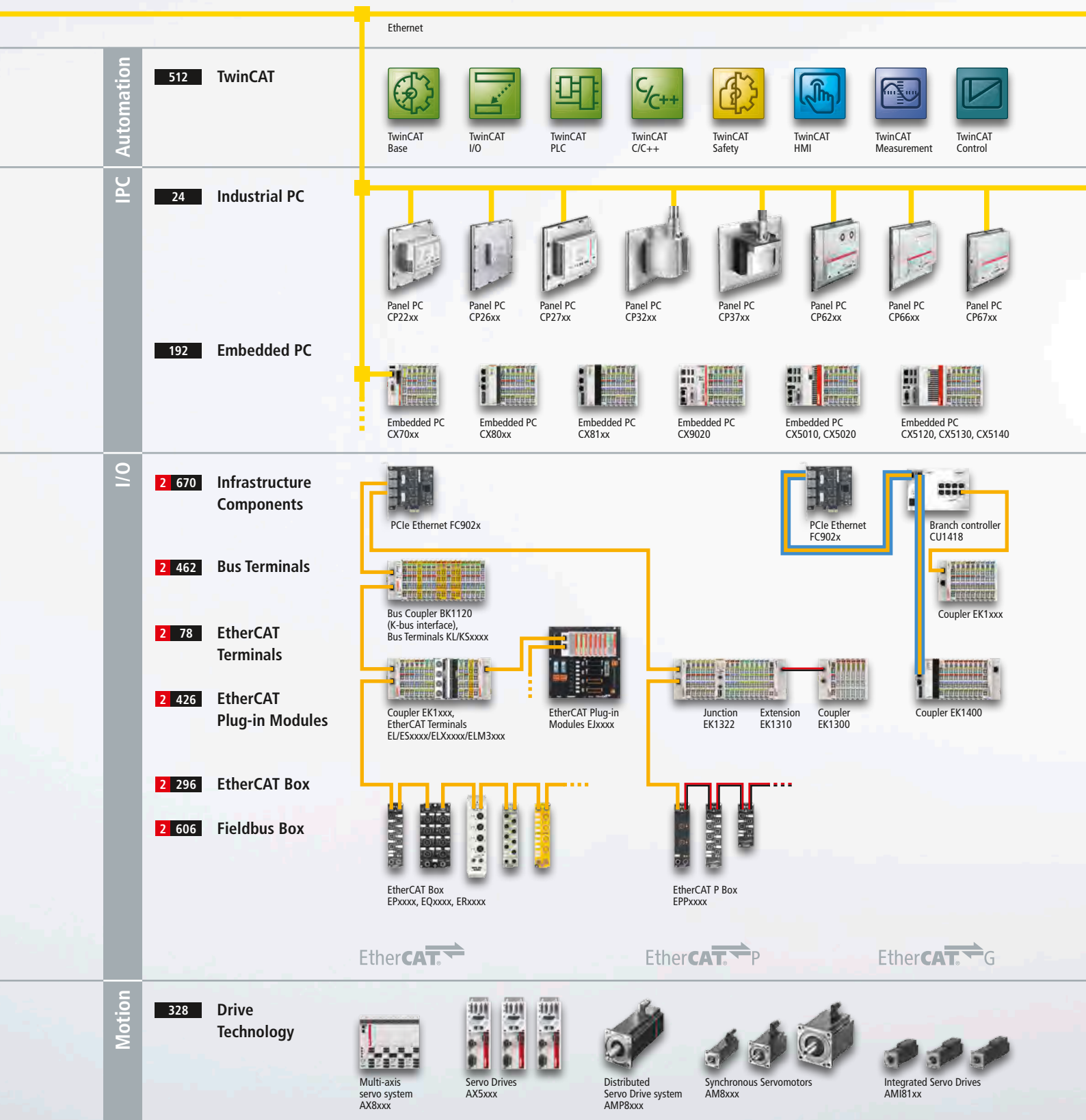
► www.beckhoff.com/TwinCAT2

► www.beckhoff.com/TwinSAFE



- 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.

System overview



Detailed system and fieldbus information from page **2 30**



TwinCAT Speech



TwinCAT Vision



TwinCAT Motion



TwinCAT PTP



TwinCAT NC I



TwinCAT CNC



TwinCAT Robotics



TwinCAT Connectivity



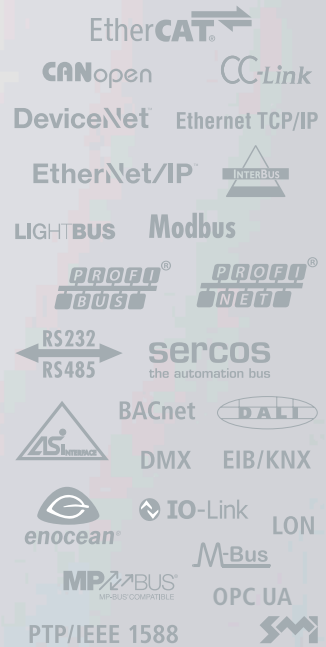
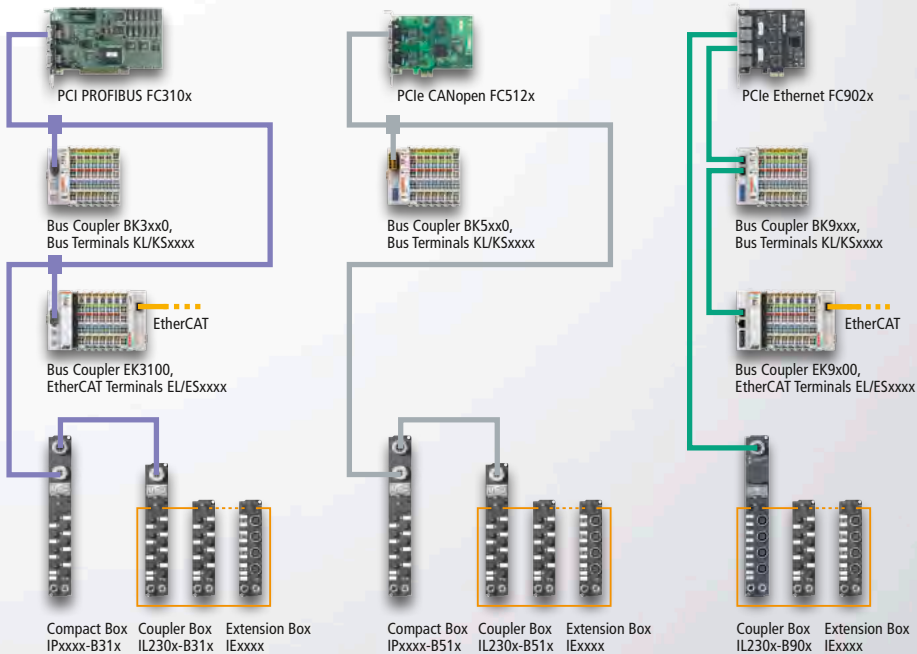
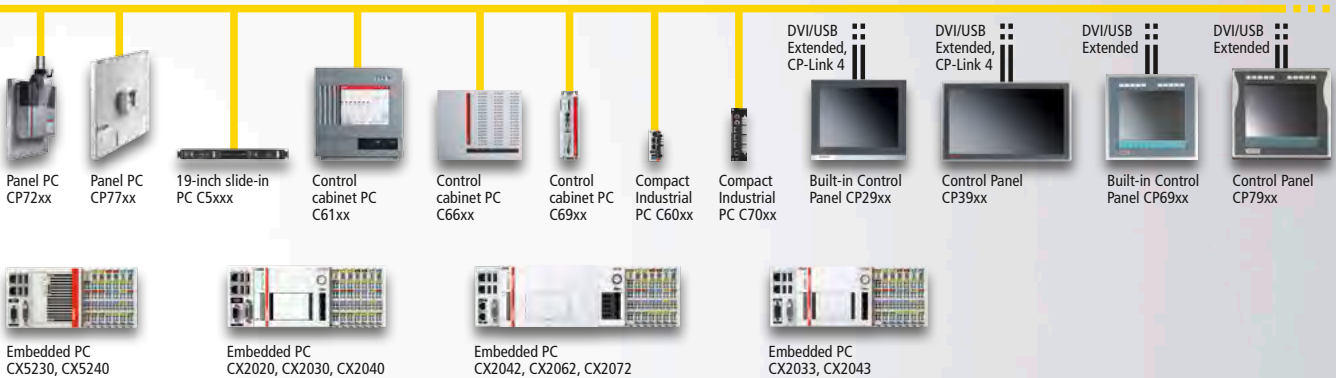
TwinCAT Industrie 4.0



TwinCAT Industry specific



TwinCAT BACnet



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(as of 09/2020)



Highlights

- designed for machine-oriented use
- long-term availability of components
- developed in accordance with the requirements of automation technology
- appealing industrial design housings

Industrial PC

PC Control for all applications

► www.beckhoff.com/IPC

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Product overview Industrial PC

Industrial PCs														
	Compact motherboard Intel® Core™		Compact motherboard Intel Atom®		ATX motherboard Intel® Core™		3½-inch motherboard Intel® Core™		3½-inch motherboard Intel Atom®/ Intel® Celeron® ULV		3½-inch motherboard ARM Cortex™-A8		Control Panel	
Multi-touch Panel PCs/Control Panels							CP22xx	42	CP27xx	50	CP26xx	46	CP29xx	162
									CPX27xx	52			CPX29xx	164
							CP32xx	56	CP37xx	60			CP39xx	166
									CPX37xx	63			CPX39xx	165
Single-touch Panel PCs/Control Panels							CP62xx	68	CP67xx	80	CP66xx	74	CP69xx	180
		CP77xx	90				CP72xx	86					CP79xx	184
19-inch slide-in Industrial PCs				C5240	97	C5210	96							
Control cabinet Industrial PCs	C6025	116	C6015	114	C6140	100	C6515	126	C6905	132				
	C6030	117	C6017	115	C6150	101	C6525	128	C6915	133				
	C6032	118			C6240	104	C6920	134	C6925	136				
					C6250	105	C6930	137						
					C6640	108								
					C6650	109								
IP 65 Industrial PCs			C7015	122										

Control cabinet industrial server

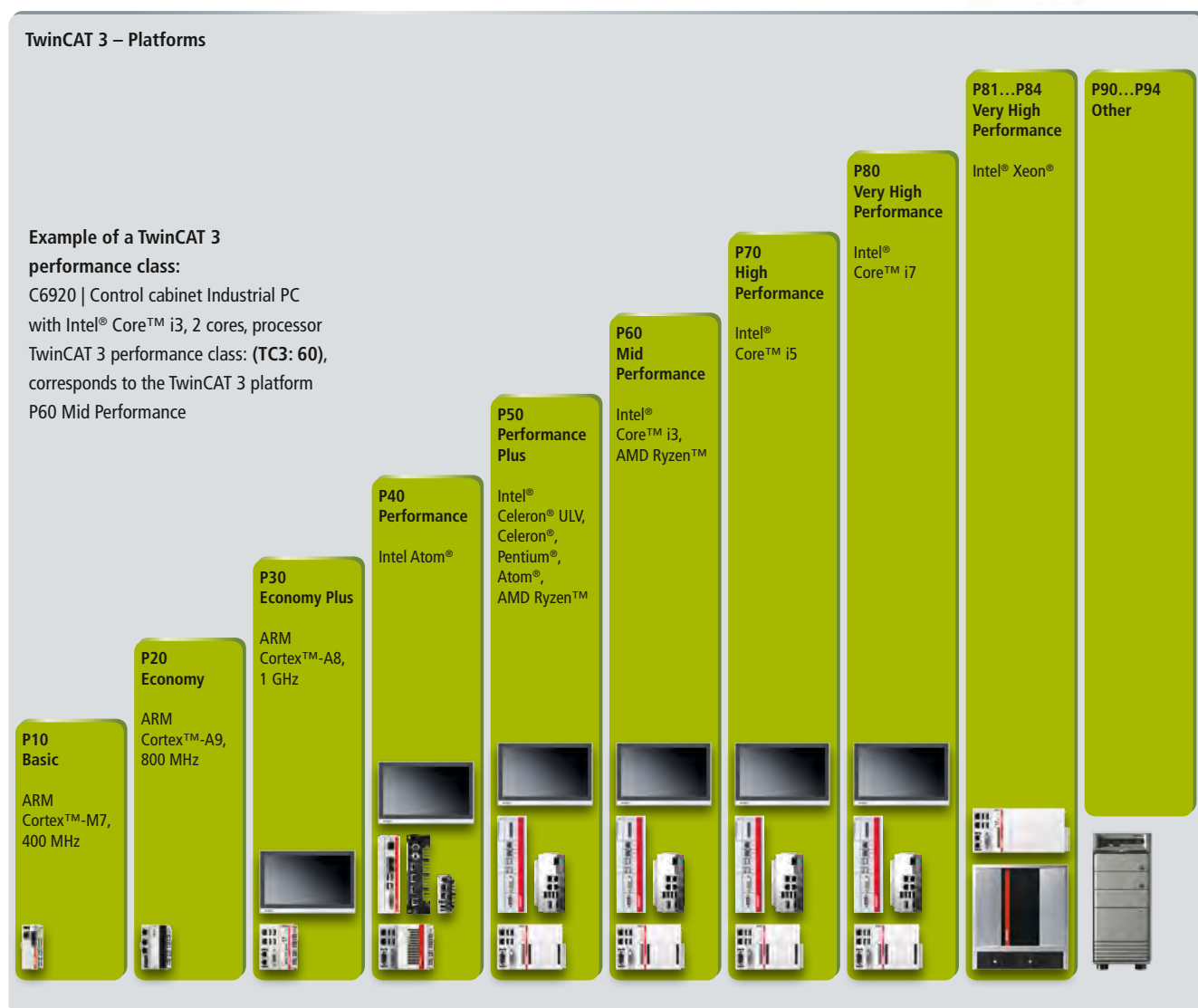
SSI EEB motherboard
2 x Intel® Xeon®
C6670

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Product overview TwinCAT 3

The TwinCAT 3 runtime components are available for different platforms. The platform levels correspond to the various TwinCAT 3 performance classes of the Beckhoff PCs. The TwinCAT 3 performance class of a Beckhoff PC depends on the configuration and the technical data of the PC (including the processor).

The following overview shows the various TwinCAT 3 platforms. The controllers integrated in the platform classifications represent sample configurations. The TwinCAT 3 performance class required for a TwinCAT 3 Runtime component can be found in the product description of the respective Beckhoff PC.



The controllers integrated in the platform categorization are only example configurations.

For further information on TwinCAT 3 see page 524 or ► www.beckhoff.com/TwinCAT3

Product overview multi-touch Panel PCs



Multi-touch built-in Panel PCs, front side IP 65											
	Display	7-inch	12-inch	12.1-inch	15-inch	15.6-inch	18.5-inch	19-inch	21.5-inch	24-inch	
	Resolution	800 x 480	800 x 600	1280 x 800	1024 x 768	1366 x 768	1366 x 768	1280 x 1024	1920 x 1080	1920 x 1080	
	Format	5:3	4:3	16:10	4:3	16:9	16:9	5:4	16:9	16:9	
CP22xx – up to Intel® Core™ i3/i5/i7	multi-finger touch screen		CP2212	CP2213	CP2215	CP2216	CP2218	CP2219	CP2221	CP2224	42
CP26xx – ARM Cortex™-A8	dual-finger touch screen	CP2607	CP2612	CP2613	CP2615	CP2616	CP2618	CP2619	CP2621	CP2624	46
CP27xx – Intel® Celeron® ULV or Atom®	multi-finger touch screen, only horizontal		CP2712	CP2713	CP2715	CP2716	CP2718	CP2719	CP2721	CP2724	50
					CPX2715			CPX2719	CPX2721		52

Multi-touch Panel PCs, all sides IP 65											
	Display	7-inch	12-inch	12.1-inch	15-inch	15.6-inch	18.5-inch	19-inch	21.5-inch	24-inch	
	Resolution	800 x 480	800 x 600	1280 x 800	1024 x 768	1366 x 768	1366 x 768	1280 x 1024	1920 x 1080	1920 x 1080	
	Format	5:3	4:3	16:10	4:3	16:9	16:9	5:4	16:9	16:9	
CP32xx – up to Intel® Core™ i3/i5/i7	multi-finger touch screen, only horizontal		CP3212		CP3215	CP3216	CP3218	CP3219	CP3221	CP3224	56
CP37xx – Intel Atom®	multi-finger touch screen, only horizontal		CP3712	CP3713	CP3715	CP3716	CP3718	CP3719	CP3721	CP3724	60
					CPX3715			CPX3719	CPX3721		63
CP37xx- 1600-0020 – Intel Atom®	multi-finger touch screen, only horizontal, fanless without cooling fins				CP3715- 1600-0020	CP3716- 1600-0020	CP3718- 1600-0020	CP3719- 1600-0020	CP3721- 1600-0020	CP3724- 1600-0020	65

Product overview multi-touch Control Panels



Multi-touch built-in Control Panels, front side IP 65

	Display	7-inch	12-inch	12.1-inch	15-inch	15.6-inch	18.5-inch	19-inch	21.5-inch	24-inch	
	Resolution	800 x 480	800 x 600	1280 x 800	1024 x 768	1366 x 768	1366 x 768	1280 x 1024	1920 x 1080	1920 x 1080	
	Format	5:3	4:3	16:10	4:3	16:9	16:9	5:4	16:9	16:9	
CP29xx-0000 – DVI/USB Extended interface*	multi-finger touch screen	CP2907-0000	CP2912-0000	CP2913-0000	CP2915-0000	CP2916-0000	CP2918-0000	CP2919-0000	CP2921-0000	CP2924-0000	162
					CPX2915-0000			CPX2919-0000	CPX2921-0000		164
CP29xx-0010 – CP-Link 4*	multi-finger touch screen	CP2907-0010	CP2912-0010	CP2913-0010	CP2915-0010	CP2916-0010	CP2918-0010	CP2919-0010	CP2921-0010	CP2924-0010	162

Multi-touch Control Panels, all sides IP 65

	Display	7-inch	12-inch	12.1-inch	15-inch	15.6-inch	18.5-inch	19-inch	21.5-inch	24-inch	
	Resolution	800 x 480	800 x 600	1280 x 800	1024 x 768	1366 x 768	1366 x 768	1280 x 1024	1920 x 1080	1920 x 1080	
	Format	5:3	4:3	16:10	4:3	16:9	16:9	5:4	16:9	16:9	
CP39xx-0000 – DVI/USB Extended interface*	multi-finger touch screen	CP3907-0000	CP3912-0000	CP3913-0000	CP3915-0000	CP3916-0000	CP3918-0000	CP3919-0000	CP3921-0000	CP3924-0000	166
CP39xx-0010 – CP-Link 4*	multi-finger touch screen	CP3907-0010	CP3912-0010	CP3913-0010	CP3915-0010	CP3916-0010	CP3918-0010	CP3919-0010	CP3921-0010	CP3924-0010	166
					CPX3915-0010			CPX3919-0010	CPX3921-0010		165
CP39xx-14xx-0010 – CP-Link 4*	multi-finger touch screen, stainless steel housing			CP3913-14xx-0010		CP3916-14xx-0010	CP3918-14xx-0010				168

*For further information on CP-Link 4 see page 159, for further information on DVI/USB Extended see page 178

Product overview single-touch panels



Single-touch built-in Panel PCs, front side IP 54/65									
	Display	5.7-inch	6.5-inch	7-inch	10.1-inch	12-inch	15-inch	19-inch	
	Resolution	640 x 480	640 x 480	800 x 480	1024 x 600	800 x 600	1024 x 768	1280 x 1024	
	Format	4:3	4:3	5:3	17:10	4:3	4:3	5:4	
	Protect. class front	IP 65	IP 65	IP 54	IP 54	IP 65	IP 65	IP 65	
CP62xx – 3½-inch motherboard – up to Intel® Core™ i3/i5/i7	without keys					CP6201	CP6202	CP6203	68
	function keys					CP6211	CP6212	CP6213	
	numerical					CP6221	CP6222	CP6223	
	alphanumerical					CP6231	CP6232	CP6233	
							CP6242		
CP66xx – 3½-inch motherboard – ARM Cortex™-A8	without keys	CP6607	CP6609			CP6601	CP6602	CP6603	74
	function keys		CP6619			CP6611	CP6612	CP6613	
	numerical		CP6629			CP6621	CP6622	CP6623	
	alphanumerical					CP6631	CP6632	CP6633	
CP6606, CP6600 – 3½-inch motherboard – ARM Cortex™-A8	without keys			CP6606	CP6600				77
CP67xx – 3½-inch motherboard – Intel® Celeron® ULV or Atom®	without keys	CP6707				CP6701	CP6702	CP6703	80
	function keys					CP6711	CP6712	CP6713	
	numerical					CP6721	CP6722	CP6723	
	alphanumerical					CP6731	CP6732	CP6733	
							CP6742		
CP6706, CP6700 – 3½-inch motherboard – Intel® Celeron® ULV or Atom®	without keys			CP6706	CP6700				83



Single-touch Panel PCs, all sides IP 65

	Display	5.7-inch	6.5-inch	7-inch	10.1-inch	12-inch	15-inch	19-inch	
	Resolution	640 x 480	640 x 480	800 x 480	1024 x 600	800 x 600	1024 x 768	1280 x 1024	
	Format	4:3	4:3	5:3	17:10	4:3	4:3	5:4	
CP72xx – 3½-inch motherboard – up to Intel® Core™ i3/i5/i7	without keys					CP7201	CP7202	CP7203	86
	function keys					CP7211	CP7212	CP7213	
	numerical					CP7221	CP7222	CP7223	
	alphanumeric					CP7231	CP7232 CP7242	CP7233	
CP77xx – CP motherboard – Intel® Celeron® ULV or Atom®	without keys					CP7701	CP7702	CP7703	90
	function keys					CP7711	CP7712	CP7713	
	numerical					CP7721	CP7722	CP7723	
	alphanumeric					CP7731	CP7732	CP7733	

Single-touch built-in Control Panels, front side IP 54/65

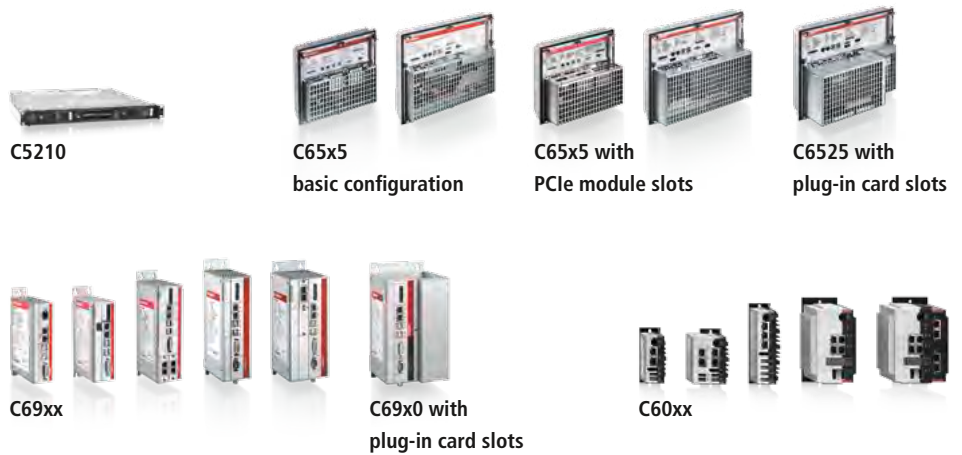
	Display	5.7-inch	6.5-inch	7-inch	10.1-inch	12-inch	15-inch	19-inch	
	Resolution	640 x 480	640 x 480	800 x 480	1024 x 600	800 x 600	1024 x 768	1280 x 1024	
	Format	4:3	4:3	5:3	17:10	4:3	4:3	5:4	
	Protect. class front	IP 65	IP 65	IP 54	IP 54	IP 65	IP 65	IP 65	
CP69xx – DVI/USB Extended interface*	without keys	CP6907	CP6909	CP6906	CP6900	CP6901	CP6902	CP6903	180
	function keys		CP6919			CP6911	CP6912	CP6913	
	numerical		CP6929			CP6921	CP6922	CP6923	
	alphanumeric					CP6931	CP6932/42	CP6933	

Single-touch Control Panels, all sides IP 65

	Display	5.7-inch	6.5-inch	7-inch	10.1-inch	12-inch	15-inch	19-inch	
	Resolution	640 x 480	640 x 480	800 x 480	1024 x 600	800 x 600	1024 x 768	1280 x 1024	
	Format	4:3	4:3	5:3	17:10	4:3	4:3	5:4	
CP79xx – DVI/USB Extended interface*	without keys		CP7909			CP7901	CP7902	CP7903	184
	function keys		CP7919			CP7911	CP7912	CP7913	
	numerical		CP7929			CP7921	CP7922	CP7923	
	alphanumeric					CP7931	CP7932/42	CP7933	
CP790x-14xx – DVI/USB Extended interface* stainless steel housing	without keys,					CP7901-14xx	CP7902-14xx	CP7903-14xx	184

*For further information on DVI/USB Extended see page 178

Product overview PCs



Control cabinet Industrial PCs with 3½-inch motherboard						
	Processor	Intel Atom®	Intel® Celeron® ULV	Intel® Celeron®, Intel® Pentium®, Intel® Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Intel® Pentium®, Intel® Core™ i3/i5/i7 8 th /9 th generation	
C5210, 19-inch slide-in Industrial PCs	1 rack unit			C5210-0030	C5210-0040	96
C65xx	fanless			C6515-0060	C6515-0070	126
	RAID			C6525-0060	C6525-0070	128
C69xx, compact Industrial PCs, connectors on front	fanless	C6905-0010 C6905-0020				132
	fanless, 1 CFast card slot	C6915-0010 C6915-0020				133
	fanless, 2 PCIe module slots	C6925-0030 C6925-0040	C6925-0020			136
	optional plug-in card slots			C6920-0060	C6920-0070	134
	2 PCIe module slots, optional plug-in card slots			C6930-0060	C6930-0070	137

Control cabinet Industrial PCs with compact industrial motherboard						
	Processor	Intel Atom®	Intel® Celeron®, Intel® Core™ i3/i5/i7 8 th generation, series U	Intel® Celeron®, Intel® Pentium®, Intel® Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Intel® Pentium®, Intel® Core™ i3/i5/i7 8 th /9 th generation	
C60xx	fanless, without slots	C6015-0010 C6015-0020	C6025-0000			114
	optional interfaces and/or an optional 1-second UPS	C6017-0010 C6017-0020				115
	up to 2 M.2 SSDs and/or 2 PCIe com- pact module slots			C6030-0060 C6032-0060	C6030-0070 C6032-0070	117 118

Embedded PCs see page 192



IP 65 Industrial PCs with compact industrial motherboard

	Processor	Intel Atom®	
C70xx, IP 65	fanless	C7015-0020	122

Control cabinet Industrial PCs with ATX motherboard

	Processor	Intel® Celeron®, Intel® Pentium®, Intel® Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Intel® Pentium®, Intel® Core™ i3/i5/i7 8 th /9 th generation	
C5240, 19-inch slide-in Industrial PCs	7 slots, 4 rack units	C5240-0010	C5240-0020	97
C61xx, connectors on top	7 slots	C6140-0070 C6150-0070	C6140-0080	100 101
C62xx, connectors on front	7 slots	C6240-0070 C6250-0080	C6240-0080	104 105
C6640/C6650, connectors on top	7 slots	C6640-0050	C6640-0060	108
	7 slots, 2 removable frames	C6650-0050	C6650-0060	109

Control cabinet industrial server with SSI EEB motherboard

	Processor	2 x Intel® Xeon® Scalable	
C6670	6 slots, 2 removable frames	C6670-0010	111

The right Industrial PC for every application



Panel PCs

A Beckhoff Panel PC consisting of a Control Panel and an Industrial PC is suitable for control cabinet installation (CP2xxx, CP6xxx) or mounting arm installation (CP3xxx, CP7xxx). High-performance components make machine-level operation, control and monitoring one of the strengths of the Beckhoff Panel PCs, whose elegant housings are designed for easy accessibility of all components and optimal space utilisation. Different display sizes between 5.7-inch and 24-inch and various add-on PCs with processors ranging from Intel Atom® to Core™ i7 can be combined to form tailored high-performance platforms for machine construction and plant engineering applications.

See page **38**

► www.beckhoff.com/Panel-PC

PCs

Beckhoff Industrial PCs for control cabinet installation or directly at the machine can be scaled in size (bus coupler format up to ATX PC) and performance class (Intel Atom® to Core™ i7), depending on the application. The Industrial PC technology represents a balance between the latest PC technology and long-term component availability. In addition, the different product lines are characterised by adaptation to the special circumstances in industrial applications.

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► www.beckhoff.com/PC



Control Panels

The Beckhoff Control Panels used as human-machine interfaces in conjunction with the high-performance Industrial PCs round off a system through their elegant design and the latest PC technology. The display sizes between 5.7-inch and 24-inch meet almost any industrial application requirements and are suitable for mounting arm installation (CP3xxx and CP7xxx) or wall installation (CP2xxx and CP6xxx). A wide range of different push-button extensions in conjunction with custom housing designs enable the Control Panel as the visual front end of a system or machine to be tailored to match the corporate identity.

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► www.beckhoff.com/ControlPanel

Accessories

Beckhoff accessories complement the Industrial PCs while complying with industrial standards: CP-Link 4 desktop transfer software, DVI splitters, USB extensions and hubs, USB CFast slot, USB Ethernet controllers, battery packs, USB sticks, PCIe modules, plug-in cards.

Industrial PC accessories see page [139](#)

Extensions for Control Panels and Panel PCs: push-button extensions (with electromechanical buttons, switches and indicator lamps), auxiliary keyboards, keyboard shelves, touch screen pens, RFID readers

Multi-touch Control Panel accessories see page [170](#)

Single-touch Control Panel accessories see page [186](#)

► www.beckhoff.com/IPC-accessories



Requirements for PC-based control technology

Balance between latest PC technology and long-term availability of control components

The personal computer has experienced an unprecedented success story and has become a firmly established part of everyday life, including industrial environments. Together with associated software, PCs in different shapes and forms 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. For classic control tasks, PC-based control technology offers excellent scalability and flexibility and is therefore increasingly used in place of hardware PLCs.

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 characterised 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.

An important feature of the Beckhoff product philosophy is the use of advanced, high-performance components and pro-

cessors for the development and design of Industrial PCs: they integrate the latest developments offered by the technology market and are used successfully worldwide. Fine scaling is provided for through processor incrementing from Intel Atom® and Intel® Core™ i7 to Intel® Xeon®. Due to the low processor power dissipation, Intel Atom® processors enable extremely small, fanless controllers and are to be found in the lower price range.

In addition to long-standing experience, another factor driving the development of our comprehensive Industrial PC product portfolio is customer-orientation. More than ten Industrial PC series with a wide range of basic PC types form the basis of our product range. The optimally tailored control computer can be found for every application from the large choice of devices and options.

The PC housing varies in size between Bus Coupler format and ATX PC, depending on the device type. In addition to long-term availability of the built-in processors and motherboards, Beckhoff also offers full commissioning of all integrated components, including software and different drives. Customised solutions can also be realised for optimum adaptation to the respective task.

Elegant Control Panels and Panel PCs

The Industrial PC is complemented by a Control Panel for the machine operator. The Beckhoff Control Panels and Panel PCs are the visual front end for machines or plants. Spatial separation of display/control unit and control computer offers maximum flexibility. Appealing design, robustness and suitability for industrial applications were important criteria in the development of the Control Panel series, which comes with display sizes between 5.7" and 24".

All displays can be fully tailored to customer requirements: options include visual adaptation to the corporate design or application of a customer logo a wide range of special mechanical keys, emergency stop switches, card scanners or RFID readers.

The Control Panel housing is made from high-quality solid aluminium and is suitable for protection class IP 65, as usually required in industrial environments. Thorough development and integration of electronic modules, displays, touch screens and front membranes ensure high availability and reliability during operation. All Beckhoff Control Panels can optionally be operated as:



- stand-alone device (Panel PC with Windows 7, Embedded Standard 7, Embedded Compact 7 or Windows 10 IoT Enterprise)
- DVI/USB Extended Control Panel for direct or indirect operation at the PC (distance up to 50 m)
- CP-Link 4 Control Panel for operation at the PC with a distance of up to 100 m, see page **159**

Careful selection of components

A great deal of attention and care is put into the development and choice of the Industrial PC components used, their compatibility, their long-term availability, mechanical loading capacity and industrial suitability. In developing electronic modules, Beckhoff fulfils the high requirements for Industrial PC components that are necessary in order to ensure permanent reliable operation.

Beckhoff is the developer and manufacturer of the motherboards in the Industrial PCs. The BIOS for the motherboards even has its own development department. In addition to that, 24 V DC power supplies with integrated UPS, Ethernet adapters and Ethernet switches, Fieldbus Cards, DVI display

interfaces, DVI/USB extensions and USB hubs are produced by Beckhoff's own development and manufacturing facilities. International standards and experience in the application of PC systems under difficult industrial conditions provide the basis for Beckhoff system integration. Only a few LC displays, plug-in cards or hard disks are suited to use in tough industrial environments. Experience and detailed testing are therefore required for checking whether the components meet the stringent requirements in terms of temperature resistance, resistance to vibration, and electromagnetic compatibility. Prior to delivery, all Industrial PCs are subjected to comprehensive quality control procedures in order to verify that they are fit for the purpose. Beckhoff Industrial PCs satisfy the Machine Guidelines and carry the CE mark: all PC components are checked for electromagnetic compatibility (EMC) and comply with the relevant standards.

Robust industrial design PCs with highest performance components

Beckhoff Industrial PCs satisfy industry's demands:

- the right Industrial PC for every controller
- highest performance PCs with Intel Atom® up to Intel® Xeon® processors
- open standards following the norm ATX
- components carefully tested to ensure appropriateness for industrial applications
- appealing industrial design housings
- CPX for use in hazardous areas, Zone 2/22
- easy access to PC components
- Individual housing construction allows optimum adaptation to controller requirements.
- integration of electromechanical buttons, switches, scanners, handwheels and other components in the Control Panel
- designed for machine-oriented use
- long-term availability of components

Panel PCs

► www.beckhoff.com/Panel-PC



CP22xx | Multi-touch built-in Panel PC, Intel® Celeron®, Pentium® or Core™

- display sizes: 12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch

See page **40**



CP26xx | Built-in Panel PC, ARM Cortex™-A8

- display sizes: 7-, 12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch

See page **44**



CP27xx | Multi-touch built-in Panel PC, Intel® Celeron® ULV or Atom®

- display sizes: 12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch
- display sizes CPX27xx: 15-, 19- or 21.5-inch

See page **48**



CP62xx | Built-in Panel PC, Intel® Celeron®, Pentium® or Core™

- display sizes: 12-, 15- or 19-inch

See page **66**



CP66xx | Built-in Panel PC, ARM Cortex™-A8

- display sizes: 5.7-, 6.5-, 12-, 15- or 19-inch
- display sizes CP6606: 7-inch; CP6600: 10.1-inch

See page **72**



CP67xx | Built-in Panel PC, Intel® Celeron® ULV or Atom®

- display sizes: 5.7-, 12-, 15- or 19-inch
- display sizes CP6706: 7-inch; CP6700: 10.1-inch

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CP32xx | Multi-touch Panel PC with mounting arm, Intel® Celeron®, Pentium® or Core™

- display sizes: 12-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch
- IP 65 protection

See page **54**



CP37xx | Multi-touch Panel PC with mounting arm, Intel Atom®

- display sizes: 12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch
- IP 65 protection
- display sizes CPX37xx: 15-, 19- or 21.5-inch

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CP37xx-1600 | Multi-touch Panel PC with mounting arm, Intel Atom®

- display sizes: 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch
- IP 65 protection

See page **64**



CP72xx | Panel PC with mounting arm, Intel® Celeron®, Pentium® or Core™

- display sizes: 12-, 15- or 19-inch
- IP 65 protection

See page **84**



CP77xx | Panel PC with mounting arm, Intel® Celeron® ULV or Atom®

- display sizes: 12-, 15- or 19-inch
- IP 65 protection

See page **88**

CP22xx | Multi-touch built-in Panel PC

► www.beckhoff.com/CP22xx

The CP22xx built-in Panel PC series is characterised by a modern operating concept with multi-touch display as well as an advanced, elegant device design. It is designed for installation in the front of a control cabinet. The CP22xx combine reliable Beckhoff Control Panel design with state-of-the-art Indus-

trial PC technology. The right display size is available for every application – in landscape or portrait orientation (horizontal/vertical). With their highly integrated 3½-inch motherboards, the CP22xx built-in Industrial PCs represent a high-performance platform for machine construction and plant engineering

applications that can be used in conjunction with TwinCAT automation software under Windows 10 IoT Enterprise.

CP22xx Panel PCs are equipped with Intel® Celeron®, Pentium® or Core™ i3/i5/i7 processors and have one or two hard disks, SSDs or CFast cards or combinations thereof. With the



Display sizes



on-board RAID controller, two same hard disks, SSDs or CFast cards can be mirrored.

CP22xx are supplied with a 24 V power supply unit, optionally also with an integrated uninterruptible power supply (UPS). A battery pack can be connected externally and installed on a DIN rail close to the PC.

Data media, the fan and the lithium battery of the system clock are accessible from the rear under the fan cover.

Due to its two independent Ethernet interfaces the CP22xx is ideally suited as a compact central processing unit for an EtherCAT control system.

Two free slots for PCIe modules can be optionally integrated in the PC housing, offering the possibility to extend the PC, e.g. with additional Ethernet interfaces, USB ports or PROFIBUS. NOVRAM for fail-safe data storage can also be plugged as PCIe module.

Lithium battery accessible from the top

Hard disk, SSD or CFast card accessible from the top

DVI connection

TFT display

Serial interface

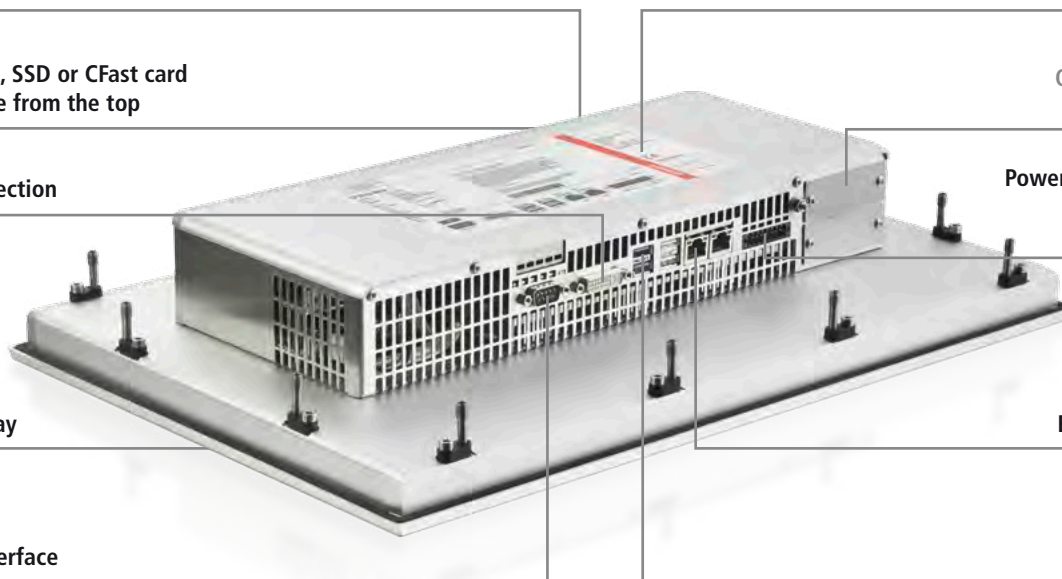
3½-inch motherboard

Optionally 2 PCIe module slots

Power supply 24 V DC, optionally with UPS

On-board dual Ethernet adapter

4 USB ports





Rear view for
12-, 12.1-, 15-inch and
all portrait orientations

Rear view for all
landscape orientations
from 15.6-inch

CP22xx | Panel PC with Intel® Core™ i processor

The high-performance multi-touch built-in Panel PC



CP2212

CP2213

CP2215

CP2216

CP2218

CP2219

CP2221

CP2224

Ordering information		Multi-finger touch screen
12-inch display	800 x 600	CP2212
12.1-inch display	1280 x 800	CP2213
15-inch display	1024 x 768	CP2215
15.6-inch display	1366 x 768	CP2216
18.5-inch display	1366 x 768	CP2218
19-inch display	1280 x 1024	CP2219
21.5-inch display	1920 x 1080	CP2221
24-inch display	1920 x 1080	CP2224



Stainless steel front C9900-F94x with blue silicone seal for horizontal alignment in 15.6-, 18.5- and 21.5-inch

CP22xx	CP22xx-0020, -0030
Housing	aluminium housing with glass front all connectors at the bottom of the rear side PC to be opened from the back side all components easily accessible 1 slot for one 2½-inch hard disk or SSD and 1 slot for one CFast card, accessible from outside 2 connector brackets to lead out interfaces of the motherboard at the connection section fan cartridge at the PC top side, accessible from outside pull-out clamping levers for fast installation without loose parts protection class front side IP 65, rear side IP 20 operating temperature 0...55 °C

Features	CP22xx-0020	CP22xx-0030
Display	12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch display	12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch display
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	3½-inch	3½-inch
Interfaces	1 serial port RS232 and 4 USB 3.0 ports	1 serial port RS232 and 4 USB 3.1 ports
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	4...32 GB DDR4 RAM	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	1 or 2 x 2½-inch HDD, SSD or CFast	1 or 2 x 2½-inch HDD, SSD or CFast
RAID 1	2 x 2½-inch HDD, SSD or CFast	2 x 2½-inch HDD, SSD or CFast
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP22xx	

Ordering information	Options for CP2216, CP2218 and CP2221
C9900-F94x	stainless steel front with blue silicone seal for CP2xxx-00x0 for horizontal alignment, stainless steel 1.4404, matt ground with grain size 240, instead of standard aluminium front

CP26xx | Dual-touch built-in Panel PC

► www.beckhoff.com/CP26xx

The CP26xx built-in Panel PC series is characterised by a modern operating concept with dual-touch display as well as an advanced, elegant device design. It is designed for installation in the front of a control cabinet. The CP26xx combine reliable Beckhoff

Control Panel design with state-of-the-art Industrial PC technology. The right display size from 7 to 24 inches is available for every application – in landscape or portrait orientation (horizontal/vertical). With their highly integrated 3½-inch motherboards,

the CP26xx built-in Industrial PCs represent a high-performance platform for machine construction and plant engineering applications that can be used in conjunction with TwinCAT automation software under Windows Embedded Compact 7.



Display sizes



CP26xx Panel PCs are equipped with an ARM Cortex™-A8 processor. They are equipped with a microSD card and have no rotating parts.

CP26xx are supplied with a 24 V power supply unit, optionally also with a capacitive uninterruptible power supply (second UPS).

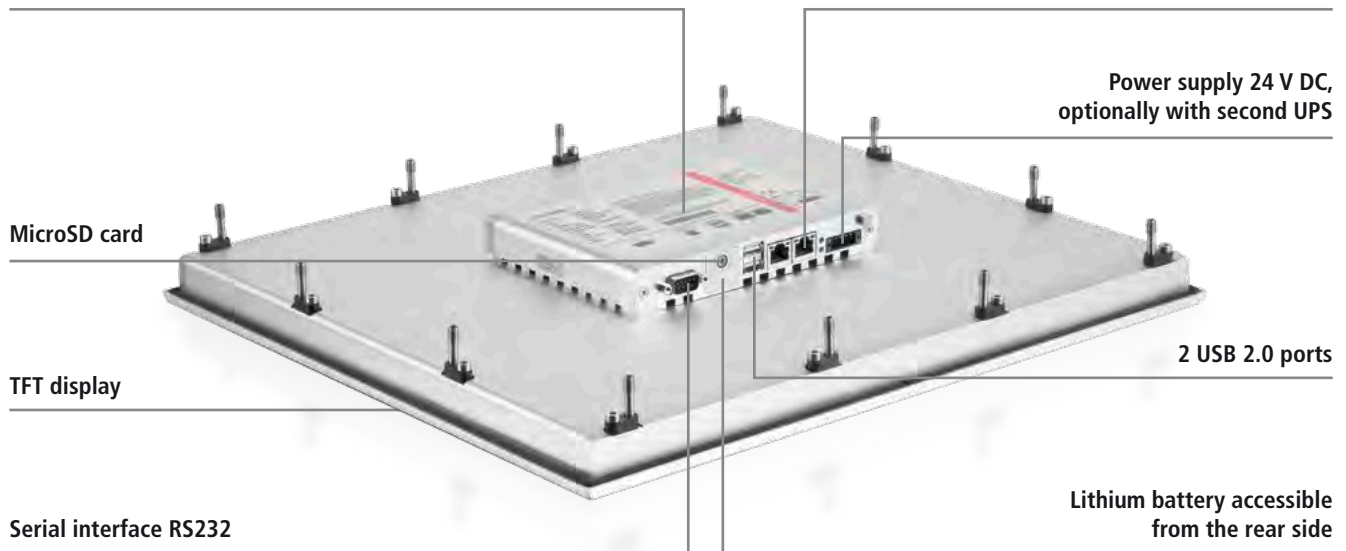
The microSD card and the lithium battery of the system clock are accessible from the rear in the connector bracket.

Due to its independent Ethernet and EtherCAT interfaces the CP26xx is ideally suited as a compact central processing unit

for an EtherCAT control system. NOVRAM for fail-safe data storage is integrated on the motherboard.

3½-inch motherboard
with ARM processor

1 x Ethernet and
1 x EtherCAT on-board





CP26xx | Panel PC with ARM Cortex™-A8

The compact dual-touch built-in Panel PC



Ordering information		Dual-finger touch screen
7-inch display	800 x 480	CP2607
12-inch display	800 x 600	CP2612
12.1-inch display	1280 x 800	CP2613
15-inch display	1024 x 768	CP2615
15.6-inch display	1366 x 768	CP2616
18.5-inch display	1366 x 768	CP2618
19-inch display	1280 x 1024	CP2619
21.5-inch display	1920 x 1080	CP2621
24-inch display	1920 x 1080	CP2624



Stainless steel front C9900-F94x with blue silicone seal for horizontal alignment in 7-, 12.1-, 15.6-, 18.5- and 21.5-inch

CP26xx	CP26xx-0000
Housing	aluminium housing with glass front
	all connectors at the bottom of the rear side
	PC to be opened from the back side, all components easily accessible
	1 slot for a microSD flash card, accessible from outside
	protection class front side IP 65, rear side IP 20
	operating temperature 0...55 °C

Features	CP26xx-0000
Display	7-, 12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch display
Processor	ARM Cortex™-A8, 1 GHz
Motherboard	3½-inch
Slots	–
Memory	1 GB DDR3 RAM
Graphic adapter	integrated in the processor
Ethernet	1 x Ethernet and 1 x EtherCAT on-board
Hard disks/flash	microSD flash card
Power supply	24 V DC
Recommendation	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP26xx

Ordering information	Options for CP2607, CP2613, CP2616, CP2618 and CP2621
C9900-F94x	stainless steel front with blue silicone seal for CP2xxx-00x0 for horizontal alignment, stainless steel 1.4404, matt ground with grain size 240, instead of standard aluminium front

CP27xx | Fanless multi-touch built-in Panel PC

► www.beckhoff.com/CP27xx

The CP27xx built-in Panel PC series is characterised by a modern operating concept with multi-touch display as well as an advanced, elegant device design. It is designed for installation in the front of a control cabinet. The CP27xx combine reliable Beckhoff Control Panel design with state-of-the-art Industrial PC technology. The right display size is available for every application. With their highly integrated 3½-inch motherboards, the CP27xx built-in Industrial PCs represent a high-performance platform for machine construction and plant engineering applica-

tions that can for example be used in conjunction with TwinCAT automation software under Windows 10 IoT Enterprise.

CP27xx Panel PCs are equipped with Intel® Celeron® ULV 1.4 GHz or with Intel Atom® with up to four cores and have one or two CFast cards. With the on-board RAID controller, two same CFast cards can be mirrored in the CP27xx-0000.

CP27xx are supplied with a 24 V power supply unit, optionally also with an integrated uninterruptible power supply (UPS). A battery pack can be

connected externally and installed on a DIN rail close to the PC.

Data media and the lithium battery of the system clock are accessible from the rear.

Due to its two independent Ethernet interfaces the CP27xx is ideally suited as a compact central processing unit for an EtherCAT control system. A third independent Ethernet interface is available as an option.

An optional PCIe module slot offers the possibility to extend the PC, e.g. with additional Ethernet interfaces.



Display sizes



CPX27xx for application in hazardous areas, Zone 2/22

With the CPX Panel PC series, the proven multi-touch technology of Beckhoff Panel PCs is available in particularly 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 convenient operation of all Beckhoff multi-touch panels. The aesthetically pleasing appearance of the panel and the

look and feel of the aluminium housing are maintained, making them visual highlights in explosion-proof environments. The devices are available with three different displays in the sizes 15, 19 and 21.5 inches.

The CPX27xx features an Intel Atom® processor with up to four cores, one CFast card and no rotating parts. The CPX27xx comes with a 24 V power supply unit. The CFast card is accessible from the rear in the plug connector panel. Optionally, a third Ethernet interface and a 2½-inch hard disk/SSD can be integrated instead of the CFast card.



Lithium battery accessible from the top

CFast card accessible from the top

DVI connection

TFT display

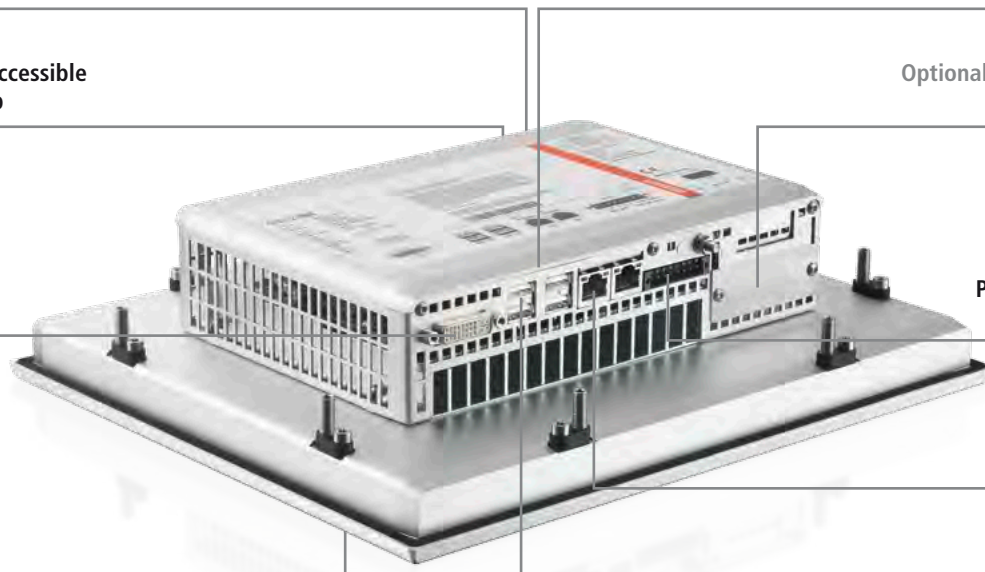
3½-inch motherboard with Intel® Celeron® ULV or Intel Atom®

Optionally 1 PCIe module slot or serial interface

Power supply 24 V DC, optionally with UPS

On-board dual Ethernet adapter

4 USB ports





CP27xx | Fanless multi-touch built-in Panel PC



Ordering information		Multi-finger touch screen
12-inch display	800 x 600	CP2712
12.1-inch display	1280 x 800	CP2713
15-inch display	1024 x 768	CP2715
15.6-inch display	1366 x 768	CP2716
18.5-inch display	1366 x 768	CP2718
19-inch display	1280 x 1024	CP2719
21.5-inch display	1920 x 1080	CP2721
24-inch display	1920 x 1080	CP2724



Stainless steel front C9900-F94x with blue silicone seal for horizontal alignment in 12.1-, 15.6-, 18.5- and 21.5-inch

CP27xx	CP27xx-0000, -0010, -0020
Housing	<ul style="list-style-type: none"> aluminium housing with glass front all connectors at the bottom of the rear side PC to be opened from the back side all components easily accessible 2 slots for CFast cards, accessible from outside 1 connector bracket to lead out interfaces of the motherboard at the connection section pull-out clamping levers for fast installation without loose parts protection class front side IP 65, rear side IP 20 operating temperature 0...55 °C

Features	CP27xx-0000	CP27xx-0010	CP27xx-0020
Display	12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch display	12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch display	12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch display
Processor	Intel® Celeron® ULV	Intel Atom® E38xx	Intel Atom® x5-E39xx
Motherboard	3½-inch	3½-inch	3½-inch
Slots	optionally 1 PCIe module	optionally 1 PCIe module	optionally 1 PCIe module
Memory	2...8 GB DDR3 RAM	2...8 GB DDR3L RAM	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board	2 on-board
Hard disks/flash	1 or 2 x CFast	1 or 2 x CFast	1 or 2 x CFast
RAID 1	2 x CFast	–	–
Power supply	24 V DC	24 V DC	24 V DC
Recommendation	not recommended for new projects	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP27xx		

Ordering information	Options for CP2713, CP2716, CP2718 and CP2721
C9900-F94x	<ul style="list-style-type: none"> stainless steel front with blue silicone seal for CP2xxx-00x0 for horizontal alignment, stainless steel 1.4404, matt ground with grain size 240, instead of standard aluminium front



CPX27xx | Fanless multi-touch built-in Panel PC

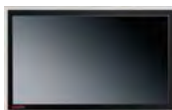
For use in hazardous areas, Zone 2/22



CPX2715



CPX2719



CPX2721

Ordering information	Multi-finger touch screen
15-inch display 1024 x 768	CPX2715
19-inch display 1280 x 1024	CPX2719
21.5-inch display 1920 x 1080	CPX2721



CPX27xx	CPX27xx-0010
Housing	aluminium housing with glass front for use in hazardous areas, Zone 2/22 all connectors at the bottom of the rear side PC to be opened from the back side all components easily accessible 1 slot for one CFast card, accessible from outside pull-out clamping levers for fast installation without loose parts solid clamping frame for even pressure distribution on the seal protection class front side IP 65, rear side IP 20 operating temperature 0...55 °C

Features	CPX27xx-0010
Display	15-, 19- or 21.5-inch TFT display
Processor	Intel Atom®
Motherboard	3½-inch
Memory	2...8 GB DDR3L RAM
Graphic adapter	integrated in the processor
Ethernet	2 on-board
Hard disks/flash	1 x 2½-inch HDD or SSD or CFast
Power supply	24 V DC
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CPX27xx

CP32xx | Multi-touch Panel PC

► www.beckhoff.com/CP32xx

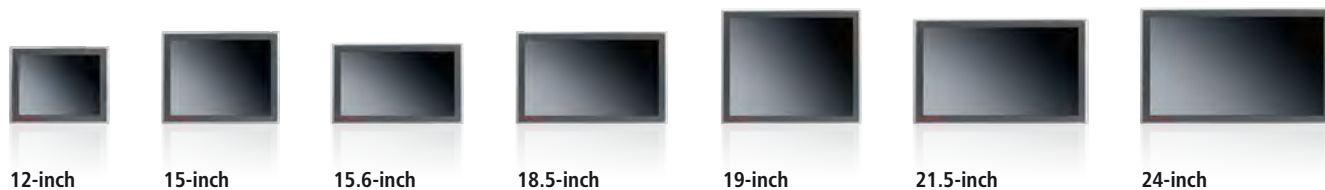
With the CP32xx series, a high-end Panel PC with multi-touch can be used directly in the field. The devices in a slender aluminium housing feature complete IP 65 protection and are designed for mounting arm installation. The Panel PCs offer maximum computing power with processors of the latest generation, such as Intel® Celeron®, Pentium® or Core™ i3/i5/i7.

A choice of seven different multi-touch TFT displays, in sizes between 12-inch and 24-inch and 4:3, 5:4 or widescreen 16:9 formats, are available. Cooling is achieved by means of cooling fins on the outer wall as well as fans inside the closed housing. The operating temperature range is 0 to 45 °C.

The Panel PC features an integrated rotatable and tiltable mounting arm adapter for a 48 mm diameter mounting arm tube. There is a choice of attaching the mounting arm from above or below. The connecting cables are laid through the mounting arm. The Industrial PC connections (up to six) with IP 65 connectors are positioned in the large wiring space and are easily accessible. The wiring area



Display sizes

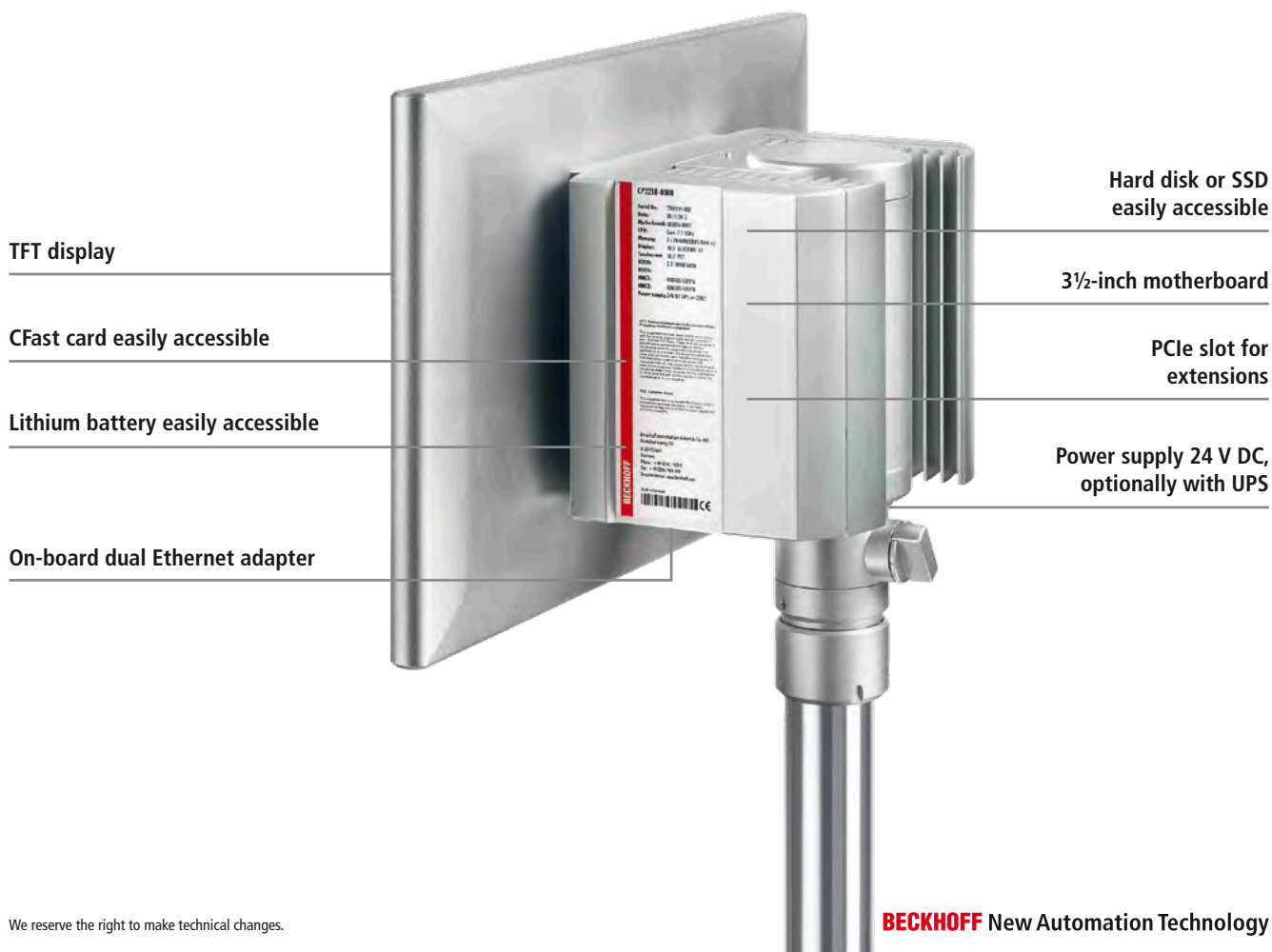


can be opened easily without dismounting the device from the mounting arm, offering fast access to the IP 65 connectors for power supply, Ethernet and optional fieldbus or USB. Prefabricated cables in various lengths are available for all connections. The C32xx series Panel PCs are supplied with a 24 V power supply unit, optionally with integrated uninterruptible power supply (UPS). A bat-

tery pack can be connected externally and installed on a DIN rail in the control cabinet.

The CP32xx Panel PCs are equipped with one or two hard disks, SSDs or CFast cards or combinations thereof. With the on-board RAID controller, two same hard disks, SSDs or CFast cards can be mirrored. The data media and the lithium battery of the system clock are accessible from the rear under the cover.

There is a PCI slot in the CP32xx. A factory-fitted FC9062 PCIe module with two additional Ethernet ports can be added. NOVRAM is also available as PCIe module for fail-safe data storage.





reddot award 2014
winner industrial design



CP32xx | Multi-touch Panel PC

The high-performance multi-touch Panel PC



CP3212



CP3215



CP3216



CP3218



CP3219



CP3221



CP3224

Ordering information		Multi-finger touch screen
12-inch display	800 x 600	CP3212
15-inch display	1024 x 768	CP3215
15.6-inch display	1366 x 768	CP3216
18.5-inch display	1366 x 768	CP3218
19-inch display	1280 x 1024	CP3219
21.5-inch display	1920 x 1080	CP3221
24-inch display	1920 x 1080	CP3224



CP32xx	CP32xx-0020, -0030
Housing	Industrial PC with Control Panel for mounting arm installation rotatable and tiltable mounting arm adapter for Rittal and Roolec mounting arm systems with 48 mm tube from top wiring area for up to 6 IP 65 connectors 1 slot for a 2½-inch hard disk or SSD and 1 slot for CFast lithium battery of the system clock changeable from outside passive cooling through heat sink structure, internal fans for equal heat distribution to all the walls of the housing 20 cm free space required around the PC for air circulation protection class IP 65 operating temperature 0...45 °C

Features	CP32xx-0020	CP32xx-0030
Display	12-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch display	12-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch display
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	3½-inch	3½-inch
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	4...32 GB DDR4 RAM	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board, one of these is led out in the wiring area	2 on-board, one of these is led out in the wiring area
Hard disks/flash	1 or 2 x 2½-inch HDD or SSD, 1 x 2½-inch HDD or SSD and 1 x CFast or 2 x CFast	1 or 2 x 2½-inch HDD or SSD, 1 x 2½-inch HDD or SSD and 1 x CFast or 2 x CFast
RAID 1	2 x 2½-inch HDD, SSD or CFast	2 x 2½-inch HDD, SSD or CFast
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP32xx	

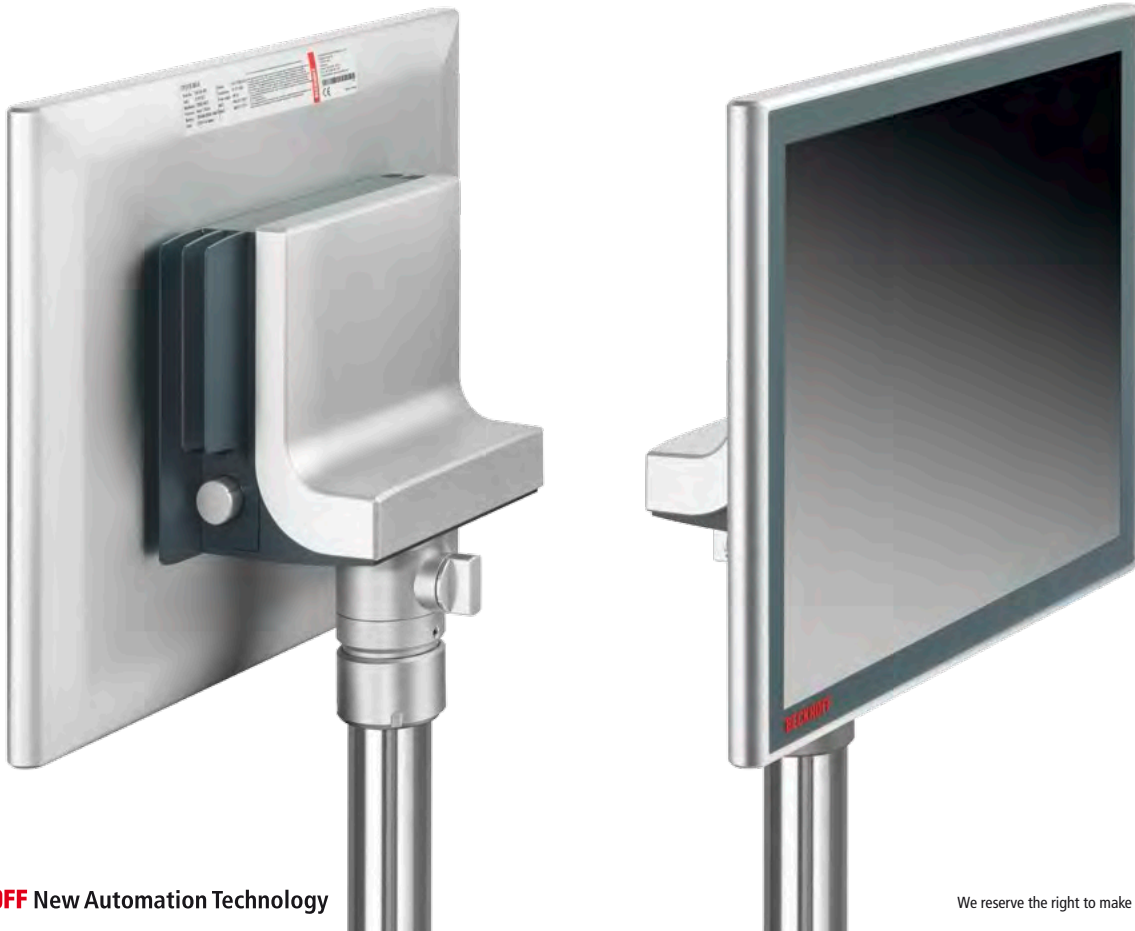
CP37xx | Multi-touch Panel PC

► www.beckhoff.com/CP37xx

With the CP37xx series, a Panel PC with multi-touch can be used directly in the field. The devices in a robust aluminium housing feature complete IP 65 protection and are designed for mounting arm installation. The Panel PCs offer high computing power with Intel Atom® processors with up to four cores.

A choice of seven different multi-touch TFT displays in sizes between 12-inch and 24-inch in 4:3, 5:4 or widescreen formats are available. Cooling is achieved by means of cooling fins on the outer wall as well as fans inside the closed housing. The operating temperature range is 0 to 45 °C.

The Panel PC features an integrated rotatable and tiltable mounting arm adapter for a 48 mm diameter mounting arm tube. There is a choice of attaching the mounting arm from above or below. The connecting cables are laid through the mounting arm. The Industrial PC connections (up to four)



Display sizes

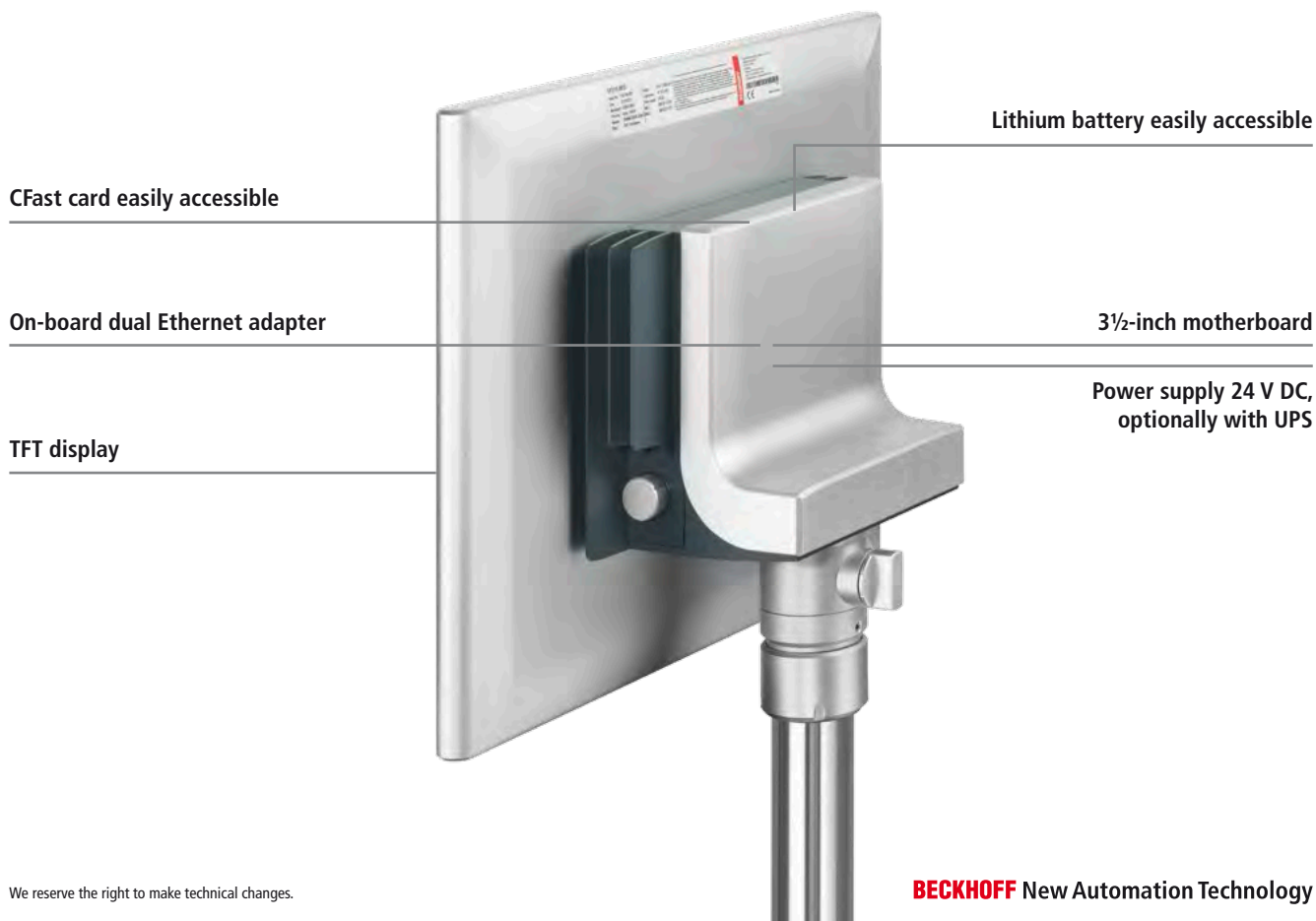


with IP 65 connectors are positioned in the large wiring space and are easily accessible. The wiring area can be opened easily without dismounting the device from the mounting arm, offering fast access to the IP 65 connectors for power supply, Ethernet and optional

USB or RS232. Prefabricated cables in various lengths are available for all connections. The C37xx series Panel PCs are supplied with a 24 V power supply unit, optionally with integrated uninterruptible power supply (UPS). A battery pack can be connected

externally and installed on a DIN rail in the control cabinet.

The CP37xx Panel PCs are equipped with one or two CFast cards. The data media and the lithium battery of the system clock are accessible from the rear under the cover.





CP37xx | Multi-touch Panel PC

Intel Atom® with up to four cores



CP3712

CP3713

CP3715

CP3716

CP3718

CP3719

CP3721

CP3724

Ordering information		Multi-finger touch screen
12-inch display	800 x 600	CP3712
12.1-inch display	1280 x 800	CP3713
15-inch display	1024 x 768	CP3715
15.6-inch display	1366 x 768	CP3716
18.5-inch display	1366 x 768	CP3718
19-inch display	1280 x 1024	CP3719
21.5-inch display	1920 x 1080	CP3721
24-inch display	1920 x 1080	CP3724



CP37xx	CP37xx-0010, -0020
Housing	Industrial PC with Control Panel for mounting arm installation rotatable and tiltable mounting arm adapter for Rittal and Roolec mounting arm systems with 48 mm tube from top wiring area for up to 4 IP 65 connectors 2 slots for CFast cards CFast cards and lithium battery of the system clock, changeable from outside passive cooling through heat sink; internal fan for equal heat distribution to all the walls of the housing 20 cm free space required around the PC for air circulation protection class IP 65 operating temperature 0...45 °C

Features	CP37xx-0010	CP37xx-0020
Display	12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch display	12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch display
Processor	Intel Atom® E38xx	Intel Atom® x5-E39xx
Motherboard	3½-inch	3½-inch
Slots	optionally 1 PCIe module	optionally 1 PCIe module
Memory	2...8 GB DDR3L RAM	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board, one of these is led out in the wiring area	2 on-board, one of these is led out in the wiring area
Hard disks/flash	1 or 2 x CFast	1 or 2 x CFast
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP37xx	

CPX37xx | Multi-touch Panel PC

► www.beckhoff.com/CPX37xx

With the CPX Panel PC series, the proven multi-touch technology of Beckhoff Panel PCs is available in particularly 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 convenient operation of all Beckhoff multi-touch panels. The aesthetically pleasing appearance of the panel and the look and feel of the aluminium housing are maintained, making them visual highlights in explosion-proof environments. They are available in three different sizes as 15-, 19- and 21.5-inches display.

The CPX37xx features an Intel Atom® processor with up to four cores, one CFast card and no rotating parts. The CPX37xx comes with a 24 V power supply unit. The CFast card is accessible from the side. Optionally, a 2½-inch hard disk/SSD can be integrated instead of the CFast card. The device is mounted via 4 x M6 threaded holes at the rear.





CPX37xx | Multi-touch Panel PC

For use in hazardous areas, Zone 2/22

Ordering information	Multi-finger touch screen
15-inch display 1024 x 768	CPX3715
19-inch display 1280 x 1024	CPX3719
21.5-inch display 1920 x 1080	CPX3721

CPX37xx	CPX37xx-0010
Housing	Industrial PC with Control Panel for mounting arm installation for use in hazardous areas, Zone 2/22
	For mounting four M6 threaded holes are provided at a distance of 100 x 100 mm in the connection block on the rear panel. The connectors for connecting the Control Panel are plugged into the connection block from the rear.
	1 slot for one CFast card
	CFast card and lithium battery of the system clock, changeable from outside
	passive cooling
	protection class IP 65
	operating temperature 0...45 °C

Features	CPX37xx-0010
Display	15-, 19- or 21.5-inch TFT display
Processor	Intel Atom®
Motherboard	3½-inch
Memory	2...8 GB DDR3L RAM
Graphic adapter	integrated in the processor
Ethernet	2 on-board, one of these is led out in the wiring area
Hard disks/flash	1 x 2½-inch HDD or SSD or CFast
Power supply	24 V DC
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CPX37xx

CP37xx-1600 | Multi-touch Panel PC

► www.beckhoff.com/CP37xx-1600

Multi-touch can be used directly in the field with the CP37xx-1600 Panel PC series. The devices in robust aluminum housing feature complete IP 65 protection and are designed for mounting arm installation. Equipped with Intel Atom® processors with up to four cores, the Panel PCs offer high computing power. There is a choice of six different multi-touch TFT displays from 15 to 24-inch, in the formats 4:3, 5:4, and widescreen 16:9. Cooling is entirely passive and takes place via the external panel of the closed housing. The PC can be operated at an ambient temperature of up to 45°C.

In parallel with the CP37xx device series with integrated mounting arm adapter, the CP37xx-1600 series offers the option of freely selecting a mounting arm adapter. The optionally available C9900-M763 mounting arm adapter, which can be mounted from top to bottom by the customer, is fastened with four M6 screws to the 100 x 100 mm mounting face. Like the Beckhoff Control Panels, it is thus possible to adapt to a 48 mm mounting arm system. Without the rotating and tilting adapter, the multi-touch Panel PC can also be mounted flexibly in the connection area. On the underside of the panel there are three threaded

holes to allow the mounting/retrofitting of mechanical extensions such as keyboard shelves or a handle.

The up to six connections of the Industrial PC are arranged with IP 65 connectors in the connection compartment, where they are easily accessible. Prefabricated cables in various lengths are available for all connections. The CP37xx-1600 is already equipped ex factory with a USB 3.0 socket on the side panel.

The Panel PCs from the CP37xx-1600 series have a hard disk, SSD or CFast card.

The data carriers and the lithium battery for the system clock are accessible from the housing side under a cover.





With mounting
arm adapter
C9900-M763

Without mounting adapter

With C9900-G05x push-button extension

CP37xx-1600 | Multi-touch Panel PC

Fanless without cooling fins, mounting holes 100 x 100 mm,
horizontal plug outlet

Ordering information	Multi-finger touch screen
15-inch display 1024 x 768	CP3715-1600-0020
15.6-inch display 1366 x 768	CP3716-1600-0020
18.5-inch display 1366 x 768	CP3718-1600-0020
19-inch display 1280 x 1024	CP3719-1600-0020
21.5-inch display 1920 x 1080	CP3721-1600-0020
24-inch display 1920 x 1080	CP3724-1600-0020

CP37xx-1600	CP37xx-1600-0020
Housing	Industrial PC with Control Panel for mounting arm installation 4 M6 threaded holes with a distance of 100 x 100 mm for connection to a mounting arm system wiring area for up to 6 IP 65 connectors 1 slot for one CFast card CFast cards and lithium battery of the system clock, changeable from outside passive cooling without fan 20 cm free space required around the PC for air circulation 3 M5 threaded holes on the underside of the Control Panel for mounting mechanical extensions, see options protection class IP 65 operating temperature 0...45 °C
Features	CP37xx-1600-0020
Display	15-, 15.6-, 18.5-, 19-, 21.5- or 24-inch display
Processor	Intel Atom® x5-E39xx
Motherboard	3½-inch
Interfaces	1-port USB 3.0 connector with IP 65 screw cap in the sidewall of the PC housing
Memory	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor
Ethernet	2 on-board, one of these is led out in the wiring area
Hard disks/flash	1 or 2 x CFast or 1x 2½-inch HDD or SSD
Power supply	24 V DC
Recommendation	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP37xx-1600

CP62xx | “Economy” built-in Panel PC

► www.beckhoff.com/CP62xx

The CP62xx built-in Panel PC-series is designed for installation in the front of a control cabinet. The CP62xx series combines the Beckhoff Control Panel design with state-of-the-art Industrial PC technology. The right display size and keyboard are available for every application. With their highly integrated 3½-inch motherboards, the CP62xx built-in

Industrial PCs represent a high-performance platform for machine construction and plant engineering applications that can be used in conjunction with TwinCAT automation software under Windows 10 IoT Enterprise.

The CP62xx Panel PCs are available with a choice of Intel® processors. The CP62xx Panel PCs can be equipped with a CFast

card and a 2½-inch hard disk or SSD. A fan cartridge with speed-controlled fans supported by dual ball bearing is integrated in the rear panel. In front of the fan cartridge a 2 cm space is required for ventilation. In each configuration the Panel PCs of this series are approved for ambient temperatures between 0 and 55 °C.



Front laminates



Without keys

Function keys

Numeric keyboard

Alphanumeric keyboard

With PLC keys on the sides

The CP62xx are supplied with a 24 V power supply unit, optionally also with an integrated uninterruptible power supply (UPS). A battery pack can be connected externally and installed on a DIN rail close to the PC.

Due to its two independent Ethernet interfaces the CP62xx is ideally suited as a compact central processing unit for an EtherCAT control system. Two free slots for PCIe modules can be optionally integrated into the PC housing, offering the possibility to extend

the PC, e.g. with additional Ethernet interfaces, USB ports or PROFIBUS. NOVRAM for fail-safe data storage can also be plugged as PCIe module.

The CP62xx can optionally be extended with PCIe module or plug-in card slots.

DVI connection

3½-inch motherboard

Hard disk or SSD

Power supply 24 V DC, optionally with UPS

CFast card

On-board dual Ethernet adapter

TFT display

4 USB ports

Serial interface

Lithium battery accessible from the rear side

Optionally 2 PCI or PCIe plug-in card slots, optionally 2 PCIe module slots



CP62xx | “Economy” built-in Panel PC

The slimline built-in Industrial PC with 3½-inch motherboard

Ordering information	without touch screen	with single-touch screen	with touch pad
Display only			
12-inch display 800 x 600	CP6201-0000-00xx	CP6201-0001-00xx	
15-inch display 1024 x 768	CP6202-0000-00xx	CP6202-0001-00xx	
19-inch display 1280 x 1024	CP6203-0000-00xx	CP6203-0001-00xx	
Display only, USB A socket in the front			
12-inch display 800 x 600	CP6201-0020-00xx	CP6201-0021-00xx	
15-inch display 1024 x 768	CP6202-0020-00xx	CP6202-0021-00xx	
19-inch display 1280 x 1024	CP6203-0020-00xx	CP6203-0021-00xx	
With function keys			
12-inch display 800 x 600	CP6211-0000-00xx	CP6211-0001-00xx	
15-inch display 1024 x 768	CP6212-0000-00xx	CP6212-0001-00xx	
19-inch display 1280 x 1024	CP6213-0000-00xx	CP6213-0001-00xx	
Numeric keyboard			
12-inch display 800 x 600	CP6221-0000-00xx	CP6221-0001-00xx	CP6221-0002-00xx
15-inch display 1024 x 768	CP6222-0000-00xx	CP6222-0001-00xx	CP6222-0002-00xx
19-inch display 1280 x 1024	CP6223-0000-00xx	CP6223-0001-00xx	CP6223-0002-00xx
Alphanumeric keyboard			
12-inch display 800 x 600	CP6231-0000-00xx	CP6231-0001-00xx	CP6231-0002-00xx
15-inch display 1024 x 768	CP6232-0000-00xx	CP6232-0001-00xx	CP6232-0002-00xx
19-inch display 1280 x 1024	CP6233-0000-00xx	CP6233-0001-00xx	CP6233-0002-00xx
Alphanumeric keyboard with PLC keys on the sides			
15-inch display 1024 x 768	CP6242-0000-00xx	CP6242-0001-00xx	



Without keys



Function keys



Numeric keyboard



Alphanumeric keyboard

Alphanumeric keyboard
with PLC keys on the sides

CP62xx	CP62xx-xxxx-0070, -0080
Housing	aluminium front with steel sheet rear cover drives easily accessible all connectors at the bottom of the rear side 1 slot for 2½-inch hard disk and 1 slot for a CFast card accessible from the rear side fan cartridge at the rear side, accessible from outside lithium battery of the system clock accessible from the rear side pull-out clamping levers for fast installation without loose parts protection class front side IP 65, rear side IP 20 operating temperature 0...55 °C

Features	CP62xx-xxxx-0070	CP62xx-xxxx-0080
Display	12-, 15- or 19-inch TFT display	12-, 15- or 19-inch TFT display
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	3½-inch	3½-inch
Interfaces	1 serial port RS232 and 4 USB 3.0 ports	1 serial port RS232 and 4 USB 3.1 ports
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	4...32 GB DDR4 RAM	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	2½-inch HDD or SSD and/or 1 x CFast or 2 x CFast	2½-inch HDD or SSD and/or 1 x CFast or 2 x CFast
RAID 1	2 x CFast	2 x CFast
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP62xx	



CP62xx with PCIe module slots C9900-B500



Extension for PCIe modules

The Panel PCs CP62xx can be expanded by two additional PCIe module slots. The rear cover is constructed 30 mm deeper for PCIe

modules (see above). The module slots can accept Beckhoff PCIe modules, for example, the FC9062 dual gigabit Ethernet module.



PCIe module FC9062, dual gigabit Ethernet

Ordering information

C9900-B500

Options for CP62xx

2 PCIe module slots integrated inside CP62xx, to plug-in Beckhoff PCIe modules or to lead out interfaces of the motherboard ex factory. The depth of the back cover is increased by 30 mm (1.2").



CP62xx with plug-in card slots
C9900-B504, -B508 or -B512

Extension for PCI and PCIe plug-in cards

The Panel PCs CP62xx can be expanded by two slots for standard PC plug-in cards. They can accept conventional PC plug-in cards up to 190 mm in length. The 66 mm deeper hood at the rear (see above) covers

a backplane that provides a choice of two PCI slots, two PCI Express slots or one PCI and one PCI Express slot. Card holders ensure the secure fixation of large cards.

Ordering information	Options for CP62xx
C9900-B504	2 PCIe plug-in card slots on the passive backplane integrated inside CP62xx, to plug-in PCIe x1 cards up to 190 mm length. The depth of the back cover is increased by 66 mm (2.6").
C9900-B508	2 PCI plug-in card slots on the passive backplane integrated inside CP62xx, to plug-in PCI cards up to 190 mm length. The depth of the back cover is increased by 66 mm (2.6").
C9900-B512	1 PCI and 1 PCIe plug-in card slot on a passive backplane integrated inside CP62xx, to plug-in one PCI and one PCIe x1 card up to 190 mm (6.3") length. The depth of the back cover is increased by 66 mm (2.6").

CP66xx | Built-in Panel PC

► www.beckhoff.com/CP66xx

The built-in Panel PCs of the CP66xx series have a wide range of uses including remote desktop display. They are available in five different sizes as 5.7-, 6.5-, 12-, 15- and 19-inch display.

CP66xx Panel PCs are equipped with an ARM Cortex™-A8 processor. They are equipped with a microSD card and have no rotating parts.

CP66xx are supplied with a 24 V power supply unit, optionally also with a capacitive uninterruptible power supply (second UPS). The microSD card and the lithium battery of the system clock



Front laminates



Without keys



Function keys



Numeric keyboard



Alphanumeric keyboard

are accessible from the rear in the connector bracket.

These devices are ideally suited as small controllers for machine construction and plant engineering applications in con-

junction with TwinCAT automation software under Windows Embedded Compact 7.

Due to its independent Ethernet and EtherCAT interfaces the CP66xx is ideally suited as a compact central processing

unit for an EtherCAT control system. NOVRAM for fail-safe data storage is integrated on the motherboard.

3½-inch motherboard with ARM processor

Optionally with 1-second UPS

TFT display

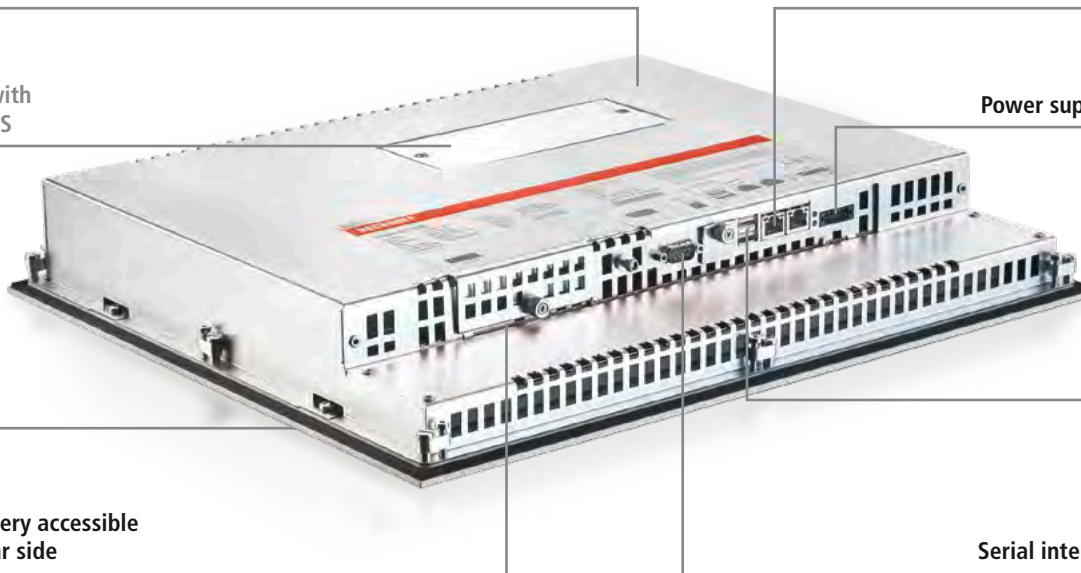
Lithium battery accessible from the rear side

1 x Ethernet and 1 x EtherCAT on-board

Power supply 24 V DC

2 USB ports

Serial interface RS232





CP66xx | Panel PC with ARM Cortex™-A8

The “Economy” built-in Panel PC

Ordering information	without touch screen	with single-touch screen	with touch pad
Display only			
5.7-inch display 640 x 480	CP6607-0000-0020	CP6607-0001-0020	
6.5-inch display 640 x 480	CP6609-0000-0020	CP6609-0001-0020	
12-inch display 800 x 600	CP6601-0000-0020	CP6601-0001-0020	
15-inch display 1024 x 768	CP6602-0000-0020	CP6602-0001-0020	
19-inch display 1280 x 1024	CP6603-0000-0020	CP6603-0001-0020	
Display only, USB A socket in the front			
12-inch display 800 x 600	CP6601-0020-0020	CP6601-0021-0020	
15-inch display 1024 x 768	CP6602-0020-0020	CP6602-0021-0020	
19-inch display 1280 x 1024	CP6603-0020-0020	CP6603-0021-0020	
With function keys			
6.5-inch display 640 x 480	CP6619-0000-0020	CP6619-0001-0020	
12-inch display 800 x 600	CP6611-0000-0020	CP6611-0001-0020	
15-inch display 1024 x 768	CP6612-0000-0020	CP6612-0001-0020	
19-inch display 1280 x 1024	CP6613-0000-0020	CP6613-0001-0020	
Numeric keyboard			
6.5-inch display 640 x 480	CP6629-0000-0020	CP6629-0001-0020	
12-inch display 800 x 600	CP6621-0000-0020	CP6621-0001-0020	CP6621-0002-0020
15-inch display 1024 x 768	CP6622-0000-0020	CP6622-0001-0020	CP6622-0002-0020
19-inch display 1280 x 1024	CP6623-0000-0020	CP6623-0001-0020	CP6623-0002-0020
Alphanumeric keyboard			
12-inch display 800 x 600	CP6631-0000-0020	CP6631-0001-0020	CP6631-0002-0020
15-inch display 1024 x 768	CP6632-0000-0020	CP6632-0001-0020	CP6632-0002-0020
19-inch display 1280 x 1024	CP6633-0000-0020	CP6633-0001-0020	CP6633-0002-0020



Without keys



Function keys



Numeric keyboard



Alphanumeric keyboard

CP66xx	CP66xx-xxxx-0020
Housing	aluminium front with steel sheet rear cover
	all connectors at the bottom of the rear side
	1 slot for microSD flash card, accessible from the rear side
	lithium battery of the system clock, accessible from the rear side
	pull-out clamping levers for fast installation without loose parts
	protection class front side IP 65, rear side IP 20
	operating temperature 0...55 °C

Features	CP66xx-xxxx-0020
Display	5.7-, 6.5-, 12-, 15- or 19-inch TFT display
Processor	ARM Cortex™-A8, 1 GHz
Motherboard	3½-inch
Slots	–
Free slots	–
Max. card length	–
Memory	1 GB DDR3 RAM
Graphic adapter	integrated in the processor
Ethernet	1 x Ethernet and 1 x EtherCAT on-board
Hard disks/flash	microSD flash card
Power supply	24 V DC
Recommendation	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP66xx

CP6606, CP6600 | “Economy” built-in Panel PC

▶ www.beckhoff.com/CP6606

▶ www.beckhoff.com/CP6600

With its highly integrated 3½-inch motherboard, the CP6606 and CP6600 built-in Panel PCs are ideally suited for use in mechanical engineering, for example with TwinCAT automation software under Windows Embedded Compact 7 or as Ethernet Control Panel.

They are designed for installation in the front of a control cabinet and have a 7-inch,

respectively 10.1-inch touch screen displays. Equipped with a fanless ARM Cortex™-A8 processor and a microSD card the CP66xx contain no rotary components.

The CP66xx are supplied with a 24 V power supply unit. The microSD card and the lithium battery of the system clock are accessible from the rear in the connector

bracket. The optional C9900-G07x push-button extensions supplement the built-in Panel PCs with an emergency stop key and three push-button keys with signal lamp.





CP6606, CP6600 | Panel PC with ARM Cortex™-A8

Ordering information	with single-touch screen
7-inch display 800 x 480	CP6606-0001-0020
10.1-inch display 1024 x 600	CP6600-0001-0020

CP6606, CP6600	CP66xx-0001-0020
Housing	aluminium front with steel sheet rear cover all connectors at the bottom of the rear side 1 slot for microSD flash card, accessible from the rear side lithium battery of the system clock, accessible from the rear side pull-out clamping levers for fast installation without loose parts protection class front side IP 54, rear side IP 20 operating temperature 0...55 °C

Features	CP66xx-0001-0020
Display	7-, 10.1-inch TFT display
Processor	ARM Cortex™-A8, 1 GHz
Motherboard	3½-inch
Slots	–
Free slots	–
Max. card length	–
Memory	1 GB DDR3 RAM
Graphic adapter	integrated in the processor
Ethernet	1 x Ethernet and 1 x EtherCAT on-board
Hard disks/flash	microSD flash card
Power supply	24 V DC
Recommendation	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP6606

Ordering information	Options
C9900-G070	push-button extension for CP6x06 with landscape 7-inch display, USB
C9900-G071	push-button extension for CP6x06 with landscape 7-inch display, terminal row
C9900-G072	push-button extension for CP6x00 with landscape 10.1-inch display, USB
C9900-G073	push-button extension for CP6x00 with landscape 10.1-inch display, terminal row

CP67xx | "Economy" built-in Panel PC

► www.beckhoff.com/CP67xx

The CP67xx built-in Panel PC series is designed for installation in the front of a control cabinet or control housing. The CP67xx series combines the Beckhoff Control Panel design with state-of-the-art Industrial PC technology. The right display size and key-

board are available for every application. With their highly integrated 3½-inch motherboard the CP67xx built-in Industrial PCs represent a high-performance platform for machine construction and plant engineering applications that can for example be used in

conjunction with TwinCAT automation software under Windows 10 IoT Enterprise. The PC can be equipped with a 5.7-, 12-, 15- or 19-inch LC display, or as a monitor without keys or with different types of keyboard. Optionally, a touch screen or touch



Front laminates



pad is available. In addition, a large number of push-button extensions are available.

A CP67xx Panel PC is equipped with an Intel® Celeron® ULV 1.4 GHz or with Intel Atom® with up to four cores and a CFast card. It contains no rotating parts. In each

configuration the fanless Panel PCs of this series are approved for ambient temperatures between 0 and 55 °C.

The CP67xx Panel PCs are supplied with a CFast card and a 2½-inch hard disk or SSD. The CP67xx have a 24 V power supply unit.

The data media and the lithium battery for the system clock are accessible from the rear. Due to its two independent Ethernet interfaces, the CP67xx is ideally suited as a compact central processing unit for an EtherCAT control system.

DVI connection

3½-inch motherboard

Hard disk or SSD

Power supply 24 V DC, optionally with UPS

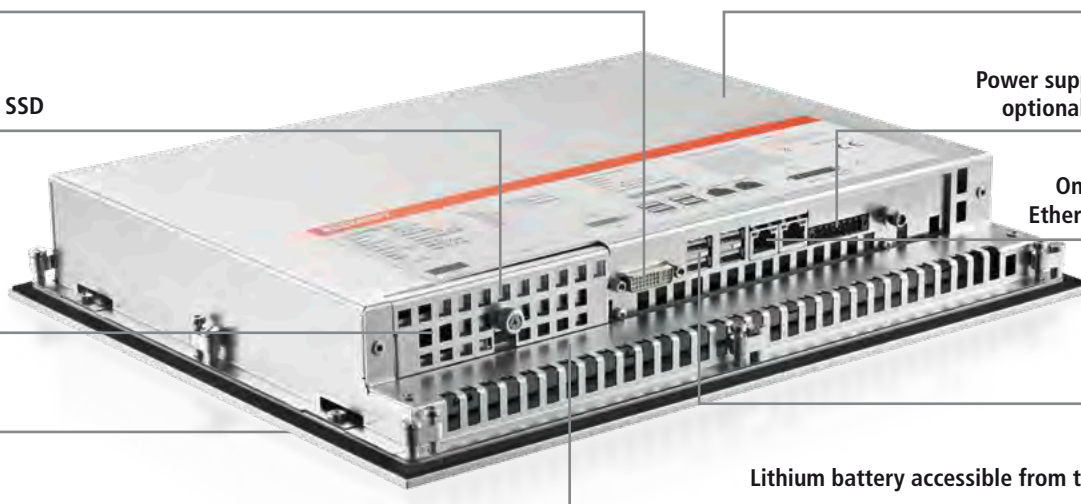
CFast card

On-board dual Ethernet adapter

TFT display

4 USB ports

Lithium battery accessible from the rear side





CP67xx | “Economy” built-in Panel PC

The slimline built-in Industrial PC with 3½-inch motherboard

Ordering information	without touch screen	with single-touch screen	with touch pad
Display only			
5.7-inch display 640 x 480	CP6707-0000-0050/60	CP6707-0001-0050/60	
12-inch display 800 x 600	CP6701-0000-00xx	CP6701-0001-00xx	
15-inch display 1024 x 768	CP6702-0000-00xx	CP6702-0001-00xx	
19-inch display 1280 x 1024	CP6703-0000-00xx	CP6703-0001-00xx	
Display only, USB A socket in the front			
12-inch display 800 x 600	CP6701-0020-00xx	CP6701-0021-00xx	
15-inch display 1024 x 768	CP6702-0020-00xx	CP6702-0021-00xx	
19-inch display 1280 x 1024	CP6703-0020-00xx	CP6703-0021-00xx	
With function keys			
12-inch display 800 x 600	CP6711-0000-00xx	CP6711-0001-00xx	
15-inch display 1024 x 768	CP6712-0000-00xx	CP6712-0001-00xx	
19-inch display 1280 x 1024	CP6713-0000-00xx	CP6713-0001-00xx	
Numeric keyboard			
12-inch display 800 x 600	CP6721-0000-00xx	CP6721-0001-00xx	CP6721-0002-00xx
15-inch display 1024 x 768	CP6722-0000-00xx	CP6722-0001-00xx	CP6722-0002-00xx
19-inch display 1280 x 1024	CP6723-0000-00xx	CP6723-0001-00xx	CP6723-0002-00xx
Alphanumeric keyboard			
12-inch display 800 x 600	CP6731-0000-00xx	CP6731-0001-00xx	CP6731-0002-00xx
15-inch display 1024 x 768	CP6732-0000-00xx	CP6732-0001-00xx	CP6732-0002-00xx
19-inch display 1280 x 1024	CP6733-0000-00xx	CP6733-0001-00xx	CP6733-0002-00xx
Alphanumeric keyboard with PLC keys on the sides			
15-inch display 1024 x 768	CP6742-0000-00xx	CP6742-0001-00xx	



Without keys



Function keys



Numeric keyboard



Alphanumeric keyboard

Alphanumeric keyboard
with PLC keys on the sides

CP67xx	CP67xx-xxxx-0040, -0050, -0060
Housing	aluminium front with steel sheet rear cover drives easily accessible all connectors at the bottom of the rear side 1 slot for one CFast card accessible from the rear side lithium battery of the system clock accessible from the rear side pull-out clamping levers for fast installation without loose parts protection class front side IP 65, rear side IP 20 operating temperature 0...55 °C

Features	CP67xx-xxxx-0040	CP67xx-xxxx-0050	CP67xx-xxxx-0060
Display	12-, 15- or 19-inch TFT display	5.7-, 12-, 15- or 19-inch TFT display	5.7-, 12-, 15- or 19-inch TFT display
Processor	Intel® Celeron® ULV	Intel Atom® E38xx	Intel Atom® x5-E39xx
Motherboard	3½-inch	3½-inch	3½-inch
Slots	optionally 2 PCIe modules or 2 PCI/PCIe plug-in card slots	optionally 2 PCIe modules or 2 PCI/PCIe plug-in card slots	optionally 2 PCIe modules or 2 PCI/PCIe plug-in card slots
Free slots	optionally 2 PCIe modules or 2 PCI/PCIe plug-in card slots	optionally 2 PCIe modules or 2 PCI/PCIe plug-in card slots	optionally 2 PCIe modules or 2 PCI/PCIe plug-in card slots
Max. card length	optionally 2 PCIe modules or 2 x 190 mm plug-in cards	optionally 2 PCIe modules or 2 x 190 mm plug-in cards	optionally 2 PCIe modules or 2 x 190 mm plug-in cards
Memory	2...8 GB DDR3 RAM	2...8 GB DDR3L RAM	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board	2 on-board
Hard disks/flash	1 or 2 x 2½-inch HDD, SSD or CFast	1 or 2 x 2½-inch HDD, SSD or CFast	1 or 2 x 2½-inch HDD, SSD or CFast
RAID 1	2 x 2½-inch HDD, SSD or CFast	–	–
Power supply	24 V DC	24 V DC	24 V DC
Recommendation	not recommended for new projects	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP67xx		

CP6706, CP6700 | “Economy” built-in Panel PC

▶ www.beckhoff.com/CP6706

▶ www.beckhoff.com/CP6700

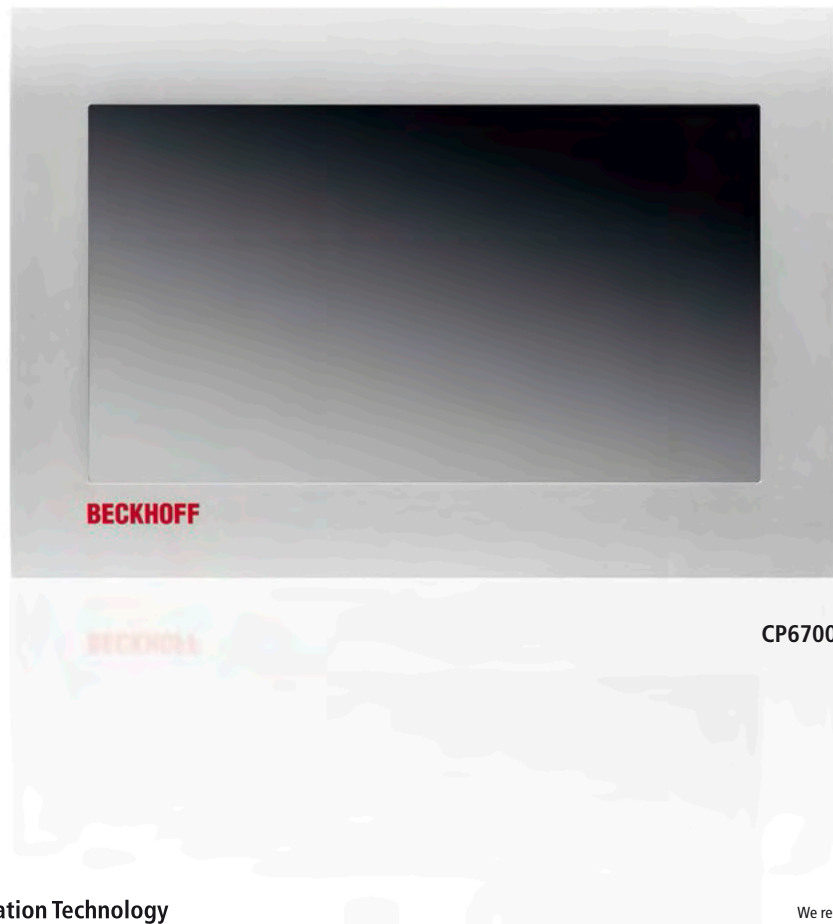
With its highly integrated 3½-inch motherboard, the CP6706 and CP6700 built-in Panel PC series is ideally suited for use in mechanical engineering, for example with TwinCAT automation software under Windows 10 IoT Enterprise.

They are designed for installation in the front of a control cabinet and have a 7-inch

or 10.1-inch touch screen display. Equipped with an Intel Atom® with up to four cores and a CFast card, the CP67xx contain no rotary components.

The CP67xx are supplied with a 24 V power supply unit. The CFast card and the lithium battery of the system clock are accessible from the rear in the connector

bracket. The optional C9900-G07x push-button extensions supplement the built-in Panel PCs with an emergency stop key and three push-button keys with signal lamp.



CP6700



CP6706

CP6706
with push-
button
extensionCP6700
with push-
button
extension

CP6706, CP6700 | Panel PC with Intel Atom® with up to four cores

Ordering information	with single-touch screen
7-inch display 800 x 480	CP6706-0001-00xx
10.1-inch display 1024 x 600	CP6700-0001-00xx

CP6706, CP6700	CP67xx-0001-0050, -0060	
Housing	aluminium front with steel sheet rear cover all connectors at the bottom of the rear side 1 slot for one CFast card accessible from the rear side lithium battery of the system clock, accessible from the rear side pull-out clamping levers for fast installation without loose parts protection class front side IP 54, rear side IP 20 operating temperature 0...55 °C	
Features	CP67xx-0001-0050	CP67xx-0001-0060
Display	7-, 10.1-inch TFT display	7-, 10.1-inch TFT display
Processor	Intel Atom® E38xx	Intel Atom® x5-E39xx
Motherboard	3½-inch	3½-inch
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	2...8 GB DDR3L RAM	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	CFast card	CFast card
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP6706	

Ordering information	Options
C9900-U214	internal, capacitive 1-second UPS
C9900-G070	push-button extension for CP6x06 with landscape 7-inch display, USB
C9900-G071	push-button extension for CP6x06 with landscape 7-inch display, terminal row
C9900-G072	push-button extension for CP6x00 with landscape 10.1-inch display, USB
C9900-G073	push-button extension for CP6x00 with landscape 10.1-inch display, terminal row

CP72xx | “Economy” Panel PC with mounting arm

► www.beckhoff.com/CP72xx

The CP72xx “Economy” Panel PC series is designed for mounting arm installation. Control Panels form the front of the IP 65 Panel PC. The right display size and keyboard are thus available for every application. The CP72xx Industrial PCs represent a powerful platform for use in machine and plant construction, for example using the TwinCAT automation software under Windows 10 IoT Enterprise.

The PC can be equipped with a 12-, 15- or 19-inch LC display as a monitor without keys or with different types of keyboards. Optionally, a touch screen or touch pad is available. In addition, a large number of push-button extensions are available.

Cooling is achieved via cooling ribs between the Control Panel and the add-on PC. Two fans inside the closed housing ensure that the heat is distributed evenly.

The PC can be operated at up to 45 °C ambient temperature.

The housing is designed for installation on a mounting arm. There is a choice of attaching the mounting arm from above or below es factory. The Panel PC features an integrated rotatable mounting arm adapter for a 48 mm diameter mounting arm tube. Optionally, a rotatable and tilttable mounting arm adapter can be integrated in the Panel PC.



Front laminates



Without keys

Function keys

Numeric keyboard

Alphanumeric keyboard

With PLC keys on the sides

The connecting cables are laid through the mounting arm.

The compact aluminium housing of the CP72xx Panel PCs is equipped with a 3½-inch Beckhoff Motherboard for Intel® Core™ i3/i5/i7 processors of the latest generation.

The Industrial PC connections (up to six) with IP 65 connectors are positioned in the large wiring space and are easily accessible. The wiring area can be opened easily without dismantling the device from the mounting

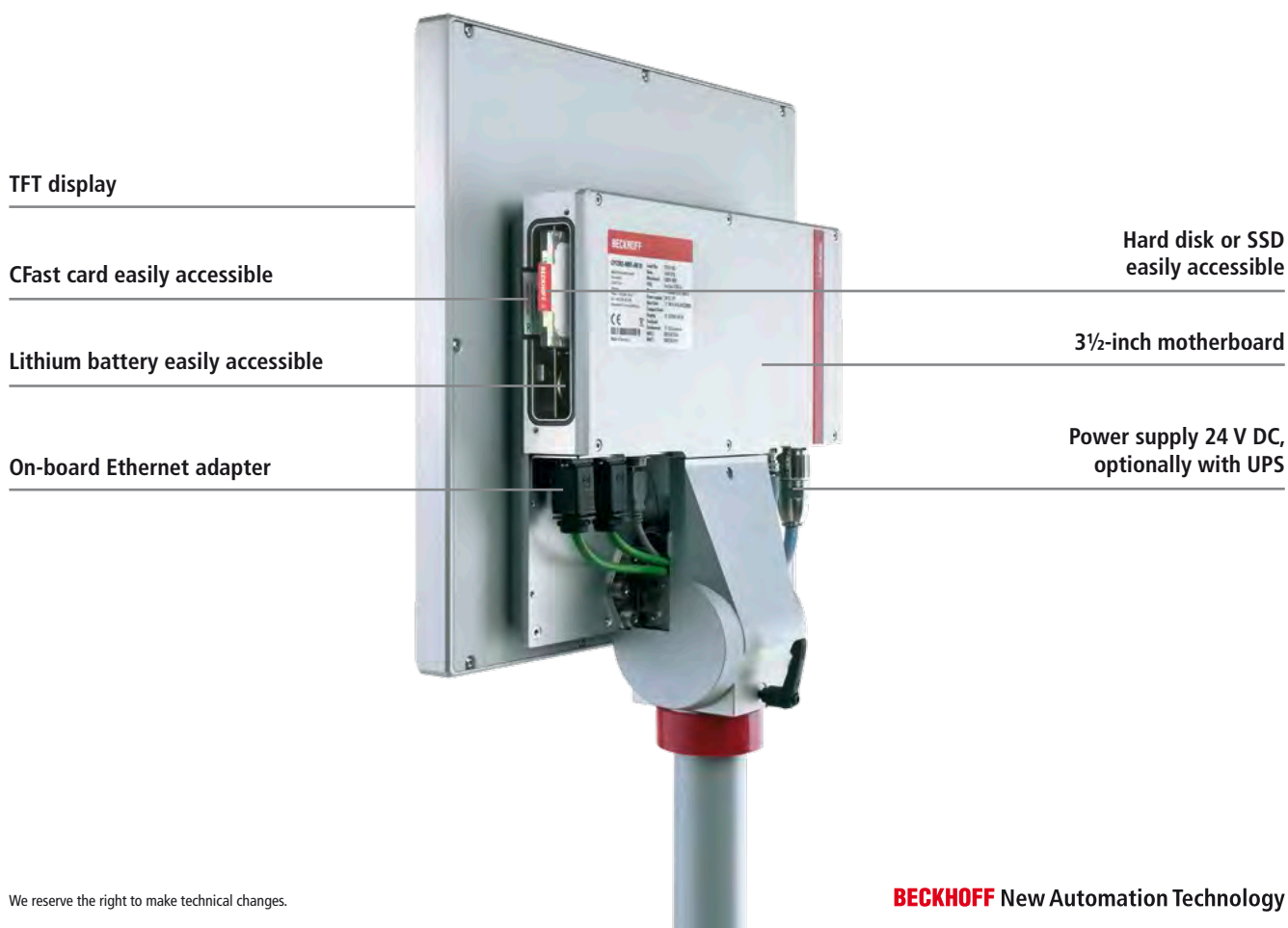
arm, offering fast access to the IP 65 connectors for power supply, Ethernet and optional USB. Prefabricated cables in various lengths are available for all connections.

Due to its two independent Ethernet interfaces the CP72xx is ideally suited as a compact central processing unit for an EtherCAT control system.

The CP72xx series Panel PCs are supplied with a 24 V power supply unit, optionally with integrated uninterruptible power supply (UPS).

A battery pack can be connected externally and installed on a DIN rail in the control cabinet.

One or two CFast cards or up to two hard disks or SSDs, as well as the lithium battery for the system clock, are accessible from the rear side underneath a cover. Two hard disks, two SSDs or two CFast cards can be mirrored using the on-board SATA RAID 1 controller.



TFT display

CFast card easily accessible

Lithium battery easily accessible

On-board Ethernet adapter

Hard disk or SSD easily accessible

3½-inch motherboard

Power supply 24 V DC, optionally with UPS



CP72xx | “Economy” Panel PC

The Industrial PC with mounting arm and 3½-inch motherboard

Ordering information	without touch screen	with single-touch screen	with touch pad
Display only			
12-inch display 800 x 600	CP7201-0000-00xx	CP7201-0001-00xx	
15-inch display 1024 x 768	CP7202-0000-00xx	CP7202-0001-00xx	
19-inch display 1280 x 1024	CP7203-0000-00xx	CP7203-0001-00xx	
Display only, USB A socket in the front			
12-inch display 800 x 600	CP7201-0020-00xx	CP7201-0021-00xx	
15-inch display 1024 x 768	CP7202-0020-00xx	CP7202-0021-00xx	
19-inch display 1280 x 1024	CP7203-0020-00xx	CP7203-0021-00xx	
With function keys			
12-inch display 800 x 600	CP7211-0000-00xx	CP7211-0001-00xx	
15-inch display 1024 x 768	CP7212-0000-00xx	CP7212-0001-00xx	
19-inch display 1280 x 1024	CP7213-0000-00xx	CP7213-0001-00xx	
Numeric keyboard			
12-inch display 800 x 600	CP7221-0000-00xx	CP7221-0001-00xx	CP7221-0002-00xx
15-inch display 1024 x 768	CP7222-0000-00xx	CP7222-0001-00xx	CP7222-0002-00xx
19-inch display 1280 x 1024	CP7223-0000-00xx	CP7223-0001-00xx	CP7223-0002-00xx
Alphanumeric keyboard			
12-inch display 800 x 600	CP7231-0000-00xx	CP7231-0001-00xx	CP7231-0002-00xx
15-inch display 1024 x 768	CP7232-0000-00xx	CP7232-0001-00xx	CP7232-0002-00xx
19-inch display 1280 x 1024	CP7233-0000-00xx	CP7233-0001-00xx	CP7233-0002-00xx
Alphanumeric keyboard with PLC keys on the sides			
15-inch display 1024 x 768	CP7242-0000-00xx	CP7242-0001-00xx	



Without keys



Function keys



Numeric keyboard



Alphanumeric keyboard

Alphanumeric keyboard
with PLC keys on the sides

CP72xx	CP72xx-xxxx-0060, -0070
Housing	Industrial PC with Control Panel for mounting arm installation rotatable mounting arm adapter for Rittal and Rolec mounting arm systems with 48 mm tube from top wiring area for up to 6 IP 65 connectors 1 slot for one 2½-inch hard disk or SSD and 1 slot for one CFast card lithium battery of the system clock, changeable from outside passive cooling through heat sink structure between Control Panel and add-on PC, internal fan for equal heat distribution to all the walls of the housing 20 cm free space required around the PC for air circulation protection class IP 65 operating temperature 0...45 °C

Features	CP72xx-xxxx-0060	CP72xx-xxxx-0070
Display	12-, 15- or 19-inch TFT display	12-, 15- or 19-inch TFT display
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	3½-inch	3½-inch
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	4...32 GB DDR4 RAM	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board, one of these is led out in the wiring area	2 on-board, one of these is led out in the wiring area
Hard disks/flash	1 or 2 x 2½-inch HDD or SSD, 1 x 2½-inch HDD or SSD and 1 x CFast or 2 x CFast	1 or 2 x 2½-inch HDD or SSD, 1 x 2½-inch HDD or SSD and 1 x CFast or 2 x CFast
RAID 1	2 x 2½-inch HDD or 2 x CFast	2 x 2½-inch HDD or 2 x CFast
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP72xx	

CP77xx | "Economy" Panel PC

► www.beckhoff.com/CP77xx

The CP77xx Panel PC series is designed for mounting arm installation. Control Panels form the front of the IP 65 Panel PC. The right display size and keyboard are thus available for every application. The CP77xx Industrial PCs represent a powerful platform for use in machine and plant construction, for example using the TwinCAT automation software.

The PC can be equipped with a 12-, 15- or 19-inch LC display, as a monitor without keys or with different types of keyboard. Optionally, a touch screen or touch pad is available. In addition, a large number of push-button extensions are available.

Cooling is achieved directly via the rear panel of the Control Panel. No fan is required.

The PC can be operated at up to 45 °C ambient temperature.

The housing is optionally designed for direct wall mounting or for mounting arm installation. The mounting arm can be attached from above or below. If a mounting arm is used, the connection cables are fed through the mounting arm adapter attached



Front laminates



Without keys



Function keys



Numeric keyboard



Alphanumeric keyboard

centrally at the rear. Prefabricated cables in various lengths are available for the Ethernet connections.

The compact aluminium housing of the Panel PCs CP77xx is equipped with an Intel® Celeron® ULV or Intel Atom® x5-E39xx with up to four cores.

Due to its two independent gigabit Ethernet interfaces, the CP77xx are ideally suited as a compact central processing unit for an EtherCAT control system.

The CP77xx series Panel PCs are supplied with a 24 V power supply unit. The CFast card and the lithium battery for the system clock

are located under a cover and accessible from the rear.

TFT display

Serial interface RS232

Power supply 24 V DC

CFast card easily accessible from the rear side

On-board dual Ethernet adapter

Lithium battery accessible from the rear side

CP motherboard





CP77xx | "Economy" Panel PC

The compact Industrial PC with mounting arm

Ordering information	without touch screen	with single-touch screen	with touch pad
Display only			
12-inch display 800 x 600	CP7701-0000-00xx	CP7701-0001-00xx	
15-inch display 1024 x 768	CP7702-0000-00xx	CP7702-0001-00xx	
19-inch display 1280 x 1024	CP7703-0000-00xx	CP7703-0001-00xx	
Display only, USB A socket in the front			
12-inch display 800 x 600	CP7701-0020-00xx	CP7701-0021-00xx	
15-inch display 1024 x 768	CP7702-0020-00xx	CP7702-0021-00xx	
19-inch display 1280 x 1024	CP7703-0020-00xx	CP7703-0021-00xx	
With function keys			
12-inch display 800 x 600	CP7711-0000-00xx	CP7711-0001-00xx	
15-inch display 1024 x 768	CP7712-0000-00xx	CP7712-0001-00xx	
19-inch display 1280 x 1024	CP7713-0000-00xx	CP7713-0001-00xx	
Numeric keyboard			
12-inch display 800 x 600	CP7721-0000-00xx	CP7721-0001-00xx	CP7721-0002-00xx
15-inch display 1024 x 768	CP7722-0000-00xx	CP7722-0001-00xx	CP7722-0002-00xx
19-inch display 1280 x 1024	CP7723-0000-00xx	CP7723-0001-00xx	CP7723-0002-00xx
Alphanumeric keyboard			
12-inch display 800 x 600	CP7731-0000-00xx	CP7731-0001-00xx	CP7731-0002-00xx
15-inch display 1024 x 768	CP7732-0000-00xx	CP7732-0001-00xx	CP7732-0002-00xx
19-inch display 1280 x 1024	CP7733-0000-00xx	CP7733-0001-00xx	CP7733-0002-00xx



Without keys



Function keys



Numeric keyboard



Alphanumeric keyboard

CP77xx	CP77xx-xxxx-0040, -0050
Housing	TFT display in three sizes aluminium housing, protection class IP 65 front laminate in four variants special keys identified by slide-in labels for mounting 4 M6 x 18 mm threaded holes in the backplane operating temperature 0...45 °C

Features	CP77xx-xxxx-0040	CP77xx-xxxx-0050
Display	12-, 15- or 19-inch TFT display	12-, 15- or 19-inch TFT display
Processor	Intel® Celeron® ULV 1.4 GHz	Intel Atom® x5-E39xx
Motherboard	CP format	CP format
Memory	2 GB DDR3 RAM	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	CFast card	CFast card
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP77xx	

PCs

► www.beckhoff.com/PC



C6670 | Control cabinet industrial server, 2 x Intel® Xeon®

See page 110



C61xx | ATX control cabinet Industrial PC, Intel® Celeron®, Pentium® or Core™

See page 98



C62xx | ATX control cabinet Industrial PC, Intel® Celeron®, Pentium® or Core™

See page 102



C52xx | 19-inch slide-in Industrial PC, Intel® Celeron® or Core™

See page 94



C6640/C6650 | ATX control cabinet Industrial PC, Intel® Celeron®, Pentium® or Core™

See page 106



C65xx | Built-in Industrial PC, Intel® Celeron® or Core™

See page 124



C6920/C6930 | Compact Industrial PC, Intel® Celeron® or Core™

See page 130



C6905/C6915/C6925 | Compact Industrial PC, Intel® Celeron® ULV or Atom®

See page 130



C60xx | Ultra-compact Industrial PC, Intel Atom® or Intel® Core™

See page 112



C7015 | Ultra-compact Industrial PC in IP 65/67, Intel Atom®

See page 120

C52xx | Industrial PC series for 19-inch rack installation

► www.beckhoff.com/C52xx

The C5210 19-inch slide-in Industrial PC measures only one height unit. This Industrial PC has an Intel® Celeron® or Core™ i3/i5/i7 processor of the latest generation on a 3½-inch motherboard with on-board RAID controller and two 3½-inch hard drive removable frames.

The combination of industrially-capable performance and functionality

with an extremely flat design makes the C5210 particularly well-suited for space-saving applications. The low installation height is made possible with the Beckhoff 3½-inch motherboards. The motherboard is equipped with a multitude of on-board interfaces, such as two Gigabit Ethernet ports, a DVI and a COM port as well as four USB ports. The C5210 can be extended

with two PCIe modules. A multi DVD drive can be optionally installed behind the front flap. For the 19-inch Industrial PC the operating system Windows 10 IoT Enterprise is offered, and up to the 6th Intel® Core™ processor also Windows 7 Professional, Windows 7 Ultimate or Windows Embedded Standard 7.

The C5240 Industrial PC expands the Industrial PC series by a version with four

19-inch housing,
1 rack unit

Optional: pull-out
rails on the side

3½-inch hard disk
in removable frame

2 USB ports

Reset button

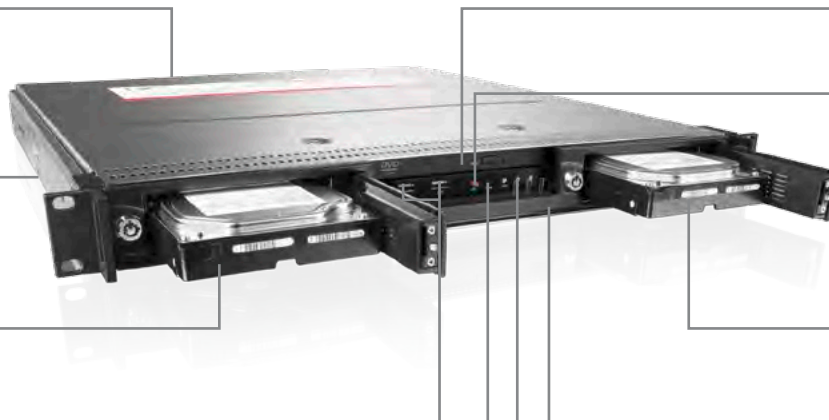
DVD drive slot

ATX power switch

Second remov-
able frame for a
RAID 1 system

Lockable front flap

Status LEDs





C5210



C5240

height units and seven PCI and PCIe plug-in card slots in 24 V DC or 110 to 230 V AC versions. The basic configuration includes three 5¼-inch drive bays behind the front flap. As an option, three additional 5¼-inch drive bays are available ex factory. It is designed for installation in a 19-inch rack and is equipped with components of the

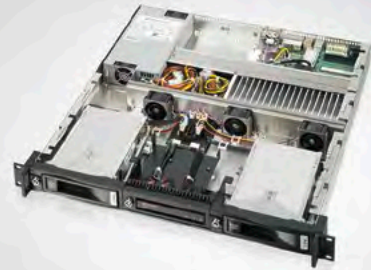
highest performance class according to the ATX standard.

A Beckhoff industrial motherboard is used with Intel® Celeron®, Intel® Pentium® or Intel® Core™ i3/i5/i7 processors of the newest generation. From the 7th generation a Windows 10 64 bit is required as operating system. With the 6th generation of Intel® Core™ processors,

Windows 7 32 bit or 64 bit can be used as well.

The C5240 is ideally suited for use in machine and plant engineering, for example with TwinCAT automation software.





C5210 | 19-inch slide-in Industrial PC

C5210	C5210-0030, -0040
Housing	slide-in housing for 19-inch racks, 1 rack unit 2 removable frames for hard disks 2 brackets to lead out serial interfaces 1 DVD drive slot, 2 USB sockets, reset key and ATX key behind a lockable front flap protection class IP 20 operating temperature 0...55 °C dimensions (W x H x D) 482.7 x 44 x 493.8 mm (19" x 1.7" x 19.44") depth behind the front 471.3 mm (18.56")

Features	C5210-0030	C5210-0040
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	3½-inch	3½-inch
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	4...32 GB DDR4 RAM	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	1–2 x 3½-inch HDD or 2½-inch SSD	1–2 x 3½-inch HDD or 2½-inch SSD
RAID 1	2 x 3½-inch HDD	2 x 3½-inch HDD
Possible disk drives	multi DVD	multi DVD
Power supply	100...240 V AC or 24 V DC	100...240 V AC or 24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C5210	



C5240 | 19-inch slide-in Industrial PC

C5240	C5240-0010, -0020
Housing	7-slot slide-in housing ATX for 19-inch racks, 4 rack units all slots for full-length plug-in cards lockable front flap card holders protection class IP 50 operating temperature 0...55 °C weight of the basic configuration 17.0 kg (37.5 lbs) dimensions (W x H x D) 482 x 177 x 511 mm (19" x 7" x 20.1") depth behind the front 471.3 mm (18.56")

Features	C5240-0010	C5240-0020
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	ATX	ATX
Slots	7	7
Free slots	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16
Max. card length	7 x fullsize	7 x fullsize
Memory	4...64 GB DDR4 RAM	4...128 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	1–6 x 3½-inch HDD or 2½-inch SSD	1–6 x 3½-inch HDD, 2½-inch SSD, PCIe plug-in card SSD
RAID 1	2 x 3½-inch HDD	2 x 3½-inch HDD
Possible disk drives	multi DVD	multi DVD
Power supply	100...240 V AC or 24 V DC	100...240 V AC or 24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C5240	

C61xx | Industrial PC series for control cabinet installation

► www.beckhoff.com/C61xx

The C61xx control cabinet PC is equipped with maximum performance class components with Intel® Celeron®, Pentium® or Core™ i3/i5/i7 of the latest generation on an ATX motherboard. The PCs in the C61xx series are constructed according to a uniform plan, optimised for the exploitation of available space and easy accessibility of all components.

The construction of the housing for the C61xx series ensures long-term compatibility with any new PC components that appear over the next few years. If, in a few years, the Industrial PC needs to be upgraded, you swap the motherboard, the processor, the memory or the hard disk, but the housing remains unchanged and is compatible with the technology of the future.

All the PC's connections face upwards, so that the connecting cable can be taken directly to the wiring channel. The side walls are completely passive and allow the Industrial PC to be fitted immediately next to other control cabinet devices.

The inner chassis can be placed on a table in any orientation for maintenance purposes. When removed, the inner chassis still has the





C6140



C6150

full function of a PC and can be operated with a standard monitor and a standard keyboard.

The housing permits fast access to the fitted components. After removing the front cover, plug-in cards and drives are freely accessible. Hard disks are held by springloaded ball catches and can be removed in a single action. Three screws must be undone, after which the PC's inner chassis, to which

all the components are attached, can be removed from the outer housing.

The C61xx series PCs are supplied with a 100 to 240 V AC full range or 24 V DC power supply unit. An industrial latching socket strip is used for the power supply.

A multi DVD drive can be fitted. Card holders for the plug-in cards generate insensitivity to shocks and vibrations.

The card holders can be fixed and removed without tools.

A type plate is located on the front cover behind an inspection window, giving detailed information about the configuration of the PC. The construction of the housing has been designed to allow individual adaptation, and many features can be adjusted for your application.

4 USB ports

On-board Ethernet adapter

All connections on the top

7 free slots

Fan with speed monitoring and double ball bearing, easily exchangeable

Hard disk or SSD

Serial interface RS232

Power supply 100–240 V full range or 24 V DC, optionally with 24 V DC UPS

ATX motherboard

Passive side wall: fitting possible immediately next to other devices

DVD drive slot





C6140 | Control cabinet Industrial PC

C6140	C6140-0070, -0080
Housing	7-slot ATX Industrial PC for control cabinet installation 3 slots for plug-in cards with a length of up to 270 mm and 4 slots for plug-in cards with a length of up to 240 mm drives and plug-in cards easily accessible all connectors on the top detailed PC configuration information on the front status LEDs and protected reset key card holders, actuated without tools protection class IP 20 operating temperature 0...55 °C weight of the basic configuration 14 kg (30.9 lbs) dimensions (W x H x D) 383 x 362 x 265 mm (14.9" x 14.1" x 10.5")

Features	C6140-0070	C6140-0080
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	ATX	ATX
Slots	7	7
Free slots	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16
Max. card length	3 x 270 mm and 4 x 240 mm	3 x 270 mm and 4 x 240 mm
Memory	4...64 GB DDR4 RAM	4...128 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	1–3 x 3½-inch HDD or 2½-inch SSD	1–3 x 3½-inch HDD, 2½-inch SSD, PCIe plug-in card SSD
RAID 1	2 x 3½-inch HDD	2 x 3½-inch HDD
Possible disk drives	multi DVD	multi DVD
Power supply	100...240 V AC or 24 V DC	100...240 V AC or 24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6140	



C6150 | Control cabinet Industrial PC

C6150	C6150-0070
Housing	7-slot ATX Industrial PC for control cabinet installation all slots for full-length plug-in cards drives and plug-in cards easily accessible all connectors on the top detailed PC configuration information on the front status LEDs and protected reset key card holders, actuated without tools protection class IP 20 operating temperature 0...55 °C weight of the basic configuration 15 kg (33.1 lbs) dimensions (W x H x D) 383 x 423 x 265 mm (15.1" x 16.7" x 10.5")

Features	C6150-0070
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation
Motherboard	ATX
Slots	7
Free slots	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16
Max. card length	7 x fullsize
Memory	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor
Ethernet	2 on-board
Hard disks/flash	1-3 x 3½-inch HDD or 2½-inch SSD
RAID 1	2 x 3½-inch HDD
Possible disk drives	multi DVD
Power supply	100...240 V AC or 24 V DC
Recommendation	available
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6150

C62xx | Industrial PC series for control cabinet installation

► www.beckhoff.com/C62xx

The control cabinet PC series C62xx is equipped with maximum performance class components: with Intel® Celeron®, Pentium® or Core™ i3/i5/i7 of the latest generation on an ATX motherboard. The PCs in the C62xx series are constructed according to a uniform plan, optimised for the exploitation of available space and easy accessibility of all components.

The construction of the housing for the C62xx series ensures long-term compatibility with any new PC components that appear over the next few years. If, in a few years, the Industrial PC needs to be upgraded, you swap the motherboard, the processor, the memory or the hard disk, but the housing remains unchanged, and is compatible with the technology of the future.

All the PC's connections face to the front. The inner chassis can be drawn out forward on telescopic rails, thus offering free access to all the fitted components.

The C62xx series PCs are offered with a 100 to 240 V AC full range or 24 V DC power supply unit. An industrial latching socket strip is used for the power supply.





C6240

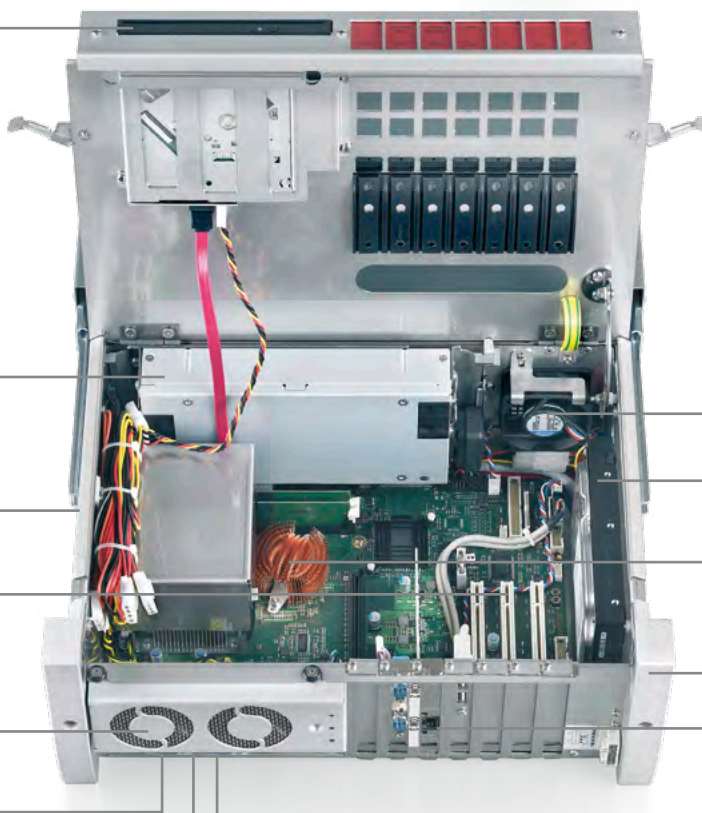


C6250

Card holders for the plug-in cards generate insensitivity to shocks and vibrations. The card holders can be fixed and removed without tools. Data describing the function and type for the fitted plug-in cards is listed on the front.



DVD drive slot



Power supply 100–240 V full range or 24 V DC, optionally with 24 V DC UPS

Passive side wall: fitting possible immediately next to other devices

7 free slots

Fan with speed monitoring and double ball bearing, easily exchangeable

Serial interface RS232

Fan with speed monitoring and double ball bearing, easily exchangeable

Hard disk or SSD

ATX industrial motherboard

Inner chassis can be pulled forward

All connections on the front

On-board Ethernet adapter

4 USB ports



C6240 | Control cabinet Industrial PC

C6240	C6240-0070, -0080
Housing	7-slot ATX Industrial PC for control cabinet installation mounting sheet for horizontal PC installation all slots for plug-in cards with a length of up to 190 mm drives and plug-in cards easily accessible all connectors on the front detailed PC configuration information on the front status LEDs and protected reset key card holders, actuated without tools protection class IP 20 operating temperature 0...55 °C weight of the basic configuration 12.3 kg (27.2 lbs) dimensions (W x H x D) 430 x 170 x 274 mm (16.9" x 6.7" x 10.8")

Features	C6240-0070	C6240-0080
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	ATX	ATX
Slots	7	7
Free slots	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16
Max. card length	7 x 190 mm	7 x 190 mm
Memory	4...64 GB DDR4 RAM	4...128 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	1 x 3½-inch HDD or 2 x 2½-inch HDD or SSD	1 x 3½-inch HDD or 2 x 2½-inch SSD, PCIe plug-in card SSD
RAID 1	2 x 2½-inch HDD	2 x 2½-inch HDD
Possible disk drives	multi DVD	multi DVD
Power supply	100...240 V AC or 24 V DC	100...240 V AC or 24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6240	



C6250 | Control cabinet Industrial PC

C6250	C6250-0080
Housing	7-slot ATX Industrial PC for control cabinet installation mounting sheet for horizontal installation 4 slots for plug-in cards with a length of up to 220 mm and 3 slots for plug-in cards with a length of up to 190 mm drives and plug-in cards easily accessible all connectors on the front detailed PC configuration information on the front status LEDs and protected reset key card holders, actuated without tools protection class IP 20 operating temperature 0...55 °C weight of the basic configuration 19.8 kg (43.7 lbs) dimensions (W x H x D) 680 x 184 x 270 mm (26.8" x 7.2" x 10.7")

Features	C6250-0080
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation
Motherboard	ATX
Slots	7
Free slots	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16
Max. card length	7 x 190 mm
Memory	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor
Ethernet	2 on-board
Hard disks/flash	1-3 x 3½-inch HDD or 2½-inch SSD
RAID 1	2 x 3½-inch HDD
Possible disk drives	multi DVD
Power supply	100...240 V AC or 24 V DC
Recommendation	available
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6250

C6640/C6650 | Industrial PC series for control cabinet installation

► www.beckhoff.com/C66xx

The C6640/C6650 control cabinet PC series includes two devices, both of which are equipped with top-performance components with Intel® Celeron®, Pentium® or Core™ i3/i5/i7 of the latest generation on an ATX motherboard. All slots are available for plug-in cards with a length of up to 210 mm. Graphics and Ethernet adapters are already

available on-board, without taking up a slot.

All PC connections face upwards, so that the connecting cable can be taken directly to the wiring channel. The side walls are completely passive, and allow the Industrial PC to be fitted immediately next to other control cabinet devices.

The C6640/C6650 series is designed for optimum space utilisation and easy accessibility of all components. The C6640 is the most compact PC with ATX motherboard but nevertheless offers convenient access to drives, memory and plug-in cards.

The C6650 features hard drive removable frames which, together with the on-board





C6640



C6650

RAID controller, form a RAID 1 system with two mirrored hard disks. This ensures high data security. Hard disks which failed can easily be exchanged during operation.

The housing design of the C6640/C6650 series ensures long-term compatibility with new PC components. The motherboard, processor, memory or hard disk are upgradable,

while the same housing can be used for years to come.

The device can be equipped with a multi DVD drive. A choice of a high-performance SSD, NVM Express™ in the format of a PCIe x4 plug-in card or a SATA 2½-inch SSD is offered for a flash disk. Card holders for the plug-in cards ensure resistance to impacts

and vibrations. The C6640/C6650 series PCs are supplied with 100 to 240 V AC full range or 24 V DC power supply unit.

A type plate is located on the top of the front cover, giving detailed information about the PC configuration.

The housing design offers plenty of scope for adjustment to the respective application.

On-board Ethernet adapter

4 USB ports

All connections on the top

ATX motherboard

7 free slots

Fan with speed monitoring and double ball bearing, easily exchangeable

Serial interface RS232

Power supply 100–240 V full range or 24 V DC, optionally with 24 V DC UPS

Passive side wall: fitting possible immediately next to other devices

Optional SSD or CFast card

DVD drive slot

Hard disks in removable frames





C6640 | Control cabinet Industrial PC

C6640	C6640-0050, -0060
Housing	7-slot ATX Industrial PC for control cabinet installation all slots for up to 210 mm long plug-in cards drives and plug-in cards easily accessible 2 brackets to led out serial interfaces all connectors on the top detailed PC configuration information on the front card holders, actuated without tools protection class IP 20 operating temperature 0...55 °C weight of the basic configuration 11 kg (24.3 lbs) dimensions (W x H x D) 371 x 336 x 198 mm (14.6" x 13.2" x 7.8")

Features	C6640-0050	C6640-0060
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	ATX	ATX
Slots	7	7
Free slots	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16
Max. card length	7 x 210 mm	7 x 210 mm
Memory	4...64 GB DDR4 RAM	4...128 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	1 x 3½-inch and 1 x 2½-inch HDD or SSD or CFast	1 x 3½-inch, 1 x 2½-inch HDD or SSD, PCIe plug-in card SSD
RAID 1	–	–
Possible disk drives	multi DVD	multi DVD
Power supply	100...240 V AC or 24 V DC	100...240 V AC or 24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6640	



C6650 | Control cabinet Industrial PC

C6650	C6650-0050, -0060
Housing	7-slot ATX Industrial PC for control cabinet installation all slots for up to 210 mm long plug-in cards 2 removable frames for hard disks drives and plug-in cards easily accessible 3 brackets to led out serial interfaces all connectors on the top detailed PC configuration information on the front card holders, actuated without tools protection class IP 20 operating temperature 0...55 °C weight of the basic configuration 12 kg (26.5 lbs) dimensions (W x H x D) 410 x 360 x 201 mm (16.1" x 14.2" x 7.9")

Features	C6650-0050	C6650-0060
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	ATX	ATX
Slots	7	7
Free slots	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16	2 PCI, 2 PCIe x1, 2 PCIe x4 and 1 PCIe x16
Max. card length	7 x 210 mm	7 x 210 mm
Memory	4...64 GB DDR4 RAM	4...128 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	1–2 x 3½-inch and 1 x 2½-inch HDD or SSD or CFast	1–2 x 3½-inch, 1 x 2½-inch HDD or SSD, PCIe plug-in card SSD
RAID 1	2 x 3½-inch HDD	2 x 3½-inch HDD
Possible disk drives	multi DVD	multi DVD
Power supply	100...240 V AC or 24 V DC	100...240 V AC or 24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6650	

C6670 | Industrial server for control cabinet installation

► www.beckhoff.com/C6670

The C6670 and a Beckhoff Control Panel with DVI and USB connection make an ideal combination, representing a powerful platform for machine construction and plant engineering applications with the TwinCAT automation software.

In combination with TwinCAT 3, two Intel® Xeon® processors, each with 8, 12, 16 or 20 cores on one motherboard with two Gigabit Ethernet controllers and a powerful graphics card produce a machine or plant controller that offers computing power for completely new ideas. Apart from the extremely high performance,

up to 1024 GB DDR4 RAM and 5 free plug-in card slots are also available for several camera interface cards for video evaluation.

All connections of the industrial server face upwards, so that the connecting cables can be taken directly to the wiring channel. The side walls are completely passive, and allow the industrial server to be fitted immediately next to other control cabinet devices.

The C6670 features two hard drive removable frames which, together with the on-board RAID controller, form a RAID 1 system with two mirrored hard disks or SSDs. This ensures high data security. Hard disks

or SSDs which failed can easily be exchanged during operation.

The device can be equipped with a multi DVD drive. Card holders for the plug-in cards ensure resistance to impacts and vibrations. The C6670 offers convenient access to drives, memory and plug-in cards. The industrial server is supplied with a 100 to 240 V AC full range power supply unit.

A type plate is located on the top of the front cover, giving detailed information about the server configuration.

All connections on the top

6 free slots: 3 PCIe x8, 3 PCIe x16

Graphic card with
2 DVI connectors

SSI EEB motherboard

Passive side wall: fitting possible
immediately next to other devices

Power supply 100–240 V AC
full range

On-board dual Ethernet adapter

2 Intel® Xeon® processors

Optional DVD drive

Removable frames with
hard disks or SSDs





C6670 | Control cabinet industrial server

C6670	C6670-0010
Housing	6-slot SSI EEB industrial server for control cabinet installation
	all slots for full-size plug-in cards
	2 removable frames for hard disks
	drives and plug-in cards easily accessible
	all connectors on the top
	detailed PC configuration information on the front
	protection class IP 20
	operating temperature 0...45 °C
weight of the basic configuration 16 kg (35.3 lbs)	
dimensions (W x H x D) 410 x 480 x 201 mm (16.1" x 18.9" x 7.9")	

Features	C6670-0010
Processor	2 x Intel® Xeon® with 8, 12, 16 or 20 cores per processor
Motherboard	SSI EEB
Slots	6
Free slots	3 PCIe x8 and 3 PCIe x16
Max. card length	6 x fullsize
Memory	64...1024 GB DDR4 RAM ECC
Graphic adapter	graphic card, 1 DVI-I and 1 DVI-D connector, occupies a PCIe x16 slot
Ethernet	2 on-board
Hard disks/flash	1-2 x 3½-inch HDD or 1-2 x 2½-inch HDD or SSD
RAID 1	2 x 3½-inch HDD or 2 x 2½-inch HDD or SSD
Possible disk drives	multi DVD
Power supply	100...240 V AC
Recommendation	available
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6670

C60xx | Ultra-compact Industrial PCs

► www.beckhoff.com/C60xx

The C60xx series of scalable ultra-compact Industrial PCs combines maximum computing power in what is currently the most compact format with a wide range of options for installation in the control cabinet. It is ideally suited for control, visualization and communication, for example into the cloud.

The latest Intel® processors – in three different performance classes, from the Intel Atom® with one core to the Intel® Core™ i7 with eight cores –

offer maximum scalability and power density with an optimal price-performance ratio.

The C601x series offers Intel Atom® computing power for a wide range of automation and visualization tasks. Due to their impressive computing power in relation to their size, the PCs are mainly suited for use in Industrie 4.0 applications, for example as an IoT gateway.

The C603x series unites high-performance Intel® Core™-i processors with extremely compact housing dimensions.

The processors from the 65 W class have only been used in the much larger ATX-based Industrial PCs up to now. The devices thus represent a new dimension in terms of power density. They are suitable above all for particularly complex automation and visualization tasks, but also for a wide range of other applications in the field of image processing, the handling of large volumes of data and in the IoT environment.

The C602x series is the link between the C601x and the C603x, and the fanless





C6015

C6017

C6025

C6030

C6032

integration of Intel® Core™-i-U processors of the 15 W class opens up new application areas and options.

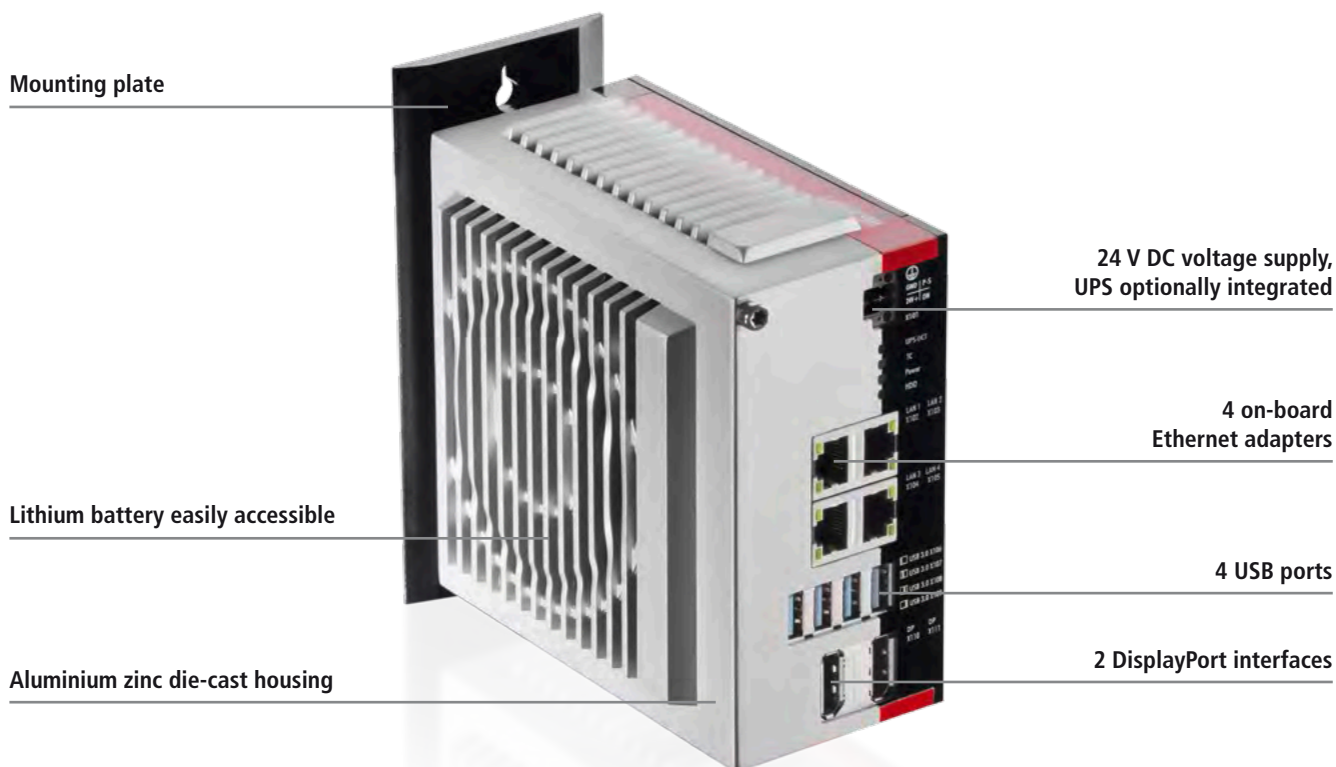
The Industrial PCs from the C60xx series are the most compact in their respective performance class in the Beckhoff portfolio. In use, up to 90% space can be saved with the same computing power (compare Beckhoff C6640 and C6030). The C6015 – the smallest Beckhoff Industrial PC with a mounting space of just 82 x 82 x 40 mm – should be highlighted here.

In particular the wide variety of mounting options for the rear panel of the control cabinet or the DIN rail should be highlighted with this Industrial PC series. The connection level can be freely oriented, i.e. adapted to possibly specified cable layouts. Due to their maximum flexibility, the PCs fit in any niche in the control cabinet, however small.

Due to the optimized housing and manufacturing concept, all Industrial PCs from the C60xx series are cost-optimized and are often less expensive in direct comparison

with other series in the Industrial PC product area without restrictions in industrial compatibility, quality or durability.

The basic concept of the series always provides for an all-in-one motherboard developed and self-manufactured by Beckhoff. The single-board PCs are characterized by further improved robustness and durability. Modular, functional extensions in the form of a second board level can be integrated in every motherboard via an internal plug connector.



Mounting plate

Lithium battery easily accessible

Aluminium zinc die-cast housing

24 V DC voltage supply,
UPS optionally integrated

4 on-board
Ethernet adapters

4 USB ports

2 DisplayPort interfaces



C6015 for
installation at
the rear wall



C6015 for
installation at
the side wall



C6015 | Fanless ultra-compact Industrial PC

C6015	C6015-0010	C6015-0020
Housing	fanless Industrial PC for space-saving control cabinet installation	
	mounting sheet at the rear wall	
	all connectors on the same level	
	flexible mounting mechanism for the free alignment of the connecting area	
	aluminium zinc die-cast housing	
	status LEDs	
	lithium battery easily accessible	
	1 slot for one M.2 SSD easily accessible	
	passive, fanless cooling with one-sided cool plate	
	5 cm (2") free space above and under as well as 2 cm (0.8") free space at the sides of the PC required for air circulation	
	protection class IP 20	
	operating temperature 0...55 °C	operating temperature 0...50 °C
	compact dimensions (W x H x D) 82 x 82 x 40 mm (3.2" x 3.2" x 1.6"), without mounting plate	

Features	C6015-0010	C6015-0020
Processor	Intel Atom® E38xx	Intel Atom® x5-E39xx
Motherboard	compact motherboard	compact motherboard
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	2...4 GB DDR3L RAM	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	M.2 SSD	M.2 SSD
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6015	



C6017 for
installation at
the rear wall



C6017 for
installation at
the side wall



C6017 | Fanless ultra-compact Industrial PC

C6017	C6017-0010	C6017-0020
Housing	fanless Industrial PC for space-saving control cabinet installation housing prepared for ex work installation of further configurations mounting plate on the rear wall all connectors on the same level flexible mounting mechanism for the free alignment of the connecting area aluminium zinc die-cast housing status LEDs lithium battery easily accessible 1 slot for one M.2 SSD easily accessible passive, fanless cooling with one-sided cool plate 5 cm (2") free space above and under as well as 2 cm (0.8") free space at the sides of the PC required for air circulation protection class IP 20 operating temperature 0...55 °C compact dimensions (W x H x D) 82 x 82 x 66 mm (3.2" x 3.2" x 2.6"), without mounting plate	
		operating temperature 0...50 °C

Features	C6017-0010	C6017-0020
Processor	Intel Atom® E38xx	Intel Atom® x5-E39xx
Motherboard	compact motherboard	compact motherboard
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	2...4 GB DDR3L RAM	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	M.2 SSD	M.2 SSD
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6017	



C6025 | Fanless ultra-compact Industrial PC

C6025	C6025-0000
Housing	fanless Industrial PC for space-saving control cabinet installation mounting plate on the rear wall all connectors on the same level aluminum zinc die-cast housing status LEDs lithium battery easily accessible under the side cover 1 slot for one M.2 SSD easily accessible under the side cover passive, fanless cooling with one-sided cool plate 5 cm (2") free space above and under as well as 2 cm (0.8") free space at the sides of the PC required for air circulation protection class IP 20 operating temperature 0...50 °C compact dimensions (W x H x D) 82 x 127 x 50 mm (3.2" x 5.0" x 1.9"), without mounting plate

Features	C6025-0000
Processor	Intel® Celeron®, Core™ i3/i5/i7 8 th generation
Motherboard	compact motherboard
Slots	–
Free slots	–
Max. card length	–
Memory	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor
Ethernet	3 on-board
Hard disks/flash	M.2 SSD
Power supply	24 V DC
Recommendation	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6025



C6030 for
installation at
the rear wall



C6030 for
installation at
the side wall



C6030 | Ultra-compact Industrial PC

C6030	C6030-0060, -0070
Housing	Industrial PC for space-saving control cabinet installation mounting plate on the rear wall for the free alignment of the connecting area all connectors on the same level flexible mounting mechanism for the free alignment of the connecting area aluminium zinc die-cast housing status LEDs lithium battery easily accessible under the side cover 2 slots for M.2 SSDs easily accessible under the side cover controlled fan with speed monitoring and double ball bearings, exchangeable 5 cm (2") free space required around the PC for air circulation protection class IP 20 operating temperature 0...55 °C compact dimensions (W x H x D) 129 x 133 x 76 mm (5.1" x 5.2" x 2.6"), without mounting plate

Features	C6030-0060	C6030-0070
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	compact motherboard	compact motherboard
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	4...32 GB DDR4 RAM	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	4 on-board	4 on-board
Hard disks/flash	2 x M.2 SSD	2 x M.2 SSD or 1x high performance M.2 SSD
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6030	

C6032 with
4 x RS232C6032 for
installation at
the side wall

C6032 | Ultra-compact Industrial PC

C6032	C6032-0060, -0070
Housing	<ul style="list-style-type: none"> Industrial PC for space-saving control cabinet installation mounting plate on the rear wall for the free alignment of the connecting area all connectors on the same level flexible mounting mechanism for the free alignment of the connecting area aluminium zinc die-cast housing status LEDs lithium battery accessible 2 slots for M.2 SSDs accessible 2 PCIe compact module slots to plug-in Beckhoff PCIe compact modules ex factory controlled fan with speed monitoring and double ball bearings, exchangeable 5 cm (2") free space required around the PC for air circulation protection class IP 20 operating temperature 0...55 °C compact dimensions (W x H x D) 129 x 133 x 104 mm (5.1" x 5.2" x 4.1"), without mounting plate

Features	C6032-0060	C6032-0070
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	compact motherboard	compact motherboard
Slots	2 PCIe compact module slots	2 PCIe compact module slots
Free slots	–	–
Max. card length	–	–
Memory	4...32 GB DDR4 RAM	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	4 on-board	4 on-board
Hard disks/flash	2 x M.2 SSD	2 x M.2 SSD or 1x high performance M.2 SSD
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6032	



C70xx | Industrial PC in IP 65 for direct integration into the machine

► www.beckhoff.com/C70xx

Following the current trend, this space-saving IP 65/67 Industrial PC hardware with flexible mounting options is ideally suited for implementing advanced Industrie 4.0 solutions. A wide variety of onboard interfaces enables the networking of machine or plant sections in the cloud or other networks. Moreover, the integrated EtherCAT P connection offers undreamt-of possibilities for the direct connection of actuators and sensors via EtherCAT P Box modules with IP 67 protection. The decentralized solving of complex diagnostic or condition monitoring tasks is thus possible.

The compact Beckhoff module motherboard and the housing combination of die-cast zinc and aluminum have been developed in typical Beckhoff style for industrial suitability, long-term availability and reliability. Despite passive cooling, the C7015 is suitable for a temperature range up to +50 °C. A wide range of interfaces (3 x LAN, 2 x USB, mini DisplayPort, EtherCAT P), a minimum of 40 GB M.2 SSD with 3D Flash and integrated Intel Atom® CPU (up to 4 cores) with continuous multi-core support for TwinCAT 3 make the C7015 the ideal platform for

different tasks: simultaneous, high-performance automation under harsh real-time conditions, visualization and communication.

The C7015 Industrial PC is one of the most compact devices in its performance class in the Beckhoff portfolio. Thanks to the sophisticated IP 65/67 design it can be used directly in or at the machine, so that there is no need for a complex control cabinet. This results in space savings of over 90% (compared to Beckhoff C6640 and C7015). Due to





C7015

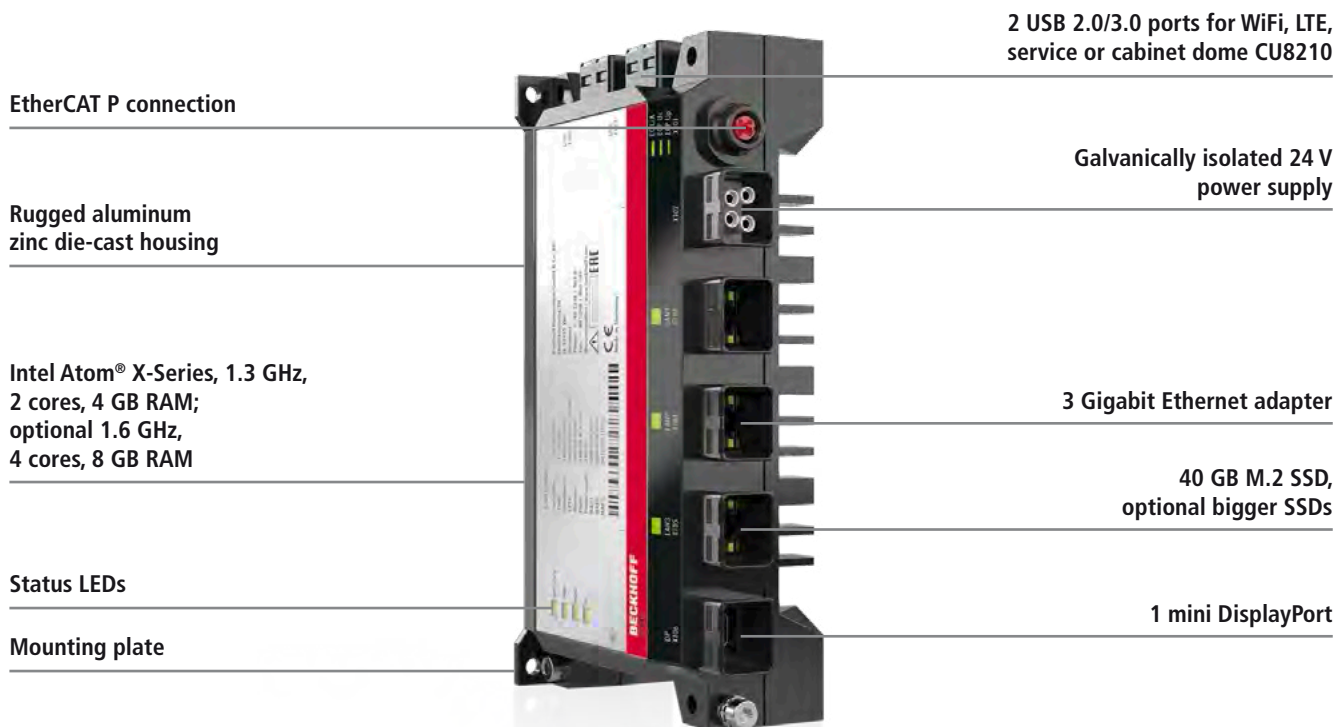
its small dimensions, the C7015 is also suitable for retrofitting in the field.

In addition to its compactness, the C70xx series also offers versatile mounting options for machine or system integration. It goes without saying that this very robust Industrial PC can also be used inside a control cabinet. The connection level can always be freely oriented. The flexible mounting concept, which is integrated ex factory as standard, allows mounting on the narrow rear wall or on the side. Thanks to this flexibility, the C70xx fits into even the smallest space.

Due to the optimized housing and manufacturing concept, all Industrial PCs from the C70xx series are cost-optimized and are often less expensive in direct comparison with other series in the Beckhoff IPC product area without restrictions in industrial compatibility, quality or durability.

The basic concept of the C70xx series always includes an all-in-one motherboard. This further increases the robustness and service life of the single-board Industrial PCs. Thanks to extensive on-board interfaces – up to an EtherCAT P connection – countless

user scenarios can be realized even when the device is installed in the field, from conventional machine control to advanced Industrie 4.0 solutions when used as an edge device.

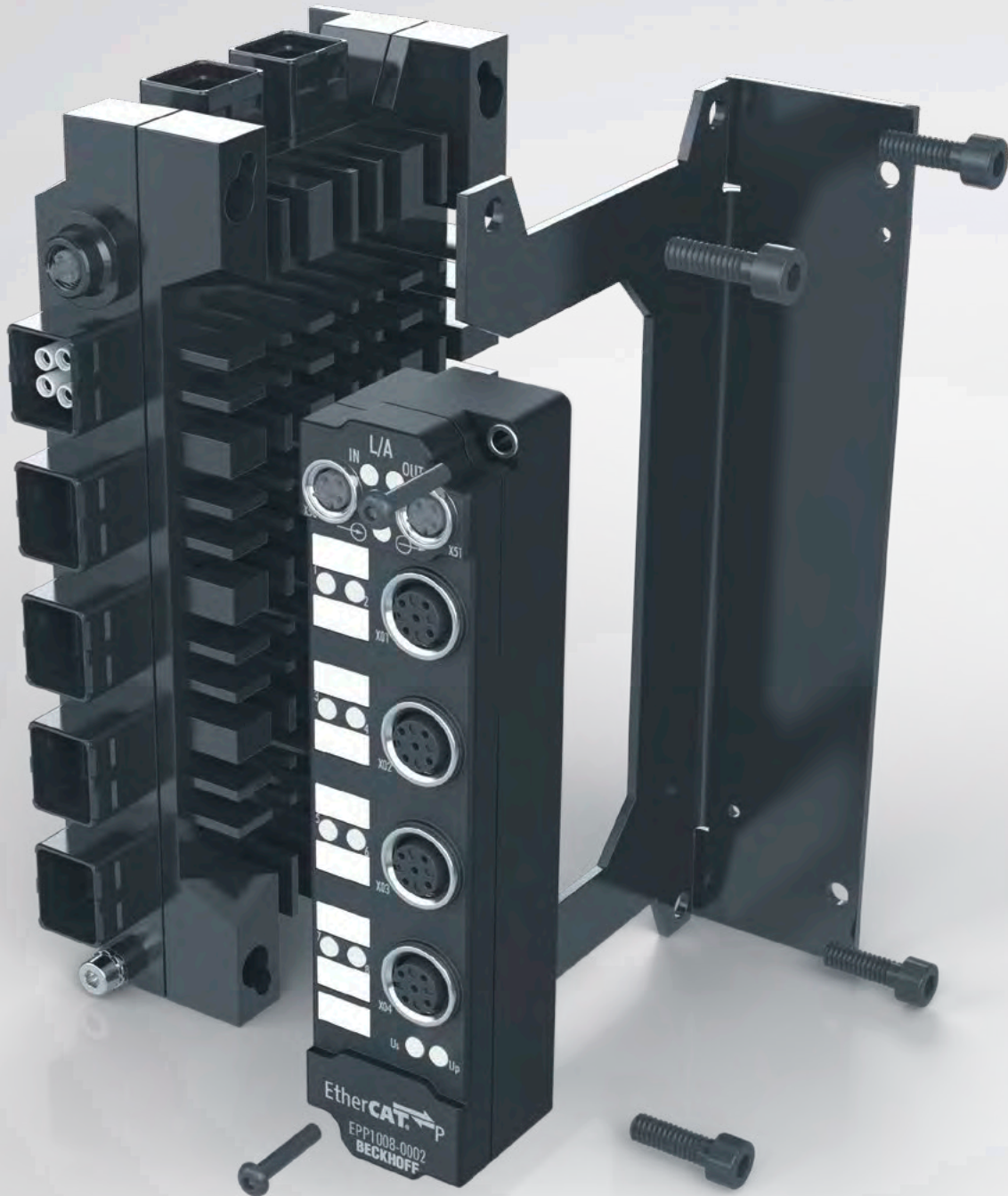




C7015 | Industrial PC in IP 65 for direct integration into the machine

C7015	C7015-0020
Housing	fanless Industrial PC in IP 65/67 for direct integration into mechanical engineering applications mounting plate on the rear and side wall flexible mounting mechanism for the free alignment of the connecting area aluminum zinc die-cast housing status LEDs 1 slot for one M.2 SSD passive, fanless cooling with one-sided cool plate 5 cm (2") free space above and under as well as 2 cm (0.8") free space at the sides of the PC required for air circulation IP 65/67 operating temperature 0...50 °C dimensions (W x H x D) 85 x 167 x 43 mm (3.3" x 6.6" x 1.7")

Features	C7015-0020
Processor	Intel Atom® x5-E39xx
Motherboard	compact motherboard
Slots	–
Free slots	–
Max. card length	–
Memory	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor
Ethernet	3 x Ethernet and 1 x EtherCAT P on-board
Interfaces	1 x mini DisplayPort Harting PushPull, 2 x USB 3.0 Harting PushPull
Hard disks/flash	M.2 SSD
Power supply	24 V DC
Recommendation	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C7015



C65xx | Industrial PC series for installation into the wall of a housing

► www.beckhoff.com/C65xx

The C65xx Industrial PC series is designed to be installed in control cabinet walls or in the rear panel of a control housing or console housing. The heat sink of the Industrial PC is fed to the outside through a suitable cut-out in the panel or wall of the control cabinet. Power dissipation from the processor and chipset takes place directly to ambient.

Integrated seals provide for an IP 65 closure. This enables high thermal stability and at the same time fanless operation. Industrial PCs of type C65xx are thus completely without rotating parts. Installation in a control housing in combination with a Beckhoff Control Panel results in a fanless Panel PC that can be operated at ambient temperatures up to 45 °C.

The compact housing is equipped with a 3½-inch motherboard for Intel® Celeron® or Core™ i3/i5/i7 of the latest generation. All of the PC's connectors are located on the top of the housing. The C65xx series PCs are supplied with an integrated power supply unit with 24 V DC input voltage, optionally with integrated uninterruptible power





C6515
basic configuration



C6515
with PCIe module slots



C6525
basic configuration



C6525
with PCIe module slots



C6525
with plug-in card slots

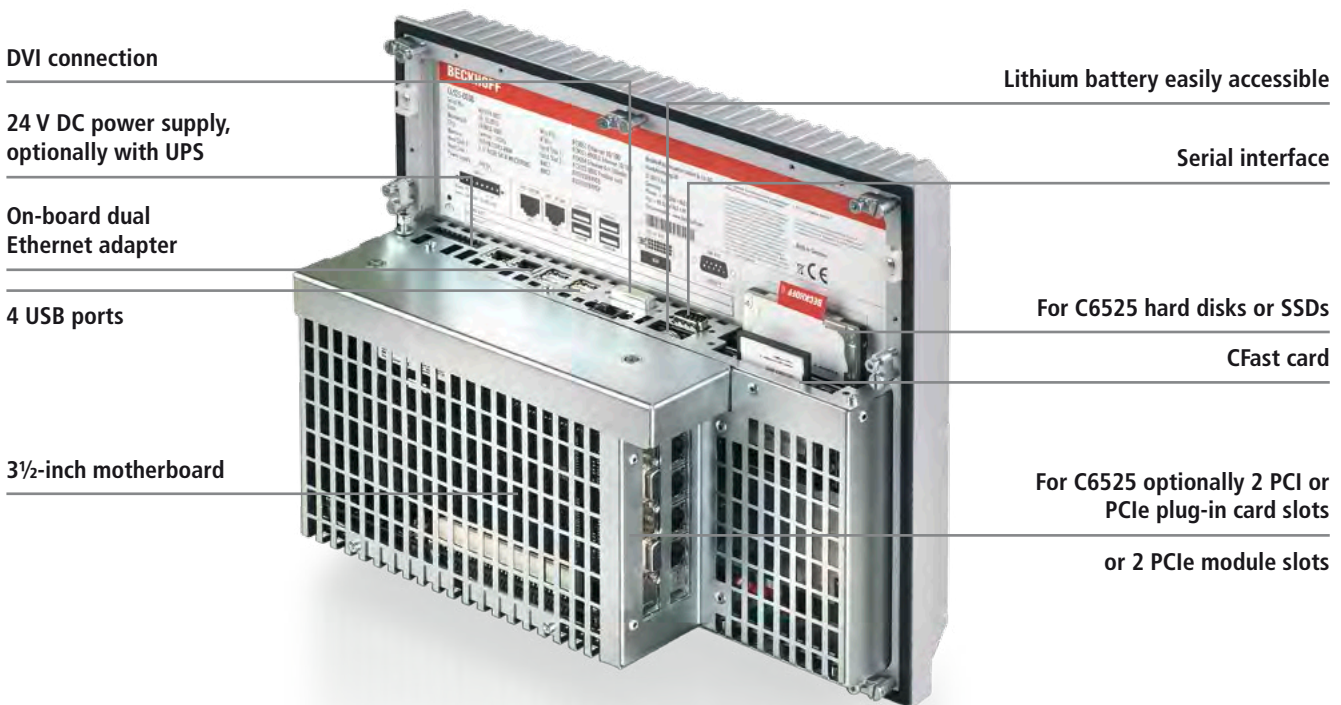
supply (UPS). A battery pack can be connected externally and installed on a DIN rail close to the PC.

Industrial PCs from this series and Beckhoff Control Panels as control units make an ideal combination for high-performance control platforms in mechanical engineering applications, particularly in

conjunction with TwinCAT automation software under Windows 10 IoT Enterprise. Due to their two independent Ethernet interfaces the C6515 and C6525 Industrial PCs are ideally suited as compact central processing units for an EtherCAT control system.

The on-board SATA RAID 1 controller can mirror two hard disks, two SSDs or two CFast

cards. If one of the RAID disks fails, the system continues to run. The faulty data medium can be replaced and mirrored during operation.





C6515 | Fanless built-in Industrial PC

C6515	C6515-0060, -0070
Housing	built-in Industrial PC with external cooling to be mounted in the back panel of a control housing or in the wall of a control cabinet
	2 slots for CFast
	CFast and lithium battery of the system clock easily exchangeable
	passive cooling through heat sink structure outside
	20 cm free space required around the heat sink of the PC for air circulation
	protection class outside IP 65, inside IP 20
	operating temperature outside 0...45 °C, inside 0...55 °C
	weight of the basic configuration 3 kg (6.61 lbs)
	dimensions (W x H x D) 240 x 230 x 81 mm (9.5" x 9.1" x 3.2")

Features	C6515-0060	C6515-0070
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	3½-inch	3½-inch
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	4...32 GB DDR4 RAM	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	1 or 2 x CFast	1 or 2 x CFast
RAID 1	2 x CFast	2 x CFast
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6515	



C6515 with PCIe module slots

Extension for PCIe modules

The built-in PCs C6515 can be expanded by two additional PCIe module slots. The inner enclosure cover has a 26 mm deep recess to accommodate PCIe modules (see above).

The module slots can accept Beckhoff PCIe modules, for example, the FC9062. Module slots also enable the usage of field bus cards e.g. FC3161.



PCIe module FC9062, dual gigabit Ethernet

Ordering information

C9900-B502

Options for C6515

2 PCIe module slots integrated inside C6515, to plug-in Beckhoff PCIe modules or to lead out interfaces of the motherboard ex factory. The depth of the inner enclosure cover is increased by 26 mm (1").



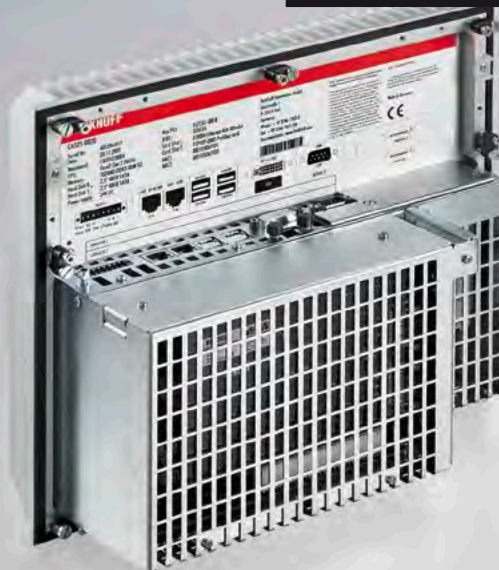
C6525 | Fanless built-in Industrial PC

C6525	C6525-0060, -0070
Housing	<p>built-in Industrial PC with external cooling to be mounted in the back panel of a control housing or in the wall of a control cabinet</p> <p>1 slot for a 2½-inch hard disk or SSD and 1 slot for CFast</p> <p>hard disk, SSD, CFast and lithium battery of the system clock easily exchangeable</p> <p>passive cooling through heat sink structure outside</p> <p>20 cm free space required around the heat sink of the PC for air circulation</p> <p>protection class outside IP 65, inside IP 20</p> <p>operating temperature outside 0...45 °C, inside 0...55 °C</p> <p>weight of the basic configuration 5.9 kg (13.0 lbs)</p> <p>dimensions (W x H x D) 330 x 275 x 82 mm (13" x 10.8" x 3.2")</p>

Features	C6525-0060	C6525-0070
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	3½-inch	3½-inch
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	4...32 GB DDR4 RAM	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	2½-inch HDD or SSD and/or CFast or 2 x CFast or 2 x 2½-inch HDD or SSD	2½-inch HDD or SSD and/or CFast or 2 x CFast or 2 x 2½-inch HDD or SSD
RAID 1	2 x 2½-inch HDD or 2 x CFast	2 x 2½-inch HDD or 2 x CFast
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6525	



C6525 with PCIe module slots



C6525 with plug-in card slots

Extension for PCIe modules

The built-in PCs C6525 can be expanded by two additional PCIe module slots. The inner enclosure cover has a 27 mm deep recess to accommodate PCIe modules (see above).

The module slots can accept Beckhoff PCIe modules, for example, the FC9062. Module slots also enable the usage of field bus cards e.g. FC3161.

Ordering information	Options for C6525
C9900-B503	2 PCIe module slots integrated inside C6525, to plug-in Beckhoff PCIe modules or to lead out interfaces of the motherboard ex factory. The depth of the inner enclosure cover is increased by 27 mm (1.1").

Extension for PCI and PCIe plug-in cards

The built-in PCs C6525 can be expanded by two slots for standard PC plug-in cards. They can accept conventional PC plug-in cards up to 190 mm in length. The 58 mm deeper hood at the rear (see above) covers

a backplane that provides a choice of two PCI slots, two PCI Express slots or one PCI and one PCI Express slot. Card holders ensure the secure fixation of large cards.

Ordering information	Options for C6525
C9900-B505	2 PCIe plug-in card slots on the passive backplane integrated inside C6525, to plug-in PCIe x1 cards up to 190 mm (6.3") length. The depth of the inner enclosure cover is increased by 58 mm (2.3").
C9900-B509	2 PCI plug-in card slots on the passive backplane integrated inside C6525, to plug-in PCI cards up to 190 mm (6.3") length, the depth of the inner enclosure cover is increased by 58 mm (2.3").
C9900-B513	1 PCI and 1 PCIe plug-in card slot on a passive backplane integrated inside C6525, to plug-in one PCI and one PCIe x1 card up to 190 mm (6.3") length. The depth of the back cover is increased by 58 mm (2.3").

C69xx | Industrial PC series for control cabinet installation

► www.beckhoff.com/C69xx

The C69xx Industrial PC series is characterized by its compact design, the robust aluminum housings, and an especially wide choice of components and interfaces.

Equipped with 3½-inch Beckhoff motherboards, C69xx Industrial PCs range from the very small C6905 for applications with medium performance requirements to the C6930, a high-performance platform for highly complex applications in manufacturing systems engineering, using, for example, the TwinCAT automation software.

The fanless, mid-performance C6905, C6915 and C6925 have an Intel Atom® CPU.

C6920 and C6930 are equipped with the latest Intel® Core™ i7 or previous generation processors for performance-hungry

applications in the field of machine automation.

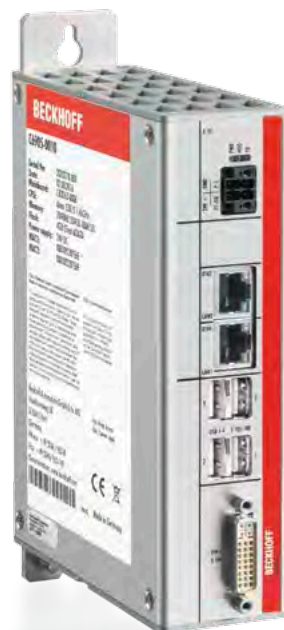
The compact aluminium housing of the C69xx Industrial PCs is equipped with a 3½-inch motherboard. All PC connections are on one side of the housing. The PC can optionally be equipped with mounting plates on two sides and fastened with screws in the control cabinet. Installation is possible at the rear panel or on the right-hand side panel.

The C69xx series PCs are supplied with a 24 V DC power supply unit, optionally with integrated uninterruptible power supply (UPS). A battery pack can be connected externally and installed on a DIN rail close to the PC. Cooling fins behind the right-hand side panel

enable fanless operation of the PC at temperatures up to 55 °C. The four types of Industrial PCs in the C69xx series differ in their processors and data storage devices.

Cooling of the C6905 and C6915 with Intel Atom® with up to four cores and the C6925 with Intel® Celeron® ULV or Intel Atom® with up to four cores requires no fan. The basic configuration of the C6905, C6915 and C6925 features a flash disk, thus creating PCs without moving parts. A hard disk or a second flash card can be integrated in all of the PCs from this series as an option.

The C6920 with Intel® Celeron® or Core™ i3/i5/i7 of the latest generation has an easily exchangeable fan cartridge on the underside of the housing. The C6930



C6905



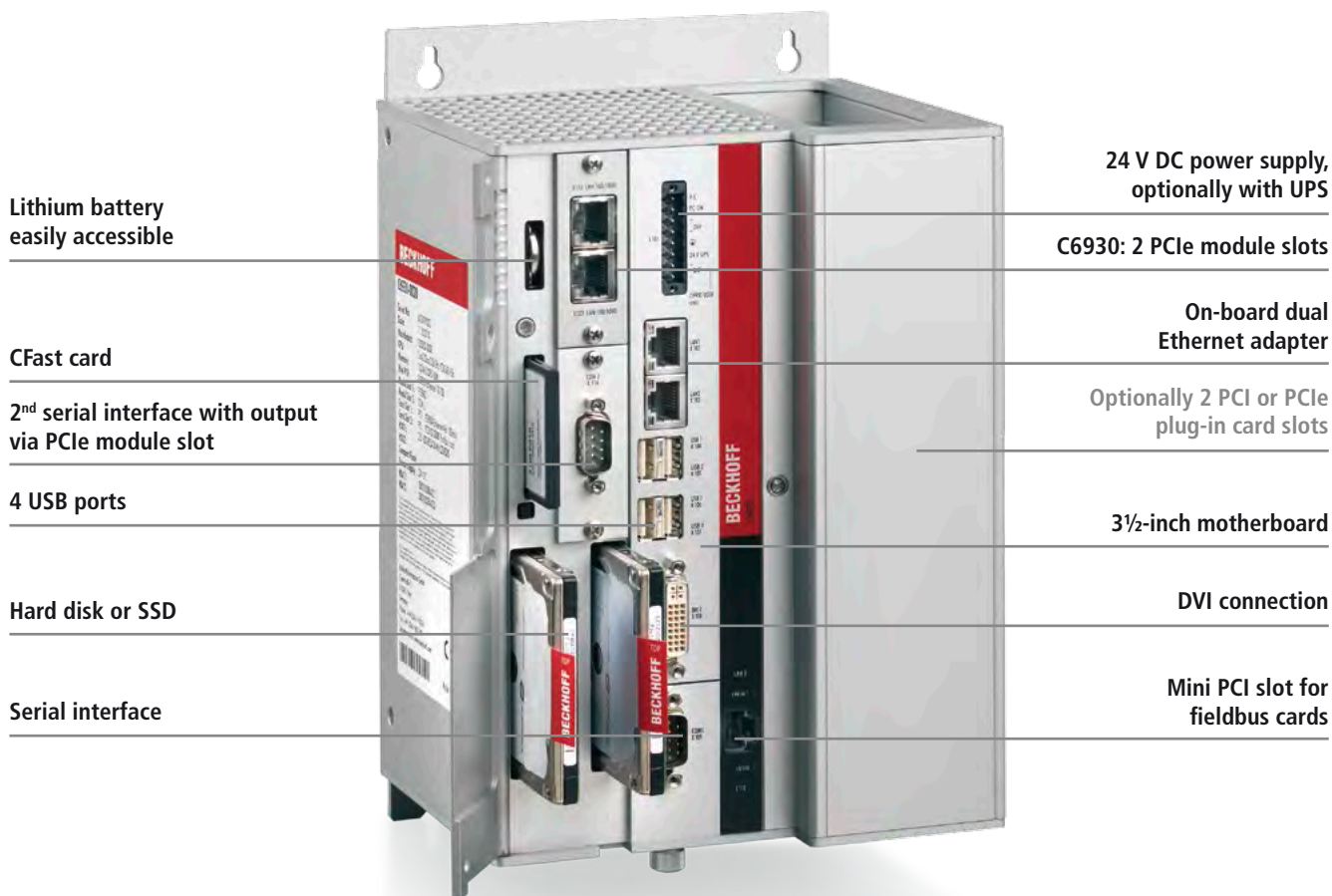
Industrial PC is also offered with Intel® Celeron® or Core™ i3/i5/i7 of the latest generation. It has a SATA RAID controller for mirroring two hard disks, SSDs or CFast cards. In the basic configuration, one of the two hard disk slots is equipped with a 2½-inch drive. A second hard disk is offered as an option. In addition, a CFast slot is accessible behind the front cover.

The C6925 and C6930 control cabinet PCs have two free slots for PCIe modules

integrated into the front of the PC housing and offer the possibility to extend the PC, for example, with additional Ethernet interfaces, USB ports, or PROFIBUS. NOVRAM for fail-safe data storage can also be plugged in as a PCIe module.

Industrial PCs of this series and a Beckhoff Control Panel with DVI and USB connection make an ideal combination and offer a high-performance control platform for mechanical engineering applications,

particularly in conjunction with the TwinCAT automation software under Windows 10 IoT Enterprise, up to the 6th generation of Intel® Core™ processors also under Windows 7 Professional, Windows 7 Ultimate, Windows Embedded Standard 7, with Intel Atom® also under Windows Embedded Compact 7. Due to its two independent Ethernet interfaces, the C69xx is ideally suited as a compact central processing unit for an EtherCAT control system.



Lithium battery easily accessible

CFast card

2nd serial interface with output via PCIe module slot

4 USB ports

Hard disk or SSD

Serial interface

24 V DC power supply, optionally with UPS

C6930: 2 PCIe module slots

On-board dual Ethernet adapter

Optionally 2 PCI or PCIe plug-in card slots

3½-inch motherboard

DVI connection

Mini PCI slot for fieldbus cards



C6905 | "Economy" control cabinet Industrial PC

C6905	C6905-0010, -0020
Housing	fanless Industrial PC for space-saving control cabinet installation
	mounting sheet at the rear wall
	all connectors on the front
	status LEDs
	passive cooling without fan
	5 cm (2") free space on top and bottom of the PC necessary for air circulation
	protection class IP 20
	operating temperature 0...55 °C
	weight of the basic configuration 0.9 kg (1.9 lbs)
	compact dimensions (W x H x D) 45 x 163 x 115 mm (1.8" x 6.4" x 4.5"), without mounting plate

Features	C6905-0010	C6905-0020
Processor	Intel Atom® E38xx	Intel Atom® x5-E39xx
Motherboard	3½-inch	3½-inch
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	2...8 GB DDR3L RAM	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	1 x 2½-inch HDD or SSD or CFast	1 x 2½-inch HDD or SSD or CFast
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6905	

Ordering information	Option
C9900-U214	internal, capacitive 1-second UPS



C6915 | Control cabinet Industrial PC

C6915	C6915-0010, -0020
Housing	fanless Industrial PC for space-saving control cabinet installation mounting sheet at the rear wall all connectors on the front status LEDs lithium battery accessible behind the front flap 1 slot for a CFast card behind the front flap passive cooling without fan 5 cm (2") free space on top and bottom of the PC necessary for air circulation protection class IP 20 operating temperature 0...55 °C weight of the basic configuration 1.25 kg (2.8 lbs) compact dimensions (W x H x D) 48 x 164 x 119 mm (1.9" x 6.5" x 4.7"), without mounting plate

Features	C6915-0010	C6915-0020
Processor	Intel Atom® E38xx	Intel Atom® x5-E39xx
Motherboard	3½-inch	3½-inch
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	2...8 GB DDR3L RAM	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	2½-inch HDD or SSD or 1 x CFast or 2 x CFast	2½-inch HDD or SSD or 1 x CFast or 2 x CFast
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6915	



C6920 | Control cabinet Industrial PC

C6920	C6920-0060, -0070
Housing	Industrial PC for space-saving control cabinet installation mounting sheet at the rear wall all connectors on the front status LEDs lithium battery accessible behind the front flap 1 slot for one 2½-inch hard disk or SSD behind the front flap 1 slot for one CFast card behind the front flap fan cartridge with speed control and double ball bearing fans, accessible from the front 5 cm (2") free space above and under the PC required for air circulation protection class IP 20 operating temperature 0...55 °C weight of the basic configuration 1.9 kg (4.2 lbs) compact dimensions (W x H x D) 65 x 235 x 121 mm (2.6" x 9.3" x 4.8"), without mounting plate

Features	C6920-0060	C6920-0070
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	3½-inch	3½-inch
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	4...32 GB DDR4 RAM	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	2½-inch HDD or SSD and/or 1 x CFast or 2 x CFast	2½-inch HDD or SSD and/or 1 x CFast or 2 x CFast
RAID 1	2 x CFast	2 x CFast
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6920	



C6920 with plug-in card slots

Extension for PCI and PCIe plug-in cards

The control cabinet PCs C6920 can be expanded by two slots for standard PC cards with a length of up to 190 mm. The 70 mm wider PC (see above) housing includes a backplane that provides a choice of two PCI slots, two PCI Express slots or one PCI and one PCI Express slot. The plug-in card connectors are located on the top side

of the PC. The plug-in card slots are arranged on the right side of the PC. An aluminium cover on the front of the slot expansion enables easy installation of the plug-in cards without having to open the housing of the computer core. The slots are powered internally by the PC power supply.

Ordering information	Options for C6920
C9900-B506	2 PCIe plug-in card slots on the passive backplane integrated inside C6920, to plug-in PCIe x1 cards up to 190 mm (6.3") length. The connectors of the plug-in cards are located at the top side of the PC on the right. The width of the PC housing is increased by 70 mm (2.76"), the depth is increased by 18 mm (0.7").
C9900-B510	2 PCI plug-in card slots on the passive backplane integrated inside C6920, to plug-in PCI cards up to 190 mm (6.3") length. The connectors of the plug-in cards are located at the top side of the PC on the right. The width of the PC housing is increased by 70 mm (2.76"), the depth is increased by 18 mm (0.7").
C9900-B514	1 PCI and 1 PCIe plug-in card slot on a passive backplane integrated inside C6920, to plug-in one PCI and one PCIe x1 card up to 190 mm (6.3") length. The connectors of the plug-in cards are located at the top side of the PC on the right. The width of the PC housing is increased by 70 mm (2.76"), the depth is increased by 18 mm (0.7").



C6925 | Fanless control cabinet Industrial PC

C6925	C6925-0020, -0030, -0040
Housing	fanless Industrial PC for space-saving control cabinet installation
	mounting sheet at the rear wall
	all connectors on the front
	status LEDs
	lithium battery accessible behind the front flap
	1 slot for one CFast flash card behind the front flap
	2 PCIe module slots to plug-in Beckhoff PCIe modules or to lead out interfaces of the motherboard ex factory
	passive cooling without fan with a heat sink
	5 cm (2") free space on top and bottom of the PC necessary for air circulation
	protection class IP 20
	operating temperature 0...55 °C
	weight of the basic configuration 1.75 kg (3.9 lbs)
	compact dimensions (W x H x D) 65 x 223 x 121 mm (2.6" x 8.8" x 4.8"), without mounting plate

Features	C6925-0020	C6925-0030	C6925-0040
Processor	Intel® Celeron® ULV	Intel Atom® E38xx	Intel Atom® x5-E39xx
Motherboard	3½-inch	3½-inch	3½-inch
Slots	2 PCIe modules	2 PCIe modules	2 PCIe modules
Free slots	2 PCIe	2 PCIe	2 PCIe
Max. card length	PCIe module	PCIe module	PCIe module
Memory	2...8 GB DDR3 RAM	2...8 GB DDR3L RAM	4...8 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board	2 on-board
Hard disks/flash	2½-inch HDD or SSD and/ or 1 x CFast or 2 x CFast	2½-inch HDD or SSD and/ or 1 x CFast or 2 x CFast	2½-inch HDD or SSD and/ or 1 x CFast or 2 x CFast
RAID 1	2 x CFast	–	–
Power supply	24 V DC	24 V DC	24 V DC
Recommendation	not recommended for new projects	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6925		



C6930 | Control cabinet Industrial PC

C6930	C6930-0060, -0070
Housing	Industrial PC for space-saving control cabinet installation mounting sheet at the rear wall all connectors on the front status LEDs lithium battery accessible behind the front flap 2 slots for 2½-inch hard disks or SSDs behind the front flap 1 slot for one CFast flash card behind the front flap 2 PCIe module slots to plug-in Beckhoff PCIe modules or to lead out interfaces of the motherboard ex factory fan cartridge with speed control and double ball bearing fans, accessible from the front 5 cm (2") free space above and under the PC required for air circulation protection class IP 20 operating temperature 0...55 °C weight of the basic configuration 2.1 kg (4.6 lbs) compact dimensions (W x H x D) 90 x 235 x 121 mm (3.5" x 9.3" x 4.8"), without mounting plate

Features	C6930-0060	C6930-0070
Processor	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 6 th /7 th generation	Intel® Celeron®, Pentium®, Core™ i3/i5/i7 8 th /9 th generation
Motherboard	3½-inch	3½-inch
Slots	–	–
Free slots	–	–
Max. card length	–	–
Memory	4...32 GB DDR4 RAM	4...64 GB DDR4 RAM
Graphic adapter	integrated in the processor	integrated in the processor
Ethernet	2 on-board	2 on-board
Hard disks/flash	1 or 2 x 2½-inch HDD or SSD and/or 1 x CFast or 2 x CFast	1 or 2 x 2½-inch HDD or SSD and/or 1 x CFast or 2 x CFast
RAID 1	2 x 2½-inch HDD or 2 x CFast	2 x 2½-inch HDD or 2 x CFast
Power supply	24 V DC	24 V DC
Recommendation	available	recommended for new projects
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/C6930	



C6930 with plug-in card slots



Extension for PCI and PCIe plug-in cards

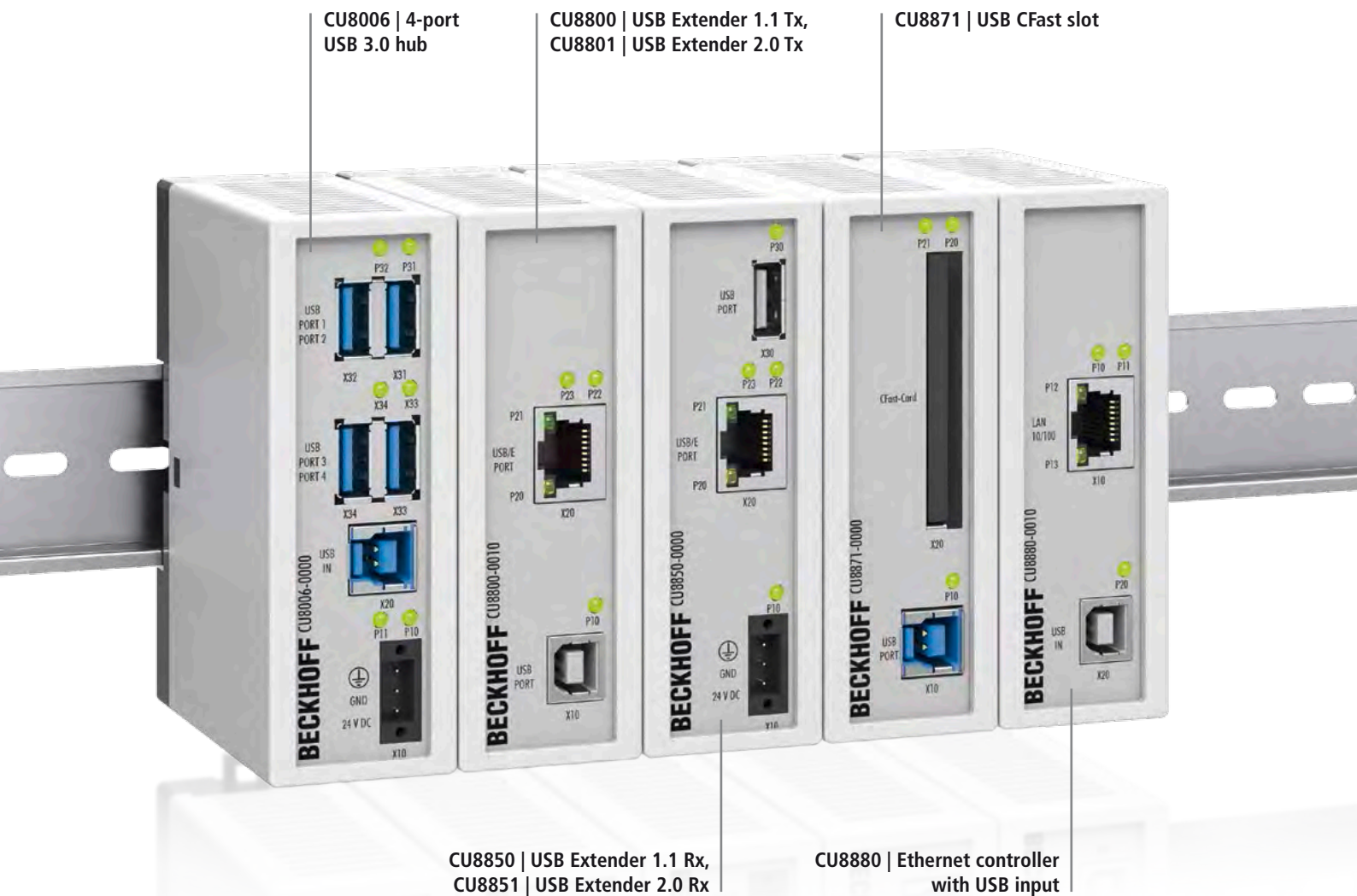
The control cabinet PCs C6930 can be expanded by two slots for standard PC cards with a length of up to 190 mm. The 70 mm wider PC housing (see above) includes a backplane that provides a choice of two PCI slots, two PCI Express slots or one PCI and one PCI Express slot. The plug-in card connectors are located on the top side of

the PC. The plug-in card slots are arranged on the right side of the PC. An aluminium cover on the front of the slot expansion enables easy installation of the plug-in cards without having to open the housing of the computer core. The slots are powered internally by the PC power supply.

Ordering information	Options for C6930
C9900-B507	2 PCIe plug-in card slots on the passive backplane integrated inside C6930, to plug-in PCIe x1 cards up to 190 mm (6.3") length. The connectors of the plug-in cards are located at the top side of the PC on the right. The width of the PC housing is increased by 70 mm (2.76"), the depth is increased by 18 mm (0.7").
C9900-B511	2 PCI plug-in card slots on the passive backplane integrated inside C6930, to plug-in PCI cards up to 190 mm (6.3") length. The connectors of the plug-in cards are located at the top side of the PC on the right. The width of the PC housing is increased by 70 mm (2.76"), the depth is increased by 18 mm (0.7").
C9900-B515	1 PCI and 1 PCIe plug-in card slot on a passive backplane integrated inside C6930, to plug-in one PCI and one PCIe x1 card up to 190 mm (6.3") length. The connectors of the plug-in cards are located at the top side of the PC on the right. The width of the PC housing is increased by 70 mm (2.76"), the depth is increased by 18 mm (0.7").

Industrial PC accessories

► www.beckhoff.com/IPC-accessories





CU8800, CU8850, C9900-E270 | USB Extended, the USB 1.1 extension

The USB specification allows a distance of 5 m between the PC and the USB devices. A further 5 m of cable can be added by using a USB hub. In the construction of machines and plants, larger distances must be bridged without having to insert a USB hub every 5 m. The CU8800 USB Extender sends the USB signal via a Cat.5 cable that can be up to 50 m long to the CU8850 USB Extended

receiver or the CP69xx or CP79xx Control Panels, which convert the signal back to USB. The USB Extender boxes are designed for DIN rail mounting. The CU8800 transmitter is supplied with power by the PC via USB. The CU8850 receiver has an integrated 24 V DC power supply unit. Data rates of up to 12 Mbit/s can be transmitted.

Technical data	CU8800 USB Extender Tx	CU8850 USB Extender Rx
	USB Extended transmitter box	USB Extended receiver box
	1 USB input with USB B socket to be connected to the PC in maximum 1 m distance	1 USB Extended input with RJ45 socket for up to 50 m Cat.5 cable
	1 USB Extended output with RJ45 socket for up to 50 m Cat.5 cable	1 USB output with USB A socket to be connected to a USB device in maximum 5 m distance
	–	quick error analysing with diagnostic LEDs
	plastic housing for DIN rail installation	plastic housing for DIN rail installation
	USB transfer rate up to 12 Mbit/s for USB 1.1, downwards compatible to USB 1.0	
	IP 20	IP 20
	0...+55 °C	0...+55 °C
	34 mm x 98 mm x 77 mm	34 mm x 98 mm x 77 mm
	power supply via USB	24 V DC power supply

Technical data	C9900-E270 USB Extender Tx PCIe module
	USB Extended transmitter module
	1 USB Extended output with RJ45 socket for up to 50 m Cat.5 cable for connecting a Control Panel with DVI/USB Extended interface CP69xx or CP79xx
	for ex factory mounting in PCs with Beckhoff PCIe module slot
	USB transfer rate up to 12 Mbit/s according to USB 1.1



CU8801, CU8851, C9900-E271 | USB Extended 2.0, the USB 2.0 extension

The USB specification allows a distance of 5 m between the PC and the USB devices. A further 5 m of cable can be added by using a USB hub. In the construction of machines and plants, larger distances must be bridged without having to insert a USB hub every 5 m. The CU8801 USB Extender sends the 2.0 USB signal via a Cat.5 cable that can be up to 50 m long to the CU8851 USB Extended

receiver, which converts the signal back to USB. Data rates of up to 480 Mbit/s can be transmitted. Both USB Extender boxes are designed for DIN rail mounting. The CU8801 transmitter is powered by the PC. The CU8851 receiver has an integrated 24 V DC power supply unit. The USB Extended 2.0 receiver is already integrated into the Control Panels from the CP29xx and CP39xx series.

Technical data	CU8801 USB Extender 2.0 Tx	CU8851 USB Extender 2.0 Rx
	USB Extended 2.0 transmitter box	USB Extended 2.0 receiver box
	1 USB input with USB B socket to be connected to the PC in maximum 1 m distance	1 USB Extended 2.0 input with RJ45 socket for up to 50 m Cat.5 cable
	1 USB Extended 2.0 output with RJ45 socket for up to 50 m Cat.5 cable	1 USB output with USB A socket to be connected to a USB device in maximum 5 m distance
	–	quick error analysing with diagnostic LEDs
	plastic housing for DIN rail installation	plastic housing for DIN rail installation
	USB transfer rate up to 480 Mbit/s for USB 2.0	USB transfer rate up to 480 Mbit/s for USB 2.0
	IP 20	IP 20
	0...+55 °C	0...+55 °C
	34 mm x 98 mm x 77 mm	34 mm x 98 mm x 77 mm
	power supply via USB	24 V DC power supply

Technical data	C9900-E271 USB Extender 2.0 Tx PCIe module
	USB Extended 2.0 transmitter module
	1 USB Extended 2.0 output with RJ45 socket for up to 50 m Cat.5 cable for connecting a Control Panel with DVI/USB Extended 2.0 interface CP29xx-0000 or CP39xx-0000
	for ex factory mounting in PCs with Beckhoff PCIe module slot
	USB transfer rate up to 480 Mbit/s according to USB 2.0



CU8802, CU8803, C9900-E276 | CP-Link 4 transmitter modules

With CP-Link 4 operating panels can be located up to 100 m away from the Industrial PC. The one cable solution can be used to transfer video signals, USB 2.0 and the power supply in a Cat.6A cable, thus reducing cable and installation costs. The CP-Link 4 technology is supported by the Beckhoff multi-touch Control Panel series CP29xx-0010 for installation inside the wall of a control cabinet, CP39xx-0010 for mounting arm installation and CPX39xx-0010 for use in hazardous areas, Zone 2/22.

CP-Link 4 – The Two Cable Display Link

The multi-touch Control Panels can be operated up to 100 m away from the PC. CP-Link 4 – The Two Cable Display Link – transfers DVI and USB together via a Cat.6A cable. The CU8802 CP-Link 4 transmitter box is connected to the PC via DVI and USB, or else the C9900-E276 PCIe module for CP-Link 4 is installed in the PC. Via a socket at the Control Panel the 24 V power supply has to be connected.

CP-Link 4 – The One Cable Display Link

The power supply for the Control Panel can also be provided via CP-Link 4 – The One Cable Display Link. The CU8803 CP-Link 4 transmitter box is used instead of the CU8802 or the PCIe module. The Control Panel remains unchanged. The CU8803 transmitter box provides power to the Control Panel via the Cat.6A cable, which also transfers DVI and USB. The power supply socket of the panel is not used.

Technical data	CU8802-0000 Transmitter box for CP-Link 4 – The Two Cable Display Link	CU8802-0001 Transmitter box for CP-Link 4 – The Two Cable Display Link
	CP-Link 4 Extender Tx for connecting a Control Panel with CP-Link 4 interface CP29xx-0010, CP39xx-0010 or CPX39xx-0010	CP-Link 4 Extender Tx for connecting a Control Panel with CP-Link 4 interface CP29xx-0010, CP39xx-0010 or CPX39xx-0010 to a PC C60xx or ATX PC with DisplayPort
	1 USB input with USB B socket to be connected to the PC in maximum 1 m distance	
	1 DVI input with DVI-D socket to be connected to the PC in maximum 1 m distance	
	1 CP-Link 4 output with RJ45 socket for up to 100 m Cat.6A cable for connecting a Control Panel with CP-Link 4 interface CP29xx-0010, CP39xx-0010 oder CPX39xx-0010	
	power supply for the Control Panel with connection of 24 V at the Control Panel	
	metal housing for DIN rail installation	metal housing for DIN rail installation
	CP-Link 4 transfers USB 2.0 with 100 Mbit/s and DVI.	CP-Link 4 transfers USB 2.0 with 100 Mbit/s and DVI.
	24 V input for power supply of the CU8802 transmitter box	24 V input for power supply of the CU8802 transmitter box
	IP 20	IP 20
	0...+55 °C	0...+55 °C
	45 mm x 100 mm x 80 mm	45 mm x 100 mm x 80 mm
	1 m USB connecting cable	1 m USB connecting cable
	1 m DVI connecting cable	1 m DisplayPort to DVI connecting cable

Technical data	C9900-E276 PCIe module for CP-Link 4 – The Two Cable Display Link
	CP-Link 4 Extender Tx PCIe module
	CP-Link 4 transmitter module for ex factory installation in PCs with Beckhoff PCIe module slots
	1 CP-Link 4 output with RJ45 socket for up to 100 m Cat.6A cable for connecting a Control Panel with CP-Link 4 interface CP29xx-0010, CP39xx-0010 or CPX39xx-0010
	CP-Link 4 transfers USB 2.0 with 100 Mbit/s and DVI.
	power supply for the Control Panel with connection of 24 V at the Control Panel

Technical data	CU8803-0000 Transmitter box for CP-Link 4 – The One Cable Display Link	CU8803-0001 Transmitter box for CP-Link 4 – The One Cable Display Link
	CP-Link 4 Extender Tx for connecting a Control Panel with CP-Link 4 interface CP29xx-0010, CP39xx-0010 or CPX39xx-0010	CP-Link 4 Extender Tx for connecting a Control Panel with CP-Link 4 interface CP29xx-0010, CP39xx-0010 or CPX39xx-0010 to a PC C60xx or ATX PC with DisplayPort
	1 USB input with USB B socket to be connected to the PC in maximum 1 m distance	
	1 DVI input with DVI-D socket to be connected to the PC in maximum 1 m distance	
	1 CP-Link 4 output with RJ45 socket for up to 100 m Cat.6A cable for connecting a Control Panel with CP-Link 4 interface CP29xx-0010, CP39xx-0010 or CPX39xx-0010	
	power supply of the Control Panel with CU8803 via the Cat.6A cable	
	metal housing for DIN rail installation	metal housing for DIN rail installation
	CP-Link 4 transfers USB 2.0 with 100 Mbit/s and DVI.	CP-Link 4 transfers USB 2.0 with 100 Mbit/s and DVI.
	24 V input for power supply of the CU8803 transmitter box and the Control Panel	
	IP 20	IP 20
	0...+55 °C	0...+55 °C
	70 mm x 100 mm x 80 mm	70 mm x 100 mm x 80 mm
	1 m USB connecting cable	1 m USB connecting cable
	1 m DVI connecting cable	1 m DisplayPort to DVI connecting cable

C9900-H3xx | USB sticks

USB sticks are used for data exchange between PCs or for data backup. For data backup operating system and application programs of a PC are saved as an image on a USB stick once the PC has been configured. In the event of a data loss on the PC the data can be restored from the USB stick.

As a data backup device the USB stick must be able to store the data reliably and for many years. In contrast to USB sticks with MLC or TLC flash memory, the high-quality SLC flash memory in the Beckhoff USB stick ensures long-term data integrity.



Ordering information	USB sticks
C9900-H356	4 GB USB stick, USB 3.0
C9900-H359	8 GB USB stick, USB 3.0
C9900-H376	16 GB USB stick, USB 3.0
C9900-H390	32 GB USB stick, USB 3.0

Ordering information	USB sticks with Beckhoff Service Tool (BST) and Acronis™ Backup & Recovery
C9900-H371	4 GB USB stick, USB 3.0, with Beckhoff Service Tool (BST) and Acronis™ Backup, English, for PCs with at least 2 GB RAM and with USB 2.0 or higher
C9900-H372	8 GB USB stick, USB 3.0, with Beckhoff Service Tool (BST) and Acronis™ Backup, English, for PCs with at least 2 GB RAM and with USB 2.0 or higher
C9900-H377	16 GB USB stick, USB 3.0, with Beckhoff Service Tool (BST) and Acronis™ Backup, English, for PCs with at least 2 GB RAM and with USB 2.0 or higher
C9900-H391	32 GB USB stick, USB 3.0, with Beckhoff Service Tool (BST) and Acronis™ Backup, English, for PCs with at least 2 GB RAM and with USB 2.0 or higher

CU8006 | 4-port USB 3.0 hub

The CU8006 DIN rail-mount USB hub has four ports and supports the USB 3.0 data transfer rate of up to 5 Gbit/s, but is also compatible with slower USB standards. USB 3.0 devices can be connected at a distance of up to 3 m. Connection to USB 2.0 devices is possible with 5-m cables. An 1-m USB cable is provided for connecting the USB hub with the PC. 3-m USB 3.0 cables are permitted between PC and CU8006.



Technical data	CU8006 4-port USB 3.0 hub
	1 USB 3.0 input with USB B socket
	4 USB 3.0 outputs with USB A socket
	delivers up to 1 A supply current at each USB port
	USB transfer rate up to 5 Gbit/s, compatible to all USB standards
	plastic housing for DIN rail installation
	IP 20
	0...+55 °C
	34 mm x 98 mm x 77 mm
	24 V DC power supply
	1 m USB connecting cable

CU8810 | DVI splitter with USB extender for CP69xx and CP79xx

A common application in machine and plant construction is the simultaneous display of a PC screen on several monitors. Up to four CP69xx or CP79xx DVI/USB Control Panels can be connected to a PC via the CU8810 DVI splitter. Thanks to DVI/USB extension technology, the Control Panels can each be connected at distances of 50 m from the DVI splitter. PCs with two DVI outputs, which are configured as extended desktops, generate two different screen contents. Both DVI outputs can be fed into the DVI splitter. Using DIP switches, the four DVI outputs can each be assigned to one of the two DVI inputs, so that the Control Panels show either the left or the right half of the desktop, as selected.



Technical data	CU8810 DVI splitter for CP69xx and CP79xx
	metal housing for DIN rail installation
	compact industrial design
	2 DVI-D inputs
	4 DVI-D outputs
	assignment of the 4 DVI outputs to the 2 inputs freely configurable via DIP switches
	DVI inputs and outputs with full DVI data range up to 1.65 Gbit/s
	unused DVI input and outputs can be switched off to save energy
	1 USB input with USB B socket
	4-port USB hub with 4 USB Extended outputs as RJ45 connectors
	USB transfer rate up to 12 Mbit/s for USB 1.1, downwards compatible to USB 1.0
	IP 20
	0...+55 °C
	146.5 mm x 100 mm x 38 mm
	24 V DC power supply

CU8815 | DVI splitter

A common application in machine and plant construction is the simultaneous display of a PC screen on several monitors. Up to four CP29xx, CP39xx, CP68xx, CP69xx, CP79xx or CP79xx DVI/USB Control Panels can be connected to a PC via the CU8815 DVI splitter. PCs with two DVI outputs, which are configured as extended desktops, generate two different screen contents. Both DVI outputs can be fed into the DVI splitter. Using DIP switches, the four DVI outputs can each be assigned to one of the two DVI inputs, so that the Control Panels show either the left or the right half of the desktop, as selected.



Technical data	CU8815 DVI splitter without USB extender
	metal housing for DIN rail installation
	compact industrial design
	2 DVI-D inputs
	4 DVI-D outputs
	assignment of the 4 DVI outputs to the 2 inputs freely configurable via DIP switches
	DVI inputs and outputs with full DVI data range up to 1.65 Gbit/s
	unused DVI input and outputs can be switched off to save energy
	IP 20
	0...+55 °C
	146.5 mm x 100 mm x 38 mm
	24 V DC power supply

CU8871 | USB CFast slot

The CU8871 offers a CFast socket with USB connector in a compact housing for DIN rail mounting. CFast cards are used in the industrial environment as data memory for process and control data. The CFast cards are hot-plug capable in the CU8871 and can hence be plugged and unplugged like removable data storage devices for exchanging data with other PCs during operation. The USB 3.0 connection offers the highest data transfer rate possible with a CFast card, but the CFast adapter can also be connected to PCs with a USB 2.0 interface. Power is also supplied via USB. Status LEDs indicate whether the CU8871 is connected, signal data accesses and provide information as to whether a CFast card is inserted.



Technical data	CU8871 USB CFast slot
	CFast slot
	front LED indicators for PWR (power), LOCK (only read permission) and CFast (access)
	1 USB 3.0 input with USB B socket
	compatible to all USB standards
	plastic housing for DIN rail installation
	IP 20
	0...+55 °C
	34 mm x 98 mm x 77 mm
	power supply via USB
	1 m USB connecting cable

CU8880 | Ethernet controller with USB input

With the CU8880 USB-to-LAN adapter, Industrial PCs can be extended with an additional industrially-suited and independent Ethernet interface. The CU8880 is used for necessary IT communication. It is not suitable for EtherCAT or real-time Ethernet communication. However, the on-board Ethernet interfaces of the respective Industrial PCs are available for this.



Technical data	CU8880 Ethernet controller with USB input
	Ethernet controller box
	1 USB 2.0 input with USB B socket
	1 Ethernet interface with 1 x 10/100BASE-T connector RJ45
	not suitable for real-time Ethernet or EtherCAT
	plastic housing for DIN rail installation
	1 m USB connecting cable
	IP 20
	0...+55 °C
	34 mm x 98 mm x 77 mm
	power supply via USB

FC1028 | PCIe EtherCAT master card

The FC1028 PCIe EtherCAT card can be used to integrate a PC as a master in an EtherCAT network. The card has 16 EtherCAT channels and a total of eight ix Industrial™ type A connections. C9900-K921 adapter cables are required for the connection of EtherCAT devices.



Technical data	FC1028
Fieldbus	EtherCAT
Number of channels	16 EtherCAT channels
Connections	8 x ix Industrial™ type A
Interface to the PC	PCIe x4

FC9071 | Gigabit Ethernet PC interface card

The FC9071 Ethernet PCIe interface card can be used in office and automation networks. It is installed in the PC's connecting area and is wired to the 3½-inch motherboard by a flexible PCIe cable. Compared to the Mini PCI bus, the PCIe bus offers a faster transfer rate and a better long time availability. The Mini PCI slot, if present, remains free for the use of NOVRAM cards. The FC9071 can be operated with TwinCAT drivers – and therefore in real-time.



Ordering information	
FC9071-0000	Gigabit Ethernet PC interface card, 10/100/1000 Mbit/s, 1-channel, PCIe interface

FC9062 | Dual Gigabit Ethernet PCIe module

The compact PC expansion card with industrial form factor Beckhoff PCIe modules are highly integrated PCI Express plug-in cards and follow the trend towards ever smaller PCs. The function of PC plug-in cards is integrated in a compact format that is suitable for harsh industrial environments. The PCIe module FC9062 provides two Gigabit Ethernet interfaces. It can be operated with TwinCAT drivers – and therefore in real-time. At PCs with one or two free PCIe module slots the FC9062 can be retrofitted on site.



Ordering information	PCI Express module
FC9062	Gigabit Ethernet PCIe module for PCs with Beckhoff PCIe module slots, 2-channel, PCI Express x1 bus



FC3161 | PCIe modules with PROFIBUS master and/or NOVRAM

Beckhoff PCIe modules are highly integrated PCI Express plug-in cards and follow the trend towards ever smaller PCs. The function of PC plug-in cards is integrated in a compact format that is suitable for harsh industrial environments.

The PCIe modules for Beckhoff Industrial PCs allow the use of a PROFIBUS master

without NOVRAM (FC3161-0000) or with 512 kB NOVRAM for easy data backup (FC3161-0002).

In TwinCAT, PROFIBUS and NOVRAM are available. Other applications also benefit from the diverse features: general PROFIBUS drivers for different Windows versions and convenient configuration tools are included

in the TwinCAT I/O software package. High-level language programs use the DLL, Visual Basic applications the ActiveX interface. Applications with OPC interface can access process data and parameters via an OPC server.

Technical data	FC3161-0000	FC3161-0002
Fieldbus	PROFIBUS DP (standard), PROFIBUS DP-V1	PROFIBUS DP (standard), PROFIBUS DP-V1
Number of fieldbus channels	1	1
Data transfer rates	9.6 kbaud...12 Mbaud	9.6 kbaud...12 Mbaud
Interface to the PC	PCIe (PCI Express)	PCIe (PCI Express)
Bus interface	1 x D-sub socket, 9-pin, galvanically decoupled	1 x D-sub socket, 9-pin, galvanically decoupled
Communication	master and slave functionality	master and slave functionality
Bus device	max. 125 slaves with up to 244 bytes input, output, parameter, configuration or diagnostic data per slave	
Hardware diagnosis	2 LEDs per channel	2 LEDs per channel
NOVRAM	–	512 kB
Driver	TwinCAT 2.11 R3 and higher	TwinCAT 2.11 R3 and higher

Ordering information	PCI Express module
C9900-R266	memory PCIe module for PCs with Beckhoff PCIe module slots, NOVRAM for fail-safe storage of process data, 512 kB, PCI Express x1 bus

C9900-E277 | USB 3.0 PCIe module

The C9900-E277 PCIe module for USB 3.0 has two ports and supports the USB 3.0 data transfer rate of up to 5 Gbit/s, but is also compatible with slower USB standards. PCIe modules can be used in 3½-inch motherboard Beckhoff PCs with a PCIe module slot. The C9900-E277 USB module can also be plugged in later. USB 3.0 devices can be connected at a distance of up to 3 m. Connection to USB 2.0 devices is possible with 5-m cables.



Technical data	C9900-E277 USB 3.0 PCIe module
	2-port USB 3.0 interfaces
	delivers up to 1 A supply current at each USB port
	USB transfer rate up to 5 Gbit/s for USB 3.0
	compatible to all USB standards

C9900-E301 | RS232 PCIe module

PCIe modules from Beckhoff are highly integrated PCI Express plug-in cards that respond to the current trend towards increasingly smaller PC devices.

The C9900-E301 PCIe module can be used to complement Industrial PCs with Beckhoff PCIe module slot by two serial RS232 interfaces. Due to the small dimensions of the module, two Harting ix type B connectors are integrated into the front plate of the PCIe modules instead of the D-sub connectors commonly used with RS232. For adaptation to 9-pin D-sub connectors, the C9900-K920 adapter cable is available.



Technical data	C9900-E301 RS232 PCIe module
	2 serial interfaces RS232
	transfer rate up to 921,600 bps
	2 sockets Harting ix type B
	requires 2 adapter cables C9900-K920 Harting ix type B to D-sub 9-pin

Ordering information	
C9900-K920	adapter cable ix Industrial® type B to D-sub, 9-pin, for RS232 PCIe module C9900-E301 or C9900-E306, length 45 cm



C9900-E2xx | Slotbox for extending Industrial PCs with two plug-in card slots

The slotbox makes PCI Express and PCI slots available outside the Industrial PC as well. The PCI Express bus is fed via a plug connector and cable to a slotbox located up to 7 m (23-ft) away. Users can use the installation space in the control cabinet flexibly and locate further plug-in cards locally.

Both PCI and PCI Express card slots are available by using different versions of the slotbox. The slotbox is made of sturdy aluminium and ideal for use in industrial environments.



PCIe module C9900-E239 for installation in the PC

Technical data	C9900-E249	C9900-E250	C9900-E251
	fanless aluminium housing for control cabinet installation		
	2 slots for up to 190 mm long plug-in cards		
	all connectors on the top	all connectors on the top	all connectors on the top
	PCIe x1 input for connection with an Industrial PC with PCIe module C9900-E236 or -E239		
	max. 7 m distance between Industrial PC and slotbox		
	1 PCI and 1 PCIe x1 slot	2 PCIe x1 slots	2 PCI slots
	IP 20	IP 20	IP 20
	0...+55 °C	0...+55 °C	0...+55 °C
	1.7 kg without plug-in cards	1.7 kg without plug-in cards	1.7 kg without plug-in cards
	94 mm x 222 mm x 132 mm without mounting plate		
	24 V DC power supply	24 V DC power supply	24 V DC power supply

C9900-E23x	PCIe modules
C9900-E236	PCIe modules with external PCIe x1 connector for CP22xx, CP62xx, C5210 or C65xx with PCIe module slot
C9900-E239	PCIe modules with external PCIe x1 connector for C6930

C9900-K50x	Connecting cables for the slotbox
C9900-K501	connecting cable PCIe x1 external, 1 m
C9900-K502	connecting cable PCIe x1 external, 3 m
C9900-K503	connecting cable PCIe x1 external, 5 m
C9900-K504	connecting cable PCIe x1 external, 7 m



CU81xx | UPS components

All Beckhoff components, in particular Industrial, Panel and Embedded PCs can be equipped with the new CU81xx UPS series. Double-layer film capacitors or nickel/metal hydride batteries are used depending on the version. In the case of battery backup UPS the batteries are easily accessible in case

they need to be replaced. For this purpose, the UPS does not need to be dismantled or dismantled from the DIN rail.

A special feature of the UPS series is its compatibility and ability to communicate with all existing Industrial, Panel and Embedded PCs. For connection to the PC, USB 2.0

or UPS OCT can be used via a 24 V power supply unit. These interfaces can also be used to retrieve status data for diagnostic purposes or to configure the UPS.

Technical data	CU8110-0120	CU8130-0120	CU8130-0240
	capacitive uninterruptible power supply (UPS)	battery-backed uninterruptible power supply (UPS)	battery-backed uninterruptible power supply (UPS)
	metal housing for mounting on norm rail TS35x15 2.3		
	storage technology: EDLC (capacitive)	storage technology: NiMh (battery)	storage technology: NiMh (battery)
	requires Windows Embedded Standard 7, Windows 7 Professional, Windows 7 Ultimate or Windows 10 IoT Enterprise		
	power supply: 24 V DC (-15 %/+20 %)		
	connection: 2 x 9-pin plug, push-in		
	interfaces: USB or UPS OCT via 24 V DC power supply module, USB cable not included in the scope of supply		
	output voltage: min. 24 V DC/max. U_{IN} DC		
	max. output: 120 W	max. output: 120 W	max. output: 240 W
	capacity: 0.9 Wh	capacity: 15 Wh	capacity: 30 Wh
	fuse: electronic, 5 A	fuse: electronic, 5 A	fuse: electronic, 10 A
	diagnostic LEDs: 1 x U_{IN} , 1 x U_{OUT} , 1 x DIAG		
	IP 20		
	-25...+50 °C	-10...+60 °C	-10...+60 °C
	approx. 650 g	approx. 800 g	approx. 1200 g
	100 mm x 100 mm x 90 mm	70 mm x 100 mm x 90 mm	100 mm x 100 mm x 90 mm

C9900-U33x | Battery pack

All Industrial PCs can be equipped with a 24 V power supply unit and an integrated UPS. The UPS supplies the PC with power if the mains power fails. This allows data to be saved on the hard disk or Flash, after which the PC can be shut down properly. A battery pack, which serves as the energy storage device, is mounted on a DIN rail outside the PC.

Rated at 3.4 Ah, the maintenance-free C9900-U330 24 V battery pack offers a very high nominal capacity in a compact package. With its rated capacity of 1.3 Ah, the very compact 24 V C9900-U332 battery pack is designed for PCs with Intel Atom® or Intel® Celeron® ULV 827E.



Technical data	C9900-U330	C9900-U332
	battery pack for PCs with 24 V power supply with intergrated UPS	
	metal housing for mounting on norm rail TS35x15 2.3	metal housing for mounting on norm rail TS35x15 2.3
	24 V nominal voltage	24 V nominal voltage
	3.4 Ah nominal capacity (20 h discharge)	1.3 Ah nominal capacity (20 h discharge)
	two 12 V batteries in series connection	two 12 V batteries in series connection
	VRLA AGM Technology = valve regulated lead acid batteries with glass fiber mat inside the separator (VRLA = valve regulated lead acid, AGM = absorbed glass mat technology)	
	maintenance-free	maintenance-free
	9 A fuse by PTC element	9 A fuse by PTC element
	operating temperature 0...50 °C	operating temperature 0...50 °C
	weight 3.3 kg (7.3 lbs)	weight 2.1 kg (4.63 lbs)
	dimensions (W x H x D)	dimensions (W x H x D)
	157 x 70 x 175 mm (6.2" x 2.8" x 6.9")	68.7 x 106.6 x 143.8 mm (4.2" x 2.8" x 5.66")

CU8210-M001-01x0 | Cabinet dome for industrial WLAN and mobile network components

The housing dome is designed for industrial WLAN and mobile communication components, and meets IP 66 requirements when properly mounted to a control cabinet. The components inside the housing dome are fully protected against physical contact, dust, and splash water. The material used is characterized by high stability and impact resistance, and its properties make it perfectly suitable for radio applications.



Technical data	CU8210-M001-0110	CU8210-M001-0130	CU8210-M001-0150
	cabinet dome for industrial WLAN and mobile network components		
	dome covering one USB socket for use with USB sticks for WLAN, Bluetooth or mobile communication networks		
	includes on-molded 1 m USB cable with USB 2.0 plug, type A, for connection to an Industrial PC	includes on-molded 3 m USB cable with USB 2.0 plug, type A, for connection to an Industrial PC	includes on-molded 5 m USB cable with USB 2.0 plug, type A, for connection to an Industrial PC
	mounting style: panel mount/control cabinet wall		
	interface: USB 2.0 socket, type A		
	IP 66		
	-40...+60 °C		
	approx. 250 g	approx. 325 g	approx. 365 g
	54 mm x 120 mm x 54 mm		

CU8210-D001-010x | WLAN USB stick

The WLAN sticks from the CU8210-D001 can be used as high-performance wireless clients and enable the transfer of encrypted data at rates of up to 433.3 Mbit/s. By means of the Beckhoff Virtual WLAN Access Point software tool, the sticks can be configured via Wi-Fi Direct to serve as Virtual Access Points on Industrial PCs, which opens up new fields of applications. The WLAN sticks are fully compatible with all previous and current WLAN standards. Thanks to their downward compatibility, the sticks also can easily be connected to older WLAN infrastructures. The WLAN sticks support 20 MHz, 40 MHz and 80 MHz transmission bandwidths.



Technical data	CU8210-D001-0101	CU8210-D001-0102
	WLAN USB stick for North America	WLAN USB stick for Europe, Russia, South Africa, Brazil, Korea, Israel, Taiwan, China, Japan, Australia, New Zealand
	WLAN standards: 802.11 b, g, n, a, ac	
	max. data rate: 72.2 Mbit/s (20 MHz), 150 Mbit/s (40 MHz), 433.3 Mbit/s (80 MHz)	
	encryption scheme: WEP, WPA/WPA2 (TKIP/AES)	
	operating system: Windows 7, Windows 10, TwinCAT/BSD	
	IP 20	
	0...+70 °C	
	approx. 5 g	
	29.5 mm x 15 mm x 8 mm	

CU8210-D004-010x | LTE USB stick

The LTE USB stick with a GSM/UMTS/LTE modem can dial into a mobile communication network via a common SIM card. The stick can be used to retrofit Industrial PCs with mobile communication if the need arises. It thus provides almost unlimited connectivity to your databases and cloud systems. Also, an Internet connection can be set up even in less populated areas, given sufficient cellular coverage. The stick uses the fourth generation (4G) cellular network technology, has a slot for a SIM card and is supplied with power via the USB interface.



Technical data	CU8210-D004-0101	CU8210-D004-0102	CU8210-D004-0103
	LTE USB stick for North America	LTE USB stick for Europe, Middle East, Africa	LTE USB stick for Asia, Australia
	LTE: R9 HSPA+/HSDPA/HSUPA/WCDMA: R8		
	4G band: B1/B2/B4/B5/B7/B12/B28	4G band: B1/B3/B7/B8/B20	4G band: B1/B3/B7/B8/B19/B28/B40
	3G band: B1/B2/B4/B5	3G band: B1/B8	3G band: B1/B6/B8/B19
	2G band: 850/900/1800/1900		
	max. data rate: LTE DL 150 Mbit/s, UL 50 Mbit/s		
	SIM slot: standard SIM (mini SIM 2FF)		
	operating system: Windows 7, Windows 10, TwinCAT/BSD		
	IP 20		
	-20...+55 °C		
	approx. 30 g		
	88 mm x 28 mm x 11.5 mm		

Control Panels

► www.beckhoff.com/ControlPanel



Multi-touch Control Panels

- built-in or mounting arm devices
- also for use in hazardous areas, Zone 2/22
- multi-finger touch screen
- 7-, 12-, 12.1-, 15-, 15.6-, 18.5-, 19-, 21.5- and 24-inch displays
- vertical or horizontal orientation (portrait/landscape)
- DVI/USB Extended interface
- CP-Link 4 – The One Cable Display Link

See page **156**

Single-touch Control Panels

- built-in or mounting arm devices
- without touch screen, with single-finger touch screen or touch pad
- 5.7-, 6.5-, 7-, 10.1-, 12-, 15- and 19-inch displays
- DVI/USB Extended interface

See page **176**



Built-in Control Panels, front side IP 65



Control Panels, IP 65 on all sides



Built-in Control Panels, front side IP 65



Control Panels, IP 65 on all sides



Multi-touch Control Panels CP29xx and CP39xx

► www.beckhoff.com/multi-touch

With Windows 10 the multi-finger touch screens are becoming increasingly popular for use with PCs. Industrial applications are using the projected capacitive multi-touch technology. An anti-reflective glass plate forms the display front. The operation with gloves is possible. Ten fingers are detected separately.

The CP29xx built-in Panel series for control cabinet installation is implemented with IP 65 protection at the front and IP 20 at the rear. The CP39xx Control Panels for mounting arm installation feature all-round IP 65 protection. The panels CP29xx-0000 and CP39xx-0000 with DVI/USB Extended

interface can be operated up to 50 m away from the Industrial PC. With CP-Link 4 – The One Cable Display Link – and CP29xx-0010 and CP39xx-0010 Control Panels the distance between Industrial PC and operating panel can be increased to 100 m.

Beckhoff offers the following display sizes:
Wide screen (16:9)

- 7-inch, resolution 800 x 480
- 12.1-inch, resolution 1280 x 800
- 15.6-inch, resolution 1366 x 768
- 18.5-inch, resolution 1366 x 768
- 21.5-inch, full HD resolution 1920 x 1080
- 24-inch, full HD resolution 1920 x 1080

Further display sizes

- 12-inch, resolution 800 x 600 (4:3)
 - 15-inch, resolution 1024 x 768 (4:3)
 - 19-inch, resolution 1280 x 1024 (5:4)
- With the option C9900-M575 all of the displays are also available in portrait format.

Some Control Panels from the CP29xx and CP39xx series are available with a stainless steel version that meets the hygiene requirements in the pharmaceutical, food and packaging industries. Customer-specific adaptations for push-button extension individualise the multi-touch Control Panel series.



CP39xx



CP29xx



CP39xx



CP39xx-14xx

CPX29xx and CPX39xx for application in hazardous areas, Zone 2/22

With the CPX Control Panel series, the proven multi-touch technology of Beckhoff Control Panels is available in particularly 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 Control Panels even under

harsh environmental conditions. The capacitive touch technology provides the typical convenient operation of all Beckhoff multi-touch panels. The aesthetically pleasing appearance of the panel and the look and feel of the aluminium housing are maintained, making them visual highlights in explosion-proof environments. The devices are available with three different displays in the sizes 15, 19 and 21.5 inches.



CPX29xx

Modern, elegant device design

Multi-touch for 5-finger touch

Vertical or horizontal variants

Use of aluminium for extremely robust design

Continuous glass surface – highest resistance to environmental influences

Display formats 4:3, 5:4 or wide-screen 16:9

LED backlight

Narrow housing edges

High protection class IP 65

Push-button extension with emergency stop, also in customer-specific design



DVI/USB Extended 2.0

With the DVI/USB Extended technology, Control Panel and Industrial PC can be operated at distances of up to 50 m. The DVI graphics signal from the PC is directly transmitted via a DVI-E cable. The Control Panel is equipped with a signal processor, which restores the DVI signal after 50 m.

For the connection of CP29xx-0000 and CP39xx-0000 Control Panels, the CU8801 USB Extender box is connected to a USB port of the PC. The CU8801 converts the USB signal coming from the PC to USB Extended 2.0

(USB-E 2.0) and transmits it via up to 50 m of Cat.5 cable to the Control Panel, where it is reconverted to USB 2.0 with data rates of 480 Mbit/s.

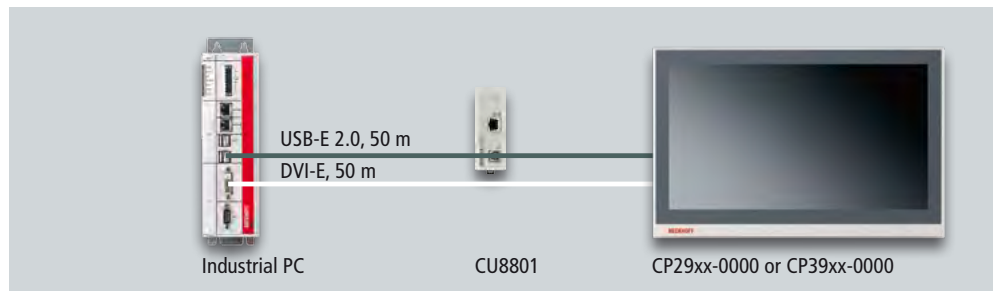
A USB hub in the Control Panel enables the connection of external USB devices such as a keyboard or USB stick in addition to touch screen and push-button extension. It is not possible, however, to connect an additional USB hub to the Control Panel.

The CU8801 USB Extender box does not require auxiliary power supply. It has a USB

input and an RJ45 USB Extended output. The box is available in a set with all required cables in various lengths to bridge distances of up to 50 m between PC and Control Panel.

For smaller distances of up to 5 m, CP29xx-0000 Control Panels and PC can be directly connected via USB cable, whereas the CP39xx-0000 Control Panels have to be connected by means of the CU8801 USB Extender no matter what distance.

**DVI/USB Extended 2.0 for
CP29xx-0000 or CP39xx-0000 via
the CU8801 transmitter box**



CP-Link 4 | The One Cable Display Link

► www.beckhoff.com/CP-Link4

With CP-Link 4 operating panels can be located up to 100 m away from the Industrial PC. The one cable solution can be used to transfer video signals, USB 2.0 and the power supply in a Cat.6A cable, thus reducing cable and installation costs. The CP-Link 4 technology is supported by the Beckhoff multi-touch Control Panel series CP29xx-0010 for installation inside the wall of a control cabinet, CP39xx-0010 for mounting arm installation and CPX39xx-0010 for use in hazardous areas, Zone 2/22.

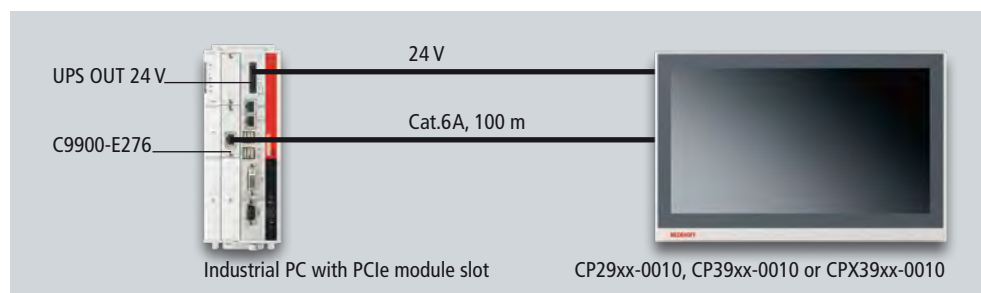
CP-Link 4 – The Two Cable Display Link

The multi-touch Control Panels can be operated up to 100 m away from the PC. CP-Link 4 – The Two Cable Display Link – transfers DVI and USB together via a Cat.6A cable. The CU8802 CP-Link 4 transmitter box is connected to the PC via DVI and USB, or else the C9900-E276 PCIe module for CP-Link 4 is installed in the PC. Via a socket at the Control Panel the 24 V power supply has to be connected.

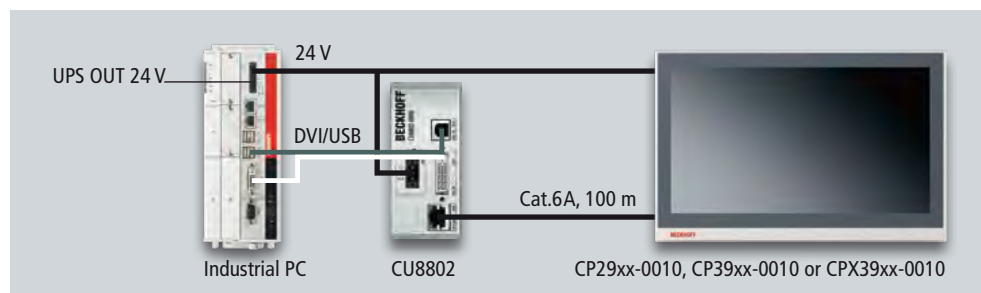
CP-Link 4 – The One Cable Display Link

The power supply for the Control Panel can also be provided via CP-Link 4 – The One Cable Display Link. The CU8803 CP-Link 4 transmitter box is used instead of the CU8802 or the PCIe module. The Control Panel remains unchanged. The CU8803 transmitter box provides power to the Control Panel via the Cat.6A cable, which also transfers DVI and USB. The power supply socket of the panel is not used.

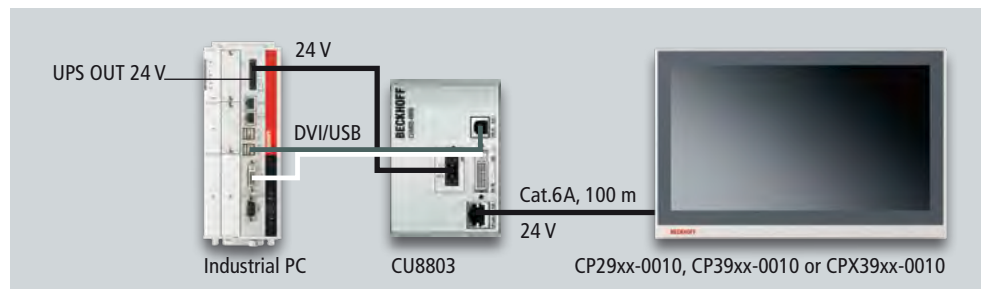
CP-Link 4 – The Two Cable Display Link: via C9900-E276 PCIe module integrated in the PC



CP-Link 4 – The Two Cable Display Link: via CU8802 transmitter box



CP-Link 4 – The One Cable Display Link: DVI, USB and 24 V via CU8803 transmitter box



Beckhoff multi-touch Control Panels in customer-specific features and designs

Beckhoff Control Panels can be designed and built for customer-specific requirements. The spectrum of options is exceptionally broad and ranges from company logos or special labels and individualised functions to PCs built in total accordance with the customer's corporate design.



Multi-touch Control Panel in portrait orientation with customised push-button extension



15-inch multi-touch Control Panel with RFID reader, emergency stop and 3 RGB illuminated ring keys



Multi-touch Control Panel with RGB illuminated ring keys



Multi-touch Control Panel with emergency stop, electromechanical keys and graycode switch



Multi-touch Control Panel with emergency stop, start/stop keys and membrane keys with slide-in labels



21.5-inch multi-touch Control Panel for machine tools



Multi-touch Control Panel with company logo and keyboard shelf



Multi-touch Control Panel in the customer's corporate design



Multi-touch Control Panel with push-button extension



18.5-inch multi-touch Control Panel with emergency stop and 3 buttons, connection alternatively via USB or directly wired



Multi-touch Control Panel in the customer's corporate design



Multi-touch Control Panel with individualised functions



CP29xx | Multi-touch built-in Control Panel



Ordering information		Multi-finger touch screen with DVI/USB Extended	Multi-finger touch screen with CP-Link 4
7-inch display	800 x 480	CP2907-0000	CP2907-0010
12-inch display	800 x 600	CP2912-0000	CP2912-0010
12.1-inch display	1280 x 800	CP2913-0000	CP2913-0010
15-inch display	1024 x 768	CP2915-0000	CP2915-0010
15.6-inch display	1366 x 768	CP2916-0000	CP2916-0010
18.5-inch display	1366 x 768	CP2918-0000	CP2918-0010
19-inch display	1280 x 1024	CP2919-0000	CP2919-0010
21.5-inch display	1920 x 1080	CP2921-0000	CP2921-0010
24-inch display	1920 x 1080	CP2924-0000	CP2924-0010



Stainless steel front C9900-F94x with blue silicone seal for horizontal alignment in 12.1-, 15.6-, 18.5- and 21.5-inch display

CP29xx	CP29xx-0000	CP29xx-0010
Features	<p>TFT display in nine sizes</p> <p>aluminium housing with glass front, front side IP 65, rear side IP 20</p> <p>multi-finger touch screen</p> <ul style="list-style-type: none"> – multi-finger touch screen driver, included in Windows 7 and Windows 10 – single-finger touch screen driver, available for Windows XP and Windows CE 6 <p>integrated DVI/USB extension technology</p> <ul style="list-style-type: none"> – DVI-E and USB-E 2.0 enable remote panel operation at a distance of up to 50 m from the PC. – USB-E 2.0 transmits USB 2.0 with 480 Mbit/s. – DVI-E input is compatible to the standard DVI output of a PC. <p>USB 3.0 input for the direct connection to a standard USB output of a PC with distances of up to 3 m</p> <p>2-port USB 3.0 socket inside the Control Panel backplane, for USB-E 2.0 limited to USB 2.0</p> <p>all connectors at the lower rear side</p> <p>24 V power supply</p> <p>operating temperature 0...55 °C</p> <p>pull-out clamping levers for fast installation without loose parts</p>	<p>TFT display in nine sizes</p> <p>aluminium housing with glass front, front side IP 65, rear side IP 20</p> <p>multi-finger touch screen</p> <ul style="list-style-type: none"> – multi-finger touch screen driver, included in Windows 7 and Windows 10 – single-finger touch screen driver, available for Windows XP and Windows CE 6 <p>integrated CP-Link 4 connection technology</p> <ul style="list-style-type: none"> – CP-Link 4 enables remote panel operation at a distance of up to 100 m from the PC via a Cat.6A cable with integrated or separate 24 V DC power supply depending on the transmitter module. – CP-Link 4 transmits USB 2.0 with 100 Mbit/s and DVI. <p>connection via an RJ45 connector for CP-Link 4 in the backplane</p> <p>additional pin contact strip, for optional 24 V power supply</p> <p>2-port USB 2.0 socket inside the Control Panel backplane</p> <p>all connectors at the lower rear side</p> <p>operating temperature 0...50 °C</p> <p>pull-out clamping levers for fast installation without loose parts</p>
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP29xx	

Ordering information	Options for CP2916, CP2918 and CP2921
C9900-F94x	stainless steel front with blue silicone seal for CP2xxx-00x0 for horizontal alignment, stainless steel 1.4404, matt ground with grain size 240, instead of standard aluminium front



CPX29xx | Multi-touch built-in Control Panel with DVI/USB Extended interface

For use in hazardous areas, Zone 2/22

Ordering information	Multi-finger touch screen
15-inch display 1024 x 768	CPX2915-0000
19-inch display 1280 x 1024	CPX2919-0000
21.5-inch display 1920 x 1080	CPX2921-0000

CPX29xx	CPX29xx-0000
Features	<p>TFT display in three sizes</p> <p>aluminium housing with glass front, front side IP 65, rear side IP 20</p> <p>for use in hazardous areas, Zone 2/22</p> <p>multi-finger touch screen</p> <ul style="list-style-type: none"> – multi-finger touch screen driver, included in Windows 7 and Windows 10 – single-finger touch screen driver, available for Windows XP and Windows CE 6 <p>integrated DVI/USB extension technology</p> <ul style="list-style-type: none"> – DVI-E and USB-E 2.0 enable remote panel operation at a distance of up to 50 m from the PC. – USB-E 2.0 transmits USB 2.0 with 480 Mbit/s. – DVI-E input is compatible to the standard DVI output of a PC. <p>USB 3.0 input for the direct connection to a standard USB output of a PC with distances of up to 3 m</p> <p>2-port USB 3.0 socket inside the Control Panel backplane, for USB-E 2.0 limited to USB 2.0</p> <p>all connectors at the lower rear side</p> <p>24 V power supply</p> <p>operating temperature 0...55 °C</p> <p>pull-out clamping levers for fast installation without loose parts</p> <p>solid clamping frame for even pressure distribution on the seal</p>
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CPX29xx



Connection block of the basic configuration



CPX39xx | Multi-touch Control Panel with CP-Link 4 – The One Cable Display Link

For use in hazardous areas, Zone 2/22

Ordering information	Multi-finger touch screen
15-inch display 1024 x 768	CPX3915-0010
19-inch display 1280 x 1024	CPX3919-0010
21.5-inch display 1920 x 1080	CPX3921-0010

CPX39xx	CPX39xx-0010
Features	TFT display in three sizes
	aluminium housing with glass front, protection class IP 65
	for use in hazardous areas, Zone 2/22
	multi-finger touch screen
	<ul style="list-style-type: none"> – multi-finger touch screen driver, included in Windows 7 and Windows 10 – single-finger touch screen driver, available for Windows XP and Windows CE 6
	integrated CP-Link 4 connection technology
	<ul style="list-style-type: none"> – CP-Link 4 enables remote panel operation at a distance of up to 100 m from the PC via a Cat.6A cable with integrated or separate 24 V DC power supply depending on the transmitter module. – CP-Link 4 transmits USB 2.0 with 100 Mbit/s and DVI.
	connection via M12 round connector (IP 65) for CP-Link 4 in the backplane
	additional M12 round connector for optional 24 V power supply
	operating temperature 0...50 °C
For mounting four M6 threaded holes at a distance of 100 x 100 mm in the connection block on the rear wall. The plug connectors for connecting the Control Panel are plugged into the connection block from underneath.	
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CPX39xx



CP39xx | Multi-touch Control Panel



Ordering information		Multi-finger touch screen with DVI/USB Extended	Multi-finger touch screen with CP-Link 4
7-inch display	800 x 480	CP3907-0000	CP3907-0010
12-inch display	800 x 600	CP3912-0000	CP3912-0010
12.1-inch display	1280 x 800	CP3913-0000	CP3913-0010
15-inch display	1024 x 768	CP3915-0000	CP3915-0010
15.6-inch display	1366 x 768	CP3916-0000	CP3916-0010
18.5-inch display	1366 x 768	CP3918-0000	CP3918-0010
19-inch display	1280 x 1024	CP3919-0000	CP3919-0010
21.5-inch display	1920 x 1080	CP3921-0000	CP3921-0010
24-inch display	1920 x 1080	CP3924-0000	CP3924-0010



reddot design award
winner 2013



Mounting arm adapter
C9900-M751



Connection block of the basic configuration with optional USB socket

CP39xx	CP39xx-0000	CP39xx-0010
Features	TFT display in nine sizes	TFT display in nine sizes
	aluminium housing with glass front, protection class IP 65	aluminium housing with glass front, protection class IP 65
	multi-finger touch screen	multi-finger touch screen
	<ul style="list-style-type: none"> – multi-finger touch screen driver, included in Windows 7 and Windows 10 – single-finger touch screen driver, available for Windows XP and Windows CE 6 	<ul style="list-style-type: none"> – multi-finger touch screen driver, included in Windows 7 and Windows 10 – single-finger touch screen driver, available for Windows XP and Windows CE 6
	integrated DVI/USB extension technology	integrated CP-Link 4 connection technology
	<ul style="list-style-type: none"> – DVI-E and USB-E 2.0 enable remote panel operation at a distance of up to 50 m from the PC. – USB-E 2.0 transmits USB 2.0 with 480 Mbit/s. – DVI-E input is compatible to the standard DVI output of a PC. 	<ul style="list-style-type: none"> – CP-Link 4 enables remote panel operation at a distance of up to 100 m from the PC via a Cat.6A cable with integrated or separate 24 V DC power supply depending on the transmitter module. – CP-Link 4 transmits USB 2.0 with 100 Mbit/s and DVI.
	connection via 3 round connectors (IP 65) for DVI, USB-E 2.0 and 24 V power supply unit in the backplane	connection via M12 round connector (IP 65) for CP-Link 4 in the backplane
	24 V power supply	additional M12 round connector for optional 24 V power supply
	operating temperature 0...55 °C	operating temperature 0...50 °C
	For mounting four M6 threaded holes at a distance of 100 x 100 mm in the connection block on the rear wall. The plug connectors for connecting the Control Panel are plugged into the connection block from underneath.	For mounting four M6 threaded holes at a distance of 100 x 100 mm in the connection block on the rear wall. The plug connectors for connecting the Control Panel are plugged into the connection block from underneath.
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP39xx	



CP39xx-1400-0010 with C9900-M759 mounting arm adapter



CP39xx-14xx | Stainless steel multi-touch panels

The Control Panels from the CP39xx-14xx series in a stainless steel finish are control and operating devices that meet strict hygiene requirements – above all important in the pharmaceutical, food and packaging industries. The Control Panels with IP 65 protection are characterised by an optimised housing design with minimised gaps. The housing geometry ensures that fluids run off automatically, thus helping to prevent the accumulation of contaminants.

Three display versions are offered with diagonal sizes of 12.1-, 15.6- and 18.5-inch.

The multi-touch screen is equipped with a laminated polyester film and thus offers increased splintering protection to avoid contamination of the produced goods when a device is damaged.

Further features, such as the resistance of the polished stainless steel surface, the polyester film and sealing agents that offer protection against a large num-

ber of chemical cleaning agents, cover a host of requirements for the use of the Control Panels in hygienic areas.

In addition to the capacitive multi-touch screen there are also versions available with additional emergency stop and three short-stroke keys with LED ring lighting for comfortable operation. Thus, central control tasks such as start and stop are integrated directly in the Control Panel.

The stainless steel Control Panels are designed for installation on a 48 mm mounting arm tube system. The mounting arm adapter (C9900-M759) for connection can be ordered separately. This simultaneously protects all connections and cables against contamination and chemical influences.

The range is rounded off by further accessories such as an RFID reader, an external USB interface or an adapter for tilting the Control Panel.



CP39xx-1400



CP39xx-1401



CP39xx-1414

Ordering information	multi-finger touch screen with CP-Link 4
12.1-inch display 1280 x 800	CP3913-1400-0010
15.6-inch display 1366 x 768	CP3916-1400-0010
18.5-inch display 1366 x 768	CP3918-1400-0010
12.1-inch display 1280 x 800	CP3913-1401-0010
15.6-inch display 1366 x 768	CP3916-1401-0010
18.5-inch display 1366 x 768	CP3918-1401-0010
12.1-inch display 1280 x 800	CP3913-1414-0010
15.6-inch display 1366 x 768	CP3916-1414-0010
18.5-inch display 1366 x 768	CP3918-1414-0010



CP39xx-1401-0010
with integrated push-
button extension

Laminated
multi-touch
screen

Keys with LED ring lighting

CP39xx-14xx	CP39xx-1400-0010	CP39xx-1401-0010	CP39xx-1414-0010
Features	TFT display in three sizes	TFT display in three sizes	TFT display in three sizes
	stainless steel housing 1.4301, matt ground with grain size 240, protection class IP 65		
	flush-mounted multi-finger touch screen with increased splintering protection through front laminate		
	– multi-finger touch screen driver included from Windows 7		
	integrated CP-Link 4 connection technology		
	– CP-Link 4 enables remote panel operation at a distance of up to 100 m from the PC via a Cat.6A cable with integrated or separate 24 V DC power supply depending on the transmitter module.		
	– CP-Link 4 transmits USB 2.0 with 100 Mbit/s and DVI.		
	–	push-button extension on the bottom side	push-button extension on the bottom side
		– 3 short-stroke buttons with LED ring lighting	– 3 short-stroke buttons with RGBW LED ring lighting, controlled via USB
		– 1 emergency stop key	– 1 emergency stop key wired to a 4-pin round connector
		– The buttons and LEDs are wired to a 19-pin round connector.	
	connection via M12 round connector (IP 65) for CP-Link 4 in the backplane		
	additional M12 round connector for optional 24 V power supply	–	additional M12 round connector for optional 24 V power supply
	operating temperature 0...45 °C	operating temperature 0...45 °C	operating temperature 0...45 °C
	6 M5 threaded holes for mounting a mounting arm adapter C9900-M759		
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP39xx		

Options	
C9900-E295	RFID reader for ISO 14443 A/B, ISO 15693, Mifare Classic, Mifare Plus, Mifare DESFire, Legic RF standards, Sony FeliCa, reading and writing, 13.56 MHz, connection via USB, mounted behind the front laminate
C9900-E299	1-port USB A interface with stainless steel screw-on cap IP 65 led out in the sidewall of the mounting arm adapter C9900-M759, second side USB A plug IP 65, occupies the USB port in the connection section, single part, not mounted
C9900-M759	Rotatable mounting arm adapter, stainless steel, 1.4404, matt ground with grain size 240, mounting arm installation from the top or the bottom. Single part, not mounted. A separate tube holder is required for mounting: C9900-M735 holder with welded-on tube or C9900-M736 tube holder, single part, not mounted.
C9900-M764	mounting arm adapter intermediate plate for C9900-M759 mounting arm adapter, stainless steel, 1.4404, matt ground with grain size 240, for tilting the Control Panel by +10° or -10°, single part, not mounted
C9900-M735	holder with welded-on tube (length: 1.50 m, diameter: 48.3 mm) for C9900-M759 mounting arm adapter, stainless steel, 1.4404, matt ground with grain size 240, single part, not mounted
C9900-M736	holder for C9900-M759 mounting arm adapter, stainless steel, 1.4404, matt ground with grain size 240, must be welded, single part, not mounted

Accessories for CP2xxx and CP3xxx multi-touch Control Panels and Panel PCs

► www.beckhoff.com/IPC-accessories



C9900-M361 | Handle at the bottom of the CP3xxx

The optional C9900-M361 handle for Beckhoff CP3xxx Panel PCs or Control Panels allows a comfortable adjusting of the position and tilt of the panel. The handle is made of aluminium and its design matches the

panel. The handle has a width of 386 mm. This option can be retrofitted to or removed from a CP3xxx-16xx panel.



Ordering information	Handle option for CP3xxx
C9900-M361	Handle, length: 386 mm, aluminium, mounted under a Control Panel or Panel PC CP3xxx, can be ordered only together with the Control Panel or Panel PC.

C9900-M406 | Keyboard shelf for CP3xxx multi-touch Control Panels and Panel PCs

The keyboard shelf at a Beckhoff Panel PC or Control Panel permits a standard PC keyboard to be placed in front of the Control Panel, allowing convenient operation during commissioning or software updates. During normal production, the machine operator can rest tools and other items here while using the multi-finger touch screen.

A USB socket is integrated at the back of the keyboard shelf for connecting the keyboard. Any keyboard USB cable excess can be wrapped around a bracket at the underside of the keyboard shelf.

The shelf is made of coated aluminium, and its design matches that of the Control Panel. The keyboard shelf has a width of 468 mm.



Ordering information	Keyboard shelf for CP3xxx
C9900-M406	Toolboard for keyboard or tools, mounted under a Control Panel or Panel PC CP3xxx, with integrated USB socket IP 65 at the back side, can only be ordered in combination with the Control Panel or Panel PC.

C9900-M419 | Toolboard for keyboard or tools without integrated USB socket

The toolboard at a Beckhoff CP3xxx Panel PC or Control Panel allows a standard PC keyboard or tools to be placed in front of the panel.

The toolboard has a width of 468 mm and is made of coated aluminium. Its design matches the panel.

This option can be retrofitted to or removed from a CP3xxx-16xx Panel PC.

For the use of a USB keyboard it is necessary to order an additional USB port. For CP39xx the option C9900-E274 is recommended. For permanent use of a USB keyboard, the toolboard option C9900-M406 with integrated USB port or the option C9900-M423 with two integrated USB ports are recommended, as it is cost-intensive to retrofit a USB port.



Ordering information	Keyboard shelf for CP3xxx
C9900-M419	Toolboard for keyboard or tools, mounted under a Control Panel or Panel PC CP3xxx, without integrated USB socket IP 65 at the rear side, can be ordered only together with the Control Panel or Panel PC.

C9900-M423 | Keyboard and mouse shelf with integrated 2-port USB socket

The keyboard and mouse shelf for a Beckhoff Panel PC or Control Panel allows a standard PC keyboard and a mouse to be placed in front of the panel.

A 2-port USB socket is integrated at the back of the keyboard and mouse shelf

for connecting the USB devices. The excess length of the USB cable can be accommodated in a cable canal underneath the shelf.

The shelf has a width of 727 mm and is made of coated aluminium. Its design matches the panel.



Ordering information	Keyboard shelf for CP3xxx
C9900-M423	Toolboard for keyboard, mouse or tools, mounted under a Control Panel or Panel PC CP3xxx, with integrated 2-port USB A socket IP 65 at the rear side and cable channel for mouse and keyboard cables on the rear side, can be ordered only together with the Control Panel or Panel PC.



CP2912 with C9900-G002 and CP2924 with C9900-G007

C9900-G00x | Push-button extension for built-in CP2xxx multi-touch panels

C9900-G00x	Push-button extension for built-in multi-touch panels
Features	push-button extension below
	push-button keys with signal lamp, type RAFI RAFIX 22FS+, round, 30 mm
	1 emergency stop key, type RAFI RAFIX 22FS+
	labels for push-button caps for individual marking of each push-button
	All push-buttons are transmitted via USB with one normally-open contact.
	Additionally, all push-buttons are directly wireable with a second normally-open contact via a terminal row.
Further information	All signal lamps are transmitted via USB only.
	Optional, selector switches and keylock switches as well as other elements from the series RAFIX 22FS+ are integrateable.
	www.beckhoff.com/C9900-G00x

Ordering information	Push-button extension for built-in multi-touch panels
C9900-G002	push-button extension for CP2x12 12" landscape: 4 push-button keys and 1 emergency stop key
C9900-G009	push-button extension for CP2x13 12.1" landscape: 4 push-button keys and 1 emergency stop key
C9900-G003	push-button extension for CP2x15 15" landscape: 7 push-button keys and 1 emergency stop key
C9900-G004	push-button extension for CP2x16 15.6" landscape: 8 push-button keys and 1 emergency stop key
C9900-G005	push-button extension for CP2x18 18.5" landscape: 10 push-button keys and 1 emergency stop key
C9900-G006	push-button extension for CP2x19 19" landscape: 9 push-button keys and 1 emergency stop key
C9900-G008	push-button extension for CP2x21 21.5" landscape: 12 push-button keys and 1 emergency stop key
C9900-G007	push-button extension for CP2x24 24" landscape: 13 push-button keys and 1 emergency stop key



CP3919 with C9900-G026 and CP3921 with C9900-G028

C9900-G02x | Push-button extension for CP39xx multi-touch panels with mounting arm

C9900-G02x	Push-button extension for multi-touch panels with mounting arm
Features	push-button extension below push-button keys with signal lamp, type RAFI RAFIX 22FS+, round, 30 mm 1 emergency stop key, type RAFI RAFIX 22FS+ labels for push-button caps for individual marking of each push-button All push-buttons are transmitted via USB with one normally-open contact. Additionally, all push-buttons are directly wireable with a second normally-open contact via a terminal row. All signal lamps are transmitted via USB only. aluminium cable channel to the mounting arm adapter on the backside Optional, selector switches and keylock switches as well as other elements from the series RAFIX 22FS+ are integrateable.
Further information	www.beckhoff.com/C9900-G02x

Ordering information	Push-button extension for multi-touch panels with mounting arm
C9900-G022	push-button extension for CP3912 12" landscape: 4 push-button keys and 1 emergency stop key
C9900-G029	push-button extension for CP3913 12.1" landscape: 4 push-button keys and 1 emergency stop key
C9900-G023	push-button extension for CP3915 15" landscape: 7 push-button keys and 1 emergency stop key
C9900-G024	push-button extension for CP3916 15.6" landscape: 8 push-button keys and 1 emergency stop key
C9900-G025	push-button extension for CP3918 18.5" landscape: 10 push-button keys and 1 emergency stop key
C9900-G026	push-button extension for CP3919 19" landscape: 9 push-button keys and 1 emergency stop key
C9900-G028	push-button extension for CP3921 21.5" landscape: 12 push-button keys and 1 emergency stop key
C9900-G027	push-button extension for CP3924 24" landscape: 13 push-button keys and 1 emergency stop key



C9900-G05x | Compact push-button extension for landscape multi-touch CP39xx Control Panels and CP37xx-1600 Panel PCs

C9900-G05x	Push-button extension for multi-touch panels with mounting arm
Features	horizontal push-button extension below
	push-button keys with signal lamp, type RAFI RAFIX 22FS+, round, 30 mm
	1 emergency stop key, type RAFI RAFIX 22FS+
	labels for push-button caps for individual marking of each push-button
	All push-buttons are transmitted via USB with switch contact.
	Additionally, all push-buttons are directly wireable with a second switch contact on a 19-pin round connector. All signal lamps are transmitted via USB only. Alternatively, all switch contacts and signal lamps can be connected via a 19-pin round connector.
Further information	connection via 19-pin round connector in the connection area
	Optional, selector switches and keylock switches as well as other elements from the series RAFIX 22FS+ are integratable. www.beckhoff.com/C9900-G05x

Ordering information	Push-button extension for multi-touch panels with mounting arm
C9900-G050	compact push-button extension for CP3716-1600 or CP3916 with landscape 15.6-inch display, one contact of each push-button and all LEDs via USB
C9900-G051	compact push-button extension for CP3716-1600 or CP3916 with landscape 15.6-inch display, all push-button contacts and LEDs via 19-pin round connector
C9900-G052	compact push-button extension for CP3718-1600 or CP3918 with landscape 18.5-inch display, one contact of each push-button and all LEDs via USB
C9900-G053	compact push-button extension for CP3718-1600 or CP3918 with landscape 18.5-inch display, all push-button contacts and LEDs via 19-pin round connector
C9900-G054	compact push-button extension for CP3721-1600 or CP3921 with landscape 21.5-inch display, one contact of each push-button and all LEDs via USB
C9900-G055	compact push-button extension for CP3721-1600 or CP3921 with landscape 21.5-inch display, all push-button contacts and LEDs via 19-pin round connector
C9900-G056	compact push-button extension for CP3724-1600 or CP3924 with landscape 24-inch display, one contact of each push-button and all LEDs via USB
C9900-G057	compact push-button extension for CP3724-1600 or CP3924 with landscape 24-inch display, all push-button contacts and LEDs via 19-pin round connector

Single-touch Control Panels CP6xxx and CP7xxx

► www.beckhoff.com/singletouch-control-panel

What frame does an image need?

The carefully planned use of design elements gives the Control Panel its reserved and elegant appearance.

The open design possibilities of a membrane keyboard are fully exploited here. The robust keyboard ensures that the IP 65 protection class is retained as if new, even after long use in a tough industrial environment.

Light emitting diodes are integrated into the keys, while slide-in labels mean that exchangeable key identification can match the needs of the plant.

The emergency stop at the Control Panel

Push-button extensions in the design of the Control Panel make it thicker, but permit the application-specific arrangement of electromechanical keys and other compo-

nents such as all kinds of switches, barcode scanners, graycode switches and handwheels. External housings can be attached to either side of the Control Panel. The signal leads may be laid separately or can be operated via USB.

Assembly

The back plate of the Control Panel series CP7xxx offers a free surface for a variety of assembly methods, for example a mounting arm system.





Mounting arm



Additional keyboard in IP 65



Touch pad



USB socket in IP 65

Control Panel for installation in the control cabinet door

The built-in Control Panels CP6xxx are designed for control cabinet installation. Only 4 mm of the front are visible in front of the control cabinet wall. Installation via pull-out clamping levers makes the process very simple without loose parts.

The built-in Control Panels CP69xx are available with 5.7-, 6.5-, 12-, 15-inch or 19-inch TFT display, with touch screen or touch pad, as a monitor without keyboard or with different membrane keyboard

models up to full alphanumeric keyboards with 10 PLC special keys and 10 LEDs. The same range of push-button extensions with electromechanical keys as for the CP7xxx series is available.

The Control Panels are connected to the PC with a DVI/USB Extended interface for distances up to 50 m.

The Control Panel toolkit

A housing that can be dimensioned precisely in line with the needs of the particular application according to the customer's wishes can

be combined with an individually designed membrane keyboard. This puts customisation on a wide footing at Beckhoff. Hardly one Control Panel is like another.

The Bus Terminal interface integrated into the Control Panel permits the connection of standard Beckhoff Bus Terminals to realise handwheels, graycode switches, buttons, switches, indicator lamps or other components without any additional wiring. Such elements can be integrated into the Control Panel and connected to the PC via USB.

Aluminium housing
in IP 65

Single-touch screen
or glass plate

Interchangeable logo



Push-button
extension with
emergency stop

CP69xx, CP79xx | "Economy" Control Panels with DVI/USB Extended interface

► www.beckhoff.com/CP69xx

► www.beckhoff.com/CP79xx

The digital visual interface (DVI), defined as successor to analog VGA connections, digitally transfers the PC image to the display. The universal serial bus (USB) enables connection of input devices and drives to the PC. DVI/USB Extended enables CP69xx and CP79xx "Economy" Control Panels to be operated at a distance of up to 50 metres from the PC. Apart from a graphics card or

a motherboard with DVI output and the USB port available with every motherboard, no additional card is required in the PC.

CP79xx Control Panels are designed for mounting arm installation. They offer all-round IP 65 protection. To this end they are equipped via industrial IP 65 round connectors for DVI or USB Extended and the 24 V power supply.

The CP69xx built-in Control Panels are connected via standard USB and DVI connectors and feature an industrial pin contact strip for the 24 V power supply. A 2-port USB socket in the rear panel enables connection of keyboard, mouse, USB stick or CD/DVD drive. USB Extended transfers the data with 12 Mbit/s according to USB 1.1.

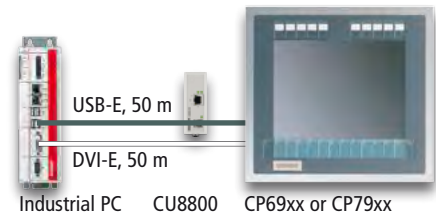




CP69xx | "Economy" built-in Control Panel



CP79xx | "Economy" Control Panel



Industrial PC CU8800 CP69xx or CP79xx

DVI/USB Extended

DVI/USB Extended

With the DVI/USB Extended technology, Control Panel and Industrial PC can be operated at distances of up to 50 m. The DVI graphics signal from the PC is directly transmitted via a DVI-E cable. The Control Panel is equipped with a signal processor, which restores the DVI signal after 50 m.

For the connection of CP69xx and CP79xx Control Panels, the CU8800 USB Extender box is connected to a USB port of the PC. The CU8800 converts the USB

signal coming from the PC to USB Extended (USB-E) and transmits it to the Control Panel via up to 50 m of Cat.5 cable, where it is reconverted to USB 1.1 with data rates of 12 Mbit/s.

A USB hub in the Control Panel enables the connection of external USB devices such as a keyboard or USB stick in addition to touch screen, membrane keyboard and push-button extension. It is not possible, however, to connect an additional USB hub to the Control Panel.

The CU8800 USB Extender box does not require auxiliary power supply. It has a USB input and an RJ45 USB Extended output. The box is available in a set with all required cables in various lengths to bridge distances of up to 50 m between PC and Control Panel.

For smaller distances of up to 5 m, CP69xx Control Panels and PC can be directly connected via a USB cable, whereas the CP79xx Control Panels have to be connected by means of the CU8800 USB Extender no matter what distance.

USB Extended input for distances up to 50 m to the PC

DVI Extended input for distances up to 50 m to the PC

5.7-, 6.5-, 7-, 10.1-, 12-, 15- or 19-inch TFT display

2 USB ports for the connection of keyboard, mouse or storage media

Power supply 24 V DC

USB input for distances up to 5 m to the PC





CP69xx | “Economy” built-in Control Panel with DVI/USB Extended interface

Ordering information	without touch screen	with single-touch screen	with touch pad
Display only			
5.7-inch display 640 x 480	CP6907-0000-0000	CP6907-0001-0000	
6.5-inch display 640 x 480	CP6909-0000-0000	CP6909-0001-0000	
12-inch display 800 x 600	CP6901-0000-0000	CP6901-0001-0000	
15-inch display 1024 x 768	CP6902-0000-0000	CP6902-0001-0000	
19-inch display 1280 x 1024	CP6903-0000-0000	CP6903-0001-0000	
Display only, USB A socket in the front			
12-inch display 800 x 600	CP6901-0020-0000	CP6901-0021-0000	
15-inch display 1024 x 768	CP6902-0020-0000	CP6902-0021-0000	
19-inch display 1280 x 1024	CP6903-0020-0000	CP6903-0021-0000	
With function keys			
6.5-inch display 640 x 480	CP6919-0000-0000	CP6919-0001-0000	
12-inch display 800 x 600	CP6911-0000-0000	CP6911-0001-0000	
15-inch display 1024 x 768	CP6912-0000-0000	CP6912-0001-0000	
19-inch display 1280 x 1024	CP6913-0000-0000	CP6913-0001-0000	
Numeric keyboard			
6.5-inch display 640 x 480	CP6929-0000-0000	CP6929-0001-0000	
12-inch display 800 x 600	CP6921-0000-0000	CP6921-0001-0000	CP6921-0002-0000
15-inch display 1024 x 768	CP6922-0000-0000	CP6922-0001-0000	CP6922-0002-0000
19-inch display 1280 x 1024	CP6923-0000-0000	CP6923-0001-0000	CP6923-0002-0000
Alphanumeric keyboard			
12-inch display 800 x 600	CP6931-0000-0000	CP6931-0001-0000	CP6931-0002-0000
15-inch display 1024 x 768	CP6932-0000-0000	CP6932-0001-0000	CP6932-0002-0000
19-inch display 1280 x 1024	CP6933-0000-0000	CP6933-0001-0000	CP6933-0002-0000
Alphanumeric keyboard with PLC keys on the sides			
15-inch display 1024 x 768	CP6942-0000-0000	CP6942-0001-0000	



Without keys



Function keys



Numeric keyboard



Alphanumeric keyboard

Alphanumeric keyboard
with PLC keys on the sides

CP69xx	"Economy" built-in Control Panel
Features	TFT display in five sizes
	aluminium front with sheet-steel rear cover, front side IP 65, rear side IP 20
	front laminate in five variants
	<ul style="list-style-type: none"> – only display – function keys and 10 PLC special keys with LED – numeric keyboard and 10 PLC special keys with LED – alphanumeric PC keyboard in US layout and 10 PLC special keys with LED – alphanumeric PC keyboard in US layout and 16 PLC special keys with LED on the sides
	integrated DVI/USB extension technology
	<ul style="list-style-type: none"> – DVI-E and USB-E enable remote panel operation at a distance of up to 50 m from the PC. – DVI-E input is compatible to the standard DVI output of a PC.
	USB input for the direct connection to a standard USB output of a PC with distances of up to 5 m
	all connectors at the lower rear side
	24 V power supply
	operating temperature 0...55 °C
	pull-out clamping levers for fast installation without loose parts
	Options
push-button extension with electromechanical switches and keys	
connecting kits for up to 50 m distance to the PC	
wall mounting frame for building installation	
Stainless steel options	stainless steel front (1.4301) with bevelled edges at top and bottom and touch screen for CP690x
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP69xx

CP6906, CP6900 | “Economy” built-in Control Panels with DVI/USB Extended interface

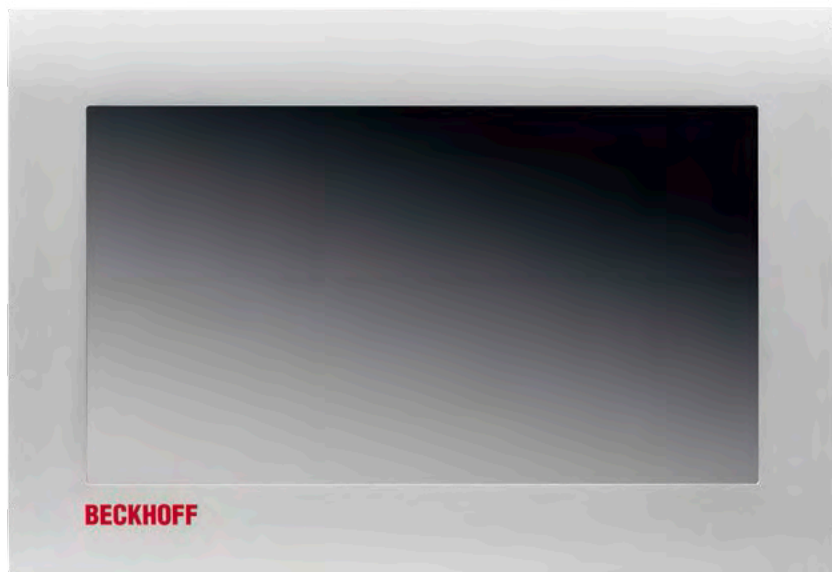
▶ www.beckhoff.com/CP6906

▶ www.beckhoff.com/CP6900

The CP6906 and CP6900 “Economy” Control Panel series expands the Industrial PC entry-level class by two built-in Control Panels with DVI/USB Extended interface. The panels are designed for installation in the front of a control cabinet and have a 7-inch respectively a 10.1-inch touch screen display.

Ideally combined with the compact Embedded PCs in the CX series or C6xxx series Industrial PCs, this results in an inexpensive PC/panel combination. Both Control Panel types are supplied with a 24 V power supply unit. The integrated DVI/USB Extended technology enables remote panel operation at

a distance of up to 50 m from the PC. The optional C9900-G07x push-button extensions supplement the built-in Control Panels with an emergency stop key and three push-button keys with signal lamp.



BECKHOFF

CP6900



CP6906, CP6900 | “Economy” built-in Control Panels with DVI/USB Extended interface

Ordering information	with single-touch screen
7-inch display 800 x 480	CP6906-0001-0000
10.1-inch display 1024 x 600	CP6900-0001-0000

CP6906, CP6900	CP69xx-0001-0000
Features	TFT display in two sizes aluminium front with sheet-steel rear cover, front side IP 54, rear side IP 20 touch screen without keys integrated DVI/USB extension technology <ul style="list-style-type: none"> – DVI-E and USB-E enable remote panel operation at a distance of up to 50 m from the PC. – DVI-E input is compatible to the standard DVI output of a PC. USB input for the direct connection to a standard USB output of a PC with distances of up to 5 m all connectors at the lower rear side 24 V power supply operating temperature 0...55 °C pull-out clamping levers for fast installation without loose parts
Options	touch screen pen with wall holder connecting kits for up to 50 m distance to the PC
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP6906

Ordering information	Options
C9900-G070	push-button extension for CP6x06 with landscape 7-inch display, USB
C9900-G071	push-button extension for CP6x06 with landscape 7-inch display, terminal row
C9900-G072	push-button extension for CP6x00 with landscape 10.1-inch display, USB
C9900-G073	push-button extension for CP6x00 with landscape 10.1-inch display, terminal row



CP79xx | “Economy” Control Panel with DVI/USB Extended interface

Ordering information	without touch screen	with single-touch screen	with touch pad
Display only			
6.5-inch display 640 x 480	CP7909-0000-0000	CP7909-0001-0000	
12-inch display 800 x 600	CP7901-0000-0000	CP7901-0001-0000	
15-inch display 1024 x 768	CP7902-0000-0000	CP7902-0001-0000	
19-inch display 1280 x 1024	CP7903-0000-0000	CP7903-0001-0000	
Display only, USB A socket in the front			
12-inch display 800 x 600	CP7901-0020-0000	CP7901-0021-0000	
15-inch display 1024 x 768	CP7902-0020-0000	CP7902-0021-0000	
19-inch display 1280 x 1024	CP7903-0020-0000	CP7903-0021-0000	
With function keys			
6.5-inch display 640 x 480	CP7919-0000-0000	CP7919-0001-0000	
12-inch display 800 x 600	CP7911-0000-0000	CP7911-0001-0000	
15-inch display 1024 x 768	CP7912-0000-0000	CP7912-0001-0000	
19-inch display 1280 x 1024	CP7913-0000-0000	CP7913-0001-0000	
Numeric keyboard			
6.5-inch display 640 x 480	CP7929-0000-0000	CP7929-0001-0000	
12-inch display 800 x 600	CP7921-0000-0000	CP7921-0001-0000	CP7921-0002-0000
15-inch display 1024 x 768	CP7922-0000-0000	CP7922-0001-0000	CP7922-0002-0000
19-inch display 1280 x 1024	CP7923-0000-0000	CP7923-0001-0000	CP7923-0002-0000
Alphanumeric keyboard			
12-inch display 800 x 600	CP7931-0000-0000	CP7931-0001-0000	CP7931-0002-0000
15-inch display 1024 x 768	CP7932-0000-0000	CP7932-0001-0000	CP7932-0002-0000
19-inch display 1280 x 1024	CP7933-0000-0000	CP7933-0001-0000	CP7933-0002-0000
Alphanumeric keyboard with PLC keys on the sides			
15-inch display 1024 x 768	CP7942-0000-0000	CP7942-0001-0000	
Stainless steel housing		with single-touch screen	with single-touch screen, push-buttons and USB socket
12-inch display 800 x 600		CP7901-1400-0000	CP7901-1401-0000
15-inch display 1024 x 768		CP7902-1400-0000	CP7902-1401-0000
19-inch display 1280 x 1024		CP7903-1400-0000	CP7903-1401-0000



Stainless steel finish



Without keys



Function keys



Numeric keyboard

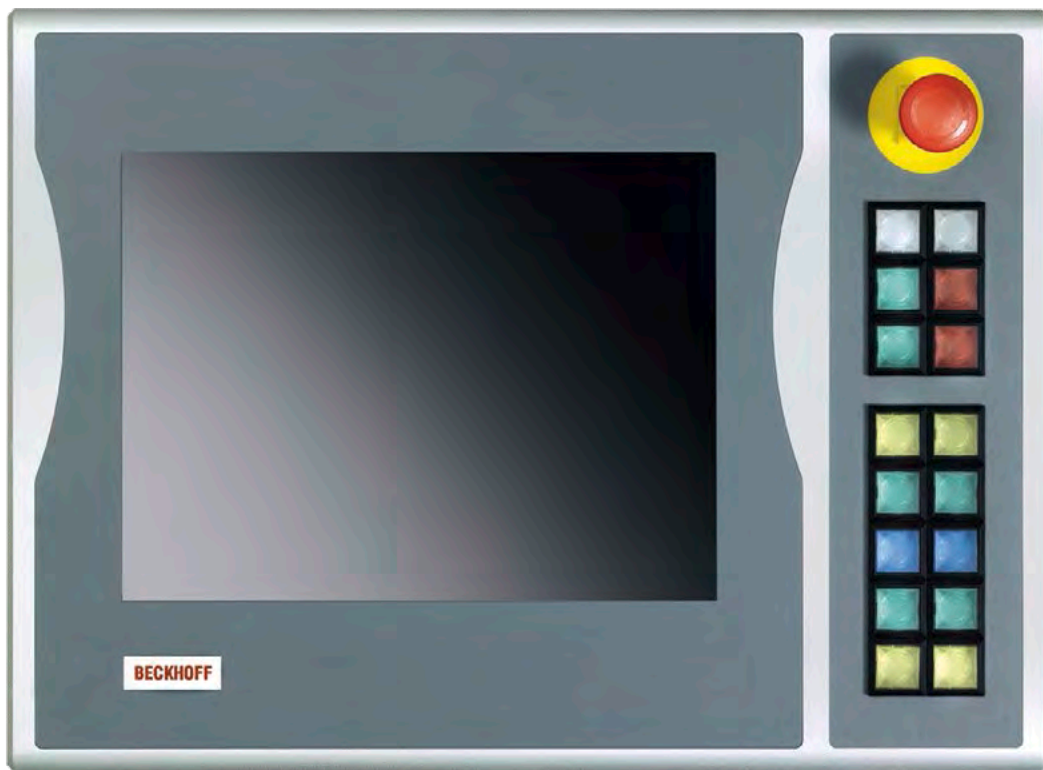


Alphanumeric keyboard

Alphanumeric keyboard
with PLC keys on the sides

CP79xx	"Economy" Control Panel
Features	<p>TFT display in four sizes</p> <p>aluminium housing, protection class IP 65</p> <p>front laminate in five variants</p> <ul style="list-style-type: none"> – only display – function keys and 10 PLC special keys with LED – numeric keyboard and 10 PLC special keys with LED – alphanumeric PC keyboard in US layout and 10 PLC special keys with LED – alphanumeric PC keyboard in US layout and 16 PLC special keys with LED on the sides <p>special keys identified by slide-in labels</p> <p>integrated DVI/USB extension technology</p> <ul style="list-style-type: none"> – DVI-E and USB-E enable remote panel operation at a distance of up to 50 m from the PC. – DVI-E input is compatible to the standard DVI output of a PC. <p>connection via 3 round connectors (IP 65) for DVI, USB-E and 24 V power supply unit in the backplane</p> <p>operating temperature 0...55 °C</p> <p>for mounting 4 M6 x 18 mm threaded holes in the backplane</p>
Options	<p>2-port IP 65 USB interface in the backplane</p> <p>touch screen pen with holder for aluminium Control Panels</p> <p>additional keyboard IP 65 or toolboard for keyboard and tools</p> <p>push-button extension with electromechanical switches and keys</p> <p>connection set up to 50 m length</p> <p>adapter plate for mounting arm installation</p>
Stainless steel options	stainless steel housing with flush-mounted touch screen for CP7901, CP7902 and CP7903
Further information	for further options, technical drawings, documentations, etc. see www.beckhoff.com/CP79xx

Accessories for CP6xxx and CP7xxx single-touch Control Panels and Panel PCs





Keyboard shelf



Touch screen pen



Additional keyboard



RFID reader

Electromechanical buttons on the Control Panel or Panel PC

Control Panels and Panel PCs with push-button extension enable the application-specific arrangement of electromechanical buttons, switches, signal lamps, additional membrane keys and a hand wheel directly on the operating unit. It enables precise adaptation of the Control Panel to the machine control requirements. In many cases, a machine operator control panel is no longer required, since all functions are integrated in the Control Panel. The Control Panel housing is increased in size on one side. Depending on the required functions and the electromechanical components, the flat rear panel is enlarged or extended with a trough-shaped rear panel for the button area.

For the CP77xx and CP79xx units the Rolec Tara Plus mounting arm system, article numbers 149.025.012, 149.025.013, 149.025.014, 149.035.012, 149.035.013 or 149.035.015, can be mounted centrally at the rear of the Control Panel. The mounting arm can optionally be connected from

above or below. The Rittal mounting arm system is available as an additional option. The CP6508.020 or CP6501.170 Rittal adapters can be mounted at the back of the Control Panel. The cables are routed through the mounting arm, through a cable gland in the mounting arm adapter and from there concealed through a channel at the rear of the Control Panel to the push-button extension. A circular plug-in connector instead of a screwed cable gland is available on request. The housings of the CP7xxx range have protection class IP 65 on all sides. The wiring space can be opened without removing the Control Panel from the mounting arm.

The buttons, switches and indicator lamps are connected to the control system via USB. A second contact on the buttons and switches can at the same time be wired directly via a terminal row. Besides the push-button extensions shown on the following pages, numerous other variants are conceivable, which can be individually designed in accordance with requirements.



Open wiring space

K7xxx, KT7xxx | Additional keyboard for CP7xxx Control Panels and Panel PCs

The indestructible PC keyboard

The K7xxx and KT7xxx PC keyboards add a keyboard to the Control Panel which allows the comfortable entry of large amounts of data with a keyboard designed for industrial use. The Control Panel keyboards K7xxx and KT7xxx are even more robust than a membrane keyboard and yet feel almost like a standard keyboard. They offer the optimum in operating comfort in tough industrial environments.

An aluminium keyboard housing in Control Panel design combines the keyboard and the Control Panel to form a homogeneous unit. The width of the housing is adapted to the Control Panel for which the keyboard is intended.

A touch pad can be integrated into the keyboard housing. Here, large, easily accessible keys meeting protection class IP 67 serve as mouse keys. The keyboards K7xxx and KT7xxx are mounted in a holder on the Control Panel which is available in a version located at a fixed angle of 100° and a version which can be adjusted between 90° and 180°. The Control Panel is modified to have additional open sections in the side contour which allow the cabling to be stored in an invisible way.



Ordering information	
K7100-0000	additional keyboard to be mounted to a Control Panel CP79xx or to a Panel PC CP72xx and CP77xx
KT7100-0000	additional keyboard with touch pad to be mounted to a Control Panel CP79xx or to a Panel PC CP72xx and CP77xx
C9900-M300	mounting adapter with fixed 100° angle for mounting a keyboard K7xxx or KT7xxx to a Control Panel
C9900-M310	mounting adapter with adjustable 90° to 180° angle for mounting a keyboard K7xxx or KT7xxx to a Control Panel

C9900-M400 | Keyboard shelf for CP7xxx Control Panels and Panel PCs

The keyboard shelf at a Beckhoff Control Panel permits a standard PC keyboard to be placed in front of the Control Panel, allowing convenient operation during commissioning or software updates. During normal production, the machine operator can rest tools and other items here while using the Control Panel.

The shelf is constructed from anodised aluminium. Its design matches that of the Control Panel. A ribbed rubber mat is glued to the surface of the shelf. The keyboard shelf is made as wide as the Control Panel. In the case of small Control Panels, the shelf is wider than the Control Panel housing, so that a keyboard can be rested on it. The Control Panel is given additional holes on the lower side, so the shelf should be ordered at the same time as the Control Panel.



Ordering information	
C9900-M400	toolboard for keyboard or tools, mounted under a Control Panel CP7xxx or Panel PCs CP7xxx
C9900-M401	drill holes at the bottom of a Control Panel or Panel PC CP7xxx for assembly of a keyboard shelf (supply without shelf)

C9900-T90x | Touch screen pen for CP6xxx, CP7xxx and C3xxx Control Panels and Panel PCs

The touch screen is the ideal operating medium for the Industrial PC. By using the Beckhoff touch screen pen, it is possible to make the touch screen technology available for tough operating environments and to allow higher operating precision than using the finger or another pointing medium.

The stable, round point of the pen allows easy, flowing operation of the touch screen and gives a better view of the display at the same time. It is also possible for operators who wear gloves to work in a precise and comfortable way with the Beckhoff touch screen pen. Grit or dirt on the finger is no longer a problem. The plastic tip is gentle on the surface of the touch screen. Direct operation without a pen still remains possible.

The user of the Beckhoff touch screen pen receives a precise input medium with an ergonomically formed, non-slip aluminium shaft, in a design which conforms to that of the Control Panel, and with the right balance of weight, form and friction. This pen is also ideal for the built-in Panel PCs with touch screen.

The touch screen pen is kept in a holder fastened to the Control Panel or to the Panel PC. A connecting cord between the pen and the holder makes the pen accessible at any time.



Ordering information	
C9900-T900	touch screen pen with holder for Control Panel and Panel PCs CP7xxx
C9900-T902	touch screen pen with wall holder for built-in Control Panel and Panel PCs CP6xxx and C3xxx

C9900-E21x | RFID reader in the CP7xxx Control Panel front

The CP720x and CP770x Panel PCs and the CP790x Control Panels with 15- or 19-inch display without membrane keyboard are available with RFID reader in the front panel. The card reader enables user identification at the device. The RFID module reads Legic transponders at a distance of up to 30 mm. The data are transferred to the PC via USB. The RFID reader is integrated in the Control Panel or the Panel PC behind the front laminate. The print on the front laminate indicates the position of the RFID reader below the display on the right-hand side. IP 65 protection class is maintained and enables operation in harsh industrial environments. The RFID option has no influence on the dimensions of the Control Panel.



C9900-E21x	RFID reader
	Legic transponder type
	transponder frequency 13.56 MHz
	integrated in the Control Panel behind the front laminate
	up to 30 mm reading distance
	internally connected via USB interface
	IP 65

Ordering information	
C9900-E213	RFID reader for Legic transponder inside the front of a Panel PC CP7202 or CP7702 or of a Control Panel CP7902, integrated behind the front laminate, protection class IP 65, connected internally by USB
C9900-E214	RFID reader for Legic transponder inside the front of a Panel PC CP7203 or CP7703 or of a Control Panel CP7903, integrated behind the front laminate, protection class IP 65, connected internally by USB

Customised Beckhoff CP6xxx/CP7xxx Control Panels

- cost-effective implementation of company logos in form of a slide-in label for standard Control Panels
- complete revision of the colour scheme of the front membrane based on the corporate design of the company
- customised keyboard extensions according to customer specifications
- realisation of customer-specific bracket adapter plates for integrating different bracket systems
- realisation of complex operating terminals with fieldbus connections (PROFIBUS, Lightbus, CANopen, Ethernet, ...)
- modification of the mechanical/electrical connection of the devices according to the local situation
- joint development and realisation of the design



Stainless steel Panel PC



Customer-specific front laminate



Individual housing construction



Individual housing adaptation



Modified membrane keypad colour scheme and keypad matrix



Individual housing construction for flush-mounted installation



Individual housing design, colour scheme and key shape/layout according to customer requirements



Individual housing construction



Push-button extension with hand wheel



Panel PC for injection molding applications



Control solution for blow molding machines



Extension with additional display, incremental encoders and switch elements



Integration of a barcode scanner and signal transducer



Extension with joystick, graycode switch and incremental encoder



Keyboard with larger number and higher density of membrane keys



Front membrane design with modified colour scheme and different size membrane keys



Highlights

- scalable performance range
- compact design
- direct I/O interface
- modular extension options
- DIN rail mounting

Embedded PC

Modular DIN rail IPCs and Industrial Motherboards

► www.beckhoff.com/Embedded-PC

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Product overview Embedded PC



Embedded PC			
Basic CPU	CX70xx 209	CX80xx 214	CX81xx 222
Processor	ARM Cortex™-M7, 480 MHz	ARM9, 400 MHz	ARM Cortex™-A9, 800 MHz
Flash memory	512 MB microSD (optionally 1 GB, 2 GB, 4 GB or 8 GB)	slot for microSD card, 512 MB included (expandable)	slot for microSD card, 512 MB included (expandable)
Main memory	32 MB SDR (internal, not expandable)	64 MB DDR2 RAM (not expandable)	512 MB DDR3 RAM (not expandable)
Interfaces	programming interface: 1 x Ethernet 10/100 Mbit/s (RJ45)	1 x RJ45 10/100 Mbit/s, 1 x USB device (behind the front flap), fieldbus interface	1 x RJ45 10/100 Mbit/s, bus interface
I/O connection	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition
System interfaces	integrated	integrated	integrated
DVI/USB	–	–	–
RS232	CX7080 209	CX8080 216	CX8180 222
RS422/RS485	CX7080 209	CX8080 216	CX8180 222
Audio	–	–	–
Ethernet	in the basic CPU 209	in the basic CPU 214	in the basic CPU 222
4-port USB hub	–	–	–
Memory medium	in the basic CPU 209	in the basic CPU 214	in the basic CPU 222
Fieldbus interfaces	expandable via EtherCAT Terminals	integrated or expandable via EtherCAT Terminals	integrated or expandable via EtherCAT Terminals
EtherCAT	EL6695 slave 2 243	CX8010 slave 214	CX8110 slave 222
PROFIBUS	EL6731 master 2 249	CX8030 master 214	EL6731 master 2 249
	EL6731-0010 slave 2 249	CX8031 slave 215	EL6731-0010 slave 2 249
CANopen	EL6751 master 2 250	CX8050 master 215	EL6751 master 2 250
	EL6751-0010 slave 2 250	CX8051 slave 215	EL6751-0010 slave 2 250
DeviceNet	EL6752 master 2 251	EL6752 master 2 251	EL6752 master 2 251
	EL6752-0010 slave 2 251	EL6752-0010 slave 2 251	EL6752-0010 slave 2 251
PROFINET RT	EL6631 controller 2 246	CX8093 device 217	EL6631 controller 2 246
	EL6631-0010 device 2 246		EL6631-0010 device 2 246
EtherNet/IP	EL6652 scanner 2 247	CX8095 adapter 217	EL6652 scanner 2 247
	EL6652-0010 adapter 2 247		EL6652-0010 adapter 2 247
UPS options	–	1-second UPS	1-second UPS



CX9020	224	CX5010	248	CX5020	248
ARM Cortex™-A8, 1 GHz		Intel Atom® Z510, 1.1 GHz clock frequency		Intel Atom® Z530, 1.6 GHz clock frequency	
2 x slot for microSD card, 512 MB included (expandable)		slot for Compact Flash card, 128 MB included (expandable)		slot for Compact Flash card, 128 MB included (expandable)	
1 GB DDR3 RAM (not expandable)		512 MB RAM (not expandable)		512 MB RAM (expandable ex factory to 1 GB)	
2 x RJ45 10/100 Mbit/s (internal switch), 1 x DVI-D, 4 x USB 2.0, 1 x optional interface		2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-D, 4 x USB 2.0, 1 x optional interface		2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-D, 4 x USB 2.0, 1 x optional interface	
E-bus or K-bus, automatic recognition		E-bus or K-bus, automatic recognition		E-bus or K-bus, automatic recognition	
integrated		integrated		integrated	
in the basic CPU	224	in the basic CPU	248	in the basic CPU	248
CX9020-N030	224	CX5010-N030	248	CX5020-N030	248
CX9020-N031	224	CX5010-N031	248	CX5020-N031	248
CX9020-N020	224	CX5010-N020	248	CX5020-N020	248
in the basic CPU	224	in the basic CPU	248	in the basic CPU	248
in the basic CPU	224	in the basic CPU	248	in the basic CPU	248
2 nd microSD slot in the basic CPU	224	in the basic CPU	248	in the basic CPU	248
integrated or expandable via EtherCAT Terminals		integrated or expandable via EtherCAT Terminals		integrated or expandable via EtherCAT Terminals	
CX9020-B110 slave	224	CX5010-B110 slave	248	CX5020-B110 slave	248
CX9020-M310 master	224	CX5010-M310 master	248	CX5020-M310 master	248
CX9020-B310 slave	224	CX5010-B310 slave	248	CX5020-B310 slave	248
CX9020-M510 master	224	CX5010-M510 master	248	CX5020-M510 master	248
CX9020-B510 slave	224	CX5010-B510 slave	248	CX5020-B510 slave	248
EL6752 master	2 251	EL6752 master	2 251	EL6752 master	2 251
EL6752-0010 slave	2 251	EL6752-0010 slave	2 251	EL6752-0010 slave	2 251
CX9020-M930 controller	224	CX5010-M930 controller	248	CX5020-M930 controller	248
CX9020-B930 device	224	CX5010-B930 device	248	CX5020-B930 device	248
CX9020-B950 adapter	224	CX5010-B950 adapter	248	CX5020-B950 adapter	248
1-second UPS (optional)		1-second UPS		1-second UPS	



Embedded PC			
Basic CPU	CX5120 252	CX5130 254	CX5140 256
Processor	Intel Atom® E3815, 1.46 GHz	Intel Atom® E3827, 1.75 GHz	Intel Atom® E3845, 1.91 GHz
Flash memory	slot for CFast card and microSD card, cards not included	slot for CFast card and microSD card, cards not included	slot for CFast card and microSD card, cards not included
Main memory	2 GB DDR3 RAM (not expandable)	4 GB DDR3 RAM (not expandable)	4 GB DDR3 RAM (not expandable)
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface
I/O connection	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition
System interfaces	integrated	integrated	integrated
DVI/USB	in the basic CPU 252	in the basic CPU 254	in the basic CPU 256
DisplayPort	–	CX5130-N011 254	CX5140-N011 256
RS232	CX5120-N030 252	CX5130-N030 254	CX5140-N030 256
RS422/RS485	CX5120-N031 252	CX5130-N031 254	CX5140-N031 256
Audio	CX5120-N020 252	CX5130-N020 254	CX5140-N020 256
Ethernet	in the basic CPU 252	in the basic CPU 254	in the basic CPU 256
Power over Ethernet	–	–	–
4-port USB hub	in the basic CPU 252	in the basic CPU 254	in the basic CPU 256
Memory medium	in the basic CPU 252	in the basic CPU 254	in the basic CPU 256
Fieldbus interfaces	integrated or expandable via EtherCAT Terminals	integrated or expandable via EtherCAT Terminals	integrated or expandable via EtherCAT Terminals
EtherCAT	CX5120-B110 slave 252	CX5130-B110 slave 254	CX5140-B110 slave 256
PROFIBUS	CX5120-M310 master 252	CX5130-M310 master 254	CX5140-M310 master 256
	CX5120-B310 slave 252	CX5130-B310 slave 254	CX5140-B310 slave 256
CANopen	CX5120-M510 master 252	CX5130-M510 master 254	CX5140-M510 master 256
	CX5120-B510 slave 252	CX5130-B510 slave 254	CX5140-B510 slave 256
DeviceNet	EL6752 master 2 251	EL6752 master 2 251	EL6752 master 2 251
	EL6752-0010 slave 2 251	EL6752-0010 slave 2 251	EL6752-0010 slave 2 251
PROFINET RT	CX5120-M930 controller 252	CX5130-M930 controller 254	CX5140-M930 controller 256
	CX5120-B930 device 252	CX5130-B930 device 254	CX5140-B930 device 256
EtherNet/IP	CX5120-B950 adapter 252	CX5130-B950 adapter 254	CX5140-B950 adapter 256
UPS options	1-second UPS	1-second UPS	1-second UPS



CX5230		CX5240	
	260		260
Intel Atom® x5-E3930, 1.3 GHz, 2 cores		Intel Atom® x5-E3940, 1.6 GHz, 4 cores	
slot for CFast card and microSD card, cards not included		slot for CFast card and microSD card, cards not included	
4 GB DDR4 RAM (internal, not expandable)		8 GB DDR4 RAM (internal, not expandable)	
2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-D, 4 x USB 3.0, 1 x optional interface		2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-D, 4 x USB 3.0, 1 x optional interface	
E-bus or K-bus, automatic recognition		E-bus or K-bus, automatic recognition	
modularly expandable		modularly expandable	
in the basic CPU, 2 nd DVI port as option CX5230-N010	260	in the basic CPU, 2 nd DVI port as option CX5240-N010	260
CX5230-N011	260	CX5240-N011	260
CX5230-N030 or CX2500-0030	260	CX5240-N030 or CX2500-0030	260
CX5230-N031 or CX2500-0031	260	CX5240-N031 or CX2500-0031	260
CX2500-0020	275	CX2500-0020	275
in the basic CPU or CX2500-0060	260	in the basic CPU or CX2500-0060	260
CX2500-0061	275	CX2500-0061	275
in the basic CPU or CX2500-0070	260	in the basic CPU or CX2500-0070	260
in the basic CPU	260	in the basic CPU	260
integrated or expandable via EtherCAT Terminals		integrated or expandable via EtherCAT Terminals	
CX5230-B110 slave	260	CX5240-B110 slave	260
CX5230-M310 or CX2500-M310 master	260	CX5240-M310 or CX2500-M310 master	260
CX5230-B310 or CX2500-B310 slave	260	CX5240-B310 or CX2500-B310 slave	260
CX5230-M510 or CX2500-M510 master	260	CX5240-M510 or CX2500-M510 master	260
CX5230-B510 or CX2500-B510 slave	260	CX5240-B510 or CX2500-B510 slave	260
EL6752 master	2 251	EL6752 master	2 251
EL6752-0010 slave	2 251	EL6752-0010 slave	2 251
CX5230-M930 controller	260	CX5240-M930 controller	260
CX5230-B930 device	260	CX5240-B930 device	260
CX5230-B950 adapter	260	CX5240-B950 adapter	260
1-second UPS		1-second UPS	



Embedded PC			
Basic CPU	CX2020 264	CX2030 264	CX2040 264
Processor	Intel® Celeron® 827E 1.4 GHz	Intel® Core™ i7 2610UE 1.5 GHz	Intel® Core™ i7 2715QE 2.1 GHz
Flash memory	20 GB or 40 GB CFast flash card (depending on the operating system), optionally extendable	20 GB or 40 GB CFast flash card (depending on the operating system), optionally extendable	20 GB or 40 GB CFast flash card (depending on the operating system), optionally extendable
Main memory	2 GB DDR3 RAM (expandable ex factory to 4 GB)	2 GB DDR3 RAM (expandable ex factory to 4 GB)	4 GB DDR3 RAM (not expandable)
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface
I/O connection	via power supply module (E-bus or K-bus, automatic recognition)	via power supply module (E-bus or K-bus, automatic recognition)	via power supply module (E-bus or K-bus, automatic recognition)
System interfaces	modularly expandable	modularly expandable	modularly expandable
DVI/USB	in the basic CPU, 2 nd DVI port as option CX2020-N010 264	in the basic CPU, 2 nd DVI port as option CX2030-N010 264	in the basic CPU, 2 nd DVI port as option CX2040-N010 264
DisplayPort	CX2020-N011 264	CX2030-N011 264	CX2040-N011 264
RS232	CX2020-N030 or CX2500-0030 264	CX2030-N030 or CX2500-0030 264	CX2040-N030 or CX2500-0030 264
RS422/RS485	CX2020-N031 or CX2500-0031 264	CX2030-N031 or CX2500-0031 264	CX2040-N031 or CX2500-0031 264
Audio	CX2500-0020 275	CX2500-0020 275	CX2500-0020 275
Ethernet	in the basic CPU or CX2500-0060 264	in the basic CPU or CX2500-0060 264	in the basic CPU or CX2500-0060 264
10G Ethernet	–	–	–
Power over Ethernet	CX2500-0061 275	CX2500-0061 275	CX2500-0061 275
4-port USB hub	in the basic CPU or CX2500-0070 264	in the basic CPU or CX2500-0070 264	in the basic CPU or CX2500-0070 264
Memory medium	in the basic CPU or CX2550-0010/ CX2550-0020 264	in the basic CPU or CX2550-0010/ CX2550-0020 264	in the basic CPU or CX2550-0010/ CX2550-0020 264
USB extension	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0) 277	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0) 277	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0) 277
Fieldbus interfaces	integrated or expandable via EtherCAT Terminals	integrated or expandable via EtherCAT Terminals	integrated or expandable via EtherCAT Terminals
EtherCAT	CX2020-B110 slave 264	CX2030-B110 slave 264	CX2040-B110 slave 264
Lightbus	EL6720 master 2 248	EL6720 master 2 248	EL6720 master 2 248
PROFIBUS	CX2020-M310 or CX2500-M310 master 264	CX2030-M310 or CX2500-M310 master 264	CX2040-M310 or CX2500-M310 master 264
	CX2020-B310 or CX2500-B310 slave 264	CX2030-B310 or CX2500-B310 slave 264	CX2040-B310 or CX2500-B310 slave 264
CANopen	CX2020-M510 or CX2500-M510 master 264	CX2030-M510 or CX2500-M510 master 264	CX2040-M510 or CX2500-M510 master 264
	CX2020-B510 or CX2500-B510 slave 264	CX2030-B510 or CX2500-B510 slave 264	CX2040-B510 or CX2500-B510 slave 264
DeviceNet	EL6752 master 2 251	EL6752 master 2 251	EL6752 master 2 251
	EL6752-0010 slave 2 251	EL6752-0010 slave 2 251	EL6752-0010 slave 2 251
PROFINET RT	CX2020-M930 controller 264	CX2030-M930 controller 264	CX2040-M930 controller 264
	CX2020-B930 device 264	CX2030-B930 device 264	CX2040-B930 device 264
EtherNet/IP	CX2020-B950 adapter 264	CX2030-B950 adapter 264	CX2040-B950 adapter 264
UPS options	CX2100-0904, CX2100-0914 274	CX2100-0904, CX2100-0914 274	CX2100-0914 274



CX2042	272	CX2062	272	CX2072	272
Intel® Xeon® D-1527 2.2 GHz, 4 cores		Intel® Xeon® D-1548 2.0 GHz, 8 cores		Intel® Xeon® D-1567 2.1 GHz, 12 cores	
slot for CFast card, card not included		slot for CFast card, card not included		slot for CFast card, card not included	
8 GB DDR4 RAM (expandable ex factory to 64 GB)		8 GB DDR4 RAM (expandable ex factory to 64 GB)		8 GB DDR4 RAM (expandable ex factory to 64 GB)	
2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 3.0, 1 x optional interface		2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 3.0, 1 x optional interface		2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 3.0, 1 x optional interface	
via power supply module (E-bus or K-bus, automatic recognition)		via power supply module (E-bus or K-bus, automatic recognition)		via power supply module (E-bus or K-bus, automatic recognition)	
modularly expandable		modularly expandable		modularly expandable	
in the basic CPU, 2 nd DVI port as option CX2042-N010	272	in the basic CPU, 2 nd DVI port as option CX2062-N010	272	in the basic CPU, 2 nd DVI port as option CX2072-N010	272
CX2042-N011	272	CX2062-N011	272	CX2072-N011	272
CX2042-N030 or CX2500-0030	272	CX2062-N030 or CX2500-0030	272	CX2072-N030 or CX2500-0030	272
CX2042-N031 or CX2500-0031	272	CX2062-N031 or CX2500-0031	272	CX2072-N031 or CX2500-0031	272
–		–		–	
in the basic CPU or CX2500-0060	272	in the basic CPU or CX2500-0060	272	in the basic CPU or CX2500-0060	272
CX2042-N067 or CX2042-N167	272	CX2062-N067 or CX2062-N167	272	CX2072-N067 or CX2072-N167	272
CX2500-0061	275	CX2500-0061	275	CX2500-0061	275
in the basic CPU or CX2500-0070	272	in the basic CPU or CX2500-0070	272	in the basic CPU or CX2500-0070	272
in the basic CPU or CX2550-0010/ CX2550-0020	272	in the basic CPU or CX2550-0010/ CX2550-0020	272	in the basic CPU or CX2550-0010/ CX2550-0020	272
CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0)	277	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0)	277	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0)	277
integrated or expandable via EtherCAT Terminals		integrated or expandable via EtherCAT Terminals		integrated or expandable via EtherCAT Terminals	
CX2042-B110 slave	272	CX2062-B110 slave	272	CX2072-B110 slave	272
EL6720 master	2 248	EL6720 master	2 248	EL6720 master	2 248
CX2042-M310 or CX2500-M310 master	272	CX2062-M310 or CX2500-M310 master	272	CX2072-M310 or CX2500-M310 master	272
CX2042-B310 or CX2500-B310 slave	272	CX2062-B310 or CX2500-B310 slave	272	CX2072-B310 or CX2500-B310 slave	272
CX2042-M510 or CX2500-M510 master	272	CX2062-M510 or CX2500-M510 master	272	CX2072-M510 or CX2500-M510 master	272
CX2042-B510 or CX2500-B510 slave	272	CX2062-B510 or CX2500-B510 slave	272	CX2072-B510 or CX2500-B510 slave	272
EL6752 master	2 251	EL6752 master	2 251	EL6752 master	2 251
EL6752-0010 slave	2 251	EL6752-0010 slave	2 251	EL6752-0010 slave	2 251
CX2042-M930 controller	272	CX2062-M930 controller	272	CX2072-M930 controller	272
CX2042-B930 device	272	CX2062-B930 device	272	CX2072-B930 device	272
CX2042-B950 adapter	272	CX2062-B950 adapter	272	CX2072-B950 adapter	272
–		–		–	



Embedded PC

Basic CPU	CX2033	268	CX2043	268
Processor	AMD Ryzen™ V1202B 2.3 GHz		AMD Ryzen™ V1807B 3.35 GHz	
Flash memory	slot for CFast card		slot for CFast card	
Main memory	8 GB DDR4 RAM (expandable ex factory to 16 GB)		8 GB DDR4 RAM (expandable ex factory to 16 GB)	
Interfaces	2 x RJ45, 10/100/1000 Mbit/s, DVI-D, 4 x USB 3.1 Gen. 2, 1 x optional interface		2 x RJ45, 10/100/1000 Mbit/s, DVI-D, 4 x USB 3.1 Gen. 2, 1 x optional interface	
I/O connection	via power supply module (E-bus or K-bus, automatic recognition)		via power supply module (E-bus or K-bus, automatic recognition)	
System interfaces	modularly expandable		modularly expandable	
DVI/USB	in the basic CPU, 2 nd DVI port as option CX2033-N010	268	in the basic CPU, 2 nd DVI port as option CX2043-N010	268
DisplayPort	CX2033-N011	268	CX2043-N011	268
RS232	CX2033-N030 or CX2500-0030	268	CX2043-N030 or CX2500-0030	268
RS422/RS485	CX2033-N031 or CX2500-0031	268	CX2043-N031 or CX2500-0031	268
Audio	CX2500-0020	275	CX2500-0020	275
Ethernet	in the basic CPU or CX2500-0060	268	in the basic CPU or CX2500-0060	268
Power over Ethernet	CX2500-0061	275	CX2500-0061	275
4-port USB hub	in the basic CPU or CX2500-0070	268	in the basic CPU or CX2500-0070	268
Memory medium	in the basic CPU or CX2550-0010/ CX2550-0020	268	in the basic CPU or CX2550-0010/ CX2550-0020	268
USB extension	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0)	277	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0)	277
Fieldbus interfaces	integrated or expandable via EtherCAT Terminals		integrated or expandable via EtherCAT Terminals	
EtherCAT	CX2033-B110 slave	268	CX2043-B110 slave	268
Lightbus	EL6720 master	2 248	EL6720 master	2 248
PROFIBUS	CX2033-M310 or CX2500-M310 master	268	CX2043-M310 or CX2500-M310 master	268
	CX2033-B310 or CX2500-B310 slave	268	CX2043-B310 or CX2500-B310 slave	268
CANopen	CX2033-M510 or CX2500-M510 master	268	CX2043-M510 or CX2500-M510 master	268
	CX2033-B510 or CX2500-B510 slave	268	CX2043-B510 or CX2500-B510 slave	268
DeviceNet	EL6752 master	2 251	EL6752 master	2 251
	EL6752-0010 slave	2 251	EL6752-0010 slave	2 251
PROFINET RT	CX2033-M930 controller	268	CX2043-M930 controller	268
	CX2033-B930 device	268	CX2043-B930 device	268
EtherNet/IP	CX2033-B950 adapter	268	CX2043-B950 adapter	268
SERCOS	–		–	
UPS options	CX2100-0914	274	CX2100-0914	274



CX1010	228	CX1020	234	CX1030	236
compatible with Intel® Pentium® MMX, clock frequency 500 MHz		Intel® Celeron® M ULV, 1 GHz clock frequency		Intel® Pentium® M, 1.8 GHz clock frequency	
slot for Compact Flash card, 128 MB included (expandable)		slot for Compact Flash card, 128 MB included (expandable)		slot for Compact Flash card, 128 MB included (expandable)	
256 MB DDR RAM (not expandable)		256 MB DDR RAM (expandable ex factory to 1 GB)		256 MB DDR RAM (expandable ex factory to 1 GB)	
1 x RJ45 10/100 Mbit/s		2 x RJ45 10/100 Mbit/s (internal switch)		2 x RJ45 10/100 Mbit/s (internal switch)	
via power supply module (E-bus, K-bus, K-bus/IP-Link)		via power supply module (E-bus, K-bus, K-bus/IP-Link)		via power supply module (E-bus, K-bus, K-bus/IP-Link)	
modularly expandable		modularly expandable		modularly expandable	
CX1010-N010	230	CX1020-N010	238	CX1030-N010	239
–		–		–	
CX1010-N030 (COM 1/2)	230	CX1020-N030 (COM 1/2)	238	CX1030-N030 (COM 1/2)	239
CX1010-N040 (COM 3/4)	230	CX1020-N040 (COM 3/4)	238	CX1030-N040 (COM 3/4)	239
CX1010-N031 (COM 1/2)	230	CX1020-N031 (COM 1/2)	238	CX1030-N031 (COM 1/2)	239
CX1010-N041 (COM 3/4)	230	CX1020-N041 (COM 3/4)	238	CX1030-N041 (COM 3/4)	239
CX1010-N020	230	CX1020-N020	238	CX1030-N020	239
CX1010-N060	230	CX1020-N060	238	CX1030-N060	239
–		–		–	
–		–		–	
in the basic CPU	230	–		–	
–		–		–	
modularly expandable		modularly expandable		modularly expandable	
EL6695 slave	2 243	EL6695 slave	2 243	EL6695 slave	2 243
CX1500-M200 master	243	CX1500-M200 master	243	CX1500-M200 master	243
CX1500-M310 master	243	CX1500-M310 master	243	CX1500-M310 master	243
CX1500-B310 slave	244	CX1500-B310 slave	244	CX1500-B310 slave	244
CX1500-M510 master	243	CX1500-M510 master	243	CX1500-M510 master	243
CX1500-B510 slave	244	CX1500-B510 slave	244	CX1500-B510 slave	244
CX1500-M520 master	243	CX1500-M520 master	243	CX1500-M520 master	243
CX1500-B520 slave	244	CX1500-B520 slave	244	CX1500-B520 slave	244
–		–		–	
–		–		–	
CX1500-M750 SERCOS II master	243	CX1500-M750 SERCOS II master	243	CX1500-M750 SERCOS II master	243
CX1100-0910, -0900	245	CX1100-0920	245	CX1100-0930	245

Embedded PCs

► www.beckhoff.com/Embedded-PC



CX7000 | Embedded PC with fieldbus interface

- CPU: ARM Cortex™-M7, 480 MHz

See page 206



CX8100 | Embedded PC with fieldbus interface

- CPU: ARM Cortex™-A9, 800 MHz
- Windows Embedded Compact 7

See page 218



CX9020 | Ethernet controller

- CPU: ARM Cortex™-A8, 1 GHz
- Windows Embedded Compact 7

See page 224



CX5000 | Embedded PC series with Intel Atom® processor

- CPU: Intel Atom® 1.1 GHz or 1.6 GHz
- Windows Embedded CE 6, Windows Embedded Standard 2009

See page 246



CX5100 | Embedded PC series with Intel Atom® processor

- CPU: Intel Atom® 1.46 GHz/1 core, Intel Atom® 1.75 GHz/2 cores, Intel Atom® 1.91 GHz/4 cores
- Windows Embedded Compact 7, Windows Embedded Standard 7 P, Windows 10 IoT Enterprise 2016/2019

See page 250



CX5200 | Embedded PC series with Intel Atom® processor

- CPU: Intel Atom® x5-E3930, 1.3 GHz/2 cores, Intel Atom® x5-E3940, 1.6 GHz/4 cores
- Windows 10 IoT Enterprise 2019

See page 258



CX8000 | Embedded PC with fieldbus interface

- CPU: ARM9, 400 MHz
- Windows Embedded CE 6

See page **210**



CX1010 | Basic CX

- CPU: Intel® Pentium® MMX-compatible 500 MHz
- Windows Embedded CE 6, Windows Embedded Standard 2009

See page **226**



CX1020, CX1030 | High-performance CX

- CPU: Intel® Celeron® M ULV 1 GHz, Intel® Pentium® M 1.8 GHz
- Windows Embedded CE 6, Windows Embedded Standard 2009

See page **232**



CX2020, CX2030, CX2040 | Multi-core CX

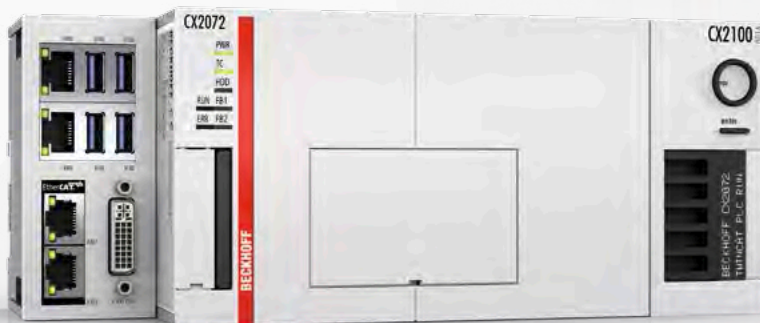
- CPU: Intel® Celeron® 1.4 GHz/1 core, Intel® Core™ i7 1.5 GHz/2 cores, Intel® Core™ i7 2.1 GHz/4 cores
- Windows Embedded Compact 7, Windows Embedded Standard 7 P, Windows 10 IoT Enterprise 2016

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CX2033, CX2043 | Multi-core CX

- CPU: AMD Ryzen™ V1202B 2.3 GHz/2 cores, AMD Ryzen™ V1807B 3.35 GHz/4 cores
- Windows 10 IoT Enterprise 2019

See page **266**



CX2042, CX2062, CX2072 | Many-core CX

- CPU: Intel® Xeon® D-1527 2.2 GHz/4 cores, Intel® Xeon® D-1548 2.0 GHz/8 cores, Intel® Xeon® D-1567 2.1 GHz/12 cores
- Windows 10 IoT Enterprise 2016/2019

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Beckhoff Embedded PC

Modular DIN rail Industrial PCs

With the Embedded PCs of the CX series, Beckhoff has combined PC technology and modular I/O level on a DIN rail unit in the control cabinet. The CX device series combines the worlds of Industrial PC and hardware PLC and is suitable for all performance control tasks. The modular system of the CX series can be configured to match the task in hand: by adding or omitting units and interfaces, only those components that the system actually requires are installed on the DIN rail in the control cabinet or terminal box. Installation space and costs are reduced.

The CX family covers the whole range of Beckhoff control technology in terms of both price and performance. This product range is designed for tasks requiring the characteristics and computing capacity of Industrial PCs, but whose budget does not stretch to full-blown Industrial PCs.

Scalable performance classes

The CX family includes several basic CPU modules with different processors for optimum adaptation to the respective control task. The following list gives an overview, sorted by CPU type and, within the group, in descending order of computing performance:

Devices with x86 CPU:

- CX2072:** many-core CX with Intel® Xeon® D-1567 2.1 GHz, 12 cores
- CX2062:** many-core CX with Intel® Xeon® D-1548 2.0 GHz, 8 cores
- CX2042:** many-core CX with Intel® Xeon® D-1527 2.2 GHz, 4 cores
- CX2043:** multi-core CX with AMD Ryzen™ V1807B CPU, 3.35 GHz, 4 cores
- CX2033:** multi-core CX with AMD Ryzen™ V1202B CPU, 2.3 GHz, 2 cores
- CX2040:** multi-core CX with Intel® Core™ i7 CPU, 2.1 GHz, 4 cores
- CX2030:** multi-core CX with Intel® Core™ i7 CPU, 1.5 GHz, 2 cores
- CX2020:** high-performance CX with Intel® Celeron® CPU, 1.4 GHz
- CX5240:** multi-core CX with Intel Atom® CPU, 1.6 GHz, 4 cores
- CX5230:** multi-core CX with Intel Atom® CPU, 1.3 GHz, 2 cores
- CX5140:** multi-core CX with Intel Atom® CPU, 1.91 GHz, 4 cores
- CX5130:** multi-core CX with Intel Atom® CPU, 1.75 GHz, 2 cores

CX5120: compact CX with Intel Atom® CPU, 1.46 GHz

CX5020: compact CX with Intel Atom® CPU, 1.6 GHz

CX5010: compact CX with Intel Atom® CPU, 1.1 GHz

CX1030: high-performance CX with Intel® Pentium® M CPU, 1.8 GHz

CX1020: high-performance CX with Intel® Celeron® M ULV CPU, 1 GHz

CX1010: basic CX with Intel® Pentium® MMX-compatible CPU, 500 MHz

Devices with ARM CPU:

CX9020: Ethernet controller with ARM Cortex™-A8 CPU, 1 GHz

CX8100: basic CX with ARM Cortex™-A9 CPU, 800 MHz, and integrated fieldbus interface

CX8000: basic CX with ARM9 CPU, 400 MHz, and integrated fieldbus interface

CX7000: basic CX with ARM Cortex™-M7 CPU, 480 MHz, and integrated fieldbus interface

Apart from various CPUs, the individual CX types also have different system interfaces and power supply units. Via the associated I/O interfaces the Embedded PCs support Beckhoff Bus Terminals and also EtherCAT Terminals as I/O system.

A suitable CX controller is selected on the basis of the expected complexity and scope of the automation program. Decisive here is not just the clock frequency of the CPU, but a combination of many criteria. The main criteria apart from the clock frequency are the CPU architecture, the cache sizes, the type and size of the RAM, graphic controller etc. Changing from one CX CPU to another with a higher performance is possible even at a very late stage in the course of the project and can usually take place without any program modification.

The components

The individual system components of the CX series come as modules in standard widths of 19 mm or 22 mm, that can be connected in series. The basic unit for the CX2000 and CX10x0 series consists of a CPU module and a separate power supply module. The CX7000, CX8000, CX8100, CX9020, CX5000, CX5100 and CX5200 Embedded PCs integrate CPU and power supply in a single unit. Depending on the

CX type, the controllers can be expanded through further system interfaces. The range of optional modules is complemented by fieldbus connections for PROFIBUS, CANopen, DeviceNet, SERCOS and Lightbus, both as master or slave versions.

In contrast to the other CX device families, the CX8000, CX8100, CX9020, CX5000, CX5100 and CX5200 series have a fixed, non-expandable number of system interfaces. The devices from the CX7000, CX8000 and CX8100 series are mainly used as programmable fieldbus slaves, while the CX9020, CX5000, CX5100 and CX5200 offer an optional fieldbus master or slave interface.

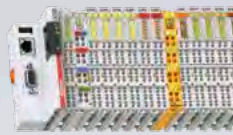
The optional interface, a common feature of all second-generation CX devices (CX9020, CX5000, CX5100, CX5200, CX2000), is an interface that can be configured ex factory with various signal types. These devices are also characterized by a further important feature: the automatic E-bus/K-bus detection enables the use of both types of I/O terminals without additional expenditure.

EtherCAT integration offers a wide range of expansion capability. Further master/slave fieldbus connections or communication interfaces and all other signal types accessible via EtherCAT can be directly connected as EtherCAT Terminals.

The software

In combination with the TwinCAT automation software, the CX Embedded PC becomes a powerful IEC 61131-3 PLC. Additionally, motion control tasks can also be executed. Depending on the required cycle time, it may be used to control several servo axes. With the CX1010, CX5000, CX5100, CX5200, CX1020, CX1030 and CX2000 even special functions such as flying saw, electronic gearbox or cam plate can be realized. The CX thus becomes a controller that covers PLC, motion control and visualization tasks with a single hardware. Under Windows Embedded CE, thanks to the real-time capability of the operating system, user tasks written in high-level languages can be processed in real-time in parallel with TwinCAT.

CX7000



CX8000



CX8100



CX9020



CX1010



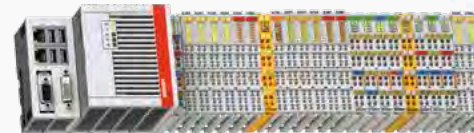
CX5000



CX5100



CX5200



CX1020, CX1030



CX2020, CX2030, CX2033, CX2040, CX2043



CX2042, CX2062, CX2072



CX7000 | Embedded PCs

► www.beckhoff.com/CX7000



Ethernet port

Fieldbus-specific bus interface

MicroSD card

E-bus or K-bus (automatic recognition)

For further information on the individual fieldbuses see page **2** 24



CX7000



CX7080

The CX7000 Embedded PC series opens up the TwinCAT 3 software environment to compact controllers. Equipped with an ARM Cortex™-M7 processor (32 bit, 480 MHz), the CX70xx makes higher processing power available in the compact controller segment. Furthermore, all the advantages of the TwinCAT 3 software generation can be utilised. The extremely compact design with dimensions of just 49 mm x 100 mm x 72 mm ensures optimum scalability of PC-based control for small controller applications that typically require minimum footprint.

The CX70xx offers directly integrated multi-functional I/O channels:


- 8 digital inputs, 24 V DC, filter 3 ms, type 3
- 4 digital outputs, 24 V DC, 0.5 A, 1-wire technology

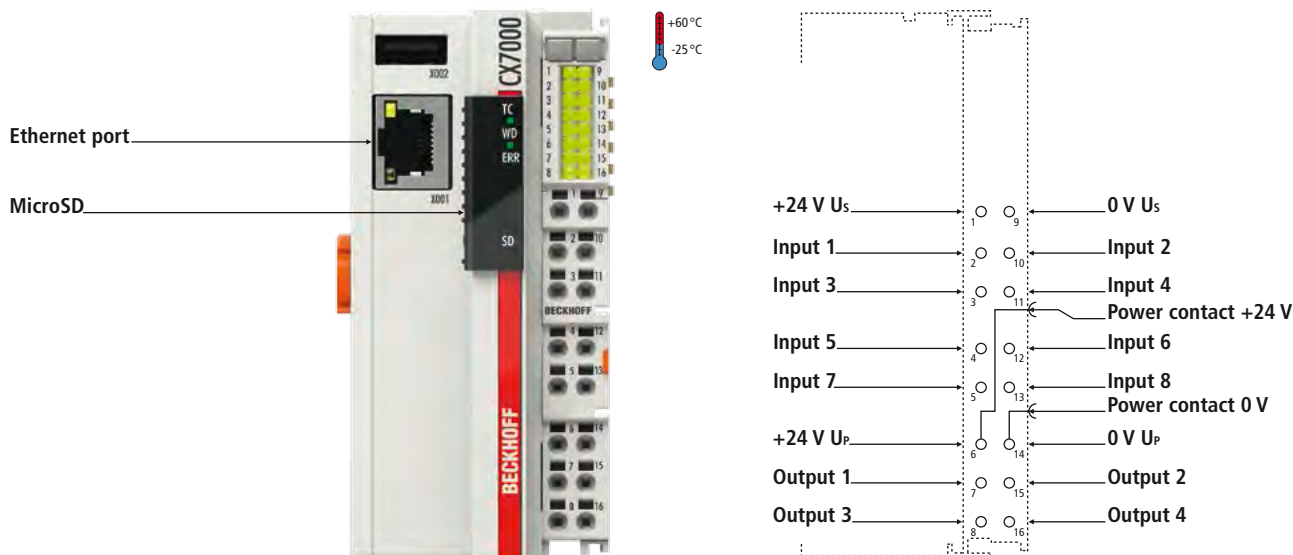
These integrated multi-functional I/Os can be configured for other operating modes via TwinCAT 3, enabling the option to use fast counting or processing of analog values:

- counter mode:
 - 1 x 100 kHz digital counter input,
 - 1 x digital input as up/down counter,
 - 2 x digital counter outputs
- incremental encoder mode:
 - 2 x digital inputs for 100 kHz encoder signal,
 - 2 x digital encoder outputs
- analog signal mode:
 - 2 x digital inputs configured as analog inputs 0 to 10 V, 12 bit
- PWM signal mode: 2 x digital outputs configured for PWM signal

If additional electrical signal types need to be processed, the CX70xx can be expanded very easily on demand by adding EtherCAT Terminals or Bus Terminals to the integrated I/Os. Additional I/O terminals will be directly attached to the CX7000.

The Embedded PC is equipped with 512 MB microSD flash memory (with the option to upgrade to 1, 2, 4 or 8 GB). An Ethernet interface (10/100 Mbit/s, RJ45) serves as the programming interface. This means that the space-saving CX70xx is ideal for use as a cost-effective, stand-alone compact controller. In the CX7080 version, peripheral devices such as displays, scanners or weighing systems can be connected via an additional serial interface (RS232/RS485).

 The extended operating temperature range between -25 and +60 °C enables application in climatically demanding situations.



CX70xx | Embedded PC with ARM Cortex™-M7 processor

The Embedded PCs of the CX7000 series have an ARM Cortex™-M7 single-core processor with 480 MHz. In the basic configuration, they have a slot for a microSD card and an Ethernet interface. As a special feature, the CX7000 series has eight inte-

grated multifunctional inputs as well as four integrated multi-functional outputs.

The CX7000 does not have a fieldbus interface. The CX7080 offers two serial interfaces, one with RS232 and one with RS485 physics. Both serial interfaces are

on the D-sub socket. E-bus or K-bus terminals can be attached as required; the CX70xx automatically recognises the type of I/O system connected during the start-up phase. The control system is programmed with TwinCAT 3 via the Ethernet interface.

Technical data	CX70xx
Processor	ARM Cortex™-M7, 480 MHz
Flash memory	512 MB microSD (optionally 1 GB, 2 GB, 4 GB or 8 GB)
Main memory	32 MB SDR (internal, not expandable)
Number of inputs	8 multi-functional inputs (24 V DC)
Number of outputs	4 multi-functional outputs (24 V DC, 0.5 A, 1-wire technique)
Programming	TwinCAT 3 PLC
NOVRAM	2 kB
Interfaces	programming interface: 1 x Ethernet 10/100 Mbit/s (RJ45)
I/O connection	E-bus or K-bus, automatic recognition
Clock	internal, capacitor-buffered real-time clock for time and date (storage capacity > 21 days)
Dimensions (W x H x D)	49 mm x 100 mm x 72 mm
Weight	125 g
Operating/storage temperature	-25...+60 °C/-40...+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
TC3 performance class	Basic (10); for further information on TwinCAT 3 see page
Further information	www.beckhoff.com/CX7000



Embedded PC
with ARM Cortex™-M7 processor

Embedded PC
for RS232/RS485

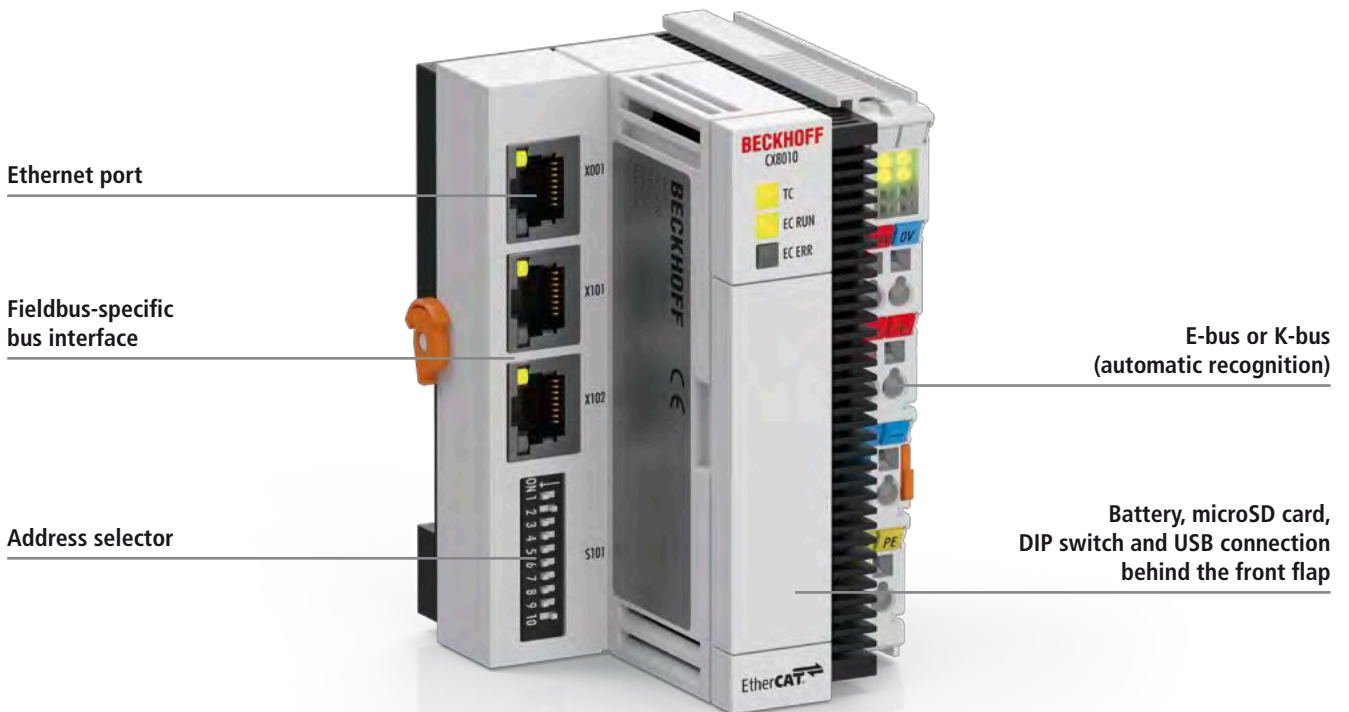
Technical data	i CX7000	i CX7080
Protocol	–	serial communication RS232/RS485
Bus interface	–	D-sub 9-pin, RS232/RS485
I/O connection	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition
Approvals/markings	CE	CE
Further information	www.beckhoff.com/CX7000	www.beckhoff.com/CX7080

i For availability status see Beckhoff website at: www.beckhoff.com/CX7000

EtherCAT Terminals see page **2** 128 , EtherCAT Box modules see page **2** 316 , Bus Terminals see page **2** 502

CX8000 | Embedded PCs with fieldbus interface

► www.beckhoff.com/CX8000



For further information on the individual fieldbuses see page **2** 24

EtherCAT®

PROFIBUS®

CANopen

PROFINET®

RS232
RS485

Ethernet

BACnet
OPC UA

EtherNet/IP™

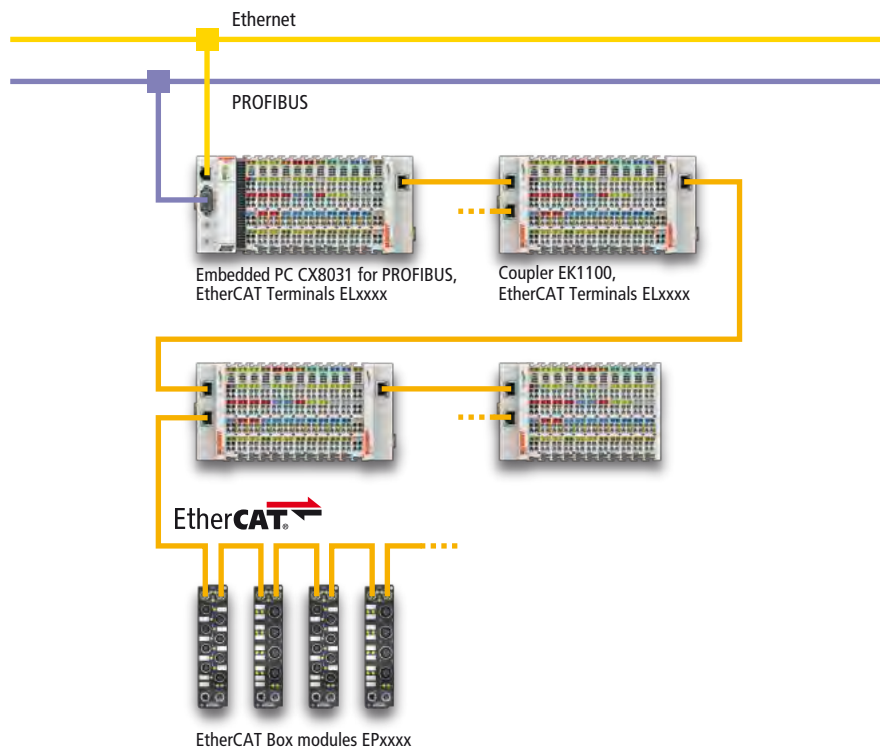
CX8000 is a device family of programmable controllers with 32-bit ARM CPU, which can be used for processing of PLC programs or as intelligent slave devices for higher-level fieldbus systems. Unlike with the non-programmable Bus Couplers of the EK series (EtherCAT Coupler), which only act as gateway between the associated fieldbus system and the connected EtherCAT terminals, the CX8000 is programmable and able to run its own control program. The CX8000 devices can therefore be used as local controllers. Bus Terminals (K-bus) or EtherCAT Terminals (E-bus) can alternatively be connected; the CX8000 automatically recognises the type of I/O system connected during the start-up phase. The use of EtherCAT gives rise to further options, such as the realisation of different topologies, the integration of further bus systems such as CANopen, PROFIBUS and PROFINET and – with the EtherCAT Box modules – connection to the IP 67 world.

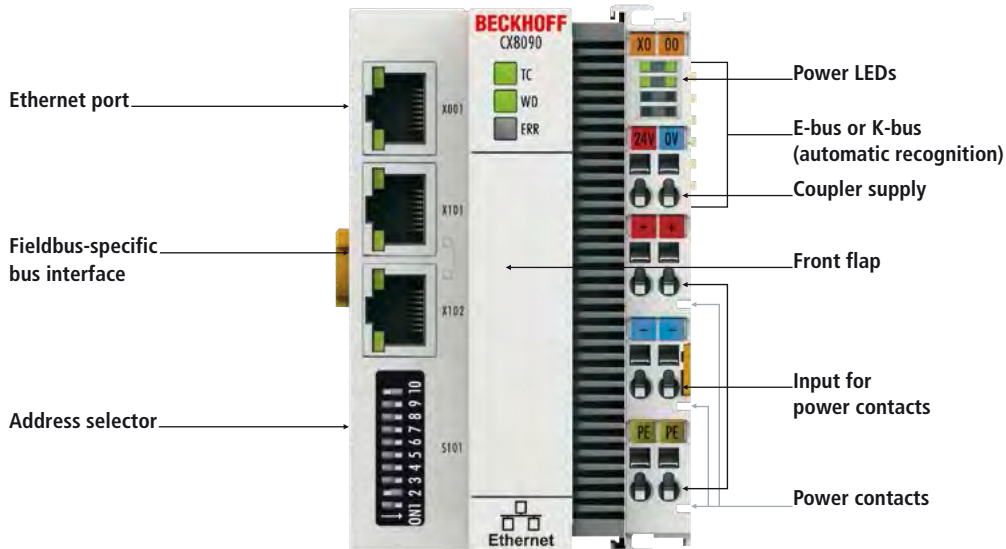
Like all CX products, the CX8000 devices are programmed and commissioned via the Ethernet interface, which can also be used for connection of the control system with a regular network. Some of the Embedded PCs have further Ethernet interfaces with switch functions, so that a linear “daisy chain” topology can be constructed inexpensively without additional hardware. The other connections on the lower plug level are fieldbus-specific. Thanks to their low power consumption, the devices are fanless. Microsoft Windows Embedded CE 6 is used as the operating system. TwinCAT 2 software is used for

system configuration and the programming of the PLC functionality. The CX8000 target device features a pre-installed TwinCAT 2 PLC runtime environment. All software required for operating the device, including the operating system, the TwinCAT files and user files and data, is stored on the microSD flash card. This simplifies exchange in the case of service. Commercial card readers can be used to access the card data. The size of the microSD flash card (e.g. 256 MB) can be chosen depending on the application and the quantity of data to be stored. The CX8000 device

family features an integrated, capacitive 1-second UPS, which in the event of a failure of the supply voltage provides sufficient energy for saving persistent data. Important data are thus retained without battery back-up in the event of a loss of power.

With a high-performance but nevertheless energy-saving 32-bit ARM processor, EtherCAT as I/O bus and TwinCAT 2 PLC with extensive PLC libraries, the Embedded Controllers from the CX8000 series represent very compact, high-performance and versatile controllers with slave fieldbus connection.





CX80xx | Basic CPU module

The devices from this series represent a further development of the well-known and proven 16-bit controllers from the Bus Terminal Controller series – through to the more powerful 32-bit ARM processors.

The CX8000 device series was developed for two different usage scenarios:

- as a local, independent PLC that can be integrated into data networks thanks to its existing Ethernet interface;
- as a local PLC that features a slave interface to a fieldbus system in addition to the Ethernet connection.

Taking the CX8010 as an example, there are two EtherCAT slave connections (IN and OUT) on the left-hand side; on the right-hand side it acts again as an independent EtherCAT master or K-bus master for the locally connected terminals.

As with the BC Bus Terminal Controller series, it is also ensured in the case of the CX8000 that the control and the local program continue to be executed in the case of interruption or loss of the higher-level fieldbus system.

The compact, fanless housing makes highly space-saving structures possible for the control of machines or for use in building automation.

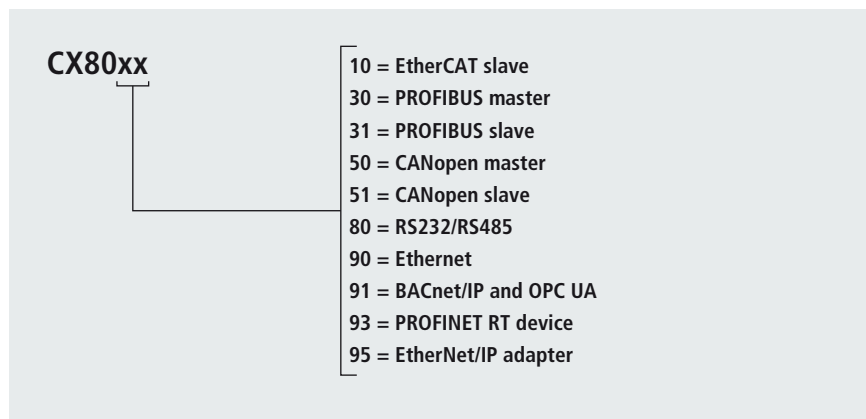
Under the cover at the upper housing level there is an exchangeable coin cell for date and time, a set of DIP switches for setting function modes, a slot for microSD flash memory cards and a USB B connection. Thanks to their low power consumption, the devices are fanless.

The very compact, small design facilitates installation in confined control cabinets, but it can nevertheless serve a large number of I/O points over EtherCAT or K-bus.

Although there is no monitor connection, the Windows Embedded CE 6 operating system and its “virtual” display can be accessed via the network. This is not absolutely necessary for the programming of the automation function: any PC or laptop equipped with TwinCAT 2 can be used for

PLC programming or online faultfinding via a network connection with the CX8000. All system software is located on the industrially-compatible microSD card. Hardware and software can thus be exchanged simply and quickly in the case of service. In addition, the microSD card can be used in any commercial card reader. The installation and execution of proprietary Windows Embedded CE 6 applications (e.g. parts tracking, data acquisition, Web operating interfaces) is also possible. Access to the microSD card is also possible via the USB connection: if the CX8000 is connected to another PC, then the microSD card becomes visible on this PC as a mass storage device.

The order identifier is derived as follows:



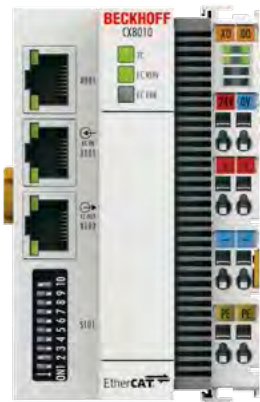

Technical data	CX80xx
Processor	ARM9, 400 MHz
Flash memory	slot for microSD card, 512 MB included (expandable)
Main memory	64 MB DDR2 RAM (not expandable)
Programming	TwinCAT 2 PLC
Programming languages	IEC 61131-3
Web visualisation	yes
Online change	yes
Up/down load code	yes/yes
Interfaces	1 x RJ45 10/100 Mbit/s, 1 x USB device (behind the front flap), fieldbus interface
I/O connection	E-bus or K-bus, automatic recognition
Clock	internal battery-backed clock for time and date (battery behind the front flap, exchangeable)
UPS	1-second UPS (for 1 MB of persistent data)
Operating system	Microsoft Windows Embedded CE 6
Web-based management	yes
Current supply E-bus/K-bus	2 A
Max. power consumption	3 W
Max. power consumption (with loading UPS)	7 W
Dimensions (W x H x D)	64 mm x 100 mm x 73 mm
Weight	approx. 180 g
Operating/storage temperature	0...+55 °C/-25...+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Further information	www.beckhoff.com/CX8000

CX80xx | Embedded PCs with fieldbus interface



Embedded PC
for EtherCAT

Embedded PC
for PROFIBUS

Technical data	CX8010	CX8030
Protocol	EtherCAT (slave)	PROFIBUS-DP (master)
Max. number of bytes fieldbus	512 byte input and 512 byte output	only limited by memory
Data transfer rates	100 Mbit/s	up to 12 Mbaud (automatic detection)
Bus interface	EtherCAT IN and OUT (2 x RJ45)	1 x D-sub 9-pin socket with shielding
	 <p>The DIP switch can be used to set the Explicit Device Identification Value for a Hot Connect group.</p>	 <p>The CX8030 is a PROFIBUS master device. Optionally it can be operated as a PROFIBUS slave device.</p>
I/O connection	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition
Type/number of peripheral signals	K-bus 2 kByte IN/OUT, E-bus only limited by memory	K-bus 2 kByte IN/OUT, E-bus only limited by memory
Approvals/markings	CE, UL, ATEX, IECEx	CE, UL, ATEX, IECEx
Further information	www.beckhoff.com/CX8010	www.beckhoff.com/CX8030

EtherCAT Terminals see page 2 128, EtherCAT Box modules see page 2 316, Bus Terminals see page 2 502

CANopen



<p>Embedded PC for PROFIBUS</p>	<p>Embedded PC for CANopen</p>	<p>Embedded PC for CANopen</p>
<p>CX8031</p>	<p>CX8050</p>	<p>CX8051</p>
<p>PROFIBUS-DP (slave)</p>	<p>CANopen (master)</p>	<p>CANopen (slave)</p>
<p>240 byte input and 240 byte output + 3 virtual slaves</p>	<p>only limited by memory</p>	<p>16 Tx/Rx PDOs + 3 virtual slaves</p>
<p>up to 12 Mbaud (automatic detection)</p>	<p>up to 1 Mbaud (automatic detection)</p>	<p>up to 1 Mbaud (automatic detection)</p>
<p>1 x D-sub 9-pin socket with shielding</p>	<p>D-sub connector, 9-pin according to CANopen specification, galvanically decoupled</p>	<p>D-sub connector, 9-pin according to CANopen specification, galvanically decoupled</p>
<div> </div> <p>The PROFIBUS address is set via two rotary selection switches. The CX8031 offers automatic baud rate detection. The CX8031 offers three virtual slaves, so that the amount of data can be tripled.</p>	<div> </div> <p>The CX8050 controller is equipped with a CANopen master interface. Apart from offering the CANopen master functionality, it can optionally be used to support CAN layer 2 communication.</p>	<div> </div> <p>The CANopen address is set via two rotary selection switches. The CX8051 offers automatic baud rate detection.</p>
<p>E-bus or K-bus, automatic recognition</p>	<p>E-bus or K-bus, automatic recognition</p>	<p>E-bus or K-bus, automatic recognition</p>
<p>K-bus 2 kByte IN/OUT, E-bus only limited by memory</p>	<p>K-bus 2 kByte IN/OUT, E-bus only limited by memory</p>	<p>K-bus 2 kByte IN/OUT, E-bus only limited by memory</p>
<p>CE, UL, ATEX, IECEx www.beckhoff.com/CX8031</p>	<p>CE, UL, ATEX, IECEx www.beckhoff.com/CX8050</p>	<p>CE, UL, ATEX, IECEx www.beckhoff.com/CX8051</p>

CX80xx | Embedded PCs with fieldbus interface



Ethernet

	Embedded PC for RS232/RS485	Embedded PC for different Ethernet protocols
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Technical data	CX8080	CX8090
Protocol	serial communication	real-time Ethernet, ADS TCP, Modbus TCP, TCP/IP, UDP/IP, EAP (EtherCAT Automation Protocol)
Max. number of bytes fieldbus	512 byte input and 512 byte output	protocol dependency
Data transfer rates	300 baud...115 kbaud	100 Mbit/s
Bus interface	D-sub socket, 9-pin, 1 x RS232, 1 x RS485	2 x RJ45 (switched)
	 <p>The CX8080 has two serial interfaces: one with RS232 and one with RS485 physics. Both serial interfaces are on the D-sub socket. The interface is not bound to a particular protocol and can be expanded with the appropriate TwinCAT supplements for the different serial communication protocols.</p>	 <p>It supports protocols such as realtime Ethernet, ADS UDP/TCP, Modbus TCP client/server or open TCP/IP-UDP/IP communication.</p>
I/O connection	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition
Type/number of peripheral signals	K-bus 2 kByte IN/OUT, E-bus only limited by memory	K-bus 2 kByte IN/OUT, E-bus only limited by memory
Approvals/markings	CE, UL, ATEX, IECEx	CE, UL, ATEX, IECEx
Further information	www.beckhoff.com/CX8080	www.beckhoff.com/CX8090

EtherCAT Terminals see page 2 128 , EtherCAT Box modules see page 2 316 , Bus Terminals see page 2 502

BACnet OPC UA

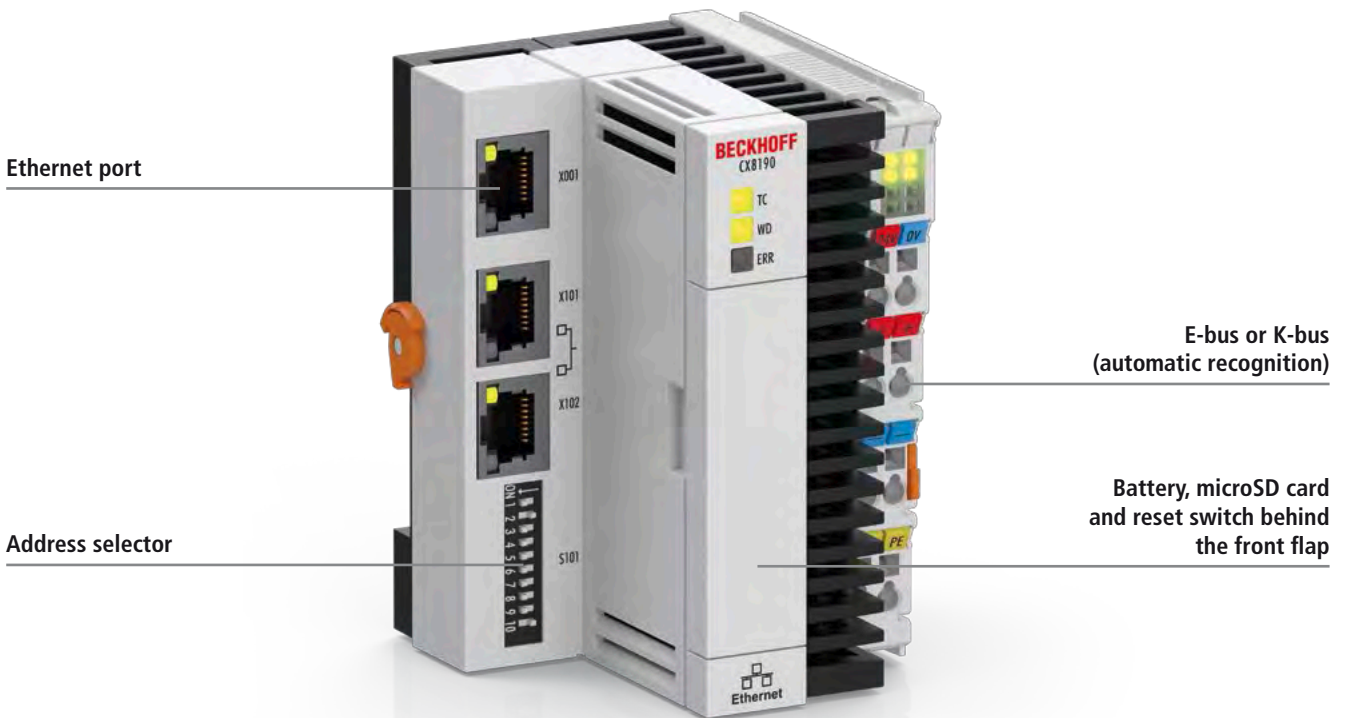


EtherNet/IP™

<p>Embedded PC for BACnet/IP and OPC UA</p>	<p>Embedded PC for PROFINET RT</p>	<p>Embedded PC for EtherNet/IP</p>
<p>CX8091</p>	<p>CX8093</p>	<p>CX8095</p>
<p>BACnet/IP or OPC UA</p>	<p>PROFINET RT device</p>	<p>EtherNet/IP</p>
<p>protocol dependency</p>	<p>1024 byte input and 1024 byte output + 1 virtual slave</p>	<p>1024 byte input and 1024 byte output + 1 virtual adapter</p>
<p>100 Mbit/s</p>	<p>100 Mbit/s</p>	<p>100 Mbit/s</p>
<p>2 x RJ45 (switched)</p>	<p>2 x RJ45 (switched)</p>	<p>2 x RJ45 (switched)</p>
<div> </div> <p>It supports the BACnet/IP and OPC UA protocols.</p>	<div> </div> <p>The PROFINET interface is designed as a 2-port switch for realisation of daisy-chain cabling.</p>	<div> </div> <p>The EtherNet/IP interface is designed as a 2-port switch for realisation of daisy-chain cabling.</p>
<p>E-bus or K-bus, automatic recognition</p>	<p>E-bus or K-bus, automatic recognition</p>	<p>E-bus or K-bus, automatic recognition</p>
<p>K-bus 2 kByte IN/OUT, E-bus only limited by memory</p>	<p>K-bus 2 kByte IN/OUT, E-bus only limited by memory</p>	<p>K-bus 2 kByte IN/OUT, E-bus only limited by memory</p>
<p>CE, UL, ATEX, IECEx</p>	<p>CE, UL, ATEX, IECEx</p>	<p>CE, UL, ATEX, IECEx</p>
<p>www.beckhoff.com/CX8091</p>	<p>www.beckhoff.com/CX8093</p>	<p>www.beckhoff.com/CX8095</p>

CX8100 | Embedded PCs with fieldbus interface

► www.beckhoff.com/CX8100



For further information on the individual fieldbuses see page **2** 24

EtherCAT

RS232
RS485

Ethernet


BACnet

Beckhoff supports a multitude of bus systems and offers an unequalled level of openness in the market segment of compact controllers. The CX8100 series of Embedded PCs is an advancement of the CX8000 series featuring a faster CPU, programmability with TwinCAT 3, and significantly expanded main memory.

- performance class 20 in TwinCAT 3
- ARM Cortex™ A9 CPU, 800 MHz, 512 MB RAM
- microSD cards up to 8 GB
- 1-second UPS

Users benefit from powerful object-oriented programming capabilities and a wide range

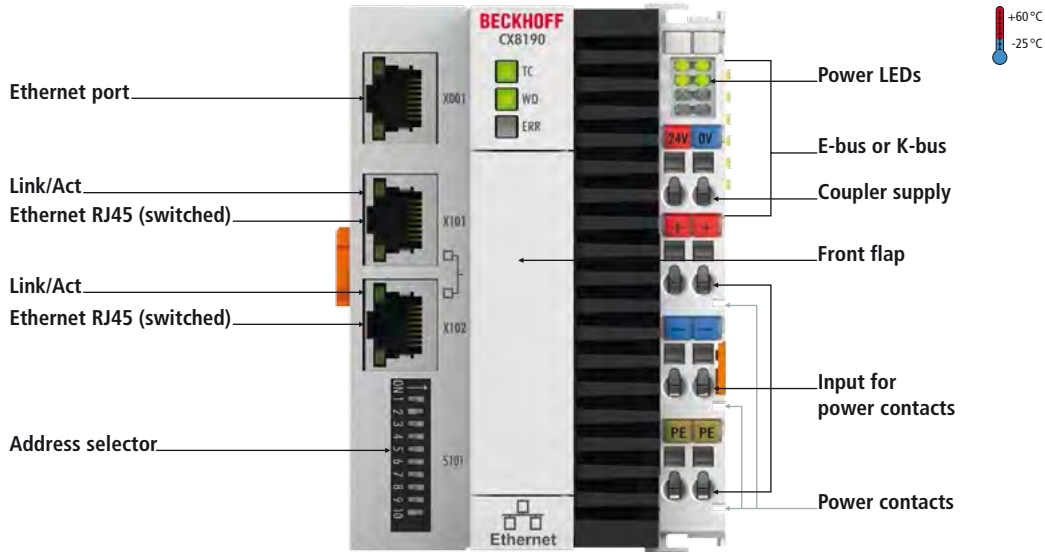
of software components (Functions) from the TwinCAT 3 portfolio. They are cost-optimised for use on the CX8100 device platform. Proven features of the CX8000 series such as e.g. a 1-second UPS for saving persistent data and automatic E-bus/K-bus recognition are also provided.

 The extended operating temperature range between -25 and +60 °C enables application in climatically demanding situations.

The CX8100 series is being advanced continuously and has its own real-time driver. The resulting reduction in jitter delivers a

noticeable performance increase in distributed-clock applications. The CX8110 EtherCAT slave, the CX8180 for serial protocols, the CX8190 for different Ethernet protocols and the CX8191 for BACnet were introduced as fieldbus interfaces. The fieldbus and communication system support will be extended e.g. PROFINET, CANopen, PROFIBUS.





CX81xx | Embedded PC for Ethernet

CX8100 is a family of programmable controller devices with a 32-bit ARM-based CPU, which can be used for executing PLC programs or as slave devices for higher-level fieldbus systems. The CX8100 device series represents a development based on the familiar and proven CX8000 series. Just like the CX8000 series, the CX8100 also ensures that the control system and the local program can still be processed in the event of an interrupted connection to the higher-level fieldbus system. The CX8100 devices can therefore be used as decentralised controllers. EtherCAT Terminals (E-bus) or Bus Terminals (K-bus) can be connected; the CX8100 automatically recognises the type of I/O system connected during the start-up phase. The application of EtherCAT opens up further options, such as the realisation of different topologies, integration of further bus systems such as CANopen, PROFIBUS and PROFINET, and the connection to the IP 67 world with the EtherCAT Box modules.

Like all CX products, the CX8100 devices are programmed and commissioned via the

Ethernet interface, which can, of course, also be used for the regular network connection of the control system. Some Embedded PCs have additional Ethernet interfaces with switch functionality, so that a linear “daisy chain” topology can be established cost-effectively without additional hardware. The other connections provided on the lower connection level are fieldbus-specific. A replaceable coin cell for date and time, a reset switch, as well as a slot for microSD flash memory cards can be found under the front flap at the upper housing level. Owing to their low electrical power consumption, the devices are fanless.

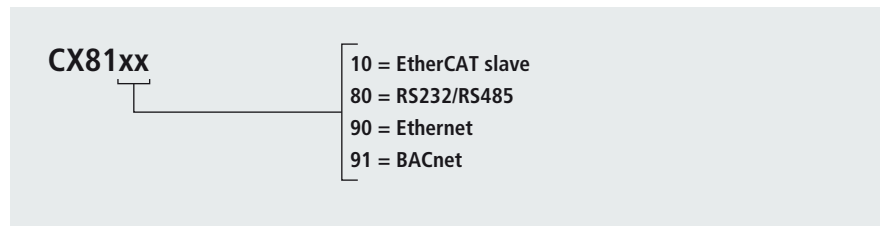
Microsoft Windows Embedded Compact 7 is used as the operating system. In the absence of a monitor port, the operating system can only be accessed via network connection and a “virtual” display. TwinCAT 3 software is used for system configuration and the programming of the PLC functionality. The CX8100 target device features a pre-installed TwinCAT 3 I/O runtime environment. TwinCAT 3 Functions from PLC to

different functions can be ordered via a licence or reloaded. Commercial card readers can be used to access the SD card data. The size of the microSD Flash card (e.g. 512 MB to 8 GB) can be chosen depending on the application and the quantity of data to be stored.

The CX8100 device family features an integrated, capacitive 1-second UPS, which in the event of a failure of the supply voltage provides sufficient energy for saving remanent data. Important data are thus preserved in a non-volatile manner without battery backup.

With a high-performance but nevertheless energy-saving 32-bit ARM processor, EtherCAT as I/O bus and TwinCAT 3 PLC with extensive PLC libraries, the Embedded Controllers from the CX8100 series represent versatile high-performance controllers with slave or master fieldbus connection.

The order identifier is derived as follows:







Technical data	CX81xx
Processor	ARM Cortex™-A9, 800 MHz (TC3: 20)
Flash memory	slot for microSD card, 512 MB included (expandable)
Main memory	512 MB DDR3 RAM (not expandable)
Programming	TwinCAT 3
Interfaces	1 x RJ45 10/100 Mbit/s, bus interface
I/O connection	E-bus or K-bus, automatic recognition
Clock	internal battery-backed clock for time and date (battery behind the front flap, exchangeable)
UPS	1-second UPS
Operating system	Microsoft Windows Embedded Compact 7
Current supply E-bus/K-bus	2 A
Max. power consumption	4 W
Max. power consumption (with loading UPS)	9 W
Dimensions (W x H x D)	71 mm x 100 mm x 73 mm
Weight	approx. 230 g
Operating/storage temperature	-25...+60 °C/-40...+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
TC3 performance class	Economy (20); for further information on TwinCAT 3 see page 524
Further information	www.beckhoff.com/CX8100

CX81xx | Embedded PCs with fieldbus interface



Embedded PC
for EtherCAT



Embedded PC
for RS232/RS485

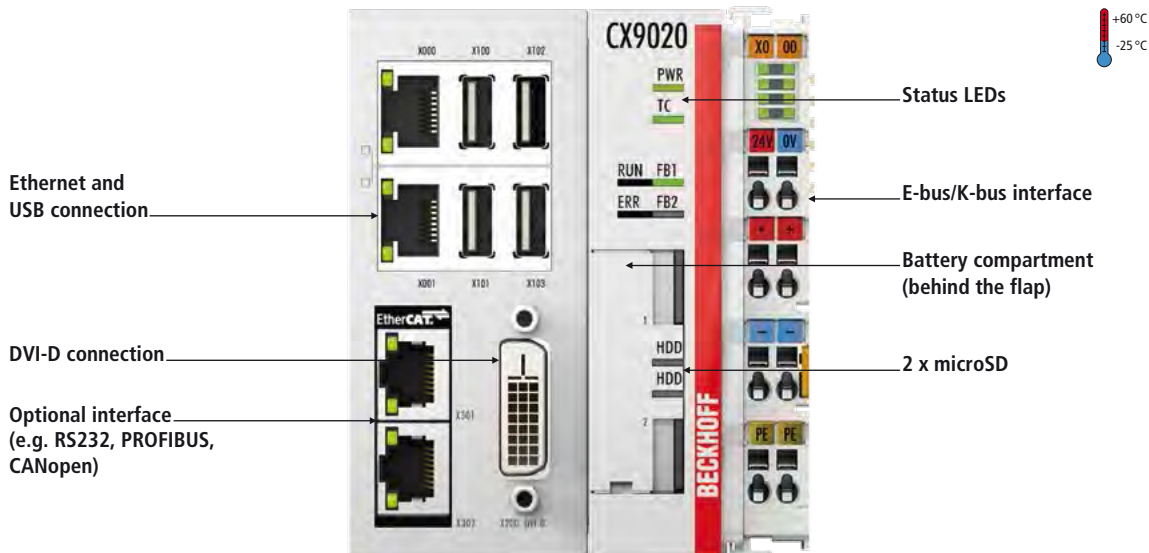
Technical data	CX8110	CX8180
Protocol	EtherCAT (slave)	serial communication
Max. number of bytes fieldbus	512 byte input and 512 byte output	512 byte input and 512 byte output
Data transfer rates	100 Mbit/s	300 baud...115 kbaud
Bus interface	EtherCAT IN and OUT (2 x RJ45)	D-sub socket, 9-pin, 1 x RS232, 1 x RS485
	 	 
I/O connection	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition
Type/number of peripheral signals	K-bus 2 kByte IN/OUT, E-bus only limited by memory	K-bus 2 kByte IN/OUT, E-bus only limited by memory
Approvals/markings	CE, UL	CE, UL
Further information	www.beckhoff.com/CX8110	www.beckhoff.com/CX8180

EtherCAT Terminals see page 2 128, EtherCAT Box modules see page 2 316, Bus Terminals see page 2 502

Ethernet

BACnet

<p>Embedded PC for different Ethernet protocols</p>	<p>Embedded PC for BACnet</p>
<p>CX8190</p>	<p>CX8191</p>
<p>real-time Ethernet, ADS UDP, ADS TCP, EAP (EtherCAT Automation Protocol) protocol dependency</p>	<p>BACnet (client and server) according to ISO 16484-5:2012 (revision 14) protocol dependency</p>
<p>100 Mbit/s</p>	<p>100 Mbit/s</p>
<p>2 x RJ45 (switched)</p>	<p>2 x RJ45 (switched)</p>
 <p>The image shows the Beckhoff CX8190 Ethernet module. It features two RJ45 ports (X101 and X102) and a terminal block (S101) for E-bus or K-bus connections. The module is labeled 'Ethernet' and includes status LEDs for TC, WD, and ERR. A temperature range indicator shows +60°C and -25°C.</p>	 <p>The image shows the Beckhoff CX8191 BACnet/IP module. It features two RJ45 ports (X101 and X102) and a terminal block (S101) for E-bus or K-bus connections. The module is labeled 'BACnet/IP' and includes status LEDs for TC, WD, and ERR. A temperature range indicator shows +60°C and -25°C.</p>
<p>E-bus or K-bus, automatic recognition</p>	<p>E-bus or K-bus, automatic recognition</p>
<p>K-bus 2 kByte IN/OUT, E-bus only limited by memory</p>	<p>K-bus 2 kByte IN/OUT, E-bus only limited by memory</p>
<p>CE, UL</p>	<p>CE</p>
<p>www.beckhoff.com/CX8190</p>	<p>www.beckhoff.com/CX8191</p>



CX9020 | Basic CPU module

The CX9020 is a compact, DIN rail-mountable Ethernet control system with 1 GHz ARM Cortex™-A8 CPU. The connection for the Beckhoff I/O systems is directly integrated into the CPU module. The unit offers automatic bus system identification (E-bus or K-bus) and independently switches in the corresponding mode. The CX9020 comprises the CPU with two microSD card slots, the internal RAM and 128 kB NOVRAM as non-volatile memory. The basic configuration also includes two switched Ethernet RJ45 inter-

faces, four USB 2.0 interfaces and a DVI-D interface. The RJ45 interfaces are connected to an internal switch and offer a simple option for creating a line topology without the need for additional Ethernet switches. The operating system is Microsoft Windows Embedded Compact 7. TwinCAT automation software transforms a CX9020 system into a powerful PLC and motion control system that can be operated with or without visualisation. Optionally, the unit can be ordered with a fieldbus, serial or audio interface.

The extended operating temperature range between -25 and +60 °C enables application in climatically demanding situations.

The order identifier is derived as follows:

CX9020-01ST

- 0 = no TwinCAT
 - 1 = with TwinCAT 2 PLC runtime
 - 2 = with TwinCAT 2 PLC/NC PTP runtime
 - 5 = with TwinCAT 3 runtime (XAR)
-
- 0 = no operating system
 - 1 = Windows Embedded Compact 7

Optional interfaces:

- CX9020-N020 = audio interface
- CX9020-N030 = RS232, D-sub plug
- CX9020-N031 = RS422/RS485, D-sub socket
- CX9020-B110 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)
- CX9020-M310 = PROFIBUS master, D-sub socket, 9-pin
- CX9020-B310 = PROFIBUS slave, D-sub socket, 9-pin
- CX9020-M510 = CANopen master, D-sub plug, 9-pin
- CX9020-B510 = CANopen slave, D-sub plug, 9-pin
- CX9020-M930 = PROFINET RT, controller
- CX9020-B930 = PROFINET RT, device, Ethernet (2 x RJ45 switch)
- CX9020-B950 = EtherNet/IP adapter, Ethernet (2 x RJ45 switch)

Since not all combinations make sense, the table ordering information contains a breakdown of the permissible combinations.

Technical data	CX9020
Processor	ARM Cortex™-A8, 1 GHz
Number of cores	1
Flash memory	2 x slot for microSD card, 512 MB included (expandable)
Main memory	1 GB DDR3 RAM (not expandable)
Persistent memory	128 KB NOVRAM integrated
Interfaces	2 x RJ45 10/100 Mbit/s (internal switch), 1 x DVI-D, 4 x USB 2.0, 1 x optional interface
Diagnostics LED	1 x power, 1 x TC status, 2 x flash access, 2 x bus status
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded Compact 7, English
Control software	TwinCAT 2 runtime TwinCAT 3 runtime (XAR)
I/O connection	E-bus or K-bus, automatic recognition
Power supply	24 V DC (-15 %/+20 %)
Current supply E-bus/K-bus	2 A
Max. power consumption	5 W
Max. power consumption (with loading UPS)	9 W
Dimensions (W x H x D)	84 mm x 99 mm x 91 mm
Weight	approx. 590 g
Operating/storage temperature	-25...+60 °C/-40...+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals/markings	CE, UL, ATEX, GL, IECEx
TC3 performance class	Economy Plus (30); for further information on TwinCAT 3 see page 524
Further information	www.beckhoff.com/CX9020

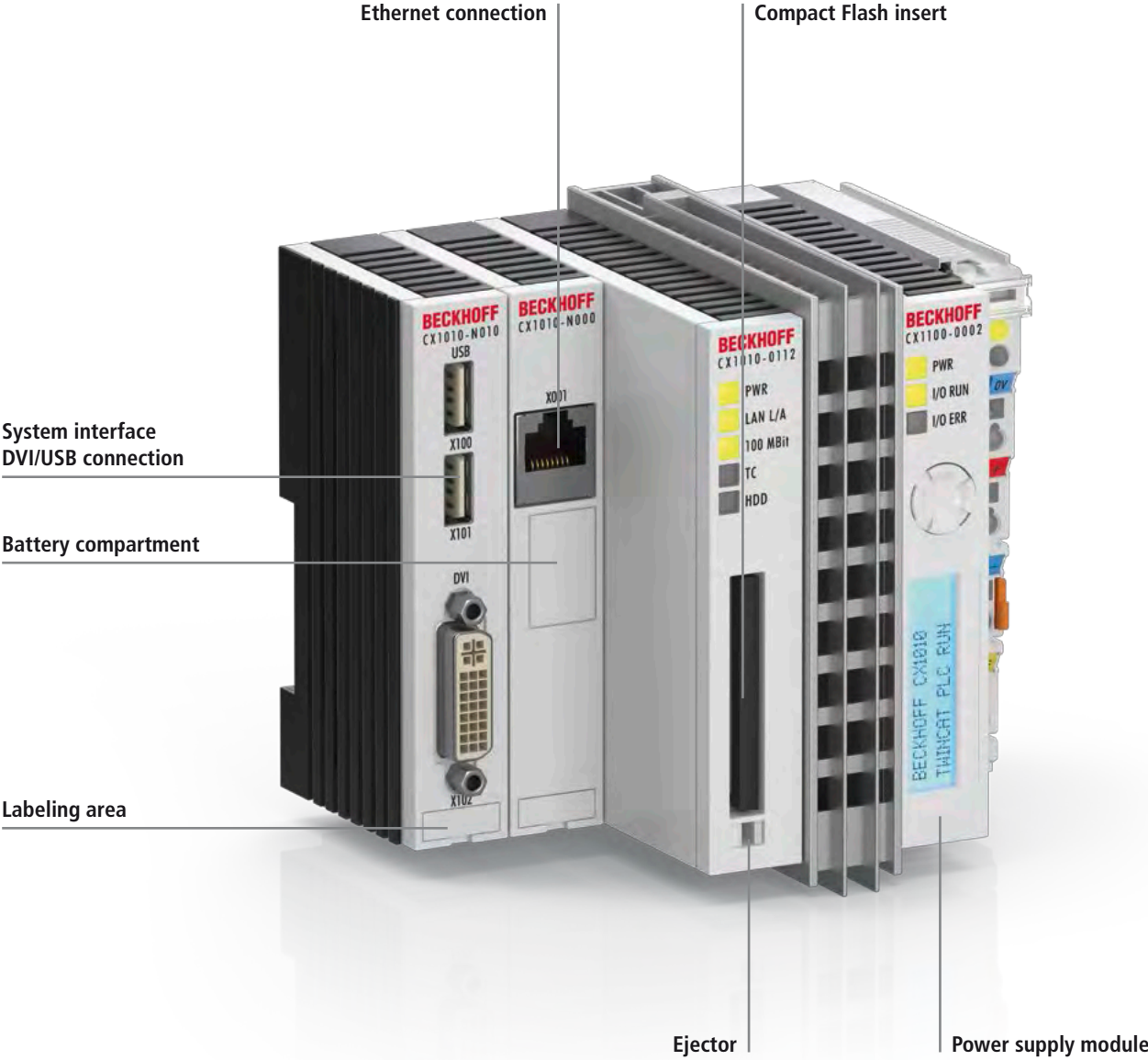
Ordering information	no operating system	Windows Embedded Compact 7	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC PTP runtime	TwinCAT 3 runtime (XAR)
CX9020-0100	x*	–	x	–	–	–
CX9020-0110	–	x	x	–	–	–
CX9020-0111	–	x	–	x	–	–
CX9020-0112	–	x	–	–	x	–
CX9020-0115	–	x	–	–	–	x

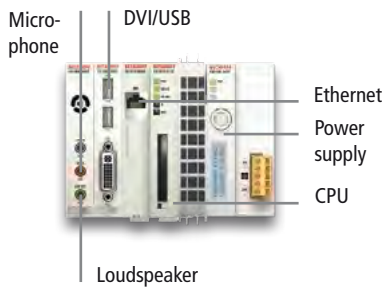
Options	
CX9020-U900	internal, capacitive 1-second UPS to ensure secure backup of persistent application data on the microSD card
CX2900-0107	Device modification for CX5120, CX5130, CX5140 and CX9020 Embedded PCs according to the requirements for ATEX and IECEx certification. The modification is mandatory for the usage of CX5120, CX5130, CX5140 and CX9020 in hazardous areas, Zone 2/22. It includes the modification and repositioning of the device label as well as a mounting bracket installed ex works for mechanical locking of the connectors. Product labeling: ATEX: II 3 G Ex nA IIC T4 Gc and II 3 D Ex tc IIIC T135 °C Dc; IECEx: Ex nA IIC T4 Gc and Ex tc IIIC T135 °C Dc Read the device documentation for use in hazardous areas carefully.

*only suitable for Linux (no Windows CE is possible)

CX1010 | Embedded PCs

► www.beckhoff.com/CX1010





Application example multimedia system with audio connection

- multimedia system (e.g. building automation)
- audio interface
- Windows Embedded Standard 2009 (no TwinCAT)

Components

- CPU CX1010-0120 (DVI/USB, audio interface)
- power supply CX1100-0001

The basic CX1010 module is the basic device of the CX family. With a 500 MHz Intel® Pentium® MMX-compatible processor it offers average CPU performance. Depending on the application the CX1010 can also be operated in "headless" mode, i.e. without display and keyboard. If local visualisation is required, this can be implemented via a DVI (digital video interface), to which all Beckhoff Control Panels and all commercially available monitors with DVI input or VGA input can be connected. The touch screen signal is read via one of the two available USB interfaces.

The components

The individual system components are modules with a width of 19 mm (single) or 38 mm (double) that can be arranged in series. The basic unit consists of a (CX1010) CPU module and a power supply module (CX1100-000x).

The CPU module is available in several variants, e.g.

- System interfaces: as an option, a DVI and two USB interfaces can be added to the existing Ethernet interface. Further system interfaces for serial communication (2 x RS232 or 2 x RS422/485) or audio signals can be ordered separately.
- Operating system: There is a choice of no operating system, Microsoft Windows Embedded CE 6 or Microsoft Windows Embedded Standard 2009.

- TwinCAT 2 software (pre-installed): without a TwinCAT 2 system, with TwinCAT 2 CE PLC or with TwinCAT 2 CE NC PTP, or with the associated full version of the individual TwinCAT 2 levels for PLC and NC PTP

Power supply unit with integrated I/O interface

For the 24 V DC power supply unit there is a choice of four different versions:

- CX1100-0001: without I/O interface
- CX1100-0002: with terminal bus interface for Beckhoff Bus Terminals
- CX1100-0003: with terminal bus interface for Beckhoff Bus Terminals and IP-Link interface for Beckhoff Fieldbus Box modules
- CX1100-0004: with terminal bus interface for Beckhoff EtherCAT Terminals

All power supply variants have an illuminated, low-glare LC-display with FSTN technology and two rows with 16 characters each for displaying status messages. The application programs can also use the display for displaying application-specific texts. 8 kB of non-volatile memory for remanent data are also included.

The range of optional modules is complemented by fieldbus connections for PROFIBUS, CANopen, DeviceNet, SERCOS and Lightbus, both as master or slave versions.

PLC, motion control and visualisation

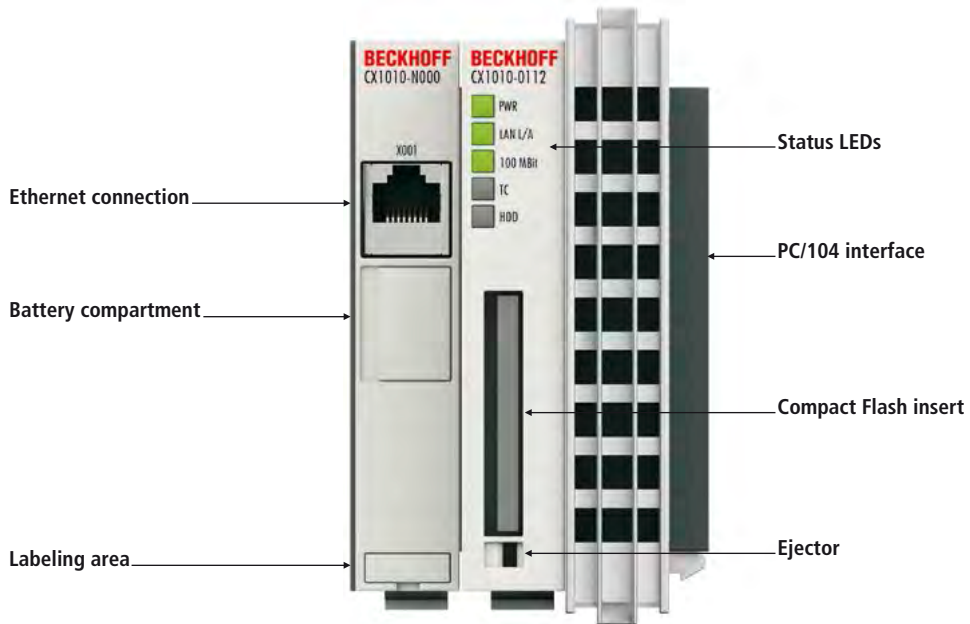
In combination with TwinCAT 2 automation software, the CX1010 Embedded PC becomes a powerful IEC 61131-3 PLC with up to four user tasks. Additionally, motion control tasks can also be executed. Depending on the required cycle time, several servo axes can be controlled. Even special functions such as flying saw, electronic gearbox and cam plate can be realised. Under Windows Embedded CE 6, thanks to the real-time capability of the operating system, user tasks written in high-level languages can be processed in real-time in parallel with TwinCAT 2.

Remote programming via Ethernet

The CX1010 units are programmed via a laptop or a desktop PC that is connected with the CX1010 via Ethernet (network or crossover cable). The programs are developed on the laptop with a standard TwinCAT 2 software license and then loaded into the target device.

Operating systems

Both Windows Embedded Standard 2009 and Windows Embedded CE 6 are available as operating system. The latter has the advantages of faster boot up and lower license costs. The Beckhoff OPC server for connection to SCADA packages is available for both operating systems variants. The same applies to the CX1010: easy visualisation and at the same time real-time control on one system.



CX1010 | Basic CPU module

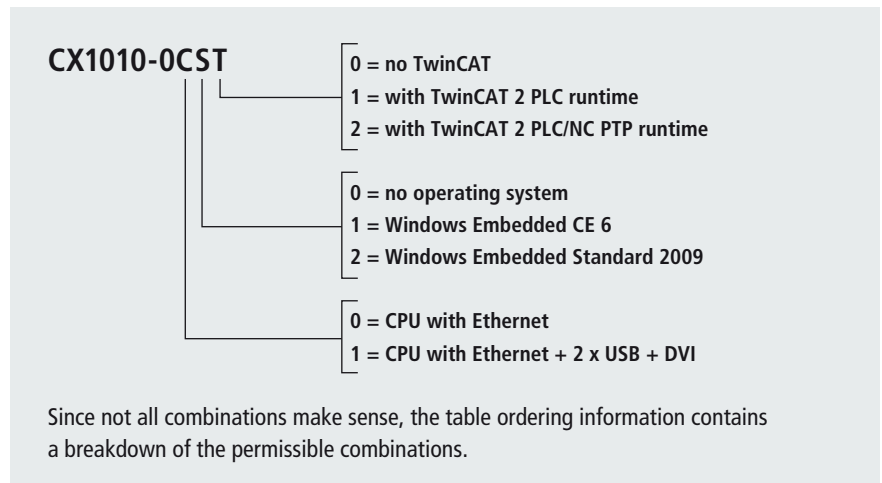
The CX1010 CPU module is the basic module of the CX system. It comprises the CPU and the internal flash memory in two implementation levels and offers the option to operate an additional memory medium in Compact Flash format II. An Ethernet interface is part of the basic configuration. All other CX family components can be connected via the PC/104 interface that is available on both sides. The CPU module can be equipped with

different hardware and software options: the operating system can be Windows Embedded CE 6 or Windows Embedded Standard 2009.

The basic configuration of the CX1010 includes a 128 MB Compact Flash card. The TwinCAT 2 automation software transforms a CX1010 system into a powerful PLC and motion control system that can be operated with or without visualisation. Further

system interfaces or fieldbus connections can be added to the basic CPU module. The passive cooling module is included in the scope of supply. The CPU module requires a CX1100 type power supply module.

The order identifier is derived as follows:



Embedded PC interfaces for CX1010
see page 240

Technical data	CX1010-0xxx
Processor	compatible with Intel® Pentium® MMX, clock frequency 500 MHz
Number of cores	1
Flash memory	slot for Compact Flash card, 128 MB included (expandable)
Main memory	256 MB DDR RAM (not expandable)
Interfaces	1 x RJ45 10/100 Mbit/s
Diagnostics LED	1 x power, 1 x LAN speed, 1 x LAN activity, TC status, 1 x flash access
Expansion slot	1 x Compact Flash type II insert with ejector
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded CE 6 or Microsoft Windows Embedded Standard 2009
Control software	TwinCAT 2 PLC runtime or TwinCAT 2 NC PTP runtime
System bus	16 bit ISA (PC/104)
I/O connection	via power supply module (E-bus, K-bus, K-bus/IP-Link)
Power supply	via system bus (through CX1100-xxxx power supply modules)
Max. power consumption	8 W
Dimensions (W x H x D)	58 mm x 120 mm x 91 mm
Weight	approx. 355 g
Operating/storage temperature	0...+50 °C/-25...+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals/markings	CE, UL
Further information	www.beckhoff.com/CX1010

Ordering information	DVI/USB	no operating system	Windows Embedded CE 6	Windows Embedded Standard 2009	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC PTP runtime
CX1010-0000	–	x	–	–	x	–	–
CX1010-0010	–	–	x	–	x	–	–
CX1010-0011	–	–	x	–	–	x	–
CX1010-0012	–	–	x	–	–	x	x
CX1010-0020	–	–	–	x*	x	–	–
CX1010-0021	–	–	–	x*	–	x	–
CX1010-0022	–	–	–	x*	–	x	x
CX1010-0100	x	x	–	–	x	–	–
CX1010-0110	x	–	x	–	x	–	–
CX1010-0111	x	–	x	–	–	x	–
CX1010-0112	x	–	x	–	–	x	x
CX1010-0120	x	–	–	x*	x	–	–
CX1010-0121	x	–	–	x*	–	x	–
CX1010-0122	x	–	–	x*	–	x	x

*CX1010 systems with Microsoft Embedded Standard 2009 require Compact Flash with a capacity of at least 2 GB (must be ordered separately).

DVI/USB
interfaceAudio
interfaceRS232
interfaceRS422/RS485
interfaceEthernet
interface

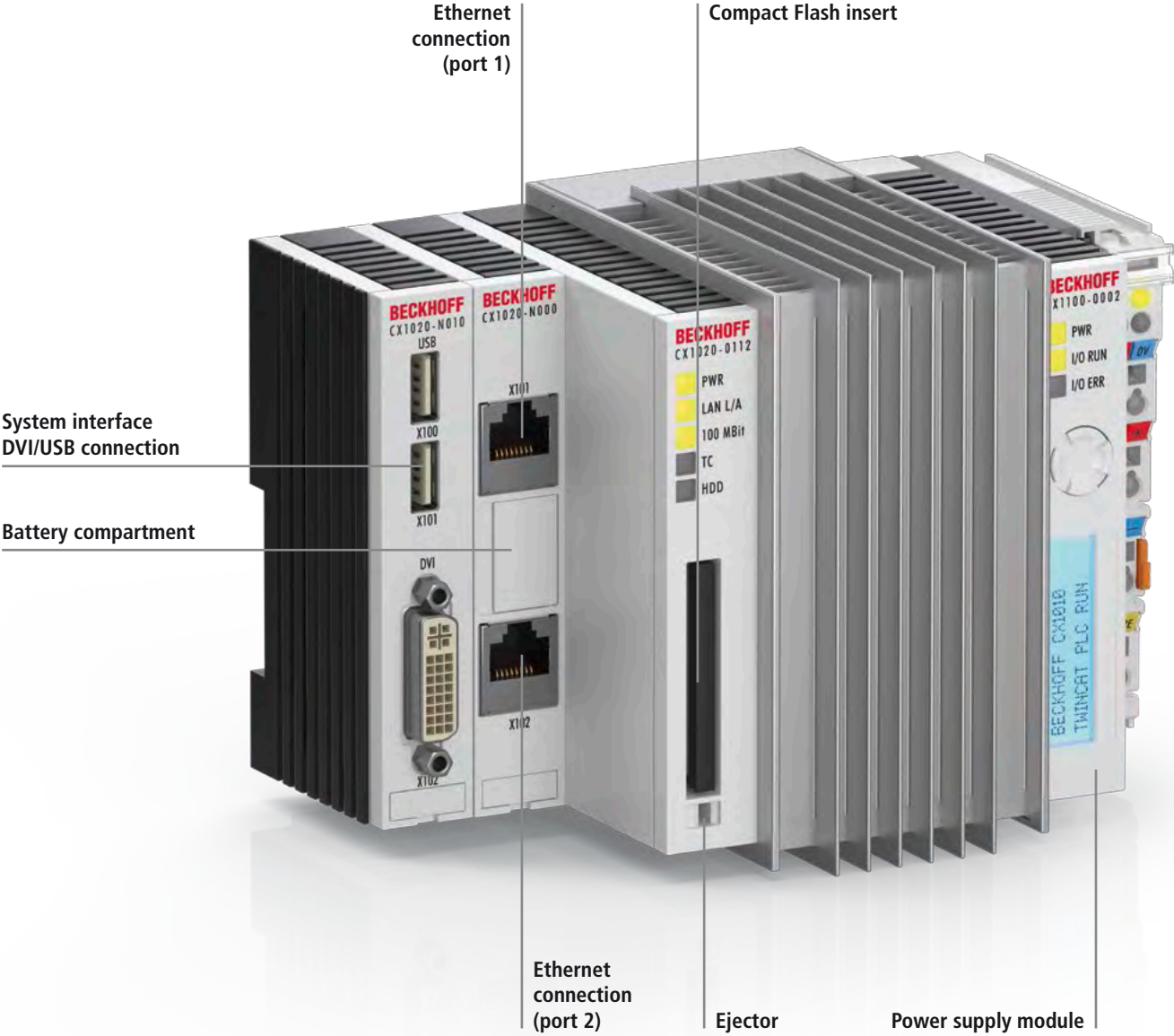
CX1010-N0xx | System interfaces

A number of optional interface modules are available for the basic CX1010 CPU module that can be installed ex factory. The CX1010-N010 option connects Beckhoff Control Panels or standard monitors with DVI or VGA input via the DVI or USB interfaces. Devices such as printer, scanner, mouse, keyboard, mass storage, etc. can be connected via the USB 2.0 interfaces. Multimedia capability is realised via the CX1010-N020 audio interface. The modules CX1010-N030 and CX1010-N040 offer a total of four serial RS232 interfaces with a maximum transfer speed of 115 kbaud. These four interfaces can be implemented in pairs as RS422/RS485, in which case they are identified as CX1010-N031 and CX1010-N041 respectively. The system interfaces cannot be retrofitted or expanded in the field. They are supplied ex factory in the specified configuration and cannot be separated from the CPU module. The internal PC/104 bus runs through the system interfaces, so that further CX components can be connected. The power supply of the system interface modules is ensured via the internal PC/104 bus.

Technical data	CX1010-N010	CX1010-N020	CX1010-N030	CX1010-N040	CX1010-N031	CX1010-N041	CX1010-N060
Interfaces	1 x DVI + 2 x USB 2.0 (max. 500 mA per port)	Line IN, Line Mic IN, Line OUT	1 x COM1 + 1 x COM2, RS232	1 x COM3 + 1 x COM4, RS232	1 x COM1 + 1 x COM2, RS422/RS485	1 x COM3 + 1 x COM4, RS422/RS485	1 x Ethernet, 10/100 Mbit/s
Type of connection	DVI-I 29-pin socket + 2 USB ports type A	3.5 mm socket for jack plug	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	2 x D-sub socket, 9-pin	2 x D-sub socket, 9-pin	1 x RJ45
Properties	DVI-I interface also carries out VGA signals (DVI-A)	built-in PC beeper, Line OUT output, max. 200 mW, suitable for earphones	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N030/ N040	max. baud rate 115 kbaud, not combinable with N030/ N040	max. 20 m cable length Cat. 5, not combinable with CX1100- 0004
Power supply	via system bus (through CX1100-xxxx power supply modules)						
Dimensions (W x H x D)	19 mm x 100 mm x 51 mm						
Weight	approx. 80 g						
Operating/storage temperature	0...+55 °C/-25...+85 °C						
Relative humidity	95 %, no condensation						
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27						
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4						
Protection class	IP 20						
Approvals/markings	CE, UL						
Further information	www. beckhoff.com/ CX1010-N010	www. beckhoff.com/ CX1010-N020	www. beckhoff.com/ CX1010-N030	www. beckhoff.com/ CX1010-N040	www. beckhoff.com/ CX1010-N031	www. beckhoff.com/ CX1010-N041	www. beckhoff.com/ CX1010-N060

CX1020, CX1030 | Embedded PCs

► www.beckhoff.com/CX1020





CX1020



CX1030

The Embedded PCs CX1020 and CX1030 extend the CX product family by versions with higher CPU performance and enable the direct connection of Bus Terminals and EtherCAT Terminals. The CX1020 is equipped with a 1 GHz Intel® Celeron® M CPU. It is an energy-saving device that operates with ultra-low core voltage and features low thermal power dissipation of only 7 W TDP (thermal design power). As a result, no fan is required despite the compact design of the CX1020 Embedded PC. Since Compact Flash is used as boot and memory medium, no rotating media are required in the controller. This is an important aspect for increasing the MTBF (mean time between failures) of the overall system.

The CX1030 is equipped with a 1.8 GHz Intel® Pentium® M. Apart from the cartridge (which is required due to the higher performance) and the CPU, the CX1030 and CX1020 feature identical hardware and software. The high-quality fan is supported by dual ball bearings and mounted in a tray so that it can be replaced in the field without tools or wiring, if required. The fan speed is monitored and can be queried via software. The combination of CX1030, EtherCAT and TwinCAT enables very fast control processes in the sub-millisecond range (eXtreme Fast Control Technology).

The basic CPU modules are equipped with two RJ45 sockets and an integrated 3-port switch as standard.

The components

The modules of the CX series system are connected with each other via the standardised PC/104 bus (16 bit). The individual system components are modules with a width of 19 mm (single) or 38 mm (double) that can be arranged in series. The basic unit consists of a CPU module CX1020/CX1030 and a power supply module (CX1100-00xx).

The range of optional modules is complemented by fieldbus connections for PROFIBUS, CANopen, DeviceNet, SERCOS and Lightbus, both as master or slave versions.

Power supply unit with integrated I/O interface

The following types of 24 V DC power supply units are available:

- CX1100-0001: without I/O interface, CX1020 only
- CX1100-00x2: with terminal bus interface for Beckhoff Bus Terminals
- CX1100-00x3: with terminal bus interface for Beckhoff Bus Terminals and IP-Link interface for Beckhoff Fieldbus Box modules
- CX1100-00x4: with terminal bus interface for Beckhoff EtherCAT Terminals

All power supply variants have an illuminated, low-glare LC display with FSTN technology and two rows with 16 characters each for displaying status messages. The application programs can also use the display for displaying application-specific texts. 8 kB of non-volatile memory for remanent data are also included.

EtherCAT as a fast I/O system

The Embedded PCs CX1020 and CX1030 were developed for optimum interaction with EtherCAT.

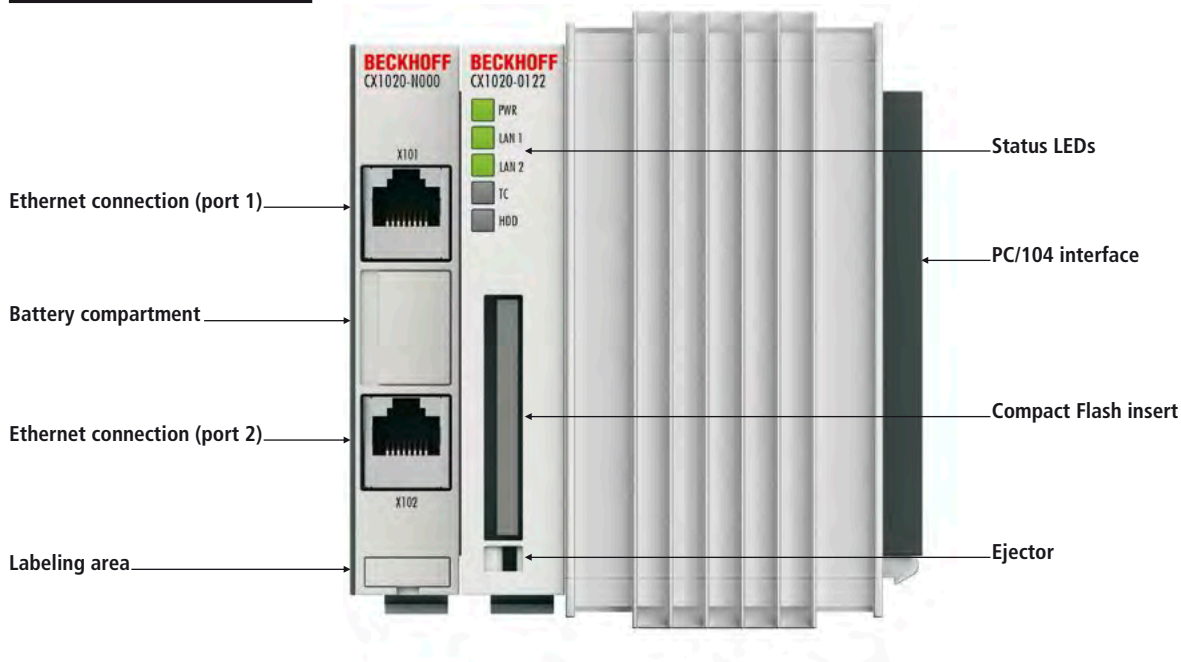
EtherCAT offers several options for connecting traditional fieldbus systems with the CX1020/CX1030: either as a CX1500 module directly at the CPU or as an EtherCAT device in terminal form. The PROFIBUS master is available either as a CX1500-M310 or as an EL6731 EtherCAT Terminal.

PLC, motion control, interpolation and visualisation

As a DIN rail Industrial PC and in conjunction with the TwinCAT software from Beckhoff, the CX1020/CX1030 offers the same functionality as large Industrial PCs. In terms of PLC, up to four virtual IEC 61131 CPUs can be programmed with up to four tasks each, with a minimum cycle time of 50 µs. All IEC 61131-3 languages can be used.

Moreover, all TwinCAT functionalities are available for motion control applications: in theory, up to 256 axes can be controlled. In addition to simple point-to-point movements, more complex multi-axis functions such as electronic gearbox, cam plate and flying saw can be implemented. Thanks to the more powerful CPU, the CX1020 and CX1030 can also be used for interpolating 3D path movements and DIN 66025 programs.

In addition to real-time execution of control tasks, the TwinCAT real-time kernel ensures that enough time remains for the user interface (HMI) to communicate with the real-time components via software interfaces such as ADS or OPC.



CX1020 | Basic CPU module

The basic CX1020 CPU module has a 1 GHz Intel® CPU. The controller does not require a fan or other rotating components. In addition to the CPU and the chipset, the CX1020 module also contains the main memory, which is available in different sizes. The controller boots from the Compact Flash.

The basic configuration of the CX1020 includes a 128 MB Compact Flash card and two Ethernet RJ45 interfaces. These interfaces are connected to an internal switch and offer a simple option for creating a line topology without the need for additional Ethernet switches. All other CX family components can be connected via the PC/104 interface that is

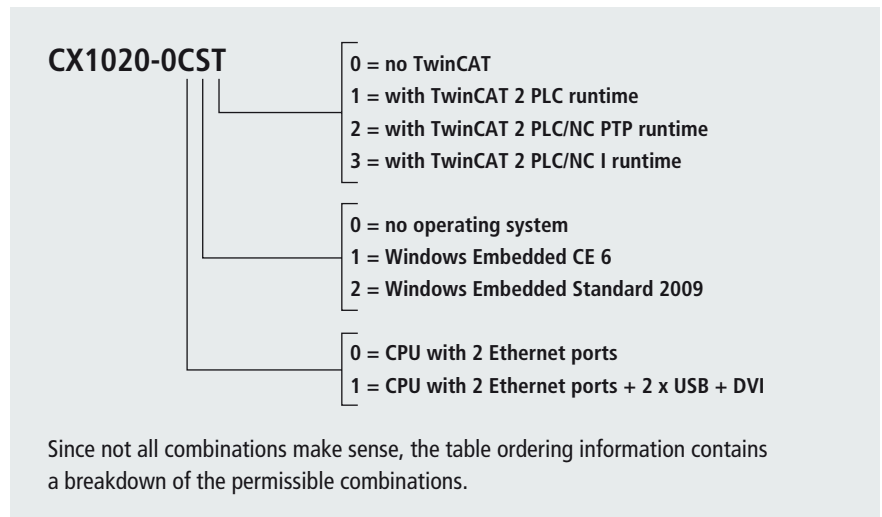
available on both sides. The passive cooling module is included in the scope of supply. The operating system can be Windows Embedded CE 6 or Windows Embedded Standard 2009. The TwinCAT 2 automation software transforms a CX1020 system into a powerful PLC and motion control system that can be operated with or without visualisation. In contrast to the CX1010, the CX1020 can also be used for interpolating axis movements with TwinCAT 2 NC I.

Further system interfaces or fieldbus connections can be added to the basic CPU module. The CPU module requires a CX1100 type power supply module. All CX1500 field-

bus modules and all CX1100 power supplies from the CX series can be used in combination with the CX1020.

The Embedded PC CX1020 is also available as the ordering option CX1900-0320 with zero second level cache. Instead of the 1 GHz processor with 512 kB second level cache (L2), a less expensive variant of the processor without a second level cache (L2 = 0 kB) is used. Since the CX1900-0320 has the same 855GME chipset as the CX1020, none of the basic characteristics of the CX1020 are changed, apart from the slightly lower CPU power.

The order identifier is derived as follows:



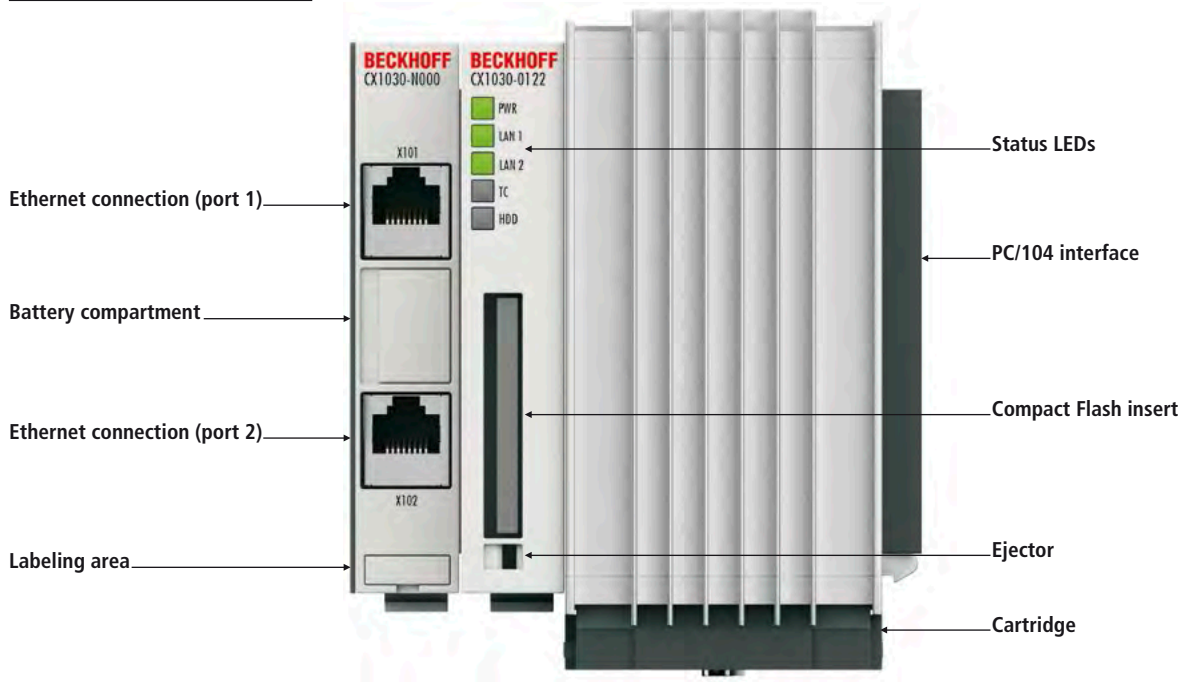
Embedded PC interfaces for CX10x0
see page 240

Technical data	CX1020-0xxx
Processor	Intel® Celeron® M ULV, 1 GHz clock frequency
Number of cores	1
Flash memory	slot for Compact Flash card, 128 MB included (expandable)
Main memory	256 MB DDR RAM (expandable ex factory to 1 GB)
Interfaces	2 x RJ45 10/100 Mbit/s (internal switch)
Diagnostics LED	1 x power, 2 x LAN link/activity, TC status, 1 x flash access
Expansion slot	1 x Compact Flash type I+II insert with eject mechanism
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded CE 6 or Microsoft Windows Embedded Standard 2009
Control software	TwinCAT 2 PLC runtime, NC PTP runtime, NC I runtime
System bus	16 bit ISA (PC/104)
I/O connection	via power supply module (E-bus, K-bus, K-bus/IP-Link)
Power supply	via system bus (through CX1100-xxxx power supply modules)
Max. power consumption	11 W
Dimensions (W x H x D)	96 mm x 112 mm x 99 mm
Weight	approx. 550 g
Operating/storage temperature	0...+50 °C/-25...+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals/markings	CE, UL
Further information	www.beckhoff.com/CX1020

Ordering information	DVI/USB	no operating system	Windows Embedded CE 6	Windows Embedded Standard 2009	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC PTP runtime	TwinCAT 2 NC I runtime
CX1020-0000	–	x	–	–	x	–	–	–
CX1020-0010	–	–	x	–	x	–	–	–
CX1020-0011	–	–	x	–	–	x	–	–
CX1020-0012	–	–	x	–	–	x	x	–
CX1020-0013	–	–	x	–	–	x	x	x
CX1020-0100	x	x	–	–	x	–	–	–
CX1020-0110	x	–	x	–	x	–	–	–
CX1020-0111	x	–	x	–	–	x	–	–
CX1020-0112	x	–	x	–	–	x	x	–
CX1020-0113	x	–	x	–	–	x	x	x
CX1020-0020	–	–	–	x*	x	–	–	–
CX1020-0021	–	–	–	x*	–	x	–	–
CX1020-0022	–	–	–	x*	–	x	x	–
CX1020-0023	–	–	–	x*	–	x	x	x
CX1020-0120	x	–	–	x*	x	–	–	–
CX1020-0121	x	–	–	x*	–	x	–	–
CX1020-0122	x	–	–	x*	–	x	x	–
CX1020-0123	x	–	–	x*	–	x	x	x

Options	
CX1900-0320	option for basic CPU module: Intel® Celeron® M processor 1 GHz, zero second level cache
CX1900-0120	"Active cooling": factory conversion of the CX1020 CPU module for active cooling in order to enable flexible installation positions (see documentation). Active cooling takes place via a fan cartridge. This option requires the use of a power supply unit type CX1100-001x.

*CX1020 systems with Microsoft Embedded Standard require Compact Flash with a capacity of at least 2 GB (must be ordered separately).



CX1030 | Basic CPU module

The CX1030 basic CPU module offers Intel® Pentium® M power on the DIN rail. The CX1030 has a 1.8 GHz Intel® Pentium® M CPU. The CPU is cooled via the cooling module and an easily exchangeable fan cartridge located on the underside of the housing. The fan speed can be read via software and can therefore be monitored.

In addition to the CPU and the chip-set, the CX1030 module also contains the RAM, which is available in different sizes. The controller boots from the Compact Flash. The basic configuration of the CX1030 includes a 128 MB Compact Flash card and

two Ethernet RJ45 interfaces. These are connected to an internal switch and offer a simple option for creating a line topology without the need for additional Ethernet Switches. All other CX family components can be connected via the PC/104 interface that is available on both sides. The passive cooling module is included in the scope of supply.

The operating system can be Windows Embedded CE 6 or Windows Embedded Standard 2009. The TwinCAT 2 automation software transforms a CX1030 system into a powerful PLC and motion control system that can be used with or without visualisa-

tion. In contrast to the CX1010, the CX1030 can also be used for interpolating axis movements with TwinCAT 2 NC I.

Further system interfaces or fieldbus connections can be added to the basic CPU module. The CPU module requires a CX1100-001x type power supply module. All CX1500 fieldbus modules and all CX1100-001x power supply units from the CX series can be used in combination with the CX1030.

The order identifier is derived as follows:

CX1030-0CST 	0 = no TwinCAT
	1 = with TwinCAT 2 PLC runtime
	2 = with TwinCAT 2 PLC/NC PTP runtime
	3 = with TwinCAT 2 PLC/NC I runtime
	0 = no operating system
	1 = Windows Embedded CE 6
	2 = Windows Embedded Standard 2009
	0 = CPU with 2 Ethernet ports
	1 = CPU with 2 Ethernet ports + 2 x USB + DVI

Since not all combinations make sense, the table ordering information contains a breakdown of the permissible combinations.

Embedded PC interfaces for CX10x0
see page 240

Technical data	CX1030-0xxx
Processor	Intel® Pentium® M, 1.8 GHz clock frequency
Number of cores	1
Flash memory	slot for Compact Flash card, 128 MB included (expandable)
Main memory	256 MB DDR RAM (expandable ex factory to 1 GB)
Interfaces	2 x RJ45 10/100 Mbit/s (internal switch)
Cooling	cooling module + fan cartridge featuring speed control with double ball bearing fans, easily replaceable
Diagnostics LED	1 x power, 2 x LAN link/activity, TC status, 1 x flash access
Expansion slot	1 x Compact Flash type I+II insert with eject mechanism
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded CE 6 or Microsoft Windows Embedded Standard 2009
Control software	TwinCAT 2 PLC runtime, NC PTP runtime, NC I runtime
System bus	16 bit ISA (PC/104)
I/O connection	via power supply module (E-bus, K-bus, K-bus/IP-Link)
Power supply	via system bus (through CX1100-0012 [K-bus], CX1100-0013 [K-bus, IP-Link], CX1100-014 [E-bus] power supply module)
Max. power consumption	32 W
Dimensions (W x H x D)	96 mm x 112 mm x 99 mm
Weight	approx. 580 g
Operating/storage temperature	0...+50 °C/-25...+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals/markings	CE, UL
Further information	www.beckhoff.com/CX1030

Ordering information	DVI/USB	no operating system	Windows Embedded CE 6	Windows Embedded Standard 2009	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC PTP runtime	TwinCAT 2 NC I runtime
CX1030-0000	–	x	–	–	x	–	–	–
CX1030-0010	–	–	x	–	x	–	–	–
CX1030-0011	–	–	x	–	–	x	–	–
CX1030-0012	–	–	x	–	–	x	x	–
CX1030-0013	–	–	x	–	–	x	x	x
CX1030-0100	x	x	–	–	x	–	–	–
CX1030-0110	x	–	x	–	x	–	–	–
CX1030-0111	x	–	x	–	–	x	–	–
CX1030-0112	x	–	x	–	–	x	x	–
CX1030-0113	x	–	x	–	–	x	x	x
CX1030-0020	–	–	–	x*	x	–	–	–
CX1030-0021	–	–	–	x*	–	x	–	–
CX1030-0022	–	–	–	x*	–	x	x	–
CX1030-0023	–	–	–	x*	–	x	x	x
CX1030-0120	x	–	–	x*	x	–	–	–
CX1030-0121	x	–	–	x*	–	x	–	–
CX1030-0122	x	–	–	x*	–	x	x	–
CX1030-0123	x	–	–	x*	–	x	x	x

*CX1030 systems with Microsoft Embedded Standard 2009 require Compact Flash with a capacity of at least 2 GB (must be ordered separately).



DVI/USB
interface



Audio
interface



RS232
interface



RS422/RS485
interface



Ethernet
interface

CX1020-N0xx | System interfaces

A number of optional interface modules are available for the basic CX1020 CPU module that can be installed ex factory. The CX1020-N010 option connects Beckhoff Control Panels or standard monitors with DVI or VGA input via the DVI or USB interfaces. Devices such as a printer, scanner, mouse, keyboard, mass storage, etc. can be connected via the USB 2.0 interfaces. Multimedia capability is realised via the CX1020-N020 audio interface. The modules CX1020-N030 and CX1020-N040 offer a total of four serial RS232 interfaces with a maximum transfer speed of 115 kbaud. These four interfaces can be implemented in pairs as RS422/RS485, in which case they are identified as CX1020-N031 and CX1020-N041 respectively. The system interfaces cannot be retrofitted or expanded in the field. They are supplied ex factory in the specified configuration and cannot be separated from the CPU module. The internal PC/104 bus runs through the system interfaces, so that further CX components can be connected. The power supply of the system interface modules is ensured via the internal PC/104 bus.

Technical data	CX1020-N010	CX1020-N020	CX1020-N030	CX1020-N040	CX1020-N031	CX1020-N041	CX1020-N060
Interfaces	1 x DVI + 2 x USB 2.0 (max. 500 mA per port)	Line IN, Line Mic IN, Line OUT	1 x COM1 + 1 x COM2, RS232	1 x COM3 + 1 x COM4, RS232	1 x COM1 + 1 x COM2, RS422/RS485	1 x COM3 + 1 x COM4, RS422/RS485	1 x Ethernet, 10/100 Mbit/s
Type of connection	DVI-I 29-pin socket + 2 USB ports type A	3.5 mm socket for jack plug	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	2 x D-sub socket, 9-pin	2 x D-sub socket, 9-pin	1 x RJ45
Properties	DVI-I interface also carries out VGA signals (DVI-A)	built-in PC beeper, Line OUT output, max. 200 mW, suitable for earphones	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N030/ N040	max. baud rate 115 kbaud, not combinable with N030/ N040	max. 20 m cable length Cat. 5, not combinable with CX1100- 0004
Power supply	via system bus (through CX1100-xxxx power supply modules)						
Dimensions (W x H x D)	19 mm x 100 mm x 51 mm						
Weight	approx. 80 g						
Operating/storage temperature	0...+55 °C/-25...+85 °C						
Relative humidity	95 %, no condensation						
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27						
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4						
Protection class	IP 20						
Approvals/markings	CE, UL						
Further information	www. beckhoff.com/ CX1020-N010	www. beckhoff.com/ CX1020-N020	www. beckhoff.com/ CX1020-N030	www. beckhoff.com/ CX1020-N040	www. beckhoff.com/ CX1020-N031	www. beckhoff.com/ CX1020-N041	www. beckhoff.com/ CX1020-N060

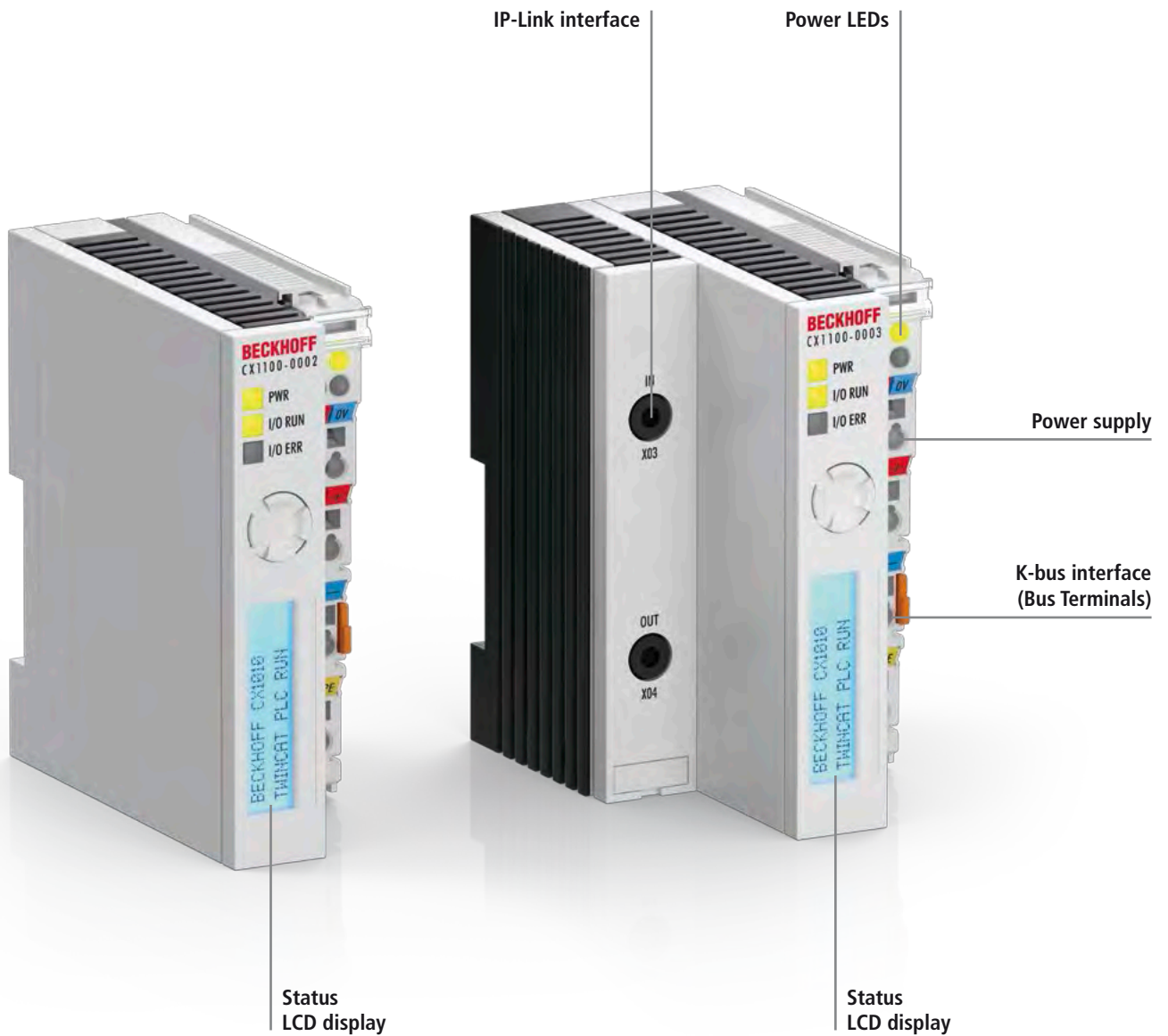


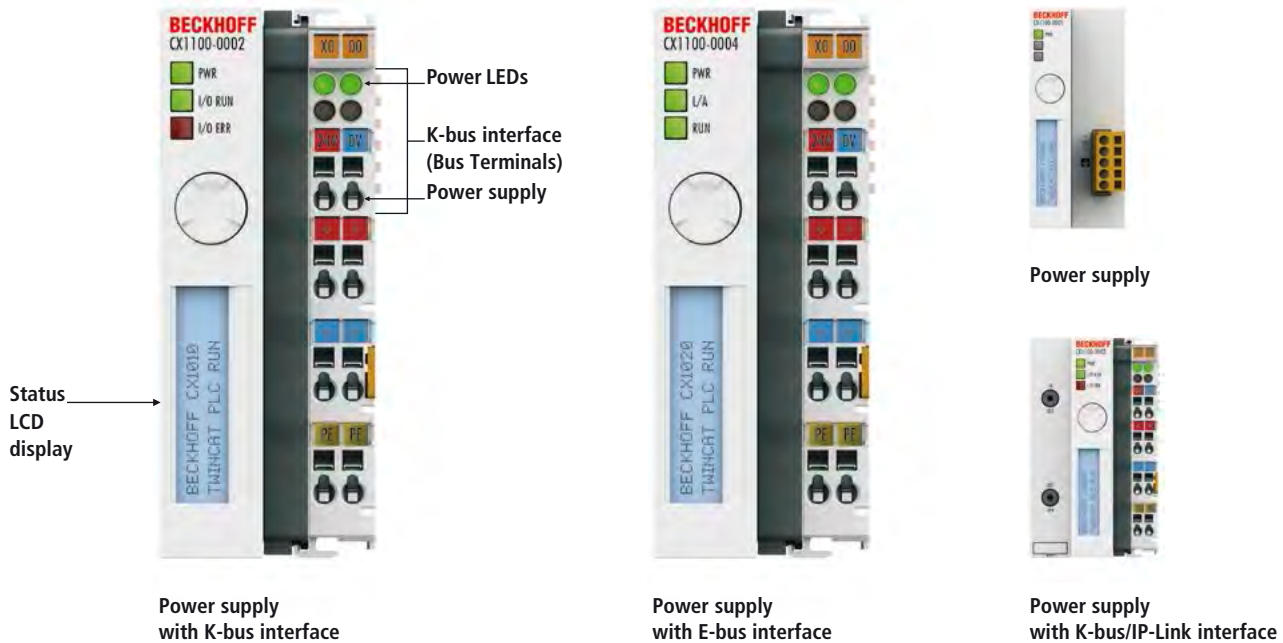
CX1030-N0xx | System interfaces

A number of optional interface modules are available for the basic CX1030 CPU module that can be installed ex factory. The CX1030-N010 option connects Beckhoff Control Panels or standard monitors with DVI or VGA input via the DVI or USB interfaces. Devices such as a printer, scanner, mouse, keyboard, mass storage, etc. can be connected via the USB 2.0 interfaces. Multimedia capability is realised via the CX1030-N020 audio interface. The modules CX1030-N030 and CX1030-N040 offer a total of four serial RS232 interfaces with a maximum transfer speed of 115 kbaud. These four interfaces can be implemented in pairs as RS422/RS485, in which case they are identified as CX1030-N031 and CX1030-N041 respectively. The system interfaces cannot be retrofitted or expanded in the field. They are supplied ex factory in the specified configuration and cannot be separated from the CPU module. The internal PC/104 bus runs through the system interfaces, so that further CX components can be connected. The power supply of the system interface modules is ensured via the internal PC/104 bus.

Technical data	CX1030-N010	CX1030-N020	CX1030-N030	CX1030-N040	CX1030-N031	CX1030-N041	CX1030-N060
Interfaces	1 x DVI + 2 x USB 2.0 (max. 500 mA per port)	Line IN, Line Mic IN, Line OUT	1 x COM1 + 1 x COM2, RS232	1 x COM3 + 1 x COM4, RS232	1 x COM1 + 1 x COM2, RS422/RS485	1 x COM3 + 1 x COM4, RS422/RS485	1 x Ethernet, 10/100 Mbit/s
Type of connection	DVI-I 29-pin socket + 2 USB ports type A	3.5 mm socket for jack plug	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	1 x RJ45
Properties	DVI-I interface also carries out VGA signals (DVI-A)	built-in PC beeper, Line OUT output, max. 200 mW, suitable for earphones	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N030/ N040	max. baud rate 115 kbaud, not combinable with N030/ N040	max. 20 m cable length Cat. 5, not combinable with CX1100- 0004
Power supply	via system bus (through CX1100-xxxx power supply modules)						
Dimensions (W x H x D)	19 mm x 100 mm x 51 mm						
Weight	approx. 80 g						
Operating/storage temperature	0...+55 °C/-25...+85 °C						
Relative humidity	95 %, no condensation						
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27						
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4						
Protection class	IP 20						
Approvals/markings	CE, UL						
Further information	www. beckhoff.com/ CX1030-N010	www. beckhoff.com/ CX1030-N020	www. beckhoff.com/ CX1030-N030	www. beckhoff.com/ CX1030-N040	www. beckhoff.com/ CX1030-N031	www. beckhoff.com/ CX1030-N041	www. beckhoff.com/ CX1030-N060

CX1100-, CX1500-xxxx | Embedded PC interfaces for CX10xx



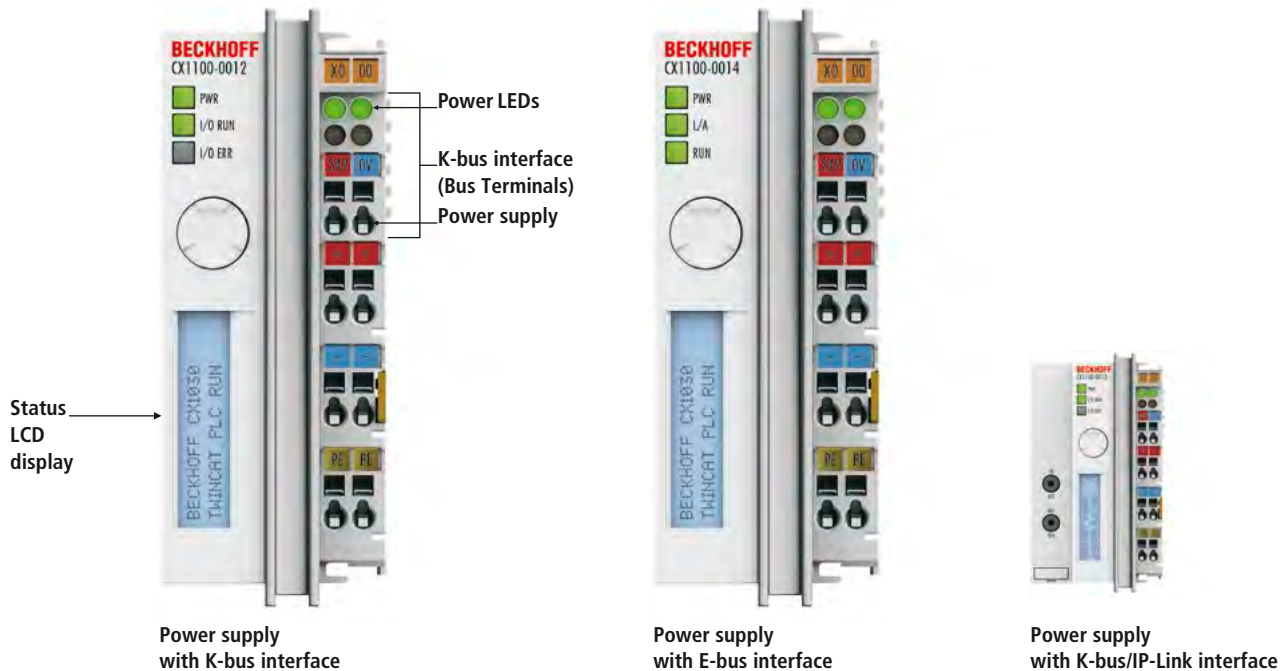


CX1100-000x | Power supply units and I/O interfaces for CX1010/CX1020

Four power supplies are optionally available for CX1010/CX1020 systems; all other system components are powered via the internal PC/104 bus. Each CX1100-000x power supply module contains an integrated NOVRAM for the non-volatile storage of process data and an LC display (two lines of 16 characters). The CX1100-0002 version is suitable for the direct connection of Beckhoff Bus Terminals (KLxxx); the Extension Box modules (IExxx) from the Fieldbus Box range can be connected to the CX1100-0003 in addition to the Bus Terminals. The CX1100-0004 power supply unit is available for the connection of EtherCAT Terminals (ELxxx). All power supply units for the CX1100-000x system can be exchanged in the field.

Technical data	CX1100-0002	CX1100-0004	CX1100-0001	CX1100-0003
Power supply	24 V DC (-15 %/+20 %)			
E-bus connection	–	yes (adapter terminal)	–	–
K-bus connection	yes (adapter terminal)	–	–	yes (adapter terminal)
IP-Link connection	–	–	–	yes
Current supply E-bus	–	2 A	–	–
Current supply K-bus	up to max. 1.75 A	–	–	1.75 A
Type of connection	spring-loaded technique (adapter terminal)	spring-loaded technique (adapter terminal)	1 x open style connector, 5-pin	spring-loaded technique (adapter terminal)
NOVRAM	8 kbytes			
Display	FSTN display 2 lines x 16 characters of text, illuminated			
I/O-DPRAM	4 kbytes	–	–	4 kbytes
Diagnostics LED	1 x PWR, 1 x I/O Run, 1 x I/O Err	1 x PWR, 1 x L/A, 1 x Run	1 x PWR	1 x PWR, 1 x I/O Run, 1 x I/O Err
Max. power consumption	3.5 W	3.5 W	2.5 W	4 W
Dimensions (W x H x D)	40 mm x 100 mm x 91 mm	40 mm x 100 mm x 91 mm	45 mm x 100 mm x 91 mm	58 mm x 100 mm x 91 mm
Weight	approx. 250 g	approx. 250 g	approx. 180 g	approx. 350 g
Operating/storage temperature	0...+55 °C/-25...+85 °C			
Relative humidity	95 %, no condensation			
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27			
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4			
Protection class	IP 20			
Approvals/markings	CE, UL			
Further information	www.beckhoff.com/CX1100-0002	www.beckhoff.com/CX1100-0004	www.beckhoff.com/CX1100-0001	www.beckhoff.com/CX1100-0003

EtherCAT Terminals see page 2 128, Bus Terminals see page 2 502, Fieldbus Box modules see page 2 636



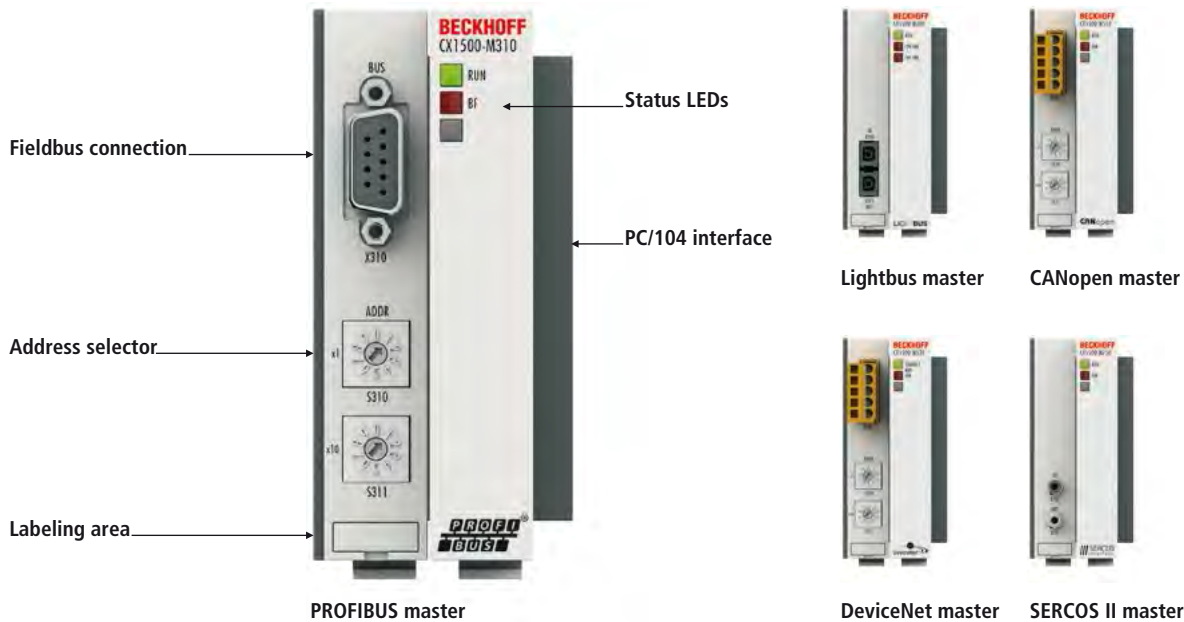
CX1100-001x | Power supply units and I/O interfaces for CX1030

Three power supplies are optionally available for CX1030 systems; all other system components are powered via the internal PC/104 bus. Each CX1100-001x power supply module contains an integrated NOVRAM for the non-volatile storage of process data and an LC display (two lines of 16 characters). The CX1100-0012 version is suitable for the direct connection of Beckhoff Bus Terminals (KLxxxx); the Extension Box modules (IExxxx) from the Fieldbus Box range can be connected to the CX1100-0013 in addition to the Bus Terminals. The CX1100-0014 power supply unit is available for EtherCAT Terminals (ELxxxx). The power supply units of the CX system can be changed in the field.

The CX1100-001x power supply units are electronically identical to the CX1100-000x series, but have an internal heat sink and additional ventilation slits. The CX1100-001x series is suitable for non-standard assembly directions, even when using a CX1020 or a CX1010 (see documentation).

Technical data	CX1100-0012	CX1100-0014	CX1100-0013
Power supply	24 V DC (-15 %/+20 %)		
E-bus connection	–	yes (adapter terminal)	–
K-bus connection	yes (adapter terminal)	–	yes (adapter terminal)
IP-Link connection	–	–	yes
Current supply E-bus	–	2 A	–
Current supply K-bus	up to max. 1.75 A	–	2 A
Type of connection	spring-loaded technique (adapter terminal)		
NOVRAM	8 kbytes		
Display	FSTN display 2 lines x 16 characters of text, illuminated		
I/O-DPRAM	4 kbytes	–	4 kbytes
Diagnostics LED	1 x PWR, 1 x I/O Run, 1 x I/O Err	1 x PWR, 1 x L/A, 1 x Run	1 x PWR, 1 x I/O Run, 1 x I/O Err
Dimensions (W x H x D)	42 mm x 109 mm x 92 mm	42 mm x 109 mm x 92 mm	58 mm x 109 mm x 92 mm
Weight	approx. 240 g	approx. 235 g	approx. 325 g
Operating/storage temperature	0...+55 °C/-25...+85 °C		
Relative humidity	95 %, no condensation		
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27		
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4		
Protection class	IP 20		
Approvals/markings	CE, UL		
Further information	www.beckhoff.com/CX1100-0012	www.beckhoff.com/CX1100-0014	www.beckhoff.com/CX1100-0013

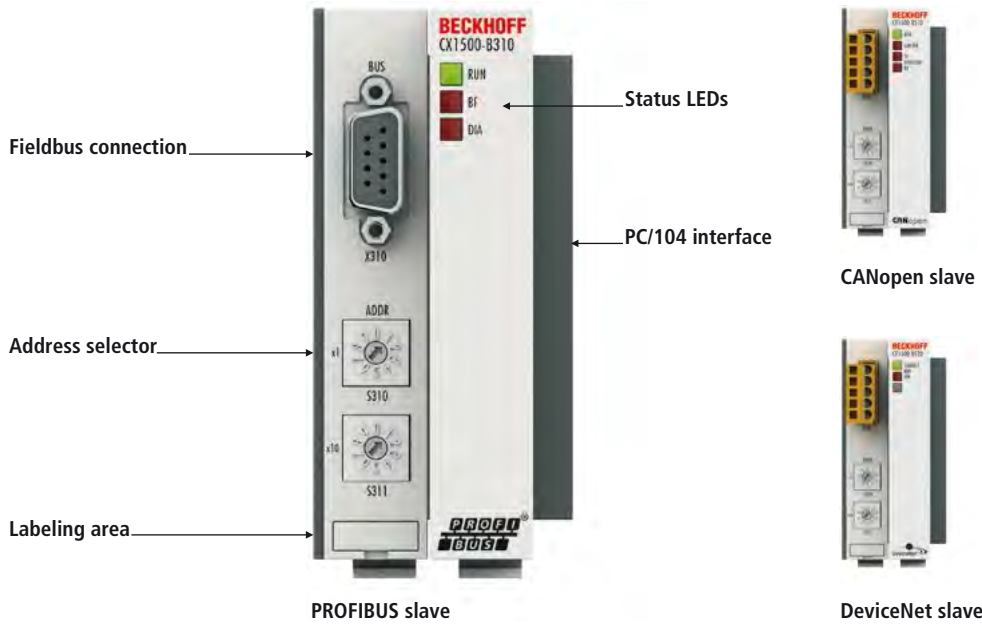
EtherCAT Terminals see page [2 128](#), Bus Terminals see page [2 502](#), Fieldbus Box modules see page [2 636](#)



CX1500-Mxxx | Master fieldbus connections for CX10x0

The fieldbus master modules enable the segment-like construction of control structures in extensive plants and machines. The parallel operation of several identical or different masters is possible, e.g. two PROFIBUS masters or a PROFIBUS master and a SERCOS II master simultaneously in a system. In the case of mixed operation of master and slave connections, CX systems act as intelligent gateways between different fieldbuses: data are received, processed and fed into other fieldbuses. Compared with the PC Fieldbus Cards, the performance data of the fieldbus master modules are almost identical; CX variants are single-channel, however. Master or slave connections network several CX systems with one another strictly deterministically via the fieldbus level. CX fieldbus modules can be retrofitted/exchanged by adding them to existing CX systems. The fieldbus connections are powered via the PC/104 bus. The scanning and recognising of the modules, the parameterisation, the configuration of the connected I/O components and the online diagnosis of the process/fieldbus status take place in the TwinCAT System Manager.

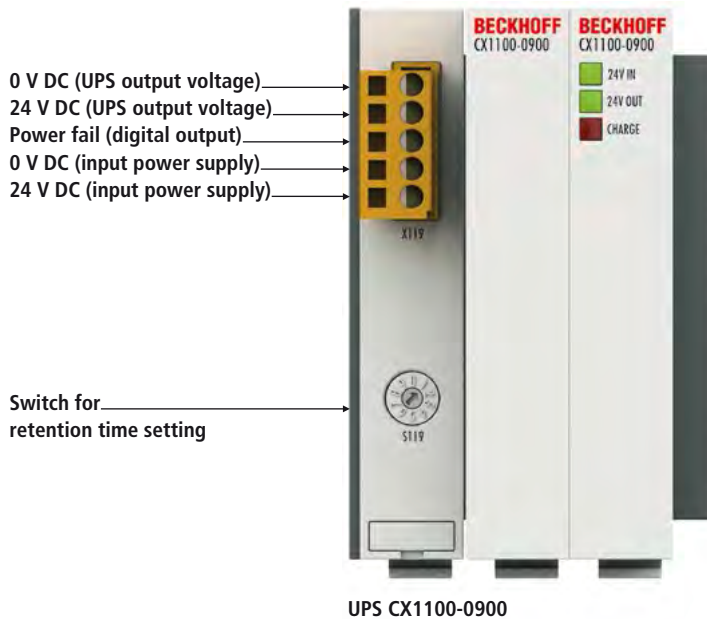
Technical data	CX1500-M200	CX1500-M310	CX1500-M510	CX1500-M520	CX1500-M750
Fieldbus	Lightbus	PROFIBUS DP, DP-V1, DP-V2 (MC)	CANopen	DeviceNet	SERCOS II
Data transfer rates	2.5 Mbaud, 32 bit of process data in 25 µs	9.6 kbaud... 12 Mbaud	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbaud	125, 250, 500 kbaud	2, 4, 8, 16 Mbaud
Bus interface	2 x fibre optic	1 x D-sub socket, 9-pin	open style connector, 5-pin	open style connector, 5-pin	FSMA standard, IEC 872-2
Bus device	max. 254 nodes with a max. of 65,280 I/O points	max. 125 slaves with up to 244 bytes data per slave	max. 127 slaves	max. 63 slaves	max. 254 slaves
Interface to the CPU	ISA plug and play, 2 kbyte DPRAM				
Max. power loss	2 W	1.8 W	1.8 W	1.8 W	1.3 W
Dimensions (W x H x D)	38 mm x 100 mm x 91 mm				
Weight	approx. 190 g				
Operating/storage temperature	0...+55 °C/-25...+85 °C				
Relative humidity	95 %, no condensation				
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27				
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4				
Driver	only compatible with TwinCAT 2	for TwinCAT 2/ TwinCAT 3	for TwinCAT 2/ TwinCAT 3	for TwinCAT 2/ TwinCAT 3	for TwinCAT 2/ TwinCAT 3
Protection class	IP 20				
Approvals/markings	CE, UL				
Further information	www.beckhoff.com/ CX1500-M200	www.beckhoff.com/ CX1500-M310	www.beckhoff.com/ CX1500-M510	www.beckhoff.com/ CX1500-M520	www.beckhoff.com/ CX1500-M750



CX1500-Bxxx | Slave fieldbus connections for CX10x0

Fieldbus slave modules enable the use of a CX system as a subordinate local controller for the construction of complex or modular systems. External process data are received from the master and processed, or data from its own process peripherals are returned to the master controller directly or processed. The interface between the respective bus system and the CX CPU module is the DPRAM, which is addressed by the CPU module via the internal ISA bus. The parallel operation of several identical or different slave connections is possible, e.g. two PROFIBUS slaves or a PROFIBUS slave and a SERCOS slave simultaneously in a system. In the case of mixed operation of master and slave connections, CX systems act as intelligent gateways between different fieldbuses: data are received, processed and fed into other fieldbuses. The CX fieldbus modules are single-channel. Master or slave connections network several CX systems with one another strictly deterministically via the fieldbus level. CX fieldbus modules can be retrofitted/exchanged by adding them to existing CX systems. The fieldbus connections are powered via the PC/104 bus. The integration of the fieldbus connections in TwinCAT automation software is simple, as usual. The scanning and recognising of the modules, the parameterisation, the configuration of the connected I/O components and the online diagnosis of the process/fieldbus status take place in the TwinCAT System Manager.

Technical data	CX1500-B310	CX1500-B510	CX1500-B520
Fieldbus	PROFIBUS DP, DP-V1, DP-V2 (MC)	CANopen	DeviceNet
Data transfer rates	9.6 kbaud...12 Mbaud	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbaud	125, 250, 500 kbaud
Bus interface	1 x D-sub socket, 9-pin	open style connector, 5-pin	open style connector, 5-pin
Bus device	max. 125 slaves	max. 127 slaves	max. 63 slaves
Max. number of bytes	max. 244 byte input/ 244 byte output	max. 1536 byte input/ 1536 byte output	max. 255 byte input/ 255 byte output
Max. power loss	1.8 W		
Dimensions (W x H x D)	38 mm x 100 mm x 91 mm		
Weight	approx. 190 g		
Operating/storage temperature	0...+55 °C/-25...+85 °C		
Relative humidity	95 %, no condensation		
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27		
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4		
Driver	for TwinCAT 2/TwinCAT 3		
Protection class	IP 20		
Approvals/markings	CE, UL		
Further information	www.beckhoff.com/CX1500-B310	www.beckhoff.com/CX1500-B510	www.beckhoff.com/CX1500-B520



UPS CX1100-0900



UPS CX1100-0910



UPS CX1100-0920, CX1100-0930

CX1100-09x0 | UPS modules for CX10x0

The CX1100-09x0 UPS module (uninterruptible power supply) for CX CPUs and the connected CX components ensures that important data are stored safely by the user software if the external voltage fails. As opposed to other battery operated methods, the use of the latest capacitor technologies enables absolute freedom from maintenance and fast charging. By storing the data, for example on a Compact Flash card, in NOVRAM or via the network in a database, the machine or the process can be placed in a defined condition during the retention time of the UPS and the operating system can be shut down. The retention time can be set via a rotary switch or via software. UPS settings are made and its status messages are output via a DPRAM interface. The functionality of the UPS is therefore independent of the operating system to be used. No driver software is required. The TwinCAT System Manager recognises the UPS module automatically, and the signals are available to the PLC programmer. The module is installed by simply adding it to a CX system in addition to wiring a 24 V DC supply line, and it can also be retrofitted on site. The 24 V DC output voltage of the UPS is protected against short circuit and overload. When dimensioning the UPS, the power consumption of the CX device being powered must be considered. For the supply, a regulated 24 V DC power supply unit with an output current of at least 4 A is required. The CX1100-0920 UPS is recommended for UPS use with a CX1020 and the CX1100-0930 UPS for use with a CX1030.

Technical data	CX1100-0900	CX1100-0910	CX1100-0920	CX1100-0930
Power supply	24 V DC (-15 %/+20 %)			
Storage technology	capacitive			
Capacity	20 As	20 As	40 As	40 As
Retention time	adjustable, load-dependent			
Max. output current	550 mA (24 V DC)	1.1 A (24 V DC)	1.1 A (24 V DC)	2.0 A (24 V DC)
Charging current	max. 4 A			
Diagnostics LED	24 V DC input, 24 V DC output, Charge			
Interface to the CPU	16 bit ISA (PC/104 standard)			
Max. power loss	2 W			
Dimensions (W x H x D)	57 mm x 100 mm x 91 mm	76 mm x 100 mm x 91 mm	95 mm x 100 mm x 91 mm	95 mm x 100 mm x 91 mm
Weight	approx. 346 g	approx. 465 g	approx. 617 g	approx. 650 g
Operating/storage temperature	0...+55 °C/-25...+85 °C			
Relative humidity	95 %, no condensation			
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27			
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4			
Protection class	IP 20			
Approvals/markings	CE, UL			
Further information	www.beckhoff.com/ CX1100-0900	www.beckhoff.com/ CX1100-0910	www.beckhoff.com/ CX1100-0920	www.beckhoff.com/ CX1100-0930

CX5000 | Embedded PCs

► www.beckhoff.com/CX5000



Ethernet and USB connection

Optional interface (e.g. CANopen, EtherCAT, PROFINET, EtherNet/IP, RS232/RS485)

E-bus or K-bus interface

Battery compartment and Compact Flash insert behind the flap

DVI-D interface



CX5020 with optional PROFINET interfaces



CX5020 with D-sub plug, 9-pin



CX5020 with audio interface

The CX5000 series devices are DIN rail-mountable, fanless Embedded PCs with direct connection for EtherCAT Terminals or Bus Terminals.

The housing concept is optimised for sturdiness and compactness; the individual housing parts are made of metal (magnesium). Apart from the electrical advantages of better screening and ESD protection, the user benefits from the weight-saving magnesium construction.

The I/O level can be implemented both with Bus Terminals and with EtherCAT Terminals. The connection of EtherCAT gives rise to many different extension options. Further master/slave fieldbus connections (PROFIBUS, CANopen, DeviceNet) or communication interfaces (RS232, RS422/RS485) and all other signal types accessible via EtherCAT can be directly connected as EtherCAT Terminals.

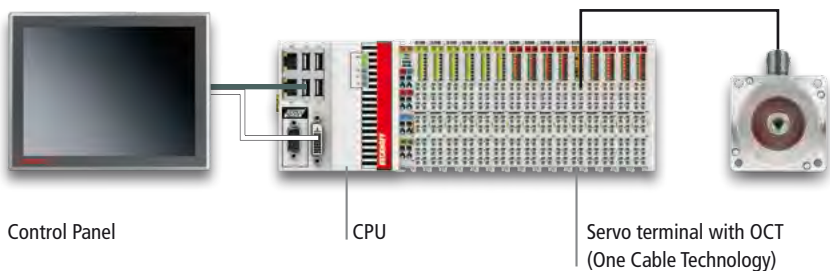
Two independent Gigabit Ethernet ports and four USB 2.0 interfaces are available. A Beckhoff Control Panel or a commercially available DVI monitor can be connected to the DVI-D interface. Unlike the other CX device families, the CX5000 series has no option for expansion using attachable expansion modules to the left. There is, however, a factory-fitted option slot in the basic housing. For example, a serial port (RS232/RS422/RS485) or a fieldbus connection with master or slave function can be added as an optional interface as required. Particularly worth mentioning is the function as an EtherCAT slave, as a result of which the CX5000 becomes a programmable local controller within an EtherCAT network.

The operating system can be Windows Embedded CE 6 or Windows Embedded Standard 2009. An exchangeable, industrially-compatible CF card, which can be accessed

behind a panel, is used as boot and storage medium. The CF card serves as a substitute for a hard disk; i.e. the operating system as well as TwinCAT and user projects are stored on it. This way, in the case of service, hardware can be exchanged quickly or a software update can be performed on site by simply exchanging the CF card. The builtin capacitive 1-second UPS ensures secure backup of persistent application data on the CF card. The date and time are buffered via a replaceable battery.

TwinCAT automation software transforms a CX5000 system into a powerful PLC and motion control system that can be operated with or without visualisation.

The extended operating temperature range between -25 and +60 °C enables application in climatically demanding situations.

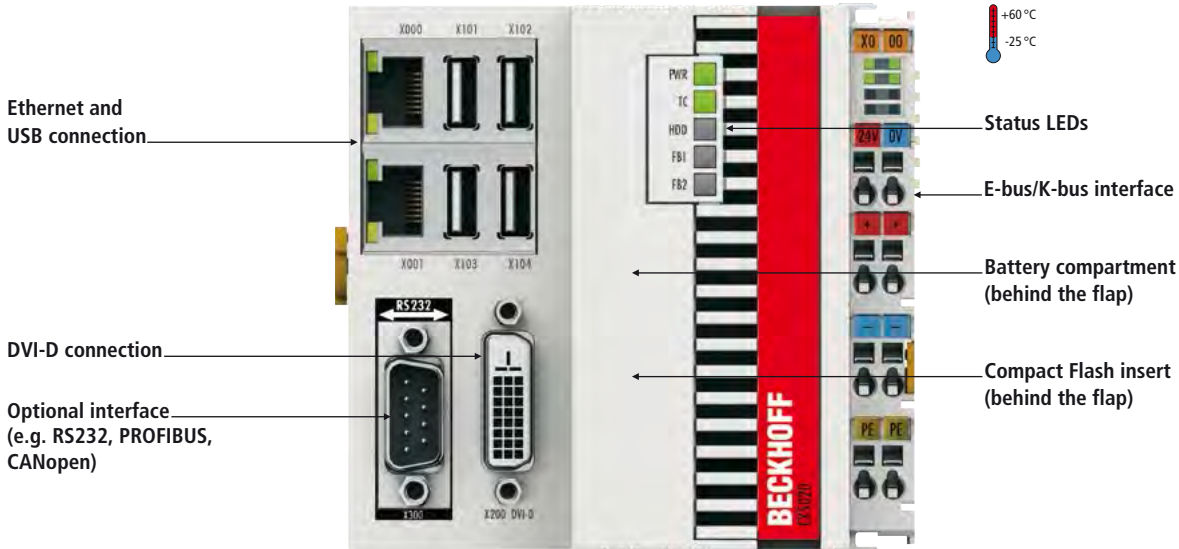


Application example: PLC and motion control system with DVI/USB interface

- PLC and motion control software
- Control Panel connection via DVI/USB
- Windows Embedded CE 6 and TwinCAT NC

Components

- CPU CX5020-0112
- display CP39xx
- drive: EL7211-0010 servo terminal and AM8131-wF1z motor



CX5010, CX5020 | Embedded PC series with Intel Atom® processor

The CX5010 and CX5020 are Embedded PCs from the CX5000 series based on Intel Atom® processors and differ only by the CPU version. The CX5010 has a 1.1 GHz Intel Atom® Z510 processor, while the CX5020 has a 1.6 GHz Intel Atom® Z530 processor. Apart from the clock speed, the two processors also differ

by the fact that the Z530 features hyper-threading technology, i.e. it has two virtual CPU cores for more effective execution of software.

Depending on the installed TwinCAT runtime environment, the CX5010/CX5020 can be used for the implementation of PLC

or PLC/motion control projects (with or without visualisation).

The order identifier is derived as follows:

CX50x0-U1ST

- 0 = no TwinCAT
- 1 = with TwinCAT 2 PLC runtime
- 2 = with TwinCAT 2 NC PTP runtime
- 5 = with TwinCAT 3 runtime (XAR)
- 0 = no operating system
- 1 = Windows Embedded CE 6
- 2 = Windows Embedded Standard 2009
- 0 = E-bus interface for EtherCAT Terminals
- 1 = K-bus interface for Bus Terminals
- 1 = Intel Atom® processor 1.1 GHz
- 2 = Intel Atom® processor 1.6 GHz

Since not all combinations make sense, the table ordering information contains a breakdown of the permissible combinations.

Optional interfaces:

- CX50x0-N020 = audio interface
- CX50x0-N030 = RS232, D-sub plug
- CX50x0-N031 = RS422/RS485, D-sub socket
- CX50x0-M310 = PROFIBUS master, D-sub socket, 9-pin
- CX50x0-B310 = PROFIBUS slave, D-sub socket, 9-pin
- CX50x0-M510 = CANopen master, D-sub plug, 9-pin
- CX50x0-B510 = CANopen slave, D-sub plug, 9-pin
- CX50x0-M930 = PROFINET RT, controller
- CX50x0-B930 = PROFINET RT, device, Ethernet (2 x RJ45 switch)
- CX50x0-B950 = EtherNet/IP adapter, Ethernet (2 x RJ45 switch)
- CX50x0-B110 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)

Technical data	CX5010	CX5020
Processor	Intel Atom® Z510, 1.1 GHz clock frequency	Intel Atom® Z530, 1.6 GHz clock frequency
Number of cores	1	
Flash memory	slot for Compact Flash card, 128 MB included (expandable)	
Main memory	512 MB RAM (not expandable)	512 MB RAM (expandable ex factory to 1 GB)
Persistent memory	integrated 1-second UPS (1 MB on Compact Flash card)	
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-D, 4 x USB 2.0, 1 x optional interface	
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status	
Clock	internal battery-backed clock for time and date (battery exchangeable)	
Operating system	Microsoft Windows Embedded CE 6 or Microsoft Windows Embedded Standard 2009	
Control software	TwinCAT 2 runtime TwinCAT 3 runtime (XAR)	
I/O connection	E-bus or K-bus, automatic recognition	
Power supply	24 V DC (-15 %/+20 %)	
Current supply E-bus/K-bus	2 A	
Max. power consumption	12 W	13 W
Dimensions (W x H x D)	100 mm x 106 mm x 92 mm	
Weight	approx. 575 g	
Operating/storage temperature	-25...+60 °C/-40...+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals/markings	CE, UL, ATEX	
TC3 performance class	Performance (40); for further information on TwinCAT 3 see page 524	
Further information	www.beckhoff.com/CX5010	www.beckhoff.com/CX5020

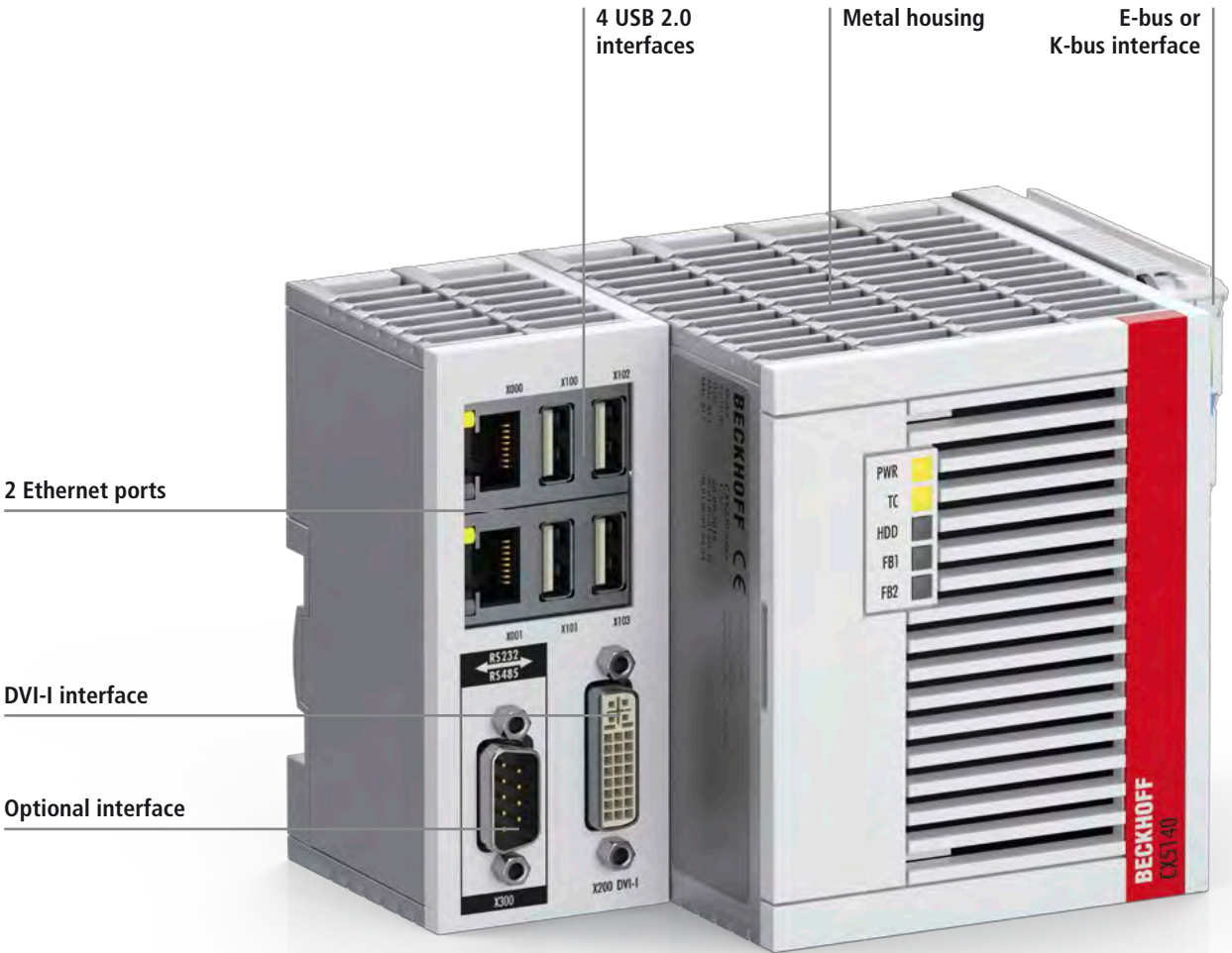
Ordering information	E-bus	K-bus	no operating system	Windows Embedded CE 6	Windows Embedded Standard 2009	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC PTP runtime	TwinCAT 3 runtime (XAR)
CX50x0-0100	x	-	x	-	-	x	-	-	-
CX50x0-0110	x	-	-	x	-	x	-	-	-
CX50x0-0111	x	-	-	x	-	-	x	-	-
CX50x0-0112	x	-	-	x	-	-	x	x	-
CX50x0-0115	x	-	-	x	-	-	-	-	x
CX50x0-0120	x	-	-	-	x*	x	-	-	-
CX50x0-0121	x	-	-	-	x*	-	x	-	-
CX50x0-0122	x	-	-	-	x*	-	x	x	-
CX50x0-0125	x	-	-	-	x*	-	-	-	x
CX50x0-1100	-	x	x	-	-	x	-	-	-
CX50x0-1110	-	x	-	x	-	x	-	-	-
CX50x0-1111	-	x	-	x	-	-	x	-	-
CX50x0-1112	-	x	-	x	-	-	x	x	-
CX50x0-1115	-	x	-	x	-	-	-	-	x
CX50x0-1120	-	x	-	-	x*	x	-	-	-
CX50x0-1121	-	x	-	-	x*	-	x	-	-
CX50x0-1122	-	x	-	-	x*	-	x	x	-
CX50x0-1125	-	x	-	-	x*	-	-	-	x

Options	
CX1900-0204	1 GB DDR2 RAM for CX5020, instead of 512 MB DDR2 RAM; pre-assembled ex factory
CX1800-0401	Microsoft Windows Embedded Standard 7 P 32 bit instead of Microsoft Windows Embedded Standard 2009
CX1900-0105	Device modification for CX5010 and CX5020 Embedded PCs according to the requirements for ATEX certification. The modification is mandatory for the usage of the devices in hazardous areas, Zone 2. It includes the modification and repositioning of the device label as well as a mounting bracket installed ex works for mechanical locking of the connectors. Product labeling: ATEX: II 3 G Ex nA IIC T4 Gc Read the device documentation for use in hazardous areas carefully.

*CX50x0 systems with Microsoft Embedded Standard 2009 require Compact Flash with a capacity of at least 2 GB (must be ordered separately).

CX5100 | Embedded PCs

► www.beckhoff.com/CX5100





CX5120



CX5130



CX5140

The DIN-rail-mountable, fanless Embedded PCs from the CX5100 series are equipped with Intel Atom® multi-core processors. The series encompasses three devices that differ from each other by processor type, RAM size and housing size. The CX5100 Embedded PCs supplement the existing devices of the CX5000 series which are equipped with processors of the first Intel Atom® generation. In direct comparison the processors are considerably more efficient: the out-of-order architecture and the modern 22-nm technology enable higher clock rates combined with reduced power losses.

- CX5120: Intel Atom® CPU, 1.46 GHz, 1 core
- CX5130: Intel Atom® CPU, 1.75 GHz, 2 cores
- CX5140: Intel Atom® CPU, 1.91 GHz, 4 cores

The CX5100 has a fixed number of system interfaces, which in the basic version is identical to previous CX5000 devices.


Two independent Gigabit Ethernet ports and four USB 2.0 interfaces are available.

To the DVI-I interface either a Beckhoff Control Panel or a commercially available DVI or VGA monitor can be connected.

Like the CX5000 the CX5100 series has a compact design; a modular device with

extension modules like in the CX2000 series is not available. The option interface of the CX5100 can be factory-fitted with various interfaces depending on needs: e.g. with a serial port (RS232/RS422/RS485) or a fieldbus connection for master or slave function. If the EtherCAT slave option is selected, the CX5100 becomes a programmable, decentralised controller within an EtherCAT network.

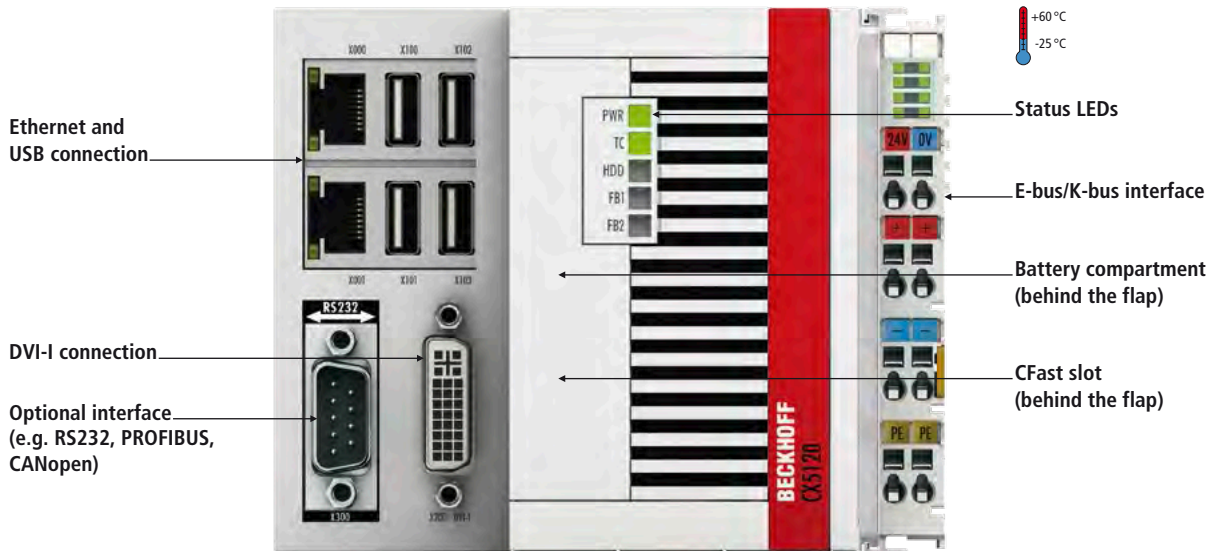
At I/O level either Bus Terminals or EtherCAT Terminals can be used. Like all Embedded PCs of the second generation, the CX5100 automatically recognises the I/O type that is plugged-in. With EtherCAT many different extension options are available: further master/slave fieldbus connections (PROFIBUS, CANopen, DeviceNet, etc.) and communication interfaces (RS232, RS422/RS485) as well as all other signal types supported by EtherCAT can be directly connected as EtherCAT Terminals.

 The extended operating temperature range between -25 and +60 °C enables application in climatically demanding situations.

The operating system is Windows Embedded Compact 7, Embedded Standard 7 P, Windows 10 IoT Enterprise 2016 LTSC or Windows 10 IoT Enterprise 2019 LTSC. The boot and storage medium

is an interchangeable, industrially compatible CFast card with a slot that is accessible behind a cover. The CFast card serves as a substitute for a hard disk; i.e. the operating system as well as TwinCAT and user projects are stored on it. Fast hardware exchange is thus possible if service is required; a software update can be performed simply by replacing the card on site. The built-in capacitive 1-second UPS ensures secure backup of persistent application data on the CFast card. Date and time are buffered via a replaceable battery.

The CX5100 Embedded PCs are positioned in terms of both price and performance below the CX2000 series with multi-core-i CPU. If the machine and plant programmer uses the CX5100 in combination with the TwinCAT 3 automation suite, he now benefits from the availability of genuine multi-core processors and the optimised allocation of different program sections to individual cores, even with Intel Atom®-based devices.



CX5120 | Embedded PC with Intel Atom® processor

The CX5120 has an Intel Atom® single-core processor with a clock rate of 1.46 GHz. The hardware interfaces in this series are oriented and implemented identically to those of the existing CX5000 series. Two independent, Gigabit-capable Ethernet interfaces as well as four USB 2.0 and a DVI-I interface are available. A multitude of further connection options or gateway functions are created by an option inter-

face, which can be pre-fitted in the factory, as well as the I/O level, which can selectively consist either of E-bus or K-bus terminals. The CX5120 is characterised by low power consumption and fanless design. Depending on the installed TwinCAT runtime environment, the CX5120 can be used for implementing PLC or PLC/motion control projects with or without visualisation. The execution of motion control applications

with interpolating axis movements is also possible. Like the CX5000, the CX5100 series has a compact design; a modular device with extension modules like in the CX2000 series is not available. The order identifier is derived as follows:

CX5120-01ST

- 0 = no TwinCAT
 - 1 = with TwinCAT 2 PLC runtime
 - 2 = with TwinCAT 2 NC PTP runtime
 - 3 = with TwinCAT 2 NC I runtime
 - 5 = with TwinCAT 3 runtime (XAR)
-
- 0 = no operating system
 - 1 = Windows Embedded Compact 7
 - 2 = Windows Embedded Standard 7 P 32 bit
 - 3 = Windows Embedded Standard 7 P 64 bit
 - 4 = Windows 10 IoT Enterprise 2016 LTSB 32 bit
 - 5 = Windows 10 IoT Enterprise 2016 LTSB 64 bit
 - 6 = Windows 10 IoT Enterprise 2019 LTSC 32 bit
 - 7 = Windows 10 IoT Enterprise 2019 LTSC 64 bit

Further ordering options see price list.

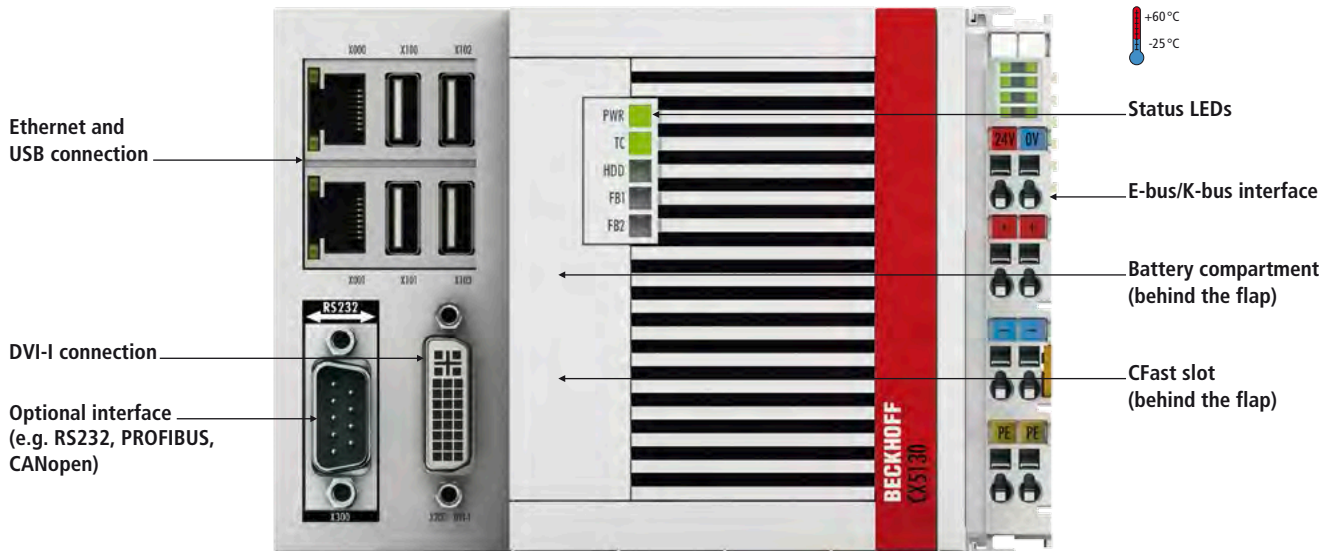
Since not all combinations make sense, the table ordering information contains a breakdown of the permissible combinations.

Optional interfaces:

- CX5120-N020 = audio interface
- CX5120-N030 = RS232, D-sub plug
- CX5120-N031 = RS422/RS485, D-sub socket
- CX5120-M310 = PROFIBUS master, D-sub socket, 9-pin
- CX5120-B310 = PROFIBUS slave, D-sub socket, 9-pin
- CX5120-M510 = CANopen master, D-sub plug, 9-pin
- CX5120-B510 = CANopen slave, D-sub plug, 9-pin
- CX5120-M930 = PROFINET RT, controller
- CX5120-B930 = PROFINET RT, device, Ethernet (2 x RJ45 switch)
- CX5120-B950 = EtherNet/IP adapter, Ethernet (2 x RJ45 switch)
- CX5120-B110 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)

Technical data	CX5120
Processor	Intel Atom® E3815, 1.46 GHz
Number of cores	1
Flash memory	slot for CFast card and microSD card, cards not included
Main memory	2 GB DDR3 RAM (not expandable)
Persistent memory	integrated 1-second UPS (1 MB on CFast card)
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded Compact 7, Microsoft Windows Embedded Standard 7 P, Microsoft Windows 10 IoT Enterprise 2016 LTSB, Microsoft Windows 10 IoT Enterprise 2019 LTSC
Control software	TwinCAT 2 runtime TwinCAT 3 runtime (XAR)
I/O connection	E-bus or K-bus, automatic recognition
Power supply	24 V DC (-15 %/+20 %)
Current supply E-bus/K-bus	2 A
Max. power consumption	11 W
Max. power consumption (with loading UPS)	18 W
Dimensions (W x H x D)	124 mm x 100 mm x 92 mm
Weight	approx. 860 g
Operating/storage temperature	-25...+60 °C/-40...+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals/markings	CE, UL, ATEX, IECEx
TC3 performance class	Performance (40); for further information on TwinCAT 3 see page 524
Further information	www.beckhoff.com/CX5120

Ordering information	no operating system	Windows Embedded		Windows 10 IoT Enterprise				no Twin-CAT	TwinCAT 2 runtime			TwinCAT 3 runtime (XAR)
		Com-pact 7	Standard 7 P	2016 LTSB	2019 LTSC	PLC	NC PTP		NC I			
CX5120-0100	x	-	-	-	-	-	-	x	-	-	-	-
CX5120-0110	-	x	-	-	-	-	-	x	-	-	-	-
CX5120-0111	-	x	-	-	-	-	-	-	x	-	-	-
CX5120-0112	-	x	-	-	-	-	-	-	-	x	-	-
CX5120-0113	-	x	-	-	-	-	-	-	-	-	x	-
CX5120-0115	-	x	-	-	-	-	-	-	-	-	-	x
CX5120-0120	-	-	x	-	-	-	-	x	-	-	-	-
CX5120-0121	-	-	x	-	-	-	-	-	x	-	-	-
CX5120-0122	-	-	x	-	-	-	-	-	-	x	-	-
CX5120-0123	-	-	x	-	-	-	-	-	-	-	x	-
CX5120-0125	-	-	x	-	-	-	-	-	-	-	-	x
CX5120-0130	-	-	-	x	-	-	-	x	-	-	-	-
CX5120-0135	-	-	-	x	-	-	-	-	-	-	-	x
CX5120-0140	-	-	-	-	x	-	-	x	-	-	-	-
CX5120-0141	-	-	-	-	x	-	-	-	x	-	-	-
CX5120-0142	-	-	-	-	x	-	-	-	-	x	-	-
CX5120-0143	-	-	-	-	x	-	-	-	-	-	x	-
CX5120-0150	-	-	-	-	-	x	-	x	-	-	-	-
CX5120-0155	-	-	-	-	-	x	-	-	-	-	-	x
CX5120-0160	-	-	-	-	-	-	x	x	-	-	-	-
CX5120-0161	-	-	-	-	-	-	x	-	x	-	-	-
CX5120-0162	-	-	-	-	-	-	x	-	-	x	-	-
CX5120-0163	-	-	-	-	-	-	x	-	-	-	x	-
CX5120-0170	-	-	-	-	-	-	-	x	x	-	-	-
CX5120-0175	-	-	-	-	-	-	-	-	x	-	-	x



CX5130 | Embedded PC with Intel Atom® processor

The CX5130 has an Intel Atom® multi-core processor with a clock rate of 1.75 GHz. This makes genuine multi-core technology possible in the Embedded PC segment. The hardware interfaces in this series are oriented and implemented identically to those of the existing CX5000 series. Two independent, Gigabit-capable Ethernet interfaces as well as four USB 2.0 and a DVI-I interface are available. A multitude

of further connection options and gateway functions is created by an option interface, which can be pre-equipped ex factory, as well as the I/O level, which can optionally consist of either E-bus or K-bus terminals.

The CX5130 is characterised by low power consumption and fanless design.

Depending on the installed TwinCAT runtime environment, the CX5130 can be used for implementing PLC or PLC/motion

control projects with or without visualisation. The execution of motion control applications with interpolating axis movements is also possible.

Like the CX5000, the CX5100 series has a compact design; a modular device with extension modules like in the CX2000 series is not available.

The order identifier is derived as follows:

CX5130-01ST

- 0 = no TwinCAT
 - 1 = with TwinCAT 2 PLC runtime
 - 2 = with TwinCAT 2 NC PTP runtime
 - 3 = with TwinCAT 2 NC I runtime
 - 5 = with TwinCAT 3 runtime (XAR)
-
- 0 = no operating system
 - 1 = Windows Embedded Compact 7
 - 2 = Windows Embedded Standard 7 P 32 bit
 - 3 = Windows Embedded Standard 7 P 64 bit
 - 4 = Windows 10 IoT Enterprise 2016 LTSB 32 bit
 - 5 = Windows 10 IoT Enterprise 2016 LTSB 64 bit
 - 6 = Windows 10 IoT Enterprise 2019 LTSC 32 bit
 - 7 = Windows 10 IoT Enterprise 2019 LTSC 64 bit

Further ordering options see price list.

Since not all combinations make sense, the table ordering information contains a breakdown of the permissible combinations.

Optional interfaces:

- CX5130-N011 = DisplayPort interface
- CX5130-N020 = audio interface
- CX5130-N030 = RS232, D-sub plug
- CX5130-N031 = RS422/RS485, D-sub socket
- CX5130-M310 = PROFIBUS master, D-sub socket, 9-pin
- CX5130-B310 = PROFIBUS slave, D-sub socket, 9-pin
- CX5130-M510 = CANopen master, D-sub plug, 9-pin
- CX5130-B510 = CANopen slave, D-sub plug, 9-pin
- CX5130-M930 = PROFINET RT, controller
- CX5130-B930 = PROFINET RT, device, Ethernet (2 x RJ45 switch)
- CX5130-B950 = EtherNet/IP adapter, Ethernet (2 x RJ45 switch)
- CX5130-B110 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)

Technical data	CX5130
Processor	Intel Atom® E3827, 1.75 GHz
Number of cores	2
Flash memory	slot for CFast card and microSD card, cards not included
Main memory	4 GB DDR3 RAM (not expandable)
Persistent memory	integrated 1-second UPS (1 MB on CFast card)
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded Compact 7 (supports only one CPU core), Microsoft Windows Embedded Standard 7 P, Microsoft Windows 10 IoT Enterprise 2016 LTSB, Microsoft Windows 10 IoT Enterprise 2019 LTSC
Control software	TwinCAT 2 runtime TwinCAT 3 runtime (XAR)
I/O connection	E-bus or K-bus, automatic recognition
Power supply	24 V DC (-15 %/+20 %)
Current supply E-bus/K-bus	2 A
Max. power consumption	14 W
Max. power consumption (with loading UPS)	20 W
Dimensions (W x H x D)	142 mm x 100 mm x 92 mm
Weight	approx. 960 g
Operating/storage temperature	-25...+60 °C/-40...+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals/markings	CE, UL, ATEX, GL, IECEx
TC3 performance class	Performance (40); for further information on TwinCAT 3 see page 524
Further information	www.beckhoff.com/CX5130

Ordering information	no operating system	Windows Embedded Com-		Windows 10 IoT Enterprise 2016 LTSB		Windows 10 IoT Enterprise 2019 LTSC		no Twin-CAT	TwinCAT 2 runtime			TwinCAT 3 runtime (XAR)
		pact 7	32 bit	64 bit	32 bit	64 bit	32 bit		64 bit	PLC	NC PTP	
CX5130-0100	x	-	-	-	-	-	-	x	-	-	-	-
CX5130-0110	-	x	-	-	-	-	-	x	-	-	-	-
CX5130-0111	-	x	-	-	-	-	-	-	x	-	-	-
CX5130-0112	-	x	-	-	-	-	-	-	-	x	-	-
CX5130-0113	-	x	-	-	-	-	-	-	-	-	x	-
CX5130-0115	-	x	-	-	-	-	-	-	-	-	-	x
CX5130-0120	-	-	x	-	-	-	-	x	-	-	-	-
CX5130-0121	-	-	x	-	-	-	-	-	x	-	-	-
CX5130-0122	-	-	x	-	-	-	-	-	-	x	-	-
CX5130-0123	-	-	x	-	-	-	-	-	-	-	x	-
CX5130-0125	-	-	x	-	-	-	-	-	-	-	-	x
CX5130-0130	-	-	-	x	-	-	-	x	-	-	-	-
CX5130-0135	-	-	-	x	-	-	-	-	-	-	-	x
CX5130-0140	-	-	-	-	x	-	-	x	-	-	-	-
CX5130-0141	-	-	-	-	x	-	-	-	x	-	-	-
CX5130-0142	-	-	-	-	x	-	-	-	-	x	-	-
CX5130-0143	-	-	-	-	x	-	-	-	-	-	x	-
CX5130-0150	-	-	-	-	-	x	-	x	-	-	-	-
CX5130-0155	-	-	-	-	-	x	-	-	-	-	-	x
CX5130-0160	-	-	-	-	-	-	x	x	-	-	-	-
CX5130-0161	-	-	-	-	-	-	x	-	x	-	-	-
CX5130-0162	-	-	-	-	-	-	x	-	-	x	-	-
CX5130-0163	-	-	-	-	-	-	x	-	-	-	x	-
CX5130-0170	-	-	-	-	-	-	-	x	x	-	-	-
CX5130-0175	-	-	-	-	-	-	-	x	-	-	-	x



CX5140 | Embedded PC with Intel Atom® processor

The CX5140 has an Intel Atom® quad-core processor with a clock rate of 1.91 GHz. This makes genuine multi-core technology possible in the Embedded PC segment. The hardware interfaces in this series are oriented and implemented identically to those of the existing CX5000 series. Two independent, Gigabit-capable Ethernet interfaces as well as four USB 2.0 and a DVI-I interface are available. A multitude

of further connection options and gateway functions is created by an option interface, which can be pre-equipped ex factory, as well as the I/O level, which can optionally consist of either E-bus or K-bus terminals.

The CX5140 is characterised by low power consumption and fanless design.

Depending on the installed TwinCAT runtime environment, the CX5140 can be used for implementing PLC or PLC/motion

control projects with or without visualisation. The execution of motion control applications with interpolating axis movements is also possible.

Like the CX5000, the CX5100 series has a compact design; a modular device with extension modules like in the CX2000 series is not available.

The order identifier is derived as follows:

CX5140-01ST

- 0 = no TwinCAT
 - 1 = with TwinCAT 2 PLC runtime
 - 2 = with TwinCAT 2 NC PTP runtime
 - 3 = with TwinCAT 2 NC I runtime
 - 5 = with TwinCAT 3 runtime (XAR)
-
- 0 = no operating system
 - 1 = Windows Embedded Compact 7
 - 2 = Windows Embedded Standard 7 P 32 bit
 - 3 = Windows Embedded Standard 7 P 64 bit
 - 4 = Windows 10 IoT Enterprise 2016 LTSB 32 bit
 - 5 = Windows 10 IoT Enterprise 2016 LTSB 64 bit
 - 6 = Windows 10 IoT Enterprise 2019 LTSC 32 bit
 - 7 = Windows 10 IoT Enterprise 2019 LTSC 64 bit

Further ordering options see price list.

Since not all combinations make sense, the table ordering information contains a breakdown of the permissible combinations.

Optional interfaces:

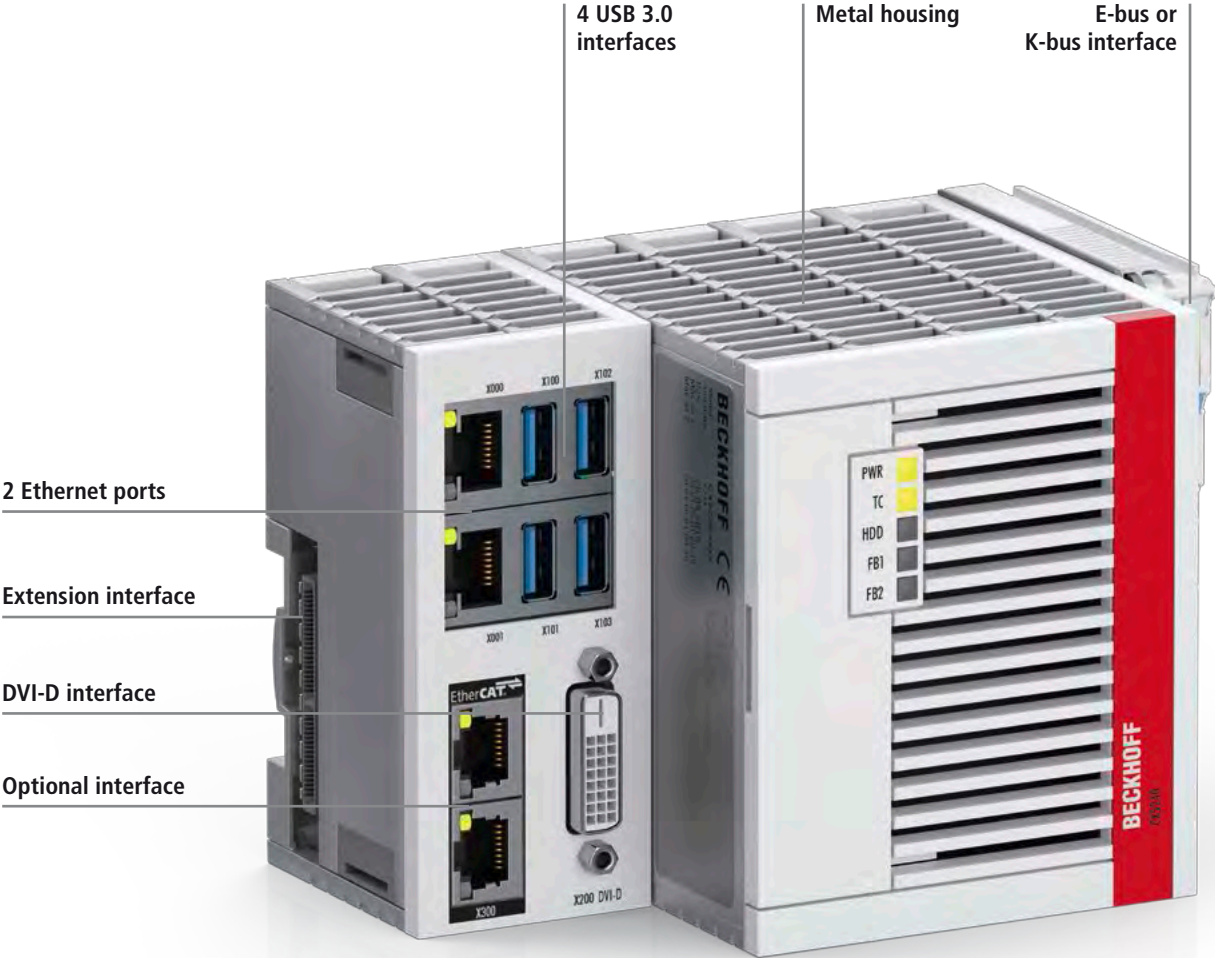
- CX5140-N011 = DisplayPort interface
- CX5140-N020 = audio interface
- CX5140-N030 = RS232, D-sub plug
- CX5140-N031 = RS422/RS485, D-sub socket
- CX5140-M310 = PROFIBUS master, D-sub socket, 9-pin
- CX5140-B310 = PROFIBUS slave, D-sub socket, 9-pin
- CX5140-M510 = CANopen master, D-sub plug, 9-pin
- CX5140-B510 = CANopen slave, D-sub plug, 9-pin
- CX5140-M930 = PROFINET RT, controller
- CX5140-B930 = PROFINET RT, device, Ethernet (2 x RJ45 switch)
- CX5140-B950 = EtherNet/IP adapter, Ethernet (2 x RJ45 switch)
- CX5140-B110 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)

Technical data	CX5140
Processor	Intel Atom® E3845, 1.91 GHz
Number of cores	4
Flash memory	slot for CFast card and microSD card, cards not included
Main memory	4 GB DDR3 RAM (not expandable)
Persistent memory	integrated 1-second UPS (1 MB on CFast card)
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded Compact 7 (supports only one CPU core), Microsoft Windows Embedded Standard 7 P, Microsoft Windows 10 IoT Enterprise 2016 LTSB, Microsoft Windows 10 IoT Enterprise 2019 LTSC
Control software	TwinCAT 2 runtime TwinCAT 3 runtime (XAR)
I/O connection	E-bus or K-bus, automatic recognition
Power supply	24 V DC (-15 %/+20 %)
Current supply E-bus/K-bus	2 A
Max. power consumption	16 W
Max. power consumption (with loading UPS)	23 W
Dimensions (W x H x D)	142 mm x 100 mm x 92 mm
Weight	approx. 960 g
Operating/storage temperature	-25...+60 °C/-40...+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals/markings	CE, UL, ATEX, GL, IECEx
TC3 performance class	Performance Plus (50); for further information on TwinCAT 3 see page 524
Further information	www.beckhoff.com/CX5140

Ordering information	no operating system	Windows Embedded Com- pact 7		Windows 10 IoT Enterprise 2016 LTSB		Windows 10 IoT Enterprise 2019 LTSC		no Twin- CAT	TwinCAT 2 runtime			TwinCAT 3 runtime (XAR)
		32 bit	64 bit	32 bit	64 bit	32 bit	64 bit		PLC	NC PTP	NC I	
CX5140-0100	x	-	-	-	-	-	-	x	-	-	-	-
CX5140-0110	-	x	-	-	-	-	-	x	-	-	-	-
CX5140-0111	-	x	-	-	-	-	-	-	x	-	-	-
CX5140-0112	-	x	-	-	-	-	-	-	-	x	-	-
CX5140-0113	-	x	-	-	-	-	-	-	-	-	x	-
CX5140-0115	-	x	-	-	-	-	-	-	-	-	-	x
CX5140-0120	-	-	x	-	-	-	-	x	-	-	-	-
CX5140-0121	-	-	x	-	-	-	-	-	x	-	-	-
CX5140-0122	-	-	x	-	-	-	-	-	-	x	-	-
CX5140-0123	-	-	x	-	-	-	-	-	-	-	x	-
CX5140-0125	-	-	x	-	-	-	-	-	-	-	-	x
CX5140-0130	-	-	-	x	-	-	-	x	-	-	-	-
CX5140-0135	-	-	-	x	-	-	-	-	-	-	-	x
CX5140-0140	-	-	-	-	x	-	-	x	-	-	-	-
CX5140-0141	-	-	-	-	x	-	-	-	x	-	-	-
CX5140-0142	-	-	-	-	x	-	-	-	-	x	-	-
CX5140-0143	-	-	-	-	x	-	-	-	-	-	x	-
CX5140-0150	-	-	-	-	-	x	-	x	-	-	-	-
CX5140-0155	-	-	-	-	-	x	-	-	-	-	-	x
CX5140-0160	-	-	-	-	-	-	x	x	-	-	-	-
CX5140-0161	-	-	-	-	-	-	x	-	x	-	-	-
CX5140-0162	-	-	-	-	-	-	x	-	-	x	-	-
CX5140-0163	-	-	-	-	-	-	x	-	-	-	x	-
CX5140-0170	-	-	-	-	-	-	-	x	x	-	-	-
CX5140-0175	-	-	-	-	-	-	-	x	-	-	-	x

CX5200 | Embedded PCs

► www.beckhoff.com/CX5200





CX5230



CX5240


The DIN-rail-mountable, fanless Embedded PCs from the CX5200 series are equipped with Intel® processors of the Atom® X series. The series encompasses two devices that differ from each other by processor type and RAM size:

- CX5230: Intel Atom® CPU, 1.3 GHz, 2 cores
- CX5240: Intel Atom® CPU, 1.6 GHz, 4 cores

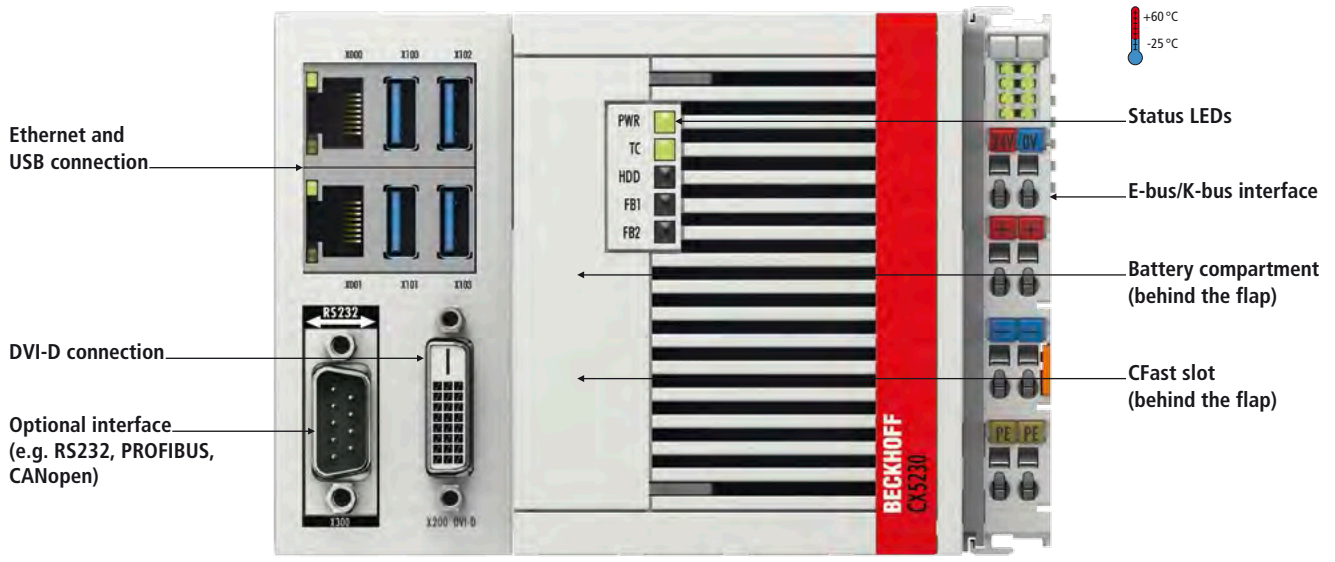
The new CX5200 supplement the existing devices of the CX5000 series. In direct comparison the new processors are more efficient. The CX5200 in the basic version is identical to previous CX5000 devices. Two independent Gigabit Ethernet ports and four USB 3.0 interfaces are available. Either a Beckhoff Control Panel or a commercially available DVI monitor can be connected to the DVI-D interface. In contrast to the CX5000 the CX5200 series has a modular construction. The multi-pin terminal on the left-hand side enables the connection of a system or fieldbus module of the CX2000 family.

The option interface of the CX5200 can be factory-fitted with various interfaces depending on needs: e.g. with a serial port (RS232/RS422/RS485) or a fieldbus connection for master or slave function. If the EtherCAT slave option is selected, the CX5200 becomes a programmable, decentralised controller within an EtherCAT network.

At I/O level either Bus Terminals or EtherCAT Terminals can be used. Like all Embedded PCs of the second generation, the CX5100 automatically recognises the I/O type that is plugged-in. With EtherCAT many different extension options are available: further master/slave fieldbus connections (PROFIBUS, CANopen, DeviceNet, etc.) and communication interfaces (RS232, RS422/RS485) as well as all other signal types supported by EtherCAT can be directly connected as EtherCAT Terminals.

 The extended operating temperature range between -25 and +60 °C enables application in climatically demanding situations.

The operating system is Windows 10 IoT Enterprise 2019 LTSC 64 bit. The boot and storage medium is an interchangeable, industrially compatible CFast card with a slot that is accessible behind a cover. The CFast card serves as a substitute for a hard disk; i.e. the operating system as well as TwinCAT and user projects are stored on it. Fast hardware exchange is thus possible if service is required; a software update can be performed simply by replacing the card on site. The built-in capacitive 1-second UPS ensures secure backup of persistent application data on the CFast card. Date and time are buffered via a replaceable battery.



CX5230, CX5240 | Embedded PCs with Intel Atom® processor

The CX5230 has an Intel Atom® multi-core processor with a clock rate of 1.3 GHz, the CX5240 has an Intel Atom® multi-core processor with a clock rate of 1.6 GHz. This makes genuine multi-core technology possible in the Embedded PC segment. The hardware interfaces in this series are oriented and implemented identically to those of the existing CX5000 series. Two independent, Gigabit-capable Ethernet interfaces as well as four USB 3.0 and a

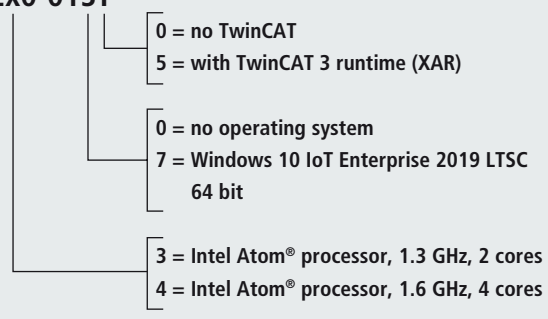
DVI-D interface are available. A multitude of further connection options and gateway functions is created by an option interface, which can be pre-equipped ex factory, as well as the I/O level, which can optionally consist of either E-bus or K-bus terminals.

Like the CX5000, the CX5200 series has a compact design. In addition, the multi-pin terminal on the left-hand side enables the connection of a system or fieldbus module of the CX2000 family.

The CX5230 and CX5240 are characterised by low power consumption and fanless design. Depending on the installed TwinCAT runtime environment, they can be used for implementing PLC or PLC/motion control projects with or without visualisation. The execution of motion control applications with interpolating axis movements is also possible.

The order identifier is derived as follows:

CX52x0-01ST



Since not all combinations make sense, the table ordering information contains a breakdown of the permissible combinations.

Optional interfaces:

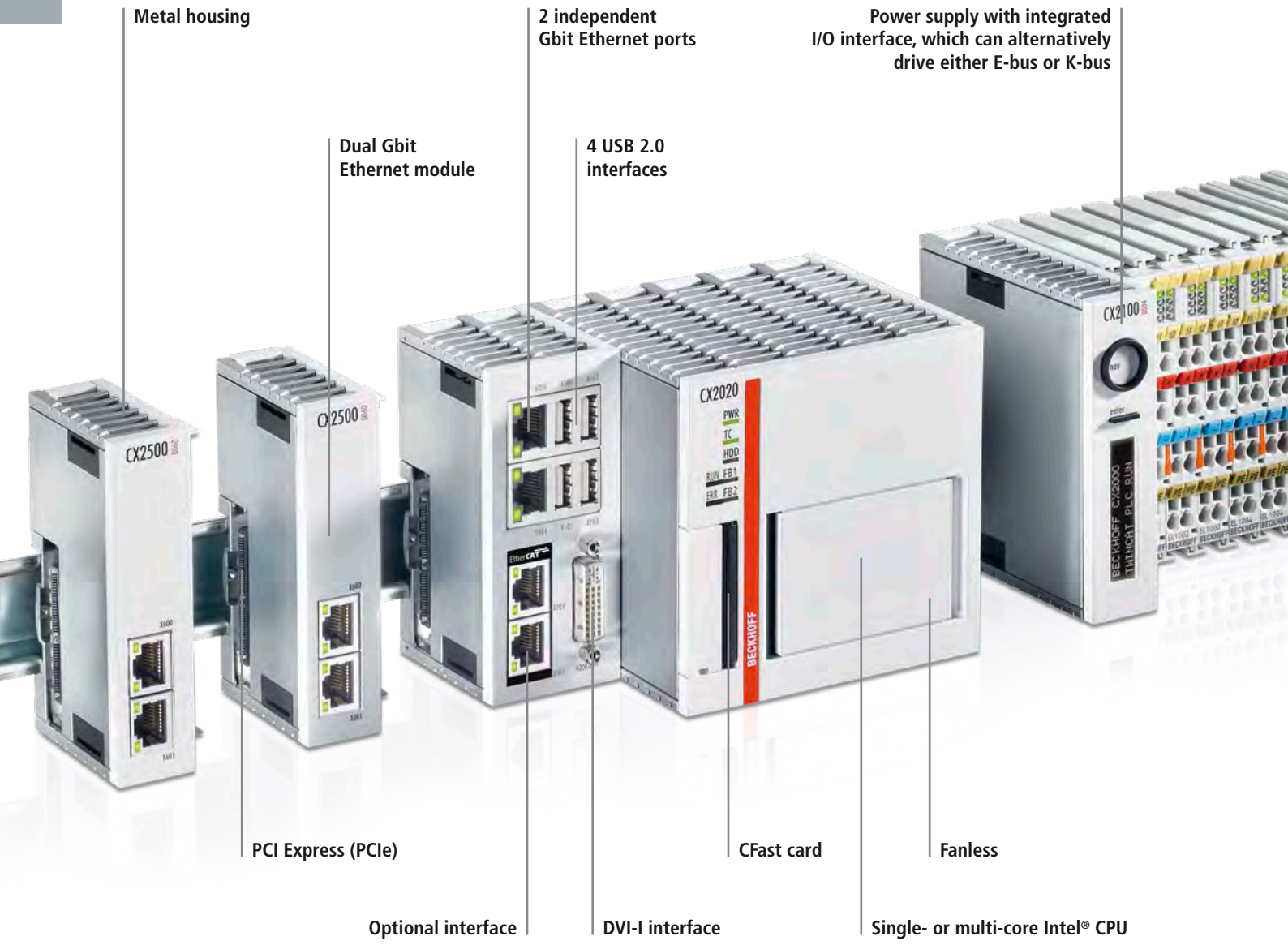
- CX52x0-N010 = second DVI connection, DVI-D port
- CX52x0-N011 = DisplayPort interface
- CX52x0-N030 = RS232, D-sub plug
- CX52x0-N031 = RS422/RS485, D-sub socket
- CX52x0-M310 = PROFIBUS master, D-sub socket, 9-pin
- CX52x0-B310 = PROFIBUS slave, D-sub socket, 9-pin
- CX52x0-M510 = CANopen master, D-sub plug, 9-pin
- CX52x0-B510 = CANopen slave, D-sub plug, 9-pin
- CX52x0-M930 = PROFINET RT, controller
- CX52x0-B930 = PROFINET RT, device, Ethernet (2 x RJ45 switch)
- CX52x0-B950 = EtherNet/IP adapter, Ethernet (2 x RJ45 switch)
- CX52x0-B110 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)

Technical data	CX5230	CX5240
Processor	Intel Atom® x5-E3930, 1.3 GHz, 2 cores (TC3: 40)	Intel Atom® x5-E3940, 1.6 GHz, 4 cores (TC3: 50)
Number of cores	2	4
Flash memory	slot for CFast card and microSD card, cards not included	
Main memory	4 GB DDR4 RAM (internal, not expandable)	8 GB DDR4 RAM (internal, not expandable)
Persistent memory	integrated 1-second UPS (1 MB on CFast card)	
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-D, 4 x USB 3.0, 1 x optional interface	
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status	
Clock	internal battery-backed clock for time and date (battery exchangeable)	
Operating system	Microsoft Windows 10 IoT Enterprise 2019 LTSC, 64 bit, Entry Level	
Control software	TwinCAT 3 runtime (XAR)	
I/O connection	E-bus or K-bus, automatic recognition	
Power supply	24 V DC (-15 %/+20 %), electrically isolated and UPS OCT-capable	
Max. power consumption	20 W	24 W
Max. power consumption (with loading UPS)	27 W	31 W
Dimensions (W x H x D)	142 mm x 100 mm x 92 mm	
Weight	approx. 1195 g	
Operating/storage temperature	-25...+60 °C/-40...+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals/markings	CE, UL	
TC3 performance class	Performance (40); for further information on TwinCAT 3 see page 524	Performance Plus (50); for further information on TwinCAT 3 see page 524
Further information	www.beckhoff.com/CX5230	www.beckhoff.com/CX5240

Ordering information	no operating system	Windows 10 IoT Enterprise 2019 LTSC 64 bit	no TwinCAT	TwinCAT 3 runtime (XAR)
CX52x0-0100	x	–	x	–
CX52x0-0170	–	x	x	–
CX52x0-0175	–	x	–	x

CX20x0 | Embedded PCs

► www.beckhoff.com/CX2000



Metal housing

Dual Gbit Ethernet module

2 independent Gbit Ethernet ports

4 USB 2.0 interfaces

Power supply with integrated I/O interface, which can alternatively drive either E-bus or K-bus

PCI Express (PCIe)

CFast card

Fanless

Optional interface

DVI-I interface

Single- or multi-core Intel® CPU



CX2020



CX2030



CX2040

The CX2020, CX2030 and CX2040 Embedded PCs extend the CX product family with versions with very high CPU power (optionally with multi-core) and enable direct connection of Bus Terminals or EtherCAT Terminals. The CX2000 in conjunction with EtherCAT and TwinCAT enables very fast control processes in the microsecond range (eXtreme Fast Control Technology).

The basic CPU modules have a CFast card, two independent Gbit Ethernet interfaces, four USB 2.0 interfaces and a DVI-I interface as standard. In addition there are fieldbus or serial connection options. Please note that these have to be specified with the order, i.e. retrospective installation is not possible. Other components from the CX2000 family can be connected via the multi-pin terminals on either side. The multi-pin terminal on the left-hand side enables the connection of up to four further optional modules.

The components

The individual system component are 22 mm wide or a multiple thereof. The basic unit consists of the CX20x0 CPU module and a power supply module (CX2100-0xxx).

Power supply unit with integrated I/O interface and optional UPS

The 24 V DC power supply unit is available in four different versions:

- CX2100-0004: E-bus/K-bus power supply unit with automatic switchover

- CX2100-0014: E-bus/K-bus power supply unit with automatic switchover and passive ventilation
- CX2100-0024: E-bus/K-bus power supply unit electrically isolated and UPS OCT-capable
- CX2100-0904: E-bus/K-bus power supply unit with automatic switchover and integrated capacitive UPS
- CX2100-0914: E-bus/K-bus power supply unit with automatic switchover and integrated electronic charging unit for external battery packs in order to maintain UPS functionality

All power supply units feature an illuminated anti-glare LC display with two rows of 16 characters each for displaying status messages.

The application programs can also use the display for displaying application-specific texts.

EtherCAT as a fast I/O system


The Embedded PCs were developed with a view towards optimised interaction with EtherCAT. EtherCAT offers a wide range of application options. The separate Gbit Ethernet interfaces enable EtherCAT to be used with cable redundancy by using one of the Ethernet interfaces as redundancy port. In addition, devices with EtherCAT slave interface can be operated such that several intelligent controllers can be synchronised via an EtherCAT network.

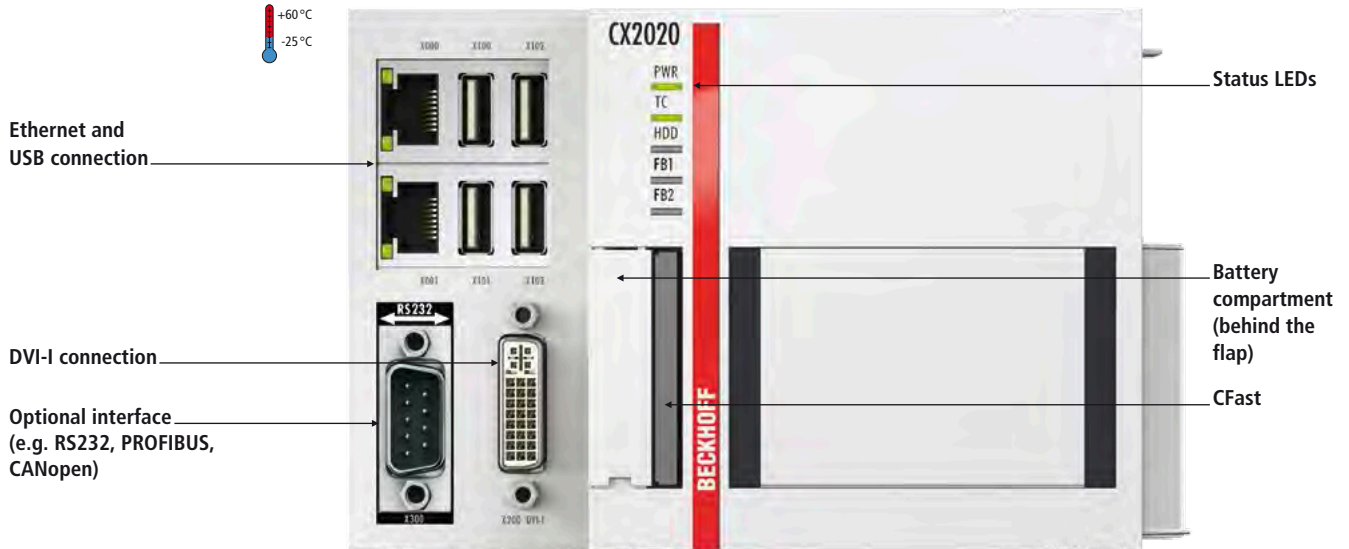
PLC, motion control, interpolation and visualisation

As Industrial PC on a DIN rail the CX2000 in conjunction with TwinCAT offers the functionality of large Industrial PCs. Multi-core CPUs in conjunction with TwinCAT 3 enable PLC projects to be distributed to several cores, resulting in significant performance gains.

Moreover, all TwinCAT functionalities are available for motion control applications: in theory, up to 256 axes can be controlled. In addition to simple point-to-point movements, more complex multi-axis functions such as electronic gearbox, cam plates and flying saw can be implemented. Due to the high-performance CPUs in the CX2000, interpolating 3D path movements can also be implemented and DIN 66025 programs executed.

In addition to handling real-time control tasks the TwinCAT real-time kernel leaves enough time for the user interface (HMI). The high performance of the graphics kernel integrated in the CPU enables demanding visualisations with advanced user interfaces to be realised.

 The extended operating temperature range between -25 and +60 °C enables application in climatically demanding situations.



CX2020, CX2030, CX2040 | Basic CPU module

The CX2020 has a 1.4 GHz Intel® Celeron® CPU, the CX2030 has a 1.5 GHz Intel® Core™ i7 dual-core CPU and the CX2040 has a 2.1 GHz Intel® Core™ i7 quad-core CPU. In the CX2020 and CX2030 the controller is fanless and has no rotating components. Due to its high power, the CX2040 has a fan with ball bearings and speed monitoring. In addition to the CPU and chipset the basic modules also contain the main memory. For the CX2020 and CX2030 the size is 2 GB.

4 GB is possible as option. The CX2040 has 4 GB of RAM as standard. The controller boots from the CFast card. The CPU has a 128 kB NOVRAM persistent data memory for situations where no UPS is used. Up to four modules can be connected to the basic CPU module. The connection order is irrelevant. Internally the modules are connected via PCI Express and can be connected subsequently to the CPU in the field. The power supply for the CPU module comes from a

CX2100 power supply module, which is connected on the right-hand side of the CPU. Two further CFast memory card modules (CX2550-0010) can be connected between the power supply unit and the CPU, so that a total of up to three CFast cards can be used. RAID can be used in situations where more than one CFast card is used.

The order identifier is derived as follows:

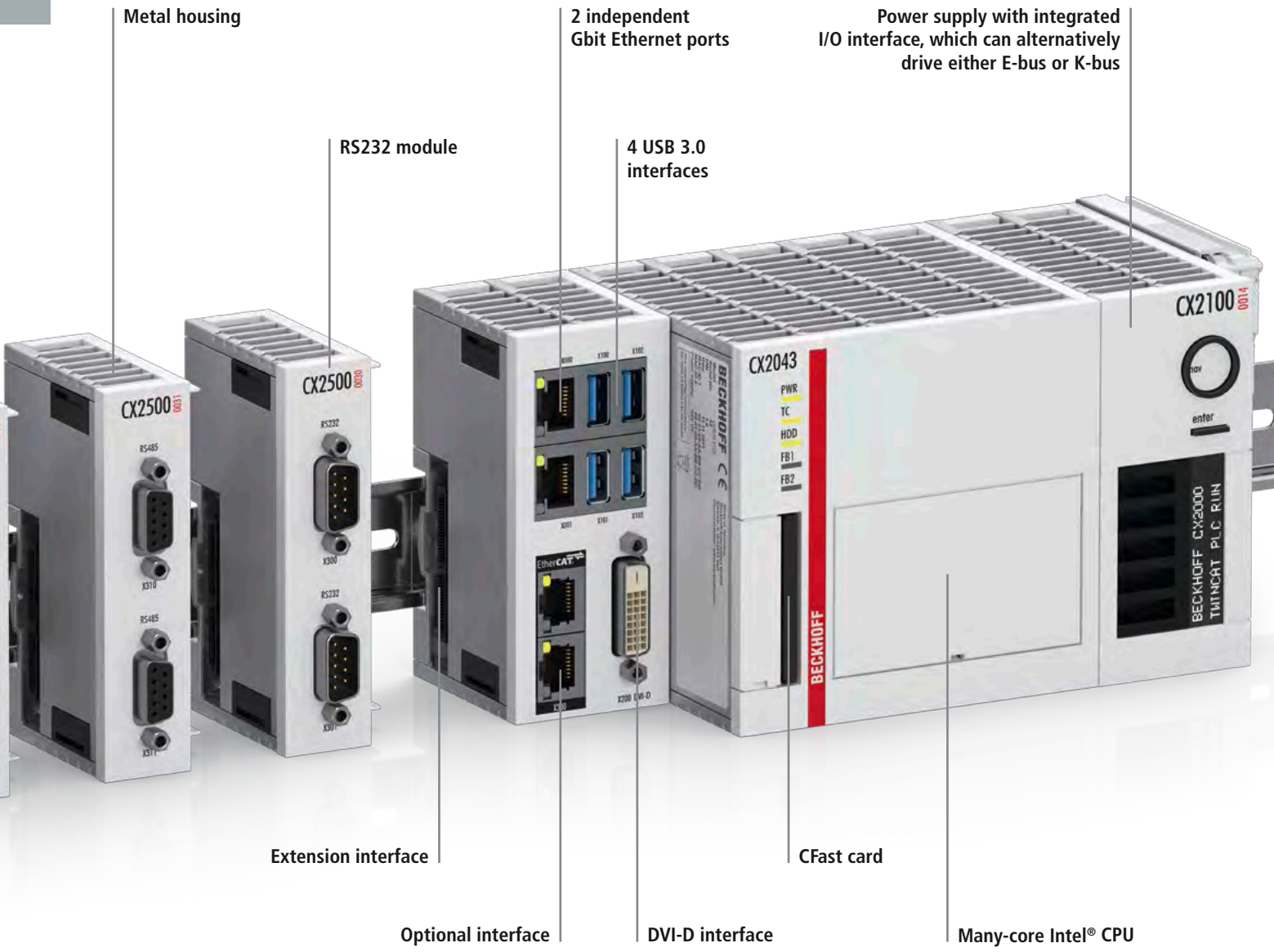
<p>CX20x0-01ST</p> <ul style="list-style-type: none"> 0 = no TwinCAT 1 = with TwinCAT 2 PLC runtime 2 = with TwinCAT 2 NC PTP runtime 3 = with TwinCAT 2 NC I runtime 5 = with TwinCAT 3 runtime (XAR) <ul style="list-style-type: none"> 0 = no operating system 1 = Microsoft Windows Embedded Compact 7 2 = Microsoft Windows Embedded Standard 7 P 32 bit 3 = Microsoft Windows Embedded Standard 7 P 64 bit 4 = Windows 10 IoT Enterprise LTSB 32 bit 5 = Windows 10 IoT Enterprise LTSB 64 bit <ul style="list-style-type: none"> 2 = Intel® Celeron® processor 1.4 GHz, 1 core 3 = Intel® Core™ processor 1.5 GHz, 2 cores 4 = Intel® Core™ processor 2.1 GHz, 4 cores 	<p>Optional interfaces:</p> <ul style="list-style-type: none"> CX20x0-N010 = second DVI connection, DVI-D port CX20x0-N011 = DisplayPort interface CX20x0-N030 = RS232, D-sub plug CX20x0-N031 = RS422/RS485, D-sub socket CX20x0-B110 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ45) CX20x0-M310 = PROFIBUS master, D-sub socket, 9-pin CX20x0-B310 = PROFIBUS slave, D-sub socket, 9-pin CX20x0-M510 = CANopen master, D-sub plug, 9-pin CX20x0-B510 = CANopen slave, D-sub plug, 9-pin CX20x0-M930 = PROFINET RT, controller CX20x0-B930 = PROFINET RT, device, Ethernet (2 x RJ45 switch) CX20x0-B950 = EtherNet/IP adapter, Ethernet (2 x RJ45 switch) <p>Since not all combinations make sense, the table ordering information contains a breakdown of the permissible combinations.</p>
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Technical data	CX2020	CX2030	CX2040
Processor	Intel® Celeron® 827E 1.4 GHz	Intel® Core™ i7 2610UE 1.5 GHz	Intel® Core™ i7 2715QE 2.1 GHz
Number of cores	1	2	4
Flash memory	20 GB or 40 GB CFast flash card (depending on the operating system), optionally extendable		
Main memory	2 GB DDR3 RAM (expandable ex factory to 4 GB)	2 GB DDR3 RAM (expandable ex factory to 4 GB)	4 GB DDR3 RAM (not expandable)
Persistent memory	128 KB NOVRAM integrated	128 KB NOVRAM integrated	128 KB NOVRAM integrated
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface		
Cooling	passive cooling, optionally with active cooling ex factory	passive cooling, optionally with active cooling ex factory	integrated fan with ball bearings and speed monitoring
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status		
Clock	internal battery-backed clock for time and date (battery exchangeable)		
Operating system	Microsoft Windows Embedded Compact 7, Microsoft Windows Embedded Standard 7 P, Microsoft Windows 10 IoT Enterprise 2016 LTSB	Microsoft Windows Embedded Compact 7 (TwinCAT 3 supports only one CPU core), Microsoft Windows Embedded Standard 7 P, Microsoft Windows 10 IoT Enterprise 2016 LTSB	Microsoft Windows Embedded Compact 7 (TwinCAT 3 supports only one CPU core), Microsoft Windows Embedded Standard 7 P, Microsoft Windows 10 IoT Enterprise 2016 LTSB
Control software	TwinCAT 2 runtime TwinCAT 3 runtime (XAR)		
I/O connection	via power supply module (E-bus or K-bus, automatic recognition)		
Power supply	24 V DC (-15 %/+20 %)		
Max. power consumption	21 W	27 W	32 W
Dimensions (W x H x D)	144 mm x 99 mm x 91 mm		
Weight	approx. 1160 g	approx. 1165 g	approx. 1230 g
Operating/storage temperature	-25...+60 °C/-40...+85 °C		
Relative humidity	95 %, no condensation		
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27		
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4		
Protection class	IP 20		
Approvals/markings	CE, UL		
TC3 performance class	Performance Plus (50); for further information on TwinCAT 3 see page 524	Mid Performance (60); for further information on TwinCAT 3 see page 524	High Performance (70); for further information on TwinCAT 3 see page 524
Further information	www.beckhoff.com/CX2020	www.beckhoff.com/CX2030	www.beckhoff.com/CX2040

Ordering information	no op- erating system	Windows Embedded		Windows 10 IoT		no TwinCAT	TwinCAT 2 runtime			TwinCAT 3 runtime (XAR)
		Com- pact 7	Standard 7 P 32 bit 64 bit	Enterprise 2016 LTSB 32 bit 64 bit	PLC		NC PTP	NC I		
CX20x0-0100	x	–	–	–	–	x	–	–	–	–
CX20x0-0110	–	x	–	–	–	x	–	–	–	–
CX20x0-0111	–	x	–	–	–	–	x	–	–	–
CX20x0-0112	–	x	–	–	–	–	–	x	–	–
CX20x0-0113	–	x	–	–	–	–	–	–	x	–
CX20x0-0115	–	x	–	–	–	–	–	–	–	x
CX20x0-0120	–	–	x	–	–	x	–	–	–	–
CX20x0-0121	–	–	x	–	–	–	x	–	–	–
CX20x0-0122	–	–	x	–	–	–	–	x	–	–
CX20x0-0123	–	–	x	–	–	–	–	–	x	–
CX20x0-0125	–	–	x	–	–	–	–	–	–	x
CX20x0-0130	–	–	–	x	–	x	–	–	–	–
CX20x0-0135	–	–	–	x	–	–	–	–	–	x
CX20x0-0140	–	–	–	–	x	–	x	–	–	–
CX20x0-0141	–	–	–	–	x	–	–	x	–	–
CX20x0-0142	–	–	–	–	x	–	–	x	–	–
CX20x0-0143	–	–	–	–	x	–	–	–	x	–
CX20x0-0150	–	–	–	–	–	x	x	–	–	–
CX20x0-0155	–	–	–	–	–	x	–	–	–	x

CX20x3 | Embedded PCs

► www.beckhoff.com/CX20x3



Metal housing

RS232 module

2 independent Gbit Ethernet ports

4 USB 3.0 interfaces

Power supply with integrated I/O interface, which can alternatively drive either E-bus or K-bus

Extension interface

Optional interface

DVI-D interface

CFast card

Many-core Intel® CPU



CX2033



CX2043

The CX2033 and CX2043 Embedded PCs extend the CX product family with versions with very high CPU power (optionally with multi-core) and enable direct connection of Bus Terminals or EtherCAT Terminals. The CX20x3 in conjunction with EtherCAT and TwinCAT enables very fast control processes in the microsecond range (eXtreme Fast Control Technology).

The basic CPU modules have a CFast card, two independent Gbit Ethernet interfaces, four USB 3.1 Gen. 2 interfaces and a DVI-D interface as standard. In addition there are fieldbus or serial connection options. Please note that these have to be specified with the order, i.e. retrospective installation is not possible. Other components from the CX2000 family can be connected via the multi-pin terminals on either side. The multi-pin terminal on the left-hand side enables the connection of up to four further optional modules.

The components

The individual system component are 22 mm wide or a multiple thereof. The basic unit consists of the CX20x3 CPU module and a power supply module (CX2100-0xxx).

Power supply unit with integrated I/O interface and optional UPS

The 24 V DC power supply unit is available in two different versions:

- CX2100-0014: E-bus/K-bus power supply unit with automatic switchover and passive ventilation
- CX2100-0914: E-bus/K-bus power supply unit with automatic switchover and integrated electronic charging unit for external battery packs in order to maintain UPS functionality

Both power supply units feature an illuminated anti-glare LC display with two rows of 16 characters each for displaying status messages.

The application programs can also use the display for displaying application-specific texts.

EtherCAT as a fast I/O system

The CX2033 and CX2043 Embedded PCs were developed with a view towards optimised interaction with EtherCAT. EtherCAT offers a wide range of application options. The separate Gbit Ethernet interfaces enable EtherCAT to be used with cable redundancy by using one of the Ethernet interfaces as redundancy port. In addition, devices with EtherCAT slave interface can be operated

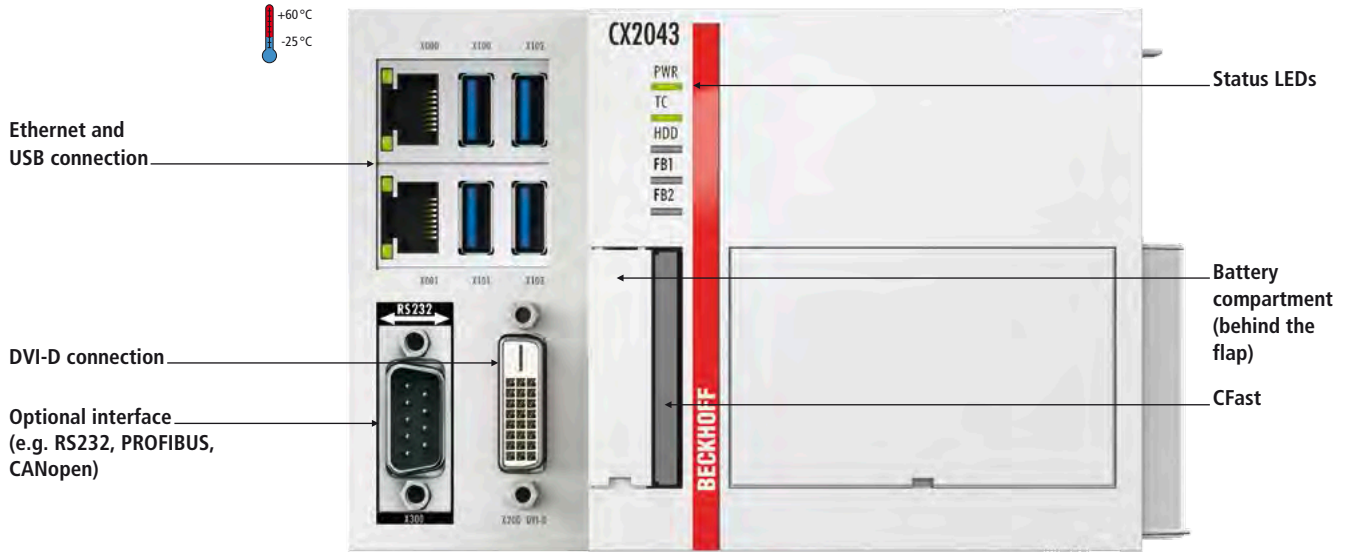
such that several intelligent controllers can be synchronised via an EtherCAT network.

PLC, motion control, interpolation and visualisation

As Industrial PC on a DIN rail the CX20x3 in conjunction with TwinCAT offers the functionality of large Industrial PCs. Multi-core CPUs in conjunction with TwinCAT 3 enable PLC projects to be distributed to several cores, resulting in significant performance gains.

Moreover, all TwinCAT functionalities are available for motion control applications: in theory, up to 256 axes can be controlled. In addition to simple point-to-point movements, more complex multi-axis functions such as electronic gearbox, cam plates and flying saw can be implemented. Due to the high-performance CPUs in the CX20x3, interpolating 3D path movements can also be implemented and DIN 66025 programs executed.

In addition to handling real-time control tasks the TwinCAT real-time kernel leaves enough time for the user interface (HMI). The high performance of the graphics kernel integrated in the CPU enables demanding visualisations with advanced user interfaces to be realised.



CX2033, CX2043 | Basic CPU module

The CX2033 has an AMD Ryzen™ V1202B CPU with 2.3 GHz and two cores, while the CX2043 has an AMD Ryzen™ V1807B CPU with 3.35 GHz and four cores. In the case of the CX2033 the controller is fanless and has no rotating components. Due to its high power, the CX2043 has a fan with ball bearings and speed monitoring.

In addition to the CPU and chipset, the basic modules also contain the RAM,

which in the case of CX2033 and CX2043 have a capacity of 8 GB. 16 GB is possible as option. The controller boots from the CFast card. The CPU has an internal 128 kB NOVRAM, which functions as a persistent data memory if no UPS is used. Up to four modules can be connected to the basic CPU module. The connection order is irrelevant. Internally the modules are connected via PCI Express and can be plugged to the CPU

in the field. The power supply for the CPU module comes from a CX2100 power supply module, which is connected on the right-hand side of the CPU. Two further CFast memory card modules (CX2550-0010) can be connected between the power supply unit and the CPU.

The order identifier is derived as follows:

CX20x3-01ST

- 0 = no TwinCAT
- 1 = with TwinCAT 2 PLC runtime
- 2 = with TwinCAT 2 NC PTP runtime
- 3 = with TwinCAT 2 NC I runtime
- 5 = with TwinCAT 3 runtime (XAR)
- 0 = no operating system
- 6 = Microsoft Windows 10 IoT Enterprise 2019 LTSC 32 bit
- 7 = Microsoft Windows 10 IoT Enterprise 2019 LTSC 64 bit
- 3 = AMD Ryzen™ V1202B processor 2.3 GHz, 2 cores
- 4 = AMD Ryzen™ V1807B processor 3.35 GHz, 4 cores

Optional interfaces:

- CX20x3-N010 = second DVI connection, DVI-D port
- CX20x3-N011 = DisplayPort interface
- CX20x3-N030 = RS232, D-sub plug
- CX20x3-N031 = RS422/RS485, D-sub socket
- CX20x3-B110 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)
- CX20x3-M310 = PROFIBUS master, D-sub socket, 9-pin
- CX20x3-B310 = PROFIBUS slave, D-sub socket, 9-pin
- CX20x3-M510 = CANopen master, D-sub plug, 9-pin
- CX20x3-B510 = CANopen slave, D-sub plug, 9-pin
- CX20x3-M930 = PROFINET RT, controller
- CX20x3-B930 = PROFINET RT, device, Ethernet (2 x RJ45 switch)
- CX20x3-B950 = EtherNet/IP adapter, Ethernet (2 x RJ45 switch)

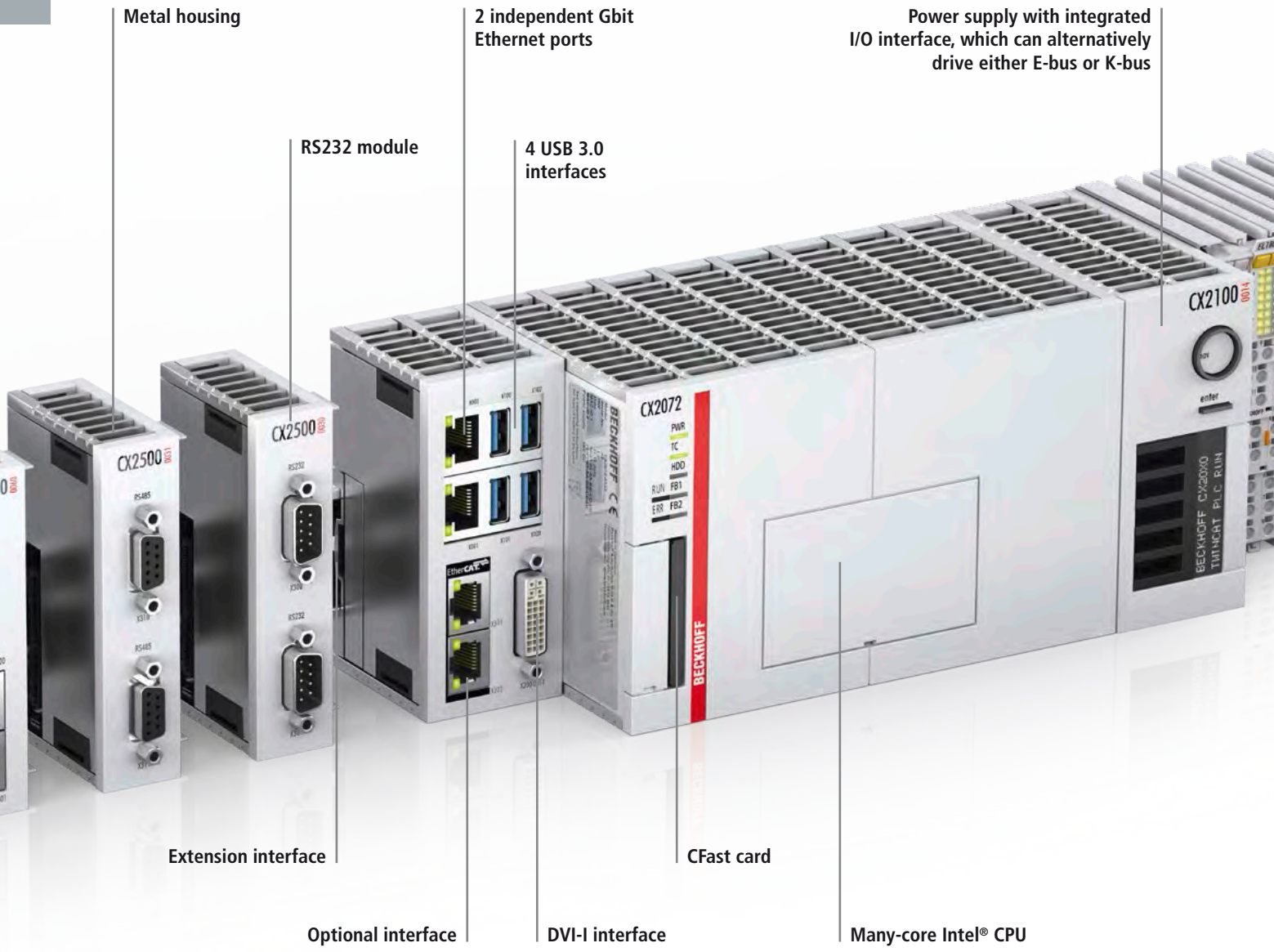
Since not all combinations make sense, the table ordering information contains a breakdown of the permissible combinations.

Technical data	CX2033	CX2043
Processor	AMD Ryzen™ V1202B 2.3 GHz	AMD Ryzen™ V1807B 3.35 GHz
Number of cores	2	4
Flash memory	slot for CFast card	
Main memory	8 GB DDR4 RAM (expandable ex factory to 16 GB)	
Persistent memory	128 KB NOVRAM integrated	
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-D, 4 x USB 3.1 Gen. 2, 1 x optional interface	
Cooling	passive cooling, optionally with active cooling ex factory	integrated fan with ball bearings and speed monitoring
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status	
Clock	internal battery-backed clock for time and date (battery exchangeable)	
Operating system	Microsoft Windows 10 IoT Enterprise 2019 LTSC	
Control software	TwinCAT 2 runtime TwinCAT 3 runtime (XAR)	
I/O connection	via power supply module (E-bus or K-bus, automatic recognition)	
Power supply	24 V DC (-15 %/+20 %)	
Max. power consumption	42 W	70 W
Dimensions (W x H x D)	144 mm x 99 mm x 91 mm	
Weight	approx. 1165 g	approx. 1230 g
Operating/storage temperature	-25...+60 °C/-40...+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals/markings	CE, UL	
TC3 performance class	Performance Plus (50); for further information on TwinCAT 3 see page 524	Mid Performance (60); for further information on TwinCAT 3 see page 524
Further information	www.beckhoff.com/CX2033	

Ordering information	no operating system	Windows 10 IoT Enterprise 2019 LTSC 32 bit	Windows 10 IoT Enterprise 2019 LTSC 64 bit	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC PTP runtime	TwinCAT 2 NC I runtime	TwinCAT 3 runtime (XAR)
CX20x3-0100	x	–	–	x	–	–	–	–
CX20x3-0160	–	x	–	x	–	–	–	–
CX20x3-0161	–	x	–	–	x	–	–	–
CX20x3-0162	–	x	–	–	–	x	–	–
CX20x3-0163	–	x	–	–	–	–	x	–
CX20x3-0170	–	–	x	x	–	–	–	–
CX20x3-0175	–	–	x	–	–	–	–	x

CX20x2 | Embedded PCs

► www.beckhoff.com/CX20x2



Metal housing

2 independent Gbit Ethernet ports

Power supply with integrated I/O interface, which can alternatively drive either E-bus or K-bus

RS232 module

4 USB 3.0 interfaces

Extension interface

Optional interface

DVI-I interface

CFast card

Many-core Intel® CPU



CX2042, CX2062, CX2072

The CX2042, CX2062 and CX2072 Embedded PCs extend the CX product family with versions with very high CPU power (optionally with many-core) and enable direct connection of Bus Terminals or EtherCAT Terminals. The CX20x2 in conjunction with EtherCAT and TwinCAT enables very fast control processes in the microsecond range (eXtreme Fast Control Technology).

The basic CPU modules have a CFast card, two independent Gbit Ethernet interfaces, four USB 3.0 interfaces and a DVI-I interface as standard. In addition there are fieldbus or serial connection options. Please note that these have to be specified with the order, i.e. retrospective installation is not possible. Other components from the CX2000 family can be connected via the multi-pin terminals on either side. The multi-pin terminal on the left-hand side enables the connection of up to four further optional modules.

The components

The individual system component are 22 mm wide or a multiple thereof. The basic unit consists of the CX20x2 CPU module and a power supply module (CX2100-0xxx).

Power supply unit with integrated I/O interface and optional UPS

The 24 V DC power supply unit is available in two different versions:

- CX2100-0014: E-bus/K-bus power supply unit with automatic switchover and passive ventilation
- CX2100-0914: E-bus/K-bus power supply unit with automatic switchover and integrated electronic charging unit for external battery packs in order to maintain UPS functionality

Both power supply units feature an illuminated anti-glare LC display with two rows of 16 characters each for displaying status messages.

The application programs can also use the display for displaying application-specific texts.

EtherCAT as a fast I/O system

The CX2042, CX2062 and CX2072 Embedded PCs were developed with a view towards optimised interaction with EtherCAT. EtherCAT offers a wide range of application options. The separate Gbit Ethernet interfaces enable EtherCAT to be used with cable redundancy by using one of the Ethernet interfaces as redundancy port. In addition, devices with EtherCAT

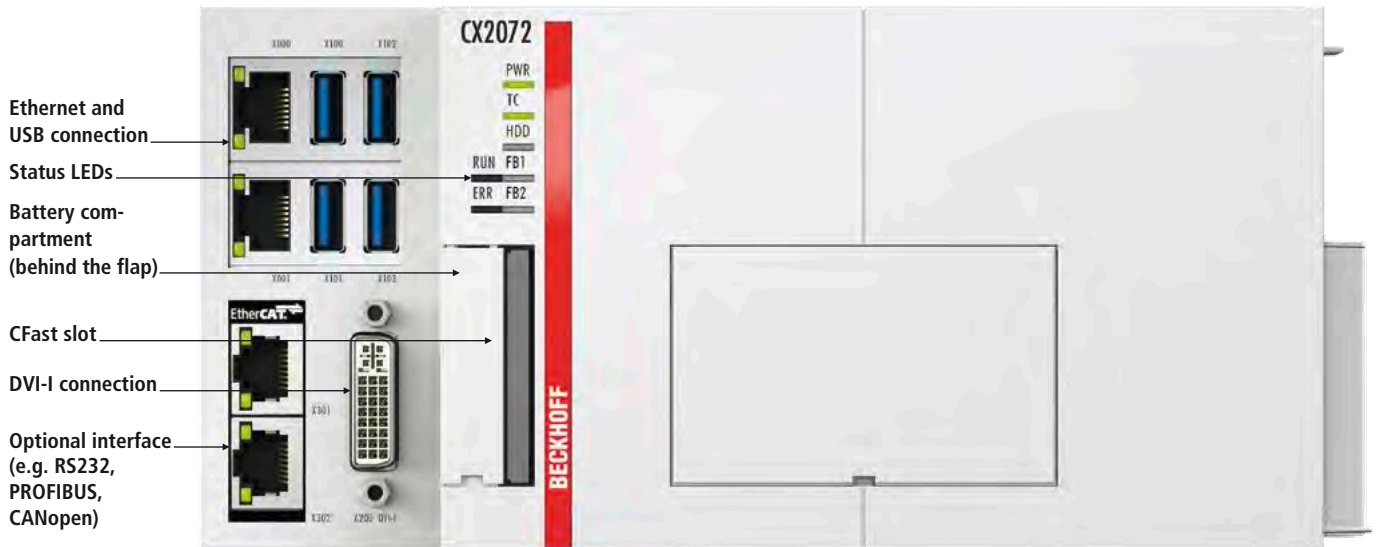
slave interface can be operated such that several intelligent controllers can be synchronised via an EtherCAT network.

PLC, motion control, interpolation and visualisation

As Industrial PC on a DIN rail the CX20x2 in conjunction with TwinCAT offers the functionality of large Industrial PCs. Many-core CPUs in conjunction with TwinCAT 3 enable PLC projects to be distributed to several cores, resulting in significant performance gains.

Moreover, all TwinCAT functionalities are available for motion control applications: in theory, up to 256 axes can be controlled. In addition to simple point-to-point movements, more complex multi-axis functions such as electronic gearbox, cam plates and flying saw can be implemented. Due to the high-performance CPUs in the CX20x2, interpolating 3D path movements can also be implemented and DIN 66025 programs executed.

In addition to handling real-time control tasks the TwinCAT real-time kernel leaves enough time for the user interface (HMI). The high performance of the graphics kernel integrated in the CPU enables demanding visualisations with advanced user interfaces to be realised.



CX2042, CX2062, CX2072 | Many-core basic CPU module

Providing many-core performance on the DIN rail, the Embedded PCs CX20x2 make very powerful industrial control systems possible.

The CX2042 has an Intel® Xeon® CPU with a clock rate of 2.2 GHz (four cores), the CX2062 an Intel® Xeon® CPU with a clock rate of 2.0 GHz (eight cores) and the CX2072 an Intel® Xeon® CPU with a clock rate of 2.1 GHz (12 cores). A fan with ball bearings and speed monitoring is integrated into all basic CPU modules. In addition to the CPU, the basic modules also contain

the main memory with a size of 8 GB RAM. The controller boots from a CFast card where both the operating system as well as user programs and data are stored. The CPU has an internal 128 kB NOVRAM, which acts as a persistent data memory if no UPS is used.

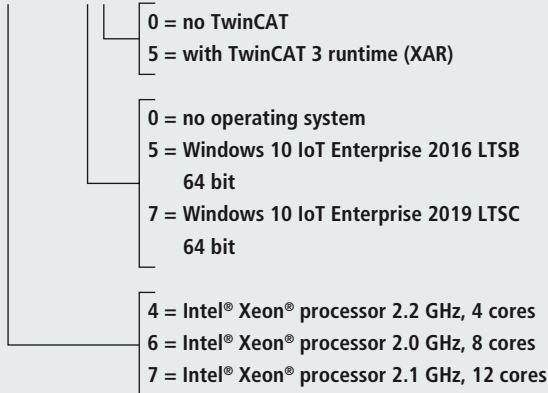
The use of TwinCAT 3 allows automation tasks to be distributed across the various cores of the Intel® Xeon® CPU.

All system modules from the CX2000 series for left- or right-sided functional extensions can be connected to the Embedded PCs. Internally the modules are connected

via PCI Express and can be plugged to the CPU in the field. The power supply for the CPU module comes from a CX2100-0014 power supply module. Up to two mass storage modules (either CX2550-0010 CFast modules or CX2550-0020 2½-inch SSD modules) can be plugged in between the power supply unit and the CPU, allowing the use of up to three mass storage devices in total.

The order identifier is derived as follows:

CX20x2-01ST



Further ordering options see price list.

Since not all combinations make sense, the table ordering information contains a breakdown of the permissible combinations.

Optional interfaces:

- CX20x2-N010 = second DVI connection, DVI-D port
- CX20x2-N011 = DisplayPort interface
- CX20x2-N030 = RS232, D-sub plug
- CX20x2-N031 = RS422/RS485, D-sub socket
- CX20x2-N067 = 2 x 10G Ethernet interface (wired, 2 x RJ45), version in the upper front of the device
- CX20x2-N167 = 2 x 10G Ethernet interface (optical, 2 x SFP + cage), version in the upper front of the device
- CX20x2-M310 = PROFIBUS master, D-sub socket, 9-pin
- CX20x2-B310 = PROFIBUS slave, D-sub socket, 9-pin
- CX20x2-M510 = CANopen master, D-sub plug, 9-pin
- CX20x2-B510 = CANopen slave, D-sub plug, 9-pin
- CX20x2-M930 = PROFINET RT, controller
- CX20x2-B930 = PROFINET RT, device, Ethernet (2 x RJ45 switch)
- CX20x2-B950 = EtherNet/IP adapter, Ethernet (2 x RJ45 switch)
- CX20x2-B110 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)

Technical data	CX2042	CX2062	CX2072
Processor	Intel® Xeon® D-1527 2.2 GHz, 4 cores (TC3: 70)	Intel® Xeon® D-1548 2.0 GHz, 8 cores (TC3: 80)	Intel® Xeon® D-1567 2.1 GHz, 12 cores (TC3: 81)
Number of cores	4	8	12
Graphics	AMD E8860, 2 GB GDDR5		
Flash memory	slot for CFast card, card not included		
Main memory	8 GB DDR4 RAM (expandable ex factory to 64 GB)		
Persistent memory	128 KB NOVRAM integrated		
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 3.0, 1 x optional interface		
Cooling	integrated fan with ball bearings and speed monitoring		
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status		
Clock	internal battery-backed clock for time and date (battery exchangeable)		
Operating system	Microsoft Windows 10 IoT Enterprise 2016 LTSC, Microsoft Windows 10 IoT Enterprise 2019 LTSC		
Control software	TwinCAT 3 runtime (XAR)		
I/O connection	via power supply module (E-bus or K-bus, automatic recognition)		
Power supply	24 V DC (-15 %/+20 %)		
Max. power consumption	95 W	103 W	131 W
Dimensions (W x H x D)	204 mm x 99 mm x 91 mm		
Weight	approx. 1300 g		
Operating/storage temperature	-25...+50 °C/-40...+85 °C		
Relative humidity	95 %, no condensation		
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27		
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4		
Protection class	IP 20		
Approvals/markings	CE		
TC3 performance class	High Performance (70); for further information on TwinCAT 3 see page 524	Very High Performance (80); for further information on TwinCAT 3 see page 524	Many-core 5...8 Cores (81); for further information on TwinCAT 3 see page 524
Further information	www.beckhoff.com/CX2042	www.beckhoff.com/CX2062	www.beckhoff.com/CX2072

Ordering information		no operating system		Windows 10 IoT Enterprise 2016 LTSC 64 bit	Windows 10 IoT Enterprise 2019 LTSC 64 bit	no TwinCAT	TwinCAT 3 runtime (XAR)
CX20x2-0100	x	–	–	–	–	x	–
CX20x2-0150	–	x	–	–	–	x	–
CX20x2-0155	–	x	–	–	–	–	x
CX20x2-0170	–	–	–	x	x	x	–
CX20x2-0175	–	–	–	x	x	–	x



+60°C
-25°C



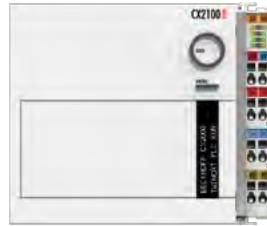
+60°C
-25°C

240 W power supply module for CX20xx, electrically isolated and UPS OCT-capable



+60°C
-25°C

Power supply unit with E-bus/K-bus interface and passive ventilation



+60°C
-25°C

Power supply unit with integrated capacitive UPS and E-bus/K-bus interface



+60°C
-25°C

Power supply unit with integrated Smart Battery charger and E-bus/K-bus interface

Power supply unit with E-bus/K-bus interface

CX2100-0xxx | Power supply units and UPS modules

The power supply modules have an LC display with 2 x 16 characters. They are controlled via TwinCAT. All modules feature automatic E-bus/K-bus detection. Thanks to its wider housing front the CX2100-0014 allows passive ventilation through the front and is thus also suitable for horizontal mounting positions. Optionally it can be equipped with active ventilation (fan option) to provide the normally fanless CX2020/CX2030 with a better heat dissipation for operation in different ambient conditions. The CX2100-0904 module also features integrated capacitive UPS. The CX2100-0914 module can be used to charge external battery packs in order to provide backup power for the system and external components such as Control Panels.

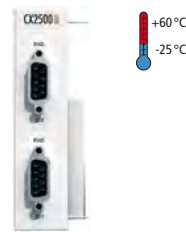
Technical data	CX2100-0004	CX2100-0014	CX2100-0024	CX2100-0904	CX2100-0914
Power supply	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %), electrically isolated and UPS OCT-capable	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %)
Max. output	45 W	130 W	240 W	45 W	100 W
I/O connection	E-bus or K-bus, automatic recognition				
Current supply E-bus/K-bus	2 A				
UPS	–	–	communication to CU81xx via UPS OCT via 24 V DC cable	capacitively integrated	external
Capacity	–	–	dependent on battery	75 As	dependent on battery
Type of connection	spring-loaded technique (adapter terminal)				
Display	FSTN display 2 lines x 16 characters of text, illuminated				
Diagnostics LED	1 x PWR, 1 x I/O Run, 1 x I/O Err				
Max. power consumption	3.5 W				
Dimensions (W x H x D)	40 x 100 x 91 mm	60 x 100 x 91 mm	60 x 100 x 91 mm	118 x 100 x 91 mm	84 x 100 x 91 mm
Weight	approx. 375 g	approx. 550 g	approx. 650 g	approx. 1025 g	approx. 695 g
Operating/storage temperature	-25...+60 °C/ -40...+85 °C	-25...+60 °C/ -40...+85 °C	-25...+60 °C/ -25...+85 °C	-25...+50 °C/ -25...+60 °C	-25...+60 °C/ -40...+85 °C
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27				
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4				
Protection class	IP 20				
Approvals/markings	CE, UL				
Further information	www.beckhoff.com/ CX2100-0004	www.beckhoff.com/ CX2100-0014	www.beckhoff.com/ CX2100-0024	www.beckhoff.com/ CX2100-0904	www.beckhoff.com/ CX2100-0914
Option					
CX2900-0192	battery pack for CX2100-0914				



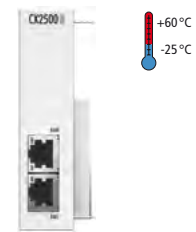
Audio interface



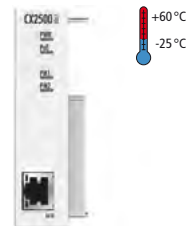
RS232 interface



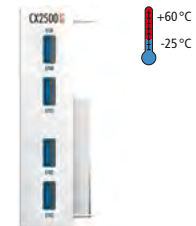
RS422/RS485 interface



Dual Gbit Ethernet interface



Power over Ethernet interface



USB interface

CX2500-00xx | System modules for CX20xx and CX52x0

The system modules for the CX20xx and CX52x0 family are connected to the CPU on the left-hand side via a multi-pin connector. Internally they are connected via PCI Express. Up to four modules can be connected at CX20xx in any order. The CX52x0 can be expanded with one module.

The CX2500-0020 audio module (only for CX2020, CX2030 and CX2040) has a jack plug (5 x 3.5 mm) and a cinch plug for digital signals (SPDIF). Up to 7.1 multi-channel audio can be used. Serial interfaces can be added with the modules CX2500-0030 (RS232) and CX2500-0031 (RS422/RS485). The CX2500-0060 module provides two further independent Gbit Ethernet interfaces.

The CX2500-0061 Power over Ethernet module supports devices with PoE class 0, 1, 2, 3 and 4 in accordance with the PoE standard IEEE 802.3af-2003. The maximum PoE power output is 15.4 W. The PoE supply voltage is generated internally, no external power supply is necessary. In the case of an overload of the CX2500-0061, the PoE supply shuts down for two seconds, then restarts. The diagnostic LEDs PWR, PoE, PM1 and PM2 provide information about the type of PoE supply (mode A or B) as well as about the PoE class reported by the powered device.

The CX2500-0070 module can be used to add up to four further USB 3.0 interfaces.

Technical data	CX2500-0020	CX2500-0030	CX2500-0031	CX2500-0060	CX2500-0061	CX2500-0070
Interfaces	Line IN, Line OUT, Mic IN, 7.1, SPDIF	RS232	RS422/RS485	2 x Ethernet, 10/100/1000 Mbit/s	1 x Ethernet, 10/100/1000 Mbit/s with Power over Ethernet (PoE)	4 x USB 3.0 (max. 2 A total current)
Type of connection	3.5 mm socket for jack plug, RCA socket	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	2 x RJ45	1 x RJ45	4 x USB 3.0, type A
Power supply	via system bus (through CX2100-0xxx power supply modules)					
Dimensions (W x H x D)	24 mm x 99 mm x 54.5 mm					
Weight	approx. 180 g	approx. 205 g	approx. 203 g	approx. 195 g	approx. 208 g	approx. 195 g
Operating/storage temperature	-25...+60 °C/-40...+85 °C					
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27					
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4					
Protection class	IP 20					
Approvals/markings	CE, UL	CE, UL	CE, UL	CE, UL	CE	CE, UL
Further information	www.beckhoff.com/CX2500-0020	www.beckhoff.com/CX2500-0030	www.beckhoff.com/CX2500-0031	www.beckhoff.com/CX2500-0060	www.beckhoff.com/CX2500-0061	www.beckhoff.com/CX2500-0070



CFast slot



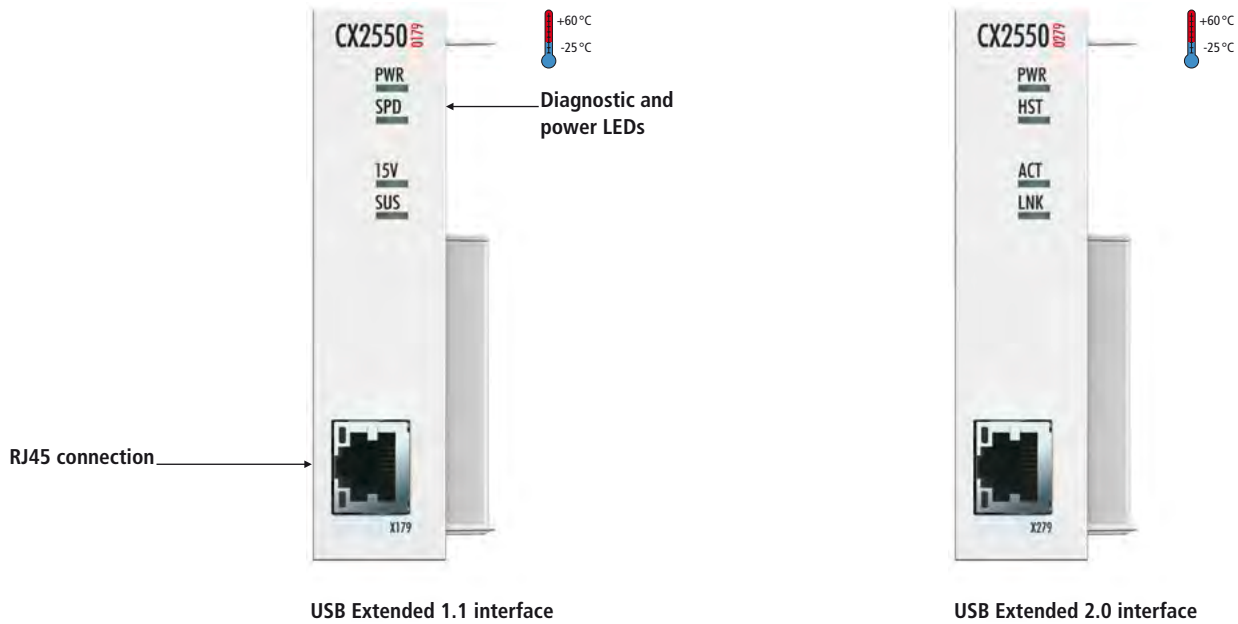
2 1/2-inch HDD/SSD

CX2550-00x0 | Extension modules for CX20xx

The extension modules for the CX20xx family are connected to the CPU on the right-hand side via a multi-pin connector. Up to two CX2550-0010 CFast or CX2550-0020 HDD/SSD modules can be connected, so that a total of up to three storage media are available. The storage media can be mounted at the front without tools (CX2550-0010) or by means of a plug-in frame (CX2550-0020), enabling fast and uncomplicated exchange of the storage medium.

The CX2550-0020 module can accept 2 1/2-inch storage media with a thickness of up to 9.5 mm. The internal SATA 6G port offers sufficient bandwidth even for the latest SSD storage media. The storage medium is protected by the attachable cap, which latches to the housing of the module.

Technical data	CX2550-0010	CX2550-0020
Interfaces	SATA	
Type of connection	CFast slot	2 1/2-inch slot
Diagnostics LED	1 x RDY, 1 x HDD	–
Power supply	via system bus (through CX2100-0xxx power supply modules)	
Dimensions (W x H x D)	24 mm x 99 mm x 91 mm	24 mm x 99 mm x 125 mm
Weight	approx. 280 g (without medium)	approx. 290 g (without medium)
Operating/storage temperature	-25...+60 °C/-40...+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals/markings	CE, UL	
Further information	www.beckhoff.com/CX2550-0010	www.beckhoff.com/CX2550-0020

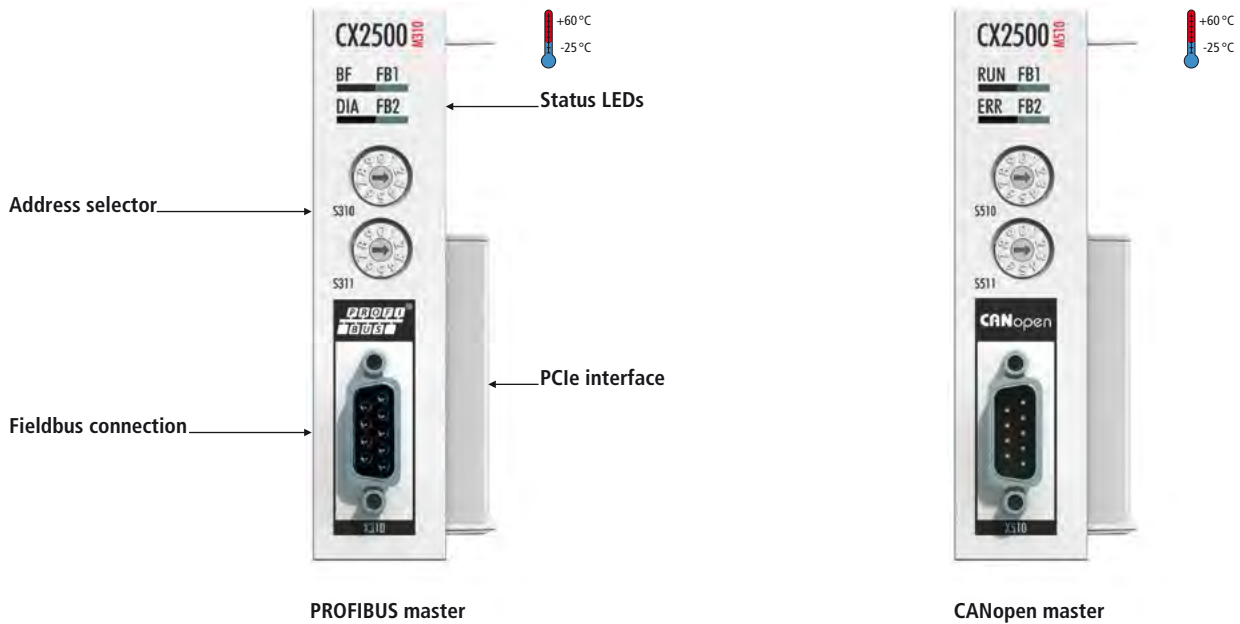


CX2550-0x79 | System modules USB extension for CX20xx

The CX2550-0x79 system modules are attachments for the CX20xx Embedded PC series. They transmit USB signals via a Cat. 5e cable over distances of up to max. 50 m. The CX2550-0179 system module transmits USB signals according to the USB 1.1 standard (full speed, max. 12 Mbit/s) while the CX2550-0279 system module transmits USB signals according to the USB 2.0 standard (high speed, max. 480 Mbit/s). Both modules can be attached at the right-hand side of a CX20xx-CPU and are placed between the power supply unit and the CPU. The internal connection is made via a USB port of the CX20xx-CPU; this way, no PCI Express resources are required or used. No additional drivers are required for operation since signal transformation and forwarding of the USB signals take place at the electrical level and are completely transparent for the operating system. Each module has four diagnostic LEDs, which indicate the status of the transmission standard in addition to the power. For better visibility the LEDs of the RJ45 sockets are redundantly implemented on the lower diagnostic LEDs.

The CX2550-0179 and CX2550-0279 modules supplement the CX20xx series by the function of the CU8800 and CU8801 USB extension for Industrial PCs and enable the direct connection of Beckhoff Control Panels with USB Extended interface. The CX2550-0179 system module is suitable for the connection of the Beckhoff CP69xx and CP79xx Control Panel series with USB Extended 1.1 connection. The CX2550-0279 system module is suitable for the connection of the Beckhoff CP29xx and CP39xx Control Panel series with USB Extended 2.0 connection.

Technical data	CX2550-0179	CX2550-0279
Interfaces	1 x USB Extended 1.1	1 x USB Extended 2.0
Type of connection	RJ45 socket	
Properties	transmission of USB 1.1 up to max. 50 m via Cat. 5e cable	transmission of USB 2.0 up to max. 50 m via Cat. 5e cable
Diagnostics LED	1 x power, 1 x speed, 1 x +15 V, 1 x suspend	1 x power, 1 x host, 1 x activity, 1 x link
Power supply	via system bus (through CX2100-0xxx power supply modules)	
Dimensions (W x H x D)	24 mm x 99 mm x 54.5 mm	
Weight	approx. 190 g	
Operating/storage temperature	-25...+60 °C/-40...+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals/markings	CE, UL	
Further information	www.beckhoff.com/CX2550-0179	www.beckhoff.com/CX2550-0279



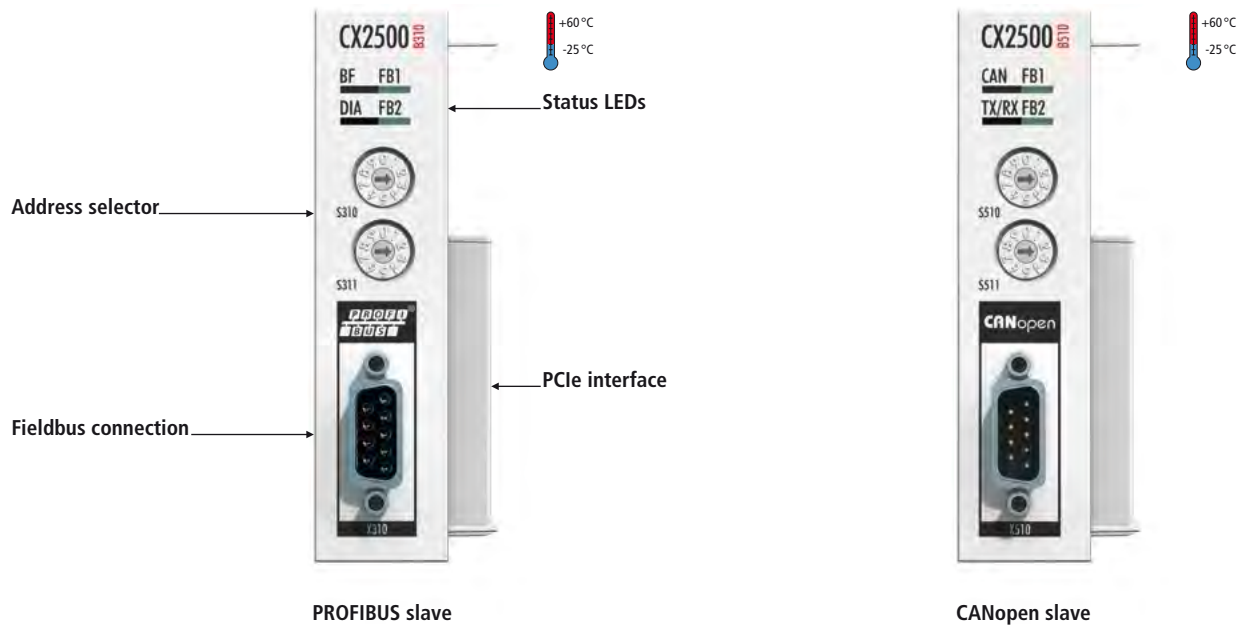
CX2500-Mxxx | Master fieldbus modules for CX20xx

The CX2500-Mxxx fieldbus master modules are left-sided attachments for the CX20xx Embedded PC series. The use of CX20xx systems with fieldbus master modules enables the segment-like construction of control structures in extensive plants and machines using further fieldbus components (Bus Couplers, Bus Terminal Controllers, Drive Technology, etc.).

The CX2500-M310 fieldbus master module assumes the function of a PROFIBUS master, while the CX2500-M510 is a CANopen master. Each of these modules occupies a PCI Express lane, so that a total of four modules can be connected in any desired combination to the left side of a CX20xx group. Compared with the Beckhoff PCIe Fieldbus Cards, the technical data of the fieldbus master modules are almost identical, but with single channels.

The parallel operation of several identical or different masters is possible, e.g. two PROFIBUS masters or a PROFIBUS master and a CANopen master. In the case of mixed operation of master and slave connections, CX systems act as intelligent gateways between different fieldbuses: data are received, processed and fed into other fieldbuses. Master or slave connections network several CX systems with one another strictly deterministically via the fieldbus level. CX fieldbus modules can be retrofitted/exchanged by adding them to existing CX systems. The scanning and recognizing of the modules, the parameterization, the configuration of the connected I/O components and the online diagnostics of the process/fieldbus status take place in the TwinCAT System Manager.

Technical data	CX2500-M310	CX2500-M510
Fieldbus	PROFIBUS DP, DP-V1; DP-V2 (MC) in preparation	CANopen
Data transfer rates	9.6 kbaud...12 Mbaud	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbaud
Bus interface	1 x D-sub socket, 9-pin	
Bus device	max. 125 slaves with up to 244 bytes input, output, parameter, configuration or diagnostic data per slave	max. 127 slaves
Interface to the CPU	PCI Express	
Max. power loss	2.8 W	
Dimensions (W x H x D)	24 mm x 99 mm x 54.5 mm	
Weight	approx. 180 g	
Operating/storage temperature	-25...+60 °C/-40...+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals/markings	CE, UL	
Further information	www.beckhoff.com/CX2500-M310	www.beckhoff.com/CX2500-M510



PROFIBUS slave

CANopen slave

CX2500-Bxxx | Slave fieldbus modules for CX20xx

The CX2500-Bxxx fieldbus slave modules are left-sided attachments for the CX20xx Embedded PC series. The use of CX20xx systems with fieldbus slave modules enables the use of a CX system as a subordinate local controller for the construction of complex or modular systems. External process data are received from the master and processed, or data from its own process peripherals are returned to the master controller directly or processed.

The CX2500-B310 fieldbus slave module assumes the function of a PROFIBUS slave, while the CX2500-B510 is a CANopen slave. Each of these modules occupies a PCI Express lane, so that a total of four of these modules can be connected in any desired combination to the left side of a CX20xx group. The fieldbus slave modules are single-channel modules. The CX2500-B310 fieldbus slave module for PROFIBUS can present itself to the master as a multiple (max. quadruple) virtual slave station, resulting in a four-fold increase in the quantity of exchanged process data.

The parallel operation of several identical or different slaves is possible, e.g. two PROFIBUS slaves or a PROFIBUS slave and a CANopen slave. In the case of mixed operation of master and slave connections, CX systems act as intelligent gateways between different fieldbuses: data are received, processed and fed into other fieldbuses.

Master or slave connections network several CX systems with one another strictly deterministically via the fieldbus level. CX fieldbus modules can be retrofitted/exchanged by adding them to existing CX systems. The scanning and recognizing of the modules, the parameterization, the configuration of the connected I/O components and the online diagnostics of the process/fieldbus status take place in the TwinCAT System Manager.

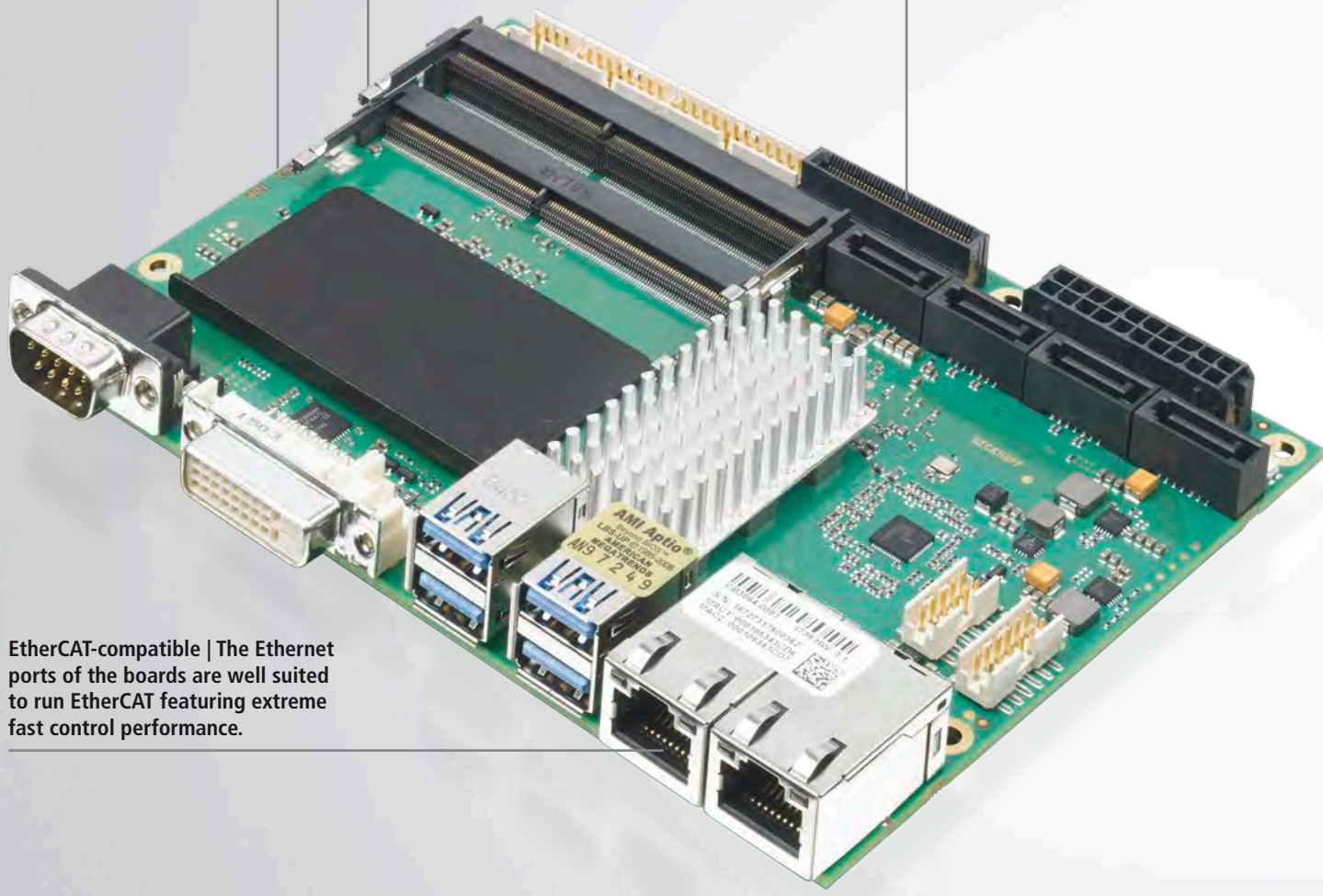
Technical data	CX2500-B310	CX2500-B510
Fieldbus	PROFIBUS DP, DP-V1	CANopen
Data transfer rates	9.6 kbaud...12 Mbaud	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbaud
Bus interface	1 x D-sub socket, 9-pin	
Bus device	max. 125 slaves	max. 127 slaves
Interface to the CPU	PCI Express	
Max. number of bytes	max. 244 byte input/244 byte output	max. 1536 byte input/1536 byte output
Max. power loss	2.8 W	
Dimensions (W x H x D)	24 mm x 99 mm x 54.5 mm	
Weight	approx. 180 g	
Operating/storage temperature	-25...+60 °C/-40...+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals/markings	CE, UL	
Further information	www.beckhoff.com/CX2500-B310	www.beckhoff.com/CX2500-B510

Industrial Motherboards

Simple cooling adaptation |
The layout of the boards is optimised for simple and efficient cooling.

Operating system support |
Beckhoff supports all Microsoft operating systems.

Auxiliary on-board interfaces |
On-board touch screen controller, I²C, SMB and GPIO reduce the overall bill of material for a device.



EtherCAT-compatible | The Ethernet ports of the boards are well suited to run EtherCAT featuring extreme fast control performance.



Motherboard series ATX



Motherboard series 3½-inch



Compact motherboard

Motherboards with Intel® x86 and ARM architecture

The industrial motherboards are subject to a complete process control, with in-house board development, design and production. In addition, the own motherboard and BIOS development initiatives enable Beckhoff to respond more quickly to new technologies in the PC market and to customer-specific requirements.

Flexible PC BIOS software

BIOS source code access for Phoenix and AMI BIOS makes it possible to adapt to special board functions or introduce specific customer requirements. BIOS functionality very much depends on the field of usage for a motherboard: commercial applications typically require a balance between power dissipation and program load, the industrial usage often requires full CPU availability at any time. For example, settings for speed stepping and thermal monitoring need to be adapted in the BIOS to reflect the different usage modes.

Standard form factors

Typical form factors such as 3½-inch and ATX are supported. The 3½-inch form factor is characterised by its compact dimensions and simple cooling adaptation. No specially adapted cables are required for fast commissioning. In general, Beckhoff provides all form factors with one chipset. This allows the construction of a family with architecture-identical devices.

Long-term availability

Beckhoff-Embedded-PCs are made available for a minimum of five years, based on the general market availability of the components. All components are selected according to the longevity of supply. CPUs and chipsets, for example, are selected only if they are part of the embedded product line of the manufacturer.

Manufacturing quality

In the in-house motherboard production, quality is the highest priority. That is why only these high-quality components are used in Beckhoff Embedded PCs. The focus is robustness and reliability; only high quality

electronic components are used. All boards must pass a visual, electrical and functional inspection. The manufacturing date and serial number are clearly marked on the boards.

Customer-specific adaptation and integration services

Board and BIOS can be adapted to meet the needs of a customized device. Furthermore, Beckhoff is experienced in designing and producing complete embedded units, including the housing, display, various other electrical and mechanical interfaces, operating systems and application software.

Beckhoff Motherboards – Hightech from Westphalia, Germany

The complete engineering and design cycle as well as manufacturing of the boards takes place in Westphalia, Germany, at two locations: in Münster and at the Beckhoff headquarters in Verl. This local geographical context ensures short turnaround cycles between engineering, production and quality control. It also ensures that reaction time on customer feedback is the shortest possible.



Highlights

- comprehensive, modular I/O system for all signal types and fieldbus systems
- universal product range optimised for EtherCAT
- high investment security: mature I/O technology based on more than 20 years of success in the field

Fieldbus Components

I/Os for all common fieldbus systems

► www.beckhoff.com/FieldbusComponents

284 Modular I/O system

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I/O

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Modular I/O system for all signal types and fieldbus systems

Beckhoff supplies a complete range of fieldbus components for all common I/O and bus systems. With Bus Terminals offering IP 20 protection and Fieldbus Box modules in IP 67, 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 optimised for EtherCAT. Invented by Beckhoff, this real-time Ethernet solution for industrial automation has global acceptance and is characterised by outstanding performance and simple handling. The result is high-precision machine and plant control and significantly increased production efficiency.

EtherCAT

EtherCAT (Ethernet Control Automation Technology) is the Ethernet solution for industrial automation, characterised by outstanding performance and particularly simple handling.

Ethernet

The advantages of Ethernet, such as high data transmission rates, easy methods of integration into existing networks, and a wide range of services and interfaces are also found in the Beckhoff Ethernet products.

Lightbus

This well proven fibre optics bus system from Beckhoff is characterised by particularly good immunity to EMI, easy installation and a very fast, cyclic and deterministic data flow.

PROFIBUS

PROFIBUS is widely used as a fast bus for decentralised peripheral components (PROFIBUS DP). In addition to PROFIBUS DP and FMS, Beckhoff also supports the standard for drive communication, PROFIBUS MC.

PROFINET

PROFINET is the open Industrial Ethernet standard of the PNO (PROFIBUS users organisation). Internationally established IT standards such as TCP/IP are used for communication.

EtherNet/IP

EtherNet/IP is the Industrial Ethernet standard of the ODVA (Open DeviceNet Vendor Association). EtherNet/IP is based on Ethernet TCP/IP and UDP/IP.

CANopen

The effective utilisation of the bus bandwidth allows CANopen to achieve a short system reaction time at comparatively low data rates. The typical advantages of CAN, such as high data security and multi-master capability are retained.

DeviceNet

DeviceNet is a sensor/actuator bus system that originated in the USA, but which meanwhile is increasingly being used in Europe and Asia. DeviceNet is CAN-based (Controller Area Network).

SERCOS

SERCOS was originally developed as a fast fibre optic bus system for drives. Thanks to the Beckhoff SERCOS Bus Coupler, the advantages such as high data rate and short cycle times can now be provided for the I/O peripherals too.

Modbus RTU

Modbus RTU is an open, serial communications protocol based on the master/slave architecture. Since it is extremely easy to implement on all kinds of serial interfaces, it has gained wide acceptance.

Modbus TCP

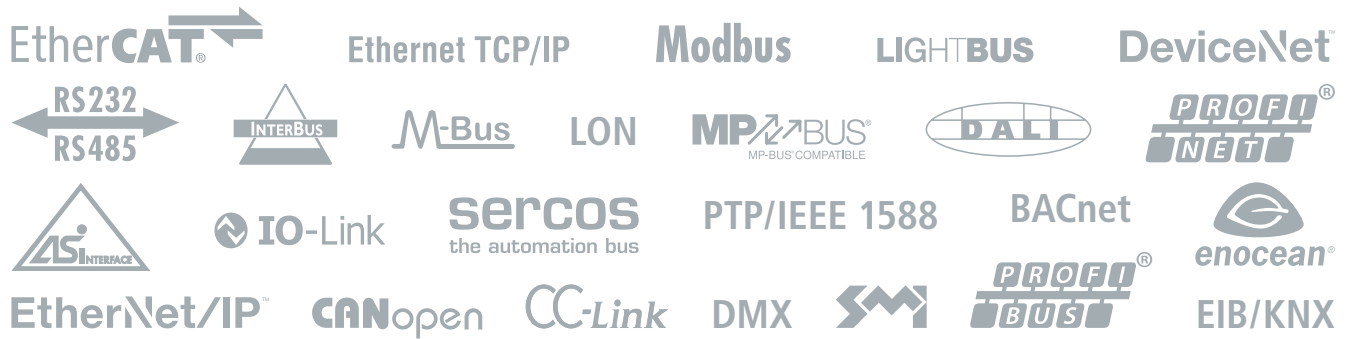
Due to its open standards Modbus TCP is common for the use of Ethernet in the fields of automation. Modbus TCP has a so called "Well known port (Port 502)", which makes it routable via the Internet.

RS232/RS485

The classic serial interfaces, RS232 and RS485, continue in wide use. The Beckhoff RS485/RS232 I/O modules use a simple, published serial communication protocol that is easy to implement.

IO-Link

IO-Link serves to connect sensors and actuators to the control level by means of an inexpensive point-to-point connection. As an open interface, IO-Link can be integrated in all common fieldbus systems.



EnOcean

EnOcean enables the battery-free transmission of switching signals and measured values and is mainly used in building automation.

BACnet

BACnet (Building Automation Control Network) is a standardised, manufacturer-independent communication protocol for building automation, based on Ethernet. Areas of application include HVAC, lighting control, safety and fire alarm technology.

AS-Interface

AS-Interface connects sensors and actuators with the higher control level via a simple and low-priced wiring method. AS-Interface is internationally standardised through EN 50295 and IEC 62026-2.

DALI

In building automation DALI is a standard for digital control of electronic ballasts for lighting.

EIB/KNX

The local two-wire bus system EIB/KNX for the connection of sensors and actuators has its main area of use in building automation, since it is well suited for implementation in various functionalities.

LON

LON (Local Operating Network) is a multi-network-capable communication system for distributed applications. It is predominately used for automation applications in commercial buildings.

DMX

As bus system for professional lighting equipment DMX (Digital Multiplexing) controls dynamic lighting in stage and event business as well as lighting of exclusive displays of light and color in high-profile buildings.

MP-Bus

As simple sensor/actuator bus for HVAC systems the MP-Bus (Multi Point Bus) serves to control flaps and volumetric flow rate controllers alongside valves and window ventilation systems.

SMI

Standard Motor Interface (SMI) is a standard interface for the control of electronic drives for sun blinds and roller shutters e.g. via bus topologies used in building automation.

M-Bus

The M-Bus (Metering Bus) is used as a standardised system for reading energy and consumption meters or other end devices in buildings and properties with a large number of end users (see EN 13757).

IEEE 1588 PTP

The Precision Time Protocol (PTP) secures the synchronicity of the time settings of several devices in a network and is defined in IEEE 1588 as the protocol standard for the synchronisation of distributed clocks in networks.

CC-Link

CC-Link (Control & Communication Link) is an open bus system for communication between the control and fieldbus level. It is predominately used in Asia.

Product overview fieldbus systems

Fieldbus	EtherCAT Terminals	EtherCAT Box	EtherCAT Plug-in Modules	Bus Terminals	Fieldbus Box	
	Couplers/Gateways	Modules		Bus Couplers/ Master terminals	PLC (IEC 61131-3)	Compact Box
EtherCAT	EK1xxx, EKM1xxx	EPxxxx	EJxxxx	BK1120		
	EL6695 bridge	ERxxxx		BK1150		
		EQxxxx		BK1250		
EtherCAT P	EK13xx	EPPxxxx				
		EP1312				
LIGHT BUS	EL6720 master			BK2020		IPxxxx-B200
PROFINET	EK3100			BK3xx0	BC3150	IPxxxx-B31x
	EL6731 master/slave				BX3100	
INTERBUS	EL6740-0010 slave			BK4020		IPxxxx-B400
CANopen	EL6751 master/slave			BK51xx	BC5150	IPxxxx-B51x
					BX5100	
DeviceNet	EL6752 master/slave			BK52x0	BX5200	IPxxxx-B52x
CC-Link	EL6711-0010 slave			BK7150		
Modbus				BK7350		IPxxxx-B730
SERCOS				BK7520		
RS485	EL6021, EL6022	EP600x	EJ6002	BK8000	BC8050	IPxxxx-B800
		EPP600x		KL6021	BX8000	
				KL6041		
RS232	EL6001, EL6002	EP600x	EJ6002	BK8100	BC8150	IPxxxx-B810
		EPP600x		KL6001	BX8000	
				KL6031		
Ethernet TCP/IP	EK9000			BK9xx0	BC9xxx	
	EL6601, EL6614 switch port				BX9000	
PROFINET	EK9300	EP9300		BK9xx3		
	EL6631 RT controller/device					
	EL6632 IRT controller					
EtherNet/IP	EK9500			BK9xx5		
	EL6652 scanner/adapter					
AS-Interface	EL6201			KL62x1		
IO-Link	EL6224 master	EP622x,	EJ6224	KL6224		
		EPP6228 master	master	master		
EIB/KNX				KL6301		
LON				KL6401		
MP-Bus				KL6771		
M-Bus				KL6781		
DALI/DSI				KL6811		
DALI-2				KL6821		
IEEE 1588	EL6688					
DMX	EL6851					
EnOcean				KL658x		
SMI				KL6841		
BACnet	EL6861					

			Fieldbus Modules	Infrastructure Components	Embedded PC 192	Drive Technology 328
Coupler Box	PLC Box (IEC 61131-3)	IO-Link box	For thermo-couples/mV	Interfaces	Master/Slave	Servo Drives
IL230x-B110			FM33xx-B110	FC90xx, FC11xx CUxxxx EP9xxx	CXxxxx 194	AX8000 360 AX5000 372 AMI8100 456
IL230x-B200				FC200x	CX1500-M200 243	
IL230x-B31x	IL230x-C31x		FM33xx-B310	FC31xx	CXxxxx 194 CX2500-M/B310 278	
IL230x-B400						
IL230x-B51x				FC51xx	CXxxxx 194 CX2500-M/B510 278	
IL230x-B52x				FC52xx	CX1500-M/B520 243	
IL230x-B730					CXxxxx 194	
IL230x-B800				FC75xx	CXxxxx 194 CXxxxx 194	
IL230x-B810	IL230x-C810				CXxxxx 194	
IL230x-B90x	IL230x-C900			FC90xx CU2xxx, CU2508 Ethernet Switch	CXxxxx 194	
IL230x-B903				CU2508	CXxxxx 194	
IL230x-B905				CU2508	CXxxxx 194	
		EPxxxx, ERxxxx devices				

Product overview signal types

Signal	EtherCAT Terminals		EtherCAT Box		
			Industrial housing	Zinc die-cast housing	Stainless steel housing
Digital input					
5/12/48/60 V DC	EL1xxx	ELM274x			
24 V DC	EL1xxx		EP1xxx	ER1xxx	EQ1xxx
120 V AC/DC	EL1712				
230 V AC	EL17x2				
Safety	EL19xx		EP19xx		
NAMUR	EL105x				
Thermistor	EL1382				
Counter	EL15x2		EP1518	ER1518	
Digital output					
5 V DC/12 V DC	EL2x24				
24 V DC	EL2xxx		EP2xxx	ER2xxx	EQ2xxx
30 V AC/DC	EL27xx		EP2624	ER2624	
125 V AC/DC					
230 V AC	EL2xxx				
400 V AC					
Safety	EL29xx				
PWM	EL25xx				
Digital combi					
24 V DC	EL1859		EP23xx	ER23xx	EQ23xx
	EL1259				
Safety			EP1957		
Analog input					
Multi-function	EL3751				
±10 V, ±20 mA, NAMUR NE43	EL3174				
0...2 V, ±2 V					
0...10 V	EL3x6x		EP31xx	ER31x4	EQ3174
±10 V	EL3x0x		EP31xx	ER31x4	EQ3174
0...20 mA	EL3xxx		EP31xx	ER31x4	EQ3174
4...20 mA	EL3xxx		EP31xx	ER31x4	EQ3174
Resistance thermometer	EL32xx		EP32xx	ER3204	EQ3204
Thermocouple/mV	EL331x		EP3314	ER3314	EQ3314
Measurement bridge	EL335x		EP3356		
Potentiometer	EL3255				
Power meas./Condition Monitor.	EL3xxx	ELM3xxx	EP3632		
Pressure measurement	EM37xx		EP3744		
Analog output					
0...10 V	EL4x0x		EP4x74	ER4x74	
±10 V	EL4x3x		EP4x74	ER4x74	
24 V DC			EP4378-1022		
0...20 mA	EL4x1x		EP4x74	ER4x74	
4...20 mA	EL4x2x		EP4x74	ER4x74	
Special functions					
SSI sensor interface	EL500x		EP5001		
EnDat 2.2 interface	EL5032				
Incremental encoder interface	EL51xx		EP51x1	ER51x1	
RS232, RS485, TTY, IO-Link	EL60xx		EP6xxx	ER600x	
Compact Drive Technology	EL7xxx		EP7xxx	ER7x4x	
Overcurrent protection	EL922x				
Multi-functional			EP8309	ER8309	

	EtherCAT P Box	EtherCAT Plug-in Modules	Bus Terminals		Fieldbus Box	
	Industrial housing		Bus Terminals	Terminal Modules	Compact Box, Coupler/ PLC Box, Extension Box	IO-Link box (industrial/ zinc die-cast housing)
	EPP1xxx	EJ1128 EJ1xxx	KL1124 KL1xxx KL1712 KL17x2 KL1904 KL1352 KL1382 KL15xx	KM1xxx	IP10xx-Bxxx, IE10xx	EPI1xxx, ERI1xxx
	EPP1518	EJ19xx			IP1502-Bxxx, IE1502	
	EPP2xxx EPP2624	EJ2128 EJ2xxx	KL2124 KL2xxx KL27xx KL2612 KL2xxx KL2631 KL2904 KL25xx	KM20xx KM2xxx	IP20xx-Bxxx, IE2xxx	EPI2xxx, ERI2xxx
	EPP23xx	EJ1859 EJ1957	KL1859		IP/IL23xx-Bxxx, IE23xx IL230x-Cxxx	EPI23xx, ERI23xx
	EPP31x4 EPP31x4 EPP31x4 EPP31x4 EPP3204 EPP3314	EJ3068 EJ3x0x EJ3048 EJ3058 EJ32xx EJ3318	KL31x2 KL3x6x KL3xxx KL3xxx KL3xxx KL32xx KL331x KL335x		IP3102-Bxxx, IE3102 IP3102-Bxxx, IE3102 IP3112-Bxxx, IE3112 IP3112-Bxxx, IE3112 IP3202-Bxxx, IE3202 IP3312-Bxxx, IE3312	EPI3174, ERI3174 EPI3174, ERI3174 EPI3174, ERI3174 EPI3174, ERI3174
	EPP3632 EPP3744	EJ3255	KL3xxx KM37xx			
	EPP4x74 EPP4x74	EJ400x EJ413x	KL4x0x KL4xxx	KM4602	IP4132-Bxxx, IE4132 IP4132-Bxxx, IE4132	EPI4374, ERI4374 EPI4374, ERI4374
	EPP4x74 EPP4x74	EJ4018 EJ4024	KL4x1x KL402x		IP4112-Bxxx, IE4112 IP4112-Bxxx, IE4112	EPI4374, ERI4374 EPI4374, ERI4374
	EPP5001	EJ5002	KL50x1		IP5009-Bxxx, IE5009	
	EPP51x1 EPP6xxx EPP7xxx	EJ51x1 EJ6xxx EJ7xxx	KL51xx KL60x1 KL25x1		IP5109-Bxxx, IE5109 IP60x2-Bxxx, IE60x2	

System overview EtherCAT I/O



EK EtherCAT Coupler series



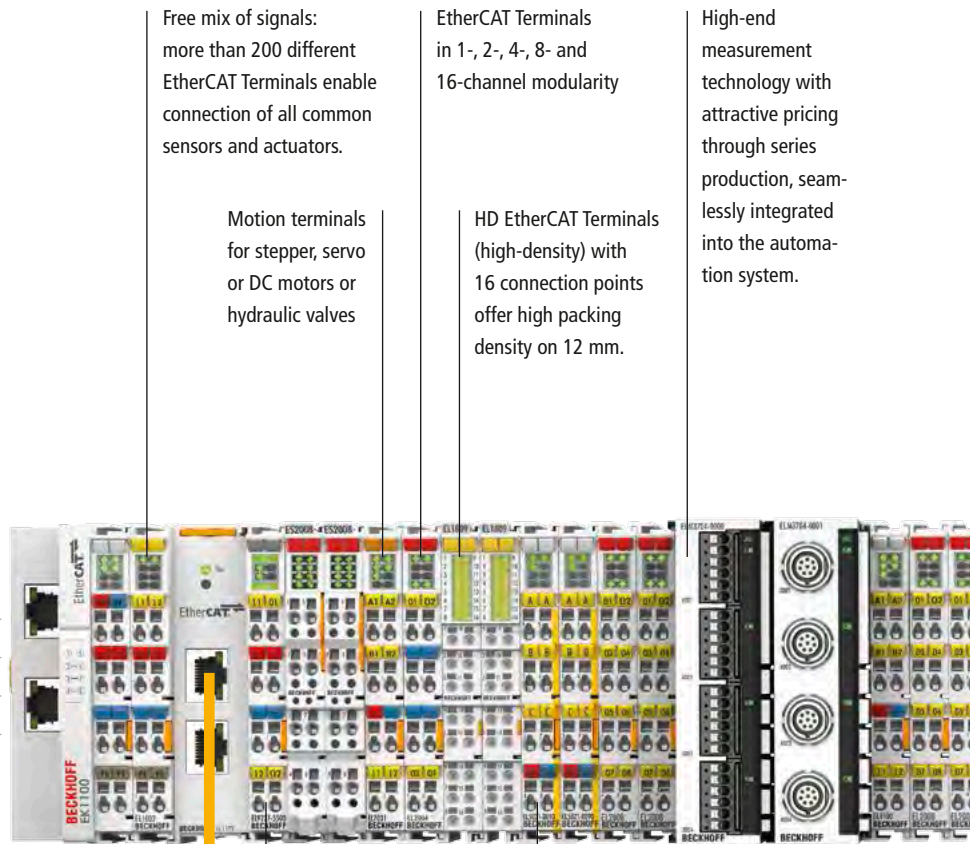
EtherCAT Coupler with integrated digital I/Os



Bus Coupler (e.g. PROFIBUS) for EtherCAT Terminals



Embedded PC series CX, further Embedded PCs see page 192



Free mix of signals: more than 200 different EtherCAT Terminals enable connection of all common sensors and actuators.

Motion terminals for stepper, servo or DC motors or hydraulic valves

EtherCAT Terminals in 1-, 2-, 4-, 8- and 16-channel modularity

HD EtherCAT Terminals (high-density) with 16 connection points offer high packing density on 12 mm.

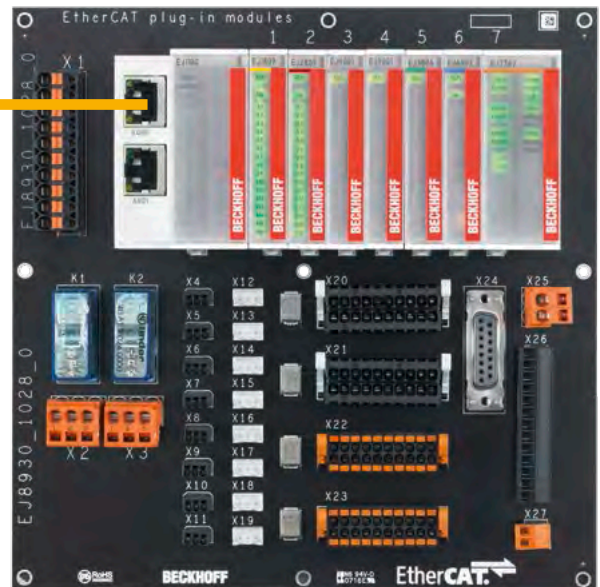
High-end measurement technology with attractive pricing through series production, seamlessly integrated into the automation system.

100 m Industrial Ethernet cable (100BASE-TX)

Integrated electronic overcurrent protection for safeguarding of potential groups incl. monitoring function

With the aid of the TwinSAFE SC technology it is possible to make use of standard signals for safety tasks in any network or fieldbus.

EtherCAT plug-in modules: very compact EtherCAT I/O system in IP 20 for plug-in into a circuit board (signal distribution board)



TwinSAFE: safety I/Os and compact Safety PLC for up to 212 safety-relevant bus devices

Ultra-fast I/O terminals for I/O response times < 100 µs for fast I/O, oversampling and timestamping

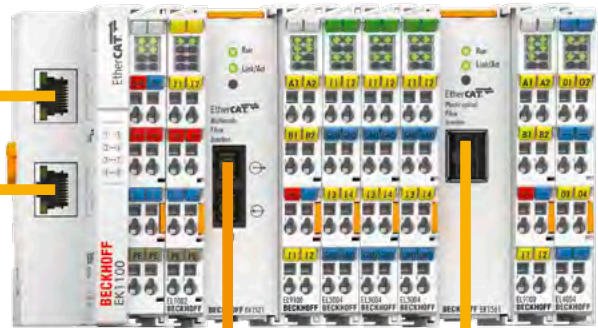
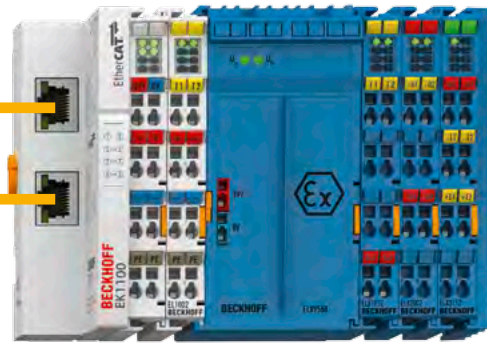
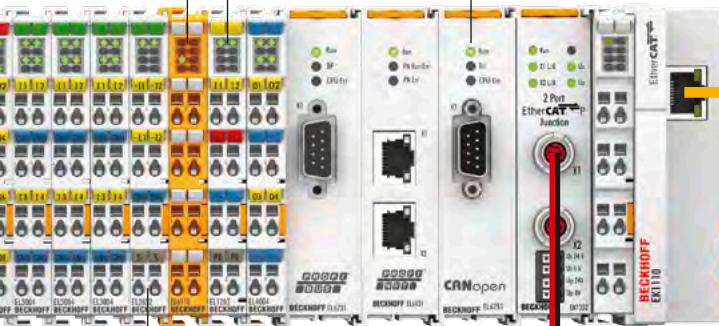
Optional fieldbus integration via decentralized fieldbus master/slave terminals

ELX terminals: direct connection of intrinsically safe sensors and actuators

2000/20,000 m fibre optic (100BASE-FX)

50 m Plastic Optical Fibre (100BASE-FX POF)

High-speed measurement, high-precision measurement, condition monitoring, energy monitoring



IP 67
EtherCAT P
Box

IP 67
EtherCAT
Box

IP 69K EtherCAT Box
(stainless steel)

IP 67
EtherCAT Box
(die-cast zinc)

Product overview EtherCAT Terminals



EtherCAT Couplers

EtherCAT Couplers E-bus	EK1100	EK1100-0008 M8 connection	EK1000 Ethernet/TSN	EK1300 EtherCAT P	EK1400 EtherCAT G
	EK1101 ID switch	EK1101-0008 ID switch, M8 connection	EK1101-0010 ID switch, Extended Distance	EK1101-0080 ID switch, Fast Hot Connect	EKM1101 ID switch and diagnostics
	EK1501 ID switch, multimode fibre optic	EK1501-0010 ID switch, singlemode fibre optic	EK1501-0100 ID switch, multimode fibre optic to RJ45	EK1541 ID switch, POF	
EtherCAT Couplers E-bus with integrated digital I/Os	EK1814 4 inputs + 4 outputs	EK1818 8 inputs + 4 outputs	EK1828 4 inputs + 8 outputs	EK1828-0010 8 outputs	
	EK1914 4 standard inputs, 4 standard outputs, 2 safe inputs, 2 safe outputs	EK1960 TwinSAFE Logic, 20 safe inputs, 24 safe outputs			
EtherCAT Couplers K-bus	BK1120 Bus Coupler (Economy plus)	BK1150 "Compact"	BK1250 E-bus to K-bus interface		
Bus Couplers (for ELxxxx)	EK3100 PROFIBUS	EK9000 Modbus TCP/UDP	EK9160 IoT (MQTT, OPC UA)	EK9300 PROFINET RT	EK9500 EtherNet/IP
Extension system and junctions	EK1110 extension end terminal	EK1110-0008 extension end terminal, M8	EK1110-0043 EtherCAT EJ coupler, CX and EL terminal connection	EK1110-0044 EtherCAT EJ coupler, CX and EL terminal connection, EtherCAT junction	EK1121-0010 1-port junction, Extended Distance
	EK1122 2-port junction	EK1122-0008 2-port junction, M8	EK1122-0080 2-port junction, Fast Hot Connect	EK1310 EtherCAT P extension with feed-in	EK1322 EtherCAT P junction with feed-in
	EK1521 multimode fibre optic junction	EK1521-0010 singlemode fibre optic junction	EK1561 POF junction		

EtherCAT Terminals | Digital input 24 V DC: EL1xxx/ES1xxx

Signal	2-channel	4-channel	8-channel	16-channel
Filter 3.0 ms	EL1002 type 3	EL1004 type 3	EL1004-0020 > 2500 V	EL1008 type 3, 1-wire
		EL1104 type 3, with sensor supply	EL1804 type 3, 8 x 24 V, 4 x 0 V	EL1808 type 3, 8 x 24 V DC, 2-wire
		EL1084 ground switching	EL1024 type 2	EL1088 ground switching
				EL1809 type 3
				EL1852 type 3, 8 inputs, 8 outputs, $I_{max} = 0.5$ A, flat-ribbon cable
				EL1859 type 3, 8 inputs, 8 outputs, $I_{max} = 0.5$ A
				EL1862 type 3, flat-ribbon cable
				EL1862-0010 flat-ribbon cable, ground switching
				EL1889 ground switching
Filter 10 μs	EL1012 type 3	EL1014 type 3	EL1034 type 1, potential-free inputs	EL1018 type 3
		EL1114 type 3, with sensor supply	EL1814 type 3, 8 x 24 V, 4 x 0 V, 3-wire	
			EL1094 ground switching	EL1098 ground switching
				EL1819 type 3
				EL1872 type 3, flat-ribbon cable
				EL1872-0010 flat-ribbon cable, ground switching
XFC: T_{ON}/T_{OFF} 1 μ s	EL1202 type 3, fast input			
	EL1252 type 3, timestamping	EL1254 type 3, timestamping	EL1258 multi-timestamping	EL1259 8 multi-timestamping inputs and outputs
	EL1262 type 3, oversampling			
Counter	EL1502 type 1, 100 kHz, 32 bit			
	EL1512 type 1, 1 kHz, 32 bit			
Safe input		EL1904 TwinSAFE, 4 safe inputs	EL2911 TwinSAFE Logic, 4 safe inputs, 1 safe output	EL1918 TwinSAFE Logic, 8 safe inputs

EtherCAT Terminals | Digital input: EL1xxx/ES1xxx/ELX1xxx

Signal	2-channel	4-channel	8-channel
5 V DC		EL1124	
12 V DC		EL1144	
48 V DC		EL1134 type 1	
120 V AC/DC	EL1712 power contacts		
120 V DC	EL1712-0020 power contacts		
120...230 V AC	EL1702 power contacts		
	EL1722 no power contacts		
220 V DC	EL1702-0020 power contacts		
Thermistor	EL1382		
NAMUR	EL1052	EL1054	
Ex i, NAMUR	ELX1052	ELX1054	ELX1058

The standard EtherCAT Terminals (ELxxx) can be optionally ordered as ESxxxx with pluggable wiring level.
EN 61131-2 specification ► www.beckhoff.com/EN61131-2

EtherCAT Terminals | Digital output 24 V DC: EL2xxx/ES2xxx/ELX2xxx

Signal	1-channel	2-channel	4-channel	8-channel	16-channel
$I_{max} = 0.5 \text{ A}$		EL2002	EL2004	EL2008	EM2042 D-sub connection
			EL2014 with diagnostics	EL2878-0005 flat-ribbon cable, with diagnostics	EL2872 flat-ribbon cable
				EL2808 8 x 0 V	EL2809
				EL1852 type 3, 8 inputs, 8 outputs, $I_{max} = 0.5 \text{ A}$, flat-ribbon cable	EL2819 with diagnostics
			EL2084 ground switching	EL2088 ground switching	EL2889 ground switching
				EL1859 type 3, 8 inputs, 8 outputs, filter 3.0 ms	EL2872-0010 flat-ribbon cable, ground switching
$I_{max} = 2.0 \text{ A}$		EL2022 EL2032 with diagnostics	EL2024 EL2034 with diagnostics EL2044 with extended diagnostics	EL2828	
$I_{max} = \sum 8.0 \text{ A}$		EL2042 2 x 4.0 A/1 x 8.0 A			
XFC: $T_{ON}/T_{OFF} 1 \mu\text{s}$		EL2202 push-pull outputs	EL2212 overexcitation, multi-timestamping	EL1259 8 multi-timestamping inputs and outputs	
		EL2252 timestamping	EL2262 oversampling	EL2258 multi-timestamping	
Ex i		ELX2002		ELX2008	
Safe output	EL2911 TwinSAFE Logic, 4 safe inputs, 1 safe output	EL2912 TwinSAFE Logic, 2 safe outputs	EL2904 TwinSAFE, 4 safe outputs		

EtherCAT Terminals | Digital output: EL2xxx/ES2xxx/ELM2xxx

Signal	2-channel	4-channel	8-channel
5 V DC		EL2124 $I_{max} = \pm 20 \text{ mA}$	
12 V DC		EL2024-0010 $I_{max} = 2.0 \text{ A}$	
30 V AC/DC ($I_{max} = 2.0 \text{ A}$)		EL2784 EL2794 potential-free	EL2788 EL2798 potential-free
48 V AC/DC	ELM2742-0000 2 x multiplexer, 1 x 4 solid-state relays	ELM2744-0000 4 x multiplexer, 1 x 4 solid-state relays	
Relay (up to 230 V AC)	EL2602 $I_{max} = 5.0 \text{ A}$, make contact, power contacts	EL2622 $I_{max} = 5.0 \text{ A}$, make contact, no power contacts	EL2612 $I_{max} = 2.0 \text{ A}$, change-over, no power contacts
	EL2602-0010 $I_{max} = 5.0 \text{ A}$, make contact, power contacts, contact- protecting switching	EL2622-0010 $I_{max} = 5.0 \text{ A}$, make contact, no power contacts, contact- protecting switching	EL2652 $I_{max} = 1.0 \text{ A}$, change-over, no power contacts
			EL2624 $I_{max} = 2.0 \text{ A}$, make contact, no power contacts
			EL2634 $I_{max} = 4.0 \text{ A}$, make contact, 250 V AC/30 V DC

The standard EtherCAT Terminals (ELxxxx) can be optionally ordered as ESxxxx with pluggable wiring level.

EtherCAT Terminals | Digital output: EL2xxx/ES2xxx/ELM2xxx

Signal	1-channel		2-channel	
Triac (12...230 V AC)			EL2712 $I_{max} = 0.5 A$, power contacts	EL2722 $I_{max} = 1.0 A$, mutually locked outputs
PWM			EL2502 push-pull outputs, separate frequency can be set for each channel	EL2502-0010 push-pull outputs, separate frequency can be set for each channel, timestamping
Frequency output	EL2521 1-channel AB, 0...500 kHz, RS422		EL2522 2-channel AB, 1-channel ABC, 0...4 MHz	
	EL2521-0024 1-channel AB, 0...500 kHz, 24 V DC			
Current control	EL2595 LED constant current terminal	EL2596 LED strobe control, 24 V DC	EL2535 24 V DC, $I_{max} = \pm 50 mA$, $\pm 1 A$, $\pm 2 A$	EL2545 50 V DC, $I_{max} = \pm 3.5 A$
	EL2596-0010 LED strobe control, 48 V DC		EL2535-0005 24 V DC, $I_{max} = \pm 5 A$	

EtherCAT Terminals | Analog input: EL3xxx/ES3xxx/ELM3xxx/ELX3xxx

Signal	1-channel		2-channel		4-channel		5-/6-/8-channel
$\pm 10 V$	EL3001 single-ended, 12 bit		EL3002 single-ended, 12 bit		EL3004 single-ended, 12 bit		EL3008 single-ended, 12 bit
	EL3101 differential input, 16 bit		EL3102 differential input, 16 bit	EL3602 differential input, 24 bit	EL3104 differential input, 16 bit		
			EL3702 differential input, 16 bit, oversampling				
0...10 V	EL3061 12 bit	EL3161 16 bit	EL3062 12 bit	EL3162 16 bit	EL3064 12 bit	EL3164 16 bit	EL3068 12 bit
0...30 V			EL3062-0030 12 bit				
$\pm 30 V \dots$ $\pm 20 mV$			ELM3002-0000 24 bit, 20 ksps, push-in		ELM3004-0000 24 bit, 10 ksps, push-in		
$\pm 200 mV$			EL3602-0002 differential input, 24 bit				
$\pm 150 mV$			EL3702-0015 differential input, 16 bit, oversampling				
$\pm 75 mV$			EL3602-0010 differential input, 24 bit				
$\pm 10 V /$ 0...20 mA					EL3174 16 bit, NAMUR NE43	EL3174-0002 16 bit, electrically isolated, NAMUR NE43	
					EL3174-0032 16 bit, electrically isolated, NAMUR NE43, $\pm 3 V$	EL3174-0090 16 bit, NAMUR NE43, TwinSAFE SC	
			ELM3142-0000 24 bit, 1 ksps, push-in		ELM3144-0000 24 bit, 1 ksps, push-in		ELM3146-0000 24 bit, 1 ksps, push-in
							ELM3148-0000 24 bit, 1 ksps, push-in

EtherCAT Terminals | Analog input: EL3xxx/ES3xxx/ELM3xxx/ELX3xxx

Signal	1-channel		2-channel		4-channel		5-/6-/8-channel
0...20 mA	EL3041 single-ended, 12 bit	EL3141 single-ended, 16 bit	EL3042 single-ended, 12 bit	EL3142 single-ended, 16 bit	EL3044 single-ended, 12 bit	EL3144 single-ended, 16 bit	EL3048 single-ended, 12 bit
	EL3011 differential input, 12 bit	EL3111 differential input, 16 bit	EL3742 differential input, 16 bit, oversampling	EL3012 differential input, 12 bit	EL3014 differential input, 12 bit	EL3114 differential input, 16 bit	
			EL3112 differential input, 16 bit	EL3612 differential input, 24 bit			
4...20 mA	EL3051 single-ended, 12 bit	EL3151 single-ended, 16 bit	EL3052 single-ended, 12 bit	EL3152 single-ended, 16 bit	EL3054 single-ended, 12 bit	EL3154 single-ended, 16 bit	EL3058 single-ended, 12 bit
	EL3021 differential input, 12 bit	EL3121 differential input, 16 bit	EL3022 differential input, 12 bit	EL3122 differential input, 16 bit	EL3024 differential input, 12 bit	EL3124 differential input, 16 bit	
		EL3621-0020 differential input, 24 bit	EL3182 single-ended, 16 bit, HART			EL3124-0090 16 bit, TwinSAFE SC	
Ex i, 0/4...20 mA	ELX3181 4...20 mA, single-ended, 16 bit, HART		ELX3152 0/4...20 mA, single-ended, 16 bit	ELX3152-0090 0/4...20 mA, single-ended, 16 bit, TwinSAFE SC	ELX3184 4...20 mA, single-ended, 16 bit, HART		ELX3158 0/4...20 mA, single-ended, 16 bit
±20 mA			EL3112-0011 differential input, 16 bit	ELM3102-0000 24 bit, 20 ksps, NAMUR NE43, push-in	ELM3104-0000 24 bit, 10 ksps, NAMUR NE43, push-in		
±10 mA			EL3142-0010 single-ended, 16 bit				
Multi-function	EL3751 24 bit, 10 ksps	EL3751-0004 24 bit, 10 ksps	ELM3702-0000 24 bit, 10 ksps, push-in		ELM3704-0000 24 bit, 10 ksps, push-in	ELM3704-0001 24 bit, 10 ksps, LEMO	
Thermo- couple/mV	EL3311 16 bit		EL3312 16 bit		EL3314 16 bit	EL3314-0090 16 bit, TwinSAFE SC	EL3318 16 bit
					EL3314-0002 24 bit, electrically isolated		
Ex i, thermo- couple/mV			ELX3312 16 bit	ELX3312-0090 16 bit, TwinSAFE SC	ELX3314 16 bit	ELX3314-0090 16 bit, TwinSAFE SC	
Resistance thermometer (RTD)	EL3201 16 bit		EL3202 16 bit		EL3204 2-wire, 16 bit		EL3208 16 bit
					EL3204-0162 2-wire, 16 bit, 2 x RTD, 2 x ±10 V	EL3204-0200 16 bit, universal input for RTD	EL3208-0010 PT1000, Ni1000, NTC 1.8...100 k, potentiom. 1, 5, 10 kΩ
					EL3214 3-wire, 16 bit	EL3214-0090 16 bit, TwinSAFE SC	EL3218 3-wire, 16 bit
Ex i, resistance thermometer (RTD)			ELX3202 16 bit	ELX3202-0090 16 bit, TwinSAFE SC	ELX3204 2-wire, 16 bit	ELX3204-0090 2-wire, 16 bit, TwinSAFE SC	
Measurement bridge (SG)	EL3351	EL3356 self-calibration	ELM3502-0000 24 bit, 20 ksps, push-in		ELM3504-0000 24 bit, 10 ksps, push-in		
	EL3356-0010 24 bit, 10 ksps	EL3356-0090 TwinSAFE SC	ELM3542-0000 24 bit, 1 ksps, push-in		ELM3544-0000 24 bit, 1 ksps, push-in		
Ex i, measurement bridge (SG)	ELX3351 24 bit	ELX3351-0090 24 bit, TwinSAFE SC					
Measurement technology	EL3681 digital multimeter terminal, 18 bit		EL3692 resistance measurement, 100 mΩ...10 MΩ				EL3255 potentiometer measurement, 5-channel

The standard EtherCAT Terminals (ELxxxx) can be optionally ordered as ESxxxx with pluggable wiring level.

EtherCAT Terminals | Analog input: EL3xxx/ES3xxx/ELM3xxx/ELX3xxx

Signal	1-channel	2-channel	4-channel	5-/6-/8-channel
Ex i, potentiometer		ELX3252 potentiometer measurement, 16 bit		
Condition monitoring/ IEPE		EL3632 16 bit, 50 ksp/s	ELM3602-0002 24 bit, 50 ksp/s, BNC	ELM3604-0002 24 bit, 20 ksp/s, BNC
Pressure measuring	EM3701 differential pressure, ±100 hPa	EM3702 relative pressure, 7500 hPa	EM3712 relative pressure, ±1000 hPa	

EtherCAT Terminals | Analog input 3-phase power measurement terminal: EL3xxx

Signal	≤ 500 V					> 500 V
Power measurement	EL3403 500 V AC, 1 A	EL3423 480 V AC/DC, 1 A, Economy	EL3433 500 V AC, 10 A	EL3443 480 V AC/DC, 1 A, extended functionalities	EL3443-0010 480 V AC/DC, 5 A, extended functionalities	EL3413 690 V AC, 5 A
	EL3443-0011 480 V AC/DC, 100 mA, extended functionalities	EL3443-0013 480 V AC/DC, 333 mV, extended functionalities	EL3446 distributed power measurement	EL3483 480 V AC/DC, mains monitor	EL3483-0060 480 V AC/DC, mains monitor with voltage measurement	EL3453 690 V AC, 5 A, extended functionalities
Power monitoring	EL3773 500 V AC/DC, 10 ksp/s					EL3783 690 V AC, 20 ksp/s

EtherCAT Terminals | Analog output: EL4xxx/ES4xxx/ELX4xxx

Signal	1-channel	2-channel	4-channel	8-channel		
0...10 V	EL4001 12 bit	EL4002 12 bit	EL4102 16 bit	EL4004 12 bit	EL4104 16 bit	EL4008 12 bit
±10 V	EL4031 12 bit	EL4032 12 bit	EL4132 16 bit	EL4034 12 bit	EL4134 16 bit	EL4038 12 bit
		EL4732 16 bit, oversampling				
0...20 mA	EL4011 12 bit	EL4012 12 bit	EL4112 16 bit	EL4014 12 bit	EL4114 16 bit	EL4018 12 bit
		EL4712 16 bit, oversampling				
4...20 mA	EL4021 12 bit	EL4022 12 bit		EL4024 12 bit		EL4028 12 bit
		EL4122 16 bit		EL4124 16 bit		
Ex i, 0/4...20 mA	ELX4181 16 bit, HART			ELX4154 single-ended, 16 bit		
±10 mA		EL4112-0010 16 bit				

EtherCAT Terminals | Position measurement: EL5xxx/ES5xxx/ELX5xxx

Signal	1-channel				2-channel	
Absolute encoder	EL5001	EL5001-0011	EL5001-0090		EL5002	EL5032
	SSI encoder interface	SSI monitor terminal	SSI encoder interface, TwinSAFE SC		SSI encoder interface	EnDat 2.2 interface
					EL5032-0090	EL5042
					EnDat 2.2 interface, TwinSAFE SC	BiSS C interface, unidirectional
					EL5072	
					SinCos encoder interface, 1 V _{PP}	
Incremental encoder	EL5151	EL5151-0021	EL5151-0090		EL5152	
	incremental encoder interface 24 V DC	incremental encoder interface 24 V DC, parameterisable 24 V DC output	incremental encoder interface 24 V DC, TwinSAFE SC		incremental encoder interface 24 V DC	
	EL5101	EL5101-0010	EL5101-0011	EL5101-0090		
	incremental encoder interface, RS422, 4 million increments/s	incremental encoder interface, RS422, 20 million increments/s	incremental encoder interface, RS422, oversampling	incremental encoder interface, RS422, TwinSAFE SC		
	EL5021	EL5021-0090				
	SinCos encoder interface, 1 V _{PP}	SinCos encoder interface, 1 V _{PP} , TwinSAFE SC				
Ex i, incremental encoder	ELX5151	ELX5151-0090				
	incremental encoder interface, 32 bit, NAMUR	incremental encoder interface, 32 bit, NAMUR, TwinSAFE SC				

EtherCAT Terminals | Communication: EL6xxx/ES6xxx

Signal	1-channel			2-channel		4-channel
System	EL6090	EL6070	EL6080			
	display terminal	license key terminal	memory terminal 128 kbyte			
Serial	EL6001	EL6021		EL6002	EL6022	
	RS232, 115.2 kbaud	RS422/RS485, 115.2 kbaud		RS232, 115.2 kbaud, D-sub	RS422/RS485, 115.2 kbaud, D-sub	
EtherCAT/Ethernet	EL6601	EL6688		EL6692	EL6695	EL6614
	switch port	IEEE 1588 master/slave		EtherCAT bridge	EtherCAT bridge, high performance	switch port
Master	EL6201	EL6631	EL6632			EL6224
	AS-Interface	PROFINET RT	PROFINET IRT			IO-Link
	EL6652	EL6720	EL6731			EL6224-0090
	EtherNet/IP	Lightbus	PROFIBUS			IO-Link, TwinSAFE SC
	EL6751	EL6752	EL6851			
	CANopen	DeviceNet	DMX			
	EL6861					
	BACnet, MS/TP, RS485					
Slave	EL6631-0010	EL6652-0010	EL6711-0010			
	PROFINET RT	EtherNet/IP	CC-Link			
	EL6731-0010	EL6740-0010	EL6751-0010			
	PROFIBUS	Interbus	CANopen			
	EL6752-0010	EL6851-0010				
	DeviceNet	DMX				
Safety	EL6910	EL6900	EL6930			
	TwinSAFE Logic, PROFIsafe master and slave support	TwinSAFE Logic	TwinSAFE Logic, PROFIsafe slave support			

The standard EtherCAT Terminals (ELxxxx) can be optionally ordered as ESxxxx with pluggable wiring level.

EtherCAT Terminals | Motion: EL7xxx/ES7xxx/EM7xxx

	< 3 A	3...5 A	> 5 A
Servomotor	EL7201-9014 <i>I_{ms}</i> = 2.8 A, 48 V DC, OCT, STO	EL7211-9014 <i>I_{ms}</i> = 4.5 A, 48 V DC, OCT, STO	EL7221-9014 <i>I_{ms}</i> = 7...8 A with ZB8610, 48 V DC, OCT, STO
	EL7201-0010 <i>I_{ms}</i> = 2.8 A, 48 V DC, OCT	EL7211-0010 <i>I_{ms}</i> = 4.5 A, 48 V DC, OCT	ZB8610 fan cartridge for EtherCAT and Bus Terminals
	EL7201 <i>I_{ms}</i> = 2.8 A, 48 V DC, resolver	EL7211 <i>I_{ms}</i> = 4.5 A, 48 V DC, resolver	
Stepper motor	EL7031 <i>I_{max}</i> = 1.5 A, 24 V DC	EL7041 <i>I_{max}</i> = 5.0 A, 48 V DC, incremental encoder	
	EL7031-0030 <i>I_{max}</i> = 2.8 A, 24 V DC	EL7041-0052 <i>I_{max}</i> = 5.0 A, 48 V DC	
	EL7037 <i>I_{max}</i> = 1.5 A, 24 V DC, incremental encoder, vector control	EL7047 <i>I_{max}</i> = 5.0 A, 48 V DC, incremental encoder, vector control	
		EL7047-9014 <i>I_{max}</i> = 5.0 A, 48 V DC, incremental encoder, vector control, STO	
DC motor output stage	EL7332 <i>I_{max}</i> = 1.0 A, 24 V DC	EL7342 <i>I_{max}</i> = 3.5 A, 48 V DC, incremental encoder	
		EL7411-9014 <i>I_{ms}</i> = 4.5 A, 48 V DC, STO	
		EL7411 <i>I_{ms}</i> = 4.5 A, 48 V DC	
4-axis interface	EM7004 4 incremental encoders, 32 digital I/Os 24 V DC, 4 analog outputs ±10 V		

EtherCAT Terminals | System terminals: EL9xxx/ES9xxx/ELM9xxx/ELX9xxx

Signal	System				
Components for system bus	EL9011 bus end cover	EL9012 bus end cover for power and E-bus contacts	ELM9012 bus end cover for ELMxxxx, black	ELX9012 bus end cover for ELXxxxx, blue	EL9195 shield terminal
	EL9070 shield terminal	EL9080 isolation terminal			
Potential distribution	EL9180 2 clamping units per power contact	EL9181 2 x 8 terminal points	EL9182 8 x 2 terminal points	EL9183 1 x 16 terminal points	EL9184 8 x 24 V DC, 8 x 0 V DC
	EL9185 4 clamping units at 2 power contacts	EL9185-0010 4 clamping units at 2 power contacts, potential supply function	EL9186 8 x 24 V DC	EL9187 8 x 0 V DC	EL9188 16 x 24 V DC
	EL9189 16 x 0 V DC				
Potential supply, 24 V DC	EL9100	EL9110 diagnostics	EL9200 with fuse	EL9210 diagnostics, with fuse	EL9520 AS-Interface potential supply with filter
Potential supply, 120...230 V AC	EL9150 with LED	EL9160 diagnostics	EL9190	EL9250 with fuse, with LED	EL9260 diagnostics, with fuse
	EL9290 with fuse				
Overcurrent protection, 24 V DC	EL9221 1-channel	EL9222 2-channel	EL9227 2-channel, extended functionalities		
Power supply	EL9410 input 24 V DC, output 5 V DC/2 A	ELM9410 input 24 V DC, output 5 V DC/2 A	ELX9410 power supply terminal for E-bus refresh, 1 A	EL9505 input 24 V DC, output 5 V DC/0.5 A	EL9508 input 24 V DC, output 8 V DC/0.5 A
	EL9510 input 24 V DC, output 10 V DC/0.5 A	EL9512 input 24 V DC, output 12 V DC/0.5 A	EL9515 input 24 V DC, output 15 V DC/0.5 A	EL9560 input 24 V DC, output 24 V DC/0.1 A with electrical isolation	ELX9560 power supply, 24 V DC, electrically isolated
Filtering and smoothing	EL9540 surge filter terminal for field supply	EL9550 surge filter terminal for system/field supply	EL9550-0012 surge filter terminal for system/field supply with up to 10 A	EL9576 brake chopper terminal, up to 72 V DC, 155 µF	ZB8110 external braking resistor

Product overview current transformers



SCT1111



SCT21xx



SCT32xx

Accuracy class 1

Primary current	Max. diameter round conductor							
	Ø 7.6 mm	Ø 13.5 mm	Ø 18 mm	Ø 18.5 mm	Ø 20 mm	Ø 22 mm	Ø 25.7 mm	Ø 27.9 mm
1 A								
2.5 A								
5 A								
10 A								
15 A								
20 A								
25 A								
30 A								
32 A	SCT1111-0032							
35 A	SCT1111-0035							
40 A	SCT1111-0040							
50 A	SCT1111-0050	SCT3111-0050						
60 A	SCT1111-0060	SCT3111-0060		SCT6101-0060 ⁽²⁾			SCT2111-0060	
64 A	SCT1111-0064							
75 A		SCT3111-0075		SCT6101-0075 ⁽²⁾			SCT2111-0075	
80 A							SCT2111-0080	
100 A		SCT3111-0100	SCT3215-0100	SCT6101-0100 ⁽²⁾	SCT7105-0100 ⁽²⁾		SCT2111-0100	
125 A							SCT2111-0125	
150 A		SCT3111-0150	SCT3215-0150	SCT6101-0150 ⁽²⁾			SCT2111-0150	
200 A				SCT6311-0200 ⁽¹⁾	SCT7105-0200 ⁽²⁾		SCT2111-0200	
250 A			SCT3215-0250	SCT6311-0250 ⁽¹⁾	SCT7115-0250 ⁽¹⁾	SCT3315-0250	SCT2111-0250	
300 A							SCT2111-0300	SCT6411-0300 ⁽¹⁾
400 A					SCT7115-0400 ⁽¹⁾	SCT3315-0400	SCT2111-0400	SCT6411-0400 ⁽¹⁾
500 A						SCT3315-0500	SCT2111-0500	SCT6411-0500 ⁽¹⁾
600 A						SCT3315-0600		
750 A								
800 A								
1000 A								
1250 A								
1500 A								
2000 A								
2500 A								
3000 A								
4000 A								
5000 A								

⁽¹⁾ split-core CT, for retrofitting existing systems, ⁽²⁾ accuracy class 3



SCT1111



SCT21xx



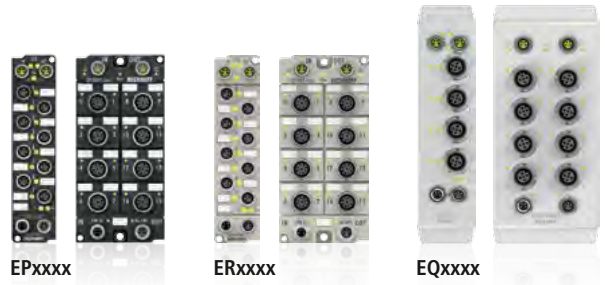
SCT32xx

Accuracy class 0.5

Primary current	Max. diameter round conductor							
	Ø 7.6 mm	Ø 13.5 mm	Ø 18 mm	Ø 18.5 mm	Ø 20 mm	Ø 22 mm	Ø 25.7 mm	Ø 27.9 mm
1 A								
2.5 A								
5 A								
10 A								
15 A								
20 A								
25 A								
30 A								
125 A		SCT3111-0125						
150 A		SCT3121-0150					SCT2121-0150	
200 A				SCT6321-0200 ⁽¹⁾			SCT2121-0200	
250 A				SCT6321-0250 ⁽¹⁾			SCT2121-0250	
300 A							SCT2121-0300	
400 A					SCT7125-0400 ⁽¹⁾		SCT2121-0400	SCT6421-0400 ⁽¹⁾
500 A							SCT2121-0500	SCT6421-0500 ⁽¹⁾
600 A							SCT2121-0600	
750 A								
800 A								
1000 A								
1250 A								
1500 A								
2000 A								
2500 A								
3000 A								
4000 A								
5000 A								

⁽¹⁾ split-core CT, for retrofitting existing systems

Product overview EtherCAT Box



EtherCAT Box | Digital input: EP1xxx

Signal	8-channel		16-channel	
24 V DC, filter 3.0 ms	EP1008-0001 ⁽¹⁾ 8 x M8	EP1008-0002 ^(1, 2) 4 x M12	EP1809-0021 ⁽¹⁾ 16 x M8	EP1809-0022 ^(1, 2) 8 x M12
		EP1008-0022 ⁽¹⁾ 8 x M12		EP1809-0042 8 x M12, EtherCAT M12
24 V DC, filter 10 µs	EP1018-0001 ⁽¹⁾ 8 x M8	EP1018-0002 ⁽¹⁾ 4 x M12	EP1819-0021 ⁽¹⁾ 16 x M8	EP1819-0022 ⁽¹⁾ 8 x M12
	EP1098-0001 ⁽¹⁾ 8 x M8, ground switching		EP1816-0003 connector with spring-loaded system	EP1816-0008 D-sub, 25-pin
	EP1258-0001 ⁽¹⁾ 8 x M8, 2-channel timestamp	EP1258-0002 ⁽¹⁾ 4 x M12, 2-channel timestamp		EP1816-3008 D-sub, 25-pin, acceleration sensor
24 V DC, counter	EP1518-0002 ⁽¹⁾ 4 x M12, multi-function input			
24 V DC, safe inputs	EP1908-0002 TwinSAFE, 8 safe inputs		EP1918-0002 TwinSAFE Logic, 8 safe inputs	

EtherCAT Box | Digital output: EP2xxx

Signal	4-channel	8-channel	16-channel	24-channel
24 V DC, $I_{max} = 0.5 A$		EP2008-0001 ⁽¹⁾ 8 x M8	EP2008-0002 ^(1, 2) 4 x M12	
24 V DC, $I_{max} = 0.5 A,$ $\Sigma 4 A$			EP2008-0022 ⁽¹⁾ 8 x M12	EP2809-0021 ⁽¹⁾ 16 x M8
			EP2816-0003 connector with spring-loaded system	EP2816-0004 M16, 19-pin
24 V DC, $I_{max} = 0.5 A,$ $\Sigma 16 A$			EP2816-0008 D-sub, 25-pin	EP2816-0010 2 x D-sub, 9-pin
				EP2817-0008 D-sub, 25-pin
24 V DC, $I_{max} = 2 A,$ $\Sigma 4 A$		EP2028-0001 ⁽¹⁾ 8 x M8	EP2028-0002 ⁽¹⁾ 4 x M12	
		EP2038-0001 ⁽¹⁾ 8 x M8, with diagnostics	EP2038-0002 ⁽¹⁾ 4 x M12, with diagnostics	
24 V DC, $I_{max} = 2.8 A,$ $\Sigma 16 A$			EP2028-0032 8 x M12	
			ER2028-1032 8 x M12	
25 V AC/ 30 V DC	EP2624-0002 ⁽¹⁾ relay output, 4 x M12			
24 V DC, safe outputs			EP2918-0032 TwinSAFE Logic, 8 safe outputs	

EPxxxx: industrial housing in IP 67, ⁽¹⁾also as ERxxxx: zinc die-cast housing in IP 67, ⁽²⁾also as EQxxxx: stainless steel housing in IP 69K

EtherCAT Box | Digital combi: EP23xx

Signal	8-channel	12-channel	16-channel	
24 V DC, filter 3.0 ms	EP2308-0001 ⁽¹⁾ 8 x M8, 4 inputs + 4 outputs, $I_{max} = 0.5 A$	EP2308-0002 ⁽¹⁾ 4 x M12, 4 inputs + 4 outputs, $I_{max} = 0.5 A$	EP1859-0042 8 x M12, 8 inputs + 8 outputs, $I_{max} = 0.5 A$, EtherCAT M12	
	EP2328-0001 ⁽¹⁾ 8 x M8, 4 inputs + 4 outputs, $I_{max} = 2 A$	EP2328-0002 ⁽¹⁾ 4 x M12, 4 inputs + 4 outputs, $I_{max} = 2 A$	EP2339-0021 ⁽¹⁾ 16 x M8, 16 inputs/outputs, $I_{max} = 0.5 A, \sum 4 A$	EP2339-0022 ^(1, 2) 8 x M12, 16 inputs/outputs, $I_{max} = 0.5 A, \sum 4 A$
	EP2338-1001 ⁽¹⁾ 8 x M8, 8 inputs/outputs, $I_{max} = 0.5 A$	EP2338-1002 ⁽¹⁾ 4 x M12, 8 inputs/outputs, $I_{max} = 0.5 A$	EP2339-0003 16 inputs/outputs, $I_{max} = 0.5 A, \sum 4 A$, connector with spring-loaded system	EP2339-0042 8 x M12, 16 inputs/outputs, $I_{max} = 0.5 A, \sum 16 A$, EtherCAT M12
24 V DC, filter 10 μs	EP2318-0001 ⁽¹⁾ 8 x M8, 4 inputs + 4 outputs, $I_{max} = 0.5 A$	EP2318-0002 ⁽¹⁾ 4 x M12, 4 inputs + 4 outputs, $I_{max} = 0.5 A$	EP2349-0021 ⁽¹⁾ 16 x M8, 16 inputs/outputs, $I_{max} = 0.5 A, \sum 4 A$	EP2349-0022 ⁽¹⁾ 8 x M12, 16 inputs/outputs, $I_{max} = 0.5 A, \sum 4 A$
	EP2338-0001 ⁽¹⁾ 8 x M8, 8 inputs/outputs, $I_{max} = 0.5 A$	EP2338-0002 ⁽¹⁾ 4 x M12, 8 inputs/outputs, $I_{max} = 0.5 A$	EP2316-0003 8 inputs + 8 outputs, $I_{max} = 0.5 A$, connector with spring-loaded system	EP2316-0008 8 inputs + 8 outputs, D-sub, 25-pin
Safety		EP1957-0022 TwinSAFE Logic, 8 safe inputs, 4 safe outputs		

EtherCAT Box | Analog input: EP3xxx

Signal	1-channel	2-channel	4-channel	
$\pm 10 V, \pm 20 mA$		EP3162-0002 parameterizable, electrically isolated, single-ended, 16 bit		
$\pm 10 V,$ 0/4...20 mA		EP3182-1002 2 analog inputs, parameterizable, single- ended, 16 bit, 2 digital control outputs (sink/ source type), 24 V DC, short-circuit proof	EP3174-0002 ^(1, 2) parameterizable, differential inputs, 16 bit	EP3174-0092 parameterizable, differential inputs, 16 bit, TwinSAFE SC
			EP3184-0002 ⁽¹⁾ parameterizable, single-ended, 16 bit	EP3184-1002 ⁽¹⁾ parameterizable, single-ended, 16 bit, 2 channels per socket
Resistance thermometer (RTD)			EP3204-0002 ^(1, 2) PT100, PT200, PT500, PT1000, Ni100, Ni120, Ni1000, 16 bit	
Thermo- couple/mV			EP3314-0002 ^(1, 2) type J, K, L, B, E, N, R, S, T, U, 16 bit	
Measurement bridge (SG)	EP3356-0022 24 bit, self-calibration			
Condition monitoring/IEPE		EP3632-0001 16 bit		
Accelerometers		EP3752-0000 2 x 3 axes		
Pressure measuring			EP3744-0041 4 pressure inputs -1...1 bar (differential pressure to fifth connection)	EP3744-1041 4 pressure inputs 0...7 bar (differential pressure to fifth connection)

EtherCAT Box | Analog output: EP4xxx

Signal	4-channel
±10 V, 0/4...20 mA	EP4174-0002 ⁽¹⁾ parameterizable, 16 bit

EtherCAT Box | Analog combi: EP43xx

Signal	4-channel	16-channel
±10 V, 0/4...20 mA	EP4374-0002 ⁽¹⁾ 2 inputs + 2 outputs, parameterizable, 16 bit	EP4378-1022 4 inputs + 4 outputs, U/I parameterizable per channel, 8 digital I/Os, 24 V DC/3.0 ms
±10 mA, ±20 mA	EP4314-1002 2 inputs + 2 outputs, parameterizable per channel, 2 digital inputs, 24 V DC/3.0 ms	

EtherCAT Box | Position measurement: EP5xxx

Function	M12	Other
SSI encoder interface	EP5001-0002 1 MHz, 32 bit	
Incremental encoder interface RS422	EP5101-0002 ⁽¹⁾ 32/16 bit, 5 V DC sensor supply	EP5101-0011 32/16 bit, 5 V DC sensor supply, D-sub, 4 million increments/s
	EP5101-1002 ⁽¹⁾ 32/16 bit, 24 V DC sensor supply	EP5101-2011 32/16 bit, 5 V DC sensor supply, D-sub, 20 million increments/s
Incremental encoder interface 24 V DC	EP5151-0002 ⁽¹⁾ 32/16 bit	

EtherCAT Box | Communication: EP6xxx

Function	1-channel	2-channel	4-channel	8-channel	Other
Serial interface	EP6001-0002 ⁽¹⁾ RS232, RS422/RS485, 5 V DC/1 A	EP6002-0002 ⁽¹⁾ RS232, RS422/RS485			
IO-Link master			EP6224-2022 Class A	EP6228-0022 Class A	
			EP6224-0042 Class A, EtherCAT M12	EP6228-0042 Class A, EtherCAT M12	
			EP6224-3022 Class B	EP6228-3032 Class B	
				EP6228-3132 4 x Class A, 4 x Class B	
				EP6228-3142 4 x Class A, 4 x Class B, EtherCAT M12	
Status and diagnostic information					EP6090-0000 display box

EPxxxx: industrial housing in IP 67, ⁽¹⁾also as ERxxxx: zinc die-cast housing in IP 67, ⁽²⁾also as EQxxxx: stainless steel housing in IP 69K

EtherCAT Box Motion: EP7xxx			
Function	1-channel	2-channel	Other
Servomotor	EP7211-0034 <i>I</i> _{max} = 4.5 A, 48 V DC, OCT, STO		
Stepper motor	EP7041-1002⁽¹⁾ <i>I</i> _{max} = 1.5 A, 48 V DC, incremental encoder, 2 digital inputs, 1 digital output		EP7047-0032 <i>I</i> _{max} = 5.0 A, 48 V DC, STO
	EP7041-0002⁽¹⁾ <i>I</i> _{max} = 5 A, 48 V DC, incremental encoder, 2 digital inputs, 1 digital output	EP7041-2002⁽¹⁾ <i>I</i> _{max} = 5 A, 48 V DC, incremental encoder, 2 digital inputs, 1 digital output, motor connection via plug	
	EP7041-3002⁽¹⁾ <i>I</i> _{max} = 5 A, 48 V DC, incremental encoder, for high-speed applications, encoder system (24 V DC encoder)	EP7041-3102 <i>I</i> _{max} = 5 A, 48 V DC, incremental encoder, for high-speed applications, encoder system (5 V DC encoder)	
DC motor output stage		EP7342-0002⁽¹⁾ <i>I</i> _{max} = 3.5 A, 48 V DC	
Motor controller		EP7402-0057 for roller conveyor systems, 48 V DC	

EtherCAT Box Special functions: EP8xxx	
Function	M12
Special functions	EP8309-1022⁽¹⁾ 8 digital inputs/outputs, 2 x tachometer input, 2 x 0/4...20 mA input, 1 x 0/4...20 mA output, 1 x 1.2 A PWMi output

EtherCAT Box System: EPxxxx			
Function	M8	M12	Other
EtherCAT Box	EP1111-0000 3 decimal ID switches		
Junctions	EP1122-0001 EtherCAT, 2 channels		
	EP1312-0001 EtherCAT P, 2 ports		
	EP9128-0021 EtherCAT, 8-way		
Power distribution			EP9214-0023 4/4-channel, 7/8" plug, 7/8" socket
			EP9224-0023 4/4-channel, 7/8" plug, 7/8" socket, with current measurement and data logging
			EP9221-0057 1-channel, ENP B17 plug, ENP B17 socket, ENP to EtherCAT P
			EP9224-0037 4-channel, ENP B17 plug, ENP B17 socket, ENP to EtherCAT P
PROFINET RT EtherCAT Box		EP9300-0022 EtherCAT Box interface with PROFINET RT	
EtherCAT media converters fibre optic			EP9521-0020 1-channel, multimode
Brake chopper box			EP9576-1032 up to 72 V DC

Product overview EtherCAT P Box



EtherCAT P Box | Digital input: EPP1xxx

Signal	4-channel	8-channel	16-channel	
24 V DC, filter 3.0 ms	EPP1004-0061 4 x M8	EPP1008-0001 8 x M8	EPP1008-0002 4 x M12	EPP1809-0021 16 x M8
			EPP1008-0022 8 x M12	EPP1809-0022 8 x M12
24 V DC, filter 10 µs		EPP1018-0001 8 x M8	EPP1018-0002 4 x M12	EPP1819-0021 16 x M8
		EPP1258-0001 8 x M8, 2-channel timestamp	EPP1258-0002 4 x M12, 2-channel timestamp	EPP1816-0003 connector with spring-loaded system
				EPP1816-0008 D-sub, 25-pin
24 V DC, counter			EPP1518-0002 4 x M12, multi-function input	EPP1816-3008 D-sub, 25-pin, acceleration sensor

EtherCAT P Box | Digital output: EPP2xxx

Signal	4-channel	8-channel	16-channel	24-channel
24 V DC, $I_{max} = 0.5 A$		EPP2008-0001 8 x M8	EPP2008-0002 4 x M12	
24 V DC, $I_{max} = 0.5 A,$ $\Sigma 3 A$			EPP2008-0022 8 x M12	EPP2809-0021 16 x M8
				EPP2809-0022 8 x M12
				EPP2816-0008 D-sub, 25-pin
				EPP2816-0010 2 x D-sub, 9-pin
24 V DC, $I_{max} = 2 A,$ $\Sigma 3 A$		EPP2028-0001 8 x M8	EPP2028-0002 4 x M12	EPP2816-0004 M16, 19-pin
		EPP2038-0001 8 x M8, with diagnostics	EPP2038-0002 4 x M12, with diagnostics	EPP2817-0008 D-sub, 25-pin
25 V AC/ 30 V DC	EPP2624-0002 relay output, 4 x M12			

EtherCAT P Box | Digital combi: EPP23xx

Signal	4-channel	8-channel		16-channel	
24 V DC, filter 10 μ s	EPP2334-0061 4 x M8, 4 inputs/outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$	EPP2318-0001 8 x M8, 4 inputs + 4 outputs, $I_{max} = 0.5 \text{ A}$	EPP2318-0002 4 x M12, 4 inputs + 4 outputs, $I_{max} = 0.5 \text{ A}$	EPP2349-0021 16 x M8, 16 inputs/outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$	EPP2349-0022 8 x M12, 16 inputs/outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$
		EPP2338-0001 8 x M8, 8 inputs/outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$	EPP2338-0002 4 x M12, 8 inputs/outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$	EPP2316-0003 8 inputs + 8 outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$, connector with spring-loaded system	EPP2316-0008 8 inputs + 8 outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$, D-sub, 25-pin
24 V DC, filter 3.0 ms		EPP2308-0001 8 x M8, 4 inputs + 4 outputs, $I_{max} = 0.5 \text{ A}$	EPP2308-0002 4 x M12, 4 inputs + 4 outputs, $I_{max} = 0.5 \text{ A}$	EPP2339-0021 16 x M8, 16 inputs/outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$	EPP2339-0022 8 x M12, 16 inputs/outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$
		EPP2328-0001 8 x M8, 4 inputs + 4 outputs, $I_{max} = 2 \text{ A}, \Sigma 3 \text{ A}$	EPP2328-0002 4 x M12, 4 inputs + 4 outputs, $I_{max} = 2 \text{ A}, \Sigma 3 \text{ A}$	EPP2339-0003 16 inputs/outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$, connector with spring-loaded system	
		EPP2338-1001 8 x M8, 8 inputs/outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$	EPP2338-1002 4 x M12, 8 inputs/outputs, $I_{max} = 0.5 \text{ A}, \Sigma 3 \text{ A}$		

EtherCAT P Box | Analog input: EPP3xxx

Signal	2-channel	4-channel
± 10 V, 0/4...20 mA		EPP3174-0002 parameterizable, differential input, 16 bit
		EPP3184-0002 parameterizable, single-ended, 16 bit
Resistance thermometer (RTD)		EPP3204-0002 PT100, PT200, PT500, PT1000, Ni100, Ni120, Ni1000, 16 bit
Thermocouple/mV		EPP3314-0002 type J, K, L, B, E, N, R, S, T, U, 16 bit
Condition monitoring/IEPE	EPP3632-0001 16 bit	
Accelerometers	EPP3752-0000 2 x 3 axes	
Pressure measuring		EPP3744-0041 4 pressure inputs -1...1 bar (differential pressure to fifth connection)
		EPP3744-1041 4 pressure inputs 0...7 bar (differential pressure to fifth connection)

EtherCAT P Box | Analog output: EPP4xxx

Signal	4-channel
± 10 V, 0/4...20 mA	EPP4174-0002 parameterizable, 16 bit

EtherCAT P Box | Analog combi: EPP43xx

Signal	4-channel
± 10 mA, ± 20 mA	EPP4314-1002 2 inputs + 2 outputs, parameterizable per channel, 2 digital inputs, 24 V DC/3.0 ms
± 10 V, 0/4...20 mA	EPP4374-0002 2 inputs + 2 outputs, parameterizable, 16 bit

EtherCAT P Box | Position measurement: EPP5xxx

Function	M12	Other	
SSI encoder interface	EPP5001-0002 1 MHz, 32 bit		
Incremental encoder interface RS422	EPP5101-0002 32/16 bit, 5 V DC sensor supply	EPP5101-1002 32/16 bit, 24 V DC sensor supply	EPP5101-0011 32/16 bit, 5 V DC sensor supply, D-sub, 4 million increments/s
Incremental encoder interface 24 V DC	EPP5151-0002 32/16 bit		

EtherCAT P Box | Communication: EPP6xxx

Function	1-channel	2-channel	8-channel	Other
Serial interface	EPP6001-0002 RS232, RS422/RS485, 5 V DC/1 A	EPP6002-0002 RS232, RS422/RS485		
IO-Link master			EPP6228-0022 Class A, 8 ports	
Status and diagnostic information				EPP6090-0000 display box

EtherCAT P Box | Motion: EPP7xxx

Function	1-channel	2-channel
Stepper motor	EPP7041-1002 $I_{max} = 1.5 \text{ A}$, 48 V DC, incremental encoder	EPP7041-3002 $I_{max} = 5.0 \text{ A}$, 48 V DC, incremental encoder
DC motor output stage		EPP7342-0002 $I_{max} = 3.5 \text{ A}$, 48 V DC

EtherCAT P Box | System: EPPxxxx

Function	1-channel	2-channel	4-channel
EtherCAT P Box	EPP1111-0000 with ID switch	EPP9022-0060 4 x diagnostics (Us, Ur, Is, Ir)	
	EPP9001-0060 EtherCAT P/EtherCAT connector with power transmission	EPP9022-9060 4 x diagnostics (Us, Ur, Is, Ir), TwinSAFE SC	
Junctions		EPP1322-0001 3 ports, with feed-in	
		EPP1332-0001 3 ports, with refresh	
		EPP1342-0001 3 ports	
Supply module EtherCAT to EtherCAT P	EPP1321-0060 EtherCAT to EtherCAT P		
Power distribution ENP to EtherCAT P	EP9221-0057 ENP B17 plug, ENP B17 socket		EP9224-0037 ENP B17 plug, ENP B17 socket

Product overview EtherCAT Plug-in Modules



EtherCAT Couplers

EtherCAT Couplers E-bus	EJ1100	EJ1101-0022
Extension system and junctions	EJ1122 2-port junction	external: connectors, power supply module and optional ID switches

EtherCAT Plug-in Modules | Digital input 24 V DC: EJ1xxx

Signal	4-channel	8-channel	16-channel
Filter 10 μ s			EJ1819 type 3
Filter 3.0 ms		EJ1008 type 3 EJ1859 type 3, 8 inputs, 8 outputs	EJ1809 type 3 EJ1889 ground switching
Safe input	EJ1914 TwinSAFE Logic, 4 safe inputs	EJ1918 TwinSAFE Logic, 8 safe inputs EJ1957 TwinSAFE Logic, 8 safe inputs, 4 safe outputs	

EtherCAT Plug-in Modules | Digital input: EJ1xxx

Signal	8-channel
3.3 V DC/ 5 V DC	EJ1128

EtherCAT Plug-in Modules | Digital output 24 V DC: EJ2xxx

Signal	1-channel	2-channel	4-channel	8-channel	16-channel
$I_{max} = 0.5$ A				EJ2008 EJ1859 type 3, 8 inputs, 8 outputs	EJ2809 EJ2889 ground switching
Safe output			EJ2914 TwinSAFE Logic, 4 safe outputs EJ1957 TwinSAFE Logic, 8 safe inputs, 4 safe outputs	EJ2918 TwinSAFE Logic, 8 safe outputs	
PWM	EJ2521-0224 24 V DC, 1 A	EJ2502 24 V DC, 0.5 A			

EtherCAT Plug-in Modules | Digital output: EJ2xxx

Signal	8-channel
3.3 V DC/ 5 V DC	EJ2128

EtherCAT Plug-in Modules | Analog input: EJ3xxx

Signal	2-channel	4-channel	5-channel	8-channel
± 10 V		EJ3004 single-ended, 12 bit EJ3104 differential input, 16 bit		EJ3108 6 x differential inputs, 2 x single-ended, 16 bit
0...10 V				EJ3068 single-ended, 12 bit

EN 61131-2 specification ► www.beckhoff.com/EN61131-2

EtherCAT Plug-in Modules | Analog input: EJ3xxx

Signal	2-channel	4-channel	5-channel	8-channel
0...20 mA				EJ3048 single-ended, 12 bit
4...20 mA				EJ3058 single-ended, 12 bit
Thermocouple				EJ3318 type J, K, L...U, 16 bit
Resistance thermometer (RTD)	EJ3202 16 bit	EJ3214 16 bit		
Potentiometer			EJ3255 16 bit	

EtherCAT Plug-in Modules | Analog output: EJ4xxx

Signal	2-channel	4-channel	8-channel
0...10 V	EJ4002 12 bit	EJ4004 12 bit	EJ4008 12 bit
±10 V	EJ4132 16 bit	EJ4134 16 bit	
0...20 mA			EJ4018 12 bit
4...20 mA		EJ4024 12 bit	

EtherCAT Plug-in Modules | Position measurement: EJ5xxx

Signal	1-channel	2-channel
Absolute encoder		EJ5002 SSI encoder interface
Incremental encoder	EJ5101 incremental encoder interface RS422	EJ5151 incremental encoder interface 24 V DC

EtherCAT Plug-in Modules | Communication: EJ6xxx

Signal	1-channel	2-channel	4-channel
Master		EJ6002 serial interface RS232, RS485 or RS422	EJ6224 IO-Link
Safety	EJ6910 TwinSAFE Logic		EJ6224-0090 IO-Link, TwinSAFE SC

EtherCAT Plug-in Modules | Motion: EJ7xxx

	< 3 A	3...5 A
Servomotor		EJ7211-0010 $I_{rms} = 4.5\text{ A}$, 48 V DC, OCT
		EJ7211-9414 $I_{rms} = 4.5\text{ A}$, 48 V DC, OCT, STO, TwinSAFE SC
Stepper motor	EJ7031 $I_{max} = 1.5\text{ A}$, 24 V DC	EJ7041-0052 $I_{max} = 5.0\text{ A}$, 48 V DC
		EJ7047 $I_{max} = 5.0\text{ A}$, 48 V DC, incremental encoder, vector control
DC motor output stage		EJ7342 $I_{max} = 3.5\text{ A}$, 48 V DC, incremental encoder

EtherCAT Plug-in Modules | System: EJ9xxx

Signal	Power supply and accessories		
Power supply	EJ9400 input 24 V DC, E-bus power supply, 2.5 A	EJ9404 input 24 V DC, E-bus power supply, 12 A	EJ9505 input 24 V DC, output 5 V DC, 0.5 A
Filtering and smoothing	EJ9576 brake chopper module, up to 72 V DC, 155 μF		
	System		
System	EJ9001 placeholder module		

System overview fieldbus I/O



Bus Coupler series BK, the link between Bus Terminals and fieldbus



Bus Terminal Controller series BC with integrated IEC 61131-3 PLC



Bus Terminal Controller series BX with integrated IEC 61131-3 PLC and extended interfaces



Embedded PC series CX, further Embedded PCs see page 192

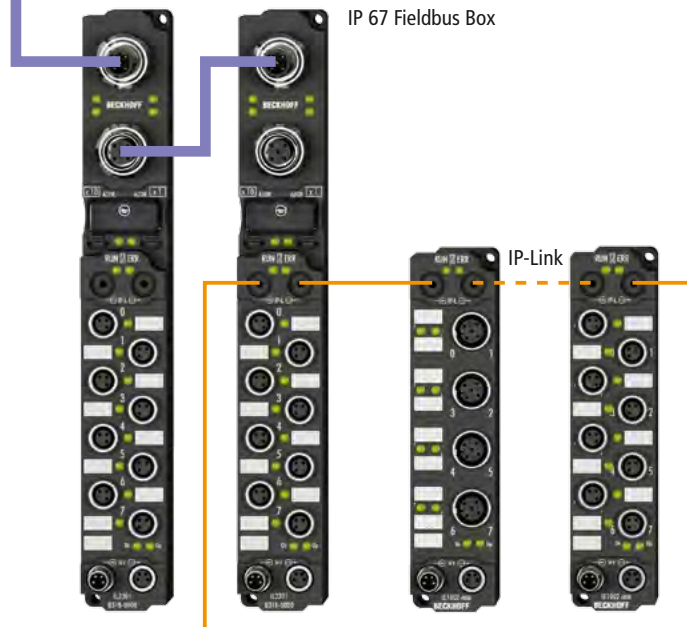
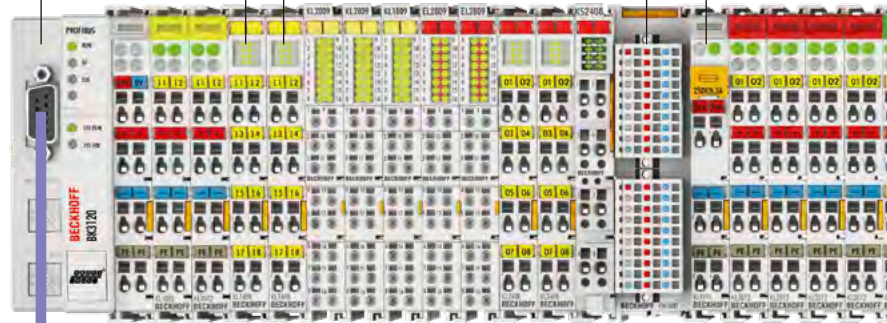
The head station of the Bus Terminals: from Bus Coupler with fieldbus interface to Embedded PC

Free mix of signals: about 400 different Bus Terminals for connection to all common sensors and actuators

Potential feed terminals enable configuration of different potential groups.

Bus Terminals in 1-, 2-, 4-, 8- and 16-channel modularity

The terminal modules with plug-in wiring combine 16, 32 or 64 digital I/Os within a very small space and with high packing density.



IP 67 Fieldbus Box

IP-Link

Compact Box

Coupler Box/
PLC Box

Extension Box modules

3-phase power measurement capability enables all relevant electrical data of the supply network to be measured.

Communication terminals enable the integration of subsystems such as AS-Interface, RS232 and RS485.

Integrated safety: the TwinSAFE Bus Terminals enable the connection of all common safety sensors and actuators.

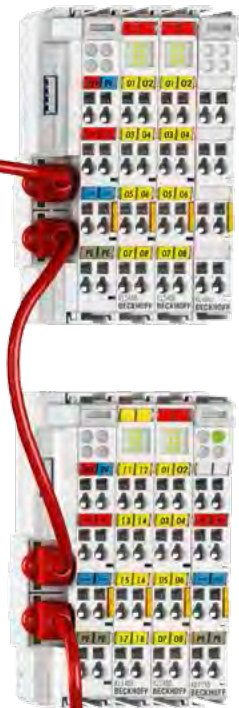
Bus Terminals with a maximum measurement error of $\pm 0.01\%$



Bus end terminal



The terminal bus extension enables the connection of up to 255 Bus Terminals (instead of 64) to a single station.









Manual operating modules enable switching, controlling and monitoring of digital and analog signals as well as setting and reading of data and values in the event of a controller failure. Process data connection via K-bus interface with K-bus extension (up to 31 modules). Signal connection via KL9309.









IO-Link box modules



System overview Bus Couplers

	Bus Coupler			PLC		
	Standard BKxx00	Economy plus BKxx20	Compact BKxx5x	Controller BCxx50	BCxx20	BC9191-xxxx
						
Fieldbus function	fieldbus slave	fieldbus slave	fieldbus slave	fieldbus slave	fieldbus slave	Room Controller
Integrated IEC 61131-3 PLC for	–	–	–	TwinCAT 2	TwinCAT 2	TwinCAT 2
Performance qualities	–	–	–	–	–	Building Automation, integrated I/Os
Program memory	–	–	–	48 kbyte	128 kbyte	48/128 kbyte
Main memory	–	–	–	–	–	–
Current supply K-bus	1750 mA	1750 mA	1000 mA	1000 mA	1750 mA	200 mA
Fieldbus connection technology	plug depending on fieldbus	plug depending on fieldbus	plug depending on fieldbus	plug depending on fieldbus	plug depending on fieldbus	2 x RJ45 (switched)
Supported Bus Terminals	all	all	all	all	all	all
Max. number of Bus Terminals	64	255 with terminal bus extension	255 with terminal bus extension	255 with terminal bus extension	255 with terminal bus extension	255 with terminal bus extension
Electrical isolation	between fieldbus/ power contacts/ supply voltage	between fieldbus/ power contacts/ supply voltage	between fieldbus/ power contacts/ supply voltage	between fieldbus/ power contacts/ supply voltage	between fieldbus/ power contacts/ supply voltage	between mains supply and internal 24 V power supply

Embedded PC						
BXxx00	CX70xx	CX80xx	CX81xx	CX9020	CX51xx	
						
fieldbus slave	integrated fieldbus master/slave	integrated fieldbus master/slave	integrated fieldbus master/slave	optional fieldbus master/slave	optional fieldbus master/slave	
TwinCAT 2	TwinCAT 3	TwinCAT 2	TwinCAT 3	TwinCAT 3, TwinCAT 2	TwinCAT 3, TwinCAT 2	
–	–	–	–	motion control, visualisation	motion control, visualisation	
256 kbyte	–	–	–	–	–	
–	32 Mbyte SDR (internal, not expandable)	64 Mbyte DDR2 RAM	512 Mbyte DDR3 RAM	1 Gbyte DDR3 RAM	2 or 4 Gbyte DDR3 RAM	
1450 mA	2000 mA	2000 mA	2000 mA	2000 mA	2000 mA	
plug depending on fieldbus	plug depending on fieldbus	plug depending on fieldbus	plug depending on fieldbus	optional, plug depending on fieldbus	optional, plug depending on fieldbus	
all	all	all	all	all	all	
255 with terminal bus extension	255 with terminal bus extension	255 with terminal bus extension	255 with terminal bus extension	255 with terminal bus extension	255 with terminal bus extension	
between fieldbus/ power contacts/ supply voltage	between supply voltage and fieldbus	between supply voltage and fieldbus	between supply voltage and fieldbus	between supply voltage and fieldbus	between supply voltage and fieldbus	

Further Embedded PCs see page **192**

Product overview Bus Couplers



Bus Coupler				PLC		
Fieldbus slave	Standard	Economy plus	Compact	Controller for TwinCAT 2 (IEC 61131-3)		
				Program memory 48 kbyte	Program memory 128 kbyte	Program memory 256 kbyte
EtherCAT		BK1120	BK1150 BK1250			
LIGHTBUS		BK2020				
PROFINET		BK3120 12 Mbaud	BK3150 12 Mbaud	BC3150 12 Mbaud		BX3100 12 Mbaud
		BK3520 12 Mbaud, fibre optic				
INTERBUS		BK4020				
CANopen		BK5120	BK5150 BK5151	BC5150		BX5100
DeviceNet		BK5220	BK5250			BX5200
CC-Link			BK7150			
Modbus			BK7350	BC8050 BC8150		
sercos the automation bus		BK7520				
RS485	BK8000			BC8050		BX8000
RS232	BK8100			BC8150		BX8000
Ethernet TCP/IP	BK9100 2-channel switch		BK9050	BC9050 BC9191 Room Controller	BC9120 2-channel switch BC9191-0100 Room Controller	BX9000
PROFINET	BK9103 2-channel switch		BK9053			
EtherNet/IP	BK9105 2-channel switch		BK9055			

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Embedded PC

CX70xx	CX80xx	CX81xx	CX9020	CX1010	CX50xx	CX51xx, CX52xx	CX1020, CX1030	CX20xx
	CX8010 214	CX8110 222	optional ⁽²⁾		optional ⁽²⁾	optional ⁽²⁾		optional ⁽²⁾
				optional ⁽¹⁾			optional ⁽¹⁾	
	CX8030 214 master		optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾	optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾
	CX8031 215 slave		optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾	optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾
	CX8050 215 master		optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾	optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾
	CX8051 215 slave		optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾	optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾
		optional ⁽³⁾	optional ⁽³⁾	optional ⁽³⁾	optional ⁽³⁾	optional ⁽³⁾	optional ⁽³⁾	optional ⁽³⁾
CX7080 209	CX8080 216	CX8180 222	optional ⁽²⁾	optional ⁽²⁾	optional ⁽²⁾	optional ⁽²⁾	optional ⁽²⁾	optional ⁽²⁾
CX7080 209	CX8080 216	CX8180 222	optional ⁽²⁾	optional ⁽²⁾	optional ⁽²⁾	optional ⁽²⁾	optional ⁽²⁾	optional ⁽²⁾
	CX8090 216	CX8190 223	CX9020 224	CX1010 228	CX5010 248	CX5120 252	CX1020 234	CX2020 264
					CX5020 248	CX5130 254	CX1030 236	CX2030 264
						CX5140 256		CX2040 264
						CX5230 260		CX2033 268
						CX5240 260		CX2043 268
								CX2042 272
								CX2062 272
								CX2072 272
	CX8093 217		optional ⁽²⁾	optional ⁽³⁾	optional ^(2,3)	optional ^(2,3)	optional ⁽³⁾	optional ^(2,3)
	CX8095 217		optional ⁽²⁾	optional ⁽³⁾	optional ^(2,3)	optional ^(2,3)	optional ⁽³⁾	optional ^(2,3)

⁽¹⁾via modular fieldbus interface, ⁽²⁾via hardware, ⁽³⁾via software library

Product overview Bus Terminals



Bus Terminals Digital input: KL1xxx/KS1xxx					KM1xxx	
Signal	2-channel	4-channel	8-channel	16-channel	4-/16-/32-/64-ch.	
5 V DC		KL1124				
24 V DC, filter 3.0 ms	KL1002 type 3	KL1104 type 3	KL1304 type 2	KL1408 type 3	KL1809 type 3	
	KL1302 type 2	KL1402 type 3	KL1154 positive/ground switching	KL1184 ground switching	KL1488 ground switching	KL1862 type 3, flat-ribbon cable
	KL1052 positive/ground switching	KL1352 NAMUR	KL1404 type 3, 4 x 2-wire connection	KL1804 type 3, 8 x 24 V, 4 x 0 V	KL1808 type 3, 8 x 24 V DC	KL1889 ground switching
	KL1212 type 1, short-circuit protected sensor supply	KL1362 break-in alarm			KL1859 8 inputs, 8 outputs, type 3, I _{max} = 0.5 A	KL1862-0010 type 3, flat-ribbon cable, ground switching
24 V DC, filter 0.2 ms	KL1012 type 3	KL1312 type 2	KL1114 type 3	KL1314 type 2	KL1418 type 3	KL1819 type 3
		KL1412 type 3	KL1164 positive/ground switching	KL1194 ground switching	KL1498 ground switching	KL1872 type 3, flat-ribbon cable
			KL1414 type 3, 4 x 2-wire connection	KL1434 type 2, 4 x 2-wire connection		
			KL1814 type 3, 8 x 24 V, 4 x 0 V			
24 V DC, counter	KL1501 type 1, 100 kHz, 32 bit	KL1512 type 1, 1 kHz, 16 bit				
24 V DC	KL1232 pulse expansion	KL1382 thermistor	KL1904 TwinSAFE, 4 safe inputs			KL1644 4-channel, manual operation
≥ 48 V DC	KL1032 filter 3.0 ms	KL1712-0060				
120 V AC/DC	KL1712					
230 V AC	KL1702 120/230 V AC	KL1722 no power contacts	KL1704			

Bus Terminals Digital output: KL2xxx/KS2xxx					KM2xxx
Signal	2-channel	4-channel	8-channel	16-channel	16-/32-/64-channel
5 V DC		KL2124			
24 V DC, I _{max} = 0.5 A	KL2012	KL2114	KL2408	KL2809	KL2819 with diagnostics
	KL2032 reverse voltage protection	KL2184 ground switching	KL2488 ground switching	KL2889 ground switching	KL2872 flat-ribbon cable
		KL2134 reverse voltage protection	KL2808 8 x 0 V	KL2872 flat-ribbon cable	KL2872-0010 flat-ribbon cable, ground switching
	KL2212 diagnostics, protected sensor supply	KL2404 4 x 2-wire	KL1859 type 3, 8 inputs, 8 outputs, filter 3.0 ms		

The standard Bus Terminals (KLxxxx) can be optionally ordered as KSxxxx with pluggable wiring level. EN 61131-2 specification ► www.beckhoff.com/EN61131-2

Bus Terminals Digital output: KL2xxx/KS2xxx					KM2xxx
Signal	1-channel	2-channel	4-channel	8-channel	2-/4-channel
24 V DC, $I_{max} = 2.0 A$		KL2022	KL2424 4 x 2-wire	KL2828 8 x 2-wire	
30 V AC/DC, $I_{max} = 2.0 A$, solid state relay			KL2784		
24 V DC		KL2442 2 x 4 A/1 x 8 A	KL2904 TwinSAFE, 4 safe outputs		
Relay > 100 V AC	KL2631 400 V AC, make contact	KL2612 125 V AC, change-over			
230 V AC	KL2641 relay, make contact, manual operation, $I_{max} = 16 A$	KL2602 relay, make contact, $I_{max} = 5 A$	KL2622 relay, make contact, no power contacts, $I_{max} = 5 A$	KL2634 relay, make contact, 250 V AC/30 V DC	KM2604 relay, $I_{max} = 16 A$, 4-channel
	KL2751 universal dimmer, 300 W	KL2602-0010 relay, make contact, $I_{max} = 5 A$, contact- protecting switching	KL2622-0010 relay, make contact, no power contacts, $I_{max} = 5 A$, contact-protecting switching		KM2614 relay, $I_{max} = 16 A$, 4-channel, manual operation
	KL2761 universal dimmer, 600 W	KL2652 relay, change-over, $I_{max} = 5 A$	KL2702 solid state relay, $I_{max} = 0.3 A$		KM2774 triac outputs, $I_{max} = 1.5 A$
	KL2701 solid state relay, $I_{max} = 3 A$	KL2712 triac	KL2722 triac, mutually locked outputs		KM2642 relay, $I_{max} = 6 A$, manual/automatic operation, relay state readable
		KL2732 triac, mutually locked outputs, no power contacts	KL2692 cycle monitoring (watchdog)		KM2652 relay, $I_{max} = 6 A$, manual/automatic operation, switch and relay state readable
PWM		KL2502 24 V DC, $I_{max} = 0.1 A$	KL2512 24 V DC, $I_{max} = 1.5 A$, ground switching		
		KL2535 $I_{max} = \pm 1 A$, 24 V DC, current-controlled	KL2545 $I_{max} = \pm 3.5 A$, 50 V DC, current-controlled		
Frequency output	KL2521				

Bus Terminals Motion: KL2xxx/KS2xxx	
	< 3 A
Stepper motor	KL2531 $I_{max} = 1.5 A$, 24 V DC
DC motor output stage	KL2532 $I_{max} = 1.0 A$, 24 V DC
	KL2284 reverse switching, $I_{max} = 2.0 A$, 0...24 V DC
AC motor speed controller	KL2791 230 V AC, 200 VA, 1-phase AC motor
	3...5 A
	KL2541 $I_{max} = 5.0 A$, 48 V DC, incremental encoder
	KL2552 $I_{max} = 5.0 A$, 48 V DC, incremental encoder

Bus Terminals | Analog input: KL3xxx/KS3xxx, KM3xxx

Signal	1-channel	2-channel	4-channel	8-channel
0...2 V, 0...500 mV		KL3172 0...2 V, 16 bit, 0.05 %	KL3172-0500 0...500 mV, 16 bit, 0.05 %	
±2 V			KL3182 16 bit, 0.05 %	
0...10 V	KL3061 single-ended, 12 bit	KL3062 single-ended, 12 bit	KL3162 16 bit, 0.05 %	KL3064 single-ended, 12 bit KL3464 single-ended, 12 bit
±10 V	KL3001 differential input, 12 bit	KL3002 differential input, 12 bit	KL3102 differential input, 16 bit KL3132 16 bit, 0.05 %	KL3404 single-ended, 12 bit KL3408 single-ended, 12 bit
0...20 mA	KL3011 differential input, 12 bit	KL3041 with sensor supply, 12 bit	KL3012 differential input, 12 bit KL3042 with sensor supply, 12 bit	KL3112 differential input, 16 bit KL3142 16 bit, 0.05 %
4...20 mA	KL3021 differential input, 12 bit	KL3051 with sensor supply, 12 bit	KL3022 differential input, 12 bit KL3052 with sensor supply, 12 bit	KL3122 differential input, 16 bit KL3152 16 bit, 0.05 %
Resistance thermometer (RTD)	KL3201 PT100...1000, Ni100, 16 bit		KL3202 PT100...1000, Ni100, 16 bit	KL3222 PT100, 4-wire connection, high-precision
				KL3204 PT100...1000, Ni100...1000, 2-wire connection KL3214 PT100...1000, Ni100...1000, KTY, 3-wire connection
				KL3208-0010 PT1000, Ni1000, NTC 1.8... 100 k, potentiom. 1, 5, 10 kΩ KL3228 PT1000, Ni1000
Thermo- couple/mV	KL3311 type J, K, L...U, 16 bit		KL3312 type J, K, L...U, 16 bit	KL3314 type J, K, L...U, 16 bit
Measurement bridge (SG)	KL3351 strain gauge, 16 bit	KL3356 strain gauge, 16 bit, self-calibration		
Oscilloscope	KL3361 ±16 mV		KL3362 ±10 V	
Measurement technology	KL3681 digital multimeter, 18 bit		KL3403 power measurement, 3-phase, 1 A	KL3403-0010 power measurement, 3-phase, 5 A
Pressure measuring	KM3701 differential pressure, -100...+100 hPa	KM3701-0340 differential pressure, up to 340 hPa	KM3702 relative pressure, 7500 hPa	KM3712 relative pressure, -1000...+1000 hPa

Bus Terminals | Analog output: KL4xxx/KS4xxx

Signal	1-channel	2-channel	4-channel	8-channel	2-channel
0...10 V	KL4001 12 bit, potential-free output	KL4002 12 bit	KL4004 12 bit, no power contacts		KM4602 12-bit manual/automatic operation
			KL4404 12 bit	KL4408 12 bit	
±10 V	KL4031 12 bit, potential-free output	KL4032 12 bit	KL4034 12 bit, no power contacts		
		KL4132 16 bit	KL4434 12 bit KL4494 12 bit, 2 x input, 2 x output	KL4438 12 bit	
0...20 mA	KL4011 12 bit	KL4012 12 bit KL4112 16 bit	KL4414 12 bit	KL4418 12 bit	
4...20 mA	KL4021 12 bit	KL4022 12 bit	KL4424 12 bit	KL4428 12 bit	

The standard Bus Terminals (KLxxxx) can be optionally ordered as KSxxxx with pluggable wiring level.

Bus Terminals | Special functions: KL5xxx/KS5xxx, KL6xxx/KS6xxx, KL8xxx

Signal				Signal		
Position measurement	KL5001 SSI encoder interface	KL5051 SSI encoder interface, bidirectional	KL5121 incremental encoder interface with programmable outputs	Safety	KL6904 TwinSAFE Logic, 4 safe outputs	
	KL5101 incremental encoder interface RS422	KL5151 incremental encoder interface 24 V DC, 1-channel, 32 bit	KL5152 incremental encoder interface 24 V DC, 2-channel, 32 bit		Manual operation	KL8519 16-channel digital input signal module
	KL5111 incremental encoder interface 24 V DC					KL8524 4 x 2-channel digital output, 24 V DC, 0.5 A
Communication	KL6001 serial interface RS232, 19.2 kbaud	KL6031 serial interface RS232, 115.2 kbaud	KL6011 serial interface TTY, 20 mA current loop	Power terminals	KL8528 8-channel digital output, 24 V DC, 0.5 A	
	KL6051 data exchange terminal, 32 bit	KL6021 serial interface RS422/RS485, 19.2 kbaud	KL6041 serial interface RS422/RS485, 115.2 kbaud		KL8548 8-channel analog output, 0...10 V	
	KL6201 AS-Interface master terminal	KL6211 AS-Interface master terminal with power contacts	KL6224 IO-Link master		KL8001 switching capacity 5.5 kW, nominal current 0.9...9.9 A, connection mechanism for Siemens contactors (Sirius 3R series)	
	KL6301 EIB/KNX Bus Terminal	KL6401 LON Bus Terminal	KL6581 EnOcean master			
	KL6583 EnOcean transmitter/receiver	KL6771 MP-Bus master terminal	KL6781 M-Bus master terminal			
	KL6811 DALI/DSI master and power supply terminal	KL6821 DALI-2 multi-master and power supply terminal	KL6831 SMI terminal, LoVo			
	KL6841 SMI terminal, 230 V AC					

Bus Terminals | System terminals: KL9xxx/KS9xxx

Signal	System		Signal	Potential supply	Power supply and accessories	
System	KL9010 bus end terminal	KL9070 shield terminal	24 V DC	KL9100	KL9400 K-bus power supply, 2 A	
	KL9020 terminal bus extension end terminal	KL9050 terminal bus extension coupler terminal		KL9110 diagnostics	KL9505 output 5 V DC, 0.5 A	
	KL9060 adapter terminal for power terminal KL8xxx	KL9309 adapter terminal for KL85xx manual operating modules		KL9200 with fuse	KL9508 output 8 V DC, 0.5 A	
	KL9080 isolation terminal	KL9195 shield terminal		KL9210 diagnostics, with fuse	KL9510 output 10 V DC, 0.5 A	
Potential distribution terminals	KL9180 2 terminal points per power contact	KL9181 2 x 8 terminal points	48 V DC		KL9512 output 12 V DC, 0.5 A	
	KL9182 8 x 2 terminal points	KL9183 1 x 16 terminal points			KL9515 output 15 V DC, 0.5 A	
	KL9184 8 x 24 V DC, 8 x 0 V DC	KL9185 only 2 power contacts		KL9520 AS-Interface potential supply	KL9528 AS-Interface power supply terminal	
	KL9186 8 x 24 V DC	KL9187 8 x 0 V DC			KL9560 output 24 V DC, 0.1 A	
	KL9188 16 x 24 V DC	KL9189 16 x 0 V DC		120... 230 V AC	KL9150	KL9570 buffer capacitor terminal, 500 µF
	KL9380 mains filter, approx. 1 µF				KL9160 diagnostics	
Filter	KL9540 surge filter terminal for field supply		Up to 400 V AC	KL9250 with fuse		
	KL9540-0010 surge filter field supply for analog terminals	KL9550 surge filter terminal for system/field supply		KL9260 diagnostics, with fuse		
Diode array	KL9300 4 diodes, potential-free		KL9190			
	KL9301 7 diodes, common cathode	KL9302 7 diodes, common anode	KL9290 with fuse			

Product overview Fieldbus Box



Fieldbus Box	Compact Box		Coupler Box		PLC Box	
Fieldbus	Fieldbus Box without IP-Link interface		Fieldbus Box with IP-Link interface		Controller for TwinCAT 2 (IEC 61131-3) with IP-Link interface	
EtherCAT			IL230x-B110			
LIGHTBUS	IPxxxx-B200		IL230x-B200			
PROFIBUS	IPxxxx-B310	IPxxxx-B318 with integrated tee-connector	IL230x-B310	IL230x-B318 with integrated tee-connector	IL230x-C310	IL230x-C318 with integrated tee-connector
INTERBUS	IPxxxx-B400		IL230x-B400			
CANopen	IPxxxx-B510	IPxxxx-B518 with integrated tee-connector	IL230x-B510	IL230x-B518 with integrated tee-connector		
DeviceNet	IPxxxx-B520	IPxxxx-B528 with integrated tee-connector	IL230x-B520	IL230x-B528 with integrated tee-connector		
Modbus	IPxxxx-B730		IL230x-B730			
RS485	IPxxxx-B800		IL230x-B800			
RS232	IPxxxx-B810		IL230x-B810		IL230x-C810	
Ethernet TCP/IP			IL230x-B900	IL230x-B901	IL230x-C900	
PROFINET			IL230x-B903			
EtherNet/IP			IL230x-B905			

Fieldbus Box | Digital input: IP1xxx-Bxxx

Signal	2-channel	8-channel		
24 V DC, filter 3.0 ms		IP1000-Bxxx ⁽¹⁾ 8 x 8 mm	IP1001-Bxxx ⁽¹⁾ 8 x M8	IP1002-Bxxx ⁽¹⁾ 4 x M12
24 V DC, filter 0.2 ms		IP1010-Bxxx ⁽¹⁾ 8 x 8 mm	IP1011-Bxxx ⁽¹⁾ 8 x M8	IP1012-Bxxx ⁽¹⁾ 4 x M12
Counter	IP1502-Bxxx ⁽¹⁾ up/down counter 24 V DC, 100 kHz			

Fieldbus Box | Digital output: IP2xxx-Bxxx

Signal	2-channel	8-channel			16-channel
24 V DC, $I_{max} = 0.5 A$		IP2000-Bxxx ⁽¹⁾ 8 x 8 mm	IP2001-Bxxx ⁽¹⁾ 8 x M8	IP2002-Bxxx ⁽¹⁾ 4 x M12	
24 V DC, $I_{max} = 0.5 A$, $\Sigma 4 A$					IE2808 D-sub
24 V DC, $I_{max} = 2 A$, $\Sigma 4 A$		IP2020-Bxxx ⁽¹⁾ 8 x 8 mm	IP2021-Bxxx ⁽¹⁾ 8 x M8	IP2022-Bxxx ⁽¹⁾ 4 x M12	
24 V DC, $I_{max} = 2 A$, $\Sigma 12 A$		IP2040-Bxxx ⁽¹⁾ 8 x 8 mm	IP2041-Bxxx ⁽¹⁾ 8 x M8	IP2042-Bxxx ⁽¹⁾ 4 x M12	
PWM, $I_{max} = 2.5 A$	IP2512-Bxxx ⁽¹⁾ 4 x M12				

⁽¹⁾also as IExxxx: Extension Box, ⁽²⁾also as ILxxxx-Bxxx: Coupler Box, ⁽³⁾also as ILxxxx-Cxxx: PLC Box

Fieldbus Box | Digital combi: IP23xx-Bxxx, IP24xx-Bxxx

Signal	8-channel			16-channel		
24 V DC, filter 3.0 ms, $I_{max} = 0.5 \text{ A}$	IP2300-Bxxx ^(1, 2, 3) 8 x 8 mm, 4 inputs + 4 outputs	IP2301-Bxxx ^(1, 2, 3) 8 x M8, 4 inputs + 4 outputs	IP2302-Bxxx ^(1, 2, 3) 4 x M12, 4 inputs + 4 outputs	IP2400-Bxxx ⁽¹⁾ 8 x 8 mm, 8 inputs/outputs	IP2401-Bxxx ⁽¹⁾ 8 x M8, 8 inputs/outputs	IE2403 IP 20 plug
24 V DC, filter 0.2 ms, $I_{max} = 0.5 \text{ A}$	IP2310-Bxxx ⁽¹⁾ 8 x 8 mm, 4 inputs + 4 outputs	IP2311-Bxxx ⁽¹⁾ 8 x M8, 4 inputs + 4 outputs	IP2312-Bxxx ⁽¹⁾ 4 x M12, 4 inputs + 4 outputs			
24 V DC, filter 3.0 ms, $I_{max} = 2 \text{ A}, \sum 4 \text{ A}$	IP2320-Bxxx ⁽¹⁾ 8 x 8 mm, 4 inputs + 4 outputs	IP2321-Bxxx ⁽¹⁾ 8 x M8, 4 inputs + 4 outputs	IP2322-Bxxx ⁽¹⁾ 4 x M12, 4 inputs + 4 outputs			
24 V DC, filter 0.2 ms, $I_{max} = 2 \text{ A}, \sum 4 \text{ A}$	IP2330-Bxxx ⁽¹⁾ 8 x 8 mm, 4 inputs + 4 outputs	IP2331-Bxxx ⁽¹⁾ 8 x M8, 4 inputs + 4 outputs	IP2332-Bxxx ⁽¹⁾ 4 x M12, 4 inputs + 4 outputs			

Fieldbus Box | Analog input: IP3xxx-Bxxx

Signal	4-channel
$\pm 10 \text{ V}$	IP3102-Bxxx ⁽¹⁾ differential inputs, 16 bit
0/4...20 mA	IP3112-Bxxx ⁽¹⁾ differential inputs, 16 bit
Resistance thermometer	IP3202-Bxxx ⁽¹⁾ PT100, PT200, PT500, PT1000, Ni100, 16 bit
Thermo-couple/mV	IP3312-Bxxx ⁽¹⁾ type J, K, L, B, E, N, R, S, T, U, 16 bit

Fieldbus Box | Analog output: IP4xxx-Bxxx

Signal	4-channel
$\pm 10 \text{ V}$	IP4132-Bxxx ⁽¹⁾
0/4...20 mA	IP4112-Bxxx ⁽¹⁾

Fieldbus Box | Position measurement: IP5xxx-Bxxx

Function	1-channel		
Absolute encoder	IP5009-Bxxx ⁽¹⁾ SSI encoder interface		
Incremental encoder	IP5109-Bxxx ⁽¹⁾ incremental encoder interface, 1 MHz	IP5209-Bxxx SinCos encoder interface, 12-pin	IP5209-Bxxx-1000 SinCos encoder interface, 9-pin

Fieldbus Box | Communication: IP6xxx-Bxxx

Function	1-channel		
Serial interface	IP6002-Bxxx ⁽¹⁾ RS232	IP6012-Bxxx ⁽¹⁾ 0...20 mA (TTY)	IP6022-Bxxx ⁽¹⁾ RS422/RS485



EPIxxxx

ERLxxxx

Fieldbus Box | IO-Link box, digital input: EPI1xxx

Signal	8-channel		16-channel	
24 V DC, filter 3.0 ms	EPI1008-0001 ⁽¹⁾ 8 x M8	EPI1008-0002 ⁽¹⁾ 4 x M12	EPI1809-0021 ⁽¹⁾ 16 x M8	EPI1809-0022 ⁽¹⁾ 8 x M12

Fieldbus Box | IO-Link box, digital output: EPI2xxx

Signal	8-channel		16-channel	
24 V DC, $I_{max} = 0.5 A$	EPI2008-0001 ⁽¹⁾ 8 x M8	EPI2008-0002 ⁽¹⁾ 4 x M12		
24 V DC, $I_{max} = 0.5 A$, $\Sigma 4 A$			EPI2809-0021 ⁽¹⁾ 16 x M8	EPI2809-0022 ⁽¹⁾ 8 x M12

Fieldbus Box | IO-Link box, digital combi: EPI23xx

Signal	8-channel		16-channel	
24 V DC, filter 3.0 ms, $I_{max} = 0.5 A$	EPI2338-0001 ⁽¹⁾ 8 x M8	EPI2338-0002 ⁽¹⁾ 4 x M12		
24 V DC, filter 3.0 ms, $I_{max} = 0.5 A$, $\Sigma 4 A$			EPI2339-0021 ⁽¹⁾ 16 x M8	EPI2339-0022 ⁽¹⁾ 8 x M12

Fieldbus Box | IO-Link box, analog input: EPI3xxx

Signal	4-channel
$\pm 10 V$, 0/4...20 mA	EPI3174-0002 ⁽¹⁾ parameterizable, differential input, 16 bit

Fieldbus Box | IO-Link box, analog output: EPI4xxx

Signal	4-channel
$\pm 10 V$, 0/4...20 mA	EPI4374-0002 ⁽¹⁾ 2 inputs + 2 outputs, parameterizable, 16 bit

EPIxxxx: industrial housing in IP 67, ⁽¹⁾also as ERLxxxx: zinc die-cast housing in IP 67

Product overview Infrastructure Components



Ethernet components

	Gbit/s	100 Mbit/s
Switches	CU2208 8 x RJ45, IP 20	CU2008 8 x RJ45, IP 20
		CU2608 8 x M12 (D-coded), IP 67
		CU2016 16 x RJ45, IP 20
		CU2005 5 x RJ45, IP 20
Port multiplier	CU2508 1 x RJ45 (+ 8 x RJ45: 100 Mbit/s)	
PCI	FC9024-0000 4 x RJ45, PCIe	FC9004-0000 4 x RJ45
	FC9022-0000 2 x RJ45, PCIe	FC9002-0000 2 x RJ45
	FC9011-0000 1 x RJ45	FC9001-0010 1 x RJ45
Mini PCI	FC9151-0000 1 x RJ45	FC9051-0000 1 x RJ45

EtherCAT components

	Gbit/s, IP 20	100 Mbit/s, IP 20	100 Mbit/s, IP 67
Junctions	CU1423 junction, 3 x RJ45	CU1123 junction, 3 x RJ45	
	CU1411 branch controller, 1 port	CU1123-0010 junction, 3 x RJ45, Extended Distance	
	CU1418 branch controller, 8 ports	CU1124 junction, 4 x RJ45	
		CU1128 junction, 8 x RJ45	EP9128-0021 EtherCAT, 8-way
Media converters		CU1521-0000 multimode	EP9521-0020 1-channel, multimode
		CU1521-0010 singlemode	
		CU1561 POF	
Slave (PCI)		FC1100 1-channel	
		FC1121 1-channel, PCIe	

PC Fieldbus Cards

	PCI		Mini PCI	
LIGHTBUS	FC2001-0000 1-channel	FC2002-0000 2-channel		
PROFINET® BUS	FC3101-0000 1-channel	FC3101-0002 1-channel, 32 kbyte NOVRAM	FC3121 1-channel, PCIe	FC3151-0000 1-channel
	FC3102-0000 2-channel	FC3102-0002 2-channel, 32 kbyte NOVRAM	FC3122 2-channel, PCIe	FC3151-0002 1-channel, 128 kbyte NOVRAM
CANopen	FC5101-0000 1-channel	FC5101-0002 1-channel, 32 kbyte NOVRAM	FC5121 1-channel, PCIe	FC5151-0000 1-channel
	FC5102-0000 2-channel	FC5102-0002 2-channel, 32 kbyte NOVRAM	FC5122 2-channel, PCIe	FC5151-0002 1-channel, 128 kbyte NOVRAM
DeviceNet	FC5201-0000 1-channel	FC5201-0002 1-channel, 32 kbyte NOVRAM		FC5251-0000 1-channel
	FC5202-0000 2-channel	FC5202-0002 2-channel, 32 kbyte NOVRAM		FC5251-0002 1-channel, 128 kbyte NOVRAM
serCOS the automation bus	FC7501-0000 1-channel	FC7502-0000 2-channel		FC7551-0000 1-channel
				FC7551-0002 1-channel, 128 kbyte NOVRAM



Highlights

- complete drive system with TwinCAT Motion Control
- for highly dynamic, single and multiple axis positioning tasks
- modularity and scalable power in compact Drive Technology
- XTS – Linear motor on an endless path
- XPlanar: Flying Motion

Drive Technology

The drive system for highly dynamic positioning tasks

► www.beckhoff.com/DriveTechnology

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351	Fan-cooled motors	391	Power supply module AMP8620	460	Linear actuators AA1000
352	TwinSAFE	392	Distribution module AMP8805	462	Servomotor series AM8100
354	XTS (eXtended Transport System)	393	Coupling modules AX883x	468	Stepper motors AS2000
356	XPlanar (eXtended planar motor system)			472	Stepper motors AS1000
358	Servo Drives	394	Synchronous Servomotors	476	eXtended Transport System
360	Multi-axis servo system AX8000	398	Motor series AM8000	478	XTS Standard
362	Power supply modules AX86xx	410	Motor series with higher moment of inertia AM8500	480	Motor modules AT20xx-0xxx
363	Combined power supply and axis modules AX85xx	424	Motor series with anodized housing AM8700	483	Guide rails AT9xxx-xxxx
364	Axis modules AX81xx, AX82xx	428	Stainless steel motor series AM8800	485	Movers AT9011, AT9012
366	Option modules AX88xx	432	Motor series AM3000	486	Starter kits AT2000-xx00
368	Accessories			488	XTS Hygienic
372	Digital Compact Servo Drives AX5000	418	Planetary gear units	490	Motor modules ATH2000
374	1-channel Servo Drives AX51xx	420	High-end gear series AG2300	491	Movers ATH9011, ATH9013
376	2-channel Servo Drives AX52xx	422	Economy gear series AG3xxx	492	Guide rails ATH9000
377	Encoder option cards AX57xx		High-end/Economy gear series with output flange AGx400	494	eXtended planar motor system
377	TwinSAFE drive option cards AX58xx	431	Stainless steel gear series AG2800	498	Movers APM4xxx
378	AX-Bridge quick connection system AX59xx	466	Gear series AG2250	499	Tile APS4322
379	Accessories	436	Linear motors	500	Starter kits APS9000
		440	Linear Servomotors AL8000	502	Software
		444	Linear Servomotors AL2000	504	TC3 Motion Designer TE5910
		448	Accessories	506	TC3 Drive Manager 2 TE5950
		453	Tubular motor AA2518	508	TC3 XTS Extension TF5850
				510	TC3 XPlanar TF5890

Product overview Servo Drives



AX8000

AX8000 | Multi-axis servo system: power supply modules

	AX8620-0000-0000 362	AX8640-0000-0000 362
DC-Link output current	1~: 5 A DC without mains choke/7 A DC with mains choke 3~: 20 A DC	3~: 40.0 A DC
Rated supply voltage	1 x 100...240 V AC 3 x 200...480 V AC	3 x 200...480 V AC

Any number of axis modules can be added provided that the rated output current of the power supply modules is sufficient.

AX8000 | Multi-axis servo system: axis modules

	AX8108-0xx0-0000 365	AX8118-0xx0-0000 365	AX8206-0xx0-0000 365
Rated output current (axis)	8 A	18 A	6 A
Number of channels	1	1	2
Feedback system	OCT, multi-feedback	OCT, multi-feedback	OCT, multi-feedback
TwinSAFE safe drive technology	STO/SS1, Safe Motion	STO/SS1, Safe Motion	STO/SS1, Safe Motion

AX8000 | Combined power supply and axis modules

	AX8525-0xx0-0000 363	AX8540-0xx0-0000 363
Rated supply voltage	3 x 200...480 V AC	3 x 200...480 V AC
Rated input current	70 A AC	70 A AC
DC-Link output current	80 A DC, thereof max. 50 A DC for the AX-Bridge	80 A DC, thereof max. 50 A DC for the AX-Bridge
Rated output current (axis)	25 A	40 A
Peak output current (axis)	50 A	80 A
Feedback system	OCT, multi-feedback	OCT, multi-feedback
TwinSAFE safe drive technology	STO/SS1, Safe Motion	STO/SS1, Safe Motion

AX8000 | Multi-axis servo system: option modules

	1-channel	2-channel
Coupling modules for AMP8000	AX8831-0000-0000 393 For AX86xx-0000	AX8832-0000-0000 393
Capacitor module	AX8810-0000-0000 366 For AX81xx-0xx0, AX82xx-0xx0	
Energy recovery modules	AX8820-00xx-0000 367	



AX5000

AX5000 | Digital Compact Servo Drives

	AX5101...AX5112 374	AX5201...AX5206 376	AX5118...AX5140 374	AX5160...AX5193 375
Number of channels	1	2	1	1
Rated output current (axis)	3~: 1.5...12 A, 1~: 1.5...4.5 A	3~: 1.5...6 A (total device current: 3...12 A), 1~: 1.5 A (total device current: 3...9 A)	3~: 18...40 A	3~: 60...170 A
Rated supply voltage	3 x 100...480 V AC (wide voltage range), 1 x 100...240 V AC	3 x 100...480 V AC (wide voltage range), 1 x 100...240 V AC	3 x 100...480 V AC (wide voltage range)	3 x 400...480 V AC
Feedback system	OCT, multi-feedback	OCT, multi-feedback	OCT, multi-feedback	multi-feedback

AX5000 | Digital Compact Servo Drives: options

	1-channel	2-channel
Encoder option cards	AX5701 377 1 V _{PP} : BiSS B, Hiperface, EnDat 2.1	AX5721 377 EnDat 2.2, BiSS C
TwinSAFE safe drive technology	AX5801-0200 377 for AX5101...AX5140 and AX5201...AX5206	AX5702 377 AX5722 377 1 V _{PP} : BiSS B, Hiperface, EnDat 2.1 EnDat 2.2, BiSS C
AX-Bridge	AX5901 378 for AX5101...AX5125 and AX5201...AX5206	AX5805-0000 377 AX5806-0000 377 for AX5101...AX5140 and AX5201...AX5206
Brake module	AX5902 378 for AX5140	AX5911 378 AX5912 378 for AX5101...AX5112 and AX5201...AX5206
Brake energy recovery	AX5021 383 connection of external brake resistors	

Product overview Distributed Servo Drive system



AMP804x | Distributed Servo Drive, flange code F4

Data for 560 V DC	AMP8041-Dxyz 389	AMP8041-Exyz 389	AMP8042-Exyz 389	AMP8043-Exyz 389
Standstill torque	2.25 Nm	2.40 Nm	3.90 Nm	5.35 Nm
Rated speed	3000 min ⁻¹	6000 min ⁻¹	2500 min ⁻¹	2500 min ⁻¹
Rated power	0.69 kW	1.44 kW	0.97 kW	1.31 kW
Standstill current	1.60 A	3.00 A	2.05 A	2.75 A
Connection technology	ECP B23 plug	ECP B23 plug	ECP B23 plug	ECP B23 plug
One Cable Automation (OCA)	yes	yes	yes	yes

AMP805x | Distributed Servo Drive, flange code F5

Data for 560 V DC	AMP8051-Exyz 389	AMP8051-Gxyz 389	AMP8052-Fxyz 389	AMP8053-Gxyz 389
Standstill torque	4.55 Nm	4.60 Nm	7.80 Nm	10.75 Nm
Rated speed	2500 min ⁻¹	5000 min ⁻¹	2000 min ⁻¹	2000 min ⁻¹
Rated power	1.14 kW	2.17 kW	1.49 kW	1.98 kW
Standstill current	2.60 A	4.50 A	3.15 A	4.45 A
Connection technology	ECP B23 plug	ECP B23 plug	ECP B23 plug	ECP B23 plug
One Cable Automation (OCA)	yes	yes	yes	yes

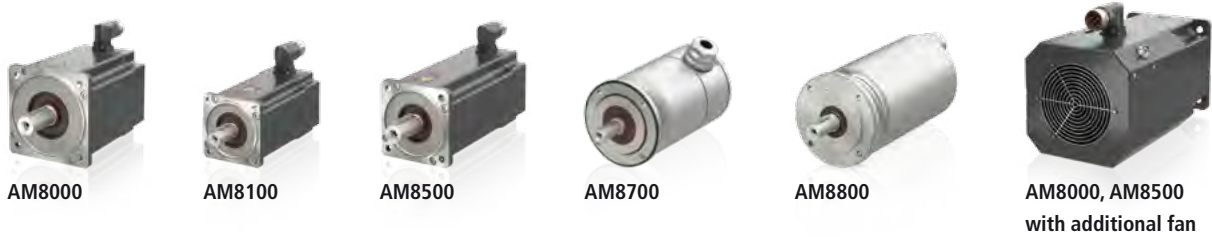
AX883x | Coupling modules for AMP8000

	AX8831-0000-0000 393	AX8832-0000-0000 393
Function	coupling module	coupling module
Number of channels	1	2
DC-Link output current	20 A DC	2 x 20 A DC
Rated output current 24 V	10 A DC	2 x 10 A DC
DC-Link voltage	max. 875 V DC	max. 875 V DC

AMP8805, AMP8620 | Distribution/power supply module for AMP8000

	AMP8805-1000-0000 392	AMP8620-2005-0000 391
Function	distribution module	power supply module
Number of channels	1 x power IN 565...680 V DC, 5 x power OUT 565...680 V DC/Σ max. 20 A DC, 1 x EtherCAT P OUT	3 x power IN 400...480 V AC, 1 x EtherCAT/EtherCAT P, 5 x power OUT 565...680 V DC/Σ max. 20 A DC, 2 x EtherCAT P OUT Σ max. 6 A DC
DC-Link voltage	565...680 V DC	565...680 V DC
DC-Link capacitance	940 μF	940 μF
Protection class	IP 65	IP 65

Product overview Synchronous Servomotors



Synchronous Servomotors, OCT

	Flange code							
	F1 (40 mm)	F2 (58 mm)	F3 (72 mm)	F4 (87 mm)	F5 (104 mm)	F6 (142 mm)	F7 (197 mm)	
Standard 400 V AC		AM802x $M_0 = 0.50 \dots 1.20 \text{ Nm}$	AM803x $M_0 = 1.37 \dots 3.22 \text{ Nm}$	AM804x $M_0 = 2.37 \dots 5.65 \text{ Nm}$	AM805x $M_0 = 4.80 \dots 13.8 \text{ Nm}$, up to 17.2 Nm with fan	AM806x $M_0 = 12.8 \dots 35.0 \text{ Nm}$, up to 49.0 Nm with fan	AM807x $M_0 = 29.0 \dots 92.0 \text{ Nm}$, up to 129 Nm with fan	398
Standard 230 V AC	AM801x $M_0 = 0.20 \dots 0.52 \text{ Nm}$							400
Standard 48 V DC	AM811x $M_0 = 0.20 \dots 0.52 \text{ Nm}$	AM812x $M_0 = 0.50 \dots 0.80 \text{ Nm}$	AM813x $M_0 = 1.35 \dots 2.37 \text{ Nm}$	AM8141 $M_0 = 2.40 \text{ Nm}$				462
Increased inertia 400 V AC			AM853x $M_0 = 1.37 \dots 3.22 \text{ Nm}$	AM854x $M_0 = 2.37 \dots 5.65 \text{ Nm}$	AM855x $M_0 = 4.80 \dots 11.4 \text{ Nm}$, up to 15.4 Nm with fan	AM856x $M_0 = 12.8 \dots 29.0 \text{ Nm}$, up to 41.4 Nm with fan		410
Anodized 400 V AC			AM873x* $M_0 = 1.38 \dots 3.22 \text{ Nm}$	AM874x* $M_0 = 2.45 \dots 5.65 \text{ Nm}$	AM875x* $M_0 = 4.90 \dots 11.4 \text{ Nm}$	AM876x* $M_0 = 12.80 \dots 29.0 \text{ Nm}$		424
Stainless steel 400 V AC			AM883x* $M_0 = 0.85 \dots 1.85 \text{ Nm}$	AM884x* $M_0 = 1.60 \dots 3.50 \text{ Nm}$	AM885x* $M_0 = 3.10 \dots 6.40 \text{ Nm}$	AM886x* $M_0 = 7.75 \dots 16.7 \text{ Nm}$		428

Synchronous Servomotors, 2-cable standard

	Flange code								
	F1 (40 mm)	F2 (58 mm)	F3 (72 mm)	F4 (87 mm)	F5 (104 mm)	F6 (142 mm)	F7 (197 mm)	F8 (260 mm)	
Standard 400 V AC		AM802x $M_0 = 0.50 \dots 1.20 \text{ Nm}$	AM803x $M_0 = 1.37 \dots 3.22 \text{ Nm}$	AM804x $M_0 = 2.37 \dots 5.65 \text{ Nm}$	AM805x $M_0 = 4.80 \dots 13.8 \text{ Nm}$, up to 17.2 Nm with fan	AM806x $M_0 = 12.8 \dots 35.0 \text{ Nm}$, up to 49.0 Nm with fan	AM807x $M_0 = 29.0 \dots 92.0 \text{ Nm}$, up to 129 Nm with fan		398
		AM302x $M_0 = 0.87 \dots 1.41 \text{ Nm}$	AM303x* $M_0 = 1.15 \dots 2.79 \text{ Nm}$	AM304x* $M_0 = 1.95 \dots 6.00 \text{ Nm}$	AM305x* $M_0 = 4.70 \dots 14.9 \text{ Nm}$	AM306x* $M_0 = 11.9 \dots 25.0 \text{ Nm}$	AM307x* $M_0 = 29.7 \dots 53.0 \text{ Nm}$	AM308x $M_0 = 75.0 \dots 180 \text{ Nm}$	432
Standard 230 V AC	AM801x $M_0 = 0.20 \dots 0.52 \text{ Nm}$								400
	AM301x $M_0 = 0.18 \dots 0.41 \text{ Nm}$	AM302x $M_0 = 0.48 \dots 0.87 \text{ Nm}$	AM3031 $M_0 = 1.20 \text{ Nm}$						432
Standard 48 V DC	AM811x $M_0 = 0.20 \dots 0.52 \text{ Nm}$	AM812x $M_0 = 0.50 \dots 0.80 \text{ Nm}$	AM813x $M_0 = 1.35 \dots 2.37 \text{ Nm}$	AM8141 $M_0 = 2.40 \text{ Nm}$					462
Increased inertia 400 V AC			AM853x $M_0 = 1.37 \dots 3.22 \text{ Nm}$	AM854x $M_0 = 2.37 \dots 5.65 \text{ Nm}$	AM855x $M_0 = 4.80 \dots 11.4 \text{ Nm}$, up to 15.4 Nm with fan	AM856x $M_0 = 12.8 \dots 29.0 \text{ Nm}$, up to 41.4 Nm with fan			410
Anodized 400 V AC			AM873x* $M_0 = 1.38 \dots 3.22 \text{ Nm}$	AM874x* $M_0 = 2.45 \dots 5.65 \text{ Nm}$	AM875x* $M_0 = 4.90 \dots 11.4 \text{ Nm}$	AM876x* $M_0 = 12.80 \dots 29.0 \text{ Nm}$			424
Stainless steel 400 V AC			AM883x* $M_0 = 0.85 \dots 1.85 \text{ Nm}$	AM884x* $M_0 = 1.60 \dots 3.50 \text{ Nm}$	AM885x* $M_0 = 3.10 \dots 6.40 \text{ Nm}$	AM886x* $M_0 = 7.75 \dots 16.7 \text{ Nm}$			428

*Please note the different flange size.

Product overview Linear Servomotors, stepper motors



Linear Servomotors

	AL802x 441	AL804x 441	AL806x 442	AL2xxx 445
Special features	made in Germany	made in Germany	made in Germany	standard
Dimensions secondary parts	50 mm	80 mm	130 mm	50 mm, 80 mm, 130 mm
Cooling	convection	convection, water cooling	convection, water cooling	convection, water cooling
Max. speed	10...12 m/s	3.5...7 m/s	3...6 m/s	3...12 m/s
Max. force	120...720 N	230...1840 N	1800...6750 N	120...6750 N
Protection class	IP 64	IP 64	IP 64	IP 64

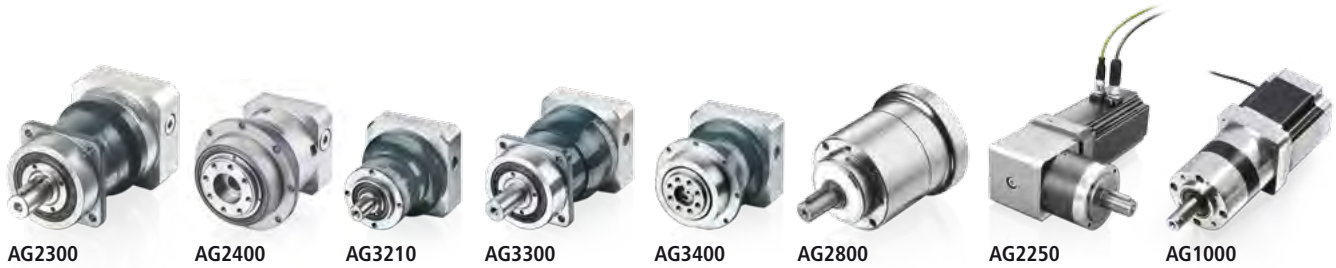
Translatory servomotors

	AA1121 460	AA1821 460	AA2518 453
Motor type	linear actuator	linear actuator	linear tubular motor
Rated supply voltage	24...48 V DC	24...48 V DC	400...480 V AC
Peak force	800 N	800 N	1050 N
Max. movement	10 mm	10 mm	400 mm
Cooling	convection	convection	water cooling
Variant	standard	stainless steel	standard
Protection class	IP 54	IP 69K	IP 65

Stepper motors

	AS1000 472	AS2000 468
Sizes	N1 (NEMA17), N2 (NEMA23), N3 (NEMA34)	N2 (NEMA23), N3 (NEMA34)
Resolution	1.8°/200 full steps	1.8°/200 full steps
Encoder	incremental, 1024 lines	incremental, 1024 lines
Standstill torque < 3 A	0.38...0.60 Nm	0.80 Nm
Standstill torque > 3 A	1.20...5.00 Nm	1.50...8.00 Nm
Protection class	IP 43, AS1060: IP 20	IP 54

Product overview planetary gear units



Planetary gear units for AM8000/AM8500

	AG2300 418	AG2400 422	AG3210 421	AG3300 420	AG3400 423
Type	high-end	high-end	economy	economy	economy
Variant	standard (MF), high-speed (MC)	standard (MF)	standard (MF)	standard (MF)	standard (MF)
Output type	shaft	flange	shaft	shaft	flange
Gear ratios	1-stage $i = 3 \dots 10$, 2-stage $i = 16 \dots 100$	1-stage $i = 4 \dots 10$, 2-stage $i = 16 \dots 100$	1-stage $i = 3 \dots 10$, 2-stage $i = 9 \dots 100$	1-stage $i = 3 \dots 10$, 2-stage $i = 9 \dots 100$	1-stage $i = 3 \dots 10$, 2-stage $i = 9 \dots 100$
Protection class	IP 65	IP 65	IP 64	IP 65	IP 64

Planetary gear units for other motor series

	AG2800 431	AG2250 466	AG1000 475
Type	economy	economy	economy
Variant	stainless steel	straight and angled versions	standard
Motor series	AM8800	AM8100, AS2000	AS1000
Output type	shaft	shaft	shaft
Gear ratios	1-stage $i = 3 \dots 10$, 2-stage $i = 9 \dots 100$	1-stage $i = 3 \dots 10$, 2-stage $i = 9 \dots 64$	1-stage $i = 3.7$ or 6.75
Protection class	IP 69K	IP 54	IP 43, AS1060: IP 20

Product overview compact Drive Technology



EtherCAT Terminals



EtherCAT Plug-in Modules



Bus Terminals

	Product group	BLDC motors		DC motors		
		4.5...8 A		< 3 A	3...5 A	> 5 A
I/O	EtherCAT Terminals IP 20	EL7411-9014 2 264 <small>I_{ms} = 4.5 A, 48 V DC, STO</small>		EL7332 2 263 <small>I_{max} = 1.0 A, 24 V DC</small>	EL7332+ZB8610 2 263 <small>I_{max} = 3.0 A, 24 V DC</small>	
		EL7411-9014+ ZB8610 2 264 <small>I_{ms} = 7...8 A, 48 V DC, STO</small>			EL7342 2 263 <small>I_{max} = 3.5 A, 48 V DC, incremental encoder</small>	EL7342+ZB8610 2 263 <small>I_{max} = 6.5 A, 48 V DC, incremental encoder</small>
		EL7411 2 264 <small>I_{ms} = 4.5 A, 48 V DC</small>				
	EtherCAT Plug-in Modules IP 20				EJ7342 2 459 <small>I_{max} = 3.5 A, 48 V DC, incremental encoder</small>	
	Bus Terminals IP 20		KL2532 2 543 <small>I_{max} = 1.0 A, 24 V DC</small>	KL2552 2 543 <small>I_{max} = 5.0 A, 48 V DC, incremental encoder</small>		
	EtherCAT Box modules IP 67				EP/ER7342-0002 2 370 <small>I_{max} = 3.5 A, 48 V DC</small>	
	EtherCAT P Box modules IP 67				EPP7342-0002 2 414 <small>I_{max} = 3.5 A, 48 V DC</small>	
Motion	Flange code F1 (40 mm)					
	Flange code F2 (58 mm)					
	Flange code F3 (72 mm)					
	Flange code F4 (87 mm)					

Drive Technology



EtherCAT Box modules



EtherCAT P Box modules



Flange code F1



Flange code F2



Flange code F3



Flange code F4



Integrated Servo Drives, rear view

Servomotors			Integrated Servo Drives	
< 3 A	3...5 A	> 5 A	3...5 A	> 5 A
EL7201-9014 2 261 <i>I_{ms}</i> = 2.8 A, 48 V DC, OCT, STO	EL7201-9014+ 2 261 ZB8610 <i>I_{ms}</i> = 4.5 A, 48 V DC, OCT, STO	EL7221-9014 2 260 <i>I_{ms}</i> = 7...8 A with ZB8610, 48 V DC, OCT, STO		
EL7201-0010 2 261 <i>I_{ms}</i> = 2.8 A, 48 V DC, OCT	EL7201-0010+ 2 261 ZB8610 <i>I_{ms}</i> = 4.5 A, 48 V DC, OCT			
EL7201 2 261 <i>I_{ms}</i> = 2.8 A, 48 V DC, resolver	EL7201+ZB8610 2 261 <i>I_{ms}</i> = 4.5 A, 48 V DC, resolver			
	EL7211-9014 2 261 <i>I_{ms}</i> = 4.5 A, 48 V DC, OCT, STO			
	EL7211-0010 2 261 <i>I_{ms}</i> = 4.5 A, 48 V DC, OCT			
	EL7211 2 261 <i>I_{ms}</i> = 4.5 A, 48 V DC, resolver			
	EJ7211-9414 2 458 <i>I_{ms}</i> = 4.5 A, 48 V DC, OCT, STO, TwinSAFE SC			
	EJ7211-0010 2 458 <i>I_{ms}</i> = 4.5 A, 48 V DC, OCT			
	EP7211-0034 2 366 <i>I_{ms}</i> = 4.5 A, 48 V DC, OCT, STO			
AM8111-wFyz 463 2.8 A, 48 V DC, 0.20 Nm, 4000 min ⁻¹	AM8112-wFyz 463 4.7 A, 48 V DC, 0.38 Nm, 4500 min ⁻¹			
	AM8113-wFyz 463 4.8 A, 48 V DC, 0.52 Nm, 3000 min ⁻¹			
	AM8121-wFyz 464 4.0 A, 48 V DC, 0.50 Nm, 3000 min ⁻¹		AMI8121-ab00-wFyz 457 4.0 A, 48 V DC, 0.50 Nm, 3000 min ⁻¹	
	AM8122-wFyz 464 4.0 A, 48 V DC, 0.80 Nm, 2000 min ⁻¹	AM8122-wJyz 464 8.0 A, 48 V DC, 0.80 Nm, 4500 min ⁻¹	AMI8122-ab00-wFyz 457 4.0 A, 48 V DC, 0.70 Nm, 2000 min ⁻¹	AMI8122-ab00-wJyz 457 8.0 A, 48 V DC, 0.70 Nm, 4500 min ⁻¹
				AMI8123-ab00-wJyz 457 8.0 A, 48 V DC, 1.10 Nm, 3000 min ⁻¹
	AM8131-wFyz 464 5.0 A, 48 V DC, 1.35 Nm, 1000 min ⁻¹	AM8131-wJyz 464 8.0 A, 48 V DC, 1.35 Nm, 1800 min ⁻¹		
		AM8132-wJyz 464 8.0 A, 48 V DC, 2.37 Nm, 1000 min ⁻¹		
		AM8141-wJyz 464 8.0 A, 48 V DC, 2.40 Nm, 1000 min ⁻¹		



Flange code N1



Flange code N2



Flange code N3

Product group		Stepper motors		
		< 3 A	3...5 A	> 5 A
I/O	EtherCAT Terminals IP 20	EL7037 2 259 <i>I</i> _{max} = 1.5 A, 24 V DC, incremental encoder, vector control	EL7037+ZB8610 2 259 <i>I</i> _{max} = 3.0 A, 24 V DC, incremental encoder, vector control	
		EL7031 2 258 <i>I</i> _{max} = 1.5 A, 24 V DC	EL7047-9014 2 259 <i>I</i> _{max} = 5.0 A, 48 V DC, incremental encoder, vector control, STO	EL7047-9014+ZB8610 2 259 <i>I</i> _{max} = 6.5 A, 48 V DC, incremental encoder, vector control, STO
			EL7047 2 259 <i>I</i> _{max} = 5.0 A, 48 V DC, incremental encoder, vector control	EL7047+ZB8610 2 259 <i>I</i> _{max} = 6.5 A, 48 V DC, incremental encoder, vector control
			EL7041 2 259 <i>I</i> _{max} = 5.0 A, 48 V DC, incremental encoder	
	EtherCAT Plug-in Modules IP 20	EJ7031 2 457 <i>I</i> _{max} = 1.5 A, 24 V DC	EJ7047 2 457 <i>I</i> _{max} = 5.0 A, 48 V DC, incremental encoder, vector control	
			EJ7041-0052 2 457 <i>I</i> _{max} = 5.0 A, 48 V DC	
	Bus Terminals IP 20	KL2531 2 541 <i>I</i> _{max} = 1.5 A, 24 V DC	KL2541 2 541 <i>I</i> _{max} = 5.0 A, 48 V DC, incremental encoder	
	EtherCAT Box modules IP 67	EP/ER7041-1002 2 368 <i>I</i> _{max} = 1.5 A, incremental encoder, 2 digital inputs, 1 digital output	EP/ER7041-3002 2 369 <i>I</i> _{max} = 5 A, incremental encoder, for high-speed applications, encoder system (24 V DC encoder)	
			EP7047-0032 2 367 <i>I</i> _{max} = 5.0 A, 48 V DC, OCT, STO	
	EtherCAT P Box modules IP 67	EPP7041-1002 2 413 <i>I</i> _{max} = 1.5 A, 48 V DC, incremental encoder	EPP7041-3002 2 413 <i>I</i> _{max} = 5.0 A, 48 V DC, incremental encoder	
Motion	Flange code N1 (NEMA17)	AS1010-0000 473 1.0 A, 48 V DC, 0.38 Nm		
		AS1020-0xyz 473 1.0 A, 48 V DC, 0.50 Nm		
	Flange code N2 (NEMA23)	AS1030-0000 473 1.5 A, 48 V DC, 0.60 Nm	AS1050-0xyz 473 5.0 A, 48 V DC, 1.20 Nm	AS2022-0Hy0 469 5.6 A, 48 V DC, 1.53 Nm
		AS2021-0Dy0 469 2.0 A, 48 V DC, 0.80 Nm		AS2023-0Hy0 469 5.6 A, 48 V DC, 1.80 Nm
				AS2023-0Jy0 469 6.4 A, 48 V DC, 2.30 Nm
	Flange code N3 (NEMA34)		AS1060-wxyz 473 5.0 A, 48 V DC, 5.00 Nm	AS2041-1Hy0 469 5.6 A, 48 V DC, 3.30 Nm
				AS2042-1Hy0 469 5.6 A, 48 V DC, 6.40 Nm
				AS2043-1Jy0 469 6.5 A, 48 V DC, 8.00 Nm

Product overview XPlanar



Tile



Movers



Starter kits

Tile

APS4322-0000-0000	4 active areas, 110...230 V AC/24 V DC, 5.6 kg, 240 mm x 240 mm x 67 mm	499
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Movers

APM4220-0000-0000	95 x 95 x 12 mm, 0.39 kg, 0.4 kg payload	498
APM4330-0000-0000	155 x 155 x 12 mm, 1.27 kg, 1.5 kg payload	498
APM4550-0000-0000	235 x 235 x 12 mm, 4.0 kg, 4.2 kg payload	498

Software

TF5890-0v80	software license, TwinCAT 3 XPlanar, TwinCAT 3 platform P80 (Very High Performance)	510
TF5890-0v81	software license, TwinCAT 3 XPlanar, TwinCAT 3 platform P81 (Many-core, 5...8 Cores)	510
TF5890-0v82	software license, TwinCAT 3 XPlanar, TwinCAT 3 platform P82 (Many-core, 9...16 Cores)	510
TF5890-0v83	software license, TwinCAT 3 XPlanar, TwinCAT 3 platform P83 (Many-core, 17...32 Cores)	510
TF5890-0v84	software license, TwinCAT 3 XPlanar, TwinCAT 3 platform P84 (Many-core, 33...64 Cores)	510

Starter kits

APS9000-0000	6 (2 x 3) APS4322 planar motor tiles, 2 APM4330 movers, Industrial PC, software, pre-installed, ready for operation	500
APS9000-0001	12 (4 x 3) APS4322 planar motor tiles, 4 APM4330 movers, Industrial PC, software, pre-installed, ready for operation	500

Product overview XTS



Standard motor modules

Hygienic motor modules

Motor modules				
	Standard with interface for guide rails 480	without interface for guide rails (Black Line) 480	Hygienic with interface for guide rails 490	with additional cover for the mounting surface of the rail interface 490
Straight	AT2000-0250 UL-certified	AT2000-0250-0002 UL-certified	ATH2000-0250 with cover without feed	ATH2000-0250-0002 with cover without feed
	AT2000-0233 for L-, U-, O- and Z-shaped geometries, UL-certified	AT2000-0233-0002 for L-, U-, O- and Z-shaped geometries, UL-certified		
	AT2001-0250 with feed, not UL-certified	AT2001-0250-0002 with feed, not UL-certified	ATH2001-0250 with straight feed	ATH2001-0250-0002 with straight feed
	AT2001-0250-0003 with feed, UL-certified	AT2001-0250-0004 with feed, UL-certified		
	AT2002-0249 with rotatable B23 ENP connector for infeed, UL certification in preparation	AT2002-0249-0002 with rotatable B23 ENP connector for infeed, UL certification in preparation		
	AT2002-0250 with rotatable B23 ENP connector for infeed, UL certification in preparation	AT2002-0250-0002 with rotatable B23 ENP connector for infeed, UL certification in preparation	ATH2002-0250 with angled feed	ATH2002-0250-0002 with angled feed
Curved, 180° (clothoid)	AT2050-0500 UL-certified	AT2050-0500-0002 UL-certified	ATH2050-0500 with cover without feed	ATH2050-0500-0002 with cover without feed
			ATH2051-0500 with straight feed	ATH2051-0500-0002 with straight feed
Positive curve, 45°	AT2040-0250 UL-certified	AT2040-0250-0002 UL-certified		
	AT2041-0250 with feed, not UL-certified	AT2041-0250-0002 with feed, not UL-certified		
	AT2041-0250-0003 with feed, UL-certified	AT2041-0250-0004 with feed, UL-certified		
	AT2042-0250 with rotatable B23 ENP connector for infeed, UL certification in preparation	AT2042-0250-0002 with rotatable B23 ENP connector for infeed, UL certification in preparation		
Positive curve, 22.5°	AT2020-0250 UL-certified	AT2020-0250-0002 UL-certified		
	AT2021-0250-0003 with feed, UL-certified	AT2021-0250-0004 with feed, UL-certified		
Negative curve, -22.5°	AT2025-0250 UL-certified	AT2025-0250-0002 UL-certified		
	AT2026-0250-0003 with feed, UL-certified	AT2026-0250-0004 with feed, UL-certified		



Standard
movers



Hygienic
movers



Standard
guide rails



Hygienic
guide rails



Standard
starter kits

Movers

	Standard Mover	485	Mover 1	485	Hygienic Mover	491	Mover 1
6 rollers	AT9011-0050-0550		AT9011-0050-1550		ATH9011-0075-0550		ATH9011-0075-1550
	length 50 mm		length 50 mm		stainless steel mover, length 75 mm		stainless steel mover, length 75 mm
12 rollers	AT9011-0070-0550		AT9011-0070-1550		ATH9013-0075-0550		ATH9013-0075-1550
	length 70 mm		length 70 mm		aluminum mover, length 75 mm		aluminum mover, length 75 mm
12 rollers	AT9012-0050-0550		AT9012-0050-1550				
	length 50 mm		length 50 mm				

Guide rails

	Standard	483	Hygienic	492
Straight	AT9000-xxxx	AT9100-xxxx	ATH9000-xxxx	ATH9100-xxxx
	length 250...2500 mm, without lock	length 250...2500 mm, with lock	length 250...2000 mm, without lock	length 500...2000 mm, with lock
Positive curve, 180°	AT9020-2250	AT9040-1250		
	length 2250 mm, for 22.5° motor module ⁽¹⁾	length 1250 mm, for 45° motor module ⁽¹⁾		
Positive curve, 90°	AT9050-0500		ATH9200-xxxx	
	length 500 mm, for 180° motor module ⁽²⁾		length 250...2000 mm, connector, without lock	
Positive curve, 45°	AT9040-0750			
Positive curve, 22.5°	AT9040-0500			
Positive curve, -22.5°	AT9020-0500			
Positive curve, 360°	AT9025-0500			
	AT9142-2000			
	length 2000 mm, for 45° motor module ⁽¹⁾			

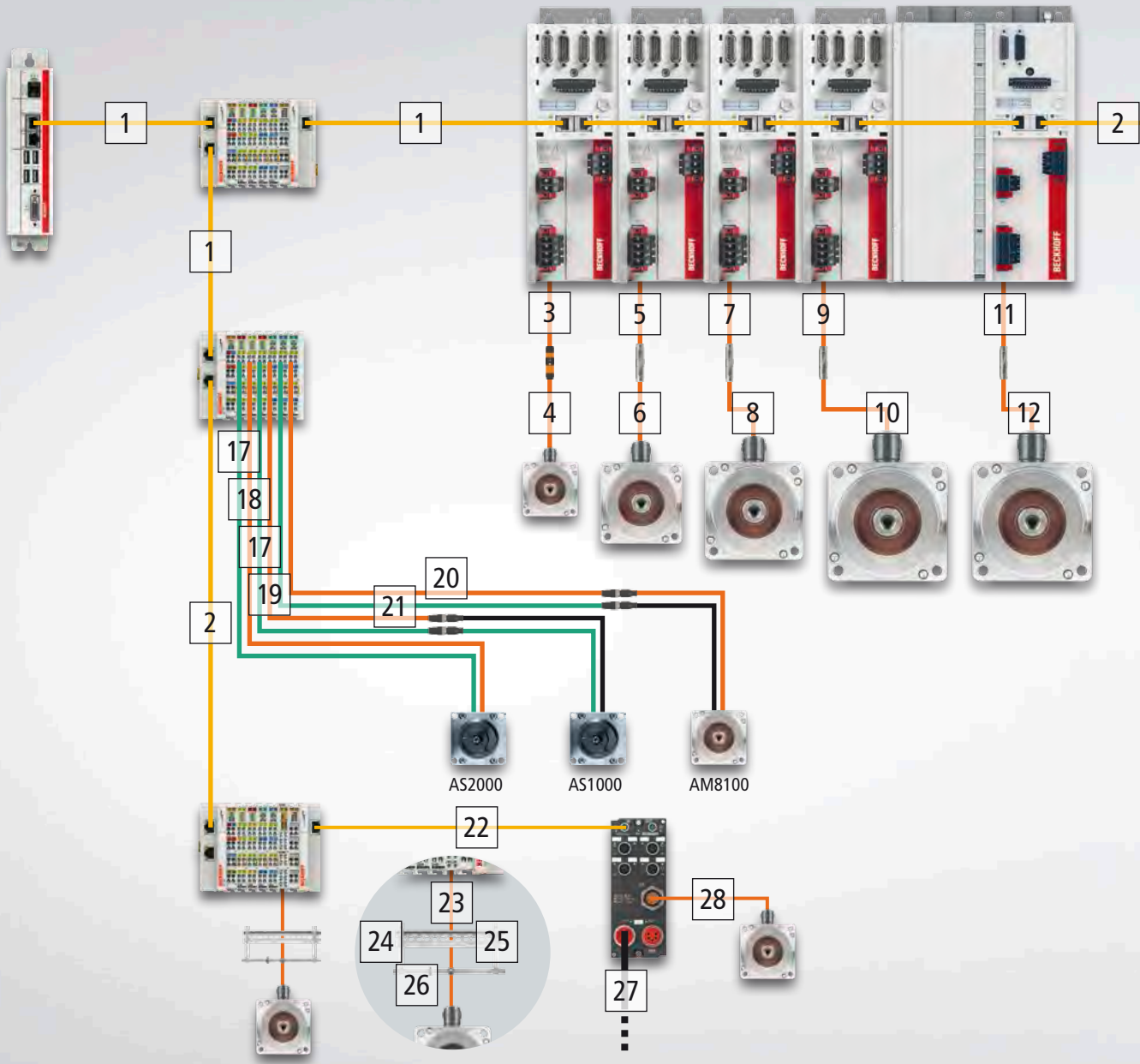
Starter kits

	Mover 70 mm length	486
Small	AT2000-0500-0070	
Medium	AT2000-1000-0070	
Large	AT2000-1500-0070	

⁽¹⁾Suitable for mover type AT9011-0050-0550. For mover AT9011-0070-0550, add -0070 to the order specification.

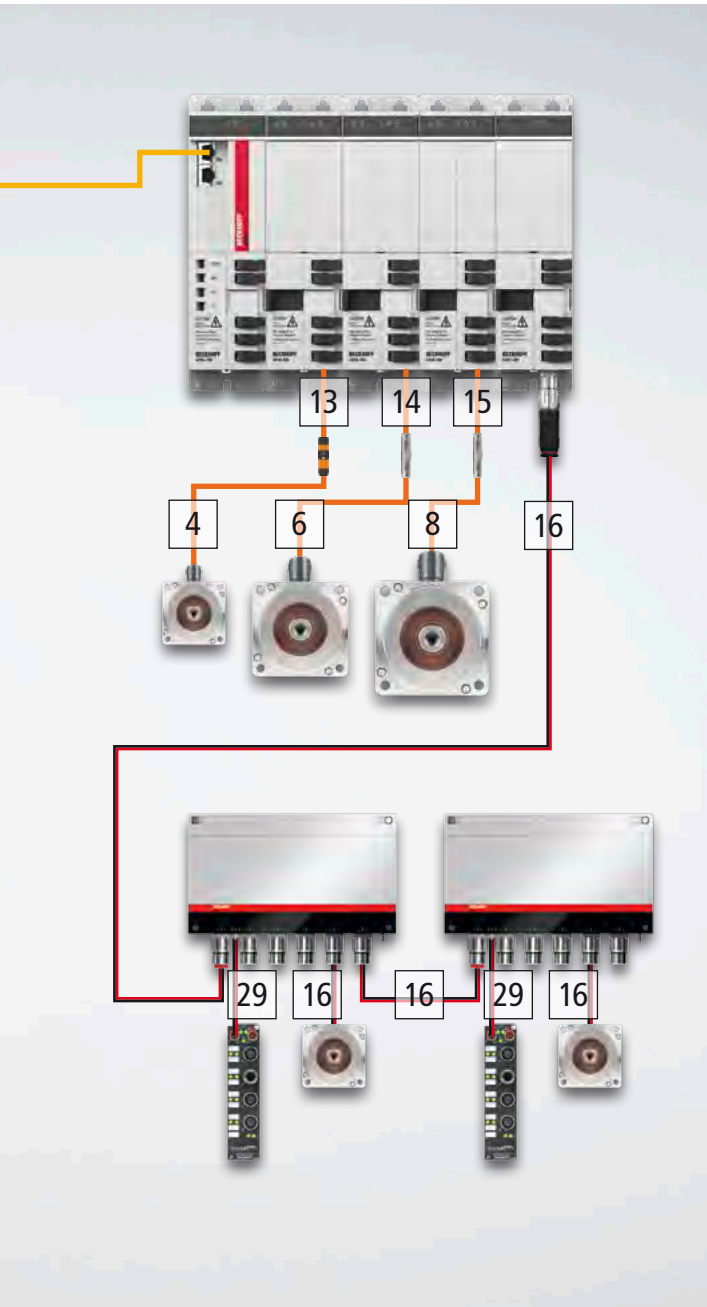
⁽²⁾Suitable for mover types AT9011-0050-0550 and AT9012-0050-0550. For mover AT9011-0070-0550, add -0070 to the order specification.

Product overview accessories



- 1 ZK1090-9191-xxxx | Industrial Ethernet/EtherCAT patch cable, green, RJ45, plug, 8-pin – RJ45, plug, 8-pin 382
- 2 ZK1093-9191-xxxx | Industrial Ethernet/EtherCAT patch cable, yellow, RJ45, plug, 8-pin – RJ45, plug, 8-pin 2 706
- 3 ZK4500-8022-xxxx | Motor cables 1 mm², PUR, drag-chain suitable, with itec[®] plug 379
- 4 ZK4501-8022-xxxx | Motor extension cables 1 mm², PUR, drag-chain suitable, with itec[®] plug 379

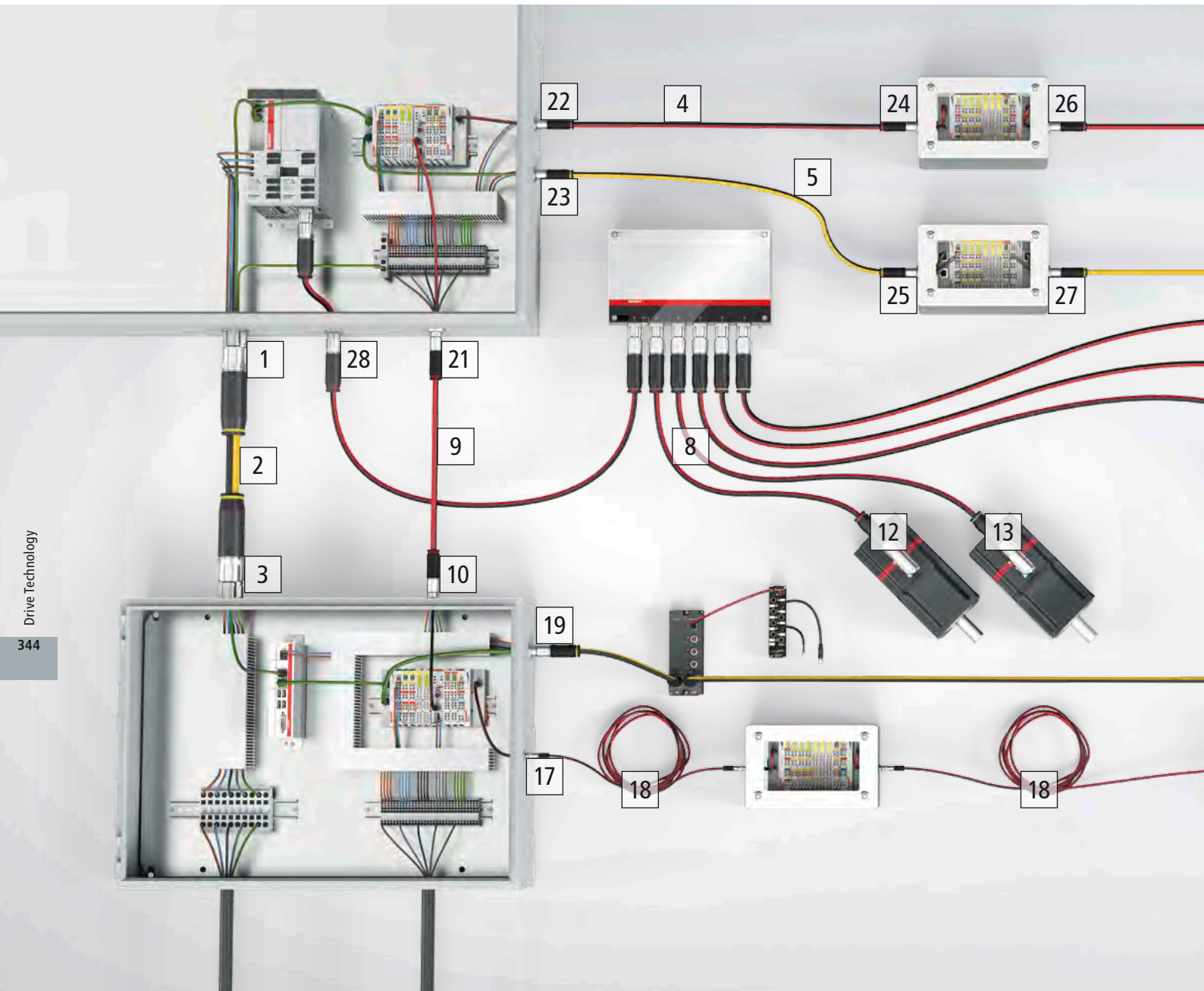
- 5 ZK4500-8023-xxxx | Motor cables 1.5 mm², PUR, drag-chain suitable, with M23 speedtec[®] plug 379
- 6 ZK4501-8023-xxxx | Motor extension cables 1.5 mm², PUR, drag-chain suitable, with M23 speedtec[®] plug 379
- 7 ZK4500-8024-xxxx | Motor cables 2.5 mm², PUR, drag-chain suitable, with M23 speedtec[®] plug 380
- 8 ZK4501-8024-xxxx | Motor extension cables 2.5 mm², PUR, drag-chain suitable, with M23 speedtec[®] plug 380



- 9 ZK4500-8025-xxxx | Motor cables 4 mm², PUR, drag-chain suitable, with M40 speedtec® plug 380
- 10 ZK4501-8025-xxxx | Motor extension cables 4 mm², PUR, drag-chain suitable, with M40 speedtec® plug 380
- 11 ZK4500-8027-xxxx | Motor cables 10 mm², PUR, drag-chain suitable, with M40 speedtec® plug 380
- 12 ZK4501-8027-xxxx | Motor extension cables 10 mm², PUR, drag-chain suitable, with M40 speedtec® plug 380

- 13 ZK4800-8022-xxxx | Motor cables 1 mm², PUR, drag-chain suitable, with itec® plug 368
- 14 ZK4800-8023-xxxx | Motor cables 1.5 mm², PUR, drag-chain suitable, with M23 speedtec® plug 368
- 15 ZK4800-8024-xxxx | Motor cables 2.5 mm², PUR, drag-chain suitable, with M23 speedtec® plug 369
- 16 ZK7A26-3031-0xxx | ECP, B23, male, 5+4-pin – ECP, B23, male, 5+4-pin 390
- 17 ZK4000-5100-2xxx | ASx000 encoder cable, M12, plug, straight, male, 5-pin, A-coded – open end 471
- 18 ZK4000-7700-xxxx | AS2000 motor cable, M12, socket, straight, female, 4-pin, T-coded – open end 471
- 19 ZK4000-6700-2xxx | AS1000 motor cable, M12, socket, straight, female, 4-pin, A-coded – open end 474
- 20 ZK4704-0411-xxxx | Motor cable, PUR, drag-chain suitable, with ytec® plug to connect to servo I/Os (IP 20) 465
- 21 ZK4724-0410-2xxx | Resolver cable, PUR, drag-chain suitable, with M12 plug to connect to servo I/Os 465
- 22 ZK1090-3191-xxxx | Industrial Ethernet/EtherCAT, M8, male, straight, 4-pin – RJ45, plug, 4-pin 458
- 23 ZK4704-0421-2xxx | Motor cable, PUR, drag-chain suitable, with itec® plug (OCT) to connect to servo I/Os (IP 20) 465
- 24 ZB8500 | Clamp strap for shield connection with knurled screw 2 770
- 25 ZB8511 | Shield busbar clamp for 5 EtherCAT Terminals/Bus Terminals 12 mm 2 770
- 26 ZB8530 | U-clamp terminal 2 770
- 27 ZK2030-1200-xxxx | Power cable, 7/8", female, straight, 5-pin – open end 2 717
- 28 ZK4701-0401-2xxx | Motor cables, PVC, fixed installation, with itec® plug (OCT) to connect to servo I/Os (IP 20) 2 717
- 29 ZK700x-0101-xxxx | EtherCAT P, M8, male, straight, 4-pin – M8, male, straight, 4-pin 2 712

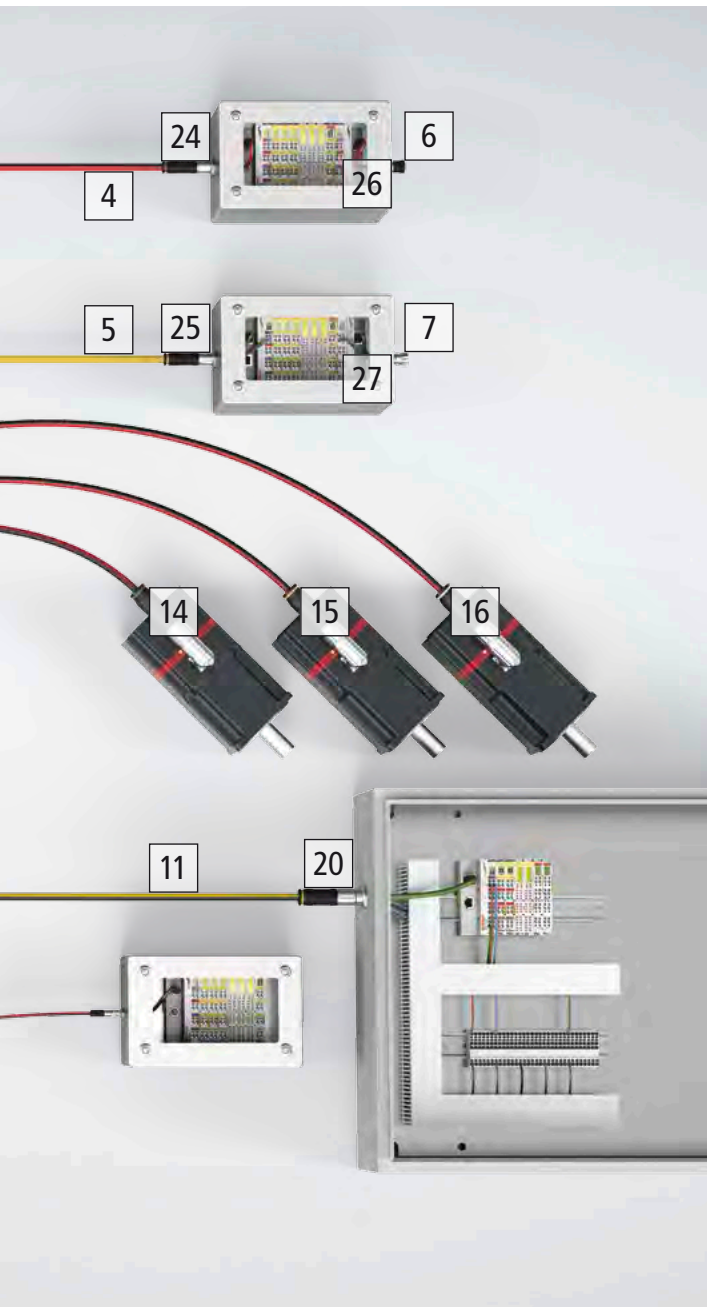
Product overview hybrid cables



Drive Technology

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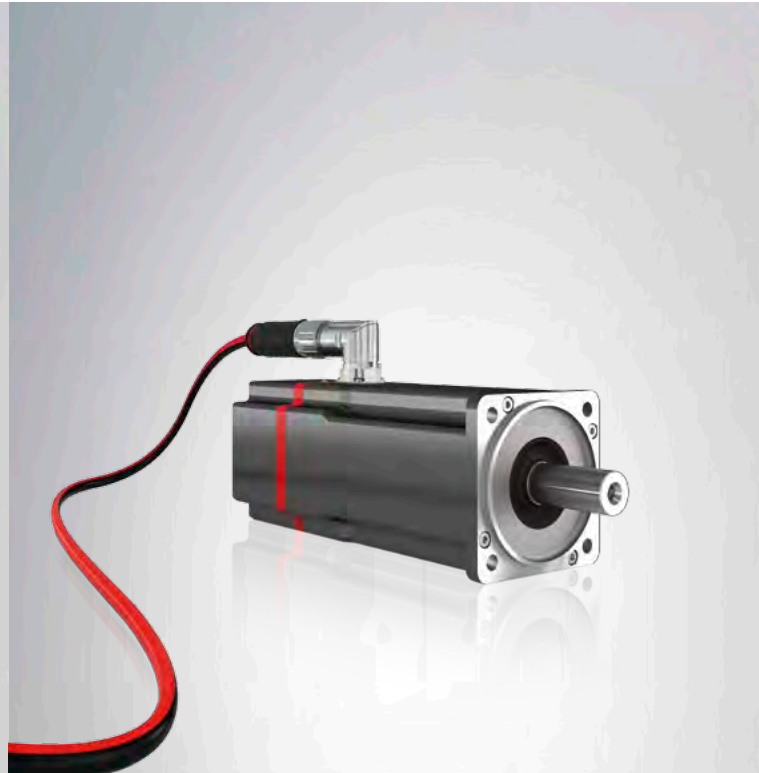
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| <p>1 ZK7425-BX00-Axxx ENP, B40, flange, male, square assembly, 5+4-pin – RJ45, plug, 4-pin – open end</p> <p>2 ZK7425-3031-Axxx ENP, B40, male, 5+4-pin – ENP, B40, female, 5+4-pin</p> <p>3 ZK7425-BW00-Axxx ENP, B40, flange, female, square assembly, 5+4-pin – RJ45, plug, 4-pin – open end</p> <p>4 ZK7102-0607-0xxx ECP, B12, male, 2+4-pin – ECP, B12, female, 2+4-pin</p> | <p>2 754</p> <p>2 754</p> <p>2 754</p> <p>2 732</p> | <p>5 ZK7102-0607-Axxx ENP, B12, male, 2+4-pin – ENP, B12, female, 2+4-pin</p> <p>6 ZS7100-B001 B12 protection cap, socket/flange, plastic, black, IP 67</p> <p>7 ZS7100-B002 B12 protection cap, socket/flange, metal, IP 67</p> <p>8 ZK7A26-3031-0xxx ECP, B23, male, 5+4-pin – ECP, B23, male, 5+4-pin</p> <p>9 ZK7208-3031-0xxx ECP, B17, male, 5+4-pin – ECP, B17, male, 5+4-pin</p> | <p>2 730</p> <p>2 756</p> <p>2 756</p> <p>390</p> <p>2 746</p> |
|---|---|---|--|



- 10 ZK7208-BY00-0xxx | ECP, B17, flange, female, square assembly, 5+4-pin – M8, male, straight, 4-pin – open end 2 746
- 11 ZK7208-3031-Axxx | ENP, B17, male, 5+4-pin – ENP, B17, male, 5+4-pin 2 744
- 12 ZS7300-B005 | B23, colour coding, red 2 757
- 13 ZS7300-B007 | B23, colour coding, blue 2 757
- 14 ZS7300-B008 | B23, colour coding, green 2 757

- 15 ZS7300-B006 | B23, colour coding, yellow 2 757
- 16 ZS7300-B016 | B23, colour coding, grey 2 757
- 17 ZK700x-0105-xxxx | EtherCAT P, M8, male, straight, 4-pin – M8, flange, female, straight, 4-pin 2 712
- 18 ZK700x-0101-xxxx | EtherCAT P, M8, male, straight, 4-pin – M8, male, straight, 4-pin 2 712
- 19 ZK7208-AW00-Axxx | ENP, B17, flange, female, front assembly, 5+4-pin – RJ45, plug, 4-pin – open end 2 744
- 20 ZK7208-AX00-Axxx | ENP, B17, flange, male, front assembly, 5+4-pin – RJ45, plug, 4-pin – open end 2 744
- 21 ZK7208-BZ00-0xxx | ECP, B17, flange, male, rear assembly, 5+4-pin – M8, male, straight, 4-pin – open end 2 746
- 22 ZK7102-AC00-0xxx | ECP, B12, flange, female, rear assembly, 2+4-pin – M8, male, straight, 4-pin – open end 2 732
- 23 ZK7102-AC00-Axxx | ENP, B12, flange, female, rear assembly, 2+4-pin – RJ45, plug, 4-pin – open end 2 730
- 24 ZK7102-BJ00-0xxx | ECP, B12, flange, male, front assembly, 2+4-pin – M8, male, straight, 4-pin – open end 2 732
- 25 ZK7102-BJ00-Axxx | ENP, B12, flange, male, front assembly, 2+4-pin – RJ45, plug, 4-pin – open end 2 730
- 26 ZK7102-BI00-0xxx | ECP, B12, flange, female, front assembly, 2+4-pin – M8, male, straight, 4-pin – open end 2 732
- 27 ZK7102-BI00-Axxx | ENP, B12, flange, female, front assembly, 2+4-pin – RJ45, plug, 4-pin – open end 2 730
- 28 ZK7A26-30BY-0xxx | ECP, B23, male, 5+4-pin – ECP, B23, flange, female, rear assembly, 5+4-pin

Beckhoff Drive Technology



Servo Drives

The AX5000 impresses with great functional variety as well as high efficiency. With current control cycle times of up to 62.5 μ s, the integrated control technology supports fast and highly dynamic positioning tasks. The compact AX8000 multi-axis servo system is a fast and easy to install high-performance drive system enabling simple commissioning. At the same time, it brings high performance in a compact design to every control cabinet: with maximum control speed, integrated mains filter and 17 drive-integrated safety functions (TwinSAFE).

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► www.beckhoff.com/Servo-Drives

Distributed Servo Drive system

The AMP8000 system ideally supports the implementation of modular machine concepts. For this purpose, the servo drive was integrated directly into the servomotor in a particularly compact manner. The power electronics are transferred to the machine, reducing the space required in the control cabinet to just one coupling module. With the AMP8620 power supply module, there is no need for a control cabinet at all. In addition, the integrated EtherCAT P cabling considerably optimises the modular machine design.

See page **384**

► www.beckhoff.com/distributed-servo-drive-system

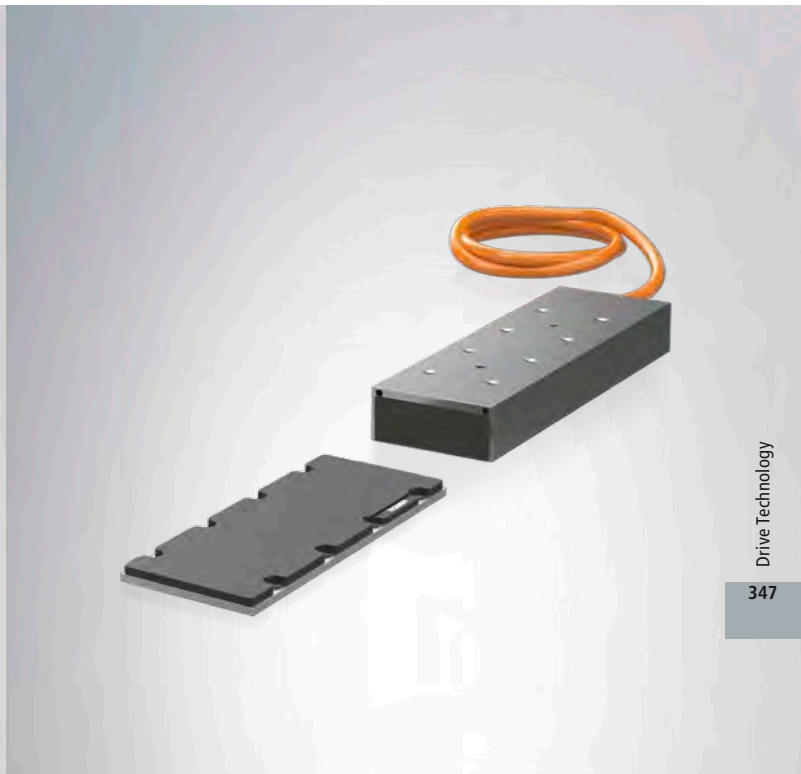


Synchronous Servomotors

The Synchronous Servomotors are characterised by high dynamics as well as energy and cost efficiency. The AM8800 stainless steel motors and the AM8700 with anodized housing are available for the food and packaging industry. The motors of the AM8500 series with increased moment of inertia have been developed for the highest demands on synchronism. To further enhance their performance the AM8000 and AM8500 series can be equipped with an additional external fan. All motors of the AM8000, AM8500, AM8700 and AM8800 series are available with OCT.

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► www.beckhoff.com/Servomotors



Linear motors

Translatory servomotors such as linear and tubular motors are direct drives with high dynamics and high precision. The AL8000 modular linear motor series is available in three widths and with up to 45 coils. Like the AL2000, the AL8000 3-phase synchronous linear servomotors consist of a primary and a secondary part and are ideally suited for use with the AX8000 servo drives. The iron-less tubular motor from the AA2500 series is completely cogging-free and can perform highly dynamic movements very precisely. An extensive range of matching accessories rounds off the translatory product portfolio.

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► www.beckhoff.com/Linear-motors



Compact Drive Technology

In the low voltage range up to 48 V DC, Beckhoff offers an efficient portfolio for compact, high-torque drive solutions: decentralized in the field with a direct EtherCAT connection or for local connection to I/O components in IP 20 and IP 67. The range of servomotors, stepper motors, integrated servo drives and linear actuators meets all requirements in mechanical engineering for compactness and makes the integration even simpler. The fail-safe function STO (Safe Torque Off) is offered for servomotors. Together with matching gear units, the portfolio is rounded off by an extensive range of accessories. The motion software products optimally support the selection and commissioning of suitable hardware components for drive solutions.

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► www.beckhoff.com/compact-drive-technology

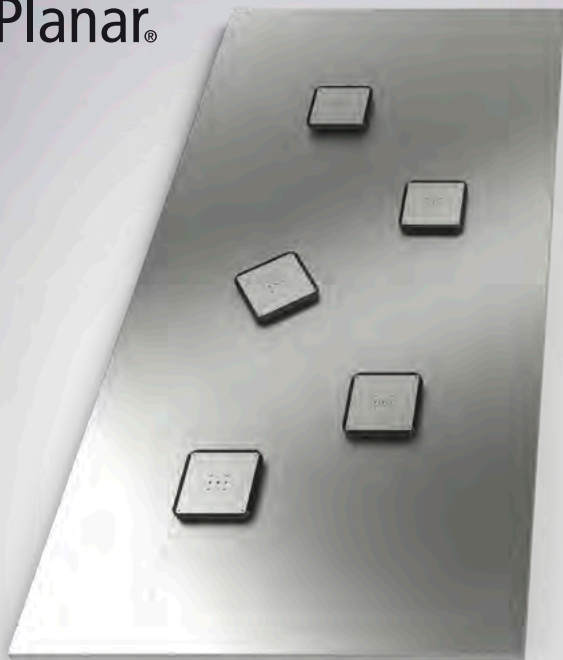
XTS

The XTS linear transport system (eXtended Transport System) from Beckhoff combines all drive technology functions in a single mechatronic system: motor movement, power electronics and displacement measurement form a technical unit which can be used to implement a wide range of complex movements. A user-friendly programming interface enables different movements to be realised simultaneously directly from TwinCAT with little effort. The modular XTS system enables fast adaptation of a transport concept to different geometries and applications.

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► www.beckhoff.com/XTS

XPlanar®



XPlanar

With flying magnets with six degrees of freedom XPlanar (eXtended planar motor system) sets new standards for transporting materials. Free-floating planar movers move jerk-free and without contact over planar tiles arranged in an arbitrary layout. Travelling magnetic fields provide for exact and highly dynamic positioning. The result: maximum freedom in product transport, maximum flexibility in positioning, and optimum machine and system design.

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► www.beckhoff.com/xplanar

Software

The motion software products from Beckhoff offer optimal user support for selecting suitable hardware components for drive solutions. The universal software toolbox provides access to all information in technical product data sheets on motors, servo drives, gear units and cables and helps implement entire drive systems from designing to commissioning.

See page **502**

► www.beckhoff.com/motion-software



AM8000, AM8500, AM8700, AM8800, AM8100 | One Cable Technology (OCT)

The One Cable Technology (OCT) of the AM8xxx motor series reduces the motor cabling to the mandatory motor cable, which can then also be used directly for the feedback signals. As in sensorless control, the user no longer has to use an additional feedback cable. All the information required for control purposes is transferred reliably and interference-proof via a digital interface.

The symbiosis of power and feedback cable enables reliable implementation of high-precision positioning and lower speed fluctuations. The encoder data, rotor position, multi-turn information and thermal conditions in motor are transferred via a purely digital interface. Costly analog evaluation function blocks in the drive amplifier can be avoided, while retaining extensive diagnostic options.

Since a cable and plug are omitted at both the motor and controller end, the component and commissioning costs are significantly reduced. The wiring is simplified significantly, possible error sources are eliminated. This also has positive effects on the peripheral devices, since drag-chains, cable bushings and areas reserved for cables in machines and control cabinets can now

be made smaller. OCT can be used for line lengths of up to 100 m.

This results in greater degrees of freedom on the motor side: the omission of a plug connector allows the technology to be used even in the smallest motor sizes. The AX5000 and AX8000 EtherCAT Servo Drives support OCT.

Features

- digital single-cable transmission via the existing motor cable
- digital transmission of sensor data
- no interference-susceptible analog signals
- support for the electronic identification plate
- Encoder cables, including expensive plugs, are dispensed with.
- reduction
 - in the costs for cable, plug and assembly
 - in warehouse costs by dispensing with a cable variant
 - in space requirements in cable carrier chains
 - in space requirements on the motor (important with small sizes)
 - in the sources of error and wear

- Remote diagnostics are possible up to the motor.
- Cable lengths of up to 100 m are possible.
- operating hours counter and error memory integrated in the motor

► www.beckhoff.com/OCT



The AX8000 and AX5000 EtherCAT Servo Drives support One Cable Technology.



AM8000, AM8500 | Fan hoods with improved connection technology


In the forced-cooling versions, the AM8000 and AM8500 servomotor series offer a high torque even at high speeds. The external axial ventilation by means of a 24 V DC fan, which is controlled independently of the motor, increases the power density of the servomotors: the standstill torque is about

35 % higher; the nominal torque at nominal speed is even 150 % higher compared with the standard variant.

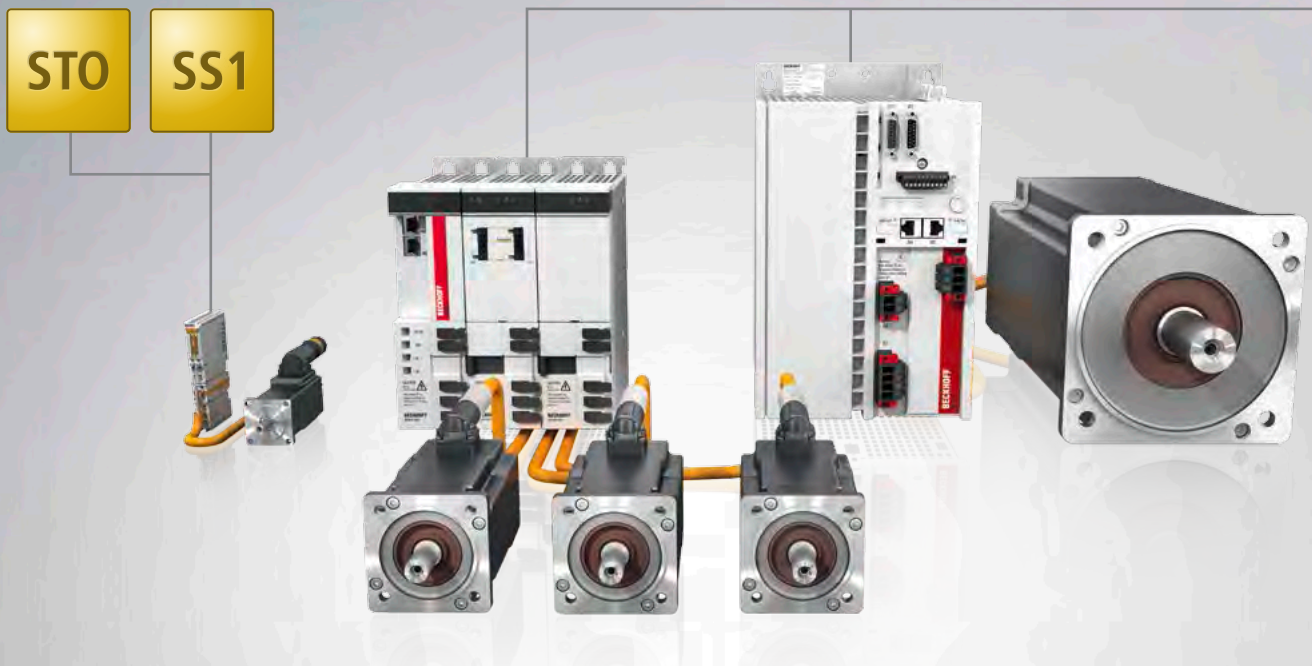
The design of the fan hoods, with an enhanced smooth surface, simplifies mounting and reduces the required mounting space by 5 %. In addition, the easy connection

using the integrated robust M12 connector is a perfect match for the angled M12 plug connector of the pre-assembled, ready-to-install ZK4054-6400-0xxx control cable.

Ordering information	Available for following motors
AM805x-wxyA/B	servomotor 4.9...11.4 Nm (standstill torque)
AM806x-wxyA/B	servomotor 12.8...29 Nm (standstill torque)
AM807x-wxyA/B	servomotor 41.2...129 Nm (standstill torque)
AM855x-wxyA/B	servomotor with increased moment of inertia 4.9...11.4 Nm (standstill torque)
AM856x-wxyA/B	servomotor with increased moment of inertia 12.8...29 Nm (standstill torque)

Ordering information	Connection cable and matching digital output terminals	Pict.
ZK4054-6400-0xxx	M12 control cable, PUR, 3 x 0.75 mm ² , drag-chain suitable, for connection of the fan for the AM8000 and AM8500 motor series	
KL2022	2-channel digital output terminal 24 V DC, 2.0 A, 4-wire system	
EL2022	2-channel digital output terminal 24 V DC, 2.0 A, 4-wire system	





TwinSAFE | Safe drive technology

TwinSAFE is a universal safety concept that integrates secure functionalities into the standard control platform: including the PLC, I/Os and drive technology. All safety functions such as emergency stop, safety door monitoring, two-hand operation, safety mat evaluation and muting, safe position, safely limited velocity, etc. can be programmed and configured with the integrated TwinCAT engineering platform.

Dynamic movements of electrical drive technology used in a machine can create considerable hazards to people and the environment. From a normative point of view, drive technology is therefore also considered in a safety-oriented way by coordinating and monitoring certain movements and processes.

TwinSAFE offers three levels for implementing safe drive technology:

- STO/SS1 according to IEC 61800-5-2
- Safe Motion according to IEC 61800-5-2
- programmable, safe drive technology through integrated logic

The safe drive components are able to switch the motor torque-free or to monitor velocity, position and direction of rotation (EN ISO 13849-1:2015 (Cat 4, PL e), EN 61508:2010 (SIL 3) and EN 62061:2005 + A1:2013/A2:2015 (SIL CL3)). No further devices such as contactors or circuit breakers are necessary in the supply lines for this. This enables a very lean installation and helps to reduce costs and control cabinet space.

Even safe position monitoring or position range monitoring is simple to implement

with the aid of the safe drive technology. It requires no additional wiring, since the EtherCAT communication in the servo drives is used to communicate directly with the TwinSAFE Logic components, based on the safe drive technology.

Like the programming or configuration of the safety application, the entire parameterisation of the safe drive technology is performed from the TwinCAT software. All system-specific settings are stored together with the application in the TwinSAFE Logic components. For that reason the safe drive components can be exchanged at any time without requiring software changes. The respective component receives all the parameters necessary for operation at the next power-on or boot-up.

Programmable, safe drive technology through integrated logic

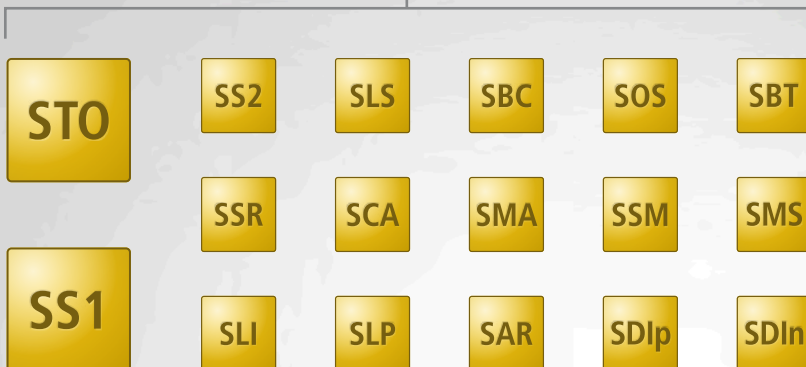
The AX8000 multi-axis servo drive system encompasses new functions of safe drive technology with TwinSAFE: the AX8108, AX8118 and AX8206 axis modules include a programmable TwinSAFE Logic corresponding to an EL6910 and enable the direct implementation of a safety application in the servo drive. The user enjoys greater degrees of freedom in the implementation of safety applications in drive technology systems, and the flexibility in programming facilitates individual design of safe drive technology to suit the specific system. The safety functions STO and SS1 can

be implemented with the TwinSAFE axis modules with the ordering option -0100 (STO/SS1). These functions can be initiated both via hard wiring and via FSoE. For TwinSAFE axis modules with the ordering option -0200 (Safe Motion), various internal and external drive signals are available for implementing an application-specific safety function. As usual, these can be interconnected with the typical EL6910 pre-certified function blocks to form complex, safe drive functions such as SLS, SLP, etc. Depending on the application, the safety-oriented information can be pre-processed directly in the drive so that the central TwinSAFE Logic need only process the information that is aggregated there.

TwinSAFE safe drive technology see

► www.beckhoff.com/TwinSAFE

or page 590



Ordering information	I/O components	
EJ7211-9414	EtherCAT plug-in module, servomotor module for OCT, with STO input, 48 V DC, $I_{rms} = 4.5$ A, TwinSAFE SC	615
EL7047-9014	stepper motor terminal with incremental encoder, STO and vector control, 48 V DC, 5 A	615
EL7201-9014	EtherCAT servo terminal for OCT, with STO input, 48 V DC, $I_{rms} = 2.8$ A	614
EL7211-9014	EtherCAT servo terminal for OCT, with STO input, 48 V DC, $I_{rms} = 4.5$ A	614
EL7221-9014	EtherCAT servo terminal for OCT, with STO input, 48 V DC, $I_{rms} = 7 \dots 8$ A with ZB8610	614
EL7411-9014	BLDC motor terminal with incremental encoder and STO, 48 V DC, $I_{rms} = 4.5$ A	615
EP7047-0032	EtherCAT Box, industrial housing, stepper motor module suitable for STO applications, 48 V DC, $I_{max} = 5$ A	615
EP7211-0034	EtherCAT Box, industrial housing, servomotor module with OCT suitable for STO applications, 48 V DC, 4.5 A (I_{rms})	614

Ordering information	Drive Technology	
AX5801-0200	TwinSAFE drive option card for AX5000 up to 40 A, HW 2.0: STO, SS1	377
AX5805-0000	TwinSAFE drive option card for AX5000 up to 40 A, HW 2.0: STO, SS1, SS2, SOS, SLS, SSM, SSR, SMS, SLP, SCA, SLI, SAR, SMA, SDIp, SDIn	377
AX5806-0000	TwinSAFE drive option card for AX5000 from 60 A, HW 2.0: STO, SS1, SS2, SOS, SLS, SSM, SSR, SMS, SLP, SCA, SLI, SAR, SMA, SDIp, SDIn	377
AX8108-0100-0000	single-axis module 8 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic	364
AX8108-0110-0000	single-axis module 8 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic, multi-feedback interface	364
AX8108-0200-0000	single-axis module 8 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic	364
AX8108-0210-0000	single-axis module 8 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic, multi-feedback interface	364
AX8118-0100-0000	single-axis module 18 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic	364
AX8118-0110-0000	single-axis module 18 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic, multi-feedback interface	364
AX8118-0200-0000	single-axis module 18 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic	364
AX8118-0210-0000	single-axis module 18 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic, multi-feedback interface	364
AX8206-0100-0000	dual-axis module 2 x 6 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic	364
AX8206-0110-0000	dual-axis module 2 x 6 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic, multi-feedback interface	364
AX8206-0200-0000	dual-axis module 2 x 6 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic	364
AX8206-0210-0000	dual-axis module 2 x 6 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic, multi-feedback interface	364
AX85xx-0100-0000	combined power supply and axis module, 80 A DC, for supply voltage 200...480 V AC and axis module 25 A/40 A, feedback OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic	363
AX85xx-0110-0000	combined power supply and axis module, 80 A DC, for supply voltage 200...480 V AC and axis module 25 A/40 A, feedback OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic, multi-feedback interface	363
AX85xx-0200-0000	combined power supply and axis module, 80 A DC, for supply voltage 200...480 V AC and axis module 25 A/40 A, feedback OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic	363
AX85xx-0210-0000	combined power supply and axis module, 80 A DC, for supply voltage 200...480 V AC and axis module 25 A/40 A, feedback OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic, multi-feedback interface	363



XTS | eXtended Transport System

The linear transport system XTS (eXtended Transport System) unites the benefits of rotary and linear systems. XTS enables individual product transport with a continuous flow of material. Due to the low construction volume the energy efficiency can be improved and the size of a machine can be significantly reduced.

Only motor module, mover, software and Industrial PC

PC-based control from Beckhoff follows a principle that is equally simple and efficient: the maximum application of information technology for the simplification of mechanical processes. With XTS, Beckhoff has transferred this principle directly to the field of drive systems – and in this way has opened up new efficiency potentials in mechanical engineering, because XTS makes do with four simple components.

- Firstly: an arbitrary number of motor parts, which serve as path modules.
- Secondly: an arbitrary number of movers, which act individually or in groups.
- Thirdly: control software.
- And fourthly: an Industrial PC.

Flexible use, arbitrary functional options

There are virtually no limits to the possibilities of use of XTS: the movers can accelerate, brake, position and synchronise; they can take up absolute and positions relative to each other; they can group themselves and accumulate; they can create clamping forces in motion; they can travel through curves as fast as along straights; they can recover energy through regenerative braking and utilise both travel directions for transport purposes. And all of that with precise position control, without backlash, without material fatigue, virtually without wear – and without cost-intensive maintenance.



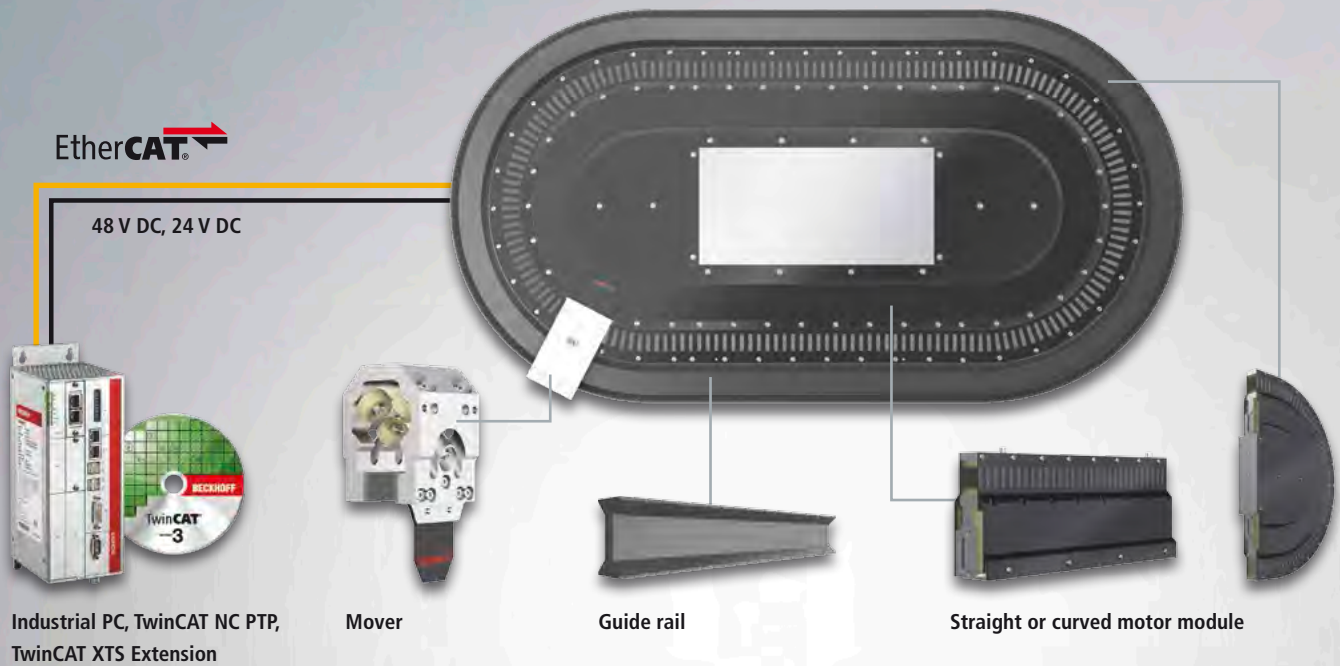
XTS Standard



XTS Black Line



XTS Hygienic



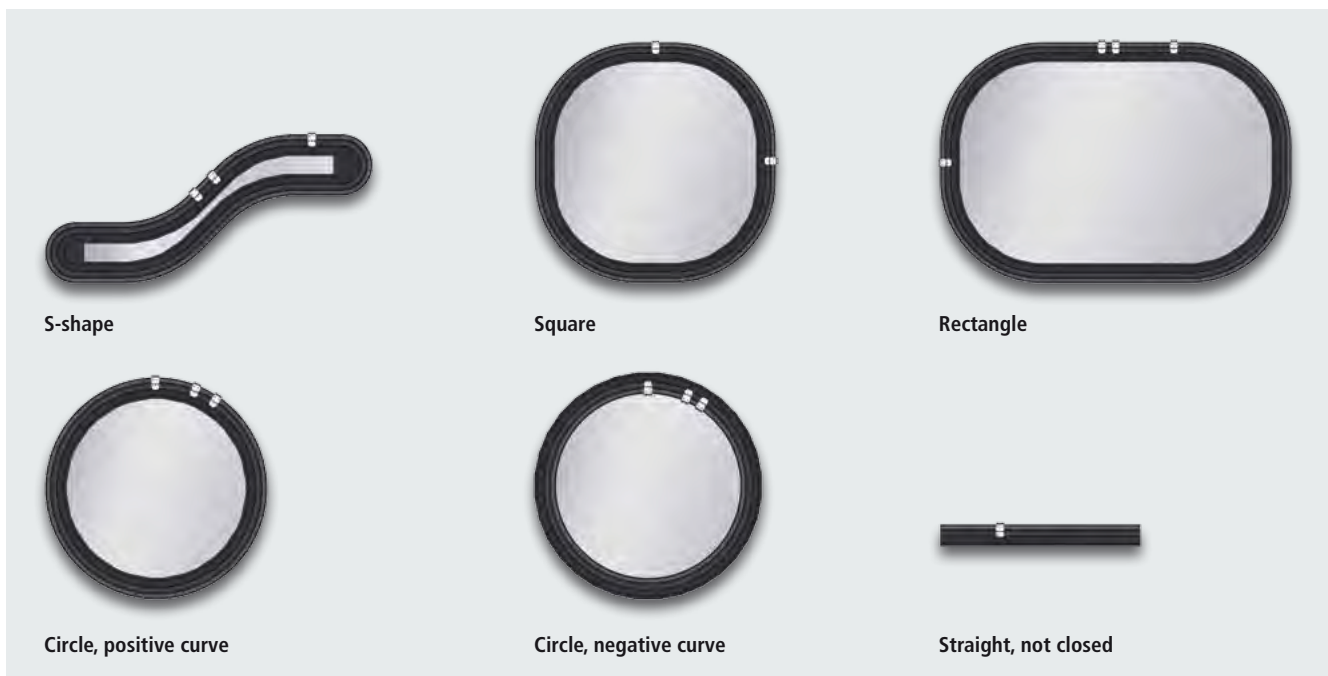
Modular and flexible

XTS is a mechatronic system containing all functions necessary for operation. A modular, fully integrated linear motor with power electronics and displacement measurement in one device. A mover

as the moved part. A mechanical guide rail. The most diverse applications can be realised with these few coordinated components. The desired geometries, lengths and radii are formed by the number and choice of the components.

The XTS components for a continuous system

- curve sections
- 2 or more straight sections
- 1 or more movers
- Beckhoff Industrial PC
- TwinCAT NC PTP
- TwinCAT XTS extension
- power supply units



Trajectories

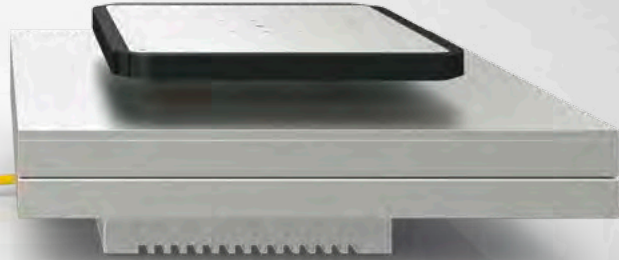


TwinCAT:
software platform for control and engineering



Industrial PC:
scalable hardware platform

EtherCAT G fieldbus:
high performance



XPlanar mover:
free positioning in three sizes

XPlanar tile:
free layout configuration



XPlanar | eXtended planar motor system

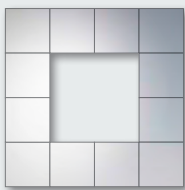
Six degrees of freedom for maximum positioning flexibility

With XPlanar, Beckhoff enables maximum freedom and simplification in the design of machines and systems. This is made possible by the freely movable planar movers floating over planar tiles that can be arranged in any desired layout. XPlanar is suitable as a highly flexible transport system for machine manufacturing, and in particular for the automation of packaging, assembly, sorting and commissioning processes. The free choice of surfaces – easy-to-clean glass, stainless steel in hygienic design or plastic film – also supports use in clean rooms, in the pharmaceutical and

food industries and under vacuum conditions.

The extremely high performance of PC-based control technology from Beckhoff provides the optimum basis for controlling such a data-intensive application as XPlanar. EtherCAT G, which is based on Gigabit Ethernet, also provides data communication with a sufficiently high data transfer rate. A certain amount of computing power is required to calculate the position, the correct current values and to avoid collisions. The computing requirement changes with the mover number and area size. The product range of Beckhoff Industrial PCs enables

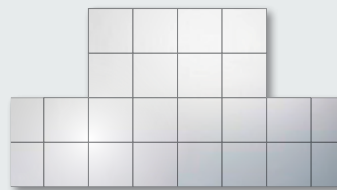
optimum adaptation of computing power to requirements. The entire TwinCAT toolbox with motion control and PLC is available for optimum use of XPlanar. The user will also find proven programming interfaces for the XPlanar system.



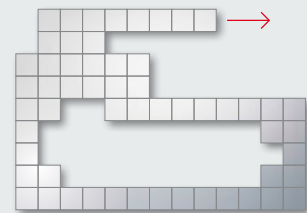
Ring shapes:
for the flow of product around a processing station



Large tile floors:
ideal for long routes

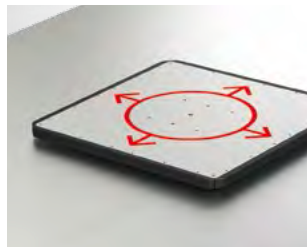
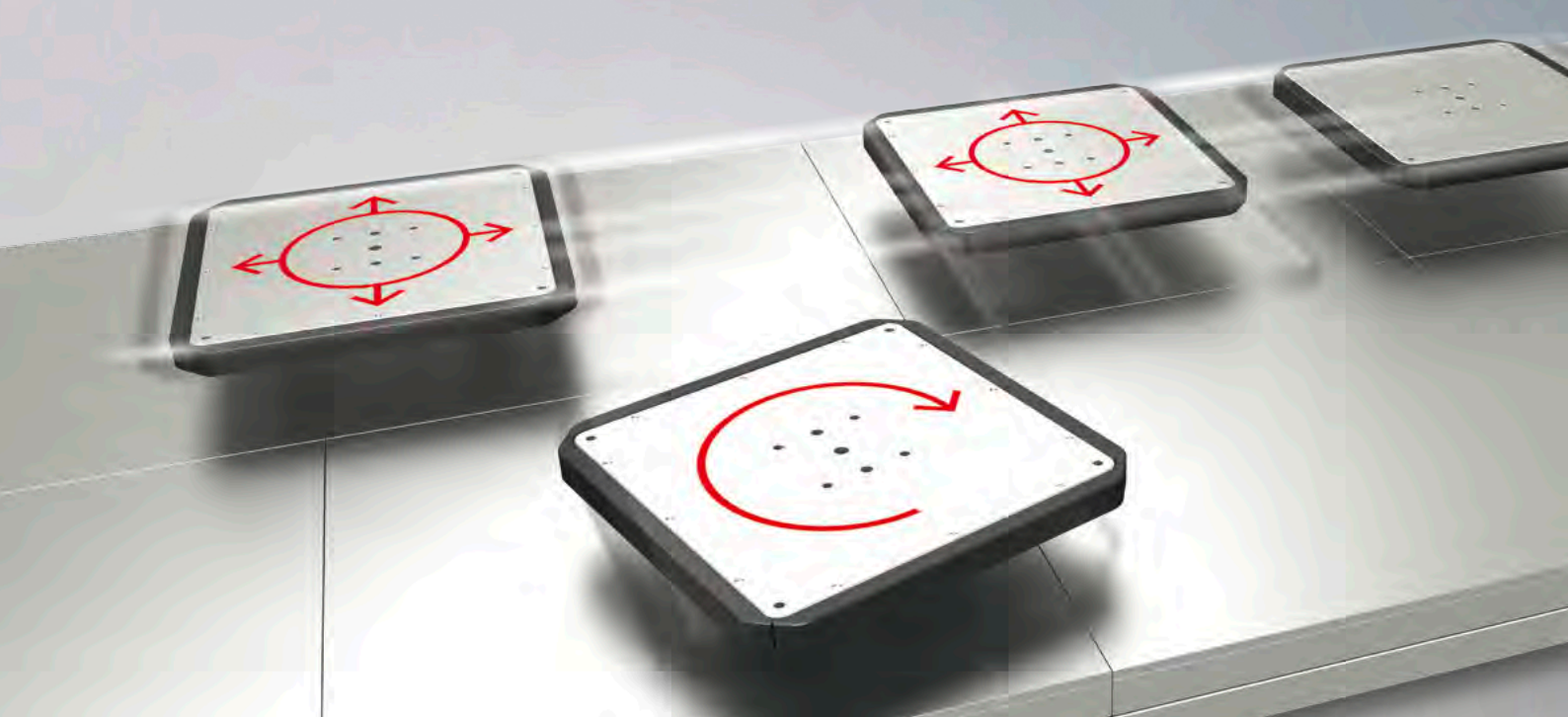


Waiting zones:
can be set up directly alongside the track.

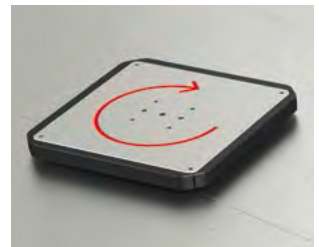


Free-form shapes:
provide a match for any space requirements.

Geometries



Forward, reverse, sideways



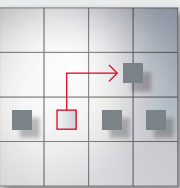
Rotating



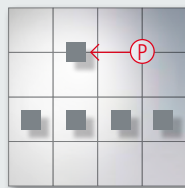
Lifting and lowering



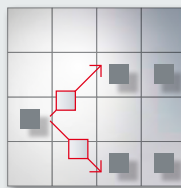
Tilting



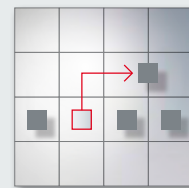
Overtaking:
Movers can change lane and accelerate.



Parking:
Movers can be extracted from the product flow.



Divider:
simple flow division, e.g. diversion of a product flow into several channels

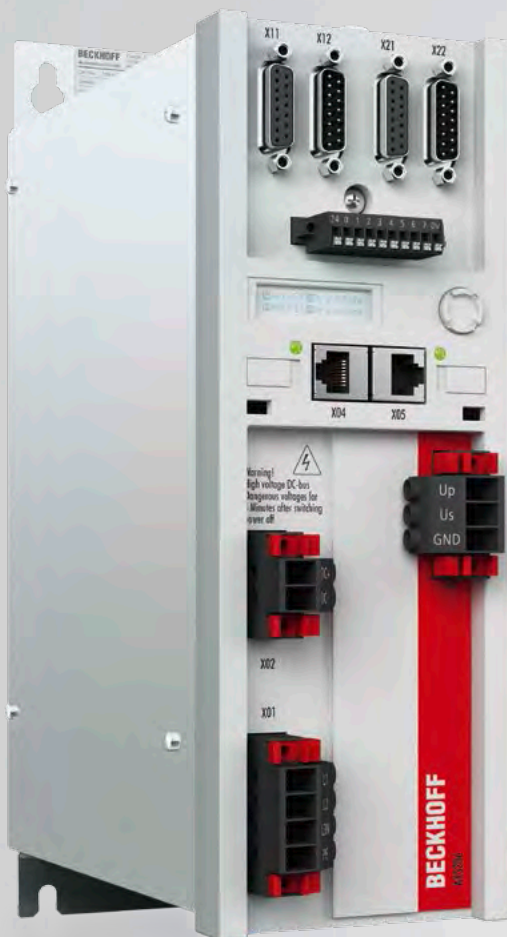


Infeed and outfeed:
e.g. into or out of contaminated areas

Applications

Servo Drives

► www.beckhoff.com/Servo-Drives



AX5101–AX5112, AX52xx | Digital Compact Servo Drives: 1-/2-channel up to 8.3 kW

- 1- or 2-channel Servo Drives
- high-speed EtherCAT communication
- rated current up to 12 A or 2 x 6 A
- optimised for multi-axis applications
- variable motor output current for 2-channel Servo Drives
- TwinSAFE drive option card

See page **372**



AX8000 | Multi-axis EtherCAT drive: Compact control power with 1 μ s current control update time

- optimised, compact dimensions for control cabinet installation
- OCT integrated
- new, integrated AX-Bridge: toolless mounting
- powerful FPGA technology combined with multi-core ARM processors
- multi-feedback interface
- TwinSAFE axis modules with integrated TwinSAFE Logic

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EL72x1-9014 | Compact servo drive as EtherCAT Terminal

- seamless integration within EtherCAT I/O system
- various performance classes between 2.8 and 8 A
- direct motor connection with OCT
- enables implementation of the STO (Safe Torque Off) safety function
- vector control for highly dynamic positioning tasks
- designed for use with AM8100

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EP7211-0034 | Servomotor box with OCT and STO, 4.5 A

- seamless integration within EtherCAT I/O system
- direct motor connection with OCT
- enables implementation of the STO (Safe Torque Off) safety function
- vector control for highly dynamic positioning tasks
- designed for use with AM8100

See page **2** 366



AM18100 | Compact integrated servo drive

- servomotor, power stage and fieldbus connection in one
- for all motion requirements up to 400 W
- no control cabinet, no upstream I/O level necessary
- EtherCAT slave can be placed directly at the machine

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AX5118-AX5140 | Digital Compact Servo Drives: 1-channel up to 28 kW

- high-speed EtherCAT communication
- rated current: 18/25/40 A
- flexible motor type selection
- TwinSAFE drive option card

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AX5160-AX5193 | Digital Compact Servo Drives: 1-channel up to 118 kW

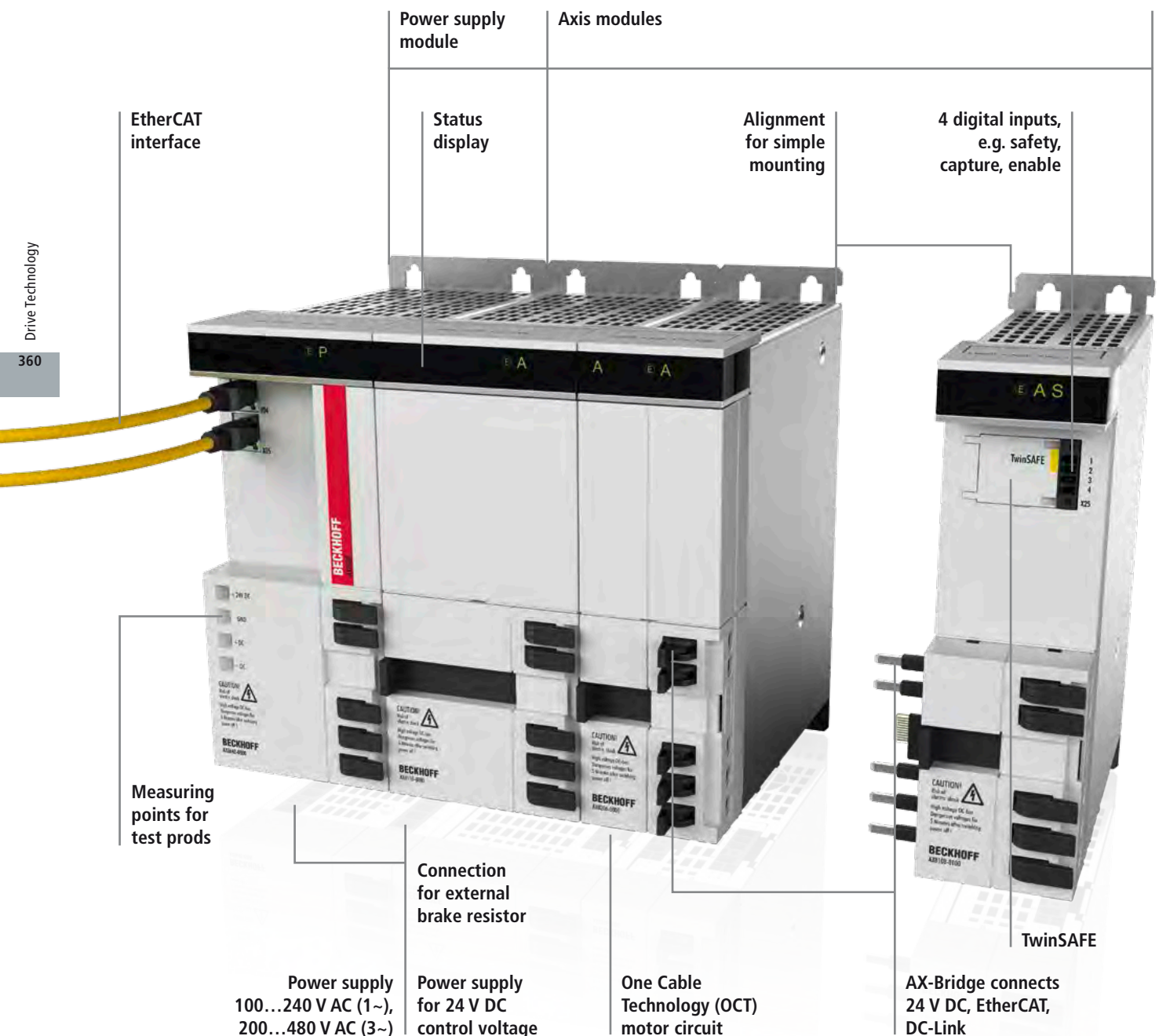
- high-speed EtherCAT communication
- rated current: 60/72/90/110/143/170 A
- high performance with small dimensions
- flexible motor type selection
- TwinSAFE drive option card

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AX8000 | Multi-axis servo system

► www.beckhoff.com/AX8000



Drive Technology

360

EtherCAT interface

Power supply module

Axis modules

Status display

Alignment for simple mounting

4 digital inputs, e.g. safety, capture, enable

Measuring points for test prods

Connection for external brake resistor

One Cable Technology (OCT) motor circuit

TwinSAFE

Power supply 100...240 V AC (1~), 200...480 V AC (3~)

Power supply for 24 V DC control voltage

AX-Bridge connects 24 V DC, EtherCAT, DC-Link



AX8620 |
Power supply
module, 20 A



AX8640 |
Power supply
module, 40 A



AX85xx |
Combined power supply and axis modules
80 A DC and 25/40 A rated motor current



AX8118 |
Axis module,
18 A



AX8206 | Dual-axis
module, 2 x 6 A,
AX8108 | Axis module, 8 A

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 power 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. The 1-axis and 2-axis modules can optionally be equipped with STO or TwinSAFE (drive-integrated safety functions).

The AX85xx combined power supply and axis modules unite the function of an AX86xx power supply module with an AX81xx axis module in a single device.

eXtreme Fast Control in the drive

The EtherCAT-based AX8000 multi-axis servo system combines powerful FPGA technology with multi-core ARM processors. The new multi-channel current control technology enables extremely short sampling

and response times. The entirely hardware-implemented current controller combines the advantages of analog and digital control technology: reaction to a current deviation from the setpoint value is possible within 1 μ s; the current controller cycle time is around 32 μ s at a switching frequency of 16 kHz. The processing of EtherCAT process data (actual and setpoint values) is carried out without a processor almost without delay in the hardware, so that the minimum EtherCAT cycle time is only 62.5 μ s.

One Cable Technology (OCT)

The AX8000 multi-axis servo system supports OCT, the One Cable Technology for power and feedback. In connection with the servomotors from the AM8000 (standard), AM8500 (increased inertia), AM8700 (anodized housing) and AM8800 (stainless steel) series, the wiring is reduced to the standard motor cable, via which the feedback signals are also transmitted.

As in sensorless control, the user no longer has to use an additional feedback cable. All information required for control purposes is transmitted reliably and interference-proof via a digital interface.

Drive-integrated safety functions

The AX8000 with TwinSAFE supports the typical drive-integrated safety functions and fulfills the requirements of EN ISO 13849-1:2015 (Cat 4, PL e), EN 61508:2010 (SIL 3) and EN 62061:2005 + A1:2013/A2:2015 (SIL CL3).

- stop functions (STO, SOS, SS1, SS2)
- speed functions (SLS, SSM, SSR, SMS) with up to 8 speeds
- position functions (SLP, SCA, SLI) with reference cams
- acceleration functions (SAR, SMA)
- rotating direction functions (SDIp, SDIn)
- brake function (SBC, SBT)

Technical data	AX8000
System bus	EtherCAT
Drive profile	CiA402 according to IEC 61800-7-201 (CoE)
Rated supply voltage	100...480 V AC, 50/60 Hz
DC-Link voltage	140...875 V DC
Current control	1 μ s update time, 32 μ s cycle time
Design form	modular system with 60 or 90 mm wide elements
Protection class	IP 20
Ambient temperature (operation)	0...+40 °C
Approvals/markings	CE, cULus, EAC



AX8620, AX8640 | Power supply modules

A power supply module generates the DC-Link voltage (DC) for the power 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.

AX8000 power supply modules can be used on 1- or 3-phase low-voltage mains supplies.

- 1-phase mains supplies 100...240 V AC, 50/60 Hz
 - 3-phase mains supplies 200...480 V AC, 50/60 Hz
- A separate 24 V DC power supply is required in each case.

Technical data	AX8620-0000-0000	AX8640-0000-0000
Rated supply voltage	1 x 100...240 V AC 3 x 200...480 V AC	3 x 200...480 V AC
Rated input current	1~: 10.0 A AC 3~: 17.5 A AC	3~: 35 A AC
DC-Link output current	1~: 5 A DC without mains choke/7 A DC with mains choke 3~: 20 A DC	3~: 40.0 A DC
DC-Link voltage	max. 875 V DC	
DC-Link capacitance	405 µF	625 µF
Rated output	1~: 2.0 kW 3~: 10.7 kW	3~: 21.4 kW
System bus	EtherCAT	
Drive profile	CiA402 according to IEC 61800-7-201 (CoE)	
Protection class	IP 20	
Ambient temperature (operation)	0...+55 °C (see documentation)	
Approvals/markings	CE, cULus, EAC	
Further information	www.beckhoff.com/AX8620	www.beckhoff.com/AX8640



AX8525, AX8540 | Combined power supply and axis modules









The AX8525 and AX8540 combined power supply and axis modules unite the function of an AX86xx power supply module with an AX81xx axis module in a single device.

As a result, the AX-Bridge is not loaded by the axis current of the first axis and another 50 A DC are available for additional axis modules. The power supply provides 80 A DC to the

DC-Link and contains an internal brake resistor as well as a chopper for the connection of an external brake resistor. The integrated axis module with TwinSAFE safety functions is

available with a rated current of 25 A or 40 A and can optionally be ordered with multi-feedback interface.

Technical data	AX8525-0xx0-0000	AX8540-0xx0-0000
Function	combined power supply and axis module	
Rated supply voltage	3 x 200...480 V AC	
Rated input current	70 A AC	
Continuous braking power	200 W/6 kW	
Rated output current (axis)	25 A	40 A
Peak output current (axis)	50 A	80 A
DC-Link output current	80 A DC, thereof max. 50 A DC for the AX-Bridge	
DC-Link voltage	max. 875 V DC	
System bus	EtherCAT	
Drive profile	CiA402 according to IEC 61800-7-201 (CoE)	
Ambient temperature (operation)	0...+40 °C	
Approvals/markings	CE, cULus, EAC	
Further information	www.beckhoff.com/AX8525	www.beckhoff.com/AX8540

Ordering information	Combined power supply and axis module 25 A	Combined power supply and axis module 40 A
STO/SS1	 AX8525-0100-0000	 AX8540-0100-0000
STO/SS1 + multi-feedback	 AX8525-0110-0000	 AX8540-0110-0000
Safe Motion	 AX8525-0200-0000	 AX8540-0200-0000
Safe Motion + multi-feedback	 AX8525-0210-0000	 AX8540-0210-0000

 For availability status see Beckhoff website at: www.beckhoff.com



AX81xx, AX8206 | 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 power 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 100 to 480 V AC, the axis modules can be operated without limitation with any of the power 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: it automatically connects DC-Link, 24 V DC control voltage and communication via EtherCAT between the linked modules. The DC-Link connection enables the exchange of energy during acceleration and braking procedures, where the regenera-

tive brake energy is primarily stored in the common DC-Link. If the energy exceeds the DC-Link capacitance, the brake resistor of the AX881x capacitor modul is used to suppress the DC-Link voltage. The AX8000 multi-axis servo drive system encompasses new functions of safe drive technology with TwinSAFE: the AX8108, AX8118 and AX8206 axis modules include a programmable TwinSAFE Logic corresponding to an EL6910 and enable the direct implementation of a safety application in the servo drive. The user has greater degrees of freedom in the implementation of safety applications in drive technology systems, and the flexibility in programming facilitates individual design of safe drive technology to suit the specific system. The safety functions STO and SS1 can be implemented with the TwinSAFE axis modules with the ordering option -0100 (STO/SS1). These functions can be initiated both

via hard wiring and via FSoE. For TwinSAFE axis modules with the ordering option -0200 (Safe Motion), various internal and external drive signals are available for implementing an application-specific safety function. As usual, these can be interconnected with the typical EL6910 pre-certified function blocks to form complex, safe drive functions such as SLS, SLP, etc. Depending on the application, the safety-oriented information can be pre-processed directly in the drive so that the central TwinSAFE Logic need only process the information that is aggregated there.

The multi-feedback interface (ordering option -0x10) supports the digital encoder systems EnDat 2.2 and BiSS C. Two further D-sub 15-pin connectors can be found behind the front cover. Therefore, one or two EnDat or BiSS encoders can be connected to a single-axis module. With a dual-axis module, an encoder interface is assigned to each axis.

These encoder systems can be used as primary or secondary feedback interfaces. Primary feedback means that these encoders are used as commutation encoders. This is the case with third-party motors or if a Beckhoff linear motor is operated with this feedback. Example of secondary feedback: An AM8000 servomotor with OCT drives a spindle axis that is additionally equipped with a linear encoder to increase the accuracy.

Technical data	AX8108-0xx0-0000	AX8118-0xx0-0000	AX8206-0xx0-0000
Function	axis module		
Number of channels	1	1	2
Rated output current (axis)	8 A	18 A	6 A
Minimum rated output current (channel) at full current resolution	1 A	5 A	1 A
Max. configurable rated output current	8 A	18 A	8 A (total device current: 12 A)
Peak output current (axis)*	20 A	40 A	20 A (total device current: 28 A)
DC-Link voltage	max. 875 V DC		
DC-Link capacitance	135 µF	405 µF	135 µF
Power loss	23 W	22 W	23 W
System bus	EtherCAT		
Drive profile	CiA402 according to IEC 61800-7-201 (CoE)		
Design form	modular system with 60 mm wide elements	modular system with 90 mm wide elements	modular system with 60 mm wide elements
Protection class	IP 20		
Ambient temperature (operation)	0...+40 °C		
Approvals/markings	CE, cULus, EAC		

*rating for 560 V DC

Ordering information	Axis module 1 x 8 A	Axis module 1 x 18 A	Axis module 2 x 6 A
Without TwinSAFE	AX8108-0000-0000	AX8118-0000-0000	AX8206-0000-0000
STO/SS1	AX8108-0100-0000	AX8118-0100-0000	AX8206-0100-0000
STO/SS1 + multi-feedback	AX8108-0110-0000	AX8118-0110-0000	AX8206-0110-0000
Safe Motion	AX8108-0200-0000	AX8118-0200-0000	AX8206-0200-0000
Safe Motion + multi-feedback	AX8108-0210-0000	AX8118-0210-0000	AX8206-0210-0000

► www.beckhoff.com/AX81xx

► www.beckhoff.com/AX82xx



AX8810 | Capacitor module

An AX8810 capacitor module extends the DC-Link capacitance and is suitable for the support of the DC-Link. It enables energy savings: voltage peaks generated by braking motors are taken up and stored. This makes the activation of the brake resistor

mostly unnecessary and helps to reduce power losses. Overall, the use of the capacitor module makes a reduction in the total connected load possible and also a smaller dimensioning of the fuse.


Technical data	AX8810-0000-0000
Function	capacitor module
For power supply modules	AX86xx-0000
DC-Link voltage	max. 875 V DC
DC-Link capacitance	1755 µF
System bus	EtherCAT
Drive profile	CiA402 according to IEC 61800-7-201 (CoE)
Protection class	IP 20
Ambient temperature (operation)	0...+40 °C
Approvals/markings	CE, UL/CSA, EAC
Further information	www.beckhoff.com/AX8810




AX8820 | Energy recovery module

The AX8000 is equipped with a unique energy recovery technology: a standard axis module can either be used as a motor module or as an energy recovery module. When a commutation choke is connected in place of a motor, the axis module is auto-

matically configured for energy recovery. As with a motor, an OCT cable can be used for connection to an AX8206, AX8108 or AX8118 axis module. In this way, the regenerative power can be adapted as required.

Technical data	 AX8820-00xx-0000
Function	energy recovery module
Rated supply voltage	400...480 V AC
DC-Link voltage	max. 875 V DC
System bus	EtherCAT
Drive profile	CiA402 according to IEC 61800-7-201 (CoE)
Protection class	IP 20
Ambient temperature (operation)	0...+40 °C
Approvals/markings	CE, cULus in preparation, EAC
Further information	www.beckhoff.com/AX8820

 For availability status see Beckhoff website at: www.beckhoff.com/AX8820

Motor supply cables for AX8000 Servo Drives at AM8xxx and AL8000

For maximum cable lengths and further specifications see current documentation under ► www.beckhoff.com/documentation.
Torsion-resistant variants for robotic applications are available in the following wire gauges: 1 mm², 1.5 mm², 2.5 mm².

Motor cables 1 mm² for motors with itec[®] plug at AX8108 and AX8206

Ordering information	Motor cable with 1 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8022-xxxx	Highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 81 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1 mm ² + (2 x 0.75 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8022-0050	example for 5 m length
ZK4501-8022-xxxx	extension cable

Ordering information	Motor cable with 1 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8062-xxxx	Highly flexible, torsion-resistant cable with 2 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 144 mm (12 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1 mm ² + (2 x 0.75 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8062-0050	example for 5 m length
ZK4501-8062-xxxx	extension cable

Motor cables 1.5 mm² for motors with M23 speedtec[®] at AX8108 and AX8206

Ordering information	Motor cable with 1.5 mm ² wire gauge, fixed installation
ZK4800-8003-xxxx	Cables for fixed installation, min. bending radius = 61 mm (5 x OD), (4 x 1.5 mm ² + (2 x 0.75 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8003-0050	example for 5 m length
ZK4501-8003-xxxx	extension cable

Ordering information	Motor cable with 1.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8023-xxxx	Highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 89 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1.5 mm ² + (2 x 0.75 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8023-0050	example for 5 m length
ZK4501-8023-xxxx	extension cable

Ordering information	Motor cable with 1.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8063-xxxx	Highly flexible, torsion-resistant cable with 2 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 164 mm (12 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1.5 mm ² + (2 x 0.75 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8063-0050	example for 5 m length
ZK4501-8063-xxxx	extension cable

Motor cables 2.5 mm² for motors with M23 speedtec® plug at AX8118

Ordering information	Motor cable with 2.5 mm ² wire gauge, fixed installation
ZK4800-8004-xxxx	Cables for fixed installation, min. bending radius = 69 mm (5 x OD), (4 x 2.5 mm ² + (2 x 1 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8004-0050	example for 5 m length
ZK4501-8004-xxxx	extension cable

Ordering information	Motor cable with 2.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8024-xxxx	Highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 97 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 2.5 mm ² + (2 x 1 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8024-0050	example for 5 m length
ZK4501-8024-xxxx	extension cable

Ordering information	Motor cable with 2.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8064-xxxx	Highly flexible, torsion-resistant cable with 2 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 183 mm (12 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 2.5 mm ² + (2 x 1 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8064-0050	example for 5 m length
ZK4501-8064-xxxx	extension cable

Motor cables 2.5 mm² for motors with M23 speedtec® plug at AX8525 and AX8540

Ordering information	Motor cable with 2.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8524-xxxx	Highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 97 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 2.5 mm ² + (2 x 1 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8524-0050	example for 5 m length
ZK4501-8024-xxxx	extension cable

Motor cables 4 mm² for motors with M40 speedtec® plug at AX8118

Ordering information	Motor cable with 4 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8025-xxxx	Highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 111 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 4 mm ² + (2 x 1 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8025-0050	example for 5 m length
ZK4501-8025-xxxx	extension cable

Motor cables 4 mm² for motors with M40 speedtec® plug at AX8525

Ordering information	Motor cable with 4 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8525-xxxx	Highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 111 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 4 mm ² + (2 x 1 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8525-0050	example for 5 m length
ZK4501-8025-xxxx	extension cable

Motor cables 10 mm² for motors with M40 speedtec® plug at AX8540

Ordering information	Motor cable with 10 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8527-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 225 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 10 mm ² + (2 x 1.5 mm ²) + (2 x AWG22)).
ZK4800-8527-0050	example for 5 m length
ZK4501-8027-xxxx	extension cable

Encoder cables for AX8000 Servo Drives with multi-feedback interface

Encoder cable with M23 speedtec® plug for connector box AL2250-0002 at AX8000 with multi-feedback interface (EnDat 2.2 or BiSS C)

Ordering information	Encoder cable, highly flexible for drag-chain use
ZK4810-8020-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 53 mm (7 x OD), max. drag-chain length horizontal = 20 m, vertical = 5 m, (7 x 2 x 0.14 mm ² + 2 x 0.5 mm ²)
ZK4810-8020-0050	example for 5 m length

Encoder cable with EnDat 2.2 M12 plug at AX8000 with multi-feedback interface

Ordering information	Encoder cable, highly flexible for drag-chain use
ZK4810-0020-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 53 mm (7 x OD), max. drag-chain length horizontal = 20 m, vertical = 5 m, (7 x 2 x 0.14 mm ² + 2 x 0.5 mm ²)

Accessories for AX8000 Servo Drives

Brake energy management | Braking resistor for AX8000

Ordering information	Components for brake energy management for AX8000
AX2090-BW80-1000	external braking resistor for AX8640-0000-0000 power supply module, 1.0 kW, 18 Ω ⁽¹⁾
AX2090-BW80-2000	external braking resistor for AX8640-0000-0000 power supply module, 2.0 kW, 18 Ω ⁽²⁾
AX2090-BW80-3200	external braking resistor for AX8640-0000-0000 power supply module, 3.2 kW, 18 Ω ⁽²⁾
AX2090-BW80-1600	external braking resistor for AX8620-0000-0000 power supply module, 1.6 kW, 33 Ω ⁽¹⁾
AX2090-BW80-6000	external braking resistor for AX8525-0xx0-0000 and AX8640-0xx0-0000 combined power supply and axis modules, 6.0 kW, 10 Ω ⁽²⁾

Recommended interface cables: ⁽¹⁾ ZK4000-2101-2zzz (1.5 mm²), ⁽²⁾ ZK4000-2102-2zzz (2.5 mm²)

Power supply | Mains chokes for AX8000

Ordering information	AX2090-ND80-00xx Mains chokes
AX2090-ND80-0010	mains choke for AX8620-0000-0000 power supply module, 1-phase, U _k 4 %
AX2090-ND80-0020	mains choke for AX8620-0000-0000 power supply module, 3-phase, U _k 4 %
AX2090-ND80-0040	mains choke for AX8640-0000-0000 power supply module, 3-phase, U _k 4 %
AX2090-ND80-0080	mains choke for AX8525-0xx0-0000 and AX8640-0xx0-0000 combined power supply and axis modules, 3-phase, U _k 4 %

Power supply | Mains filters for AX8000

Ordering information	AX2090-NF8y-0xxx Mains filters
AX2090-NF80-0010	mains filter C2 for AX8620 power supply module (1~)
AX2090-NF80-0020	mains filter C2 for AX8620 power supply module (3~)
AX2090-NF80-0040	mains filter C2 for AX8640 power supply module (3~)
AX2090-NF80-0080	mains filter C2 for AX8525/AX8540 combined power supply and axis module (3~)
AX2090-NF81-0010	mains filter C2 for AX8620 power supply module (1~)
AX2090-NF81-0020	mains filter C2 for AX8620 power supply module (3~)
AX2090-NF81-0040	mains filter C2 for AX8640 power supply module (3~)
AX2090-NF81-0080	mains filter C2 for AX8525/AX8540 combined power supply and axis module (3~)

AX5000 | Digital Compact Servo Drives

► www.beckhoff.com/AX5000

Optional slot for interface boards, e.g. additional feedback

Optional slot for TwinSAFE safety cards

Motor feedback:
Sin/Cos 1 V_{PP},
EnDat 2.1, EnDat 2.2,
Hiperface, BiSS B, BiSS C

Motor feedback (only for AX52xx
2-axis module): Sin/Cos 1 V_{PP},
EnDat 2.1, EnDat 2.2,
Hiperface, BiSS B, BiSS C

Motor feedback:
resolver

Motor feedback (only for
AX52xx 2-axis module): resolver

8 digital I/Os,
e.g. enable, limit switch,
capture input,
error message

Status display,
e.g. axis identifier
or a diagnostic message

Navigation buttons

EtherCAT system bus

Operating material identification

24 V DC control
and braking voltage

DC-Link system
or external
braking resistor

Power supply
100 V AC -10 %...
480 V AC +10 %

Motor outputs

Brake control,
motor temperature
monitoring, OCT





AX5101–AX5112 |
1-channel, up to 12 A



AX52xx | 2-channel,
up to 2 x 6 A



AX5118–AX5140 |
1-channel, 18/25/40 A



AX5160, AX5172 |
1-channel, 60/72 A



AX5190, AX5191 |
1-channel, 90/110 A



AX5192, AX5193 |
1-channel, 143/170 A

The EtherCAT drives

The AX5000 Servo Drive product line from Beckhoff sets standards in drive performance. The AX5000 series is available in single- or multi-channel form and is optimised for exceptional functionality and cost-effectiveness. Featuring integrated,

high-speed control technology with a current control cycle of down to 62.5 µs, the AX5000 drives support fast and highly dynamic positioning tasks. The drives utilise EtherCAT as a high-performance communication system, providing an ideal interface with PC-based control technology while supporting coupling

with other fieldbus systems. The 2-channel Servo Drives with variable motor output current optimise the packaging density and the cost per drive channel. The compact design and simple and safe installation through the “AX-Bridge” quick connection system significantly simplify control cabinet assembly.

Technical highlights

- **fast control algorithms**
 - current control: min. 62.5 µs
 - speed control: min. 62.5 µs
 - position control: min. 62.5 µs
- **variably adjustable current and speed filters**
- **high-speed EtherCAT system communication**
- **1- or 2-channel Servo Drive**
 - optimised for multi-axis applications
 - variable motor output current in 2-channel drives
- **active DC-Link and brake energy management via AX-Bridge**
- **variable motor interface with**
 - multi-feedback interface
 - flexible motor type selection
 - scalable, wide range motor current measurement
- **OCT (One Cable Technology)**
- **electronic identification plate**
- **high-speed capture inputs**
 - eight programmable digital I/Os, two with timestamp
- **mains connection**
 - wide voltage range 100...480 V AC
 - integrated mains filter
- **integration of safety functions (optional)**
 - STO, SS1
 - TwinSAFE: intelligent safety functions for motion control with AX58xx
- **compact design for simple control cabinet installation (300 mm depth)**
- **AX-Bridge – the quick connection system for power supply, DC-Link and control voltage**
- **variable cooling concept (fanless, forced cooling)**

Technical data	AX5000
System bus	EtherCAT
Drive profile	SERCOS™ profile for servo drives according to IEC 61800-7-204 (SoE)
Rated supply voltage	100...480 V AC, 50/60 Hz
DC-Link voltage	max. 875 V DC
Current control	62.5 µs
Design form	compact Servo Drive in 1- and 2-channel models, multi-axis systems with AX-Bridge
Protection class	IP 20
Ambient temperature (operation)	AX5x01...AX5140: 0...50 °C, AX5160...AX5193: 0...40 °C
Approvals/markings	CE, cULus, EAC

AX51xx | 1-channel Servo Drives

Rated output current up to 12 A

Technical data	AX5101-0000-020x	AX5103-0000-020x	AX5106-0000-020x	AX5112-0000-020x
Function	servo drive			
Rated supply voltage	3 x 100...480 V AC ±10 % 1 x 100...240 V AC ±10 %	3 x 100...480 V AC ±10 % 1 x 100...240 V AC ±10 %	3 x 100...480 V AC ±10 % 1 x 100...240 V AC ±10 %	3 x 100...480 V AC ±10 %
Rated output current (axis)	3~: 1.5 A, 1~: 1.5 A	3~: 3 A, 1~: 3 A	3~: 6 A, 1~: 4.5 A	3~: 12 A
Minimum rated output current (channel) at full current resolution	0.35 A	1 A	1 A	6 A
Peak output current (axis)	4.5 A	7.5 A	13 A	26 A
DC-Link voltage	max. 875 V DC			
DC-Link capacitance	235 µF	235 µF	235 µF	470 µF
Power loss	35 W	50 W	85 W	160 W
System bus	EtherCAT			
Drive profile	SERCOS™ profile for servo drives according to IEC 61800-7-204 (SoE)			
Ambient temperature (operation)	0...+50 °C (see documentation)			
Approvals/markings	CE, cULus, EAC			
Further information	www.beckhoff.com/ AX5101	www.beckhoff.com/ AX5103	www.beckhoff.com/ AX5106	www.beckhoff.com/ AX5112

Rated output current up to 40 A

Technical data	AX5118-0000-020x	AX5125-0000-020x	AX5140-0000-020x
Function	servo drive		
Rated supply voltage	3 x 100...480 V AC ±10 %		
Rated output current (axis)	3~: 18 A	3~: 25 A	3~: 40 A
Minimum rated output current (channel) at full current resolution	12 A	12 A	18 A
Peak output current (axis)	36 A	50 A	80 A
DC-Link voltage	max. 875 V DC		
DC-Link capacitance	470 µF	1175 µF	1485 µF
Power loss	255 W	340 W	550 W
System bus	EtherCAT		
Drive profile	SERCOS™ profile for servo drives according to IEC 61800-7-204 (SoE)		
Ambient temperature (operation)	0...+50 °C (see documentation)		
Approvals/markings	CE, cULus, EAC		
Further information	www.beckhoff.com/AX5118	www.beckhoff.com/AX5125	www.beckhoff.com/AX5140

Rated output current up to 90 A

Technical data	AX5160-0000-020x	AX5172-0000-020x	AX5190-0000-020x
Function	servo drive		
Rated supply voltage	3 x 400...480 V AC $\pm 10\%$		
Rated output current (axis)	3~: 60 A	3~: 72 A	3~: 90 A
Minimum rated output current (channel) at full current resolution	25 A	40 A	50 A
Peak output current (axis)	120 A	144 A	180 A
DC-Link voltage	max. 875 V DC		
DC-Link capacitance	900 μF	900 μF	1060 μF
Power loss	830 W	1010 W	1300 W
System bus	EtherCAT		
Drive profile	SERCOS™ profile for servo drives according to IEC 61800-7-204 (SoE)		
Ambient temperature (operation)	0...+50 °C (see documentation)		
Approvals/markings	CE, cULus, EAC		
Further information	www.beckhoff.com/AX5160	www.beckhoff.com/AX5172	www.beckhoff.com/AX5190

Rated output current up to 170 A

Technical data	AX5191-0000-020x	AX5192-0000-020x	AX5193-0000-020x
Function	servo drive		
Rated supply voltage	3 x 400...480 V AC $\pm 10\%$		
Rated output current (axis)	3~: 110 A	3~: 143 A	3~: 170 A
Minimum rated output current (channel) at full current resolution	60 A	70 A	80 A
Peak output current (axis)	180 A	215 A	221 A
DC-Link voltage	max. 875 V DC		
DC-Link capacitance	2120 μF	3180 μF	4240 μF
Power loss	1600 W	2100 W	2500 W
System bus	EtherCAT		
Drive profile	SERCOS™ profile for servo drives according to IEC 61800-7-204 (SoE)		
Ambient temperature (operation)	0...+50 °C (see documentation)		
Approvals/markings	CE, cULus, EAC		
Further information	www.beckhoff.com/AX5191	www.beckhoff.com/AX5192	www.beckhoff.com/AX5193

Recommended combinations for mains supply and braking energy management with the AX51xx

Servo Drives	Mains choke	Mains filter	Braking resistor (x = 3 or 6)
AX5160	AX2090-ND50-0060	integrated (C3 up to 25 m)	AX2090-BW52-x000
AX5172	AX2090-ND50-0072	integrated (C3 up to 25 m)	AX2090-BW52-x000
AX5190	AX2090-ND50-0090	AX2090-NF50-0100	AX2090-BW53-x000
AX5191	AX2090-ND50-0110	AX2090-NF50-0150	AX2090-BW53-x000
AX5192	AX2090-ND50-0143	AX2090-NF50-0150	AX2090-BW54-x000
AX5193	AX2090-ND50-0170	AX2090-NF50-0180	AX2090-BW54-x000

Braking resistor: x = power in kW

AX52xx | 2-channel Servo Drives

Technical data	AX5201-0000-020x	AX5203-0000-020x	AX5206-0000-020x
Function	servo drive		
Rated supply voltage	3 x 100...480 V AC ±10 % 1 x 100...240 V AC ±10 %		
Rated output current (axis)	3~: 1.5 A (total device current: 3 A), 1~: 1.5 A (total device current: 3 A)	3~: 3 A (total device current: 6 A), 1~: total device current: 4.5 A	3~: 6 A (total device current: 12 A), 1~: total device current: 9 A
Minimum rated output current (channel) at full current resolution	0.35 A	1 A	1 A
Max. configurable rated output current	3~: 3 A, 1~: 3 A	3~: 4.5 A, 1~: 6 A	3~: 9 A, 1~: 9 A
Peak output current (axis)	2 x 5 A	2 x 10 A	2 x 13 A
DC-Link voltage	max. 875 V DC		
DC-Link capacitance	235 µF	235 µF	470 µF
Power loss	55 W	85 W	160 W
System bus	EtherCAT		
Drive profile	SERCOS™ profile for servo drives according to IEC 61800-7-204 (SoE)		
Ambient temperature (operation)	0...+50 °C (see documentation)		
Approvals/markings	CE, cULus, EAC		
Further information	www.beckhoff.com/AX52xx		

Dimensions	Height without connectors	Width	Depth without connectors
AX5101	274 mm	92 mm	232 mm
AX5103	274 mm	92 mm	232 mm
AX5106	274 mm	92 mm	232 mm
AX5112	274 mm	92 mm	232 mm
AX5118	274 mm	185 mm	232 mm
AX5125	274 mm	185 mm	232 mm
AX5140	274 mm	185 mm	232 mm
AX5201	274 mm	92 mm	232 mm
AX5203	274 mm	92 mm	232 mm
AX5206	274 mm	92 mm	232 mm
AX5160	345 mm	190 mm	259 mm
AX5172	345 mm	190 mm	259 mm
AX5190	540 mm	280 mm	253 mm
AX5191	540 mm	280 mm	253 mm
AX5192	540 mm	280 mm	332 mm
AX5193	540 mm	280 mm	332 mm

Options for AX5000 Servo Drives

AX57xx | Encoder option cards

The AX5000 Servo Drive series supports a large number of feedback interfaces via the multi-feedback interface:

- OCT (One Cable Technology)
- resolver (2-, 4-, 6- or 8-pole)
- SinCos encoder 1 V_{PP}
- single- and multi-turn encoder EnDat 2.1
- single- and multi-turn encoder EnDat 2.2
- single- and multi-turn encoder Hiperface 1 V_{PP}
- single- and multi-turn encoder BiSS 1 V_{PP}

From hardware revision 2 onwards, OCT (One Cable Technology) is also supported by the AX5000 and with it the “second

encoder” function where the encoder inside the motor is used for commutation and a second high-resolution encoder is used for position control.

Encoder option cards

For the integration of further feedback systems the controllers can be equipped with encoder option cards from hardware revision 2 onwards. The option cards are inserted in the second option slot on top of the AX5000, offering the possibility to connect one or two further encoders, depending on the version.

Encoder option cards for AX51xx

- AX5701 | one additional encoder input 1 V_{PP}: BiSS B, Hiperface, EnDat 2.1
- AX5721 | one additional encoder input EnDat 2.2 or BiSS C

Encoder option cards for AX52xx

- AX5702 | two additional encoder inputs 1 V_{PP}: BiSS B, Hiperface, EnDat 2.1
- AX5722 | two additional encoder inputs EnDat 2.2 or BiSS C

Ordering information		Pict.
AX5701-0000	encoder option card for one additional encoder input 1 V _{PP} : BiSS B, Hiperface, EnDat 2.1	
AX5702-0000	encoder option card for two additional encoder inputs 1 V _{PP} : BiSS B, Hiperface, EnDat 2.1	A
AX5721-0000	encoder option card for one additional encoder input EnDat 2.2, BiSS C	
AX5722-0000	encoder option card for two additional encoder inputs EnDat 2.2, BiSS C	

AX58xx | TwinSAFE drive options cards

Significant hazards to persons arise from the dynamic movements of the electrical drive equipment of machines. With the AX58xx TwinSAFE drive option cards numerous safety functions can be easily implemented by the user. No further circuits are necessary for this, such as circuit breakers or contactors in the supply lines or special external encoder systems. Optional cards that are certified according to DIN EN ISO 13849-1:2008 (Cat. 4, PL e) and IEC 61508:2010 (SIL 3) are available for different safety categories:

AX5801 | Personal protection against inadvertent restart of the drive axis (STO/SS1):

- Safe Torque Off (STO) according to IEC 61800-5-2
- control through safe 24 V DC outputs
- mains voltage and motor line remain connected

AX5805, AX5806 | Safe Motion according to IEC 61800-5-2. Control is performed via EtherCAT; no further wiring is required:

- stop functions (STO, SOS, SS1, SS2)
- speed functions (SLS, SSM, SSR, SMS) with up to 8 speeds
- position functions (SLP, SCA, SLI) with reference cams
- acceleration functions (SAR, SMA)
- rotating direction functions (SDIp, SDIn)

For further safety-relevant features of the TwinSAFE system and the TwinSAFE products see page [590](#)

Ordering information		Pict.
AX5801-0200	TwinSAFE drive option card for AX5000 up to 40 A, HW 2.0: STO, SS1 ⁽¹⁾	B
AX5805-0000	TwinSAFE drive option card for AX5000 up to 40 A, HW 2.0: STO, SS1, SS2, SOS, SLS, SSM, SSR, SMS, SLP, SCA, SLI, SAR, SMA, SDIp, SDIn ⁽¹⁾	C
AX5806-0000	TwinSAFE drive option card for AX5000 from 60 A, HW 2.0: STO, SS1, SS2, SOS, SLS, SSM, SSR, SMS, SLP, SCA, SLI, SAR, SMA, SDIp, SDIn ⁽²⁾	

⁽¹⁾ AX5000 up to 40 A: AX5x01-0000-020x, AX5x03-0000-020x, AX5x06-0000-020x, AX5112-0000-020x, AX5118-0000-020x, AX5125-0000-020x, AX5140-0000-020x

⁽²⁾ AX5000 from 60 A up to 170 A: AX5160-0000-020x, AX5172-0000-020x, AX519x-0000-020x

Illustrations see next page

AX59xx | AX-Bridge quick connection system

For Servo Drives up to a rated current of 40 A, the AX59xx AX bridge enables the simple and fast connection of several AX5000 units to form a multi-axis system by means of plug-in power supply and connection modules.

The AX590x power supply module is simply snapped onto the Servo Drive. The AX591x connection module with integrated busbars is suitable for multi-axis systems and combines mains input, intermediate circuit, 24 V DC control voltage and brake voltage. In combination, the AX590x and AX591x modules enable fast installation and commissioning.

- integration of power supply, DC-Link, 24 V DC control and braking voltage

- connection module with power rail system, current carrying capacity up to 85 A
- straightforward installation and disassembly without additional wiring
- visible and safe contacting

Active DC-Link and brake energy management

With the AX-Bridge the DC-Links are automatically through-connected: This enables an economic energy balancing between axes.

- short-circuit proof
- intelligent utilisation of all available system braking resistors
- elimination power loss



Ordering information		Pict.
AX5901-0000	AX-Bridge power supply module for connection of supply voltage and 24 V DC for control and brake energy (pluggable), for AX5x01...AX5125, 85 A	D
AX5902-0000	AX-Bridge power supply module for connection of supply voltage and 24 V DC for control and brake energy (pluggable), for AX5140, 85 A	D
AX5911-0000	AX-Bridge power distribution module, quick connection system for power supply, DC-Link and control voltage (pluggable), for AX5x01...AX5112, 85 A	E
AX5912-0000	AX-Bridge power distribution module, quick connection system for power supply, DC-Link and control voltage (pluggable), for AX5118 and AX5125, 85 A	F



Motor cables for AX5000 Servo Drives at AM8xxx

For maximum cable lengths and further specifications see current documentation under ► www.beckhoff.com/documentation.

Torsion-resistant variants for robotic applications are available in the following wire gauges: 1 mm², 1.5 mm², 2.5 mm².

Motor cables 1 mm² for motors with itec[®] plug at AX5000 (1.5...6 A)

Ordering information	Motor cable with 1 mm ² wire gauge, highly flexible for drag-chain use
ZK4500-8022-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 81 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1 mm ² + (2 x 0.75 mm ²) + (2 x AWG22))
ZK4500-8022-0050	example for 5 m length
ZK4501-8022-xxxx	extension cable

Ordering information	Motor cable with 1 mm ² wire gauge, highly flexible for drag-chain use
ZK4500-8062-xxxx	highly flexible, torsion-resistant cable with 2 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 144 mm (12 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1 mm ² + (2 x 0.75 mm ²) + (2 x AWG22))
ZK4500-8062-0050	example for 5 m length
ZK4501-8062-xxxx	extension cable

Motor cables 1.5 mm² for motors with M23 speedtec[®] plug at AX5000 (1.5...12 A)

Ordering information	Motor cable with 1.5 mm ² wire gauge, fixed installation
ZK4500-8003-xxxx	cables for fixed installation, min. bending radius = 61 mm (5 x OD), (4 x 1.5 mm ² + (2 x 0.75 mm ²) + (2 x AWG22))
ZK4500-8003-0050	example for 5 m length
ZK4501-8003-xxxx	extension cable

Ordering information	Motor cable with 1.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4500-8023-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 89 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1.5 mm ² + (2 x 0.75 mm ²) + (2 x AWG22))
ZK4500-8023-0050	example for 5 m length
ZK4501-8023-xxxx	extension cable

Ordering information	Motor cable with 1.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4500-8063-xxxx	highly flexible, torsion-resistant cable with 2 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 164 mm (12 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1.5 mm ² + (2 x 0.75 mm ²) + (2 x AWG22))
ZK4500-8063-0050	example for 5 m length
ZK4501-8063-xxxx	extension cable

Motor cables 2.5 mm² for motors with M23 speedtec[®] plug at AX5000 (18...25 A)

Ordering information	Motor cable with 2.5 mm ² wire gauge, fixed installation
ZK4500-8004-xxxx	cables for fixed installation, min. bending radius = 69 mm (5 x OD), (4 x 2.5 mm ² + (2 x 1 mm ²) + (2 x AWG22))
ZK4500-8004-0050	example for 5 m length
ZK4501-8004-xxxx	extension cable

Ordering information	Motor cable with 2.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4500-8024-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 97 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 2.5 mm ² + (2 x 1 mm ²) + (2 x AWG22))
ZK4500-8024-0050	example for 5 m length
ZK4501-8024-xxxx	extension cable

Ordering information	Motor cable with 2.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4500-8064-xxxx	highly flexible, torsion-resistant cable with 2 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 183 mm (12 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 0.75 mm ² + (2 x 0.34 mm ²) + (2 x AWG22))
ZK4500-8064-0050	example for 5 m length
ZK4501-8064-xxxx	extension cable

Motor cables 4 mm² for motors with M40 speedtec® plug at AX5000 (12...25 A)

Ordering information	Motor cable with 4 mm ² wire gauge, highly flexible for drag-chain use
ZK4500-8025-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 111 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 4 mm ² + (2 x 1 mm ²) + (2 x AWG22))
ZK4500-8025-0050	example for 5 m length
ZK4501-8025-xxxx	extension cable

Motor cables 10 mm² for motors with M40 speedtec® plug at AX5000 (40 A)

Ordering information	Motor cable with 10 mm ² wire gauge, highly flexible for drag-chain use
ZK4500-8027-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 225 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 10 mm ² + (2 x 1.5 mm ²) + (2 x AWG22))
ZK4500-8027-0050	example for 5 m length
ZK4501-8027-xxxx	extension cable

Motor cables 10 mm² for motors with M40 speedtec® plug at AX5000 (60 A)⁽¹⁾

Ordering information	Motor cable with 10 mm ² wire gauge, highly flexible for drag-chain use
ZK4504-8027-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 255 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 10 mm ² + (2 x 1.5 mm ²) + (2 x AWG22))
ZK4504-8027-0050	example for 5 m length
ZK4501-8027-xxxx	extension cable

⁽¹⁾ According to DIN EN 60204-1 only permitted for a continuous current of 52 A! With AX5000 Servo Drives (60 A) only permitted for utilising the peak current capacity! AX5000 (60 A) does not support OCT. Order feedback cable separately: ZK4530-8010-xxxx for resolver, ZK4510-8020-xxxx for encoder.

Motor cables 10 mm² for motors with connector box at AX5000 (60 A)⁽¹⁾

Ordering information	Motor cable with 10 mm ² wire gauge, highly flexible for drag-chain use
ZK4506-8027-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 255 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 10 mm ² + (2 x 1.5 mm ²) + (2 x AWG22))
ZK4506-8027-0050	example for 5 m length

⁽¹⁾ According to DIN EN 60204-1 only permitted for a continuous current of 52 A! With AX5000 Servo Drives (60 A) only permitted for utilising the peak current capacity! AX5000 (60 A) does not support OCT. Order feedback cable separately: ZK4530-8010-xxxx for resolver, ZK4510-8020-xxxx for encoder.

Motor cables 16 mm² for motors with M40 speedtec[®] plug at AX5000 (72 A)⁽¹⁾

Ordering information	Motor cable with 16 mm ² wire gauge, flexible for drag-chain use
ZK4504-8018-xxxx	Flexible, drag-chain suitable cable with 5 million bending cycles, max. 180 m/min, max. 5 m/s ² , min. bending radius = 250 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 16 mm ² + (2 x 1.5 mm ²) + (2 x 1.5 mm ²)).
ZK4504-8018-0050	example for 5 m length

⁽¹⁾ According to DIN EN 60204-1 only permitted for a continuous current of 70 A! With AX5000 Servo Drives (72 A) only permitted for utilising the peak current capacity! AX5000 (72 A) does not support OCT. Order feedback cable separately: ZK4530-8010-xxxx for resolver, ZK4510-8020-xxxx for encoder.

Motor cables 16 mm² for motors with connector box at AX5000 (72 A)⁽¹⁾

Ordering information	Motor cable with 16 mm ² wire gauge, flexible for drag-chain use
ZK4506-8018-xxxx	flexible, drag-chain suitable cable with 5 million bending cycles, max. 180 m/min, max. 5 m/s ² , min. bending radius = 250 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 16 mm ² + (2 x 1.5 mm ²) + (2 x 1.5 mm ²))
ZK4506-8018-0050	example for 5 m length

⁽¹⁾ According to DIN EN 60204-1 only permitted for a continuous current of 70 A! With AX5000 Servo Drives (72 A) only permitted for utilising the peak current capacity! AX5000 (72 A) does not support OCT. Order feedback cable separately: ZK4530-8010-xxxx for resolver, ZK4510-8020-xxxx for encoder.

Feedback cables for AX5000 Servo Drives at AM8xxx

Resolver cables for motors with itec[®] plug at AX5000

Ordering information	Resolver cable with 0.25 mm ² wire gauge, flexible for drag-chain use
ZK4530-8110-xxxx	flexible, drag-chain suitable cable with 5 million bending cycles, max. 120 m/min, max. 4 m/s ² , min. bending radius = 75 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, 4 x 2 x 0.25 mm ²
ZK4530-8110-0050	example for 5 m length
ZK4531-8110-xxxx	extension cable

Resolver cables for motors with M23 speedtec[®] plug at AX5000

Ordering information	Resolver cable with 0.25 mm ² wire gauge, flexible for drag-chain use
ZK4530-8010-xxxx	flexible, drag-chain suitable cable with 5 million bending cycles, max. 120 m/min, max. 4 m/s ² , min. bending radius = 75 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, 4 x 2 x 0.25 mm ²
ZK4530-8010-0050	example for 5 m length
ZK4531-8010-xxxx	extension cable

Encoder cables for motors with M23 speedtec[®] plug at AX5000

Ordering information	Encoder cable with 0.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4510-8020-xxxx	Highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 53 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (7 x 2 x 0.14 mm ² + 2 x 0.5 mm ²). The cable is UL and CSA listed.
ZK4510-8020-0050	example for 5 m length
ZK4511-8020-xxxx	extension cable

Accessories for AX5000 Servo Drives at AM8xxx

EtherCAT patch cables

Ordering information	ZK1090-9191-0xxx EtherCAT patch cables
ZK1090-9191-0001	EtherCAT bridge AX5x01 to AX5112, length 0.17 m
ZK1090-9191-0002	EtherCAT bridge AX5118 to AX5140, length 0.26 m
ZK1090-9191-0xxx	EtherCAT patch cable, 0xxx = length in decimetres (-0020 = 2 m)

Not assembled motor cables for higher performance, for AX5000 (from 25 A)

Ordering information	Motor cable, flexible, drag-chain suitable with 5 million bending cycles, for Servo Drives AX5000 from 25 A
ZK4509-0016-0zzz	6 mm ² , for AX5125, (4 x 6 mm ² + (2 x 1 mm ² + 2 x 1.5 mm ²)) ⁽¹⁾
ZK4509-0017-0zzz	10 mm ² , for AX5140, (4 x 10 mm ² + (2 x 1 mm ² + 2 x 1.5 mm ²)) ⁽¹⁾
ZK4509-0018-0zzz	16 mm ² , for AX5160, (4 x 16 mm ² + 2 x (2 x 1.5 mm ²)) ⁽¹⁾
ZK4509-0019-0zzz	25 mm ² , for AX5172, (4 x 25 mm ² + 2 x (2 x 1.5 mm ²)) ⁽¹⁾
ZK4509-0019-1zzz	35 mm ² , for AX5190, (4 x 35 mm ² + 2 x (2 x 1.5 mm ²)) ⁽¹⁾
ZK4509-0019-2zzz	50 mm ² , for AX5191, (4 x 50 mm ² + 2 x (2 x 2.5 mm ²)) ⁽¹⁾

zzz = ordering indication of the length of material in decimetres, e.g. ZK4509-0016-0100 = 10 metres, ⁽¹⁾ not suitable for OCT

EMC accessories | Shroud for AX5000 (from 60 A)

Ordering information	Shroud for connecting cable screens
AX2090-SB50-0001	shroud for AX5160/AX5172
AX2090-SB50-0002	shroud for AX5190/AX5191
AX2090-SB50-0003	shroud for AX5192/AX5193

Power supply | Mains filters for AX5000 (from 1.5 A)

Ordering information	AX2090-NF50-0xxx Mains filters
AX2090-NF50-0014	mains filter C2 up to AX5112 Servo Drives, 46.4 x 231 x 70 mm (W x H x D), 0.9 kg
AX2090-NF50-0032	mains filter C2 up to AX5125 Servo Drives, 58 x 265 x 90 mm (W x H x D), 1.75 kg
AX2090-NF50-0063	mains filter C3 for AX5160* Servo Drives up to 63 A, 62 x 305 x 180 mm (W x H x D), 5 kg
AX2090-NF50-0100	mains filter C3 for AX5172*/AX5190 Servo Drives up to 100 A, 75 x 336 x 200 mm (W x H x D), 6 kg
AX2090-NF50-0150	mains filter C3 for AX5191/AX5192 Servo Drives up to 150 A, 90 x 380 x 220 mm (W x H x D), 6.8 kg
AX2090-NF50-0180	mains filter C3 for AX5193 Servo Drives up to 180 A, 200 x 410 x 120 mm (W x H x D), 7 kg

*AX5160, AX5172: mains filter already integrated. Additional mains filter for C3 only necessary if the cable lengths exceed 25 m.

Power supply | Mains chokes for AX5000 (from 60 A)

Ordering information	AX2090-ND50-0xxx Mains chokes
AX2090-ND50-0060	mains choke for AX5160 Servo Drive, 60 A, 0.25 mH, U _k 2 %, 190 x 200 x 120 mm (W x H x D), 7 kg
AX2090-ND50-0072	mains choke for AX5172 Servo Drive, 72 A, 0.20 mH, U _k 2 %, 190 x 240 x 110 mm (W x H x D), 10 kg
AX2090-ND50-0090	mains choke for AX5190 Servo Drive, 90 A, 0.16 mH, U _k 2 %, 230 x 300 x 160 mm (W x H x D), 13 kg
AX2090-ND50-0110	mains choke for AX5191 Servo Drive, 110 A, 0.13 mH, U _k 2 %, 230 x 300 x 180 mm (W x H x D), 15 kg
AX2090-ND50-0143	mains choke for AX5192 Servo Drive, 143 A, 0.10 mH, U _k 2 %, 240 x 330 x 200 mm (W x H x D), 25 kg
AX2090-ND50-0170	mains choke for AX5193 Servo Drive, 170 A, 0.09 mH, U _k 2 %, 240 x 330 x 200 mm (W x H x D), 25 kg

Power supply | Transient voltage suppressor for AX5000 (1.5...25 A)

Ordering information	Transient voltage suppressor for AX5000 Servo Drives
AX2090-TS50-3000	transient voltage suppressor for AX5000, required if CSA certification necessary

Braking energy management

Ordering information	Components for brake energy management for AX5000
AX5021-0000-0000	brake module unit with internal braking resistor (250 W) and option for connecting an external braking resistor up to 6 kW as well as an additional DC-Link expansion capacity for storing brake energy efficiently
AX2090-BW50-0300	external braking resistor for AX5x01 to AX5112 (stand-alone), 0.3 kW/47 Ω, 92 x 120 x 349 mm (W x H x D), 2 kg ⁽¹⁾
AX2090-BW50-0600	external braking resistor for AX5x01 to AX5112 (stand-alone), 0.6 kW/47 Ω, 92 x 120 x 549 mm (W x H x D), 3 kg ⁽¹⁾
AX2090-BW50-1600	external braking resistor for AX5x01 to AX5112 (stand-alone), 1.6 kW/47 Ω, 185 x 120 x 649 mm (W x H x D), 5.8 kg ⁽¹⁾
AX2090-BW51-1000	external braking resistor for AX5118 to AX5140 (stand-alone) and in combination with AX5021 braking unit, 1 kW/23 Ω, 92 x 120 x 749 mm (W x H x D), 4 kg ⁽²⁾
AX2090-BW51-3000	external braking resistor for AX5118 to AX5140 (stand-alone) and in combination with AX5021 braking unit, 3 kW/23.4 Ω, 355 x 255 x 490 mm (W x H x D), 8 kg ⁽²⁾
AX2090-BW51-6000	external braking resistor for AX5118 to AX5140 (stand-alone) and in combination with AX5021 braking unit, 6 kW/23.2 Ω, 455 x 255 x 490 mm (W x H x D), 12 kg ⁽²⁾
AX2090-BW52-3000	external braking resistor for AX5160 and AX5172 (stand-alone), 3 kW/13.2 Ω, 355 x 260 x 490 mm (W x H x D), 9.5 kg ⁽³⁾
AX2090-BW52-6000	external braking resistor for AX5160 and AX5172 (stand-alone), 6 kW/13 Ω, 455 x 260 x 490 mm (W x H x D), 13 kg ⁽³⁾
AX2090-BW53-3000	external braking resistor for AX5190 and AX5191 (stand-alone), 3 kW/10.2 Ω, 355 x 255 x 490 mm (W x H x D), 9.5 kg ⁽⁴⁾
AX2090-BW53-6000	external braking resistor for AX5190 and AX5191 (stand-alone), 6 kW/10 Ω, 455 x 260 x 490 mm (W x H x D), 13 kg ⁽⁴⁾
AX2090-BW54-3000	external braking resistor for AX5192 and AX5193 (stand-alone), 3 kW/6.6 Ω, 355 x 255 x 490 mm (W x H x D), 9.5 kg ⁽⁴⁾
AX2090-BW54-6000	external braking resistor for AX5192 and AX5193 (stand-alone), 6 kW/6.5 Ω, 455 x 260 x 490 mm (W x H x D), 13 kg ⁽⁴⁾
AX2090-BW65-0418	external braking resistor IP 65 for AX5160 to AX5172/AX8640, 0.4 kW, 18 Ω, 5 m connection cable
AX2090-BW65-0423	external braking resistor IP 65 for AX5118 to AX5140, 0.4 kW, 23 Ω, 5 m connection cable
AX2090-BW65-0433	external braking resistor IP 65 for AX5112/AX8620/AMP8620, 0.4 kW, 33 Ω, 5 m connection cable
AX2090-BW65-0447	external braking resistor IP 65 for AX5101 to AX5112 and AX520x, 0.4 kW, 47 Ω, 5 m connection cable
AX2090-BW65-1518	external braking resistor IP 65 for AX5160 and AX5172/AX8640, 1.5 kW, 18 Ω, 5 m connection cable
AX2090-BW65-1523	external braking resistor IP 65 for AX5118 to AX5140, 1.5 kW, 23 Ω, 5 m connection cable
AX2090-BW65-1533	external braking resistor IP 65 for AX5112/AX8620/AMP8620, 1.5 kW, 33 Ω, 5 m connection cable
AX2090-BW65-1547	external braking resistor IP 65 for AX5101 to AX5112 and AX520x, 1.5 kW, 47 Ω, 5 m connection cable

Recommended interface cables: ⁽¹⁾ ZK4000-2101-2xxx (1.5 mm²), ⁽²⁾ ZK4000-2102-2xxx (2.5 mm²), ⁽³⁾ ZK4509-8025-xxxx (4 mm²), ⁽⁴⁾ ZK4000-2104-2xxx (6 mm²)

AX5000 motor chokes

Ordering information	AX2090-MD50-00xx Motor chokes
AX2090-MD50-0012	motor choke for AX5000 (1.5...12 A) up to 12 A rated current, necessary for motor cable ≥ 25 m with a max. cable length of 100 m, with integrated supply cable (150 mm)
AX2090-MD50-0025	motor choke for AX5000 (18...25 A) up to 25 A rated current, necessary for motor cable ≥ 25 m with a max. cable length of 50 m, with integrated supply cable (150 mm)

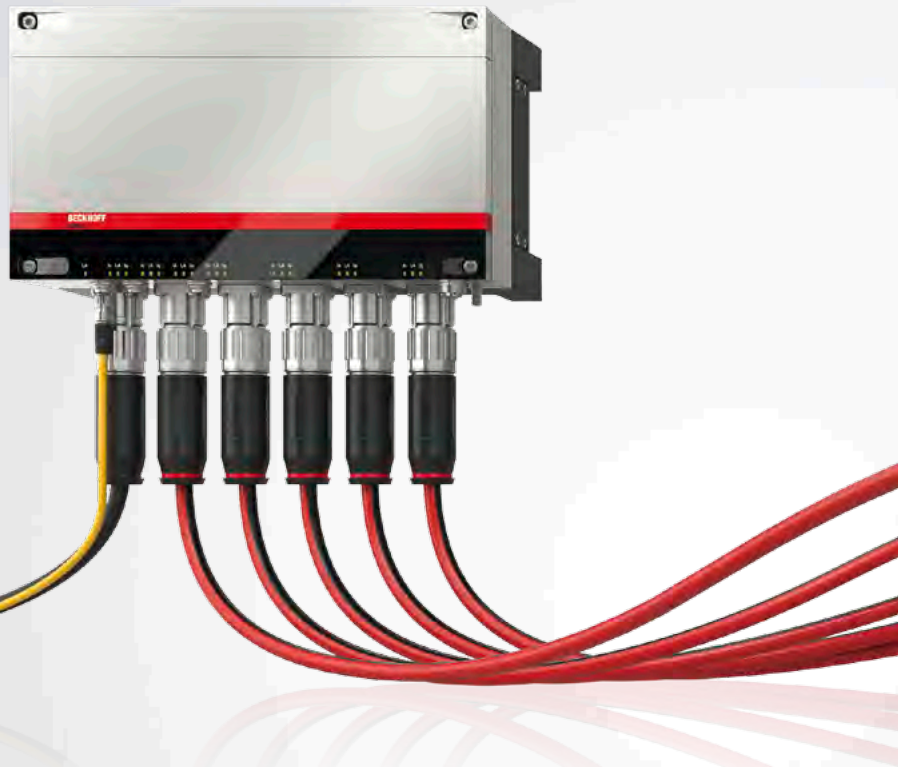
Distributed Servo Drive system

► www.beckhoff.com/AMP8000

AMP8620 | **Power supply module for AMP8000**

- concept without control cabinets
- minimised machine footprint
- integrated safe 24 V power supply unit
- energy efficiency through energy exchange via intermediate circuit
- high IP 65 protection rating for use at the machine

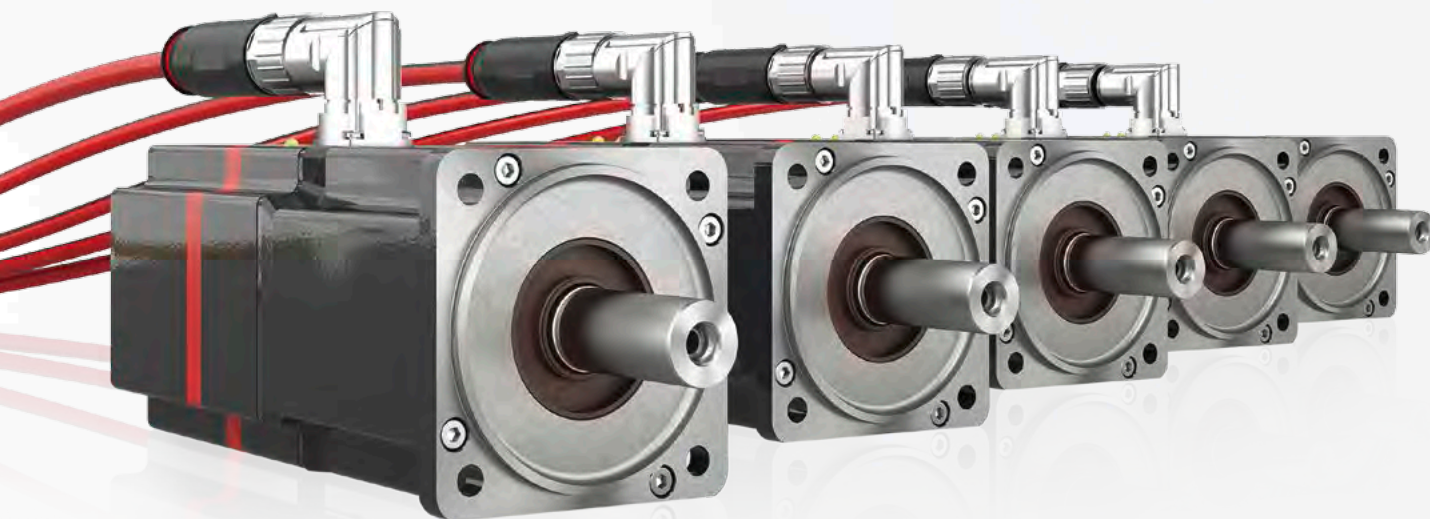
See page **391**



AMP80xx | **Distributed Servo Drive**

- permanent magnet-excited three-phase synchronous motor with integrated servo drive
- safe single-turn and multi-turn encoder
- 2.01 to 9.70 Nm standstill torque
- integrated TwinSAFE Logic

See page **386**



AMP8000 | Distributed Servo Drive system

► www.beckhoff.com/AMP8000

EtherCAT[®] P

High-efficiency power output stage

Rotatable connector

Same attachment dimensions as the standard AM8000 and AM8500 motor series

Status LEDs

Permanent-magnet holding brake with zero backlash

Safety single-turn and multi-turn encoder

Modular design concept for maximum flexibility

Powder-coating
– scratch-proof
– long-lasting

High-quality radial bearings
– service life: 30,000 hrs
– maximum radial and axial load capacity



AX8831



AMP8620



AMP8805



AMP8000



Distributed Servo Drives for modular machines

The AMP8000 distributed Servo Drive system opens up new possibilities for modular machine concepts, because it integrates the drive directly into the motor in a very compact design. By relocating the power electronics to the machine, the control cabinet needs to house only a single coupling module that supplies multiple distributed Servo Drives with a single cable via a distribution module. In another expansion stage, the control cabinet space required for drive technology is completely eliminated. While previously the space requirements in the control cabinet for connecting the drives with the coupling modules was reduced to just one cable, it is now completely eliminated when the AMP8620 power supply module is used. This produces significant savings in terms of material, space, cost, and installation effort.

More compact motors, fewer cables

The one cable solution EtherCAT P can be used for consistently cabling entire distributed Servo Drive systems. EtherCAT P combines communication and power supply in one cable. Instead of having to use multiple connection cables between a control cabinet and a machine, a single cable to the AMP8805 distribution module is all it takes,

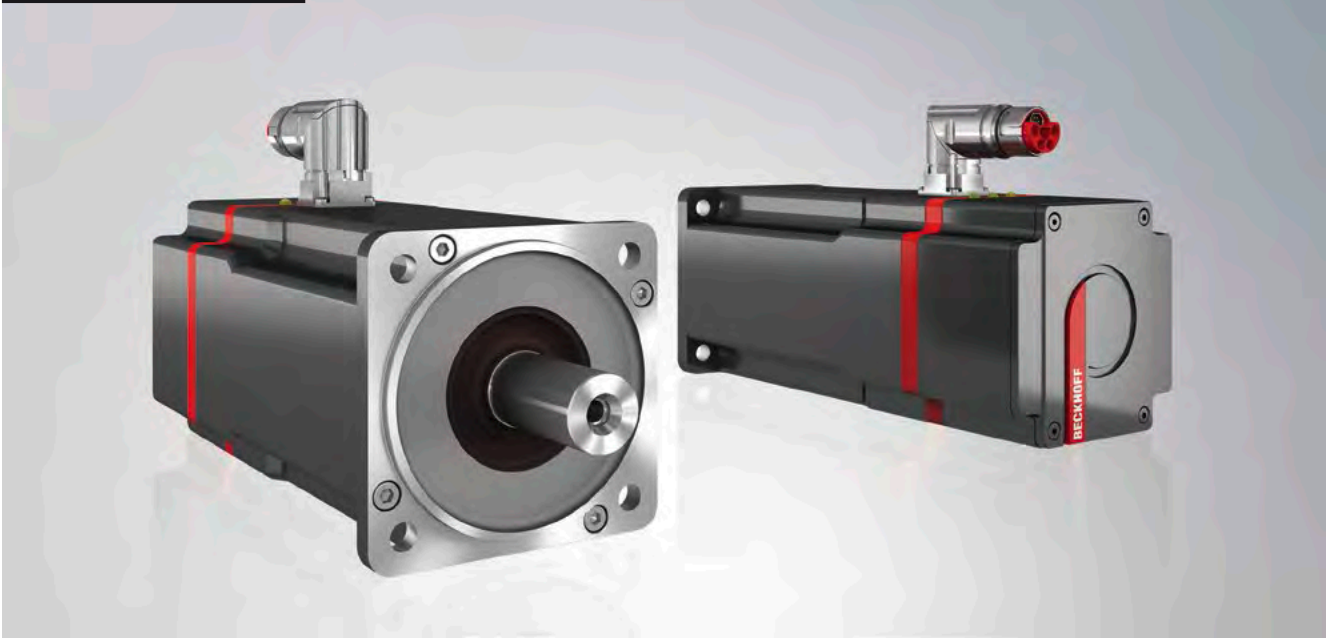
because each of the AMP8805 distribution Servo Drives is in turn connected to the distribution module with just a short cable. Since the entire system can be cascaded, even complex machines or lines can be implemented in simple topologies. The one cable solution EtherCAT P simplifies the logistics in installation considerably and minimises wiring errors. The cable routes to the motor can be laid out much more clearly, and space requirements in the control cabinet are reduced to a minimum.

Safe drive technology with TwinSAFE

TwinSAFE is a universal safety concept that seamlessly integrates safety functionalities – from the PLC to I/Os through to the drive technology – into the standard control platform. All safety functions such as emergency stop, safety door monitoring, two-hand operation, safety mat monitoring, and muting, safe position, safely limited speed, a.o., can be programmed and/or configured with the universal TwinCAT engineering platform. The distributed AMP8000 Servo Drives support drive-integrated STO/SS1 safety functions with TwinSAFE as per IEC 61800-2 by default. The system will soon be available with TwinSAFE Safe Motion as well, so that more complex and more limiting safety functions can be implemented.

Highlights

- reduced space requirements in control cabinets through direct integration of the servo drive in the motor
- modularity and flexibility through coupling and distribution modules
- complete elimination of the control cabinet through AMP8620 power supply module
- Existing machine designs can remain unchanged: flange and shaft are mechanically compatible with the AM8000.
- no reduction in motor performance because of highly efficient and thermally insulated power electronics
- cost-effectiveness through one cable solution: only one cable type needed in the entire drive system
- reduced cabling effort and minimised cable lengths through AMP8805 distribution module
- Efficient through DC-Link group: regenerative energy can be used by other drives.
- STO/SS1 safety functions as standard; extensive Safe Motion functions as an option



AMP80xx | Distributed Servo Drive

The AMP8000 can be installed in place of a standard AM8000 or AM8500 servomotor. There is no need to modify existing machine design, since only the overall length has been changed, i.e. the other dimensions remain unchanged. Through the use of

the latest output stage technologies, there is minimal derating, i.e. the performance data is almost on a par with the comparable standard motor type.

The AMP8000 is available with flange sizes F4

(2.01...4.80 Nm) and F5 (4.08...9.70 Nm). It can be equipped with either multi-turn or single-turn encoders. TwinSAFE (STO/SS1) is integrated as standard; Safe Motion will be available as an option.

Technical data	AMP80xx
Motor type	permanent magnet-excited three-phase synchronous motor with integrated servo drive
Magnet material	neodymium-iron-boron
Insulation class	thermal class F (155 °C)
Design form	flange-mounted according to IM B5, IM V1, IM V3
Protection class	IP 54, IP 65 (shaft seal)
Cooling	convection, permissible ambient temperature 40 °C
Coating/surface	dark grey powder coating, similar to RAL7016
Temperature sensor	integrated in stator winding
Connection method	round plug connector, swivelling, angled
Approvals/markings	CE, EAC, UL in preparation
Feedback system	absolute encoder single-turn and multi-turn (OCT)

Options	AMP80xx
Feather key groove	according to DIN 6885 P1
Holding brake backlash-free	permanent magnet single-surface brake, suitable only as holding brake
Shaft seal	radial shaft seal made of FPM
Feedback system option	safe absolute encoder single- and multi-turn
TwinSAFE	integrated TwinSAFE Logic, STO, SS1, SS2, SOS, SLS, SDIp, SDIn,
safe drive technology	SSM, SSR, SMS, SLP, SCA, SLI, SAR, SMA (in preparation)

Ordering options

You will find the possible ordering options for the distributed Servo Drives listed in this table. Please note: The options cannot be retrofitted. All electrical variables are RMS values.

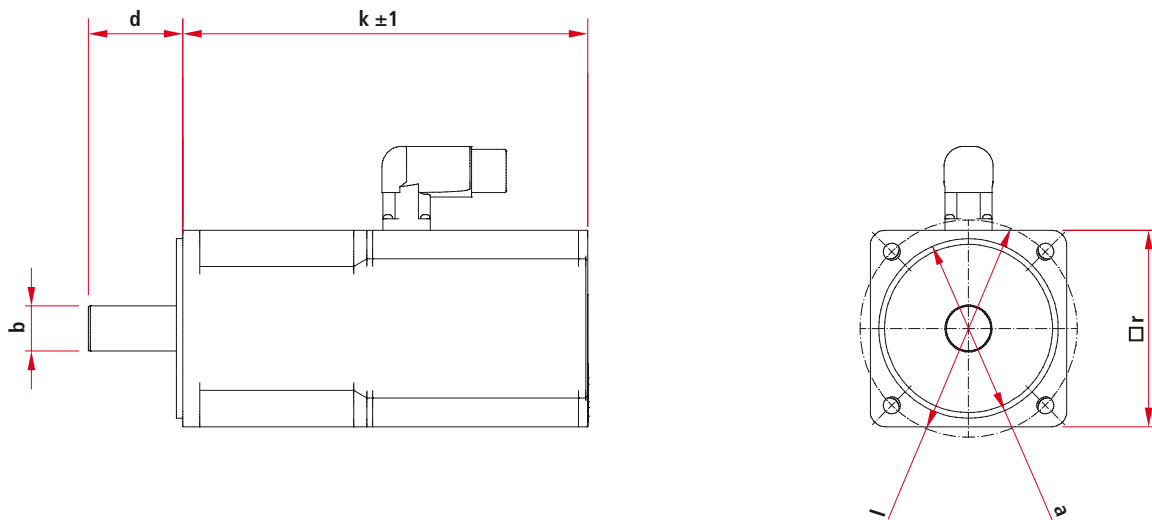
Order reference	AMP80uv-wxyz
u	flange code F
v	motor length
w	winding code A...Z
x = 0	smooth shaft
x = 1	shaft with groove and feather key according to DIN 6885
x = 2	shaft with IP 65 sealing ring and smooth shaft
x = 3	shaft with IP 65 sealing ring and shaft with groove and feather key
x = 4	shaft with IP 65 sealing ring, smooth shaft and sealing air connection
x = 5	shaft with IP 65 sealing ring, shaft with groove and feather key and sealing air connection
y = 1	absolute encoder single-turn, absolute position within one revolution, 24 bit resolution, STO, SS1
y = 2	absolute encoder multi-turn, absolute position within 4096 revolutions, 24 bit resolution, STO, SS1
y = 3	absolute encoder single-turn, absolute position within one revolution, 24 bit resolution, Safe Motion
y = 4	absolute encoder multi-turn, absolute position within 4096 revolutions, 24 bit resolution, Safe Motion
z = 0	without holding brake
z = 1	with holding brake
Information	AMP804x = F4, ECP B23 plug AMP805x = F5, ECP B23 plug

AMP804x | Flange code F4, motor length 1 – 3

Data for 560 V DC	AMP8041-Dxyz	AMP8041-Exyz	AMP8042-Exyz	AMP8043-Exyz
Standstill torque	2.25 Nm	2.40 Nm	3.90 Nm	5.35 Nm
Rated speed	3000 min ⁻¹	6000 min ⁻¹	2500 min ⁻¹	2500 min ⁻¹
Rated power	0.69 kW	1.44 kW	0.97 kW	1.31 kW
Standstill current	1.60 A	3.00 A	2.05 A	2.75 A
Connection technology	ECP B23 plug			
One Cable Automation (OCA)	yes			

AMP805x | Flange code F5, motor length 1 – 3

Data for 560 V DC	AMP8051-Exyz	AMP8051-Gxyz	AMP8052-Fxyz	AMP8053-Gxyz
Standstill torque	4.55 Nm	4.60 Nm	7.80 Nm	10.75 Nm
Rated speed	2500 min ⁻¹	5000 min ⁻¹	2000 min ⁻¹	2000 min ⁻¹
Rated power	1.14 kW	2.17 kW	1.49 kW	1.98 kW
Standstill current	2.60 A	4.50 A	3.15 A	4.45 A
Connection technology	ECP B23 plug			
One Cable Automation (OCA)	yes			



Dimensions	a	b	d	l	r	k (without brake)	k (with brake)
AMP8041	80 j6	19 k6	40 mm	100 mm	87 mm	208.5 mm	256 mm
AMP8042	80 j6	19 k6	40 mm	100 mm	87 mm	238.5 mm	286 mm
AMP8043	80 j6	19 k6	40 mm	100 mm	87 mm	268.5 mm	316 mm
AMP8051	95 j6	24 k6	50 mm	115 mm	104 mm	209 mm	256 mm
AMP8052	95 j6	24 k6	50 mm	115 mm	104 mm	242 mm	289 mm
AMP8053	95 j6	24 k6	50 mm	115 mm	104 mm	275 mm	324 mm

► www.beckhoff.com/AMP8000

Accessories

Ordering information	Motor cable with 2.5 mm ² wire gauge, flexible for drag-chain use
i ZK7A26-3031-0xxx	EtherCAT P cable, ECP, PUR, drag-chain suitable, B23, plug, straight, female+female, pins 5+4, P-coded – B23, plug, straight, male+male, pins 5+4, P-coded

Ordering information	Components for brake energy management for AMP8000
AX2090-BW65-0418	external braking resistor IP 65 for AX5160 to AX5172/AX8640, 0.4 kW, 18 Ω, 5 m connection cable
AX2090-BW65-0433	external braking resistor IP 65 for AX5112/AX8620/AMP8620, 0.4 kW, 33 Ω, 5 m connection cable
AX2090-BW65-1518	external braking resistor IP 65 for AX5160 and AX5172/AX8640, 1.5 kW, 18 Ω, 5 m connection cable
AX2090-BW65-1533	external braking resistor IP 65 for AX5112/AX8620/AMP8620, 1.5 kW, 33 Ω, 5 m connection cable

Ordering information	Components for marking the cables for AMP8000
ZS7300-B005	B23 colour coding connector/square flange, red, packaging unit = 10 pieces
ZS7300-B006	B23 colour coding connector/square flange, yellow, packaging unit = 10 pieces
ZS7300-B007	B23 colour coding connector/square flange, blue, packaging unit = 10 pieces
ZS7300-B008	B23 colour coding connector/square flange, green, packaging unit = 10 pieces
ZS7300-B015	B23 colour coding connector/square flange, orange, packaging unit = 10 pieces
ZS7300-B016	B23 colour coding connector/square flange, grey, packaging unit = 10 pieces

i For availability status see Beckhoff website at: www.beckhoff.com/AMP8000



AMP8620 | Power supply module for AMP8000

The AMP8620 module is directly connected to the mains supply, which minimises the footprint and the cabling effort for the entire machine. It contains all required circuitry components, such as mains filters, rectifiers and charging circuits for the integrated DC-Link capacitors.

Further distribution modules or decentralised AMP8000 Servo Drives can optionally be connected to the power supply module. It has two EtherCAT P outputs, through which either EtherCAT P modules can be supplied or else additional power supply modules can

be connected that may be required for system expansion. The safe 24 V power supply unit integrated in the power supply module ensures that the logic power supply does not exceed the permissible level. The DC-Link capacitors integrated in the power supply module store

the regenerative energy of the entire system and then make it available again for acceleration processes. This ensures the best-possible utilisation of the energy supplied.

Technical data	i AMP8620-2005-0000
Function	power supply module
EtherCAT P inputs	1
Motor outputs	5
EtherCAT P outputs	2
Rated supply voltage	3 x 400...480 V AC
Rated input current	3~: 17.5 A AC
DC-Link voltage	565...680 V DC
DC-Link capacitance	940 µF
Protection class	IP 65
Further information	www.beckhoff.com/AMP8620
Ordering information	Field assembly connector for mains input on AMP8620
ZS7300-0006	B23, plug, metal, shielded, crimp, straight, female, 5-pin, power-coded, IP 65/67

i For availability status see Beckhoff website at: www.beckhoff.com/AMP8620



AMP8805 | Distribution module for AMP8000

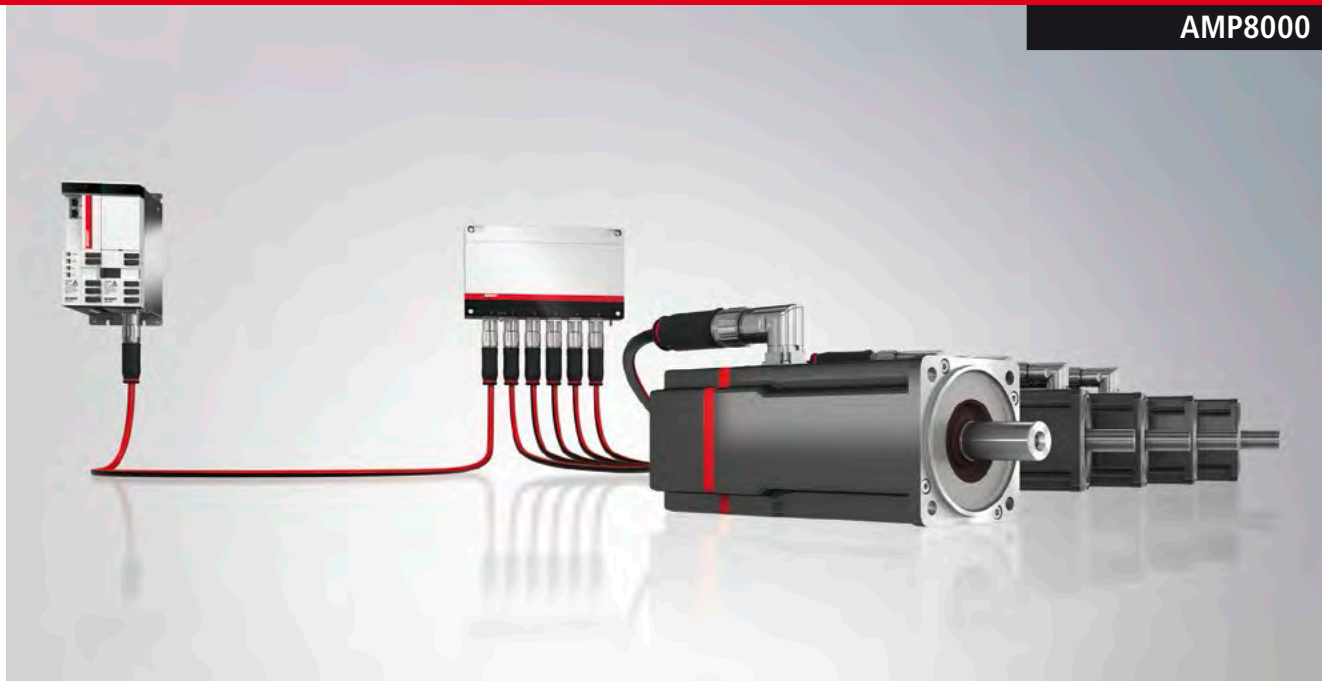
Via the AMP8805 distribution module, the AMP8000 system can be cascaded using just one short cable in such a way that even complex machines and lines can be implemented in simple topologies. Up to five outputs are available to connect further distributed Servo Drives

or distribution modules. Because of their high protection rating, the AMP8805 distribution modules can be directly integrated into the machine layout. This reduces the overall cable lengths and wiring effort considerably, because only a single cable needs to be routed from the

control cabinet to the machine. To store energy efficiently, the coupling modules are equipped with capacitors. Additional EtherCAT P Box modules can be installed easily and quickly via the integrated EtherCAT P output in order to integrate further I/Os or data acquisition applications.

Technical data	i AMP8805-1000-0000
Function	distribution module
Motor outputs	5
EtherCAT P outputs	1
Rated input current 24 V	16 A DC
DC-Link input current	20 A DC
DC-Link voltage	565...680 V DC
DC-Link capacitance	940 µF
DC-Link output current	∑ max. 20 A DC
Protection class	IP 65
Further information	www.beckhoff.com/AMP8805

i For availability status see Beckhoff website at: www.beckhoff.com/AMP8805





AX883x | Coupling modules for AMP8000

For connecting AMP8000 distributed Servo Drives to the PC-based control technology, and more specifically to the EtherCAT-based Servo Drive systems there are two coupling modules available

in single-channel and dual-channel versions. The coupling modules provide a connection for the DC-Link intermediate circuit, 24 V DC power supply and EtherCAT communication. By means of the 1- or 2-channel

coupling modules and the AMP8805 distribution module, the implementation of simple as well as complex distributed drive solutions is easy and straightforward.

Technical data	 AX8831-0000-0000	 AX8832-0000-0000
Function	coupling module	
Number of channels	1	2
Rated supply voltage	3 x 100...480 V AC $\pm 10\%$	
DC-Link output current	20 A DC	2 x 20 A DC
DC-Link voltage	max. 875 V DC	
Rated output current 24 V	10 A DC	2 x 10 A DC
EtherCAT connection	integrated via AX-Bridge	
System bus	EtherCAT	
Drive profile	CiA402 according to IEC 61800-7-201 (CoE)	
Protection class	IP 20	
Further information	www.beckhoff.com/AX8831	www.beckhoff.com/AX8832

 For availability status see Beckhoff website at: www.beckhoff.com

Synchronous Servomotors

► www.beckhoff.com/Servomotors



Servomotors

- AM8000 for applications with highest demands on dynamics and performance, One Cable Technology (OCT) for power and feedback
- AM8500 with increased internal inertia ratio, One Cable Technology (OCT) for power and feedback

For dynamic applications in the lower power range Beckhoff offers the compact Drive Technology series.

See page [396](#),
compact Drive Technology see page [454](#)



Servomotors with forced cooling

- higher performance AM8000 and AM8500 motor series due to additional forced cooling
- independent 24 V DC fan
- standstill torques increased by about 30 %
- rated torque at rated speed increased by up to 150 %

See page [396](#)



Special housings

- AM8700 with anodized housing for harsh operating conditions, One Cable Technology (OCT), IP 69K
- AM8800: stainless steel servomotors for use in the food, chemical and pharmaceutical industries, One Cable Technology (OCT) for power and feedback
- AG2800: stainless steel gear unit turns the AM8800 into a perfectly matched hygienic design servo axis by dead-space-free design, smooth surfaces and high resistance to corrosion

See page **424**



Planetary gear units

- AG2300: high-end planetary gear units with output shaft
- AG2400: high-end planetary gear units with output flange
- AG3210, AG3300: Economy planetary gear units with output shaft
- AG3400: Economy planetary gear units with output flange

See page **418**

AMxxxx | Synchronous Servomotors

► www.beckhoff.com/Servomotors

One Cable Technology (OCT)
for power and feedback with
absolute encoder

Backlash-free
permanent magnet
holding brake

Rotatable
speedtec® plug

– modular design
– greatest possible
variability

– salient-pole
winding technology
– fully-encapsulated
stator

Temperature
sensor LPTC

Powder-coated
– scratch-proof
– durable
– high quality

Single- and
multi-turn encoder,
resolver

– low cogging
– high performance
– high power density
– high overload capacity

High-quality radial bearing
– service life 30,000 hrs
– maximum axial and
radial loadability



AM80xx high-performance type



AM85xx



AM87xx



AM88xx

AM8000 – Dynamic power packages made in Germany

The AM8000 servomotors are durable and powerful synchronous servomotors in seven sizes, each with up to four overall lengths and provide seamless coverage for all areas of application from 0.2 up to 129 Nm. The high-performance servomotor series is characterised by an exceptional power density. Small end turns and the fully potted stator enable an optimised thermal transition from winding to motor housing.

As a result of low rotor moment of inertia coupled with an overload capability of up to 5 times, the AM8000 series is highly dynamic. The motors can be optionally equipped with OCT (One Cable Technology) or resolver (2-cable standard). With OCT, no encoder cable is required, since the feedback signals are digitally transmitted over the existing standard motor cable. Thus, the wiring costs can be reduced by up to 50 %.

Typical for all seven sizes of this motor series is the modular design. Therefore, mechanical adjustments to suit customer requirements can be made quickly and easily. With a guaranteed service life of 30,000 h for wearing parts such as ball bearings, this motor series offers high durability and robustness. Matching accessories such as gears and pre-assembled motor and encoder cables are available.

AM8500 – Synchronous servomotors with increased rotor moment of inertia

The AM8500 series extends the servomotor range by a complete series with increased rotor moment of inertia. This series covers a wide performance range with four sizes and three lengths with standstill torques ranging from 1.37 to 41 Nm. Due to the high rotor moment of inertia, the control of AM8500 servomotors is simplified in applications where a high external inertia has to be moved, because these motor types tend to vibrate less and are much easier to adjust via the servo controller.

AM8000/AM8500 – Forced Cooling

High torques even at high speeds: This is the benefit of the AM8000 and AM8500 motor series with additional forced cooling for increased performance. Equipped with a fan for axial ventilation, the standstill torques of these servomotors can be increased by about 35 %, and the rated torques at the rated speed by even up to 150 %. The external 24 V DC fan can be actuated independently of the motor.

AM8700 – Servomotors with anodized housing

The AM8700 series combines the advantages of the AM8000 standard servomotors with the requirements of the packaging

and food industries. The aluminium housing is very light and therefore offers a further benefit, e.g. when moving axes. The AM8700 motors have IP 69K protection (not including the output shaft) as standard and can be equipped with a sealing air connection to prevent condensate formation. The OCT direct cable outlet is also implemented in hygienic design. All lubricants used are FDA-certified as food-safe.

AM8800 – Attractive hygienic design

The AM8800 stainless steel motor range is based on the AM8000 range and especially designed for use in the food, chemical and pharmaceutical industries. The AM8800 motors meet hygienic design requirements and the materials used with the FDA guidelines. The motors are made from AISI 316L stainless steel, making them resistant to aggressive cleaning materials. All AM8800 motors comply with protection class IP 69K and are provided with a hygienic design cable gland. Four sizes, each with three different lengths, are available. The AM8800 range supports the One Cable Technology (OCT) as standard. The available options include a resolver, a sealing-air connection, or an AG2280 stainless steel gear unit for the implementation of a perfectly matched and standards-compliant servo axis in hygienic design.



AM8000 | Synchronous Servomotors

The AM8000 series represents robust, durable and high-performance synchronous servomotors "Made in Germany". The seven flange codes, with up to four overall lengths, cover a wide torque range from 0.2 up to 129 Nm.

The AM8000 motors feature a low rotor moment of inertia and a very high overload capacity. Based on these technical characteristics, the most highly dynamic applications can be realised.

The windings of the AM8000 motors are implemented using salient pole-wound technology, resulting in a high copper space

factor. Due to the high slot space factor, high continuous torques can be achieved. The fully potted stator provides for an ideal thermal transition from winding to housing. Another advantage is mechanical protection of the winding wires against vibrations.

Amplly sized, sealed grooved ball bearings in conjunction with a sophisticated mechanical design ensure a bearing service life of 30,000 hours. All motors feature an integrated temperature sensor for exact temperature evaluation.

In the forced-cooling version, the power density of the AM8000 motor series can be

further increased by means of external axial ventilation. This option is available for the AM806x to AM807x sizes.

The modular design of the AM8000 motors enables rapid implementation of mechanical adjustments. Customer-specific variants are available. The motors offer an electronic identification plate for simple commissioning.

The housing is fully powder-coated so that cutting edges are covered. The acrylic powder coating also offers high resistance against scratching and corrosion. In the basic version, AM8000 motors feature IP 54 protected

housings. For harsh environmental conditions, the shaft feedthrough can optionally be equipped with an FPM sealing ring (fluoropolymer rubber), so that the whole motor is IP 65 protected.

Planetary gear units
see page [418](#)

Pre-assembled cables
see page [379](#)

Technical data	AM80xx
Motor type	permanent magnet-excited three-phase synchronous motor
Magnet material	neodymium-iron-boron
Insulation class	thermal class F (155 °C)
Design form	flange-mounted according to IM B5, IM V1, IM V3
Protection class	IP 54, IP 65 (shaft seal)
Cooling	convection, permissible ambient temperature 40 °C, optionally: external axial ventilation
Coating/surface	dark grey powder coating, similar to RAL7016
Temperature sensor	integrated in stator winding
Connection method	round plug connector, swivelling, angled; terminal box according to winding type
Life span	$L_{10h} = 30,000$ hrs for ball bearings
Approvals/markings	CE, UL/CuL
Feedback system	absolute encoder single-turn and multi-turn, OCT, resolver, multi-turn 2-cable standard

Ordering options

You will find the possible ordering options for the listed motors in this table. The options cannot be retrofitted. All specified electrical values are RMS values. The specifications for the connection technology (size of the connector) apply to motors with OCT. For motors with standard 2-cable configuration, "connection technology" refers to the size of the power connector. The size of the feedback connector for a standard 2-cable configuration is different, as follows: flange sizes F1...F3 = ytec® plug, F4...F7 = M23 speedtec® plug.

Order reference	AM80uv-wxyz	Pict.
u	flange code F	
v	motor length	
w = 0	smooth shaft	
w = 1	shaft with groove and feather key according to DIN 6885	
w = 2	smooth shaft with IP 65 sealing ring (not for AM801x)	
w = 3	shaft with IP 65 sealing ring and with groove and feather key	
w = 4	shaft with IP 65 sealing ring, smooth shaft and sealing air connection (not for AM801x)	
w = 5	shaft with IP 65 sealing ring, shaft with groove and feather key and sealing air connection (not for AM801x)	
x	winding code A...Z	
y = 0	2-cable standard: feedback resolver	
y = 1	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, single-turn, absolute position within one revolution, 18 bit resolution	
y = 2	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, multi-turn, absolute position within 4096 revolutions, 18 bit resolution	
y = 4	2-cable standard: feedback multi-turn, absolute encoder SKM36, 128 SinCos periods (only for AM806x, AM807x)	
y = G	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, single-turn, absolute position within one revolution, resolution 24 bit, SIL 2 (only in combination with AX8xxx-0200)	
y = H	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, multi-turn, absolute position within 4096 revolutions, resolution 24 bit, SIL 2 (only in combination with AX8xxx-0200)	
y = N	without feedback (sensorless)	
z = 0	without holding brake	
z = 1	with permanent magnet-excited holding brake	
z = A	forced cooling, without holding brake, for AM805x, AM806x, AM807x ⁽¹⁾	A
z = B	forced cooling, with permanent magnet-excited holding brake, for AM805x, AM806x, AM807x ⁽¹⁾	A

⁽¹⁾ The EL2022 2 148 or KL2022 2 521 digital output terminal with matching ZK4054-6400-xxxx 351 supply cable is recommended for controlling the external 24 V DC ventilation.



AM801x | Flange code F1, motor length 1 – 3

Data for 230 V AC	AM8011-wByz	AM8012-wCyz	AM8013-wDyz
Standstill torque	0.20 Nm	0.38 Nm	0.52 Nm
Rated torque	0.18 Nm	0.33 Nm	0.45 Nm
Rated speed	8000 min ⁻¹		
Rated power	0.15 kW	0.28 kW	0.38 kW
Standstill current	0.76 A	1.30 A	1.65 A
Rotor moment of inertia	0.034 kgcm ²	0.053 kgcm ²	0.072 kgcm ²
Rotor moment of inertia (with brake)	0.057 kgcm ²	0.075 kgcm ²	0.094 kgcm ²
Connection technology	itec® plug		
One Cable Technology (OCT)	yes		

AM8021 | Flange code F2, motor length 1

Data for 400 V AC	AM8021-wByz	AM8021-wDyz
Standstill torque	0.50 Nm	
Rated torque	0.50 Nm	
Rated speed	8000 min ⁻¹	9000 min ⁻¹
Rated power	0.42 kW	0.47 kW
Standstill current	0.85 A	1.60 A
Rotor moment of inertia	0.139 kgcm ²	
Rotor moment of inertia (with brake)	0.208 kgcm ²	
Connection technology	itec® plug	
One Cable Technology (OCT)	yes	

AM8022 | Flange code F2, motor length 2

Data for 400 V AC	AM8022-wDyz	AM8022-wEyz
Standstill torque	0.80 Nm	
Rated torque	0.70 Nm	0.65 Nm
Rated speed	8000 min ⁻¹	9000 min ⁻¹
Rated power	0.59 kW	0.61 kW
Standstill current	1.50 A	2.44 A
Rotor moment of inertia	0.258 kgcm ²	
Rotor moment of inertia (with brake)	0.328 kgcm ²	
Connection technology	itec® plug	
One Cable Technology (OCT)	yes	

AM8023 | Flange code F2, motor length 3

Data for 400 V AC	AM8023-wEyz	AM8023-wFyz
Standstill torque	1.20 Nm	
Rated torque	1.00 Nm	0.90 Nm
Rated speed	8000 min ⁻¹	9000 min ⁻¹
Rated power	0.84 kW	0.85 kW
Standstill current	2.20 A	3.40 A
Rotor moment of inertia	0.378 kgcm ²	
Rotor moment of inertia (with brake)	0.448 kgcm ²	
Connection technology	itec® plug	
One Cable Technology (OCT)	yes	

AM8031 | Flange code F3, motor length 1

Data for 400 V AC	AM8031-wCyz	AM8031-wDyz	AM8031-wFyz
Standstill torque	1.37 Nm	1.38 Nm	1.40 Nm
Rated torque	1.34 Nm	1.33 Nm	1.30 Nm
Rated speed	3000 min ⁻¹	6000 min ⁻¹	9000 min ⁻¹
Rated power	0.42 kW	0.84 kW	1.23 kW
Standstill current	1.00 A	1.95 A	3.20 A
Rotor moment of inertia	0.467 kgcm ²		
Rotor moment of inertia (with brake)	0.546 kgcm ²		
Connection technology	itec® plug		
One Cable Technology (OCT)	yes		

AM8032 | Flange code F3, motor length 2

Data for 400 V AC	AM8032-wDyz	AM8032-wEyz	AM8032-wHyz
Standstill torque	2.38 Nm	2.37 Nm	2.37 Nm
Rated torque	2.30 Nm	2.20 Nm	1.85 Nm
Rated speed	3000 min ⁻¹	6000 min ⁻¹	9000 min ⁻¹
Rated power	0.72 kW	1.38 kW	1.74 kW
Standstill current	1.70 A	2.95 A	5.10 A
Rotor moment of inertia	0.847 kgcm ²		
Rotor moment of inertia (with brake)	0.926 kgcm ²		
Connection technology	itec® plug		
One Cable Technology (OCT)	yes		

AM8033 | Flange code F3, motor length 3

Data for 400 V AC	AM8033-wEyz	AM8033-wFyz	AM8033-wJyz
Standstill torque	3.20 Nm	3.22 Nm	3.22 Nm
Rated torque	2.98 Nm	2.70 Nm	2.30 Nm
Rated speed	3000 min ⁻¹	6000 min ⁻¹	9000 min ⁻¹
Rated power	0.94 kW	1.70 kW	2.17 kW
Standstill current	2.10 A	4.10 A	6.80 A
Rotor moment of inertia	1.23 kgcm ²		
Rotor moment of inertia (with brake)	1.46 kgcm ²		
Connection technology	itec® plug		
One Cable Technology (OCT)	yes		

AM8041 | Flange code F4, motor length 1

Data for 400 V AC	AM8041-wDyz	AM8041-wEyz	AM8041-wHyz
Standstill torque	2.37 Nm	2.45 Nm	2.40 Nm
Rated torque	2.30 Nm	2.31 Nm	2.10 Nm
Rated speed	3000 min ⁻¹	6000 min ⁻¹	8000 min ⁻¹
Rated power	0.72 kW	1.45 kW	1.76 kW
Standstill current	1.65 A	3.00 A	5.25 A
Rotor moment of inertia	1.09 kgcm ²		
Rotor moment of inertia (with brake)	1.73 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8042 | Flange code F4, motor length 2

Data for 400 V AC	AM8042-wEyz	AM8042-wFyz	AM8042-wJyz
Standstill torque	4.10 Nm		
Rated torque	3.90 Nm	3.70 Nm	3.10 Nm
Rated speed	2500 min ⁻¹	5000 min ⁻¹	8000 min ⁻¹
Rated power	1.02 kW	1.94 kW	2.60 kW
Standstill current	2.15 A	4.10 A	6.90 A
Rotor moment of inertia	1.98 kgcm ²		
Rotor moment of inertia (with brake)	2.63 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8043 | Flange code F4, motor length 3

Data for 400 V AC	AM8043-wEyz	AM8043-wHyz	AM8043-wKyz
Standstill torque	5.65 Nm	5.65 Nm	5.60 Nm
Rated torque	5.30 Nm	4.90 Nm	4.10 Nm
Rated speed	2500 min ⁻¹	5000 min ⁻¹	8000 min ⁻¹
Rated power	1.39 kW	2.57 kW	3.43 kW
Standstill current	2.90 A	5.40 A	9.30 A
Rotor moment of inertia	2.87 kgcm ²		
Rotor moment of inertia (with brake)	3.52 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8051 | Flange code F5, motor length 1

Data for 400 V AC	AM8051-wEyz	AM8051-wGyz	AM8051-wKyz
Standstill torque	4.80 Nm	4.90 Nm	4.90 Nm
Rated torque	4.60 Nm	4.40 Nm	3.90 Nm
Rated speed	2500 min ⁻¹	5000 min ⁻¹	8000 min ⁻¹
Rated power	1.20 kW	2.30 kW	3.27 kW
Standstill current	2.70 A	4.75 A	8.50 A
Rotor moment of inertia	2.25 kgcm ²		
Rotor moment of inertia (with brake)	2.91 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8051 | Flange code F5, motor length 1, high-performance type with additional fan

Data for 400 V AC	AM8051-wFyz	AM8051-wJyz	AM8051-wLyz
Standstill torque	6.20 Nm	6.30 Nm	6.30 Nm
Rated torque	5.8 Nm	5.5 Nm	3.6 Nm
Rated speed	2500 min ⁻¹	4750 min ⁻¹	8000 min ⁻¹
Rated power	1.52 kW	2.74 kW	3.02 kW
Standstill current	3.50 A	5.80 A	11.1 A
Rotor moment of inertia	2.24 kgcm ²		
Rotor moment of inertia (with brake)	2.90 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8052 | Flange code F5, motor length 2

Data for 400 V AC	AM8052-wFyz	AM8052-wJyz	AM8052-wLyz
Standstill torque	8.20 Nm		
Rated torque	7.50 Nm	6.90 Nm	5.40 Nm
Rated speed	2000 min ⁻¹	4000 min ⁻¹	7300 min ⁻¹
Rated power	1.57 kW	2.89 kW	4.13 kW
Standstill current	3.30 A	6.30 A	11.3 A
Rotor moment of inertia	4.09 kgcm ²		
Rotor moment of inertia (with brake)	4.75 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8052 | Flange code F5, motor length 2, high-performance type with additional fan

Data for 400 V AC	AM8052-wGyz	AM8052-wKyz	AM8052-wNyz
Standstill torque	10.7 Nm	10.7 Nm	9.6 Nm
Rated torque	9.7 Nm	9.1 Nm	5.4 Nm
Rated speed	2000 min ⁻¹	4000 min ⁻¹	6000 min ⁻¹
Rated power	2.03 kW	3.77 kW	4.08 kW
Standstill current	4.30 A	8.50 A	13.6 A
Rotor moment of inertia	4.08 kgcm ²		
Rotor moment of inertia (with brake)	4.74 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8053 | Flange code F5, motor length 3

Data for 400 V AC	AM8053-wGyz	AM8053-wKyz	AM8053-wNyz
Standstill torque	11.4 Nm		
Rated torque	10.0 Nm	8.35 Nm	4.50 Nm
Rated speed	2000 min ⁻¹	4000 min ⁻¹	7000 min ⁻¹
Rated power	2.09 kW	3.50 kW	3.30 kW
Standstill current	4.70 A	8.80 A	15.6 A
Rotor moment of inertia	5.93 kgcm ²		
Rotor moment of inertia (with brake)	7.04 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8053 | Flange code F5, motor length 3, high-performance type with additional fan

Data for 400 V AC	AM8053-wJyz	AM8053-wLyz	AM8053-wPyz
Standstill torque	15.4 Nm	15.4 Nm	13.3 Nm
Rated torque	14.9 Nm	12.9 Nm	7.1 Nm
Rated speed	2000 min ⁻¹	4000 min ⁻¹	5000 min ⁻¹
Rated power	3.12 kW	5.41 kW	3.72 kW
Standstill current	6.40 A	11.9 A	18.6 A
Rotor moment of inertia	5.92 kgcm ²		
Rotor moment of inertia (with brake)	7.04 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8054 | Flange code F5, motor length 4

Data for 400 V AC	AM8054-wJyz	AM8054-wMyz
Standstill torque	13.8 Nm	
Rated torque	10.3 Nm	7.3 Nm
Rated speed	2000 min ⁻¹	4000 min ⁻¹
Rated power	2.16 kW	3.06 kW
Standstill current	6.5 A	12.4 A
Rotor moment of inertia	7.9 kgcm ²	
Rotor moment of inertia (with brake)	9.66 kgcm ²	
Connection technology	M23 speedtec® plug	
One Cable Technology (OCT)	yes	

AM8054 | Flange code F5, motor length 4, high-performance type with additional fan

Data for 400 V AC	AM8054-wKyz	AM8054-wNyz
Standstill torque	17.2 Nm	
Rated torque	15.5 Nm	10.95 Nm
Rated speed	2000 min ⁻¹	4000 min ⁻¹
Rated power	3.24 kW	4.59 kW
Standstill current	8.1 A	15.5 A
Rotor moment of inertia	7.9 kgcm ²	
Rotor moment of inertia (with brake)	9.66 kgcm ²	
Connection technology	M23 speedtec® plug	
One Cable Technology (OCT)	yes	

AM8061 | Flange code F6, motor length 1

Data for 400 V AC	AM8061-wGyz	AM8061-wJyz	AM8061-wMyz
Standstill torque	12.8 Nm		
Rated torque	12.1 Nm	11.0 Nm	9.00 Nm
Rated speed	1500 min ⁻¹	3000 min ⁻¹	5000 min ⁻¹
Rated power	1.90 kW	3.46 kW	4.71 kW
Standstill current	4.00 A	7.80 A	13.1 A
Rotor moment of inertia	11.1 kgcm ²		
Rotor moment of inertia (with brake)	13.4 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8061 | Flange code F6, motor length 1, high-performance type with additional fan

Data for 400 V AC	AM8061-wHyz	AM8061-wLyz	AM8061-wNyz
Standstill torque	17.1 Nm	17.1 Nm	15.5 Nm
Rated torque	16.1 Nm	14.7 Nm	10.7 Nm
Rated speed	1400 min ⁻¹	3000 min ⁻¹	5000 min ⁻¹
Rated power	2.36 kW	4.60 kW	5.60 kW
Standstill current	5.20 A	10.1 A	15.8 A
Rotor moment of inertia	11.1 kgcm ²		
Rotor moment of inertia (with brake)	13.4 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8062 | Flange code F6, motor length 2

Data for 400 V AC	AM8062-wJyz	AM8062-wLyz	AM8062-wPyz
Standstill torque	21.1 Nm		
Rated torque	18.50 Nm	15.2 Nm	6.50 Nm
Rated speed	1500 min ⁻¹	3000 min ⁻¹	5000 min ⁻¹
Rated power	2.91 kW	4.78 kW	3.40 kW
Standstill current	6.20 A	12.4 A	20.3 A
Rotor moment of inertia	20.0 kgcm ²		
Rotor moment of inertia (with brake)	22.3 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8062 | Flange code F6, motor length 2, high-performance type with additional fan

Data for 400 V AC	AM8062-wKyz	AM8062-wNyz	AM8062-wRyz
Standstill torque	29.9 Nm	29.9 Nm	28.1 Nm
Rated torque	26.4 Nm	22.2 Nm	13.4 Nm
Rated speed	1400 min ⁻¹	3000 min ⁻¹	5000 min ⁻¹
Rated power	3.87 kW	7.00 kW	7.00 kW
Standstill current	8.70 A	17.4 A	28.7 A
Rotor moment of inertia	20.0 kgcm ²		
Rotor moment of inertia (with brake)	22.3 kgcm ²		
Connection technology	M23 speedtec® plug	M23 speedtec® plug	M40 speedtec® plug
One Cable Technology (OCT)	yes		

AM8063 | Flange code F6, motor length 3

Data for 400 V AC	AM8063-wKyz	AM8063-wNyz	AM8063-wRyz
Standstill torque	29.0 Nm		
Rated torque	22.3 Nm	13.2 Nm	6.10 Nm
Rated speed	1500 min ⁻¹	3000 min ⁻¹	4000 min ⁻¹
Rated power	3.50 kW	4.15 kW	2.56 kW
Standstill current	8.70 A	17.2 A	29.5 A
Rotor moment of inertia	29.0 kgcm ²		
Rotor moment of inertia (with brake)	34.9 kgcm ²		
Connection technology	M23 speedtec® plug	M23 speedtec® plug	M40 speedtec® plug
One Cable Technology (OCT)	yes		

AM8063 | Flange code F6, motor length 3, high-performance type with additional fan

Data for 400 V AC	AM8063-wLyz	AM8063-wQyz	AM8063-wTyz
Standstill torque	41.4 Nm	41.4 Nm	40.1 Nm
Rated torque	33.9 Nm	25.5 Nm	15.1 Nm
Rated speed	1400 min ⁻¹	3000 min ⁻¹	4000 min ⁻¹
Rated power	4.97 kW	8.00 kW	6.30 kW
Standstill current	11.6 A	24.0 A	39.8 A
Rotor moment of inertia	29.0 kgcm ²		
Rotor moment of inertia (with brake)	34.9 kgcm ²		
Connection technology	M23 speedtec® plug	M40 speedtec® plug	M40 speedtec® plug
One Cable Technology (OCT)	yes		

AM8064 | Flange code F6, motor length 4

Data for 400 V AC	AM8064-wLy0	AM8064-wQy0	AM8064-wTy0
Standstill torque	35.0 Nm		
Rated torque	28.0 Nm	20.9 Nm	10.0 Nm
Rated speed	1500 min ⁻¹	3000 min ⁻¹	4000 min ⁻¹
Rated power	4.4 kW	6.57 kW	4.19 kW
Standstill current	10.8 A	22.2 A	35.0 A
Rotor moment of inertia	38.6 kgcm ²		
Connection technology	M23 speedtec® plug	M40 speedtec® plug	M40 speedtec® plug
One Cable Technology (OCT)	yes		

AM8064 | Flange code F6, motor length 4, high-performance type with additional fan

Data for 400 V AC	AM8064-wNyA	AM8064-wRyA	AM8064-wTyA
Standstill torque	49.0 Nm	49.0 Nm	47.0 Nm
Rated torque	43.0 Nm	36.5 Nm	25.0 Nm
Rated speed	1500 min ⁻¹	3000 min ⁻¹	4000 min ⁻¹
Rated power	6.75 kW	11.5 kW	10.5 kW
Standstill current	15.2 A	30.8 A	47.0 A
Rotor moment of inertia	38.6 kgcm ²		
Connection technology	M23 speedtec® plug	M40 speedtec® plug	terminal box
One Cable Technology (OCT)	yes	yes	–

AM8071 | Flange code F7, motor length 1

Data for 400 V AC	AM8071-wKyz	AM8071-wNyz	AM8071-wRyz
Standstill torque	31.8 Nm	31.8 Nm	29.0 Nm
Rated torque	26.5 Nm	19.5 Nm	18.0 Nm
Rated speed	1500 min ⁻¹	3000 min ⁻¹	4000 min ⁻¹
Rated power	4.16 kW	6.13 kW	3.35 kW
Standstill current	9.60 A	17.8 A	28.2 A
Rotor moment of inertia	49.6 kgcm ²		
Rotor moment of inertia (with brake)	68.3 kgcm ²		
Connection technology	M40 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8071 | Flange code F7, motor length 1, high-performance type with additional fan

Data for 400 V AC	AM8071-wMyz	AM8071-wPyz	AM8071-wTyz
Standstill torque	42.8 Nm	42.8 Nm	41.2 Nm
Rated torque	36.2 Nm	29.2 Nm	18.1 Nm
Rated speed	1500 min ⁻¹	2900 min ⁻¹	4000 min ⁻¹
Rated power	5.70 kW	8.90 kW	7.60 kW
Standstill current	12.6 A	23.8 A	41.1 A
Rotor moment of inertia	49.6 kgcm ²		
Rotor moment of inertia (with brake)	68.3 kgcm ²		
Connection technology	M40 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8072 | Flange code F7, motor length 2

Data for 400 V AC	AM8072-wLyz	AM8072-wPyz	AM8072-wTyz
Standstill torque	54.6 Nm	54.6 Nm	50.0 Nm
Rated torque	48.9 Nm	38.2 Nm	13.0 Nm
Rated speed	1000 min ⁻¹	2000 min ⁻¹	3000 min ⁻¹
Rated power	5.12 kW	8.00 kW	4.08 kW
Standstill current	11.1 A	20.6 A	39.0 A
Rotor moment of inertia	92.2 kgcm ²		
Rotor moment of inertia (with brake)	110.9 kgcm ²		
Connection technology	M40 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8072 | Flange code F7, motor length 2, high-performance type with additional fan

Data for 400 V AC	AM8072-wNyz	AM8072-wRyz	AM8072-wUyz
Standstill torque	80.7 Nm	80.7 Nm	74.0 Nm
Rated torque	72.6 Nm	60.1 Nm	33.8 Nm
Rated speed	1000 min ⁻¹	2000 min ⁻¹	3000 min ⁻¹
Rated power	7.6 kW	12.6 kW	10.6 kW
Standstill current	16.1 A	29.2 A	53.0 A
Rotor moment of inertia	92.2 kgcm ²		
Rotor moment of inertia (with brake)	111 kgcm ²		
Connection technology	M40 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8073 | Flange code F7, motor length 3

Data for 400 V AC	AM8073-wNyz	AM8073-wQyz	AM8073-wTyz
Standstill torque	72.6 Nm	72.6 Nm	70.0 Nm
Rated torque	58.5 Nm	38.8 Nm	10.8 Nm
Rated speed	1000 min ⁻¹	2000 min ⁻¹	3000 min ⁻¹
Rated power	6.13 kW	8.13 kW	3.39 kW
Standstill current	14.7 A	27.9 A	45.6 A
Rotor moment of inertia	135 kgcm ²		
Rotor moment of inertia (with brake)	154 kgcm ²		
Connection technology	M40 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8073 | Flange code F7, motor length 3, high-performance type with additional fan

Data for 400 V AC	AM8073-wPyz	AM8073-wRyz	AM8073-wUyz
Standstill torque	104 Nm	104 Nm	95.0 Nm
Rated torque	83.7 Nm	63.3 Nm	17.8 Nm
Rated speed	1000 min ⁻¹	2000 min ⁻¹	3000 min ⁻¹
Rated power	8.8 kW	13.3 kW	5.60 kW
Standstill current	19.8 A	37.4 A	66.5 A
Rotor moment of inertia	135 kgcm ²		
Rotor moment of inertia (with brake)	154 kgcm ²		
Connection technology	M40 speedtec® plug		
One Cable Technology (OCT)	yes		

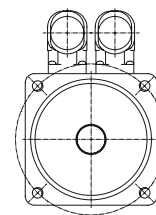
AM8074 | Flange code F7, motor length 4

Data for 400 V AC	AM8074-wNy0	AM8074-wRy0	AM8074-wTy0
Standstill torque	92 Nm		
Rated torque	67 Nm	34 Nm	19.1 Nm
Rated speed	1000 min ⁻¹	2000 min ⁻¹	2500 min ⁻¹
Rated power	7.02 kW	7.12 kW	5.0 kW
Standstill current	17.4 A	34.9 A	49.8 A
Rotor moment of inertia	180 kgcm ²		
Connection technology	M40 speedtec® plug	M40 speedtec® plug	terminal box
One Cable Technology (OCT)	yes	yes	–

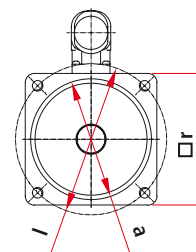
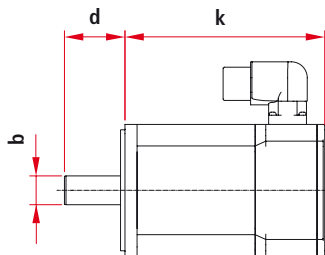
AM8074 | Flange code F7, motor length 4, high-performance type with additional fan

Data for 400 V AC	AM8074-wRyA	AM8074-wTyA	AM8074-wUyA
Standstill torque	129 Nm		
Rated torque	93.3 Nm	51.7 Nm	24.5 Nm
Rated speed	1000 min ⁻¹	2000 min ⁻¹	3000 min ⁻¹
Rated power	9.77 kW	10.83 kW	7.7 kW
Standstill current	25.8 A	49.4 A	69.2 A
Rotor moment of inertia	180 kgcm ²		
Connection technology	M40 speedtec® plug	terminal box	terminal box
One Cable Technology (OCT)	yes	–	–

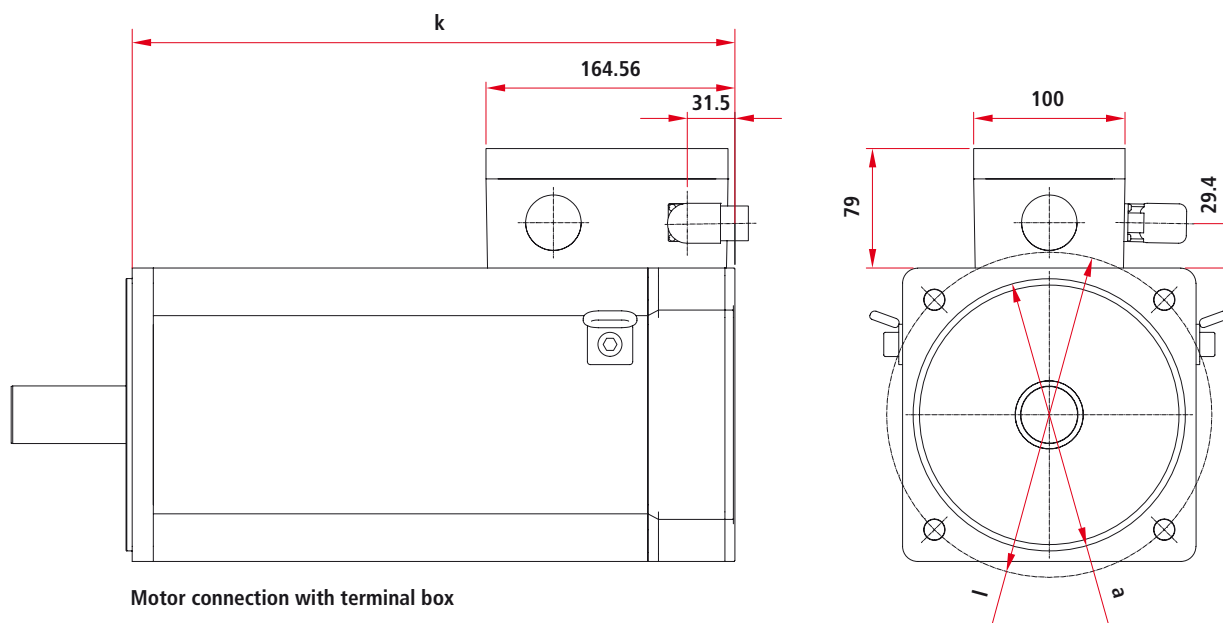
Drive Technology



Resolver version



One Cable Technology



Dimensions	a	b	d	l	r	k (without brake)	k (with brake)
AM8011	30 h7	8 h7	25 mm	46 mm	40 mm	97 mm	129 mm
AM8012	30 h7	8 h7	25 mm	46 mm	40 mm	117 mm	149 mm
AM8013	30 h7	8 h7	25 mm	46 mm	40 mm	137 mm	169 mm
AM8021	40 j6	9 k6	20 mm	63 mm	58 mm	111.5 mm	146 mm
AM8022	40 j6	9 k6	20 mm	63 mm	58 mm	133.5 mm	168 mm
AM8023	40 j6	9 k6	20 mm	63 mm	58 mm	155.5 mm	190 mm
AM8031	60 j6	14 k6	30 mm	75 mm	72 mm	129 mm	168 mm
AM8032	60 j6	14 k6	30 mm	75 mm	72 mm	154 mm	194 mm
AM8033	60 j6	14 k6	30 mm	75 mm	72 mm	180 mm	229 mm
AM8041	80 j6	19 k6	40 mm	100 mm	87 mm	132 mm	179.5 mm
AM8042	80 j6	19 k6	40 mm	100 mm	87 mm	162 mm	209.5 mm
AM8043	80 j6	19 k6	40 mm	100 mm	87 mm	192 mm	239.5 mm
AM8051	95 j6	24 k6	50 mm	115 mm	104 mm	136.5 mm	183.5 mm
AM8051*	95 j6	24 k6	50 mm	115 mm	104 mm	209 mm	256 mm
AM8052	95 j6	24 k6	50 mm	115 mm	104 mm	169.5 mm	216.5 mm
AM8052*	95 j6	24 k6	50 mm	115 mm	104 mm	242 mm	289 mm
AM8053	95 j6	24 k6	50 mm	115 mm	104 mm	202.5 mm	251.5 mm
AM8053*	95 j6	24 k6	50 mm	115 mm	104 mm	275 mm	324 mm
AM8061	130 j6	32 k6	58 mm	165 mm	142 mm	176 mm	228 mm
AM8061*	130 j6	32 k6	58 mm	165 mm	142 mm	259 mm	311 mm
AM8062	130 j6	32 k6	58 mm	165 mm	142 mm	216 mm	268 mm
AM8062*	130 j6	32 k6	58 mm	165 mm	142 mm	299 mm	351 mm
AM8063	130 j6	32 k6	58 mm	165 mm	142 mm	256 mm	315 mm
AM8063*	130 j6	32 k6	58 mm	165 mm	142 mm	339 mm	398 mm
AM8064	130 j6	32 k6	58 mm	165 mm	142 mm	296 mm	–
AM8071	180 j6	38 k6	80 mm	215 mm	194 mm	212 mm	284.5 mm
AM8071*	180 j6	38 k6	80 mm	215 mm	194 mm	322.5 mm	395 mm
AM8072	180 j6	38 k6	80 mm	215 mm	194 mm	269 mm	341.5 mm
AM8072*	180 j6	38 k6	80 mm	215 mm	194 mm	379.5 mm	452 mm
AM8073	180 j6	38 k6	80 mm	215 mm	194 mm	326 mm	398.5 mm
AM8073*	180 j6	38 k6	80 mm	215 mm	194 mm	436.5 mm	509 mm
AM8074	180 j6	38 k6	80 mm	215 mm	194 mm	398.5 mm	–
AM8074*	180 j6	38 k6	80 mm	215 mm	194 mm	517 mm	–

*high-performance type: oversize caused by fan, see dimension "k"

► www.beckhoff.com/AM80xx



AM8500 | Synchronous Servomotors with higher moment of inertia

The AM8500 series extends the servomotor range by a complete series with increased rotor moment of inertia. Due to the modified rotor geometry it is increased, depending on the length, by 100 to 300 % compared to the AM8000 servomotors. The AM8500 series covers a wide performance range with four sizes and three lengths with standstill torques from 1.37 to 41 Nm. A particular highlight, as with all servomotors from the AM8000 series, is the One Cable Technology (OCT) that combines power and feedback system in the standard motor cable.

Due to the high rotor inertia, control of the AM8500 is simplified in areas in which a high external inertia has to be moved, e.g. CNC applications in machine tools and woodworking machines. The servomotors tend to vibrate less and are much easier to adjust to the application on the servo controller. Where the ratio of external to inherent inertia has previously required a gearbox, this can now be dispensed with in some cases. Typical areas of application for the AM8500 servomotors are in woodworking machines, printing machines and machine tools as

well as in film winders and feeding drive units.

In the forced cooling version the power density of the AM8500 motor series is thus increased further thanks to the external axial ventilation of the servomotors: the standstill torques can be increased by about 35 %; the rated torques at the rated speed even by up to 150 %. In this version the servomotor series offers high torques even at high speeds. Cooling takes place with a 24 V DC fan, which is actuated independently of the motor. In the forced cooling version all further options

are available in accordance with the order data such as OCT or backlash-free permanent magnet holding brake. The forced cooling option is available for AM855x and AM856x.

Planetary gear units
see page [418](#)

Pre-assembled cables
see page [379](#)

Technical data	AM85xx
Motor type	permanent magnet-excited three-phase synchronous motor
Magnet material	neodymium-iron-boron
Insulation class	thermal class F (155 °C)
Design form	flange-mounted according to IM B5, IM V1, IM V3
Protection class	IP 54, IP 65 (shaft seal)
Cooling	convection, permissible ambient temperature 40 °C, optionally: external axial ventilation
Coating/surface	dark grey powder coating, similar to RAL7016
Temperature sensor	integrated in stator winding
Connection method	round plug connector, swivelling, angled
Life span	$L_{10h} = 30,000$ hrs for ball bearings
Approvals/markings	CE, UL
Feedback system	absolute encoder single-turn and multi-turn, OCT, resolver, multi-turn 2-cable standard

Ordering options

You will find the possible ordering options for the listed motors in this table. The options cannot be retrofitted. All specified electrical values are RMS values. The specifications for the connection technology (size of the connector) apply to motors with OCT. For motors with standard 2-cable configuration, "connection technology" refers to the size of the power connector. The size of the feedback connector for a standard 2-cable configuration is different, as follows: flange size F3: ytec® plug, flange sizes F4...F6 = M23 speedtec® plug.

Order reference	AM85uv-wxyz	Pict.
u	flange code F	
v	motor length	
w = 0	smooth shaft	
w = 1	shaft with groove and feather key according to DIN 6885	
w = 2	smooth shaft with IP 65 sealing ring	
w = 3	shaft with IP 65 sealing ring and with groove and feather key	
w = 4	shaft with IP 65 sealing ring, smooth shaft and sealing air connection	
w = 5	shaft with IP 65 sealing ring, shaft with groove and feather key and sealing air connection	
x	winding code A...Z	
y = 0	2-cable standard: feedback resolver	
y = 1	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, single-turn, absolute position within one revolution, 18 bit resolution	
y = 2	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, multi-turn, absolute position within 4096 revolutions, 18 bit resolution	
y = 4	2-cable standard: feedback multi-turn, absolute encoder SKM36, 128 SinCos periods (only for AM856x)	
y = G	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, single-turn, absolute position within one revolution, resolution 24 bit, SIL 2 (only in combination with AX8xxx-0200)	
y = H	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, multi-turn, absolute position within 4096 revolutions, resolution 24 bit, SIL 2 (only in combination with AX8xxx-0200)	
y = N	without feedback (sensorless)	
z = 0	without holding brake	
z = 1	with holding brake (not available for AM8533, AM8543, AM8553 and AM8563)	
z = A	forced cooling, without holding brake, for AM855x, AM856x ⁽¹⁾	A
z = B	forced cooling, with holding brake, for AM855x, AM856x (not available for AM8553 and AM8563) ⁽¹⁾	A

⁽¹⁾ The EL2022 2 148 or KL2022 2 521 digital output terminal with matching ZK4054-6400-xxxx 351 supply cable is recommended for controlling the external 24 V DC ventilation.



AM8531 | Flange code F3, motor length 1

Data for 400 V AC	AM8531-wCyz	AM8531-wDyz	AM8531-wFyz
Standstill torque	1.37 Nm	1.38 Nm	1.40 Nm
Rated torque	1.34 Nm	1.33 Nm	1.30 Nm
Rated speed	3000 min ⁻¹	6000 min ⁻¹	9000 min ⁻¹
Rated power	0.42 kW	0.84 kW	1.23 kW
Standstill current	1.00 A	1.95 A	3.20 A
Rotor moment of inertia	1.67 kgcm ²		
Rotor moment of inertia (with brake)	1.76 kgcm ²		
Connection technology	itec® plug		
One Cable Technology (OCT)	yes		

AM8532 | Flange code F3, motor length 2

Data for 400 V AC	AM8532-wDyz	AM8532-wEyz	AM8532-wHyz
Standstill torque	2.38 Nm	2.37 Nm	2.37 Nm
Rated torque	2.30 Nm	2.20 Nm	1.85 Nm
Rated speed	3000 min ⁻¹	6000 min ⁻¹	9000 min ⁻¹
Rated power	0.72 kW	1.38 kW	1.74 kW
Standstill current	1.70 A	2.95 A	5.10 A
Rotor moment of inertia	2.05 kgcm ²		
Rotor moment of inertia (with brake)	2.15 kgcm ²		
Connection technology	itec® plug		
One Cable Technology (OCT)	yes		

AM8533 | Flange code F3, motor length 3

Data for 400 V AC	AM8533-wEy0	AM8533-wFy0	AM8533-wJy0
Standstill torque	3.20 Nm	3.22 Nm	3.22 Nm
Rated torque	2.98 Nm	2.70 Nm	2.30 Nm
Rated speed	3000 min ⁻¹	6000 min ⁻¹	9000 min ⁻¹
Rated power	0.94 kW	1.70 kW	2.17 kW
Standstill current	2.10 A	4.10 A	6.80 A
Rotor moment of inertia	2.44 kgcm ²		
Rotor moment of inertia (with brake)	–		
Connection technology	itec® plug		
One Cable Technology (OCT)	yes		

AM8541 | Flange code F4, motor length 1

Data for 400 V AC	AM8541-wDyz	AM8541-wEyz	AM8541-wHyz
Standstill torque	2.37 Nm	2.45 Nm	2.40 Nm
Rated torque	2.30 Nm	2.31 Nm	2.10 Nm
Rated speed	3000 min ⁻¹	6000 min ⁻¹	8000 min ⁻¹
Rated power	0.72 kW	1.45 kW	1.76 kW
Standstill current	1.65 A	3.00 A	5.25 A
Rotor moment of inertia	4.62 kgcm ²		
Rotor moment of inertia (with brake)	5.27 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8542 | Flange code F4, motor length 2

Data for 400 V AC	AM8542-wEyz	AM8542-wFyz	AM8542-wJyz
Standstill torque	4.10 Nm		
Rated torque	3.90 Nm	3.70 Nm	3.10 Nm
Rated speed	2500 min ⁻¹	5000 min ⁻¹	8000 min ⁻¹
Rated power	1.02 kW	1.94 kW	2.60 kW
Standstill current	2.15 A	4.10 A	6.90 A
Rotor moment of inertia	5.51 kgcm ²		
Rotor moment of inertia (with brake)	6.17 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8543 | Flange code F4, motor length 3

Data for 400 V AC	AM8543-wEy0	AM8543-wHy0	AM8543-wKy0
Standstill torque	5.65 Nm	5.65 Nm	5.60 Nm
Rated torque	5.30 Nm	4.90 Nm	4.10 Nm
Rated speed	2500 min ⁻¹	5000 min ⁻¹	8000 min ⁻¹
Rated power	1.39 kW	2.57 kW	3.43 kW
Standstill current	2.90 A	5.40 A	9.30 A
Rotor moment of inertia	6.41 kgcm ²		
Rotor moment of inertia (with brake)	–		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8551 | Flange code F5, motor length 1

Data for 400 V AC	AM8551-wEyz	AM8551-wGyz	AM8551-wKyz
Standstill torque	4.80 Nm	4.90 Nm	4.90 Nm
Rated torque	4.60 Nm	4.40 Nm	3.90 Nm
Rated speed	2500 min ⁻¹	5000 min ⁻¹	8000 min ⁻¹
Rated power	1.20 kW	2.30 kW	3.27 kW
Standstill current	2.70 A	4.75 A	8.50 A
Rotor moment of inertia	8.75 kgcm ²		
Rotor moment of inertia (with brake)	9.41 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8551 | Flange code F5, motor length 1, high-performance type with additional fan

Data for 400 V AC	AM8551-wFyz	AM8551-wJyz	AM8551-wLyz
Standstill torque	6.20 Nm	6.30 Nm	6.30 Nm
Rated torque	5.8 Nm	5.5 Nm	3.6 Nm
Rated speed	2500 min ⁻¹	4750 min ⁻¹	8000 min ⁻¹
Rated power	1.52 kW	2.74 kW	3.02 kW
Standstill current	3.50 A	5.80 A	11.1 A
Rotor moment of inertia	8.75 kgcm ²		
Rotor moment of inertia (with brake)	9.41 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8552 | Flange code F5, motor length 2

Data for 400 V AC	AM8552-wFyz	AM8552-wJyz	AM8552-wLyz
Standstill torque	8.20 Nm		
Rated torque	7.50 Nm	6.90 Nm	5.40 Nm
Rated speed	2000 min ⁻¹	4000 min ⁻¹	7300 min ⁻¹
Rated power	1.57 kW	2.89 kW	4.13 kW
Standstill current	3.30 A	6.30 A	11.3 A
Rotor moment of inertia	10.6 kgcm ²		
Rotor moment of inertia (with brake)	11.3 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8552 | Flange code F5, motor length 2, high-performance type with additional fan

Data for 400 V AC	AM8552-wGyz	AM8552-wKyz	AM8552-wNyz
Standstill torque	10.7 Nm	10.7 Nm	9.6 Nm
Rated torque	9.7 Nm	9.1 Nm	5.4 Nm
Rated speed	2000 min ⁻¹	4000 min ⁻¹	6000 min ⁻¹
Rated power	2.03 kW	3.77 kW	4.08 kW
Standstill current	4.30 A	8.50 A	13.6 A
Rotor moment of inertia	10.6 kgcm ²		
Rotor moment of inertia (with brake)	11.2 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8553 | Flange code F5, motor length 3

Data for 400 V AC	AM8553-wGy0	AM8553-wKy0	AM8553-wNy0
Standstill torque	11.4 Nm		
Rated torque	10.0 Nm	8.35 Nm	4.50 Nm
Rated speed	2000 min ⁻¹	4000 min ⁻¹	7000 min ⁻¹
Rated power	2.09 kW	3.50 kW	3.30 kW
Standstill current	4.70 A	8.80 A	15.6 A
Rotor moment of inertia	12.4 kgcm ²		
Rotor moment of inertia (with brake)	–		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8553 | Flange code F5, motor length 3, high-performance type with additional fan

Data for 400 V AC	AM8553-wJyA	AM8553-wLyA	AM8553-wPyA
Standstill torque	15.4 Nm	15.4 Nm	13.3 Nm
Rated torque	14.9 Nm	12.9 Nm	7.1 Nm
Rated speed	2000 min ⁻¹	4000 min ⁻¹	5000 min ⁻¹
Rated power	3.12 kW	5.41 kW	3.72 kW
Standstill current	6.40 A	11.9 A	18.6 A
Rotor moment of inertia	12.5 kgcm ²		
Rotor moment of inertia (with brake)	–		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8561 | Flange code F6, motor length 1

Data for 400 V AC	AM8561-wGyz	AM8561-wJyz	AM8561-wMyz
Standstill torque	12.8 Nm		
Rated torque	12.1 Nm	11.0 Nm	9.00 Nm
Rated speed	1500 min ⁻¹	3000 min ⁻¹	5000 min ⁻¹
Rated power	1.90 kW	3.46 kW	4.71 kW
Standstill current	4.00 A	7.80 A	13.1 A
Rotor moment of inertia	48.2 kgcm ²		
Rotor moment of inertia (with brake)	50.6 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8561 | Flange code F6, motor length 1, high-performance type with additional fan

Data for 400 V AC	AM8561-wHyz	AM8561-wLyz	AM8561-wNyz
Standstill torque	17.1 Nm	17.1 Nm	15.5 Nm
Rated torque	16.1 Nm	14.7 Nm	10.7 Nm
Rated speed	1400 min ⁻¹	3000 min ⁻¹	5000 min ⁻¹
Rated power	2.36 kW	4.60 kW	5.60 kW
Standstill current	5.20 A	10.1 A	15.8 A
Rotor moment of inertia	48.2 kgcm ²		
Rotor moment of inertia (with brake)	50.6 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8562 | Flange code F6, motor length 2

Data for 400 V AC	AM8562-wJyz	AM8562-wLyz	AM8562-wPyz
Standstill torque	21.1 Nm		
Rated torque	18.5 Nm	15.2 Nm	6.50 Nm
Rated speed	1500 min ⁻¹	3000 min ⁻¹	5000 min ⁻¹
Rated power	2.91 kW	4.78 kW	3.40 kW
Standstill current	6.20 A	12.4 A	20.3 A
Rotor moment of inertia	57.1 kgcm ²		
Rotor moment of inertia (with brake)	59.6 kgcm ²		
Connection technology	M23 speedtec® plug		
One Cable Technology (OCT)	yes		

AM8562 | Flange code F6, motor length 2, high-performance type with additional fan

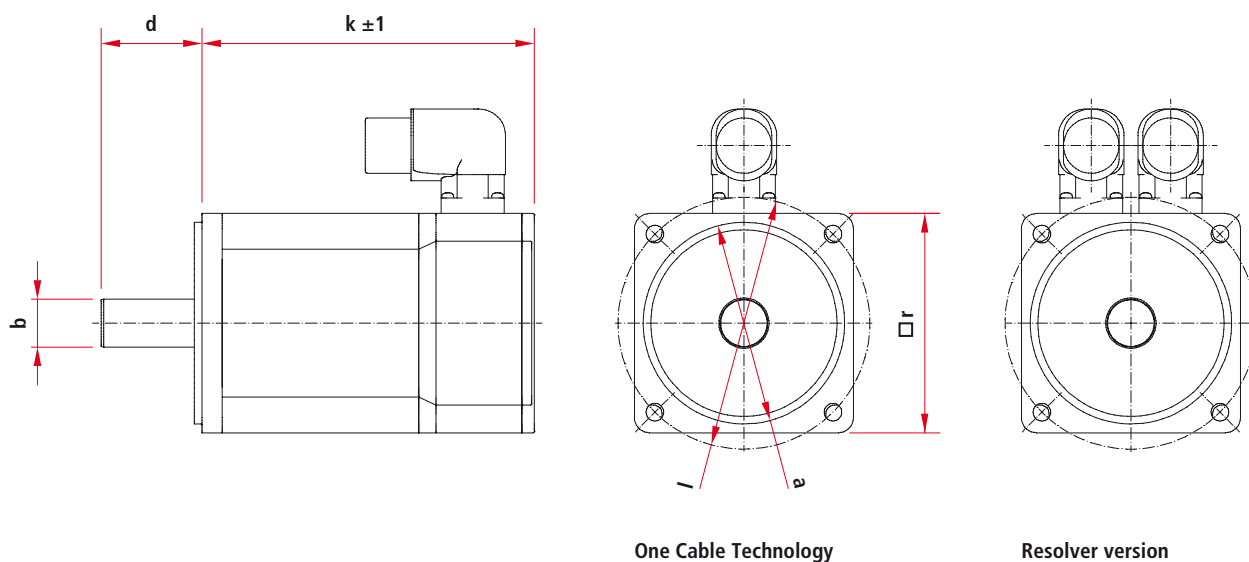
Data for 400 V AC	AM8562-wKyz	AM8562-wNyz	AM8562-wRyz
Standstill torque	29.9 Nm	29.9 Nm	28.1 Nm
Rated torque	26.4 Nm	22.2 Nm	13.4 Nm
Rated speed	1400 min ⁻¹	3000 min ⁻¹	5000 min ⁻¹
Rated power	3.87 kW	7.00 kW	7.00 kW
Standstill current	8.70 A	17.4 A	28.7 A
Rotor moment of inertia	57.1 kgcm ²		
Rotor moment of inertia (with brake)	59.6 kgcm ²		
Connection technology	M23 speedtec® plug	M23 speedtec® plug	M40 speedtec® plug
One Cable Technology (OCT)	yes		

AM8563 | Flange code F6, motor length 3

Data for 400 V AC	AM8563-wKy0	AM8563-wNy0	AM8563-wRy0
Standstill torque	29.0 Nm		
Rated torque	22.3 Nm	13.2 Nm	6.10 Nm
Rated speed	1500 min ⁻¹	3000 min ⁻¹	4000 min ⁻¹
Rated power	3.50 kW	4.15 kW	2.56 kW
Standstill current	8.70 A	17.2 A	29.5 A
Rotor moment of inertia	66.1 kgcm ²		
Rotor moment of inertia (with brake)	–		
Connection technology	M23 speedtec® plug	M23 speedtec® plug	M40 speedtec® plug
One Cable Technology (OCT)	yes		

AM8563 | Flange code F6, motor length 3, high-performance type with additional fan

Data for 400 V AC	AM8563-wLyA	AM8563-wQyA	AM8563-wTyA
Standstill torque	41.4 Nm	41.4 Nm	40.1 Nm
Rated torque	33.9 Nm	25.5 Nm	15.1 Nm
Rated speed	1400 min ⁻¹	3000 min ⁻¹	4000 min ⁻¹
Rated power	4.97 kW	8.00 kW	6.30 kW
Standstill current	11.6 A	24.0 A	39.8 A
Rotor moment of inertia	66.1 kgcm ²		
Rotor moment of inertia (with brake)	–		
Connection technology	M23 speedtec® plug	M40 speedtec® plug	M40 speedtec® plug
One Cable Technology (OCT)	yes		



Dimensions	a	b	d	l	r	k (without brake)	k (with brake)
AM8531	60 j6	14 k6	30 mm	75 mm	72 mm	168 mm	194 mm
AM8532	60 j6	14 k6	30 mm	75 mm	72 mm	194 mm	229 mm
AM8533	60 j6	14 k6	30 mm	75 mm	72 mm	229 mm	–
AM8541	80 j6	19 k6	40 mm	100 mm	87 mm	179.5 mm	209.5 mm
AM8542	80 j6	19 k6	40 mm	100 mm	87 mm	209.5 mm	239.5 mm
AM8543	80 j6	19 k6	40 mm	100 mm	87 mm	239.5 mm	–
AM8551	95 j6	24 k6	50 mm	115 mm	104 mm	183.5 mm	216.5 mm
AM8551*	95 j6	24 k6	50 mm	115 mm	104 mm	256 mm	289 mm
AM8552	95 j6	24 k6	50 mm	115 mm	104 mm	216.5 mm	251.5 mm
AM8552*	95 j6	24 k6	50 mm	115 mm	104 mm	289 mm	324 mm
AM8553	95 j6	24 k6	50 mm	115 mm	104 mm	251.5 mm	–
AM8553*	95 j6	24 k6	50 mm	115 mm	104 mm	324 mm	–
AM8561	130 j6	32 k6	58 mm	165 mm	142 mm	228 mm	268 mm
AM8561*	130 j6	32 k6	58 mm	165 mm	142 mm	311 mm	351 mm
AM8562	130 j6	32 k6	58 mm	165 mm	142 mm	268 mm	315 mm
AM8562*	130 j6	32 k6	58 mm	165 mm	142 mm	351 mm	398 mm
AM8563	130 j6	32 k6	58 mm	165 mm	142 mm	315 mm	–
AM8563*	130 j6	32 k6	58 mm	165 mm	142 mm	398 mm	–

*high-performance type: oversize caused by fan, see dimension "k"

► www.beckhoff.com/AM85xx



AG2300 | High-end gear series for AM8000 and AM8500 servomotors

The low-backlash, high-performance planetary gear units of the AG2300 series offer high torque, low torsional backlash and a very low noise level in all 14 gear ratios. The high-end gear units for the AM8000 and AM8500 servomotors have a high power density and are able to absorb high radial and axial forces. The high quality and running smoothness of this helical gear unit series meet the highest control quality demands.

The MF standard variant allows high positioning accuracy and highly dynamic operating cycles (duty cycle < 60 %). The high-speed MC variant is

suited for positioning with high nominal speeds in continuous operation (duty cycle > 60 %).

The gear units of the AG2300 series are perfectly matched to the AM8000 and AM8500 motor series. The inertia ratios, the required torques and the suitable motors can be conveniently calculated directly in TwinCAT with the TC Motion Designer. In addition, the tool checks in a single step whether the selected motor can be adapted to the gear unit. The planetary gear units are fitted to the respective motor in the factory and delivered as a complete motor/gear unit.

Features

- standard version MF for high positioning quality in highly dynamic operating cycles
- high-speed version MC for high speeds in continuous operation
- low-backlash planetary gear unit with output shaft
- absolutely maintenance-free, thanks to unique lubrication concept
- high axial and radial forces
- long service life (MF > 20,000 h, MC > 30,000 h)
- maximum efficiency
- maximum power density
- low running noise and smooth running thanks to helical gearing
- flexible installation position
- output shaft with feather key or smooth shaft
- available in 7 or 6 sizes
 - MF: SP060 to SP240
 - MC: SP075 to SP240
- 14 gear ratios, $i = 3, 4, 5, 7, 8, 10$ (1-stage), $i = 16, 20, 25, 28, 32, 35, 40, 50, 64, 70, 100$ (2-stage)
- acceleration torques between 36 and 5400 Nm
- low torsional backlash (1...8 arcmin)

Technical data	Gear ratio	Max. acceleration torque	Max. torsional backlash standard/reduced	Typ. flange code
AG2300-+SP060S-MF1-i	3/4/5/7/8/10	36...50 Nm	≤ 4/2 arcmin	F2, F3
AG2300-+SP060S-MF2-i	16/20/25/28/32/35/40/50/64/70/100	38...50 Nm	≤ 6/4 arcmin	F2, F3
AG2300-+SP075S-MF1-i	3/4/5/7/8/10	102...132 Nm	≤ 4/2 arcmin	F3, F4, F5
AG2300-+SP075S-MF2-i	16/20/25/28/32/35/40/50/64/70/100	105...132 Nm	≤ 6/4 arcmin	F3, F4
AG2300-+SP075S-MC1-i	3/4/5/7/8/10	68...90 Nm	≤ 6/4 arcmin	F3, F4, F5
AG2300-+SP075S-MC2-i	16/20/25/28/32/35/40/50/64/70/100	70...90 Nm	≤ 8/6 arcmin	F3, F4
AG2300-+SP100S-MF1-i	3/4/5/7/8/10	282...378 Nm	≤ 3/1 arcmin	F4, F5, F6
AG2300-+SP100S-MF2-i	16/20/25/28/32/35/40/50/64/70/100	259...347 Nm	≤ 5/3 arcmin	F3, F4, F5
AG2300-+SP100S-MC1-i	3/4/5/7/8/10	180...240 Nm	≤ 4/2 arcmin	F4, F5, F6
AG2300-+SP100S-MC2-i	16/20/25/28/32/35/40/50/64/70/100	180...240 Nm	≤ 6/4 arcmin	F3, F4, F5
AG2300-+SP140S-MF1-i	3/4/5/7/8/10	468...792 Nm	≤ 3/1 arcmin	F5, F6, F7
AG2300-+SP140S-MF2-i	16/20/25/28/32/35/40/50/64/70/100	583...726 Nm	≤ 5/3 arcmin	F4, F5, F6
AG2300-+SP140S-MC1-i	3/4/5/7/8/10	310...480 Nm	≤ 4/2 arcmin	F5, F6, F7
AG2300-+SP140S-MC2-i	16/20/25/28/32/35/40/50/64/70/100	380...480 Nm	≤ 6/4 arcmin	F4, F5, F6
AG2300-+SP180S-MF1-i	3/4/5/7/8/10	1164...1452 Nm	≤ 3/1 arcmin	F6, F7
AG2300-+SP180S-MF2-i	16/20/25/28/32/35/40/50/64/70/100	1164...1452 Nm	≤ 5/3 arcmin	F5, F6
AG2300-+SP180S-MC1-i	3/4/5/7/8/10	700...880 Nm	≤ 4/2 arcmin	F6, F7
AG2300-+SP180S-MC2-i	16/20/25/28/32/35/40/50/64/70/100	700...880 Nm	≤ 6/4 arcmin	F5, F6, F7
AG2300-+SP210S-MF1-i	3/4/5/7/8/10	1920...3000 Nm	≤ 3/1 arcmin	F7
AG2300-+SP210S-MF2-i	16/20/25/28/32/35/40/50/64/70/100	2043...3000 Nm	≤ 5/3 arcmin	F7
AG2300-+SP210S-MC1-i	3/4/5/7/8/10	1200...2000 Nm	≤ 4/2 arcmin	F7
AG2300-+SP210S-MC2-i	16/20/25/28/32/35/40/50/64/70/100	1040...2000 Nm	≤ 5/4 arcmin	F7
AG2300-+SP240S-MF1-i	3/4/5/7/8/10	3300...5400 Nm	≤ 3/1 arcmin	F7, AM308x
AG2300-+SP240S-MF2-i	16/20/25/28/32/35/40/50/64/70/100	3642...5400 Nm	≤ 5/3 arcmin	F7, AM308x
AG2300-+SP240S-MC1-i	3/4/5/7/8/10	1750...3600 Nm	≤ 4/2 arcmin	F7, AM308x
AG2300-+SP240S-MC2-i	16/20/25/28/32/35/40/50/64/70/100	1680...3600 Nm	≤ 5/4 arcmin	F7, AM308x

► www.beckhoff.com/AG2300



AG3300 | Economy planetary gear units

The planetary gear units with output shaft in the AG3300 economy series are a cost-efficient alternative to the high-end AG2300 gears. The gears, which are available in 1-stage and 2-stage versions, are compatible in their mating dimensions with those of the high-end AG2300 series and enable the user to implement applications with lower demands on dynamics, torque and accuracy in a very cost-effective manner. The AG3300 series

is available in standard and high-torque versions for AM8000 and AM8500 servomotors. The transmission ratios are finely scalable and range from 3 to 100.

Features

- equipped with output shaft
- standard version for applications with high positioning accuracy in dynamic cyclical operation; high-torque version for high-torque applications
- 4 sizes with up to 21 gear ratios
- acceleration torques from 51 to 800 Nm
- high efficiency and high power density
- high radial and axial forces with low torsional backlash
- lubricated for life
- IP 65 protection rating; any installation position
- integrated into TC Motion Designer for optimal specification

Technical data	Gear ratio	Max. acceleration torque	Max. torsional backlash standard/reduced	Typ. flange code
AG3300-+NPS015S-MF1-i	3/4/5/7/8/10	51...64 Nm	≤ 8 arcmin	F2, F3, F4
AG3300-+NPS015S-MF2-i	12/15/16/20/25/28/30/32/35/40/50/64/70/100	51...64 Nm	≤ 10 arcmin	F1, F2, F3
AG3300-+NPS025S-MF1-i	3/4/5/7/8/10	128...160 Nm	≤ 8 arcmin	F3, F4, F5
AG3300-+NPS025S-MF2-i	9/12/15/16/20/25/28/30/32/35/40/50/64/70/100	128...160 Nm	≤ 10 arcmin	F2, F3, F4
AG3300-+NPS035S-MF1-i	3/4/5/7/8/10	320...408 Nm	≤ 8 arcmin	F4, F5, F6
AG3300-+NPS035S-MF2-i	9/12/15/16/20/25/28/30/32/35/40/50/64/70/100	320...408 Nm	≤ 10 arcmin	F3, F4, F5
AG3300-+NPS045S-MF1-i	5/8/10	640...800 Nm	≤ 8 arcmin	F6, F7
AG3300-+NPS045S-MF2-i	25/50/64/100	640...800 Nm	≤ 10 arcmin	F5, F6, F7

► www.beckhoff.com/AG3300



AG3210 | Economy planetary gear units

The planetary gear units of the AG3210 economy series with output shaft are a cost-efficient alternative to the high-end AG2210 gears. The gears, which are available in 1-stage and 2-stage versions, are compatible in their mating dimensions with those of the high-end AG2210 series, offering added value with regard to the transmittable torque as well as radial and axial force, and significantly reduced torsional backlash. The AG3210 series is available in standard

and high-torque versions for AM8000 and AM8500 servomotors. The gear ratios are finely scalable and range from 3 to 100.

Features

- equipped with output shaft
- standard version for applications with high positioning accuracy in dynamic cyclical operation; high-torque version for high-torque applications
- 5 sizes with up to 21 gear ratios
- acceleration torques from 18 to 800 Nm
- high efficiency and high power density
- high radial and axial forces with low torsional backlash
- lubricated for life
- IP 64 protection rating; any installation position
- integrated into TC Motion Designer for optimal specification

Technical data	Gear ratio	Max. acceleration torque	Max. torsional backlash standard/reduced	Typ. flange code
AG3210-+NP005S-MF1-i	4/5/7/8/10	18...22 Nm	≤ 10 arcmin	F1, F2, F3
AG3210-+NP005S-MF2-i	16/20/25/28/35/40/50/64/70/100	18...22 Nm	≤ 13 arcmin	F1, F2, F3
AG3210-+NP015S-MF1-i	3/4/5/7/8/10	51...64 Nm	≤ 8 arcmin	F2, F3, F4
AG3210-+NP015S-MF2-i	12/15/16/20/25/28/30/32/35/40/50/64/70/100	51...64 Nm	≤ 10 arcmin	F1, F2, F3
AG3210-+NP025S-MF1-i	3/4/5/7/8/10	128...160 Nm	≤ 8 arcmin	F3, F4, F5
AG3210-+NP025S-MF2-i	9/12/15/16/20/25/28/30/32/35/40/50/64/70/100	128...160 Nm	≤ 10 arcmin	F2, F3, F4
AG3210-+NP035S-MF1-i	3/4/5/7/8/10	320...408 Nm	≤ 8 arcmin	F4, F5, F6
AG3210-+NP035S-MF2-i	9/12/15/16/20/25/28/30/32/35/40/50/64/70/100	320...408 Nm	≤ 10 arcmin	F3, F4, F5
AG3210-+NP045S-MF1-i	5/8/10	640...800 Nm	≤ 8 arcmin	F6, F7
AG3210-+NP045S-MF2-i	25/50/64/100	640...700 Nm	≤ 10 arcmin	F5, F6, F7

► www.beckhoff.com/AG3210



AG2400 | High-end planetary gear units with output flange

The planetary gear units with output flange in the high-end AG2400 series absorb maximum radial and axial forces and transmit highest torques. High-quality gear tooth systems result in very low torsional backlash, making this gear series the ideal solution for dynamic and highly accurate positioning applications. The low-noise gears of the AG2400 series are optimised for

the AM8xxx high-performance servomotors and meet the highest requirements regarding precision, dynamics and power density.

Features

- equipped with output flange
- standard version for applications with high positioning accuracy in

dynamic cyclical operation; high-torque version for high-torque applications

- 7 sizes with up to 20 gear ratios
- acceleration torques from 38 to 7200 Nm
- maximum efficiency
- maximum radial and axial forces with very low torsional backlash
- lubricated for life

- IP 65 protection rating; any installation position
- integrated into TC Motion Designer for optimal specification

Technical data	Gear ratio	Max. acceleration torque	Max. torsional backlash standard/reduced	Typ. flange code
AG2400-+TP004S-MF1-i	4/5/7/8/10	42...66 Nm	≤ 4/2 arcmin	F2, F3, F4
AG2400-+TP004S-MF2-i	16/20/21/25/28/31/32/35/40/50/61/64/70/91/100	38...66 Nm	≤ 4/2 arcmin	F1, F2, F3
AG2400-+TP010S-MF1-i	4/5/7/8/10	126...172 Nm	≤ 4/2 arcmin	F3, F4, F5
AG2400-+TP010S-MF2-i	16/20/21/25/28/31/32/35/40/50/61/64/70/91/100	96...158 Nm	≤ 3/1 arcmin	F2, F3, F4
AG2400-+TP025S-MF1-i	4/5/7/8/10	318...380 Nm	≤ 3/1 arcmin	F4, F5, F6
AG2400-+TP025S-MF2-i	16/20/21/25/28/31/32/35/40/50/61/64/70/91/100	275...380 Nm	≤ 3/1 arcmin	F3, F4, F5
AG2400-+TP050S-MF1-i	4/5/7/8/10	648...840 Nm	≤ 3/1 arcmin	F5, F6, F7
AG2400-+TP050S-MF2-i	16/20/21/25/28/31/32/35/40/50/61/64/70/91/100	550...825 Nm	≤ 3/1 arcmin	F4, F5, F6
AG2400-+TP110S-MF1-i	4/5/7/8/10	1680...1920 Nm	≤ 3/1 arcmin	F6, F7
AG2400-+TP110S-MF2-i	16/20/21/25/28/31/32/35/40/50/61/64/70/91/100	1430...1760 Nm	≤ 3/1 arcmin	F5, F6, F7
AG2400-+TP300S-MF1-i	5/7/8/10	2280...4200 Nm	≤ 3/1 arcmin	F6, F7
AG2400-+TP300S-MF2-i	20/21/25/31/32/35/50/61/64/70/91/100	2800...3949 Nm	≤ 3/2 arcmin	F6, F7
AG2400-+TP500S-MF1-i	5/7/8/10	4000...7200 Nm	≤ 3/1 arcmin	F6, F7
AG2400-+TP500S-MF2-i	20/21/25/31/32/35/50/61/64/70/91/100	4800...6808 Nm	≤ 3/2 arcmin	F6, F7

► www.beckhoff.com/AG2400



AG3400 | Economy planetary gear units with output flange

The planetary gear units with output flange in the AG3400 economy series are a cost-efficient alternative to the high-end AG2400 gears.

The gears, which are available in 1-stage and 2-stage versions, are compatible in their mating dimensions with those of the high-end AG2400 series and enable the user to implement applications with lower demands on dynamics, torque and accuracy in a very cost-effective manner. The AG3400 series is

available in standard and high-torque versions for AM8000 and AM8500 servomotors. The gear ratios are finely scalable and range from 3 to 100.

Features

- equipped with output flange
- standard version for applications with high positioning accuracy in dynamic cyclical operation; high-torque version for high-torque applications
- 5 sizes with up to 21 gear ratios
- acceleration torques from 18 to 700 Nm
- high efficiency and high power density
- high radial and axial forces with low torsional backlash
- lubricated for life
- IP 64 protection rating; any installation position
- integrated into TC Motion Designer for optimal specification

Technical data	Gear ratio	Max. acceleration torque	Max. torsional backlash standard/reduced	Typ. flange code
AG3400-+NPT005S-MF1-i	4/5/7/8/10	18...22 Nm	≤ 10 arcmin	F1, F2, F3
AG3400-+NPT005S-MF2-i	16/20/25/28/35/40/50/64/70/100	18...22 Nm	≤ 13 arcmin	F1, F2, F3
AG3400-+NPT015S-MF1-i	3/4/5/7/8/10	51...60 Nm	≤ 8 arcmin	F2, F3, F4
AG3400-+NPT015S-MF2-i	12/15/16/20/25/28/30/32/35/40/50/64/70/100	51...60 Nm	≤ 10 arcmin	F1, F2, F3
AG3400-+NPT025S-MF1-i	3/4/5/7/8/10	128...160 Nm	≤ 8 arcmin	F3, F4, F5
AG3400-+NPT025S-MF2-i	9/12/15/16/20/25/28/30/32/35/40/50/64/70/100	128...160 Nm	≤ 10 arcmin	F2, F3, F4
AG3400-+NPT035S-MF1-i	3/4/5/7/8/10	320...365 Nm	≤ 8 arcmin	F4, F5, F6
AG3400-+NPT035S-MF2-i	9/12/15/16/20/25/28/30/32/35/40/50/64/70/100	320...365 Nm	≤ 10 arcmin	F3, F4, F5
AG3400-+NPT045S-MF1-i	5/8/10	640...700 Nm	≤ 8 arcmin	F6, F7
AG3400-+NPT045S-MF2-i	25/50/64/100	640...700 Nm	≤ 10 arcmin	F5, F6, F7

► www.beckhoff.com/AG3400



AM8700 | Servomotors with anodized housing

The anodized servomotors from the AM8700 series combine the advantages of the highly dynamic AM8000 standard servomotors with the requirements of the packaging and food industries.

Like the AM8800 motors, the AM8700 motors meet hygienic design requirements and are therefore intended for use in the food, pharmaceutical and chemical industries. Due to the specially treated aluminium housing

of the AM8700 motors, the housing surface can also withstand harsh operating conditions, but nevertheless offers ideal thermal conductivity, so that there is no derating of the motor power. In comparison with the stainless steel housing the aluminium housing is very light and therefore offers a further benefit, e.g. when moving axes.

The windings of the AM8700 series are implemented using

salient pole-wound technology. The benefit is a high copper fill factor. High torques can be attained due to the high slot fill factor. The fully potted stator provides for a thermally ideal transition from the windings to the motor housing. Another advantage of full potting is mechanical protection of the winding wires against vibrations.

The AM8700 motors have IP 69K protection (not including

the output shaft) as standard and can be equipped with a sealing air connection to prevent condensate formation. The OCT direct cable outlet is also implemented in hygienic design. All lubricants used are FDA-certified as food-safe.

For a wide performance range the anodized motors are offered in the flange sizes R3 to R6, each in three different overall lengths.

Technical data	AM87xx
Motor type	permanent magnet-excited three-phase synchronous motor
Magnet material	neodymium-iron-boron
Insulation class	thermal class F (155 °C)
Design form	flange-mounted according to IM B5, IM V1, IM V3
Protection class	IP 69K not including shaft feedthrough, FKM shaft seal
Cooling	convection, permissible ambient temperature 40 °C
Materials	aluminium silver anodized
Temperature sensor	integrated in stator winding
Connection method	direct cable outlet via cable gland with connected M23 speedtec® coupling plug or direct connection for AX5000 or AX8000
Life span	$L_{10h} = 30,000$ hrs for ball bearings
Approvals/markings	CE
Feedback system	absolute encoder single-turn and multi-turn (OCT)

Ordering options

You will find the possible ordering options for the motors listed in this table. Please note: The options cannot be retrofitted. All electrical variables are RMS values.

Order reference	AM87uv-wxyz-caaa
u	flange code R
v	motor length
w = 0	smooth shaft with sealing ring IP 69K
w = 1	shaft with groove and feather key according to DIN 6885 and sealing ring IP 69K
x	winding code A...Z
y = 0	2-cable standard
y = 1	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, single-turn, absolute position within one revolution, 18 bit resolution
y = 2	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, multi-turn, absolute position within 4096 revolutions, 18 bit resolution
y = G	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, single-turn, absolute position within one revolution, resolution 24 bit, SIL 2 (only in combination with AX8xxx-0200)
y = H	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, multi-turn, absolute position within 4096 revolutions, resolution 24 bit, SIL 2 (only in combination with AX8xxx-0200)
z = 0	without holding brake
z = 1	with holding brake
z = 2	without holding brake, with sealing air connection
z = 3	with holding brake, with sealing air connection
c = 0	motor connection via M23 speedtec® plug, cable length definable via aaa ⁽¹⁾
c = 2	direct connection for AX5000 up to 25 A (X13+X14), cable length definable via aaa
c = 3	direct connection for AX8000 (X13), cable length definable via aaa
aaa	length of the motor cable in decimetres

⁽¹⁾ For motor connection via an M23 speedtec® plug, a ZK4x00-80x3-xxxx motor supply cable must also be ordered in the required length. Motor connections see page [379](#)

AM873x | Flange code R3

Data for 400 V AC	AM8731-wDyz	AM8732-wEyz	AM8733-wFyz
Standstill torque	1.38 Nm	2.37 Nm	3.22 Nm
Rated torque	1.33 Nm	2.20 Nm	2.70 Nm
Rated speed	6000 min ⁻¹		
Rated power	0.84 kW	1.38 kW	1.70 kW
Standstill current	1.95 A	2.95 A	4.10 A
Rotor moment of inertia	0.467 kgcm ²	0.847 kgcm ²	1.23 kgcm ²
Rotor moment of inertia (with brake)	0.546 kgcm ²	0.926 kgcm ²	1.46 kgcm ²
Connection technology	M23 speedtec® plug or direct connection for AX5000/AX8000		
One Cable Technology (OCT)	yes		

AM874x | Flange code R4

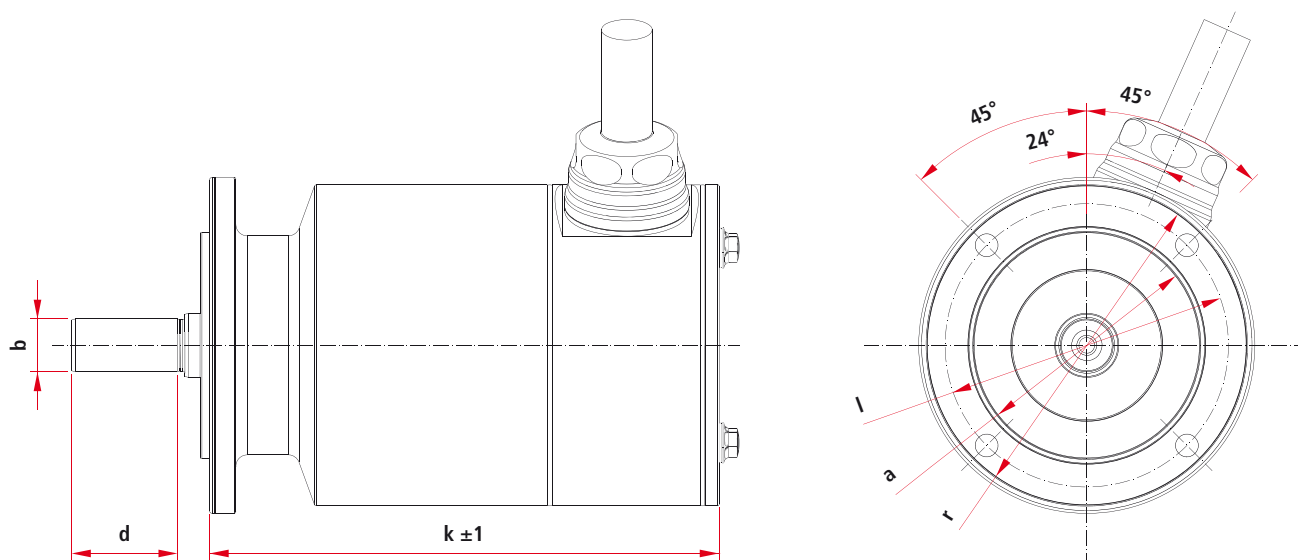
Data for 400 V AC	AM8741-wEyz	AM8742-wFyz	AM8743-wHyz
Standstill torque	2.45 Nm	4.10 Nm	5.65 Nm
Rated torque	2.31 Nm	3.70 Nm	4.90 Nm
Rated speed	6000 min ⁻¹	5000 min ⁻¹	5000 min ⁻¹
Rated power	1.45 kW	1.94 kW	2.57 kW
Standstill current	3.00 A	4.10 A	5.40 A
Rotor moment of inertia	1.09 kgcm ²	1.98 kgcm ²	2.87 kgcm ²
Rotor moment of inertia (with brake)	1.73 kgcm ²	2.63 kgcm ²	3.52 kgcm ²
Connection technology	M23 speedtec® plug or direct connection for AX5000/AX8000		
One Cable Technology (OCT)	yes		

AM875x | Flange code R5

Data for 400 V AC	AM8751-wGyz	AM8752-wJyz	AM8753-wKyz
Standstill torque	4.90 Nm	8.20 Nm	11.40 Nm
Rated torque	4.40 Nm	6.90 Nm	8.35 Nm
Rated speed	5000 min ⁻¹	4000 min ⁻¹	4000 min ⁻¹
Rated power	2.30 kW	2.89 kW	3.50 kW
Standstill current	4.75 A	6.30 A	8.80 A
Rotor moment of inertia	2.25 kgcm ²	4.09 kgcm ²	5.93 kgcm ²
Rotor moment of inertia (with brake)	2.91 kgcm ²	4.75 kgcm ²	7.04 kgcm ²
Connection technology	M23 speedtec® plug or direct connection for AX5000/AX8000		
One Cable Technology (OCT)	yes		

AM876x | Flange code R6

Data for 400 V AC	AM8761-wJyz	AM8762-wLyz	AM8763-wNyz
Standstill torque	12.80 Nm	21.10 Nm	29.00 Nm
Rated torque	11.0 Nm	15.2 Nm	13.2 Nm
Rated speed	3000 min ⁻¹		
Rated power	3.46 kW	4.78 kW	4.15 kW
Standstill current	7.80 A	12.40 A	17.20 A
Rotor moment of inertia	11.1 kgcm ²	20.0 kgcm ²	29.0 kgcm ²
Rotor moment of inertia (with brake)	13.4 kgcm ²	22.3 kgcm ²	34.9 kgcm ²
Connection technology	M23 speedtec® plug or direct connection for AX5000/AX8000		
One Cable Technology (OCT)	yes		



Dimensions	a	b	d	l	r	k (without brake)	k (with brake)
AM8731	60 j6	14 k6	30 mm	75 mm	89 mm	135 mm	173 mm
AM8732	60 j6	14 k6	30 mm	75 mm	89 mm	160.5 mm	198.5 mm
AM8733	60 j6	14 k6	30 mm	75 mm	89 mm	186 mm	233 mm
AM8741	80 j6	19 k6	40 mm	100 mm	114 mm	141 mm	188 mm
AM8742	80 j6	19 k6	40 mm	100 mm	114 mm	171 mm	218 mm
AM8743	80 j6	19 k6	40 mm	100 mm	114 mm	201 mm	248 mm
AM8751	95 j6	24 k6	50 mm	115 mm	134 mm	146 mm	192 mm
AM8752	95 j6	24 k6	50 mm	115 mm	134 mm	179 mm	225 mm
AM8753	95 j6	24 k6	50 mm	115 mm	134 mm	212 mm	258 mm
AM8761	130 j6	32 k6	58 mm	165 mm	189 mm	173.5 mm	223.5 mm
AM8762	130 j6	32 k6	58 mm	165 mm	189 mm	213.5 mm	263.5 mm
AM8763	130 j6	32 k6	58 mm	165 mm	189 mm	253.5 mm	311.5 mm



AM8800 | Stainless steel servomotors

Based on the AM8000 technology, the AM8800 series has a stainless steel housing in hygienic design. The AM8800 is ideally suited for use in the food, pharmaceutical and chemical industries.

The windings of the AM8800 motors are implemented using salient pole-wound technology. This gives rise to a high copper space factor. Due to the high slot space factor, high continuous torques can be attained. The fully potted stator provides for a thermally ideal transition of the winding to the housing. A further positive consequence

of this is the mechanical protection of the winding wires against vibrations.

Since the housing and motor shaft are manufactured from scratch-proof stainless steel AISI 316L, no corrosion creep or damage to the paint finish is possible. The motors are manufactured as standard with IP 69K protection, allowing the use of steam pressure cleaners. An optional sealing air connection to prevent the formation of condensation is also available. The cable gland also has a hygienic design. The lubricants used are certified food-safe (FDA).

One Cable Technology (OCT)

With the servomotors of the AM8000 series the feedback signals are sent directly along the conductor to the power supply so that the power and feedback systems are combined in a single motor supply cable. With the use of OCT, the information is sent reliably and without interference through a digital interface. Since a cable and plug are omitted at both the motor and controller end, the component and commissioning costs are significantly reduced.

For further information on OCT see page [350](#)

Stainless steel gear units AG2800 see page [431](#)

Pre-assembled cables see page [379](#)

Technical data	AM88xx
Motor type	permanent magnet-excited three-phase synchronous motor
Magnet material	neodymium-iron-boron
Insulation class	thermal class F (155 °C)
Design form	flange-mounted according to IM B5, IM V1, IM V3, optionally IM B14, IM V18, IM V19
Protection class	IP 69K, PTFE double-lip shaft seal with FDA approval
Cooling	convection, permissible ambient temperature 40 °C
Materials	AISI 316L
Temperature sensor	integrated in stator winding
Connection method	direct cable outlet via cable gland with connected M23 speedtec® coupling plug or direct connection for AX5000 or AX8000
Life span	L _{10h} = 30,000 hrs for ball bearings
Approvals/markings	CE, UL
Feedback system	absolute encoder single-turn and multi-turn (OCT), resolver

Ordering options

You will find the possible ordering options for the motors listed in this table. Please note: The options cannot be retrofitted. All electrical variables are RMS values.

Order reference	AM88uv-wxyz-caaa
u	flange code R
v	motor length
w = 0	smooth shaft with sealing ring IP 69K
w = 1	shaft with groove and feather key according to DIN 6885 and sealing ring IP 69K
x	winding code A...Z
y = 0	2-cable standard: feedback resolver
y = 1	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, single-turn, absolute position within one revolution, 18 bit resolution
y = 2	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, multi-turn, absolute position within 4096 revolutions, 18 bit resolution
y = G	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, single-turn, absolute position within one revolution, resolution 24 bit, SIL 2 (only in combination with AX8xxx-0200)
y = H	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, multi-turn, absolute position within 4096 revolutions, resolution 24 bit, SIL 2 (only in combination with AX8xxx-0200)
z = 0	without holding brake
z = 1	with holding brake
z = 2	without holding brake, with sealing air connection
z = 3	with holding brake, with sealing air connection
c = 0	motor connection via M23 speedtec® plug, cable length definable via aaa ⁽¹⁾
c = 2	direct connection for AX5000 up to 25 A (X13+X14), cable length definable via aaa
c = 3	direct connection for AX8000 (X13), cable length definable via aaa
aaa	length of the motor cable in decimetres

⁽¹⁾ For motor connection via an M23 speedtec® plug, a ZK4x00-80x3-xxxx motor supply cable must also be ordered in the required length.

Motor connections see page [379](#)

AM883x | Flange code R3

Data for 400 V AC	AM8831-wByz	AM8832-wCyz	AM8833-wDyz
Standstill torque	0.85 Nm	1.40 Nm	1.85 Nm
Rated torque	0.70 Nm	1.00 Nm	1.35 Nm
Rated speed	3000 min ⁻¹		
Rated power	0.22 kW	0.31 kW	0.42 kW
Standstill current	0.65 A	1.00 A	1.25 A
Rotor moment of inertia	0.469 kgcm ²	0.850 kgcm ²	1.231 kgcm ²
Rotor moment of inertia (with brake)	0.548 kgcm ²	0.929 kgcm ²	1.471 kgcm ²
One Cable Technology (OCT)	yes		

AM884x | Flange code R4

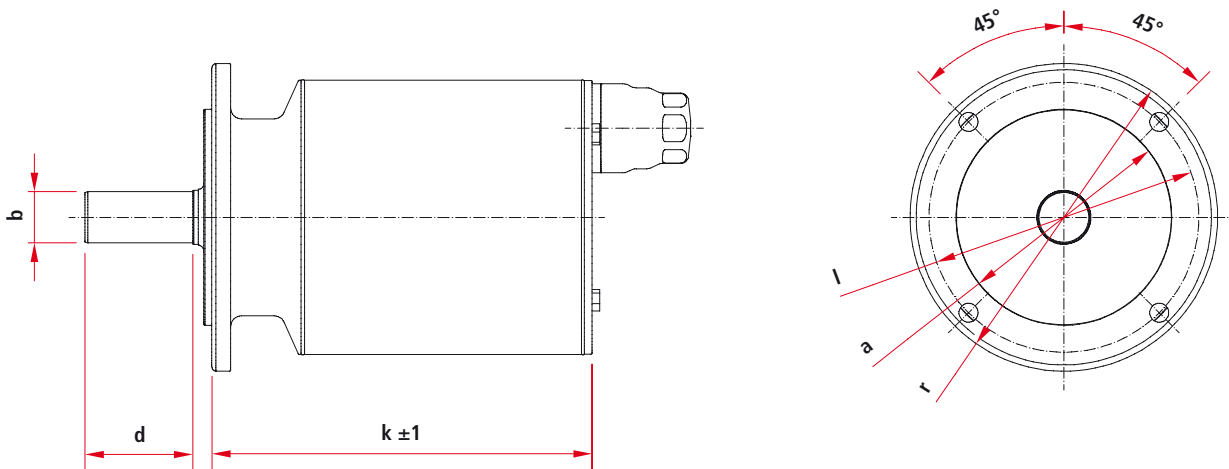
Data for 400 V AC	AM8841-wCyz	AM8842-wDyz	AM8843-wEyz
Standstill torque	1.60 Nm	2.60 Nm	3.50 Nm
Rated torque	1.30 Nm	1.90 Nm	2.75 Nm
Rated speed	3000 min ⁻¹	2500 min ⁻¹	2500 min ⁻¹
Rated power	0.41 kW	0.50 kW	0.72 kW
Standstill current	1.10 A	1.60 A	1.90 A
Rotor moment of inertia	1.115 kgcm ²	2.006 kgcm ²	2.898 kgcm ²
Rotor moment of inertia (with brake)	1.765 kgcm ²	2.656 kgcm ²	3.548 kgcm ²
One Cable Technology (OCT)	yes		

AM885x | Flange code R5

Data for 400 V AC	AM8851-wDyz	AM8852-wEyz	AM8853-wFyz
Standstill torque	3.10 Nm	4.80 Nm	6.40 Nm
Rated torque	2.70 Nm	3.70 Nm	4.30 Nm
Rated speed	2500 min ⁻¹	2000 min ⁻¹	2000 min ⁻¹
Rated power	0.71 kW	0.77 kW	0.90 kW
Standstill current	1.80 A	2.10 A	2.80 A
Rotor moment of inertia	2.315 kgcm ²	4.142 kgcm ²	5.970 kgcm ²
Rotor moment of inertia (with brake)	2.975 kgcm ²	4.802 kgcm ²	7.090 kgcm ²
One Cable Technology (OCT)	yes		

AM886x | Flange code R6

Data for 400 V AC	AM8861-wEyz	AM8862-wFyz	AM8863-wGyz
Standstill torque	7.75 Nm	13.1 Nm	16.7 Nm
Rated torque	6.20 Nm	6.00 Nm	8.00 Nm
Rated speed	1500 min ⁻¹		
Rated power	0.97 kW	0.94 kW	1.26 kW
Standstill current	2.53 A	4.10 A	4.90 A
Rotor moment of inertia	11.69 kgcm ²	20.93 kgcm ²	30.16 kgcm ²
Rotor moment of inertia (with brake)	13.94 kgcm ²	23.17 kgcm ²	32.40 kgcm ²
One Cable Technology (OCT)	yes		



Dimensions	a	b	d	l	r	k (without brake)	k (with brake)
AM8831	60 j6	14 k6	30 mm	75 mm	89 mm	134 mm	172 mm
AM8832	60 j6	14 k6	30 mm	75 mm	89 mm	159.5 mm	197.5 mm
AM8833	60 j6	14 k6	30 mm	75 mm	89 mm	185 mm	223 mm
AM8841	80 j6	19 k6	40 mm	100 mm	114 mm	141 mm	188 mm
AM8842	80 j6	19 k6	40 mm	100 mm	114 mm	171 mm	218 mm
AM8843	80 j6	19 k6	40 mm	100 mm	114 mm	201 mm	248 mm
AM8851	95 j6	24 k6	50 mm	115 mm	134 mm	146 mm	192 mm
AM8852	95 j6	24 k6	50 mm	115 mm	134 mm	179 mm	225 mm
AM8853	95 j6	24 k6	50 mm	115 mm	134 mm	212 mm	258 mm
AM8861	130 j6	32 k6	58 mm	165 mm	189 mm	171.5 mm	221.5 mm
AM8862	130 j6	32 k6	58 mm	165 mm	189 mm	211.5 mm	261.5 mm
AM8863	130 j6	32 k6	58 mm	165 mm	189 mm	251.5 mm	301.5 mm

► www.beckhoff.com/AM88xx



AG2800 | Planetary gear units for AM8800 stainless steel servomotors

The AM8800 stainless steel servomotors are fully compatible with the high requirements in the food, beverage and pharmaceutical industries with respect to optimum cleaning, resistance to aggressive cleaning agents, heavy mechanical loads and adverse environmental conditions. With their absolutely edge-free design these motors reduce the costs for machine manufacturers and users to a minimum.

A hygienic design drive axis does not always end at the stain-

less steel shaft of the motor; the use of a gearbox is often absolutely necessary. The same requirements apply here as to the stainless steel servomotors. All gearbox materials that come into contact with the environment exhibit high resistance to a large number of aggressive CIP (Cleaning in Place) cleaning media. The dead-space-free design, the smooth surface, the round motor adapter and the high resistance to corrosion of the gearboxes make the

AM8800 a perfectly matched and certified hygienic design servo axis. The planetary gear units are fitted to the respective motor in the factory and delivered as a complete motor/gear unit.

Features

- corrosion-resistant implementation
- resistant to aggressive cleaning agents
- stainless steel screw plug

- food-compatible NSF-H1 lubrication
- high protection class IP 69K (at 30 bar, referring to DIN 40050-9)
- laser-etched name plate
- dead-space-free design and smooth, electro-polished surfaces

Technical data	Gear ratio	Max. acceleration torque	Max. torsional backlash standard/reduced
AG2800-+HDV015S-MF1-i	4/5/7/10	29...32 Nm	≤ 10/- arcmin
AG2800-+HDV015S-MF2-i	16/20/25/35/50/70/100	29...32 Nm	≤ 15/- arcmin
AG2800-+HDV025S-MF1-i	4/5/7/10	72...80 Nm	≤ 10/- arcmin
AG2800-+HDV025S-MF2-i	16/20/25/35/50/70/100	72...80 Nm	≤ 15/- arcmin
AG2800-+HDV035S-MF1-i	4/5/7/10	180...200 Nm	≤ 10/- arcmin
AG2800-+HDV035S-MF2-i	16/20/25/35/50/70/100	180...200 Nm	≤ 15/- arcmin

► www.beckhoff.com/AG2800



AM3000 | Synchronous Servomotors

Pole-wound motor series

For the AM3000 servomotors, the stator is not wound outside the housing but inside through a needle winder.

With pole winding, the copper wire is in close contact with the iron core. The wire insulation can be much thinner, since no pressing of the winding head is required. These measures lead to a significant increase in the proportion of "active" copper, which determines the torque value, so that the performance of the AM3000 series is approx. 25...35 % higher. An additional benefit is that the motors are significantly shorter than conventional models.

Sealed winding

The AM3000 servomotors are characterised by an extremely low moment of inertia, robust design and high overload capacity. The winding is sealed in order to eliminate air between the individual wires, since the thermal resistance of air is higher than that of epoxy resin. This further increases mechanical resilience, e.g. in case of vibrations.

The AM3000 Synchronous Servomotors are available with eight different flange codes. For each size, once the flange code has been defined, there is scope for variation in the length. The motors are offered with torques between 0.18 and

180 Nm and with a wide range of nominal speeds, so that for each application and gear ratio the motor with the optimum dimensions can be selected.

Features

- rotatable plug connectors
- terminal box for AM308x
- tight tolerances: resulting in a highly symmetric structure inside the motor reducing cogging to an absolute minimum
- feedback option: resolver, single-turn and multi-turn absolute encoders
- The motors are available with smooth shaft or with groove and feather key.

- protection class IP 65, shaft feedthrough IP 54, optional IP 65/IP 65
- UL/CSA

Option

- planetary gear units in different variants

Pre-assembled cables and more accessories

► www.beckhoff.com/AM30xx

AM30uv-wxyz-000a	Stand-still torque	Stand-still current	Rated speed at rated supply voltage			Rotor moment of inertia		Weight (without brake)	Weight (with brake)
			230 V AC	400 V AC	480 V AC	(without brake)	(with brake)		
AM3011-wByz-000a	0.18 Nm	1.16 A	8000 min ⁻¹	–	–	0.017 kg cm ²	0.020 kg cm ²	0.35 kg	0.55 kg
AM3012-wCyz-000a	0.31 Nm	1.51 A	8000 min ⁻¹	–	–	0.031 kg cm ²	0.034 kg cm ²	0.49 kg	0.69 kg
AM3013-wCyz-000a	0.41 Nm	1.48 A	8000 min ⁻¹	–	–	0.045 kg cm ²	0.048 kg cm ²	0.63 kg	0.83 kg
AM3013-wDyz-000a	0.40 Nm	2.40 A	–	–	–	0.045 kg cm ²	0.048 kg cm ²	0.63 kg	0.83 kg
AM3021-wCyz-000a	0.48 Nm	1.58 A	8000 min ⁻¹	–	–	0.107 kg cm ²	0.118 kg cm ²	0.82 kg	1.09 kg
AM3022-wCyz-000a	0.84 Nm	1.39 A	3500 min ⁻¹	8000 min ⁻¹	8000 min ⁻¹	0.161 kg cm ²	0.172 kg cm ²	1.10 kg	1.37 kg
AM3022-wEyz-000a	0.87 Nm	2.73 A	8000 min ⁻¹	–	–	0.161 kg cm ²	0.172 kg cm ²	1.10 kg	1.37 kg
AM3023-wCyz-000a	1.13 Nm	1.41 A	2500 min ⁻¹	5500 min ⁻¹	7000 min ⁻¹	0.216 kg cm ²	0.227 kg cm ²	1.38 kg	1.65 kg
AM3023-wDyz-000a	1.16 Nm	2.19 A	5000 min ⁻¹	8000 min ⁻¹	8000 min ⁻¹	0.216 kg cm ²	0.227 kg cm ²	1.38 kg	1.65 kg
AM3024-wCyz-000a	1.38 Nm	1.42 A	2000 min ⁻¹	4500 min ⁻¹	5500 min ⁻¹	0.270 kg cm ²	0.281 kg cm ²	1.66 kg	1.93 kg
AM3024-wDyz-000a	1.41 Nm	2.21 A	4000 min ⁻¹	8000 min ⁻¹	8000 min ⁻¹	0.270 kg cm ²	0.281 kg cm ²	1.66 kg	1.93 kg
AM3031-wCyz-0000	1.15 Nm	1.37 A	2500 min ⁻¹	5000 min ⁻¹	6000 min ⁻¹	0.330 kg cm ²	0.341 kg cm ²	1.55 kg	1.90 kg
AM3031-wEyz-0000	1.20 Nm	2.99 A	6000 min ⁻¹	–	–	0.330 kg cm ²	0.341 kg cm ²	1.55 kg	1.90 kg
AM3032-wCyz-0000	2.00 Nm	1.44 A	1500 min ⁻¹	3000 min ⁻¹	3500 min ⁻¹	0.590 kg cm ²	0.601 kg cm ²	2.23 kg	2.58 kg
AM3032-wDyz-0000	2.04 Nm	2.23 A	2500 min ⁻¹	5500 min ⁻¹	6000 min ⁻¹	0.590 kg cm ²	0.601 kg cm ²	2.23 kg	2.58 kg
AM3032-wHyz-0000	2.10 Nm	5.50 A	7000 min ⁻¹	–	–	0.590 kg cm ²	0.601 kg cm ²	2.23 kg	2.58 kg
AM3033-wCyz-0000	2.71 Nm	1.47 A	1000 min ⁻¹	2000 min ⁻¹	2500 min ⁻¹	0.850 kg cm ²	0.861 kg cm ²	2.90 kg	3.25 kg
AM3033-wEyz-0000	2.79 Nm	2.58 A	2000 min ⁻¹	4500 min ⁻¹	5000 min ⁻¹	0.850 kg cm ²	0.861 kg cm ²	2.90 kg	3.25 kg
AM3041-wCyz-0000	1.95 Nm	1.46 A	1200 min ⁻¹	3000 min ⁻¹	3500 min ⁻¹	0.810 kg cm ²	0.878 kg cm ²	2.44 kg	3.07 kg
AM3041-wEyz-0000	2.02 Nm	2.85 A	3000 min ⁻¹	6000 min ⁻¹	6000 min ⁻¹	0.810 kg cm ²	0.878 kg cm ²	2.44 kg	3.07 kg
AM3041-wHyz-0000	2.06 Nm	5.60 A	6000 min ⁻¹	6000 min ⁻¹	6000 min ⁻¹	0.810 kg cm ²	0.878 kg cm ²	2.44 kg	3.07 kg
AM3042-wCyz-0000	3.35 Nm	1.40 A	–	1500 min ⁻¹	2000 min ⁻¹	1.450 kg cm ²	1.518 kg cm ²	3.39 kg	4.02 kg
AM3042-wEyz-0000	3.42 Nm	2.74 A	1800 min ⁻¹	3500 min ⁻¹	4000 min ⁻¹	1.450 kg cm ²	1.518 kg cm ²	3.39 kg	4.02 kg
AM3042-wGyz-0000	3.53 Nm	4.80 A	3500 min ⁻¹	6000 min ⁻¹	6000 min ⁻¹	1.450 kg cm ²	1.518 kg cm ²	3.39 kg	4.02 kg
AM3043-wEyz-0000	4.70 Nm	2.76 A	1500 min ⁻¹	2500 min ⁻¹	3000 min ⁻¹	2.090 kg cm ²	2.158 kg cm ²	4.35 kg	4.98 kg
AM3043-wGyz-0000	4.80 Nm	4.87 A	2500 min ⁻¹	5000 min ⁻¹	6000 min ⁻¹	2.090 kg cm ²	2.158 kg cm ²	4.35 kg	4.98 kg
AM3043-wHyz-0000	4.82 Nm	5.40 A	3000 min ⁻¹	6000 min ⁻¹	–	2.090 kg cm ²	2.158 kg cm ²	4.35 kg	4.98 kg
AM3044-wEyz-0000	5.76 Nm	2.90 A	1200 min ⁻¹	2000 min ⁻¹	2500 min ⁻¹	2.730 kg cm ²	2.798 kg cm ²	5.30 kg	5.93 kg
AM3044-wGyz-0000	5.88 Nm	5.00 A	2000 min ⁻¹	4000 min ⁻¹	5000 min ⁻¹	2.730 kg cm ²	2.798 kg cm ²	5.30 kg	5.93 kg
AM3044-wHyz-0000	5.89 Nm	5.60 A	2500 min ⁻¹	5000 min ⁻¹	6000 min ⁻¹	2.730 kg cm ²	2.798 kg cm ²	5.30 kg	5.93 kg
AM3044-wJyz-0000	6.00 Nm	8.80 A	4000 min ⁻¹	6000 min ⁻¹	6000 min ⁻¹	2.730 kg cm ²	2.798 kg cm ²	5.30 kg	5.93 kg
AM3051-wEyz-0000	4.70 Nm	2.75 A	1200 min ⁻¹	2500 min ⁻¹	3000 min ⁻¹	3.420 kg cm ²	3.593 kg cm ²	4.20 kg	5.30 kg
AM3051-wGyz-0000	4.75 Nm	4.84 A	2500 min ⁻¹	5000 min ⁻¹	6000 min ⁻¹	3.420 kg cm ²	3.593 kg cm ²	4.20 kg	5.30 kg
AM3051-wHyz-0000	4.79 Nm	6.00 A	3000 min ⁻¹	6000 min ⁻¹	6000 min ⁻¹	3.420 kg cm ²	3.593 kg cm ²	4.20 kg	5.30 kg
AM3052-wGyz-0000	8.43 Nm	4.72 A	1500 min ⁻¹	2500 min ⁻¹	3000 min ⁻¹	6.220 kg cm ²	6.393 kg cm ²	5.80 kg	6.90 kg
AM3052-wHyz-0000	8.48 Nm	5.90 A	1800 min ⁻¹	3500 min ⁻¹	4000 min ⁻¹	6.220 kg cm ²	6.393 kg cm ²	5.80 kg	6.90 kg
AM3052-wKyz-0000	8.60 Nm	9.30 A	3000 min ⁻¹	5500 min ⁻¹	6000 min ⁻¹	6.220 kg cm ²	6.393 kg cm ²	5.80 kg	6.90 kg
AM3053-wGyz-0000	11.37 Nm	4.77 A	1000 min ⁻¹	2000 min ⁻¹	2400 min ⁻¹	9.120 kg cm ²	9.293 kg cm ²	7.40 kg	8.50 kg
AM3053-wHyz-0000	11.51 Nm	6.60 A	–	3000 min ⁻¹	3500 min ⁻¹	9.120 kg cm ²	9.293 kg cm ²	7.40 kg	8.50 kg
AM3053-wKyz-0000	11.60 Nm	9.40 A	2000 min ⁻¹	4000 min ⁻¹	4500 min ⁻¹	9.120 kg cm ²	9.293 kg cm ²	7.40 kg	8.50 kg
AM3054-wGyz-0000	14.30 Nm	5.00 A	–	1500 min ⁻¹	2000 min ⁻¹	11.92 kg cm ²	12.093 kg cm ²	9.00 kg	10.1 kg
AM3054-wHyz-0000	14.90 Nm	5.50 A	1000 min ⁻¹	1800 min ⁻¹	2000 min ⁻¹	11.92 kg cm ²	12.093 kg cm ²	9.00 kg	10.1 kg
AM3054-wKyz-0000	14.40 Nm	9.70 A	1800 min ⁻¹	3500 min ⁻¹	4000 min ⁻¹	11.92 kg cm ²	12.093 kg cm ²	9.00 kg	10.1 kg
AM3054-wLyz-0000	14.10 Nm	12.50 A	2500 min ⁻¹	4500 min ⁻¹	–	11.92 kg cm ²	12.093 kg cm ²	9.00 kg	10.1 kg
AM3062-wGyz-0000	11.90 Nm	4.90 A	–	1800 min ⁻¹	2000 min ⁻¹	16.90 kg cm ²	17.51 kg cm ²	8.90 kg	10.9 kg
AM3062-wHyz-0000	11.90 Nm	5.40 A	1000 min ⁻¹	2000 min ⁻¹	2400 min ⁻¹	16.90 kg cm ²	17.51 kg cm ²	8.90 kg	10.9 kg
AM3062-wKyz-0000	12.20 Nm	9.60 A	2000 min ⁻¹	3500 min ⁻¹	4500 min ⁻¹	16.90 kg cm ²	17.51 kg cm ²	8.90 kg	10.9 kg
AM3062-wMyz-0000	12.20 Nm	13.40 A	3000 min ⁻¹	6000 min ⁻¹	6000 min ⁻¹	16.90 kg cm ²	17.51 kg cm ²	8.90 kg	10.9 kg
AM3063-wKyz-0000	16.80 Nm	9.90 A	1500 min ⁻¹	3000 min ⁻¹	3500 min ⁻¹	24.20 kg cm ²	24.81 kg cm ²	11.1 kg	13.1 kg
AM3063-wMyz-0000	17.00 Nm	13.80 A	2000 min ⁻¹	4000 min ⁻¹	4500 min ⁻¹	24.20 kg cm ²	24.81 kg cm ²	11.1 kg	13.1 kg
AM3063-wNyz-0000	17.00 Nm	17.40 A	3000 min ⁻¹	5000 min ⁻¹	6000 min ⁻¹	24.20 kg cm ²	24.81 kg cm ²	11.1 kg	13.1 kg

The table is continued on the next page.

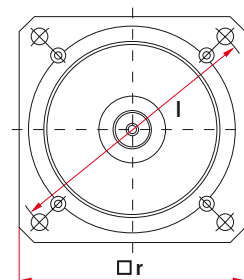
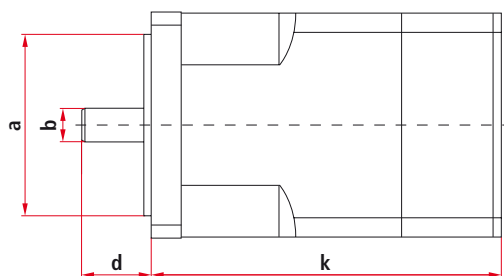
AM30uv-wxyz-000a	Stand-still torque	Stand-still current	Rated speed at rated supply voltage			Rotor moment of inertia		Weight (without brake)	Weight (with brake)
			230 V AC	400 V AC	480 V AC	(without brake)	(with brake)		
AM3063-wHyz-0000	16.60 Nm	5.60 A	–	1500 min ⁻¹	1800 min ⁻¹	31.60 kg cm ²	32.21 kg cm ²	13.3 kg	15.3 kg
AM3064-wKyz-0000	20.80 Nm	9.20 A	1200 min ⁻¹	2000 min ⁻¹	2500 min ⁻¹	31.60 kg cm ²	32.21 kg cm ²	13.3 kg	15.3 kg
AM3064-wLyz-0000	21.00 Nm	12.80 A	1500 min ⁻¹	3000 min ⁻¹	3500 min ⁻¹	31.60 kg cm ²	32.21 kg cm ²	13.3 kg	15.3 kg
AM3064-wPyz-0000	20.40 Nm	18.60 A	2500 min ⁻¹	4500 min ⁻¹	5500 min ⁻¹	31.60 kg cm ²	32.21 kg cm ²	13.3 kg	15.3 kg
AM3065-wKyz-0000	24.80 Nm	9.80 A	1000 min ⁻¹	2000 min ⁻¹	2200 min ⁻¹	40.00 kg cm ²	40.61 kg cm ²	15.4 kg	17.4 kg
AM3065-wMyz-0000	25.00 Nm	13.60 A	1500 min ⁻¹	2500 min ⁻¹	3000 min ⁻¹	40.00 kg cm ²	40.61 kg cm ²	15.4 kg	17.4 kg
AM3065-wNyz-0000	24.30 Nm	17.80 A	2000 min ⁻¹	3500 min ⁻¹	4000 min ⁻¹	40.00 kg cm ²	40.61 kg cm ²	15.4 kg	17.4 kg
AM3065-wPyz-0000	24.50 Nm	19.80 A	2400 min ⁻¹	4000 min ⁻¹	5000 min ⁻¹	40.00 kg cm ²	40.61 kg cm ²	15.4 kg	17.4 kg
AM3072-wKyz-0000	29.70 Nm	9.30 A	–	1500 min ⁻¹	1800 min ⁻¹	64.50 kg cm ²	66.14 kg cm ²	19.7 kg	21.8 kg
AM3072-wMyz-0000	30.00 Nm	13.00 A	–	2000 min ⁻¹	2500 min ⁻¹	64.50 kg cm ²	66.14 kg cm ²	19.7 kg	21.8 kg
AM3072-wPyz-0000	29.40 Nm	18.70 A	1800 min ⁻¹	3000 min ⁻¹	3500 min ⁻¹	64.50 kg cm ²	66.14 kg cm ²	19.7 kg	21.8 kg
AM3072-wQyz-0000	29.70 Nm	20.90 A	–	3500 min ⁻¹	4000 min ⁻¹	64.50 kg cm ²	66.14 kg cm ²	19.7 kg	21.8 kg
AM3073-wMyz-0000	42.00 Nm	13.60 A	–	1500 min ⁻¹	1800 min ⁻¹	92.10 kg cm ²	93.74 kg cm ²	26.7 kg	28.8 kg
AM3073-wPyz-0000	41.60 Nm	19.50 A	1300 min ⁻¹	2400 min ⁻¹	2800 min ⁻¹	92.10 kg cm ²	93.74 kg cm ²	26.7 kg	28.8 kg
AM3073-wQyz-0000	41.60 Nm	24.60 A	–	3000 min ⁻¹	3500 min ⁻¹	92.10 kg cm ²	93.74 kg cm ²	26.7 kg	28.8 kg
AM3074-wLyz-0000	53.00 Nm	12.90 A	–	1200 min ⁻¹	1400 min ⁻¹	119.7 kg cm ²	121.34 kg cm ²	33.6 kg	35.7 kg
AM3074-wPyz-0000	52.50 Nm	18.50 A	–	1800 min ⁻¹	2000 min ⁻¹	119.7 kg cm ²	121.34 kg cm ²	33.6 kg	35.7 kg
AM3074-wQyz-0000	51.90 Nm	26.20 A	–	2500 min ⁻¹	3000 min ⁻¹	119.7 kg cm ²	121.34 kg cm ²	33.0 kg	35.7 kg
AM3082-wTyz-0006	75.00 Nm	48.00 A	–	2500 min ⁻¹	3000 min ⁻¹	172.0 kg cm ²	177.00 kg cm ²	65.0 kg	73.0 kg
AM3083-wTyz-0006	130.0 Nm	62.00 A	–	2200 min ⁻¹	2500 min ⁻¹	334.0 kg cm ²	339.00 kg cm ²	85.0 kg	93.0 kg
AM3084-wTyz-0006	180.0 Nm	67.00 A	–	1800 min ⁻¹	2000 min ⁻¹	495.0 kg cm ²	500.00 kg cm ²	105 kg	113 kg

u: flange code
v: motor length

- Option w = 0: smooth shaft (preferred type)
- w = 1: shaft with groove and feather key according to DIN 6885
- w = 2: shaft with IP 65 sealing ring and smooth shaft
- w = 3: shaft with IP 65 sealing ring and shaft with groove and feather key
- Option x = winding code A...T
- Option y = 0: resolver, 2-pole
- y = 1: single-turn absolute encoder, EnDat 2.1
absolute position within one revolution, electronic identification plate
AM302x...AM304x: 512 sine periods per revolution
AM305x...AM308x: 2048 sine periods per revolution
- y = 2: multi-turn absolute encoder, EnDat 2.1
absolute position within 4096 revolutions, electronic identification plate
AM302x...AM304x: 512 sine periods per revolution
AM305x...AM308x: 2048 sine periods per revolution
- y = 3: single-turn absolute encoder, BiSS
absolute position within one revolution, electronic identification plate
AM302x...AM308x: 2048 sine periods per revolution
- y = 4: multi-turn absolute encoder, BiSS
absolute position within 4096 revolutions, electronic identification plate
AM302x...AM308x: 2048 sine periods per revolution
- Option z = 0: without holding brake
- z = 1: with holding brake
- Option a = 0: rotatable angular connectors for motor and feedback cable (only for AM302x up to AM307x)
- a = 1: supply cable 0.5 m with non-detachable plugs (only for AM301x/AM302x), only for resolver
- a = 3: vertical connectors for motor and feedback cables (only for AM302x up to AM307x)
- a = 5: yTec plug (only for AM301x)
- a = 6: motor connection via terminal box (only for AM308x)

With the exception of the shaft seal, the options cannot be installed in the field.

Options such as shaft seal, holding brake, absolute encoder can lead to a reduction of the nominal rating.



Dimensions	a	b	d	k (resolver) (without brake)	k (resolver) (with brake)	k (encoder) (without brake)	k (encoder) (with brake)	l	r
AM3011	30 mm	8 mm	25 mm	69.6 mm	106.6 mm	79.1 mm	116.1 mm	46 mm	40 mm
AM3012	30 mm	8 mm	25 mm	88.6 mm	125.6 mm	98.1 mm	135.1 mm	46 mm	40 mm
AM3013	30 mm	8 mm	25 mm	107.6 mm	144.6 mm	117.1 mm	154.1 mm	46 mm	40 mm
AM3021	40 mm	9 mm	20 mm	95.4 mm	129.5 mm	95.4 mm	129.5 mm	63 mm	58 mm
AM3022	40 mm	9 mm	20 mm	114.4 mm	148.5 mm	114.4 mm	148.5 mm	63 mm	58 mm
AM3023	40 mm	9 mm	20 mm	133.4 mm	167.5 mm	133.4 mm	167.5 mm	63 mm	58 mm
AM3024	40 mm	9 mm	20 mm	152.4 mm	186.5 mm	152.4 mm	186.5 mm	63 mm	58 mm
AM3031	60 mm	14 mm	30 mm	109.8 mm	141.3 mm	109.8 mm	141.3 mm	75 mm	70 mm
AM3032	60 mm	14 mm	30 mm	140.8 mm	172.3 mm	140.8 mm	172.3 mm	75 mm	70 mm
AM3033	60 mm	14 mm	30 mm	171.8 mm	203.3 mm	171.8 mm	203.3 mm	75 mm	70 mm
AM3041	80 mm	19 mm	40 mm	118.8 mm	152.3 mm	118.8 mm	152.3 mm	100 mm	84 mm
AM3042	80 mm	19 mm	40 mm	147.8 mm	181.3 mm	147.8 mm	181.3 mm	100 mm	84 mm
AM3043	80 mm	19 mm	40 mm	176.8 mm	210.3 mm	176.8 mm	210.3 mm	100 mm	84 mm
AM3044	80 mm	19 mm	40 mm	205.8 mm	239.3 mm	205.8 mm	239.3 mm	100 mm	84 mm
AM3051	110 mm	24 mm	50 mm	127.5 mm	172.5 mm	146.0 mm	189.0 mm	130 mm	108 mm
AM3052	110 mm	24 mm	50 mm	158.5 mm	203.5 mm	177.0 mm	220.0 mm	130 mm	108 mm
AM3053	110 mm	24 mm	50 mm	189.5 mm	234.5 mm	208.0 mm	251.0 mm	130 mm	108 mm
AM3054	110 mm	24 mm	50 mm	220.5 mm	265.5 mm	239.0 mm	282.0 mm	130 mm	108 mm
AM3062	130 mm	32 mm	58 mm	153.7 mm	200.7 mm	172.2 mm	219.7 mm	165 mm	138 mm
AM3063	130 mm	32 mm	58 mm	178.7 mm	225.7 mm	197.2 mm	244.7 mm	165 mm	138 mm
AM3064	130 mm	32 mm	58 mm	203.7 mm	250.7 mm	222.2 mm	269.7 mm	165 mm	138 mm
AM3065	130 mm	32 mm	58 mm	228.7 mm	275.7 mm	247.2 mm	294.7 mm	165 mm	138 mm
AM3072	180 mm	38 mm	80 mm	192.5 mm	234.5 mm	201.7 mm	253.7 mm	215 mm	188 mm
AM3073	180 mm	38 mm	80 mm	226.5 mm	268.5 mm	235.7 mm	287.3 mm	215 mm	188 mm
AM3074	180 mm	38 mm	80 mm	260.5 mm	302.5 mm	269.7 mm	321.3 mm	215 mm	188 mm
AM3082	250 mm	48 mm	110 mm	263.4 mm	329.4 mm	263.4 mm	329.4 mm	300 mm	260 mm
AM3083	250 mm	48 mm	110 mm	343.9 mm	410.0 mm	343.9 mm	410.0 mm	300 mm	260 mm
AM3084	250 mm	48 mm	110 mm	424.4 mm	490.4 mm	424.4 mm	490.4 mm	300 mm	260 mm

Linear motors

► www.beckhoff.com/Linear-motors

AL2xxx | Linear Servomotors

- iron core motor
- for high forces
- different magnetic path widths:
50 mm, 80 mm, 130 mm

See page **438**

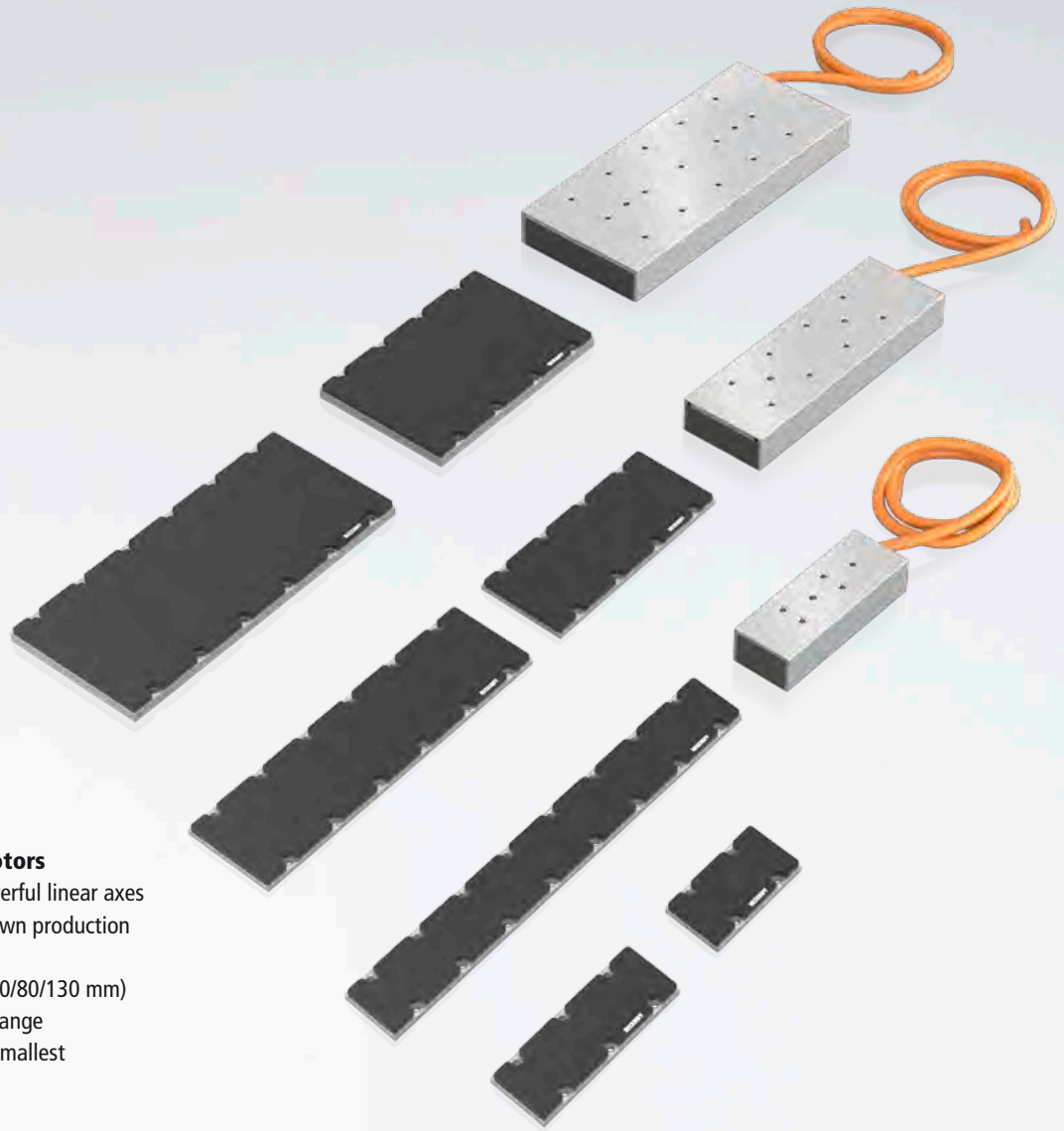


Accessories

- connector box for easy connection
- magnetic encoder system for feedback
- plugs and pre-assembled cables

See page **448**





AL8000 | Linear Servomotors

- highly dynamic and powerful linear axes
- own development and own production
Made in Germany
- three different widths (50/80/130 mm)
- high peak forces in the range of 120...6750 N in the smallest installation space

See page **438**



AA2518 | Tubular motor

- water-cooled direct drive for high-precision and dynamic linear motion
- free of detent torque and tightening forces
- simplified installation
- backlash- and wear-free

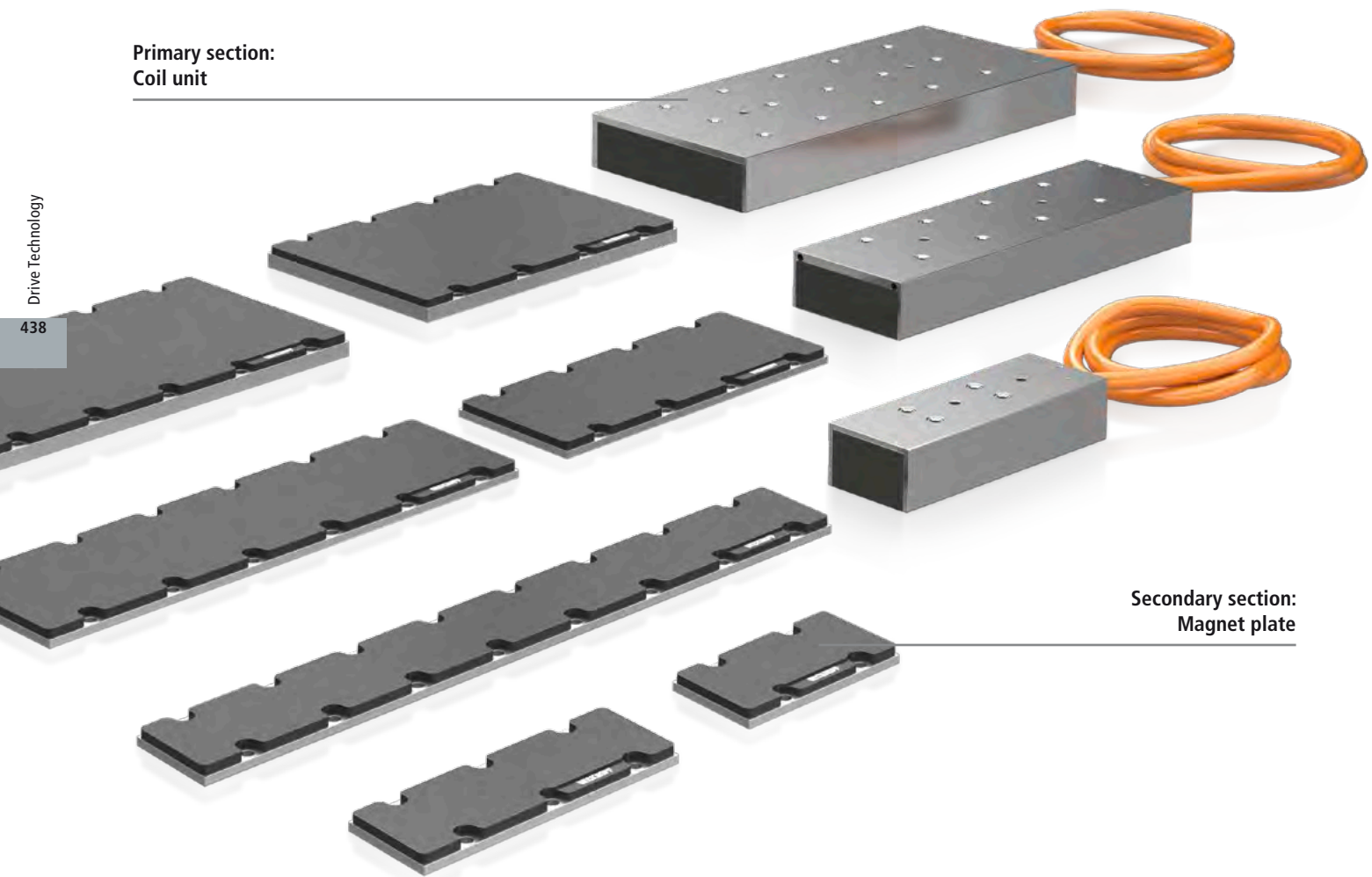
See page **452**

ALxxxx | Linear Servomotors

► www.beckhoff.com/Linear-motors

Primary section:
Coil unit

Secondary section:
Magnet plate



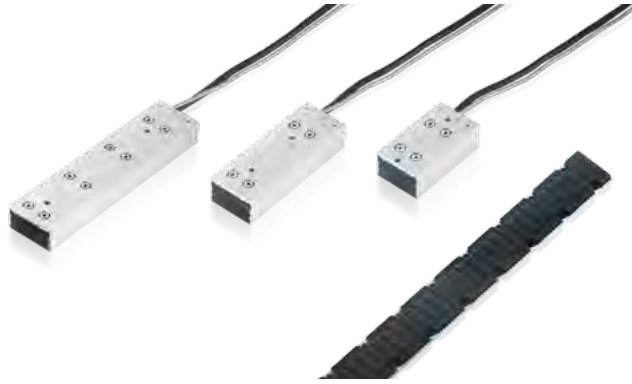
Drive Technology

438

AL8000 | Highly dynamic linear
motors made in Germany



AL20xx | Iron core motor,
magnetic path width 80 mm



AL24xx | Iron core motor,
magnetic path width 50 mm



AL28xx | Iron core motor,
magnetic path width 130 mm

Direct drives for dynamics and high precision

Translatory servomotor systems come into their own precisely where high dynamics and very high requirements for accuracy are important. There is no need to perform a mechanical implementation that is prone to backlash and reduces the efficiency of the system. The connection of the load to the motor is backlash-free; the position measuring system is mounted directly on the load or on the motor and allows a backlash-free, very dynamic, and precise position control. The direct translatory movement of the linear motor, in combination with high-resolution position feedback, is the basic prerequisite for the realization of high-precision machines.

Modular and highly dynamic

The AL8000 linear motor series, which was developed in a modular design, is available in three widths and with up to 45 coils. Developed and produced in Germany, the series offers a high level of quality, flexible adaptation to customer require-

ments, and extremely short delivery times. All linear motors from the AL8000 series have an unconnected cable end with a fixed length, which contains both the power supply and the temperature contact. This reduces material costs, possible sources of error, and installation work.

The 3-phase synchronous linear servomotors of the AL2000 series consist of a primary part and a secondary part. The primary part contains a grooved, laminated core with inlaid copper windings. It is generally used as the moving part. The secondary part contains the steel plate with attached permanent magnets.

AL2200 magnetic encoder system (MES) for linear motors

The feedback system required by linear motors for commutation and detection of speed and position normally consists of a reading head and a graduated rule installed parallel to the travel path. The hardware requirements for the complete system increase with the length of the travel path.

The AL2200 in contrast detects the magnetic field of a magnetic plate and supplies the servo drive with the incremental encoder signals for commutation and position control. The MES supplies one sine oscillation per logical motor revolution. A logical motor revolution is equivalent to the distance between two homopolar magnets, i.e. between two north poles, for example. The attainable accuracy of ± 0.1 mm is sufficient for simple positioning tasks and depends to a large extent on the mechanical accuracy and position of the magnets along the travel path. Since no graduated rule has to be installed, the MES is a cost-efficient feedback solution for linear motors.



AL80xx | Highly dynamic linear servomotors

The new AL8000 linear motor series is suitable for highly dynamic and powerful linear axes and includes three primary part widths (AL802x, AL804x, AL86x) with matched winding types and matching secondary parts (AL852x, AL854x, AL856x). Due to an optimized product design and a modular coil concept, the AL8000 series achieves high peak forces in the smallest of mounting spaces. With various overall motor widths and magnetic plate lengths, the modular product range offers great flexibility and adaptability for applications in the 400 V AC voltage range. A peak force of 6750 N

for high-power applications is available in the water-cooled AL806x variant. The linear motors are ideally matched for use with the AX8000 multi-axis servo system and the AX5000 Digital Compact Servo Drive.

Apart from the wide availability and flexibility, inhouse development and production of the motors in Germany guarantees a constantly high manufacturing quality, suitable for realizing durable and highly reliable applications with linear motor technology. Individual application requirements can be implemented through the modular overall length concept:

the number of coils in the motor can be varied in such a way that the resulting motor forces are tailored precisely to the application, but the primary part is not any longer than necessary. The AL8000 linear motors are fully integrated into the drive system: The TwinCAT engineering component TC3 Motion Designer (TE5910) enables optimally tailored drive design, taking into consideration all relevant system parameters in combination with the AX8000 and AX5000 servo drives. The engineering component TC3 Drive Manager 2 (TE5950) offers full support for the AL8000 and guides users

systematically through the commissioning process. For optimization, all drive parameters can be monitored and adjusted during ongoing operation.

Another advantage for commissioning is the combined cable for power supply and temperature contact: it not only reduces the material costs, but also enables considerable savings of assembly time. The connection cable is optionally available pre-assembled with matching connector or an open cable end with free cores.

Technical data	AL80xx
Motor type	3-phase synchronous linear servomotors
Magnet material	neodymium-iron-boron
Insulation class	thermal class B (130 °C)
Protection class	IP 64
Cooling	convection, permissible ambient temperature 40 °C, optionally: water cooling
Temperature sensor	integrated in stator winding
Connection method	round plug connector
Approvals/markings	CE, UL in preparation

Primary part

Ordering options

You will find the possible ordering options for the listed motors in this table. The options cannot be retrofitted.

Order reference	AL80uv-wxyz
u	overall width
v	overall length
w = 0	convection cooling
w = 1	water cooling
x	winding code A...Z
z = 0	1.00 m connection cable with open cable ends
z = 1	0.50 m connection cable with plug





AL802x | Linear Servomotor, overall width 50

Data for 400 V AC	AL8021-0E00-0000	AL8022-0E00-0000	AL8024-0G00-0000	AL8026-0G00-0000
Max. speed	12 m/s	12 m/s	12 m/s	10 m/s
Continuous force	120 N	240 N	480 N	720 N
Peak current	7.3 A	7.3 A	12 A	12 A
Continuous force	60 N	120 N	240 N	360 N
Continuous current	3.0 A	3.0 A	4.8 A	4.8 A
Cooling	convection			
Connection technology	itec® plug			
Corresponding Servo Drive	AX5x03, AX8206, AX8108	AX5x03, AX8206, AX8108	AX5x06, AX8206, AX8108	AX5x06, AX8206, AX8108




AL804x | Linear Servomotor, overall width 80




Data for 400 V AC	AL8041-0E00-0000	AL8042-0E00-0000	AL8043-0E00-0000	AL8043-0G00-0000
Max. speed	7 m/s	7 m/s	3.5 m/s	7 m/s
Continuous force	230 N	460 N	690 N	690 N
Peak current	7.2 A	7.2 A	7.2 A	12 A
Continuous force	100 N	200 N	300 N	300 N
Continuous current	2.5 A	2.5 A	2.5 A	4.1 A
Cooling	convection			
Connection technology	itec® plug			
Corresponding Servo Drive	AX5x03, AX8206, AX8108	AX5x03, AX8206, AX8108	AX5x03, AX8206, AX8108	AX5x06, AX8206, AX8108

Data for 400 V AC	AL8044-0E00-0000	AL8044-0H00-0000	AL8045-0G00-0000	AL8045-0K00-0000
Max. speed	3.5 m/s	7 m/s	3.5 m/s	7 m/s
Continuous force	920 N	920 N	1150 N	1150 N
Peak current	7.2 A	15 A	12 A	24 A
Continuous force	400 N	400 N	500 N	500 N
Continuous current	2.5 A	5.4 A	4.1 A	8.5 A
Cooling	convection			
Connection technology	itec® plug	itec® plug	itec® plug	M23 speedtec® plug
Corresponding Servo Drive	AX5x03, AX8206, AX8108	AX5x06, AX5112, AX8206, AX8108	AX5x06, AX8206, AX8108	AX5112, AX8108, AX8118




Data for 400 V AC	 AL8046-0G00-0000	 AL8046-0K00-0000	 AL8048-0H00-0000	 AL8048-0K00-0000
Max. speed	3.5 m/s	7 m/s	3.5 m/s	7 m/s
Continuous force	1380 N	1380 N	1840 N	1840 N
Peak current	12 A	24 A	15 A	29 A
Continuous force	600 N	600 N	800 N	800 N
Continuous current	4.1 A	8.5 A	5.4 A	10 A
Cooling	convection			
Connection technology	itec® plug	M23 speedtec® plug	itec® plug	M23 speedtec® plug
Corresponding Servo Drive	AX5x06, AX8206, AX8108	AX5112, AX8206, AX8108	AX5x06, AX5112, AX8206, AX8108	AX5112, AX5118, AX8118




AL806x | Linear Servomotor, overall width 130

Data for 400 V AC	 AL8064-0F00-0000	 AL8064-0K00-0000	 AL8065-0H00-0000
Max. speed	3 m/s	6 m/s	3 m/s
Continuous force	1800 N	1800 N	2250 N
Peak current	12 A	24 A	15 A
Continuous force	760 N	760 N	950 N
Continuous current	4.0 A	8.3 A	5.3 A
Cooling	convection		
Connection technology	itec® plug	M23 speedtec® plug	itec® plug
Corresponding Servo Drive	AX5x06, AX8206, AX8108	AX5112, AX8108, AX8118	AX5x06, AX5112, AX8206, AX8108

Data for 400 V AC	 AL8065-0K00-0000	 AL806A-0K00-0000	 AL806A-0Q00-0000
Max. speed	6 m/s	3 m/s	6 m/s
Continuous force	2250 N	4500 N	4500 N
Peak current	24 A	24 A	72 A
Continuous force	950 N	1900 N	1900 N
Continuous current	8.3 A	8.3 A	25 A
Cooling	convection		
Connection technology	M23 speedtec® plug		
Corresponding Servo Drive	AX5112, AX8108, AX8118	AX5112, AX8108, AX8118	AX5125, AX5140, AX8525, AX8540




AL806x | Linear Servomotor, overall width 130, water cooling

Data for 400 V AC	 AL8066-1J00-0000	 AL8066-1N00-0000	 AL806A-1K00-0000
Max. speed	3 m/s	6 m/s	3 m/s
Continuous force	2700 N	2700 N	4500 N
Peak current	18 A	42 A	24 A
Continuous force	1200 N	1200 N	2000 N
Continuous current	6.4 A	15 A	8.8 A
Cooling	water cooling		
Connection technology	M23 speedtec® plug		
Corresponding Servo Drive	AX5x06, AX5112, AX8206, AX8108	AX5118, AX5125, AX8118, AX8525	AX5112, AX8108, AX8118



Data for 400 V AC	 AL806A-1R00-0000	 AL806F-1N00-0000	 AL806F-1T00-0000
Max. speed	6 m/s	3 m/s	6 m/s
Continuous force	4500 N	6750 N	6750 N
Peak current	72 A	42 A	100 A
Continuous force	2000 N	3000 N	3000 N
Continuous current	26 A	15 A	36 A
Cooling	water cooling		
Connection technology	M40 speedtec® plug	M23 speedtec® plug	M40 speedtec® plug
Corresponding Servo Drive	AX5125, AX5140, AX8525, AX8540	AX5118, AX8118, AX8525	AX5140, AX5160, AX8540

Secondary part



AL852x | Magnetic plate, overall width 50

Ordering information	AL852x-0000 secondary section for AL802x
 AL8521-0000-0000	magnetic plate overall width 50, secondary part for AL802x, length 96 mm
 AL8522-0000-0000	magnetic plate overall width 50, secondary part for AL802x, length 144 mm
 AL8523-0000-0000	magnetic plate overall width 50, secondary part for AL802x, length 384 mm

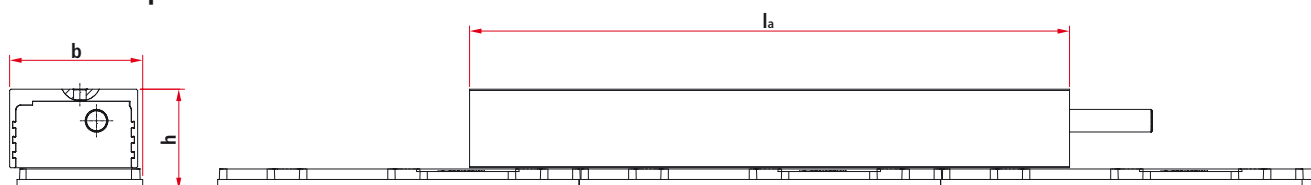
AL854x | Magnetic plate, overall width 80

Ordering information	AL854x-0000 secondary section for AL804x
 AL8541-0000-0000	magnetic plate overall width 80, secondary part for AL804x, length 192 mm
 AL8542-0000-0000	magnetic plate overall width 80, secondary part for AL804x, length 288 mm

AL856x | Magnetic plate, overall width 130

Ordering information	AL856x-0000 secondary section for AL806x
 AL8561-0000-0000	magnetic plate overall width 130, secondary part for AL806x, length 192 mm
 AL8562-0000-0000	magnetic plate overall width 130, secondary part for AL806x, length 288 mm


AL8000 | Dimensions



Dimensions	b	la	h*
AL8021	51 mm	93 mm	40 mm
AL8022	51 mm	143 mm	40 mm
AL8024	51 mm	239 mm	40 mm
AL8026	51 mm	335 mm	40 mm
AL8041	77 mm	93 mm	40 mm
AL8042	77 mm	143 mm	40 mm
AL8043	77 mm	191 mm	40 mm
AL8044	77 mm	239 mm	40 mm
AL8045	77 mm	287 mm	40 mm
AL8046	77 mm	335 mm	40 mm
AL8048	77 mm	436 mm	40 mm
AL8064	125.5 mm	239 mm	45 mm
AL8065	125.5 mm	287 mm	45 mm
AL806A	125.5 mm 130 mm	532 mm 542 mm	45 mm 47 mm
AL8066	130 mm	350 mm	47 mm
AL806F	130 mm	782 mm	47 mm

*The dimension h includes the height of the linear motor and the height of the magnetic plate.

► www.beckhoff.com/AL8000

 For availability status see Beckhoff website at: www.beckhoff.com/AL8000



AL24xx



AL20xx



AL28xx

AL2xxx | Linear Servomotors

The 3-phase Synchronous Linear Servomotors of the AL2xxx series consist of a primary section and a secondary section. The primary section contains a grooved, laminated core with inlaid copper windings. It is generally used as the moving part. The secondary section contains the steel plate with attached permanent magnets.

The motors of the individual series have the same width (including magnetic plate), i.e. all motors can be operated on the same magnetic plates, in any combination. The magnetic plates are fully sealed and therefore have an almost perfectly level and robust surface.

The primary sections have an IP 64 protection rating and are therefore suitable for application in harsh environments. They are equipped with a 0.5 m cable strand and optionally with pre-assembled connectors, so that they can be coupled with the servo drives either via the connector box or via plug connectors. This greatly reduces the difficulty of implementing the

cabling, and makes a significant contribution to avoiding errors.

In conjunction with the AX5000 Servo Drives the linear motors of the AL2xxx series are very suitable for dynamic movements, which require high acceleration values over short distances.

Features

- accelerations up to 30 g
- no mechanical wear
- complete absence of backlash, giving stiff control response
- extremely precise positioning, high repeatability
- even, immediate force, little cogging
- very low thermal resistance, allowing high capacity utilisation
- protection from thermal overload through integrated temperature sensors
- Operation with the AX5000 simplified through default values.
- connection to the AX5000 through pre-assembled cables

AL20xx

- velocity: 2.5 m/s to 7 m/s
- peak forces: 225 N to 1800 N

AL24xx

- velocity: 4.5 m/s to 10 m/s
- peak forces: 120 N to 720 N

AL28xx

- velocity: 2.5 m/s or 6 m/s
- peak forces: 1800 N to 6750 N
- operation optionally with or without water cooling

AL2200 scaleless feedback system (MES) for Linear Servomotors

An MES system is available as an optional accessory for monitoring the magnetic field of the permanent magnets on the magnetic plate. With the aid of an integrated electronic unit, it provides incremental encoder signals for the Servo Drives of the AX5000 series for

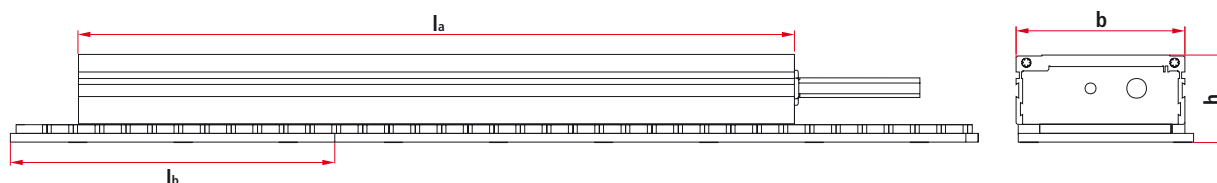
commutation, velocity and position control. The MES provides a sine wave per 24 mm pole pitch and a precision of 1/10 mm.

AL225x connector box

The AL225x connector boxes facilitate wiring between linear motor and servo drive. On one side, the motor, feedback and thermal protection cables are connected. The standard motor and encoder cables are connected on the other side of the boxes.

Options, pre-assembled cables and accessories see page [448](#)

AL2000 | Linear Servomotors



Dimensions	b	l _a	h
AL2003	77 mm	98 mm	40 mm
AL2006	77 mm	146 mm	40 mm
AL2009	77 mm	195 mm	40 mm
AL2012	77 mm	244 mm	40 mm
AL2015	77 mm	290 mm	40 mm
AL2018	77 mm	336 mm	40 mm
AL2024	77 mm	468 mm	40 mm

Technical data	AL2003	AL2006	AL2009	AL2012	AL2015	AL2018	AL2024
Winding type	S	N S	N S	N S	N S	N S	N S
Max. speed	7 m/s	3.5 m/s (N), 7 m/s (S)	2.5 m/s (N), 7 m/s (S)	3.5 m/s (N), 7 m/s (S)	3.5 m/s (N), 7 m/s (S)	3.5 m/s (N), 7 m/s (S)	3.5 m/s (N), 7 m/s (S)
Motor configuration	3-phase synchronous Linear Servomotors (400...480 V AC)						
Peak force (F _p)	225 N	450 N	675 N	900 N	1125 N	1350 N	1800 N
Peak current (I _{pa})	6.5 A	6.5 A (N), 13.0 A (S)	6.5 A (N), 19.6 A (S)	13.1 A (N), 26.2 A (S)	13.5 A (N), 32.7 A (S)	19.6 A (N), 41 A (S)	26.2 A (N), 52 A (S)
Continuous force with air cooling (F _{ca})	75 N	200 N	300 N	400 N	500 N	600 N	800 N
Continuous current with air cooling (I _{ca})	2.28 A	2.15 A (N), 4.3 A (S)	2.14 A (N), 6.45 A (S)	4.3 A (N), 8.6 A (S)	4.46 A (N), 10.75 A (S)	6.45 A (N), 13.38 A (S)	8.6 A (N), 17.2 A (S)
Force constant (K _f)	46 N/A	93 N/A (N), 46 N/A (S)	140 N/A (N), 46 N/A (S)	93 N/A (N), 46 N/A (S)	112 N/A (N), 46 N/A (S)	93 N/A (N), 44.9 N/A (S)	93 N/A (N), 46 N/A (S)
Motor constant (K _m)	185 N ² /W	380 N ² /W	570 N ² /W	760 N ² /W	950 N ² /W	1140 N ² /W	1520 N ² /W
Magnet pitch	24 mm						
Magnetic attraction force (F _a)	500 N	950 N	1325 N	1700 N	2075 N	2450 N	3400 N
Weight of the coil (M _p)	0.9 kg	1.5 kg	2.0 kg	2.6 kg	3.2 kg	3.8 kg	5.2 kg
Air gap	0.5 mm						
Temperature sensor	PTC 1 kΩ and KTY83-122						
Corresponding Servo Drive	AX5x03	AX5x03 (N), AX5x06 (S)	AX5x03 (N), AX5112 (S)	AX5x06 (N), AX5112 (S)	AX5x06 (N), AX5112 (S)	AX5112 (N), AX5118 (S)	AX5112 (N), AX5118 (S)

Ordering information	AL20xx-000x-000y coil unit
AL2003-0001-000y	Linear Servomotor, 400...480 V, F _p = 225 N, F _{ca} = 75 N
AL2006-000x-000y	Linear Servomotor, 400...480 V, F _p = 450 N, F _{ca} = 200 N
AL2009-000x-000y	Linear Servomotor, 400...480 V, F _p = 675 N, F _{ca} = 300 N
AL2012-000x-000y	Linear Servomotor, 400...480 V, F _p = 900 N, F _{ca} = 400 N
AL2015-000x-000y	Linear Servomotor, 400...480 V, F _p = 1125 N, F _{ca} = 500 N
AL2018-000x-000y	Linear Servomotor, 400...480 V, F _p = 1350 N, F _{ca} = 600 N
AL2024-000x-000y	Linear Servomotor, 400...480 V, F _p = 1800 N, F _{ca} = 800 N

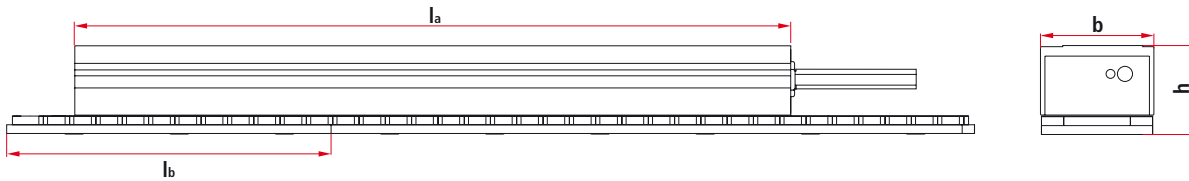
Option x = 0: N type, x = 1: S type

Option y = 0: without connector plug, y = 1: with connector plugs (motor and temperature)

Ordering information	AL21xx-0000 magnet plate
AL2110-0000	magnetic assembly (l _b = 192 mm, weight 3.8 kg/m), for AL20xx motors
AL2120-0000	magnetic assembly (l _b = 288 mm, weight 3.8 kg/m), for AL20xx motors

► www.beckhoff.com/AL20xx

AL2400 | Linear Servomotors



Dimensions	b	l _a	h
AL2403	51 mm	93 mm	40 mm
AL2406	51 mm	143 mm	40 mm
AL2412	51 mm	241 mm	40 mm
AL2418	51 mm	336 mm	40 mm

Technical data	AL2403	AL2406	AL2412	AL2418
Winding type	S	S	S	N S
Max. speed	12 m/s	12 m/s	12 m/s	4.5 m/s (N), 10 m/s (S)
Motor configuration	3-phase synchronous Linear Servomotors (400...480 V AC)			
Peak force (F _p)	120 N	240 N	480 N	720 N
Peak current (I _{pa})	4.1 A	8.2 A	16.4 A	12.3 A (N), 25.1 A (S)
Continuous force with air cooling (F _{ca})	60 N	120 N	240 N	360 N
Continuous current with air cooling (I _{ca})	1.54 A	3.08 A	6.15 A	4.50 A (N), 9.30 A (S)
Force constant (K _f)	39 N/A	39 N/A	39 N/A	79 N/A (N), 39 N/A (S)
Motor constant (K _m)	95 N ² /W	190 N ² /W	380 N ² /W	570 N ² /W
Magnet pitch	24 mm			
Magnetic attraction force (F _a)	300 N	500 N	900 N	1300 N
Weight of the coil (M _p)	0.6 kg	0.9 kg	1.6 kg	2.3 kg
Air gap	0.5 mm			
Temperature sensor	PTC 1 kΩ and KTY83-122			
Corresponding Servo Drive	AX5x03	AX5x03/AX5x06	AX5x06/AX5112	AX5x06/AX5112

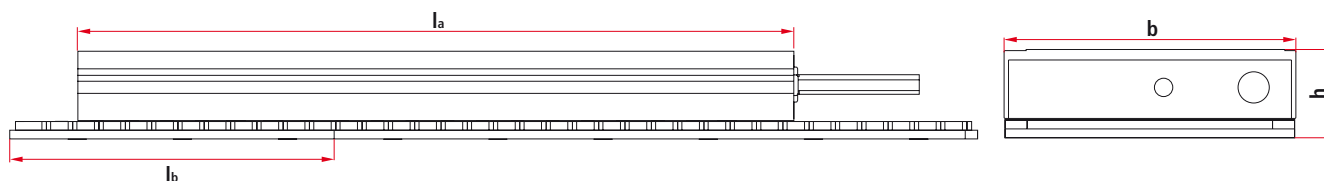
Ordering information	AL240x-000x-000y coil unit
AL2403-0001-000y	Linear Servomotor, 400...480 V, F _p = 120 N, F _{ca} = 60 N
AL2406-0001-000y	Linear Servomotor, 400...480 V, F _p = 240 N, F _{ca} = 120 N
AL2412-0001-000y	Linear Servomotor, 400...480 V, F _p = 480 N, F _{ca} = 240 N
AL2418-0000-000y	Linear Servomotor, 400...480 V, F _p = 720 N, F _{ca} = 360 N, I _{pa} = 12.3 A
AL2418-0001-000y	Linear Servomotor, 400...480 V, F _p = 720 N, F _{ca} = 360 N, I _{pa} = 25.1 A

Option y = 0: without connector plug, y = 1: with connector plugs (motor and temperature)

Ordering information	AL25xx-0000 magnet plate
AL2510-0000	magnetic assembly (l _b = 96 mm, weight 2.1 kg/m), for AL24xx motors
AL2520-0000	magnetic assembly (l _b = 144 mm, weight 2.1 kg/m), for AL24xx motors
AL2530-0000	magnetic assembly (l _b = 384 mm, weight 2.1 kg/m), for AL24xx motors

► www.beckhoff.com/AL24xx

AL2800 | Linear Servomotors



Dimensions	b	l _a	h		
AL2812	130 mm	244 mm	45 mm		
AL2815	130 mm	290 mm	45 mm		
AL2818	130 mm	344 mm	47 mm		
AL2830	130 mm	562 mm	45 mm		
AL2830-100x-0000	130 mm	580 mm	47 mm		
AL2845	130 mm	852 mm	47 mm		
Technical data	AL2812	AL2815	AL2818	AL2830	AL2845
Winding type	N S	N S	N S	N S	N S
Max. speed	3 m/s (N), 6 m/s (S)	2.5 m/s (N), 6 m/s (S)	3 m/s (N), 6 m/s (S)	2.5 m/s (N), 6 m/s (S)	2.5 m/s (N), 6 m/s (S)
Motor configuration	3-phase synchronous Linear Servomotors (400...480 V AC)				
Peak force (F _P)	1800 N	2250 N	2700 N	4500 N	6750 N
Peak current (I _{Pa})	13 A (N), 26 A (S)	13.5 A (N), 33 A (S)	19.6 A (N), 41 A (S)	27 A (N), 66 A (S)	41 A (N), 98 A (S)
Continuous force with water cooling (F _{cw})	–	–	1200 N	2000 N	3000 N
Continuous force with air cooling (F _{ca})	760 N	950 N	1140 N	1900 N	2850 N
Continuous current with water cooling (I _{cw})	–	–	6.5 A (N), 13.4 A (S)	8.9 A (N), 21.5 A (S)	13.4 A (N), 32.3 A (S)
Continuous current with air cooling (I _{ca})	4.1 A (N), 8.2 A (S)	4.2 A (N), 10.2 A (S)	6.1 A (N), 12.7 A (S)	8.5 A (N), 20 A (S)	12.5 A (N), 31 A (S)
Force constant (K _f)	186 N/A (N), 93 N/A (S)	225 N/A (N), 93 N/A (S)	186 N/A (N), 90 N/A (S)	225 N/A (N), 93 N/A (S)	225 N/A (N), 93 N/A (S)
Motor constant (K _m)	1750 N ² /W	2150 N ² /W	2580 N ² /W	4300 N ² /W	6450 N ² /W
Magnet pitch	24 mm				
Magnetic attraction force (F _a)	3400 N	4150 N	4900 N	8300 N	12450 N
Weight of the coil (M _p)	4.9 kg	5.9 kg	7.3 kg	11.6 kg, (12.3 kg*)	18.2 kg
Air gap	0.5 mm				
Temperature sensor	PTC 1 kΩ and KTY83-122				
Corresponding Servo Drive	AX5x06 (N), AX5112 (S)	AX5x06 (N), AX5118 (S)	AX5112 (N), AX5118 (S)	AX5112 (N), AX5125 (S)	AX5118 (N), AX5140 (S)

*increased weight with water-cooled primary section

Ordering information	AL28xx-000x-000y coil unit
AL2812-000x-000y	Linear Servomotor, 400...480 V, F _P = 1800 N, F _{ca} = 760 N
AL2815-000x-000y	Linear Servomotor, 400...480 V, F _P = 2250 N, F _{ca} = 950 N
AL2818-100x-000y	Linear Servomotor, 400...480 V, F _P = 2700 N, F _{cw} = 1200 N, water cooling
AL2830-000x-0000	Linear Servomotor, 400...480 V, F _P = 4500 N, F _{ca} = 1900 N
AL2830-100x-0000	Linear Servomotor, 400...480 V, F _P = 4500 N, F _{cw} = 2000 N, water cooling
AL2845-100x-0000	Linear Servomotor, 400...480 V, F _P = 6750 N, F _{cw} = 3000 N, water cooling

Option x = 0: N type, x = 1: S type, option y = 0: without connector plug, y = 1: with connector plugs (only possible with AL2812, AL2815 and AL2818!)

Ordering information	AL29xx-0000 magnet plate
AL2910-0000	magnetic assembly (l _b = 192 mm, weight 10.5 kg/m), for AL28xx motors
AL2920-0000	magnetic assembly (l _b = 288 mm, weight 10.5 kg/m), for AL28xx motors

► www.beckhoff.com/AL28xx

Accessories for AL2xxx and AL3800 linear motors

MES feedback system for linear motors

The MES supplies one sine oscillation per logical motor revolution. Since no graduated rule has to be installed, the MES is an inexpensive feedback solution for linear motors.

Ordering information	AL2200-000x Feedback system
AL2200-000x	magnetic encoder system (MES) for AL2000, AL2400 and AL2800 Linear Servomotors

Option x = 0: without connector plug, x = 1: with connector plug

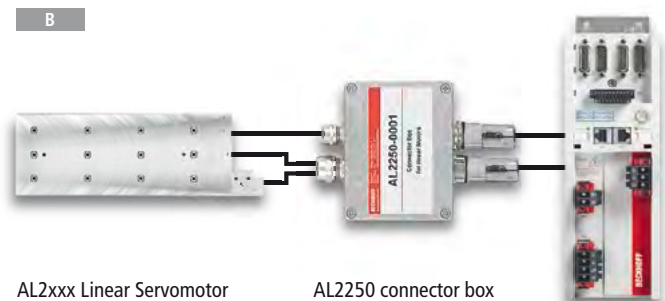
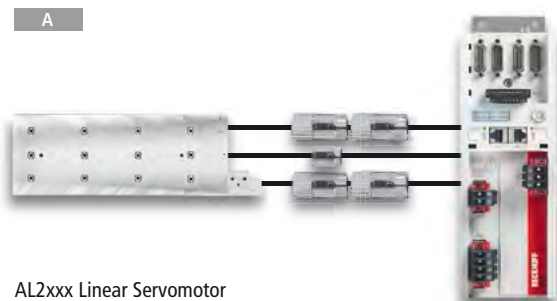
Connector box for ALxxxx

The AL225x connector boxes facilitate wiring between linear motor and the Servo Drive. They are mounted on the linear slide and move with the motor. The motor cable, the thermal protection contact cable and the encoder cable are inserted into the box through cable glands and connected to the terminal strip. The temperature contact is linked to the motor and encoder cable, so that no thermal protection contact cable is required. The standard motor and encoder cables are connected on the other side of the boxes.

Ordering information	AL225x-0001 Connector box
AL2250-0001	connector box for linear motors and AX5000, suitable for following types: AL20xx-000x-0000, AL24xx-000x-0000, AL2812-000x-0000, AL2815-000x-0000, AL2818-100x-0000, AL2830-0001-0000, AL2830-x000-0000
AL2250-0002	connector box for linear motors and AX8000, suitable for following types: AL20xx-000x-0000, AL24xx-000x-0000, AL2812-000x-0000, AL2815-000x-0000, AL2818-100x-0000, AL2830-0001-0000, AL2830-x000-0000
AL2255-0001	connector box for linear motors and AX5000, suitable for following types: AL2830-1001-0000, AL2845-1000-0000
AL2256-0001	connector box for linear motors and AX5000, suitable for following types: AL2845-1001-0000

Installation options linear motor/connector box

Cable	AX5000	A	AX5000 + AL225x-0001	B	AX8000 + AL2250-0002
Motor cable	ZK4500-0023/ZK4500-0024		ZK4500-0023/ZK4500-0024		ZK4800-8023/ZK4800-8024
Thermal protection contact cable	ZK4540-0020		–		–
Encoder cable EnDat 2.2	ZK4540-0020		–		ZK4810-8020
Encoder cable for MES or absolute encoder	ZK4510-0020				
Encoder cable for encoder with zero pulse	ZK4520-0020				
Coil and feedback system	with connector plugs		without connector plugs		without connector plugs



Supply cables for ALxxxx linear motors

Motor cable 1.5 mm² for ALxxxx at AX5000 (1.5...12 A)

Ordering information	Motor cable with 1.5 mm ² wire gauge, highly flexible for drag-chain use	Pict.
ZK4500-0023-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 87 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, length < 25 m, (4 x 1.5 mm ² + 2 x (2 x 0.75 mm ²))	A
ZK4500-0023-0050	example for 5 m length	
ZK4502-0023-xxxx	length ≥ 25 m	
ZK4509-0023-zzzz	not assembled	
ZK4501-0023-xxxx	extension cable	B

zzzz = ordering indication of the length of material in decimetres, e.g. ZK4509-0023-0100 = 10 metres

Motor cable 2.5 mm² for ALxxxx at AX5000 (18...25 A)

Ordering information	Motor cable with 2.5 mm ² wire gauge, highly flexible for drag-chain use	Pict.
ZK4500-0024-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 95 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, length < 25 m, (4 x 2.5 mm ² + 2 x (2 x 1 mm ²))	A
ZK4500-0024-0050	example for 5 m length	
ZK4502-0024-xxxx	length ≥ 25 m	
ZK4509-0024-zzzz	not assembled	
ZK4501-0024-xxxx	extension cable	B

zzzz = ordering indication of the length of material in decimetres, e.g. ZK4509-0024-0100 = 10 metres

Motor cable 10 mm² for ALxxxx at AX5000 (40 A)

Ordering information	Motor cable with 10 mm ² wire gauge, highly flexible for drag-chain use	Pict.
ZK4500-0017-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 180 m/min, max. 5 m/s ² , min. bending radius = 225 mm (10 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 10 mm ² + (2 x 1 mm ²) + (2 x 1.5 mm ²)), from 25 m motor choke required	A
ZK4500-0017-0050	example for 5 m length	
ZK4509-0017-zzzz	not assembled	
ZK4501-0017-xxxx	extension cable	B

zzzz = ordering indication of the length of material in decimetres, e.g. ZK4509-0017-0100 = 10 metres

Motor cable 1.5 mm² for AL2250 at AX8000

Ordering information	Motor cable with 1.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8023-xxxx	Highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 89 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1.5 mm ² + (2 x 0.75 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8023-0050	example for 5 m length
ZK4501-8023-xxxx	extension cable

Motor cable 2.5 mm² for AL2250 at AX8000

Ordering information	Motor cable with 2.5 mm ² wire gauge, highly flexible for drag-chain use
ZK4800-8024-xxxx	Highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 97 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 2.5 mm ² + (2 x 1 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.
ZK4800-8024-0050	example for 5 m length
ZK4501-8024-xxxx	extension cable

Illustrations see next page

Encoder cable (MES) for ALxxxx and AL2250 at AX5000

Ordering information	Encoder cable with 0.14 mm ² wire gauge, highly flexible for drag-chain use	Pict.
ZK4510-0020-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 53 mm (7 x OD), max. drag-chain length horizontal = 20 m, vertical = 5 m, (7 x 2 x 0.14 mm ² + 2 x 0.5 mm ²)	C
ZK4510-0020-0050	example for 5 m length	
ZK4519-0020-zzzz	not assembled	
ZK4511-0020-xxxx	extension cable, highly flexible, drag-chain suitable	D

zzzz = ordering indication of the length of material in decimetres, e.g. ZK4519-0020-0100 = 10 metres

Encoder cable (SinCos encoder with zero pulse) for ALxxxx and AL2250 at AX5000

Ordering information	Encoder cable with 0.14 mm ² wire gauge, highly flexible for drag-chain use
ZK4520-0020-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 53 mm (7 x OD), max. drag-chain length horizontal = 20 m, vertical = 5 m, (7 x 2 x 0.14 mm ² + 2 x 0.5 mm ²)

EnDat 2.2 encoder cable for ALxxxx and AL2250 at AX8000

Ordering information	Encoder cable with 0.14 mm ² wire gauge, highly flexible for drag-chain use
ZK4810-8020-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 53 mm (7 x OD), max. drag-chain length horizontal = 20 m, vertical = 5 m, (7 x 2 x 0.14 mm ² + 2 x 0.5 mm ²)

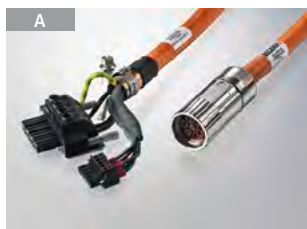
EnDat 2.2 encoder cable for ALxxxx at AX8000

Ordering information	Encoder cable with 0.14 mm ² wire gauge, highly flexible for drag-chain use
ZK4810-0020-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 53 mm (7 x OD), max. drag-chain length horizontal = 20 m, vertical = 5 m, (7 x 2 x 0.14 mm ² + 2 x 0.5 mm ²)

Thermal protection cable for ALxxxx at AX5000

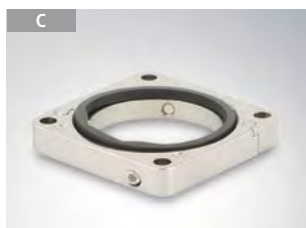
Ordering information	Thermal protection cable with 0.14 mm ² wire gauge, highly flexible for drag-chain use	Pict.
ZK4540-0020-xxxx	highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 38 mm (7 x OD), max. drag-chain length horizontal = 20 m, vertical = 5 m, (2 x 2 x 0.14 mm ²)	E

Note: Required if no connector box is used.



Connectors for AMxxxx and ALxxxx

Ordering information		Pict.
ZS4000-2030	EMC thermo-protective plug (female), D-sub, 9-pin, for AL2000, AL2400, AL2800 linear motors (counterpart to thermostat contact at AX5000 Servo Drive)	A
ZS4000-2040	EMC power coupling (male), M23, 8-pin, for motor cable extension ZK4501-00x3-xxxx and ZK4501-00x4-xxx (counterpart to motor cable ZK4500-00x3-xxxx and ZK4500-00x4-xxxx)	B
ZS4000-2100	metal flange for motor cable, itec®, M23 and feedback cable with itec®, to adjust the connector, including sealings	
ZS4000-2101	metal flange for feedback cable, M23, to adjust the connector, including sealings	C
ZS4000-2102	EMC power connector (female), itec®, 9-pin, for motor cable ZK4704-0411-xxxx for resolver feedback (counterpart to motor socket AM8100)	
ZS4000-2104	EMC power connector (female), M23, 9-pin, for motor cable ZK450x-80x3-xxxx and ZK450x-80x4-xxxx (counterpart to motor socket AM8000/AM8500)	
ZS4000-2105	EMC resolver connector (female), itec®, 12-pin, for resolver cable ZK453x-8110-xxxx (counterpart to motor socket AM801x, AM802x, AM803x, AM853x)	
ZS4000-2106	EMC resolver connector (female), M23, 12-pin, for resolver cable ZK453x-8010-xxxx (counterpart for motor socket AM8x4x up to AM8x7x)	
ZS4000-2107	EMC power connector (female), iTec, 9-pin, for motor cable ZK450x-8022-xxxx and ZK4704-0421-xxxx (counterpart for motor socket AM80xx/AM81xx/AM85xx with iTec)	
ZS4000-2108	EMC power coupling (male), M23, 9-pin, for AM8800 servomotor with cable tail (counterpart to motor cable ZK450x-80x3-xxxx and ZK450x-80x4-xxxx)	



AA2518 | Tubular motor

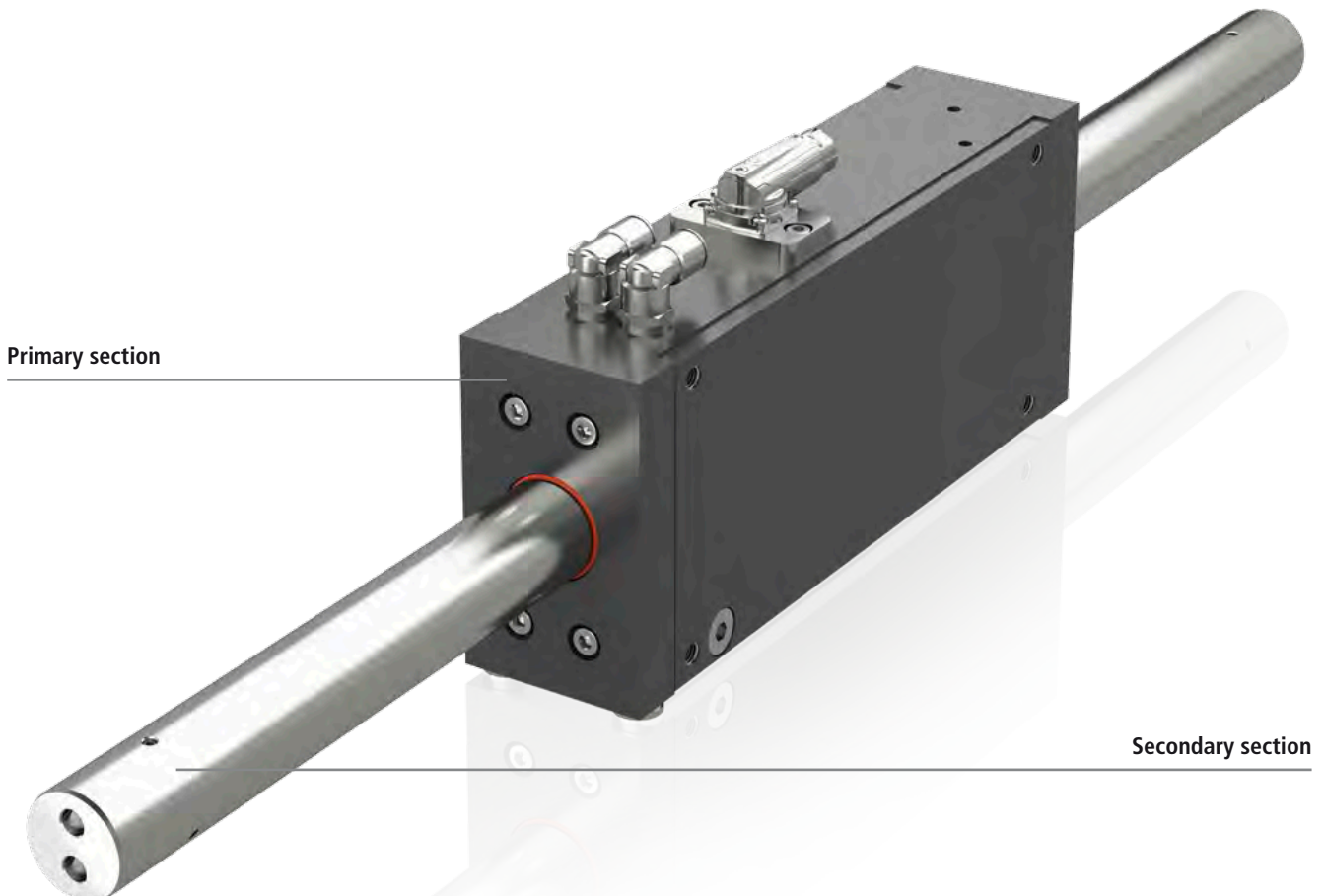
► www.beckhoff.com/AA2518

The ironless tubular motor executes a translatory movement without any detent torque and thus enables not only dynamic, but also very even and high-resolution motion profiles. It does not require any other mechanical element such as a spindle. Thanks to its compact design as well as high precision and dynamics, the motor is ideal for use in packaging machines and machine tools as well as in the paper, textile and food industries.

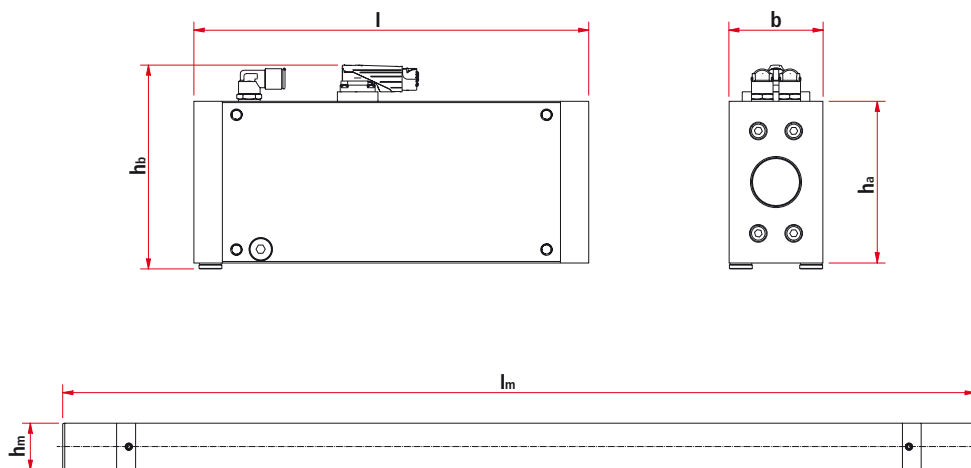
The water-cooled AA2518 tubular motor offers a peak force of 1050 N and a maximum speed of 8 m/s. It can be operated with standard linear encoders. On the one hand, due to the minimised mechanical part and only a few moving parts, it can be integrated into the respective machine or system without great effort. On the other hand, it is extremely compact and cost-effective to use. The AA2518 is both backlash-free and low-wear, so that main-

tenance costs are significantly lower than, for example, when using spindles. Typically for a linear motor, the movement can take place either via the primary or the secondary component, depending on requirements. In addition, the tubular motor offers the advantage of the high IP 65 protection.

The product portfolio is completed with compatible secondary components and ready-to-connect cables.



AA2518 | Compact tubular motor for translatory movements



Dimensions	b	l	ha	hb	lm	hm
AA2518-2HN0-1001	70 mm	293 mm	120 mm	151.37 mm	–	–
AA2500-0766-0000	–	–	–	–	766 mm	35 mm
AA2500-1000-0000	–	–	–	–	1000 mm	35 mm

Technical data	AA2518
Motor type	linear tubular motor
Rated supply voltage	400...480 V AC
Magnet material	neodymium-iron-boron
Max. speed	8 m/s
Peak force	1050 N
Peak current	15 A
Continuous force	370 N
Continuous current	4.7 A
Cooling	water cooling
Connection method	itec® plug
Corresponding Servo Drive	AX5x06, AX5112
Rated speed	8 m/s
Further information	www.beckhoff.com/AA2518

Ordering information	
i AA2518-2HN0-1001	primary component: tubular motor, 400/480 V AC, Fn = 370 N, In = 4.7 A, water cooling, with itec® plug
i AA2500-0766-0000	secondary component: magnetic rod, lm = 766 mm
i AA2500-1000-0000	secondary component: magnetic rod, lm = 1000 mm

Ordering information	Motor cables 1 mm ² for AA2518 at AX5000 and AX8000
ZK4500-8022-xxxx	Highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 81 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1 mm ² + (2 x 0.75 mm ²) + (2 x AWG22)).
ZK4800-8022-xxxx	Highly flexible, drag-chain suitable cable with 5 million bending cycles, max. 240 m/min, max. 30 m/s ² , min. bending radius = 81 mm (7 x OD), max. drag-chain length horizontal 20 m, vertical 5 m, (4 x 1 mm ² + (2 x 0.75 mm ²) + (2 x AWG22)). The cable is UL and CSA listed.

i For availability status see Beckhoff website at: www.beckhoff.com/AA2518

Compact Drive Technology

► www.beckhoff.com/compact-drive-technology

Ultra-compact servo output stages

- seamless integration into the EtherCAT I/O system
- for highly dynamic positioning tasks
- EtherCAT Terminal (EL), EtherCAT Box (EP) and EtherCAT plug-in module (EJ)
- complete servo drive with STO input (Safe Torque Off)
- 2 feedback options: OCT, resolver
- adapted to AM8100

See page **336**



AM8100 | Compact Synchronous Servomotors with OCT

- 0.2 to 2.4 Nm standstill torque
- integrated 18 or 24-bit absolute encoder (multi-turn or single-turn)
- dynamic servomotor from flange code 40 mm (F1)
- electronic type plate
- further ordering options for optimised axis matching
- suitable connecting cables for plug-and-play installation

See page **462**

AA1000 | Linear actuator with integrated power electronics

- up to 800 N peak force
- absolute stroke measuring system (0.01 mm)
- protective low voltage range (48 V DC)

See page **460**





AMI8100 | Compact integrated servo drive

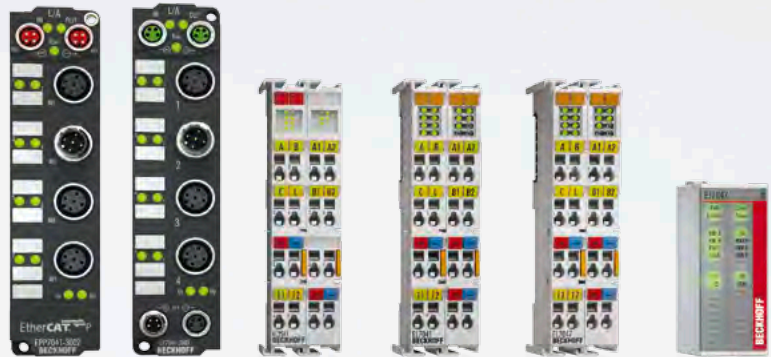
- servomotor, power stage and fieldbus connection in one
- for all motion requirements up to 400 W
- no control cabinet, no upstream I/O level necessary
- EtherCAT slave can be placed directly at the machine

See page 456

Ultra-compact stepper motor output stages

- seamless integration into the I/O system
- EtherCAT Terminal (EL), Bus Terminal (KL), EtherCAT/EtherCAT P Box (EP/EPP) and EtherCAT plug-in module (EJ)
- 1 to 5 A output current
- vector control for highly dynamic positioning tasks (EL7037/EL7047/EJ7047)
- assembled connecting cables

See page 336



AG2250 | Planetary gear units for servo and stepper motors

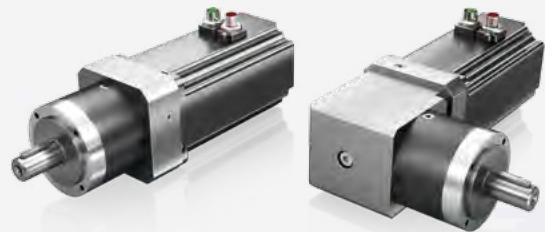
- straight or angled design
- low torsional backlash
- suitable for AMI8100, AM8100, AS2000

See page 466

AS2000 | Stepper motors in industrial design up to 8 Nm

- stepper motor with 1.8°/200 full steps
- flanges: NEMA23, NEMA34
- 0.8 to 8.0 Nm standstill torque
- industrial design and high protection class (IP 54)
- optionally with torsionally rigid integrated encoder (1024 inc/rev) for vector control

See page 468

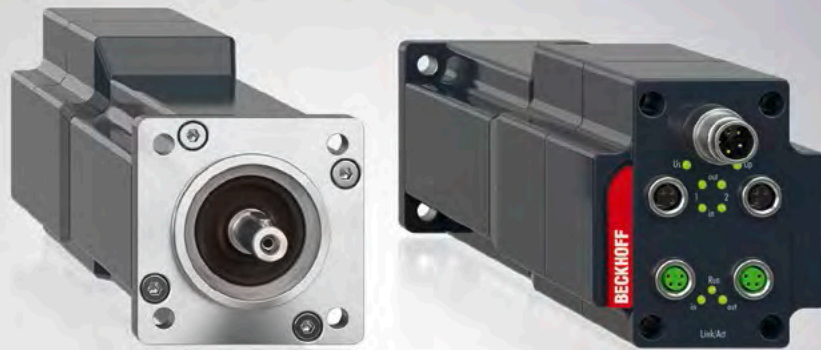


AS1000 | Stepper motors up to 5 Nm

- stepper motor with 1.8°/200 full steps
- flanges: NEMA17, NEMA23, NEMA34
- 0.4 to 5.0 Nm standstill torque
- ready for connection, with cable outlet
- optionally with encoder

See page 472





AMI8100 | Compact integrated servo drive

In the compact drive technology product range (up to 48 V DC), the newly integrated AMI812x servo drive combines servomotor, output stage and fieldbus connection in a space-saving design for all motion requirements in the power range up to 400 W. As an EtherCAT slave, the AMI812x can be placed directly on the machine without control cabinet and without upstream I/O level, allowing for the implementation of compact machines without control cabinets. On introduction to the market, the series consists

of three overall lengths in the F2 flange code with standstill torques from 0.5 to 1.1 Nm. The AMI812x is optionally available with an absolute multi-turn encoder without battery backup and with an optional backlash-free holding brake. With the additional sealing ring, it achieves high IP 65 protection rating and is suitable for all installation positions.

The fast control technology, based on vector current and PI speed control, supports fast and highly dynamic positioning tasks.

The monitoring of numerous parameters, such as overvoltage and undervoltage, overcurrent or the motor load via the calculation of an I²T model, offers maximum operational reliability. The operating state is displayed by the integrated status LEDs. Electronics and motor are supplied via the M12 power interface, while the M8 bus interface for EtherCAT offers a second port for simple cascading of the topology. The I/O interface (M8) enables the direct connection of two sensors or actuators in

the 24 V DC signal range up to 0.5 A. The connection cables are available with a straight and angled outlet. The AMI812x is configured as a complete EtherCAT slave via TwinCAT or the EtherCAT master. The AMI812x is fully integrated in the TE5910 TC3 Motion Designer. Extremely high torques can also be achieved with the matching planetary gear unit from the AG2250 series.

Electronic data	AMI812x
Motor type	permanent magnet-excited three-phase synchronous motor with integrated servo drive
Power interface	1 x M12 plug, 5-pin, screw type, L-coded
Protocol	EtherCAT
Bus interface	2 x M8 socket, shielded, screw type
Number of digital inputs/outputs	2 x digital input 24 V DC/0.5 A or 2 x digital output 24 V DC/0.5 A
I/O interface	2 x M8 socket, screw type, 3-pin
PWM clock frequency	16 kHz
Current controller frequency	32 kHz
Supply voltage electronics	24 V DC (via power interface)
Current consumption from U _s	typ. 100 mA + 300 mA break + I/Os
Supply voltage power	8...48 V DC (via power interface)
Coating/surface	dark gray powder coating, similar to RAL7016
Protection class	IP 54
Approvals/markings	CE, EAC, UL in preparation

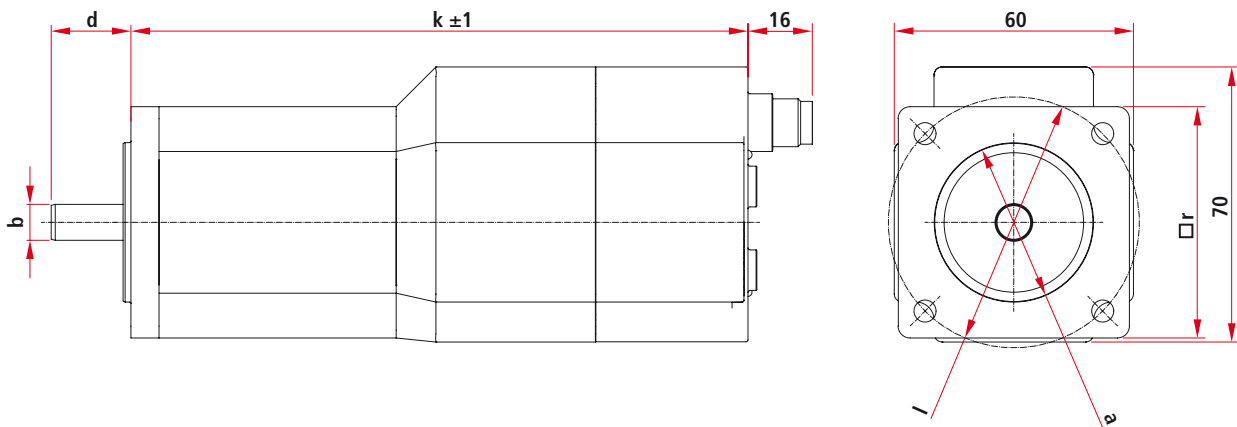
Ordering options

You will find the possible ordering options for the motors listed in this table.

Order reference	AMI81uv-ab00-wxyz
u	flange code F2
v	motor length
a = 3	feedback: single-turn absolute encoder, absolute position within one revolution, 17 bit resolution
a = 4	feedback: multi-turn absolute encoder, absolute position within 65,536 revolutions, 17 bit resolution
b = 0	without TwinSAFE
w = 0	smooth shaft
w = 1	shaft with groove and feather key according to DIN 6885
w = 2	shaft with IP 65 sealing ring and smooth shaft
w = 3	shaft with IP 65 sealing ring and shaft with groove and feather key according to DIN 6885
x	winding code
y = 1	communication interface: EtherCAT
z = 0	without holding brake
z = 1	with holding brake
	The options cannot be installed in the field.

AMI812x | Flange code F2, motor length 1 – 3

Data for 48 V DC	AMI8121-ab00-wFyz	AMI8122-ab00-wFyz	AMI8122-ab00-wJyz	AMI8123-ab00-wJyz
Standstill torque	0.5 Nm	0.7 Nm	0.7 Nm	1.1 Nm
Rated speed	3000 min ⁻¹	2000 min ⁻¹	4500 min ⁻¹	3000 min ⁻¹
Standstill current	4.00 A	4.00 A	8.00 A	8.00 A
Rotor moment of inertia	0.139 kgcm ²	0.258 kgcm ²	0.258 kgcm ²	0.378 kgcm ²
Rotor moment of inertia incl. brake (J)	0.208 kgcm ²	0.328 kgcm ²	0.328 kgcm ²	0.448 kgcm ²
Weight	1.31 kg	1.62 kg	1.62 kg	2.02 kg
Weight incl. brake (m)	1.48 kg	1.98 kg	1.98 kg	2.52 kg
Holding torque brake	2.0 Nm			
Power consumption (brake) at 24 V DC	10 W			



Dimensions	a	b	d	l	r	k (without brake)	k (with brake)
AMI8121	40 j6	9 k6	20 mm	63 mm	58 mm	155 mm	190 mm
AMI8122	40 j6	9 k6	20 mm	63 mm	58 mm	177 mm	212 mm
AMI8123	40 j6	9 k6	20 mm	63 mm	58 mm	199 mm	234 mm

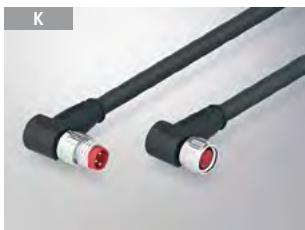
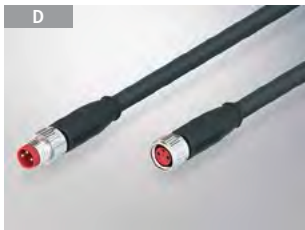
► www.beckhoff.com/AMI8100

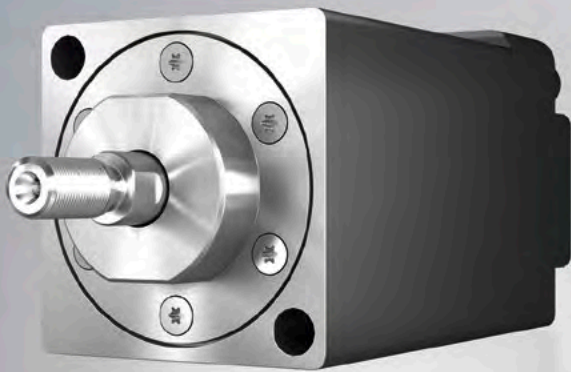
Connection cables for AMI8100 integrated servo drive

Ordering information	Bus interface: EtherCAT connection cables M8	Pict.
ZK1090-3131-0xxx	M8, plug, straight, male, 4-pin, A-coded – M8, plug, straight, male, 4-pin, A-coded	A
ZK1090-3333-0xxx	M8, plug, angled, male, 4-pin, A-coded – M8, plug, angled, male, 4-pin, A-coded	H
ZK1090-3191-0xxx	M8, plug, straight, male, 4-pin, A-coded – RJ45, plug, straight, male, 8-pin	B

Ordering information	I/O interface: connection cables M8	Pict.
ZK2000-2100-0xxx	M8, plug, straight, male, 3-pin – open end	C
ZK2000-2122-0xxx	M8, plug, straight, male, 3-pin – M8, socket, straight, female, 3-pin	D
ZK2000-2124-0xxx	M8, plug, straight, male, 3-pin – M8, socket, angled, female, 3-pin	E
ZK2000-2162-0xxx	M8, plug, straight, male, 3-pin – M12, socket, straight, female, 4-pin, A-coded	F
ZK2000-2300-0xxx	M8, plug, angled, male, 3-pin – open end	I
ZK2000-2322-0xxx	M8, plug, angled, male, 3-pin – M8, socket, straight, female, 3-pin	J
ZK2000-2324-0xxx	M8, plug, angled, male, 3-pin – M8, socket, angled, female, 3-pin	K
ZK2000-2362-0xxx	M8, plug, angled, male, 3-pin – M12, socket, straight, female, 4-pin, A-coded	

Ordering information	Power interface: motor connection cables M12	Pict.
ZK2050-5200-0xxx	M12, socket, straight, female, 5-pin, L-coded – open end (5 G 1.5 mm ²)	G
ZK2050-5400-0xxx	M12, socket, angled, female, 5-pin, L-coded – open end (5 G 1.5 mm ²)	L
ZK2051-5200-0xxx	M12, socket, straight, female, 5-pin, L-coded – open end (5 G 2.5 mm ²)	
ZK2051-5400-0xxx	M12, socket, angled, female, 5-pin, L-coded – open end (5 G 2.5 mm ²)	
ZK2053-5200-0xxx	M12, socket, straight, female, 5-pin, L-coded – open end (5 G 0.75 mm ²)	
ZK2053-5400-0xxx	M12, socket, angled, female, 5-pin, L-coded – open end (5 G 0.75 mm ²)	





AA1121



AA1821

AA1000 | Linear actuators with integrated power electronics

The linear actuators set new standards for the electronic control of valves and linear adjusting units. The complete adjustment axis is available as standard version AA1121 and as hygienic design version AA1821 in stainless steel. The AA1821 is ideal for use in the food, pharmaceutical and chemical industries due to its corner- and edge-free

design and IP 69K protection class.

Both versions are operated with a protective low voltage < 48 V DC. The AA1121 standard variant is equipped with a robust M12 plug. The field-bus connections for EtherCAT IN/OUT are realised with M8 plugs. The stainless steel AA1821 version has a direct cable outlet and, with a

power consumption of 15 W, is extremely energy-efficient.

Communication is simple and fast via EtherCAT. In addition, an absolute stroke measuring system with an accuracy of 0.01 mm is integrated. Previously necessary limit switches are not required. In comparison with conventional pneumatics, the linear actuator achieves a much higher positioning accu-

racy, resulting in higher process safety. Depending on the application, the use of an electronic actuator can save up to 75 % energy in comparison with pneumatic actuators.

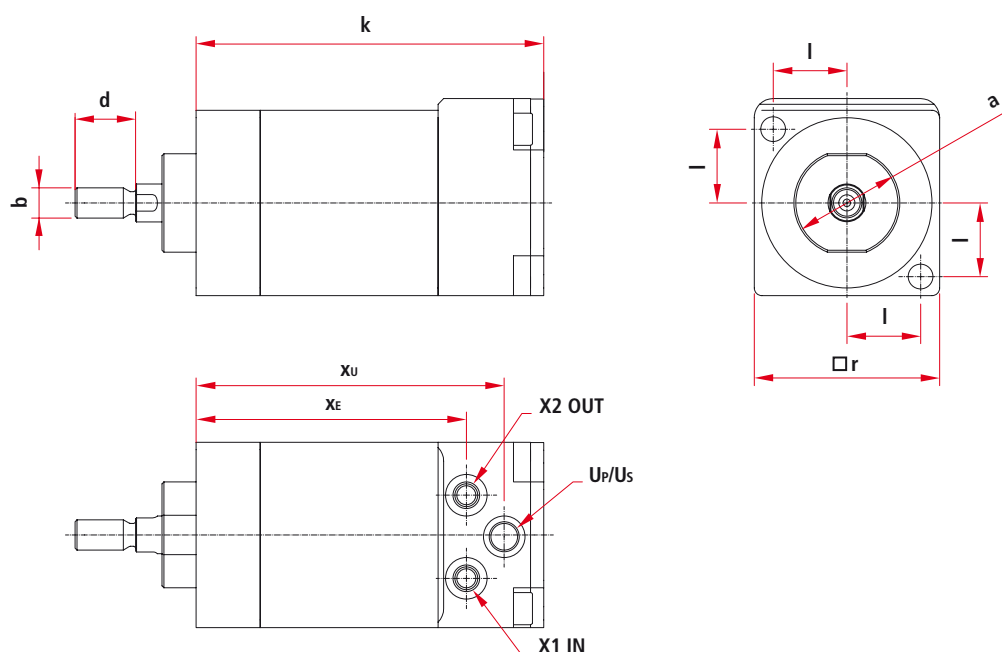
Software and pre-assembled cables round off the product range.

Technical data	AA1121	AA1821
Motor type	linear actuator with integrated servo drive	stainless steel linear actuator
Rated supply voltage	24...48 V DC	
Magnet material	neodymium-iron-boron	
Insulation class	thermal class F (155 °C)	
Design form	flange-mounted according to IM B5, IM V1, IM V3	flange-mounted according to IM B14, IM V1, IM V3
Protection class	IP 54	IP 69K, PTFE double-lip shaft seal with FDA approval
Cooling	convection, permissible ambient temperature 40 °C	
Materials	aluminium, coated	AISI 316L
Temperature sensor	integrated in stator winding	
Connection method	M12, screw type	direct cable outlet via cable gland with connected B17 coupling plug
Protocol	EtherCAT	
Bus interface	2 x M8 socket, shielded, screw type	–
Feedback system	integrated absolute encoder (resolution 0.01 mm)	

AA1121, AA1821 | Flange code A2, motor length 1

Data for 24...48 V DC	AA1121	AA1821
Continuous force	270 N*	148 N*
Peak force (F _P)	800 N	
Standstill force	300 N	162 N
Rated current	3.05 A	1.85 A
Peak current	I _{rms} = 17.5 A	
Standstill current	I _{rms} = 3.8 A	I _{rms} = 2.0 A
Max. movement	10 mm	
Max. speed	100 mm/s	
Max. acceleration	7 m/s ²	
Protection class	IP 54	IP 69K
Dimensions (r x length)	49 mm x 49 mm x 92 mm (flange square x overall length)	60 mm x 112.5 mm (flange diameter x overall length)

*depending on the thermal connection



Dimensions	a	b	d	xE	xU	l	r	k
AA1121	ø28	M8	16 mm	71.5 mm	81.5 mm	19.5 mm	49 mm	92 mm

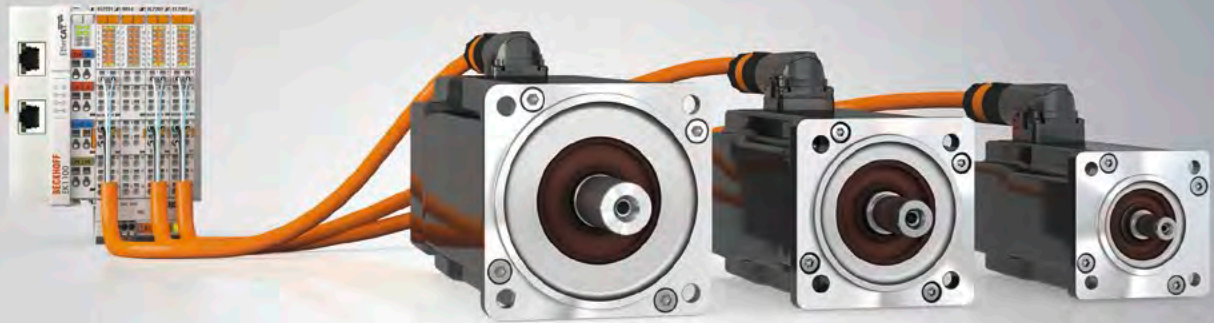
Supply cables for AA1121 linear actuators

Ordering information	
ZK1090-3131-0xxx	M8, plug, straight, male, 4-pin, A-coded – M8, plug, straight, male, 4-pin, A-coded
ZK1090-3191-0xxx	M8, plug, straight, male, 4-pin, A-coded – RJ45, plug, straight, male, 8-pin
ZK2000-6100-0xxx	M12, plug, straight, male, 4-pin, A-coded – open end

i For availability status see Beckhoff website at: www.beckhoff.com

► www.beckhoff.com/AA1121

► www.beckhoff.com/AA1821



AM8100 | Servomotors for compact Drive Technology

The AM8100 servomotors from the AM8000 series are especially designed for operation with the Servo I/Os. The high dynamics of the servomotors open up a multitude of possible applications: for example in industrial robots for pick-and-place applications, or in general in mechanical engineering, where a compact design and high positioning accuracy are necessary. Like all motors of the AM8xxx family they are available in One Cable Technology (OCT) versions where power

and feedback are combined in a single cable.

Homing is no longer necessary thanks to the absolute value encoder integrated in the motor: the position of the drive is saved in the EEPROM, which is ideal for adjustable axes. The encoder data are transmitted entirely digitally to the Servo I/Os via the motor cable. The encoder cable can be dispensed with. The full integration of the servo terminal in the Beckhoff control system facilitates the commissioning of

the drive axis. All motors of the AM8xxx family use the electronic type plate, with which the engineering expenditure is additionally reduced by the simple reading of the motor parameters. The Beckhoff TwinCAT automation software enables the convenient parameterisation of the servomotors.

The AM81xx motors can optionally be equipped with a backlash-free permanent magnet holding brake, a sealing ring or a feather key groove. They are

equipped with a sturdy rotary resolver encoder and for the purpose of long life have been developed with generously dimensioned bearings for general mechanical engineering. Matching gears and prefabricated connecting cables complete the ultra-compact drive axis.

Technical data	AM81xx
Motor type	permanent magnet-excited three-phase synchronous motor
Magnet material	neodymium-iron-boron
Insulation class	thermal class F (155 °C)
Design form	flange-mounted according to IM B5, IM V1, IM V3
Protection class	IP 54, IP 65 (shaft seal only for AM812x, AM813x, AM814x)
Cooling	convection, permissible ambient temperature 40 °C
Coating/surface	dark grey powder coating, similar to RAL7016
Temperature sensor	integrated in stator winding
Connection method	round plug connector, swivelling, angled
Life span	$L_{10h} = 30,000$ hrs for ball bearings
Approvals/markings	CE, UL (AM811x: UL in preparation)
Feedback system	resolver, OCT

Ordering options

You will find the possible ordering options for the listed motors in this table. The options cannot be retrofitted. All specified electrical values are RMS values. The specifications for the connection technology (size of the connector) apply to motors with OCT. For motors with standard 2-cable configuration, the size of the power and feedback connector is determined by the ytec® technology.

Order reference	AM81uv-wxyz
u	flange code F
v	motor length
w = 0	smooth shaft
w = 1	shaft with groove and feather key according to DIN 6885
w = 2	smooth shaft with IP 65 sealing ring (only for AM812x, AM813x, AM814x)
w = 3	shaft with IP 65 sealing ring and shaft with groove and feather key (only for AM812x, AM813x, AM814x)
w = 4	shaft with IP 65 sealing ring, smooth shaft and sealing air connection (not for AM811x)
w = 5	shaft with IP 65 sealing ring, shaft with groove and feather key and sealing air connection (not for AM811x)
x	winding code
y = 0	2-cable standard: feedback resolver
y = 1	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, single-turn, absolute position within one revolution, 18 bit resolution
y = 2	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, multi-turn, absolute position within 4096 revolutions, 18 bit resolution
y = G	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, single-turn, absolute position within one revolution, resolution 24 bit
y = H	One Cable Technology for power and feedback: feedback transmission via motor cable, no feedback cable necessary, electronic identification plate, multi-turn, absolute position within 4096 revolutions, resolution 24 bit
z = 0	without holding brake
z = 1	with holding brake
	All electric quantities are RMS values.
	The options cannot be installed in the field.

AM811x | Flange code F1, motor length 1 – 3

Data for 24...48 V DC	AM8111-wFyz	AM8112-wFyz	AM8113-wFyz
Standstill torque	0.20 Nm	0.38 Nm	0.52 Nm
Rated torque	0.19 Nm	0.36 Nm	0.50 Nm
Rated speed	4000 min ⁻¹	4500 min ⁻¹	3000 min ⁻¹
Rated power	0.08 kW	0.17 kW	0.16 kW
Standstill current	2.85 A	4.7 A	4.8 A
Rotor moment of inertia	0.029 kgcm ²	0.048 kgcm ²	0.067 kgcm ²
Rotor moment of inertia (with brake)	0.052 kgcm ²	0.071 kgcm ²	0.090 kgcm ²
EtherCAT Terminal	EL7201-0010	EL7211-0010	EL7211-0010
EtherCAT plug-in module	EJ7211-0010		
EtherCAT Box	EP7211-0034		
Connection technology	itec® plug		
One Cable Technology (OCT)	yes		

AM812x | Flange code F2, motor length 1 – 2

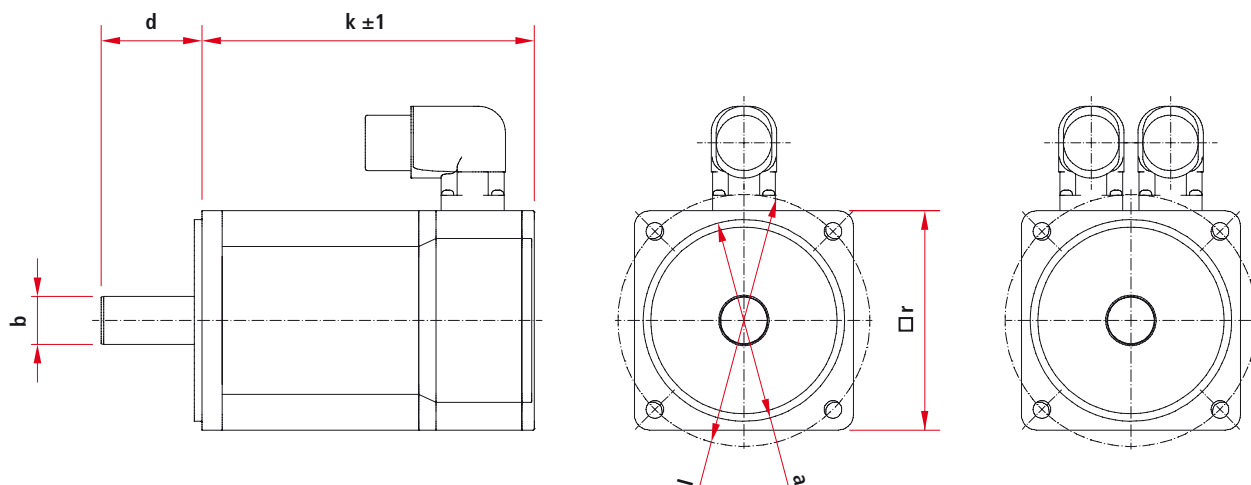
Data for 24...48 V DC	AM8121-wFyz	AM8122-wFyz	AM8122-wJyz
Standstill torque	0.50 Nm	0.80 Nm	0.80 Nm
Rated torque	0.50 Nm	0.80 Nm	0.75 Nm
Rated speed	3000 min ⁻¹	2000 min ⁻¹	4500 min ⁻¹
Rated power	0.16 kW	0.17 kW	0.35 kW
Standstill current	4.0 A	4.0 A	8.0 A
Rotor moment of inertia	0.134 kgcm ²	0.253 kgcm ²	0.253 kgcm ²
Rotor moment of inertia (with brake)	0.204 kgcm ²	0.324 kgcm ²	0.324 kgcm ²
EtherCAT Terminal	EL7211-0010	EL7211-0010	EL7221-9014
EtherCAT plug-in module	EJ7211-0010	EJ7211-0010	–
EtherCAT Box	EP7211-0034		
Connection technology	itec® plug		
One Cable Technology (OCT)	yes		

AM813x | Flange code F3, motor length 1 – 2

Data for 24...48 V DC	AM8131-wFyz	AM8131-wJyz	AM8132-wJyz
Standstill torque	1.35 Nm	1.35 Nm	2.37 Nm
Rated torque	1.35 Nm	1.34 Nm	2.35 Nm
Rated speed	1000 min ⁻¹	1800 min ⁻¹	1000 min ⁻¹
Rated power	0.14 kW	0.25 kW	0.25 kW
Standstill current	5.0 A	8.0 A	8.0 A
Rotor moment of inertia	0.462 kgcm ²	0.462 kgcm ²	0.842 kgcm ²
Rotor moment of inertia (with brake)	0.541 kgcm ²	0.541 kgcm ²	0.921 kgcm ²
EtherCAT Terminal	EL7211-0010	EL7221-9014	EL7221-9014
EtherCAT plug-in module	EJ7211-0010	–	–
EtherCAT Box	EP7211-0034		
Connection technology	itec® plug		
One Cable Technology (OCT)	yes		

AM814x | Flange code F4, motor length 1

Data for 24...48 V DC	AM8141-wJyz
Standstill torque	2.40 Nm
Rated torque	2.40 Nm
Rated speed	1000 min ⁻¹
Rated power	0.25 kW
Standstill current	8.0 A
Rotor moment of inertia	1.08 kgcm ²
Rotor moment of inertia (with brake)	1.73 kgcm ²
EtherCAT Terminal	EL7221-9014
EtherCAT plug-in module	–
EtherCAT Box	EP7211-0034
Connection technology	itec® plug
One Cable Technology (OCT)	yes



Dimensions	a	b	d	l	r	k (without brake)	k (with brake)
AM8111	30 h7	8 h7	25 mm	46 mm	40 mm	97 mm	129 mm
AM8112	30 h7	8 h7	25 mm	46 mm	40 mm	117 mm	149 mm
AM8113	30 h7	8 h7	25 mm	46 mm	40 mm	137 mm	169 mm
AM8121	40 j6	9 k6	20 mm	63 mm	58 mm	111.5 mm	146 mm
AM8122	40 j6	9 k6	20 mm	63 mm	58 mm	133.5 mm	168 mm
AM8131	60 j6	14 k6	30 mm	75 mm	72 mm	129 mm	168 mm
AM8132	60 j6	14 k6	30 mm	75 mm	72 mm	154 mm	194 mm
AM8141	80 j6	19 k6	40 mm	100 mm	87 mm	132 mm	179.5 mm

► www.beckhoff.com/AM81xx

Accessories for AM8100 servomotors

Supply cables for servomotor terminals with OCT (and STO)

Ordering information	Suitable for servomotors with OCT	Pict.
ZK4704-0461-2xxx	motor cable for OCT feedback, torsion-resistant, (4 x 0.75 mm ² + (2 x 0.34 mm ²) + (2 x AWG22)), shielded	
ZK4701-0461-2xxx	extension cable	
ZK4704-0421-2xxx	motor cable for OCT feedback, drag-chain suitable, (4 x 0.75 mm ² + (2 x 0.34 mm ²) + (2 x AWG22)), shielded ⁽¹⁾	A
ZK4701-0421-2xxx	extension cable	

⁽¹⁾ Available in metres up to 20 m (2xxx = length in decimetres, e.g. -2010 = 1 m)

Supply cables for servomotor terminals with resolver

Ordering information	Suitable for servomotors with resolver feedback	Pict.
ZK4704-0411-2xxx	motor cable for resolver feedback, drag-chain suitable, (4 x 0.75 mm ² + (2 x 0.5 mm ²)), shielded ⁽¹⁾	
ZK4724-0410-2xxx	resolver cable for AM31xx/AM81xx servomotors to EL7201 EtherCAT Terminal	B

⁽¹⁾ Available in lengths of 1 m, 3 m, 5 m, 10 m and 20 m (2xxx = length in decimetres, e.g. -2010 = 1 m)

Technical data for drag-chain use ► www.beckhoff.com/compact-drive-technology





AG2250 | Planetary gear units for compact Drive Technology

The AG2250 planetary gears are especially matched to the AM8100 motor series and have been expanded by a 2-stage version. For better design, planetary and angled planetary gears are available with the following transmission ratios: 12, 16, 20, 25, 32, 40 and 64.

The 1-stage variants of the (W)PLE60 and (W)PLE80 sizes are ideally suited for the AS2000 stepper motor series.

The AG2250 series completes the range of small, affordable drive technology products. The gears are especially suited to applications where no particu-

larly low torsional backlash is required. The inertia ratios, the required torques and the suitable motors can be conveniently calculated directly in TwinCAT with the TC Motion Designer. In addition, the tool checks in a single step whether the selected motor can be adapted to the gear unit.

The planetary gear units are fitted to the respective motor in the factory and delivered as a complete motor/gear unit. The AG2250 series also contains angled planetary gears for space-saving installation of motors at a right-angle.

Features

- low torsional backlash
- high output torques
- high efficiency
- 1-stage planetary gear, transmission ratios 3, 4, 5, 7, 8, 10
- 2-stage planetary gear/angled planetary gear, transmission ratios 12, 16, 20, 25, 32, 40, 64
- 1-stage angled planetary gear, transmission ratios 3, 4, 5, 7, 8, 10
- 2-stage angled planetary gear, transmission ratios 12, 16, 20, 25, 32, 40, 64
- flexible installation position
- lifetime lubrication
- suitable for motors of the AM8100 (48 V DC) and AS2000 (48 V DC) series

Technical data	AG2250
Type of gear	planetary gear/angled planetary gear
Life span	> 30,000 h / > 20,000 h
Lubrication	lubricated for life
Installation position	variable
Protection class	IP 54
Mechanically compatible with	flange code F, N (typical combination according to specifications)

Ordering options

You will find the possible ordering options for the gear units listed in this table. Please note: The options cannot be retrofitted.

Order reference	AG2250-+PLEaa-M0s-i-wXy-Motorsize
xPLEaa	series/size (PLE40, PLE60, PLE80, WPLE40, WPLE60, WPLE80)
s = 1	1-stage with i = 3/4/5/7/8/10
s = 2	2-stage with i = 12/16/20/25/32/40/64
i	gear ratio
w = 0	smooth shaft
w = 1	shaft with groove and feather key
X	identifying letter for clamping hub diameter; not available for selection, is selected automatically based on the respective motor
Motorsize	Specification of the size according to flange-compatible motors. The planetary gears are delivered as a unit with the assembled motor.
Motorsize = AM811x (F1)	flange code F1: AM801x, AM811x; compatible with AM301x
Motorsize = AM812x (F2)	flange code F2: AM802x, AM812x; compatible with AM302x
Motorsize = AM813x (F3)	flange code F3: AM813x, AM803x, AM853x; compatible with AM303x
Motorsize = AM814x (F4)	flange code F4: AM814x, AM804x, AM854x; compatible with AM304x
Motorsize = AS202x (N2)	flange code N2 (NEMA23): AS202x
Motorsize = AS204x (N3)	flange code N3 (NEMA34): AS204x

AG2250 | Size 40

Technical data	AG2250-+PLE40-M01-i	AG2250-+PLE40-M02-i	AG2250-+WPLE40-M01-i	AG2250-+WPLE40-M02-i
Variant	planetary gear	planetary gear	angled planetary gear	angled planetary gear
Gear ratio	3/4/5/7/8/10	12/16/20/25/32/40/64	3/4/5/7/8/10	12/16/20/25/32/40/64
Nominal output torque	5...15 Nm	7.5...20 Nm	4.5...8.5 Nm	7.5...20 Nm
Max. acceleration torque	8...24 Nm	12...32 Nm	7...13.5 Nm	12...32 Nm
Max. torsion. backlash standard/reduced	≤ 15/- arcmin	≤ 19/- arcmin	≤ 21/- arcmin	≤ 25/- arcmin
Typ. flange code	F1	F1	F1	F1

AG2250 | Size 60

Technical data	AG2250-+PLE60-M01-i	AG2250-+PLE60-M02-i	AG2250-+WPLE60-M01-i	AG2250-+WPLE60-M02-i
Variant	planetary gear	planetary gear	angled planetary gear	angled planetary gear
Gear ratio	3/4/5/7/8/10	12/16/20/25/32/40/64	3/4/5/7/8/10	12/16/20/25/32/40/64
Nominal output torque	15...40 Nm	18...44 Nm	14...25 Nm	18...44 Nm
Max. acceleration torque	24...64 Nm	29...70 Nm	24...40 Nm	29...70 Nm
Max. torsion. backlash standard/reduced	≤ 10/- arcmin	≤ 12/- arcmin	≤ 16/- arcmin	≤ 18/- arcmin
Typ. flange code	F2, F3, N2	F2, F3	F2, F3, N2	F2, F3

AG2250 | Size 80

Technical data	AG2250-+PLE80-M01-i	AG2250-+PLE80-M02-i	AG2250-+WPLE80-M01-i	AG2250-+WPLE80-M02-i
Variant	planetary gear	planetary gear	angled planetary gear	angled planetary gear
Gear ratio	3/4/5/7/8/10	12/16/20/25/32/40/64	3/4/5/7/8/10	12/16/20/25/32/40/64
Nominal output torque	38...115 Nm	38...115 Nm	38...67 Nm	38...67 Nm
Max. acceleration torque	61...184 Nm	61...184 Nm	61...107 Nm	61...107 Nm
Max. torsion. backlash standard/reduced	≤ 7/- arcmin	≤ 7/- arcmin	≤ 13/- arcmin	≤ 13/- arcmin
Typ. flange code	F4, N3	F4	F4, N3	F4

► www.beckhoff.com/AG2250



AS2000 | Stepper motors

The AS2000 two-phase stepper motors with a stepper angle of 1.8 degrees shrink the gap to the AM8000 high-performance servomotor. With their flange codes N2 (NEMA23) and N3 (NEMA34), the stepper motors comply with international standards. Users can select from seven models ranging from 0.8 to 8 Nm.

The AS2023 with 2.3 Nm is a logical addition in the medium performance range, because the AS2000 series of stepper motors delivers significantly improved scalability.

The design of the AS2000 series is more in line with industrial requirements. And with the higher IP 54 protection class, the motors can also be used under harsh environmental conditions. It also features easy cabling thanks to the standardised, integrated M12 high-power screwtype connector for power and the robust M12 connector for the encoder. With its torsion-proof, integrated encoder (1024 inc/rev), the motor is ideal for the Beckhoff-supported vector control of stepper motors. A non-encoder version is avail-

able as well. The vector control system minimises resonances and reduces the generation of heat and noise for servo-like operating characteristics.

All motors in the AS2000 series were designed to be used with EtherCAT stepper motor terminals EL7037 (1.5 A) and EL7047 (5 A). Commissioning them in TwinCAT is easy. To simplify the axis layout, the AS2000 stepper motors are integrated into the TC3 Motion Designer for easy dimensioning.

The motors are available with a smooth shaft (flange

code N2) or with a groove and feather key (flange code N3). Shielded motor and encoder cables are also available. They were designed for the stepper motor terminals and come preconfigured for the terminal points. With the low-backlash planetary gear of the AG2250 series in straight or angled versions, a wide range of applications can be accommodated. A new elastic coupling connector for easy machine mounting completes the portfolio.

Technical data	AS20xx
Motor type	stepper motor
Rated supply voltage	24...48 V DC
Resolution	1.8°/200 full steps
Insulation class	thermal class B (130 °C)
Design form	flange-mounted according to IM B5, IM V1, IM V3
Protection class	IP 54
Cooling	convection
Coating/surface	matt black coating RAL 9005
Connection method	M12 round plug connector
Life span	L _{10h} = 30,000 hrs for ball bearings
Approvals/markings	CE

Ordering options

You will find the possible ordering options for the listed motors in this table. The options cannot be retrofitted.
All specified electrical values are RMS values.

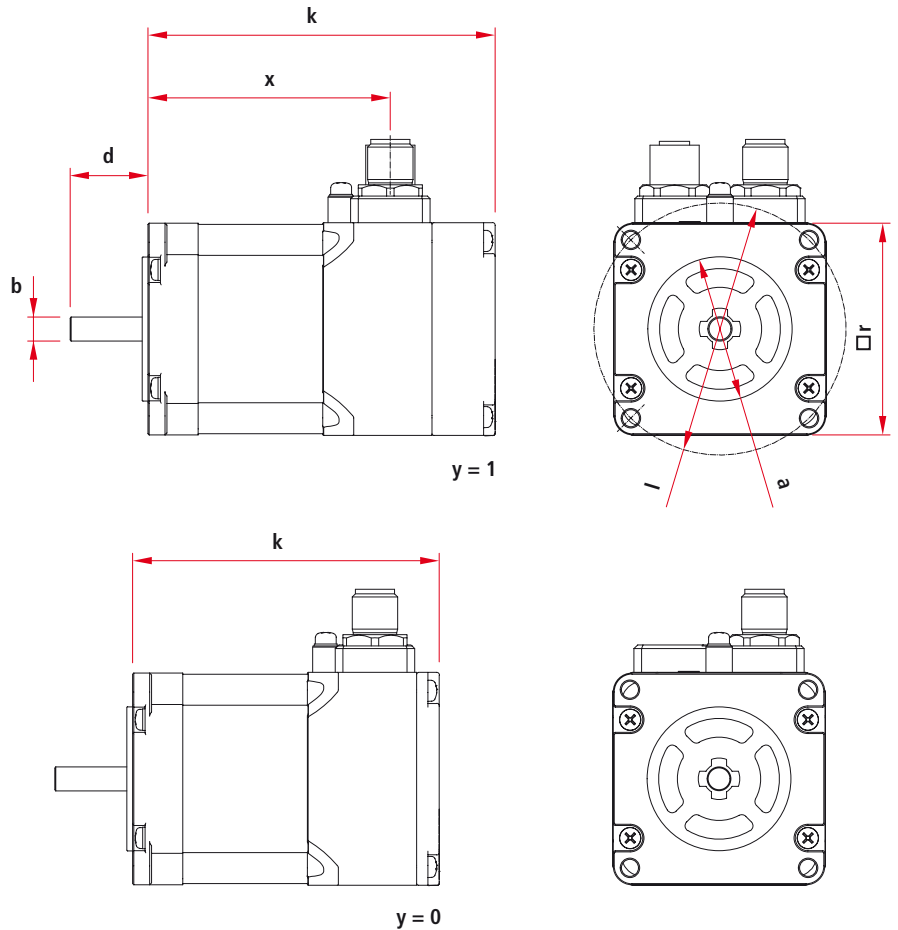
Order reference	AS20uv-wxyz
u	flange code
v	motor length
w = 0	smooth shaft (only for AS202x)
w = 1	shaft with groove and feather key according to DIN 6885 (only for AS204x)
x	winding code
y = 0	no encoder
y = 1	encoder 24 V DC, 1024 increments
z = 0	without holding brake

AS202x | Stepper motor 0.8...2.3 Nm (standstill torque), flange code N2

Data for 24...48 V DC	AS2021-0Dy0	AS2022-0Hy0	AS2023-0Hy0	AS2023-0Jy0
Flange code	N2 (NEMA23/56 mm)			
Rated supply voltage	24...48 V DC			
Rated current (per phase)	2.00 A	5.60 A	5.60 A	6.40 A
Standstill torque	0.8 Nm	1.53 Nm	1.8 Nm	2.3 Nm
EtherCAT Terminal	EL7037/EL7031	EL7047	EL7047	EL7047
EtherCAT Box	EP7041-1002	EP7041-3002	EP7041-3002	EP7041-3002
EtherCAT plug-in module	EJ7047			
Bus Terminal	KL2531	KL2541	KL2541	KL2541
Gear unit	AG2250: PLE60, WPLE60			

AS204x | Stepper motor 3.3...8.0 Nm (standstill torque), flange code N3

Data for 24...48 V DC	AS2041-1Hy0	AS2042-1Hy0	AS2043-1Jy0
Flange code	N3 (NEMA34/86 mm)		
Rated supply voltage	24...48 V DC		
Rated current (per phase)	5.60 A	5.60 A	6.50 A
Standstill torque	3.3 Nm	6.4 Nm	8.0 Nm
EtherCAT Terminal	EL7047		
EtherCAT Box	EP7041-3002		
EtherCAT plug-in module	EJ7047		
Bus Terminal	KL2541		
Gear unit	AG2250: PLE80, WPLE80		



Dimensions	a	b	d	k	k (with encoder)	x	l	r
AS2021	38.1 mm	6.35 mm	20.6 mm	80 mm	93 mm	64.1 mm	66.67 mm	56 mm (NEMA23)
AS2022	38.1 mm	6.35 mm	20.6 mm	102 mm	115 mm	86.2 mm	66.67 mm	56 mm (NEMA23)
AS2023	38.1 mm	6.35 mm	20.6 mm	121 mm	134 mm	105.1 mm	66.67 mm	56 mm (NEMA23)
AS2041	73 mm	14 mm	30 mm	89.5 mm	100 mm	71.8 mm	98.43 mm	86 mm (NEMA34)
AS2042	73 mm	14 mm	30 mm	120 mm	130.5 mm	102.3 mm	98.43 mm	86 mm (NEMA34)
AS2043	73 mm	14 mm	30 mm	150 mm	161 mm	132.7 mm	98.43 mm	86 mm (NEMA34)

Accessories for AS2000 stepper motors

Pre-assembled cables for IP 20

Ordering information	Motor and encoder cables for IP 20 I/Os	Pict.
ZK4000-7700-xxxx	AS2000 motor cable, drag-chain suitable, (4 x 0.75 mm ²), shielded, for EL703x/EL704x/KL253x/KL254x	A
ZK4000-7778-0xxx	AS2000 motor extension cable, drag-chain suitable, (4 x 0.75 mm ²), shielded, for the extension of ZK4000-7700-xxxx and ZK4000-6877-xxxx	
ZK4000-5100-2xxx	AS2000 encoder cable, drag-chain suitable, (5 x 0.25 mm ²), shielded, for EL703x/EL704x/KL253x/KL254x	B
ZK4000-5152-0xxx	AS2000 encoder extension cable, drag-chain suitable, (5 x 0.25 mm ²), shielded, for the extension of ZK4000-51xx-xxxx	

Max. cable length 10 m, available in lengths of 1 m, 3 m, 5 m and 10 m (xxx = length in decimetres, e.g. -2010 = 1 m)

Technical data for drag-chain use ► www.beckhoff.com/compact-drive-technology

Pre-assembled cables for IP 67

Ordering information	Motor and encoder cables for IP 67 I/Os	Pict.
ZK4000-6877-xxxx	AS2000 motor cable, drag-chain suitable, (4 x 0.75 mm ²), shielded, for EP704x/EJ704x	C
ZK4000-7778-0xxx	AS2000 motor extension cable, drag-chain suitable, (4 x 0.75 mm ²), shielded, for the extension of ZK4000-7700-xxxx and ZK4000-6877-xxxx	
ZK4000-5151-xxxx	AS2000 encoder cable, drag-chain suitable, (5 x 0.25 mm ²), shielded, for EP704x/EJ704x	D
ZK4000-5152-0xxx	AS2000 encoder extension cable, drag-chain suitable, (5 x 0.25 mm ²), shielded, for the extension of ZK4000-51xx-xxxx	

Max. cable length 10 m, available in lengths of 1 m, 3 m, 5 m and 10 m (xxx = length in decimetres, e.g. -x010 = 1 m)

Technical data for drag-chain use ► www.beckhoff.com/compact-drive-technology

Coupling for AS2000

Ordering information	AX2090-+ECbb-c/d
AX2090-+EC05-c/d	Elastomer coupling for flange code N2 (AS202x), available in (drive/output) 6.35/6.00 mm, 6.35/6.35 mm, 6.35/8.00 mm
AX2090-+EC10-c/d	Elastomer coupling for flange code N3 (AS204x), available in (drive/output) 14.0/14.0 mm, 14.0/16.0 mm





AS1000 | Stepper motors

The AS1000 stepper motors with flange codes from 42 to 86 mm (N1 = NEMA17, N2 = NEMA23, N3 = NEMA34) and torques from 0.4 to 5 Nm are ideally suited for use as auxiliary axes and positioning drives. They are

characterised by robustness and high holding torques. Due to the integrated micro-stepping the motors can position very well even without a feedback system and require only a motion terminal for power electronics.

Stepper motors can also be operated with TwinCAT NC PTP for synchronisation functions such as cam plates or flying saws.

Technical data	AS10xx
Motor type	stepper motor
Rated supply voltage	24...48 V DC
Resolution	1.8°/200 full steps
Insulation class	thermal class B (130 °C)
Design form	AS1010/AS1020: flange-mounted according IM B14, IM V1, IM V3, AS1030/AS1050/AS1060: flange-mounted according IM B5, IM V1, IM V3
Protection class	IP 43, AS1060: IP 20
Cooling	Free ventilation of the motors must be ensured.
Connection method	direct cable outlet via cable gland with connected M12 coupling
Life span	L _{10h} = 30,000 hrs for ball bearings
Approvals/markings	CE

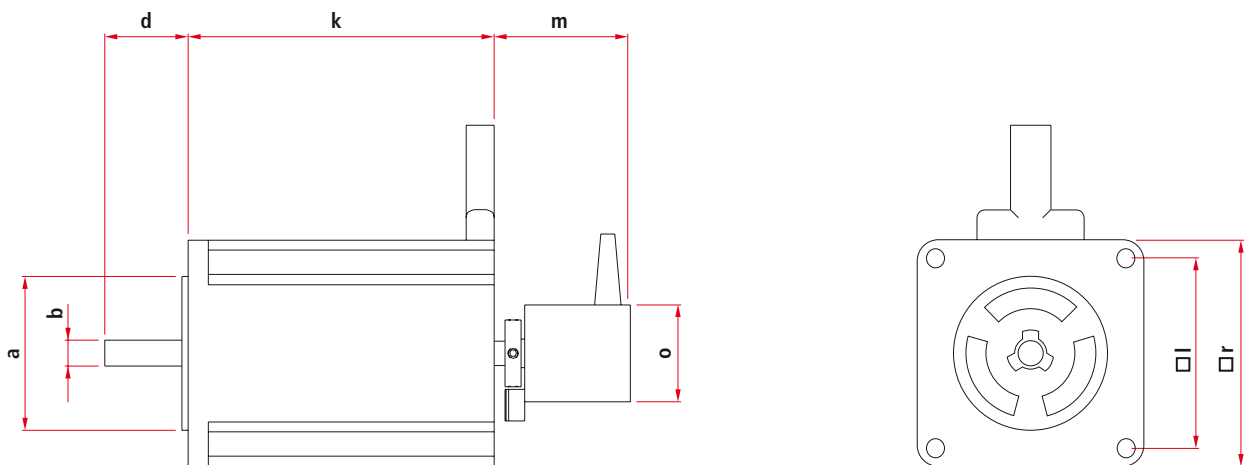
Order reference	AS10u0-wxyz
u	type
w = 0	AS1010, AS1020: smooth shaft with 1 flat, AS1030, AS1050: smooth shaft, AS1060: smooth shaft with 2 flats
w = 1	shaft with groove and feather key according to DIN 6885 (only available with AS1060)
x = 0	standard motor without second shaft
x = 1	second shaft (for AS1020/AS1050/AS1060 only), necessary for encoder
y = 0	no incremental encoder
y = 2	incremental encoder, 24 V DC, 1024 lines (only available for AS1020, AS1050, AS1060), requires x = 1

AS10xx | Rated current 1.0...1.5 A

Data for 24...48 V DC	AS1010-0000	AS1020-0xyz	AS1030-0000
Flange code	N1 (NEMA17/42 mm)	N1 (NEMA17/42 mm)	N2 (NEMA23/56 mm)
Rated current (per phase)	1.00 A	1.00 A	1.50 A
Standstill torque	0.38 Nm	0.50 Nm	0.60 Nm
Rotor moment of inertia	0.056 kgcm ²	0.074 kgcm ²	0.210 kgcm ²
Bus Terminal	KL2531	KL2531/KL2541	KL2531
EtherCAT Terminal	EL7037/EL7031	EL7047/EL7037/EL7031/EL7041	EL7037/EL7031
EtherCAT Box	EP7041-1002	EP7041-1002	EP7041-1002
Gear unit	–	–	AG1000-+PM52.i

AS10xx | Rated current 5 A

Data for 24...48 V DC	AS1050-0xyz	AS1060-wxyz
Flange code	N2 (NEMA23/56 mm)	N3 (NEMA34/86 mm)
Rated current (per phase)	5.00 A	5.00 A
Standstill torque	1.20 Nm	5.00 Nm
Rotor moment of inertia	0.360 kgcm ²	3.000 kgcm ²
Bus Terminal	KL2541	KL2541
EtherCAT Terminal	EL7047/EL7041	EL7047/EL7041
EtherCAT Box	EP7041-3002	EP7041-3002
Gear unit	AG1000-+PM52.i	AG1000-+PM81.i





Dimensions	a	b	d	k	l	m	o	r
AS1010	22 mm	5 mm	24 mm	39 mm	31 mm	–	–	42 mm (NEMA17)
AS1020	22 mm	5 mm	24 mm	48 mm	31 mm	33 mm	24 mm	42 mm (NEMA17)
AS1030	38.1 mm	6.35 mm	20.6 mm	54 mm	47.14 mm	–	–	56 mm (NEMA23)
AS1050	38.1 mm	6.35 mm	20.6 mm	75.8 mm	47.14 mm	33 mm	24 mm	56 mm (NEMA23)
AS1060	73 mm	14 mm	30 mm	96.5 mm	69.6 mm	33 mm	24 mm	86 mm (NEMA34)

► www.beckhoff.com/AS10xx

Accessories for AS1000 stepper motors

Cables for AS1000 at Bus Terminal/EtherCAT Terminal up to 5 A



Ordering information	Cables for stepper terminals EL7031, EL7037, EL7041, EL7047 and KL2531, KL2541	Pict.
ZK4000-5100-2xxx	encoder cable for ASxxxx, IP 67, PUR, (5 x 0.25 mm ²), shielded, flex, M12, plug, straight, male, 5-pin, A-coded – open end	
ZK4000-6700-2xxx	motor cable for AS1000, assembled at both ends, (4 x 0.5 mm ²), shielded, 4 million bending cycles, bending radius = 55 mm (10 x OD)	

Available in lengths of 1 m, 3 m, 5 m and 10 m (2xxx = length in decimetres, e.g. -2010 = 1 m)

Technical data for drag-chain use ► www.beckhoff.com/compact-drive-technology



Cables for AS1000 at EtherCAT Box up to 5 A

Ordering information	Cables for stepper motor EtherCAT Box EP7041	Pict.
ZK4000-5151-xxxx	encoder cable for ASxxxx, IP 67, PUR, (5 x 0.25 mm ²), shielded, flex, M12, plug, straight, male, 5-pin, A-coded – M12, plug, straight, male, 5-pin, A-coded	
ZK4000-6768-xxxx	motor cable for AS1000, assembled at both ends, (4 x 0.5 mm ²), shielded, 4 million bending cycles, bending radius = (10 x OD)	

Available in lengths of 0.5 m, 1 m, 2 m and 10 m (xxxx = length in decimetres, e.g. -0005 = 0.5 m).

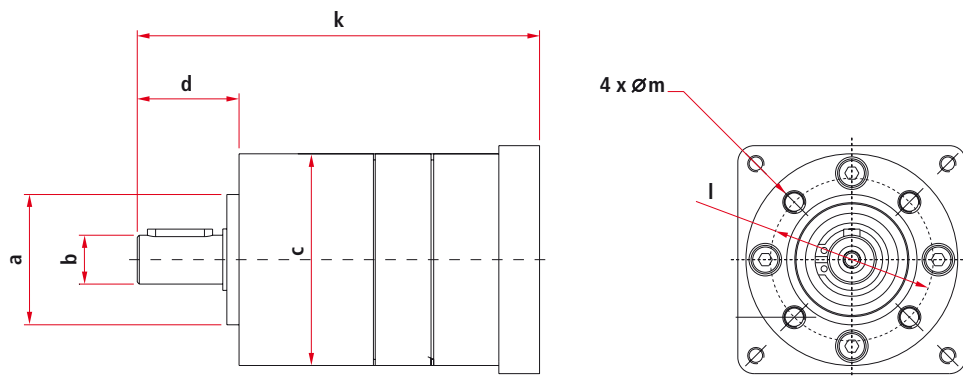
Technical data for drag-chain use ► www.beckhoff.com/compact-drive-technology



AG1000 | Planetary gear units for AS1000

Technical data	AG1000-+PM52.4	AG1000-+PM52.7	AG1000-+PM81.4	AG1000-+PM81.7
Nominal output torque	4 Nm	4 Nm	20 Nm	20 Nm
Max. acceleration torque	6 Nm	6 Nm	30 Nm	30 Nm
Gear ratio	3.7 or 63/17	6.75 or 27/4	3.7 or 63/17	6.75 or 27/4
Max. torsional backlash	≤ 0.7°	≤ 0.7°	≤ 0.5°	≤ 0.5°
Max. radial load	200 N	200 N	400 N	400 N
Efficiency	approx. 80 %			
Type of gear	planetary gear			
Weight	0.7 kg	0.7 kg	1.8 kg	1.8 kg
Available for stepper motors	AS1030, AS1050	AS1030, AS1050	AS1060	AS1060

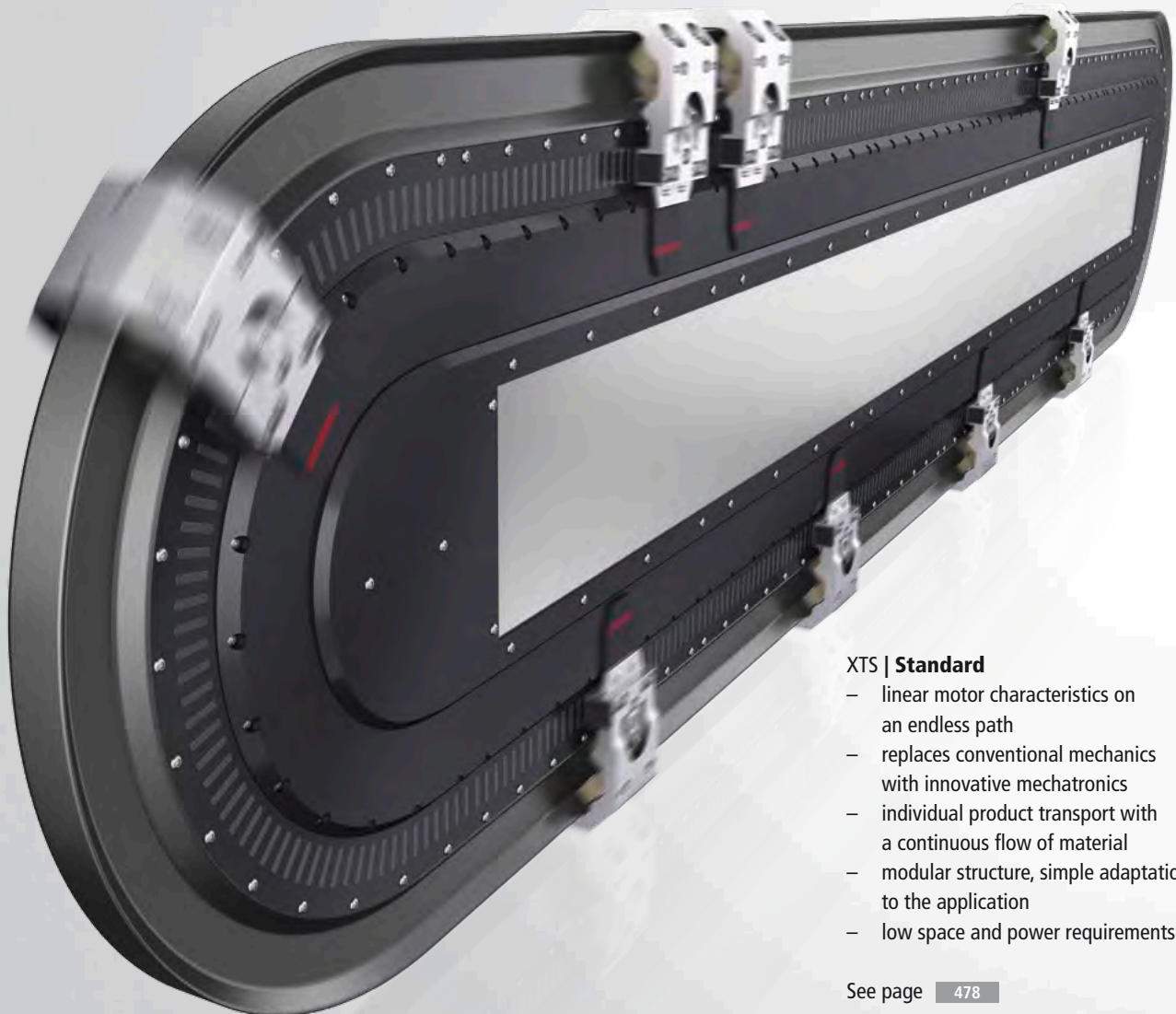
The planetary gears are delivered as a unit with the assembled stepper motor.



Dimensions	a	b	c	d	k	l	m
AG1000-+PM52.i	32 mm	12 mm	52 mm	25 mm	99.8 mm	40 mm	M5 x 10
AG1000-+PM81.i	50 mm	19 mm	81 mm	49 mm	151.2 mm	65 mm	M6 x 12

XTS | eXtended Transport System

► www.beckhoff.com/XTS



XTS | Standard

- linear motor characteristics on an endless path
- replaces conventional mechanics with innovative mechatronics
- individual product transport with a continuous flow of material
- modular structure, simple adaptation to the application
- low space and power requirements

See page **478**

XTS | **Hygienic**

- easy to clean
- chemically resistant
- stainless steel
- IP 69K protection

See page **488**



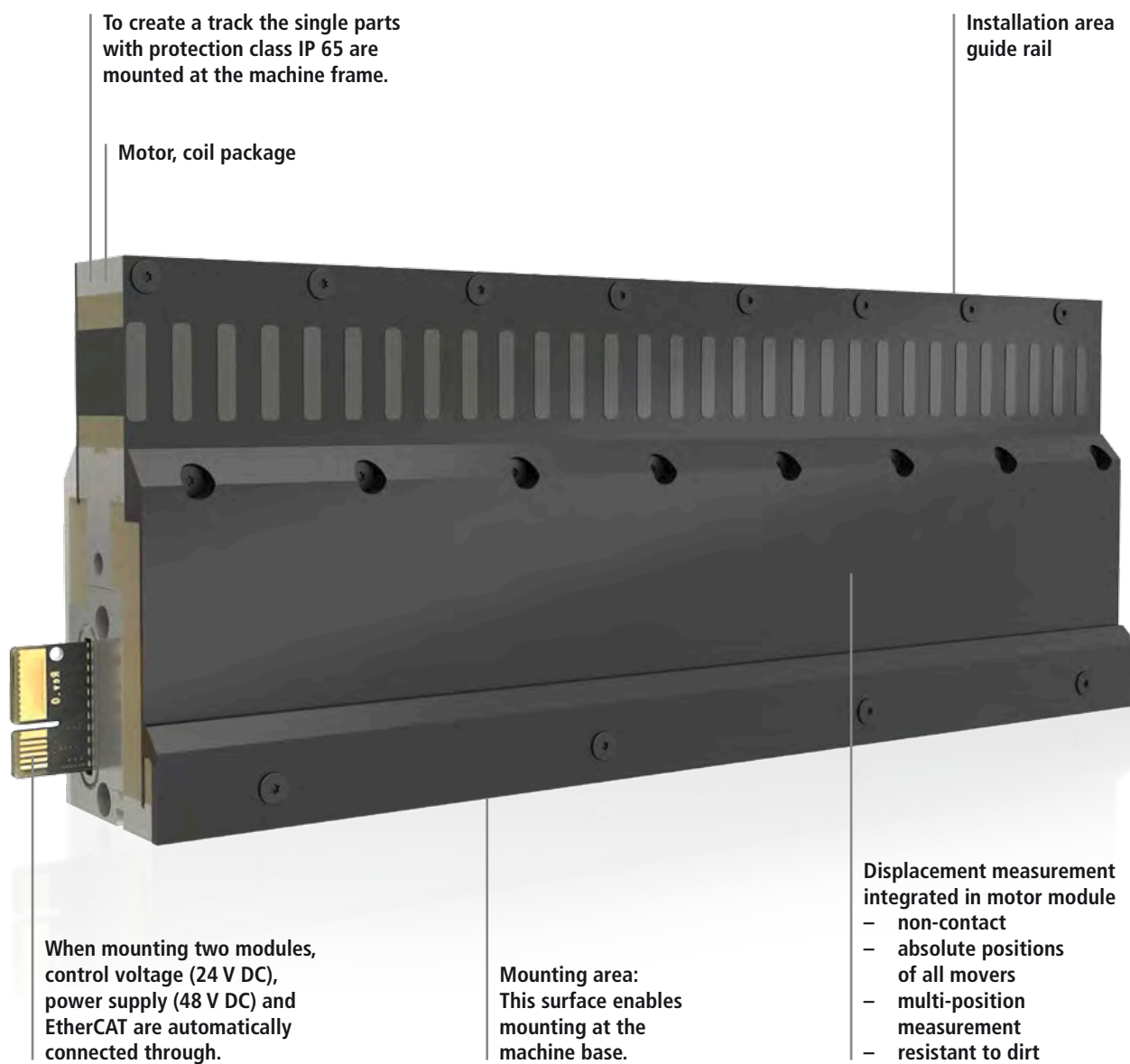
XTS | **Black Line**

- without any holes in the upper profile of the motor module
- suitable for guide rails that are not screwed onto the motor modules (e.g. GFX Hepco guide system)

See page **482**

XTS Standard | The construction kit

► www.beckhoff.com/XTS-construction-kit





Curved motor modules



Guide rail system



Mover

Motor module

The motor module contains the electromagnetic coils and all other active functions necessary for the operation of the system. Only a power supply and an EtherCAT connection are required. The motor module contains no moving parts and is not subject to any wear.

- fully integrated linear motor with power electronics and displacement measurement
- Coil arrangement and mechanical structure make up a ready-to-use unit.

Guide rail system

Movers and guide rails are optimally matched to each other. The geometry of the rail and the combination of hard anodized aluminium rail surface and running surface of the mover rollers allow good running characteristics and low wear. Lubrication of the system is not necessary.

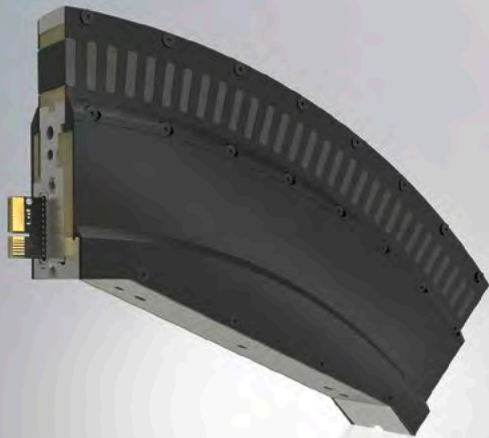
Mover

The mover contains magnetic plates which, together with the coils in the motor modules, can generate propulsive forces. It absorbs

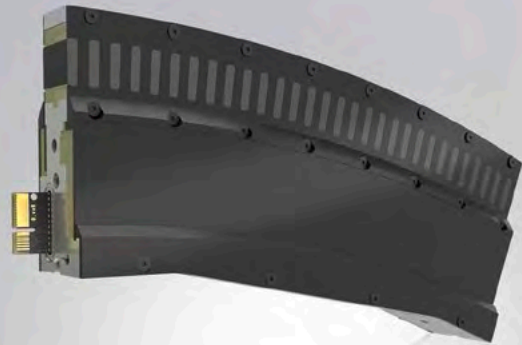
the attractive forces of the magnets on both sides and compensates them as far as possible. This allows the rollers of the mover to run at high speed in the guide rail with low wear. The rollers are equipped with a particularly wear-resistant synthetic running surface. The tensioning of the rollers prevents backlash and is at the same time designed for low wear. Consequently, the lifetime of the rollers depends on the payload. A mechanically robust encoder flag conveys the mover position to the motor module.

System properties	XTS Standard
Max. force	100 N at standstill
Continuous force	30 N (at ~30 °C temperature increase in the motor compared to mounting frame)
Speed	4 m/s @ 48 V DC supply
Acceleration	> 100 m/s ² (without payload)
Positioning accuracy	< ±0.15 mm @ 1.5 m/s possible within a straight module
Absolute accuracy	< ±0.25 mm possible within a straight module
Repeatability	< ±10 µm (standstill unidirectional)
Mover length	50 mm in direction of movement
Mover weight	approx. 410 g (complete mover without attachments)
Max. system length	> 100 m (dependent on computing power, no system limit)
Operating/storage temperature	+5...+40 °C/-25...+85 °C (for further information see documentation)
Protection class	motor modules: IP 65 (for further information see documentation)
Approvals/markings	CE, UL
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4

Electrical data	XTS Standard
Supply voltage	control voltage 24 V DC, power supply 48 V DC
Current consumption	power supply: 16 A nominal current
Power consumption 24 V DC	motor modules: 30 W/m (communication, electronics, position determination)
Length per feed	max. 3 m (voltage supply, EtherCAT)
Power consumption per mover	approx. 12 W @ 4 m/s without payload



Curved motor module, 45°



Curved motor module, +22.5°

AT20xx-0xxx | XTS motor modules

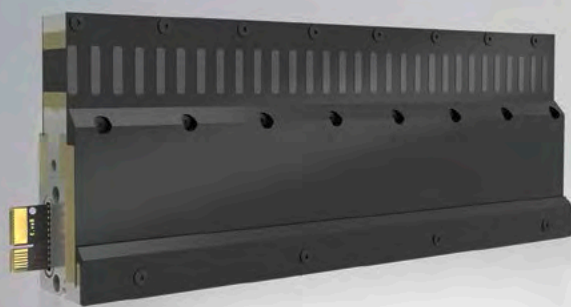
The motor module, the power electronics and the displacement measurement are built into the profile. The power electronics are optimised for the requirement and reduce assembly expenditure. There is an upper mechanical interface to the guide rail and a lower one to the support structure. Straight segments and curves can be combined arbitrarily. The geometry of the motor module without edges and openings allows easy cleaning.

Double-air-gap motor

- double-action linear motor, hence low resulting forces on the mechanical bearing and compact total solution
- displacement measurement integrated, no additional assembly, no calibration
- Tolerances are compensated automatically.
- Attractive forces neutralise each other.
- lower force effect (wear) on the guide
- Friction losses are greatly reduced.

Output stages and coil package integrated

- no cables between coil and output stage
 - no wiring expenditure
 - exclusion of errors
 - minimum mounting space
 - Output stage and coil are optimally matched to each other.
- supply voltage 48 V DC (low voltage, low safety expenditure)
- Independent supply of each individual coil with current is possible.
- arbitrary number of travelling fields/movers possible
- temperature monitoring of the output stage
- temperature model of the coils for optimum peak load use (I²T model)
- low temperature rise due to good thermal coupling to the machine bed



Straight motor module

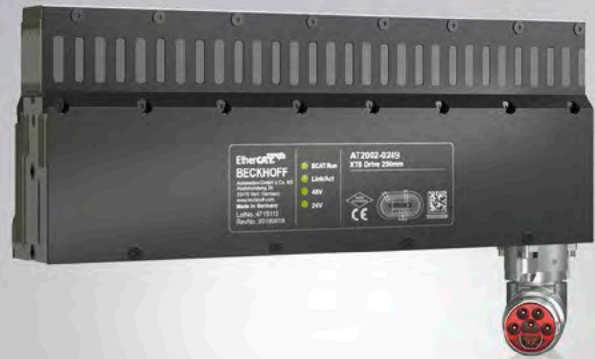


Curved motor module, 180° (clothoid)

Ordering information	XTS motor modules
AT2000-0250	motor module, straight, 48 V DC/24 V DC, 250 mm x 39.1 mm x 96 mm (L x W x H), 2.0 kg, UL-certified
AT2000-0233	motor module for L-, U-, O- and Z-shaped geometries, straight, 48 V DC/24 V DC, 233.1 mm x 39.1 mm x 96 mm (L x W x H), 1.9 kg, UL-certified
AT2001-0250	motor module with feed, straight, 48 V DC/24 V DC, cable length 5 m, 250 mm x 39.1 mm x 96 mm (L x W x H), 3.1 kg, not UL-certified
AT2001-0250-0003	motor module with feed, straight, 48 V DC/24 V DC, cable length 5 m, 250 mm x 39.1 mm x 96 mm (L x W x H), 3.1 kg, UL-certified
AT2002-0249	motor module for moving XTS track parts with rotatable B23 ENP connector for infeed, straight, 48 V DC/24 V DC, 249 mm x 39.1 mm x 96 mm (L x W x H), 3.1 kg, UL certification in preparation
AT2002-0250	motor module with rotatable B23 ENP connector for infeed, straight, 48 V DC/24 V DC, 250 mm x 39.1 mm x 96 mm (L x W x H), 2.3 kg, UL certification in preparation
AT2020-0250	motor module, 22.5° (positive curve, convex, radius constant), 48 V DC/24 V DC, 256.2 mm x 39.1 mm x 106.8 mm (L x W x H), 2.2 kg, UL-certified
AT2021-0250-0003	motor module with feed, 22.5° (positive curve, convex, radius constant), 48 V DC/24 V DC, cable length 5 m, 256.2 mm x 39.1 mm x 106.8 mm (L x W x H), 3.3 kg, UL-certified
AT2025-0250	motor module, -22.5° (negative curve, concave, radius constant), 48 V DC/24 V DC, 278.1 mm x 39.1 mm x 107.8 mm (L x W x H), 2.2 kg, UL-certified
AT2026-0250-0003	motor module with feed, -22.5° (negative curve, concave, radius constant), 48 V DC/24 V DC, cable length 5 m, 278.1 mm x 39.1 mm x 107.8 mm (L x W x H), 3.3 kg, UL-certified
AT2040-0250	motor module, 45° (positive curve, convex, radius constant), 48 V DC/24 V DC, 258.9 mm x 39.1 mm x 114.4 mm (L x W x H), 1.9 kg, UL-certified
AT2041-0250	motor module with feed, 45° (positive curve, convex, radius constant), 48 V DC/24 V DC, cable length 5 m, 258.9 mm x 39.1 mm x 114.4 mm (L x W x H), 3.0 kg, not UL-certified
AT2041-0250-0003	motor module with feed, 45° (positive curve, convex, radius constant), 48 V DC/24 V DC, cable length 5 m, 258.9 mm x 39.1 mm x 114.4 mm (L x W x H), 3.0 kg, UL-certified
AT2042-0250	motor module with rotatable B23 ENP connector for infeed, 45° (positive curve, convex, radius constant), 48 V DC/24 V DC, 258.9 mm x 39.1 mm x 114.4 mm (L x W x H), 2.2 kg, UL certification in preparation
AT2050-0500	motor module, 180° (clothoid, radius not constant), 48 V DC/24 V DC, 306.7 mm x 39.1 mm x 194.5 mm (L x W x H), 4.1 kg, UL-certified



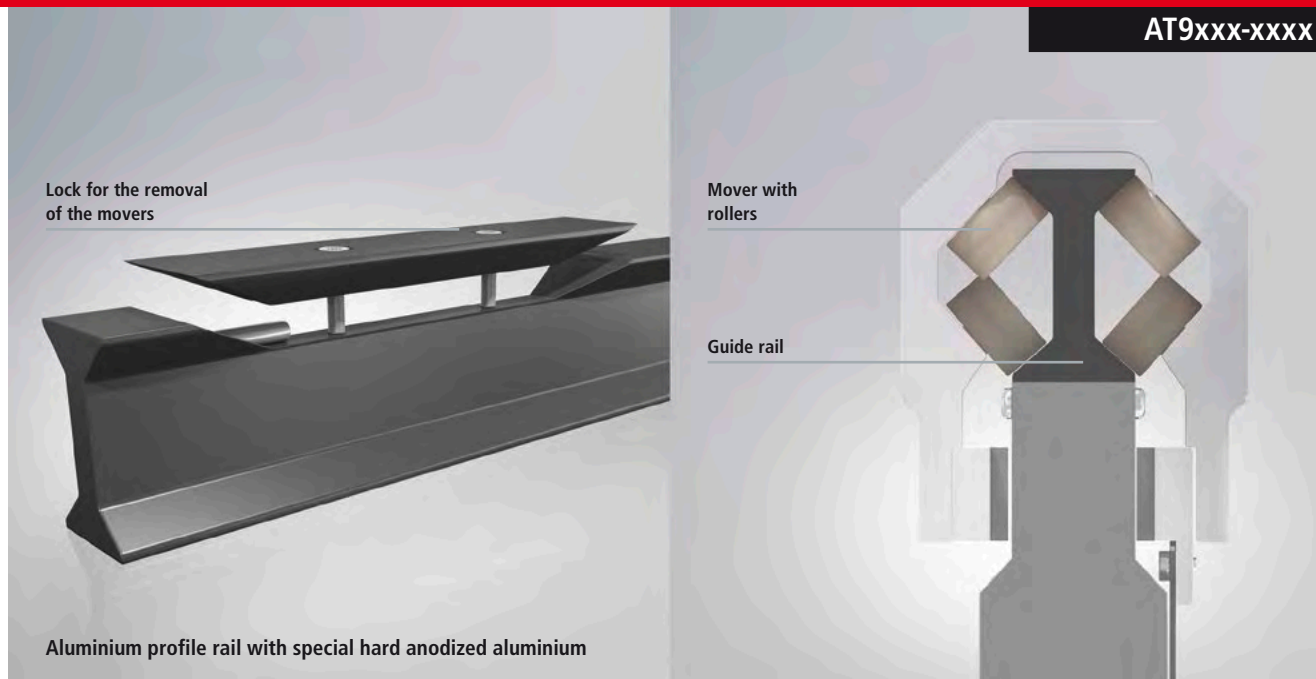
Motor module for L-, U-, O- and Z-shaped geometries



Motor module for moving XTS track parts with rotatable B23 ENP connector

Ordering information	XTS Black Line: motor modules
AT2000-0233-0002	motor module for L-, U-, O- and Z-shaped geometries, straight (top profile without drilling hole), 48 V DC/24 V DC, 233.1 mm x 39.1 mm x 96 mm (L x W x H), 1.9 kg, UL-certified
AT2000-0250-0002	motor module, straight (top profile without drilling hole), 48 V DC/24 V DC, 250 mm x 39.1 mm x 96 mm (L x W x H), 2.0 kg, UL-certified
AT2001-0250-0002	motor module with feed, straight (top profile without drilling hole), 48 V DC/24 V DC, cable length 5 m, 250 mm x 39.1 mm x 96 mm (L x W x H), 3.1 kg, not UL-certified
AT2001-0250-0004	motor module with feed, straight (top profile without drilling hole), 48 V DC/24 V DC, cable length 5 m, 250 mm x 39.1 mm x 96 mm (L x W x H), 3.1 kg, UL-certified
AT2002-0249-0002	motor module for moving XTS track parts with rotatable B23 ENP connector for infeed, straight (top profile without drilling hole), 48 V DC/24 V DC, 249 mm x 39.1 mm x 96 mm (L x W x H), 3.1 kg, UL certification in preparation
AT2002-0250-0002	motor module with rotatable B23 ENP connector for infeed, straight (top profile without drilling hole), 48 V DC/24 V DC, 250 mm x 39.1 mm x 96 mm (L x W x H), 2.3 kg, UL certification in preparation
AT2020-0250-0002	motor module, 22.5° (positive curve, convex, radius constant, top profile without drilling hole), 48 V DC/24 V DC, 256.2 mm x 39.1 mm x 106.8 mm (L x W x H), 2.2 kg, UL-certified
AT2021-0250-0004	motor module with feed, 22.5° (positive curve, convex, radius constant, top profile without drilling hole), 48 V DC/24 V DC, cable length 5 m, 256.2 mm x 39.1 mm x 106.8 mm (L x W x H), 3.3 kg, UL-certified
AT2025-0250-0002	motor module, -22.5° (negative curve, concave, radius constant, top profile without drilling hole), 48 V DC/24 V DC, 278.1 mm x 39.1 mm x 107.8 mm (L x W x H), 2.2 kg, UL-certified
AT2026-0250-0004	motor module with feed, -22.5° (negative curve, concave, radius constant, top profile without drilling hole), 48 V DC/24 V DC, cable length 5 m, 278.1 mm x 39.1 mm x 107.8 mm (L x W x H), 3.3 kg, UL-certified
AT2040-0250-0002	motor module, 45° (positive curve, convex, radius constant, top profile without drilling hole), 48 V DC/24 V DC, 58.9 mm x 39.1 mm x 114.4 mm (L x W x H), 1.9 kg, UL-certified
AT2041-0250-0002	motor module with feed, 45° (positive curve, convex, radius constant, top profile without drilling hole), 48 V DC/24 V DC, cable length 5 m, 258.9 mm x 39.1 mm x 114.4 mm (L x W x H), 3.0 kg, not UL-certified
AT2041-0250-0004	motor module with feed, 45° (positive curve, convex, radius constant, top profile without drilling hole), 48 V DC/24 V DC, cable length 5 m, 258.9 mm x 39.1 mm x 114.4 mm (L x W x H), 3.0 kg, UL-certified
AT2042-0250-0002	motor module with rotatable B23 ENP connector for infeed, 45° (positive curve, convex, radius constant, top profile without drilling hole), 48 V DC/24 V DC, 258.9 mm x 39.1 mm x 114.4 mm (L x W x H), 2.2 kg, UL certification in preparation
AT2050-0500-0002	motor module, 180° (clothoid, radius not constant, top profile without drilling hole), 48 V DC/24 V DC, 306.7 mm x 39.1 mm x 194.5 mm (L x W x H), 4.1 kg, UL-certified

► www.beckhoff.com/AT2000



AT9xxx-xxxx | XTS guide rails

The guide rail with the matching movers makes the XTS system a ready-to-use solution. However, the motor modules can also be used together with the magnetic plate sets as a custom solution without the XTS guide rail. The movers can be removed or inserted without tools through

a lock by releasing two screws and removing part of the rail.

- optimised solution for immediate mounting on the motor module
- backlash-free due to low manufacturing tolerances and pre-tensioned rollers

- abrasion-resistant hard anodized aluminium
- free of abutting ends, lengths up to 2.5 m available
- high-precision mounting by means of fits
- easy maintenance through lock for the removal of the movers

Movers and guide rail are optimally matched to each other. The geometry of the aluminium rail and the hard anodized aluminium of the surface in combination with the running surface of the mover rollers allow good running characteristics and low wear.

Ordering information	XTS guide rails, suitable for straight motor modules
AT9000-0250	guide rail, 250 mm, straight, suitable for 1 x straight motor module AT200x-0250 with/without feed
AT9000-0500	guide rail, 500 mm, straight, suitable for 2 x straight motor module AT200x-0250 with/without feed
AT9000-0750	guide rail, 750 mm, straight, suitable for 3 x straight motor module AT200x-0250 with/without feed
AT9000-1000	guide rail, 1000 mm, straight, suitable for 4 x straight motor module AT200x-0250 with/without feed
AT9000-1250	guide rail, 1250 mm, straight, suitable for 5 x straight motor module AT200x-0250 with/without feed
AT9000-1500	guide rail, 1500 mm, straight, suitable for 6 x straight motor module AT200x-0250 with/without feed
AT9000-1750	guide rail, 1750 mm, straight, suitable for 7 x straight motor module AT200x-0250 with/without feed
AT9000-2000	guide rail, 2000 mm, straight, suitable for 8 x straight motor module AT200x-0250 with/without feed
AT9000-2250	guide rail, 2250 mm, straight, suitable for 9 x straight motor module AT200x-0250 with/without feed
AT9000-2500	guide rail, 2500 mm, straight, suitable for 10 x straight motor module AT200x-0250 with/without feed

Ordering information	XTS guide rails with gate, suitable for straight motor modules
AT9100-0250	guide rail, 250 mm, straight with gate, suitable for 1 x straight motor module AT200x-0250 with/without feed
AT9100-0500	guide rail, 500 mm, straight with gate, suitable for 2 x straight motor module AT200x-0250 with/without feed
AT9100-0750	guide rail, 750 mm, straight with gate, suitable for 3 x straight motor module AT200x-0250 with/without feed
AT9100-1000	guide rail, 1000 mm, straight with gate, suitable for 4 x straight motor module AT200x-0250 with/without feed
AT9100-1250	guide rail, 1250 mm, straight with gate, suitable for 5 x straight motor module AT200x-0250 with/without feed
AT9100-1500	guide rail, 1500 mm, straight with gate, suitable for 6 x straight motor module AT200x-0250 with/without feed
AT9100-1750	guide rail, 1750 mm, straight with gate, suitable for 7 x straight motor module AT200x-0250 with/without feed
AT9100-2000	guide rail, 2000 mm, straight with gate, suitable for 8 x straight motor module AT200x-0250 with/without feed
AT9100-2250	guide rail, 2250 mm, straight with gate, suitable for 9 x straight motor module AT200x-0250 with/without feed
AT9100-2500	guide rail, 2500 mm, straight with gate, suitable for 10 x straight motor module AT200x-0250 with/without feed

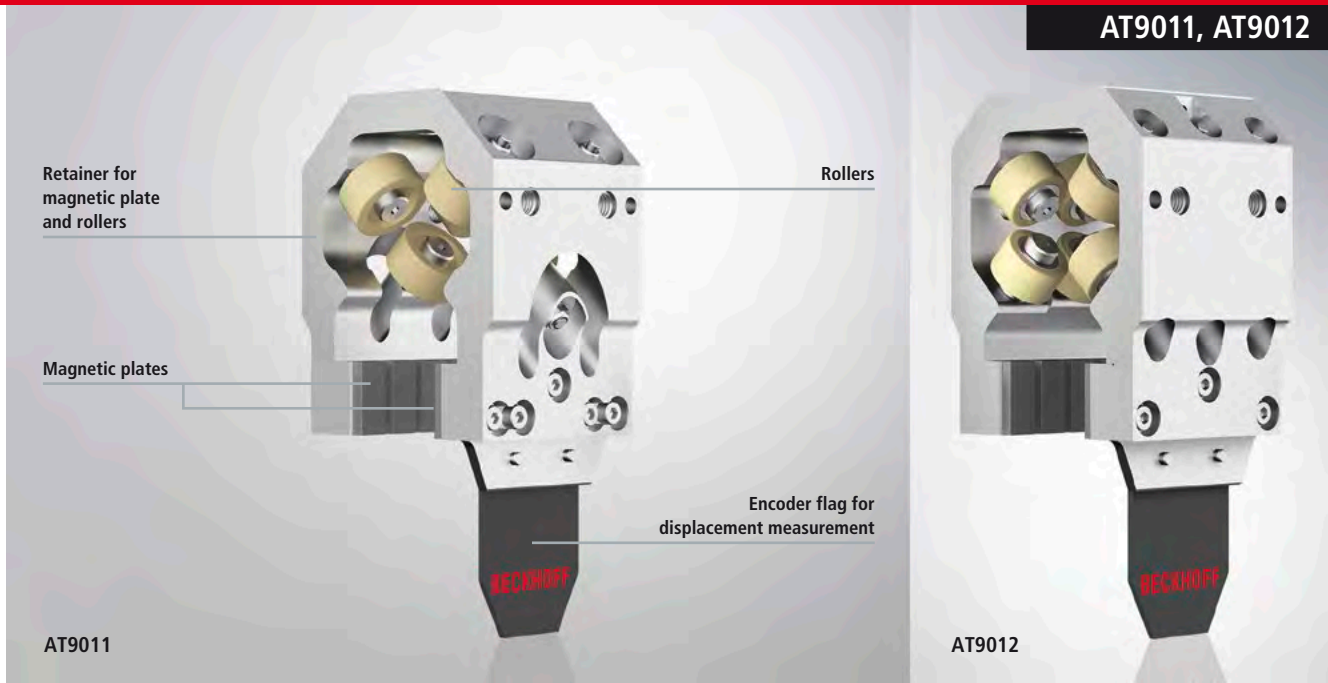
Ordering information	XTS guide rails, suitable for 22.5° motor modules
AT9020-0500	guide rail, 500 mm, 22.5° curve (positive curve, convex, radius constant), for AT9011-0050-xxxx, suitable for 1 x straight motor module AT200x-0250 with/without feed and 1 x 22.5° motor module AT202x-0250 with/without feed
AT9020-2250	guide rail set, 2250 mm, 180° curve (positive curve, convex, radius constant, 2 parts), for AT9011-0050-xxxx, consisting of 1 x AT9020-2250-1050 guide rail, 1250 mm, 90° curve, suitable for 1 x straight motor module AT200x-0250 with/without feed and 4 x 22.5° motor module AT202x-0250 with/without feed 1 x AT9020-2250-2050 guide rail, 1000 mm, 90° curve, suitable for 4 x 22.5° motor module AT202x-0250 with/without feed
AT9020-2250-0070	guide rail set, 2250 mm, 180° curve (positive curve, convex, radius constant, 2 parts), for AT9011-0070-xxxx, consisting of 1 x AT9020-2250-1070 guide rail, 1250 mm, 90° curve, suitable for 1 x straight motor module AT200x-0250 with/without feed and 4 x 22.5° motor module AT202x-0250 with/without feed 1 x AT9020-2250-2070 guide rail, 1000 mm, 90° curve, suitable for 4 x 22.5° motor module AT202x-0250 with/without feed

Ordering information	XTS guide rails, suitable for -22.5° motor modules
AT9025-0500	guide rail, 500 mm, -22.5° curve (negative curve, concave, radius constant), for AT9011-0050-xxxx, suitable for 1 x straight motor module AT200x-0250 with/without feed and 1 x -22.5° motor module AT202x-0250 with/without feed

Ordering information	XTS guide rails, suitable for 45° motor modules
AT9040-0500	guide rail, 500 mm, 45° curve (positive curve, convex, radius constant), for AT9011-0050-xxxx, suitable for 1 x straight motor module AT200x-0250 with/without feed and 1 x 45° motor module AT204x-0250 with/without feed
AT9040-0750	guide rail, 750 mm, 90° curve (positive curve, convex, radius constant), for AT9011-0050-xxxx, suitable for 1 x straight motor module AT200x-0250 with/without feed and 2 x 45° motor module AT204x-0250 with/without feed
AT9040-0750-0070	guide rail, 750 mm, 90° curve (positive curve, convex, radius constant), for AT9011-0070-xxxx, suitable for 1 x straight motor module AT200x-0250 with/without feed and 2 x 45° motor module AT204x-0250 with/without feed
AT9040-1250	guide rail set, 1250 mm, 180° curve (positive curve, convex, radius constant, 2 parts), for AT9011-0050-xxxx, consisting of 1 x AT9040-1250-1050 guide rail, 750 mm, 90° curve, suitable for 1 x straight motor module AT200x-0250 with/without feed and 2 x 45° motor module AT204x-0250 with/without feed 1 x AT9040-1250-2050 guide rail, 500 mm, 90° curve, suitable for 2 x 45° motor module AT204x-0250 with/without feed
AT9040-1250-0070	guide rail set, 1250 mm, 180° curve (positive curve, convex, radius constant, 2 parts), for AT9011-0070-xxxx, consisting of 1 x AT9040-1250-1070 guide rail, 750 mm, 90° curve, suitable for 1 x straight motor module AT200x-0250 with/without feed and 2 x 45° motor module AT204x-0250 with/without feed 1 x AT9040-1250-2070 guide rail, 500 mm, 90° curve, suitable for 2 x 45° motor module AT204x-0250 with/without feed
AT9142-2000	guide rail set, 2000 mm, 360° circle (positive curve, convex, radius constant, 4 parts), for AT9011-0050-xxxx, consisting of 1 x AT9142-2000-1050 guide rail, 500 mm, 90° curve with gate, suitable for 2 x 45° motor module AT204x-0250 with/without feed 3 x AT9142-2000-2050 guide rail, 500 mm, 90° curve, suitable for 2 x 45° motor module AT204x-0250 with/without feed

Ordering information	XTS guide rails, suitable for 180° motor modules (clothoid)
AT9050-0500	guide rail, 500 mm, 180° curve (clothoid, radius not constant), for AT9011-0050-xxxx or AT9012-0050-xxxx, suitable for 1 x 180° motor module AT2050-0500
AT9050-0500-0070	guide rail, 500 mm, 180° curve (clothoid, radius not constant), for AT9011-0070-xxxx, suitable for 1 x 180° motor module AT2050-0500

► www.beckhoff.com/AT9000



AT9011, AT9012 | XTS movers

The movers are made of a light and solid aluminium alloy. Thanks to their arrangement the rollers allow backlash-free travel on the straights and in the curves. The coating of the rollers causes very little running noise and is particularly low-wear without lubrication of the guide rail. The attractive forces of the magnetic plates are largely balanced by the opposed arrangement, so that the rollers and the rail do not have to absorb the comparatively high attractive forces of the magnets.

The centre of the encoder flag supplies a position signal to

the motor module. The encoder flag is made from a sturdy, light-weight glass-fibre reinforced material. A mover 1 can be detected by means of a special magnetic plate set. This mover is always recognised as servo axis 1 and used as the first servo axis after start-up. All following movers (standard movers) are counted upwards. This results in a fixed assignment between axis numbers and movers, which is even retained after the system has been switched off.

The AT9011-0070-0550 mover provides an increased

payload due to its overall length of 70 mm and larger rollers. The standard rail can be used for traveling in straight lines, adapted rails are necessary for traveling around corners. Therefore, a mixed operation of movers of different sizes is only possible when traveling in straight lines.

Features

- no sliding contacts or cables to the moved part, purely passive mover
- 2 magnetic plates generate the controlled propulsive force via the motor module.

- The attractive forces largely neutralise each other in relation to the guide mechanism.
- low friction losses
- An encoder flag generates the position signal.
- mover 1 – fixed assignment of mover to servo axis
- Short mover length allows small product spacings.
- Geometry allows driving through curves with full dynamics.
- no development of heat on and in the mover

Ordering information	XTS movers
AT9011-0050-0550	mover, 6 rollers (plastic coated), length 50 mm, 410 g, mounted with magnetic plate set AT9001-0550 (mover standard) and set of rollers ZX9011-0050
AT9011-0050-1550	mover, 6 rollers (plastic coated), length 50 mm, 410 g, mounted with magnetic plate set AT9001-1550 (mover 1) and set of rollers ZX9011-0050
AT9011-0070-0550	mover, 6 rollers (plastic coated), length 70 mm, 595 g, mounted with magnetic plate set AT9001-0550 (mover standard) and set of rollers ZX9011-0070
AT9011-0070-1550	mover, 6 rollers (plastic coated), length 70 mm, 595 g, mounted with magnetic plate set AT9001-1550 (mover 1) and set of rollers ZX9011-0070
AT9012-0050-0550	mover, 12 rollers (plastic coated), length 50 mm, 460 g, mounted with magnetic plate set AT9001-0550 (mover standard) and set of rollers ZX9012-0050
AT9012-0050-1550	mover, 12 rollers (plastic coated), length 50 mm, 460 g, mounted with magnetic plate set AT9001-1550 (mover 1) and set of rollers ZX9012-0050

The magnetic plates can also be procured separately in order to be able to fit them to a self-developed mover. Technical boundary conditions and support on enquiry.

► www.beckhoff.com/AT9011



AT2000-xx00 | XTS starter kits

The XTS starter kit facilitates fast and effective entry to the new technology. Mechanical tests and the programming of your own motion profiles are simple to accomplish. Programming experience in IEC 61131-3 and knowledge of TwinCAT NC are required for this. The XTS starter kit contains all components

required for the operation of an XTS system. Depending on the required path length, a choice of three starter kits is available. The construction is fully functional and completely pre-assembled.

Basic components

- stand and holder for all mechanical parts

- Industrial PC with all necessary interfaces and sufficient system performance
- TwinCAT NC PTP and XTS function package
- installed in a control cabinet, fully wired, ready for operation
- power supply units 24 V DC and 48 V DC

- 1 day instruction and programming support

Required user skills

- practical experience with TwinCAT
- basic knowledge of motion control

Starter kit small	AT2000-0500-0070
Motor module, straight	3 x AT2000-0250, 1 x AT2001-0250-0003 (feed)
Motor module, 180°	2 x AT2050-0500
Guide rail, straight	1 x AT9000-0500, 1 x AT9100-0500 (with gate)
Guide rail, 180°	2 x AT9050-0500-0070
Mover	5 x AT9011-0070-0550
Starter kit medium	AT2000-1000-0070
Motor module, straight	6 x AT2000-0250, 2 x AT2001-0250-0003 (feed)
Motor module, 180°	2 x AT2050-0500
Guide rail, straight	1 x AT9000-1000, 1 x AT9100-1000 (with gate)
Guide rail, 180°	2 x AT9050-0500-0070
Mover	10 x AT9011-0070-0550
Starter kit large	AT2000-1500-0070
Motor module, straight	10 x AT2000-0250, 2 x AT2001-0250-0003 (feed)
Motor module, 180°	2 x AT2050-0500
Guide rail, straight	1 x AT9000-1500, 1 x AT9100-1500 (with gate)
Guide rail, 180°	2 x AT9050-0500-0070
Mover	10 x AT9011-0070-0550

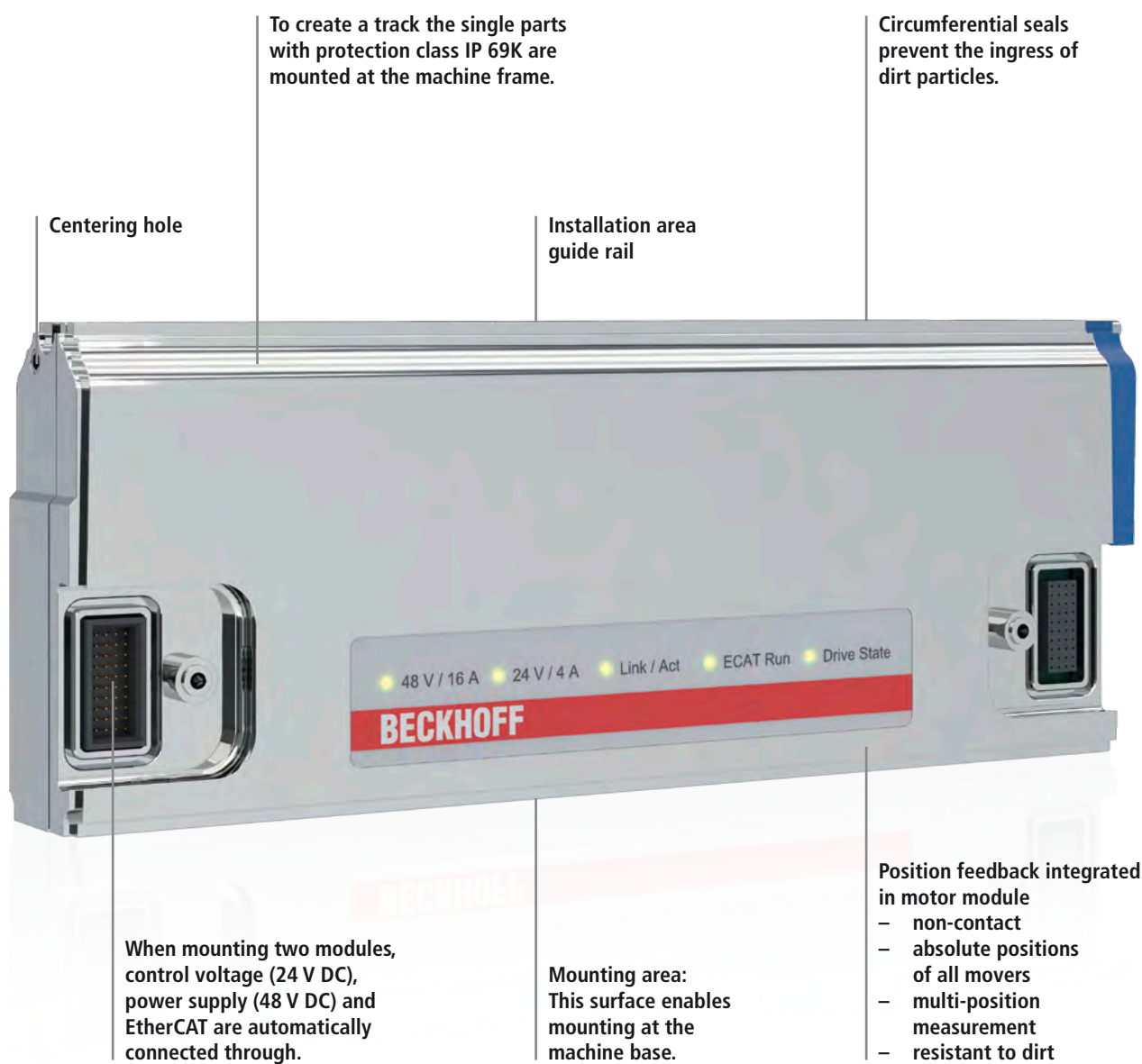
For information on the Beckhoff training offers see page **622**

Accessories

Ordering information	XTS Standard accessories
AT9001-0450	magnetic plate set mover standard, 4-pin, length 50 mm, pre-installed with 1.2 mm thick encoder flag, suitable for XTS standard movers
AT9001-1450	magnetic plate set mover 1, 4-pin, length 50 mm, pre-installed with 1.2 mm thick encoder flag, suitable for XTS standard movers
AT9001-0550	magnetic plate set mover standard, 5-pin, length 50 mm, pre-installed with 1.2 mm thick encoder flag, suitable for XTS standard movers
AT9001-0550-1640	magnetic plate set mover standard, 5-pin, length 50 mm, pre-installed with 1.6 mm thick encoder flag, suitable for external movers
AT9001-1550	magnetic plate set mover 1, 5-pin, length 50 mm, pre-installed with 1.2 mm thick encoder flag, suitable for XTS standard movers
AT9001-1550-1640	magnetic plate set mover 1, 5-pin, length 50 mm, pre-installed with 1.6 mm thick encoder flag, suitable for external movers
AT9001-0775-1640	magnetic plate set mover standard, 7-pin, length 75 mm, pre-installed with 1.6 mm thick encoder flag, suitable for external movers
AT9001-1775-1640	magnetic plate set mover 1, 7-pin, length 75 mm, pre-installed with 1.6 mm thick encoder flag, suitable for external movers
AT9001-0AA0-1640	magnetic plate set mover standard, 10-pin, length 100 mm, pre-installed with 1.6 mm thick encoder flag, suitable for external movers
AT9001-1AA0-1640	magnetic plate set mover 1, 10-pin, length 100 mm, pre-installed with 1.6 mm thick encoder flag, suitable for external movers
ZX9011-0050	set of rollers, 6 rollers (plastic coated), suitable for mover AT9011-0050-xxxx
ZX9011-0070	set of rollers, 6 rollers (plastic coated), suitable for mover AT9011-0070-xxxx
ZX9012-0050	set of rollers, 12 rollers (plastic coated), suitable for mover AT9012-0050-xxxx
ZX2000-0000	end cap, suitable for XTS standard motor modules
ZX2000-0500	device for alignment of straight XTS standard motor modules
ZX9001-0000	rail on support for XTS standard movers, suitable for XTS standard guide rails AT9100-xxxx
ZX9017-0000	Torx T20 angle pin wrench with short pin part for hard-to-reach screws
ZX0001-0500	machine bed with a straight length of 500 mm, suitable for mounting of XTS standard motor modules
ZX0001-1000	machine bed with a straight length of 1000 mm, suitable for mounting of XTS standard motor modules
ZX0001-1500	machine bed with a straight length of 1500 mm, suitable for mounting of XTS standard motor modules
ZX0002-0500	pedestal, suitable for machine bed ZX0001-0500
ZX0002-1000	pedestal, suitable for machine bed ZX0001-1000
ZX0002-1500	pedestal, suitable for machine bed ZX0001-1500
ZX9999-0001	update basic body and rollers for AT9012-0050-0550 (mover, 12 rollers (plastic coated), length 50 mm, 460 g, mounted with magnetic plate set AT9001-0550 and set of rollers ZX9012-0050)
ZX9999-0002	update basic body and rollers for AT9011-0070-0550 (mover, 6 rollers (plastic coated), length 70 mm, 595 g, mounted with magnetic plate set AT9001-0550 and set of rollers ZX9011-0070)
ZK7A30-3031-Bxxx	EtherCAT/Ethernet cable, ENP, PUR, drag-chain suitable, B23, plug, straight, female+male, 5-pin, EtherCAT-coded – B23, plug, straight, male+female, 5-pin, EtherCAT-coded
ZK7A30-3155-Bxxx	EtherCAT/Ethernet cable, ENP, PUR, drag-chain suitable, B23, plug, straight, female+male, 5-pin, EtherCAT-coded – 1 x RJ45, plug, straight 1 x open end
ZK7A30-AS00-Axxx	EtherCAT/Ethernet cable, ENP, PUR, drag-chain suitable, B23, flange, straight, short, female+male, 5-pin, square flange, EtherCAT-coded – 1 x RJ45, plug, straight 1 x open end
ZK7A30-BW00-Axxx	EtherCAT/Ethernet cable, ENP, PUR, drag-chain suitable, B23, flange, straight, long, female+male, pins 5+4, square flange, EtherCAT-coded – 1 x RJ45, plug, straight 1 x open end
ZK7A30-AU00-Axxx	EtherCAT/Ethernet cable, ENP, PUR, drag-chain suitable, B23, flange, straight, short, female+male, pins 5+4, rear assembly, EtherCAT-coded – 1 x RJ45, plug, straight 1 x open end
ZK7A30-BY00-Axxx	EtherCAT/Ethernet cable, ENP, PUR, drag-chain suitable, B23, flange, straight, long, female+male, pins 5+4, rear assembly, EtherCAT-coded – 1 x RJ45, plug, straight 1 x open end

XTS Hygienic | The construction kit

► www.beckhoff.com/XTS-Hygienic



Straight motor module



Curved motor module



Guide rail system



Mover

The fully encapsulated mechatronic transport system, XTS Hygienic combines the advantages of rotary and linear drive systems for demanding environmental conditions.

The stainless steel version of the XTS linear transport system (with IP 69K protection rating) provides all functions required for system operation:

- modular, fully integrated linear motor combines power electronics and position feedback in a single component

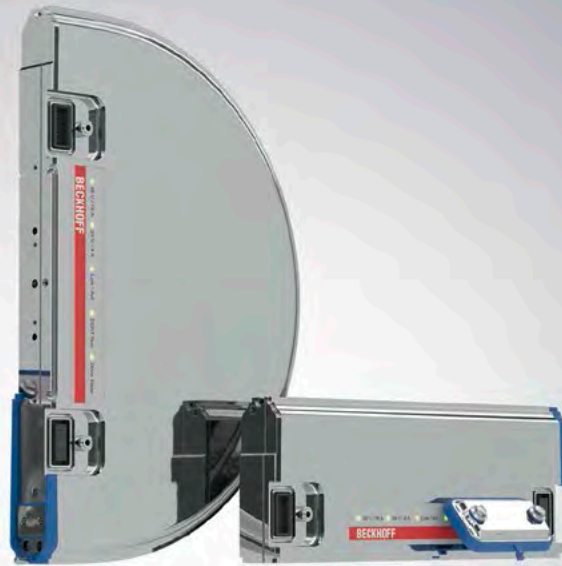
- multiple movers used as moved parts for controlling the material flow
- mechanical guide rails for configuration of any desired geometry

With this matching set of only a few components, the most diverse applications in the food and pharmaceutical industries can be realised. All surfaces are chemically resistant and provide ease of cleaning. A system implementation with XTS Hygienic offers hygienic design without any hidden edges

or undercuts. All components are sealed at the joints with a high-quality elastic material and enable high-pressure wash-down. As a result, the XTS Hygienic meets all EHEDG requirements for system certification according to EL Class I AUX. Due to the reduced construction volume of the XTS components, users benefit from a smaller machine footprint in a clear layout providing ease of maintenance.

System properties	XTS Hygienic
Max. force	90 N at standstill
Continuous force	30 N (at ~30 °C temperature increase in the motor compared to mounting frame)
Speed	4 m/s @ 48 V DC supply
Acceleration	> 50 m/s ² (without payload)
Mover length	80 mm in direction of movement
Max. system length	> 100 m (dependent on computing power, no system limit)
Surface	electropolished
Material	housing: stainless steel 1.4404 AISI 316L; sealing: FPM
Operating/storage temperature	+5...+40 °C/-25...+85 °C (for further information see documentation)
Protection class	IP 69K
Approvals/markings	CE, EHEDG EL Class I AUX (standard-compliant when assembled)
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4

Electrical data	XTS Hygienic
Supply voltage	control voltage 24 V DC, power supply 48 V DC
Current consumption	power supply: 16 A nominal current
Power consumption 24 V DC	motor modules: 30 W/m (communication, electronics, position determination)
Length per feed	max. 3 m (voltage supply, EtherCAT)
Power consumption per mover	approx. 15 W @ 4 m/s without payload



ATH2000 | XTS Hygienic motor modules

The motor modules with the product designation ATH2000 are elements for the construction of straight XTS track sections for demanding environmental conditions. Via lateral plug-in contacts for the transmission of power and communication, a connection between the motor modules can be established very simply with the help of a cover. The cover

contains the necessary contacts for the connection of two motor modules and is optionally also available with a supply cable in order to serve as a power supply point. The subsequent relocation of the power supply points or a change in the number of power supplies is possible without dismantling the motor modules.

The following sets are available:

- ATH2000: motor module with cover without power supply
- ATH2001: motor module with straight power supply
- ATH2002: motor module with an angled power supply

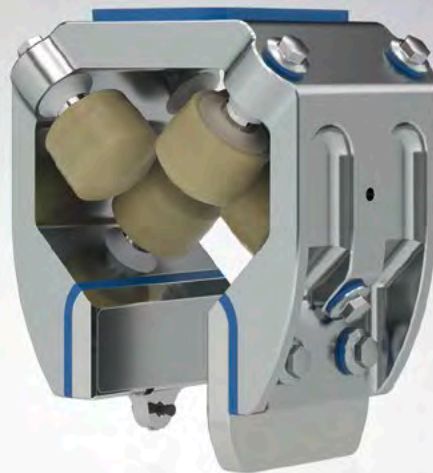
With one power supply, a maximum of 12 motor modules can be connected in a 3-meter long power supply segment.

The standardized length of 250 mm allows finely scalable system lengths.

A mechanical interface on the motor module enables the direct mounting of guide rails. If the guide rail system runs parallel to the motor modules, an additional cover is provided. The fastening holes are thus covered and hygienic cleaning is simplified.

Ordering information	XTS Hygienic: stainless steel motor modules
ATH2000-0250	stainless steel motor module, straight, 48 V DC/24 V DC, protection class IP 69K, 250 mm x 34 mm x 96 mm (L x W x H), 4.7 kg
ATH2000-0250-0002	stainless steel motor module with cover for guide rail mounting surface, straight, 48 V DC/24 V DC, protection class IP 69K, 250 mm x 34 mm x 96 mm (L x W x H), 5 kg
ATH2001-0250	stainless steel motor module with feed, straight, 48 V DC/24 V DC, cable length 8 m, protection class IP 69K, 250 mm x 34 mm x 96 mm (L x W x H), 8.0 kg
ATH2001-0250-0002	stainless steel motor module with feed and cover for guide rail mounting surface, straight, 48 V DC/24 V DC, cable length 8 m, protection class IP 69K, 250 mm x 34 mm x 96 mm (L x W x H), 8.3 kg
ATH2002-0250	stainless steel motor module with angled feed, straight, 48 V DC/24 V DC, cable length 8 m, protection class IP 69K, 250 mm x 34 mm x 96 mm (L x W x H), 8 kg
ATH2002-0250-0002	stainless steel motor module with angled feed and cover for guide rail mounting surface, straight, 48 V DC/24 V DC, cable length 8 m, protection class IP 69K, 250 mm x 34 mm x 96 mm (L x W x H), 8 kg
ATH2050-0500	stainless steel motor module, 180° (clothoid, radius not constant), 48 V DC/24 V DC, protection class IP 69K, 315 mm x 34 mm x 200 mm (L x W x H), 9.6 kg
ATH2050-0500-0002	stainless steel motor module with cover for guide rail mounting surface, 180° (clothoid, radius not constant), 48 V DC/24 V DC, protection class IP 69K, 315 mm x 34 mm x 200 mm (L x W x H), 10.3 kg
ATH2051-0500	stainless steel motor module with feed, 180° (clothoid, radius not constant), 48 V DC/24 V DC, protection class IP 69K, 315 mm x 34 mm x 200 mm (L x W x H), 12.9 kg
ATH2051-0500-0002	stainless steel motor module with feed and cover for guide rail mounting surface, 180° (clothoid, radius not constant), 48 V DC/24 V DC, protection class IP 69K, 315 mm x 34 mm x 200 mm (L x W x H), 13.6 kg

► www.beckhoff.com/ATH2000



ATH9011, ATH9013 | XTS Hygienic movers

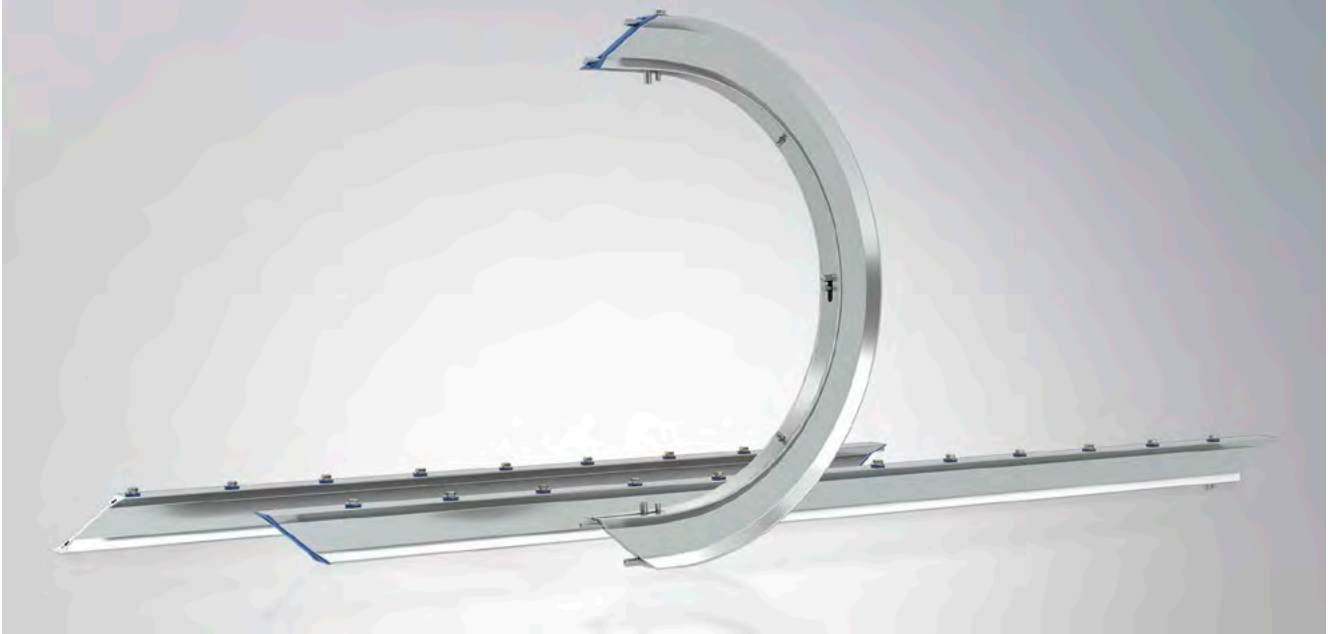
The ATH9011 mover is adapted to the new fields of application of the ATH2000 motor modules of the XTS Hygienic in order to guarantee good cleanability. The design and the materials

of the movers allow cleaning in a washing machine. The feedback flag is an integrated component of the completely encapsulated magnetic plate set of the mover. Customer-specific attachments

and tools can be mounted on the mover using a seal that is included in the delivery contents to ensure that the same hygienic requirements can also be met with customer connections.

Ordering information	XTS Hygienic: stainless steel movers suitable for the ATH9000 guide rail system
ATH9011-0075-0550	stainless steel mover, 6 rollers (plastic coated), length 75 mm, 1.04 kg, mounted with magnetic plate set ATH9001-0550 (mover standard) and set of rollers ZXH9011-0075
ATH9013-0075-0550	aluminium mover, 6 rollers (plastic coated), length 75 mm, 0.7 kg, mounted with magnetic plate set ATH9001-0550 (mover standard) and set of rollers ZXH9011-0075

► www.beckhoff.com/ATH9011



ATH9000 | XTS Hygienic guide rails

The guide rails of the XTS Hygienic are entirely made of stainless steel. The interface between individual rails has been revised for simple sealing. A lock

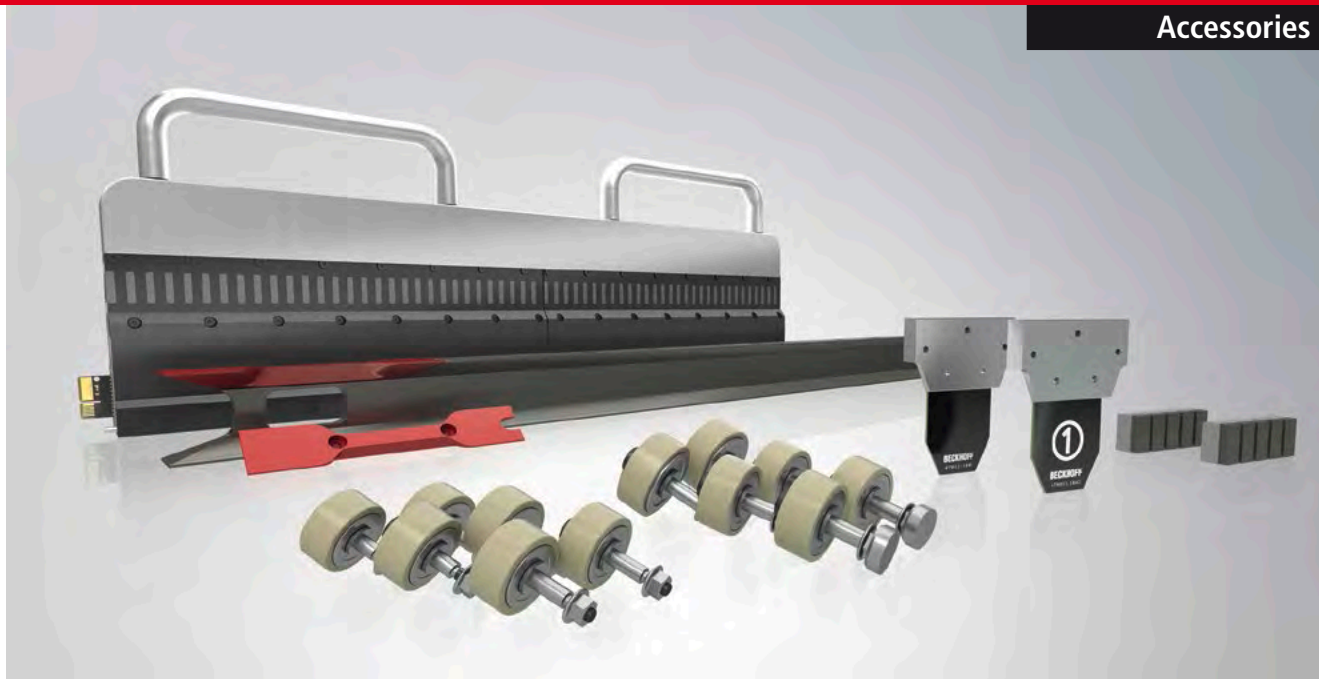
allows fast exchange of the movers for cleaning and maintenance purposes. The curved rail is optimally matched to the XTS Hygienic mover. Small manufacturing

tolerances and additional fits at the connection points to the motor modules allow both simple and precise mounting on the motor modules, ensuring a seal free of gaps and dead

spaces at such junctions, too. The ATH9200 guide rails are designed in such a way that several straight guide rails can be combined.

Ordering information	XTS Hygienic guide rails, suitable for straight motor modules
ATH9000-0250	stainless steel guide rail, 250 mm, straight, suitable for 1 x straight stainless steel motor module ATH200x-0250 with/without feed
ATH9000-0500	stainless steel guide rail, 500 mm, straight, suitable for 2 x straight stainless steel motor module ATH200x-0250 with/without feed
ATH9000-0750	stainless steel guide rail, 750 mm, straight, suitable for 3 x straight stainless steel motor module ATH200x-0250 with/without feed
ATH9000-1000	stainless steel guide rail, 1000 mm, straight, suitable for 4 x straight stainless steel motor module ATH200x-0250 with/without feed
ATH9000-1500	stainless steel guide rail, 1500 mm, straight, suitable for 6 x straight stainless steel motor module ATH200x-0250 with/without feed
ATH9000-2000	stainless steel guide rail, 2000 mm, straight, suitable for 8 x straight stainless steel motor module ATH200x-0250 with/without feed
Ordering information	XTS Hygienic guide rails with gate, suitable for straight motor modules
ATH9100-0500	stainless steel guide rail, 500 mm, straight with gate, suitable for 2 x straight stainless steel motor module ATH200x-0250 with/without feed
ATH9100-1000	stainless steel guide rail, 1000 mm, straight with gate, suitable for 4 x straight stainless steel motor module ATH200x-0250 with/without feed
ATH9100-2000	stainless steel guide rail, 2000 mm, straight with gate, suitable for 8 x straight stainless steel motor module ATH200x-0250 with/without feed
Ordering information	XTS Hygienic guide rails, suitable for 180° motor modules (clothoid)
ATH9050-0500-0075	stainless steel guide rail, 500 mm, 180° curve (clothoid, radius not constant), for ATH901x-0075-0550, suitable for 1 x stainless steel motor module ATH2050-0500
Ordering information	XTS Hygienic guide rails, connectors
ATH9200-0250	stainless steel guide rail, 250 mm, connector for straight stainless steel guide rails, suitable for 1 x straight stainless steel motor module ATH200x-0250 with/without feed
ATH9200-1000	stainless steel guide rail, 1000 mm, connector for straight stainless steel guide rails, suitable for 4 x straight stainless steel motor module ATH200x-0250 with/without feed
ATH9200-2000	stainless steel guide rail, 2000 mm, connector for straight stainless steel guide rails, suitable for 8 x straight stainless steel motor module ATH200x-0250 with/without feed

► www.beckhoff.com/ATH9000



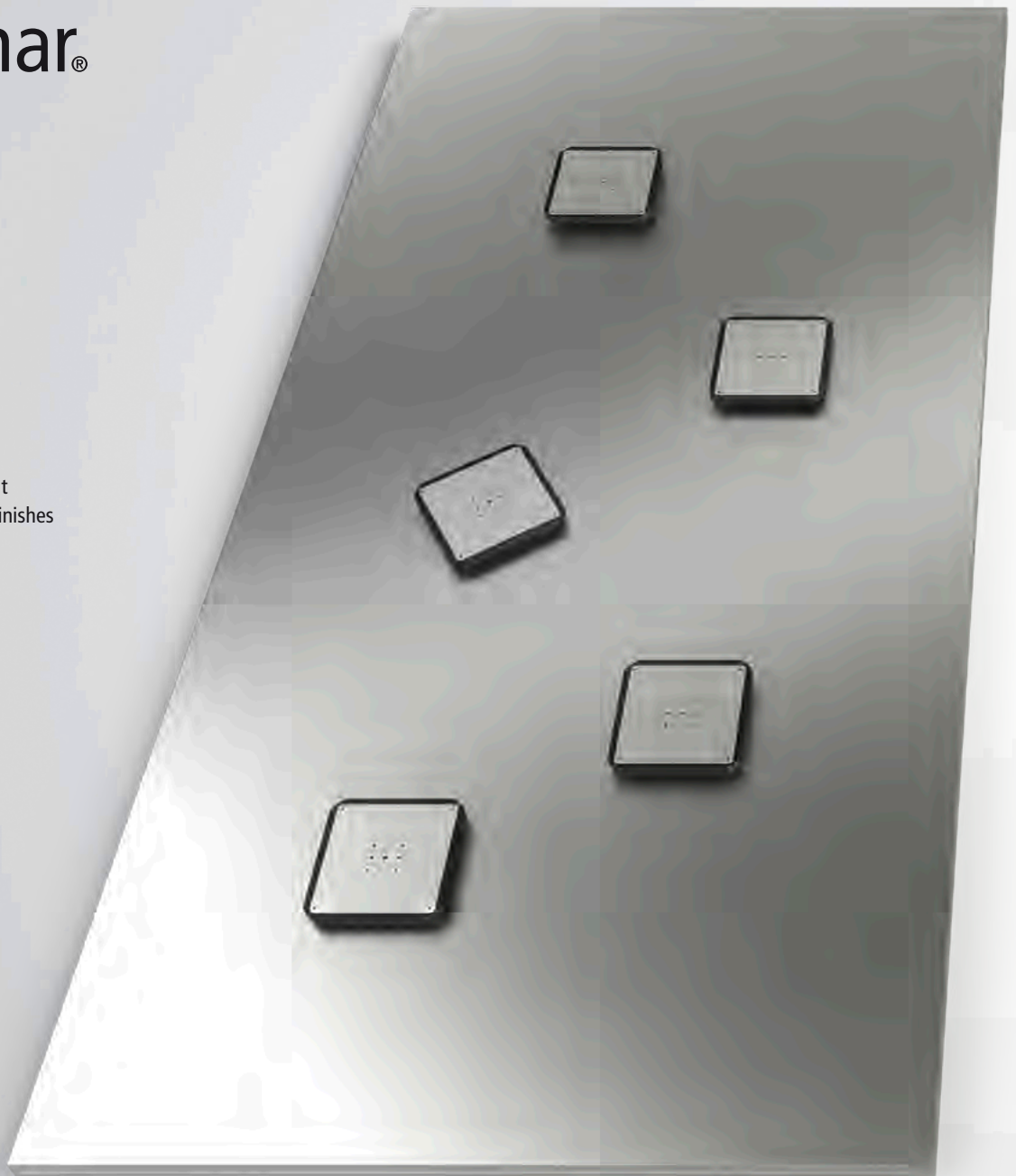
Accessories

Ordering information	XTS Hygienic accessories
ATH9001-0550	stainless steel magnetic plate set mover standard, 5-pin, 50 mm, suitable for external movers
ATH9001-0550-0001	stainless steel magnetic plate set mover standard, 5-pin, 50 mm, suitable for ATH9011-0075-0550 and ATH9013-0075-0550
ZXH9011-0075	set of rollers, 6 rollers (plastic coated), suitable for ATH9011-0075-x550 and ATH9013-0075-x550
ZXH2000-0250	spare stainless steel motor module ATH200x-0250 without cap ZXH9999-002x and without seals ZXH9999-003x
ZXH2050-0500	spare stainless steel motor module ATH2050-0500 without cap ZXH9999-002x and without seals ZXH9999-003x
ZXH9001-0000	rail on support for hygienic movers, 250 mm, straight, suitable for stainless steel guide rails ATH9100-xxxx
ZXH9999-0020	cap for interface between stainless steel motor modules
ZXH9999-0021	cap with infeed (cable length 8 m, RJ45 pre-assembled) for interface between stainless steel motor modules
ZXH9999-0022	cap with angled infeed (cable length 8 m, RJ45 pre-assembled) for interface between stainless steel motor modules
ZXH9999-0037-0001	seal set for stainless steel machine beds with a length of 1 m
ZXH9999-0037-0002	seal set for stainless steel machine beds with a length of 2 m
ZXH9999-0037-0005	seal set for stainless steel machine beds with a length of 5 m
ZXH9999-0037-0010	seal set for stainless steel machine beds with a length of 10 m
ZXH9999-0038-0001	seal set for stainless steel guide rails, suitable for stainless steel machine beds with a length of 1 m
ZXH9999-0038-0002	seal set for stainless steel guide rails, suitable for stainless steel machine beds with a length of 2 m
ZXH9999-0038-0005	seal set for stainless steel guide rails, suitable for stainless steel machine beds with a length of 5 m
ZXH9999-0038-0010	seal set for stainless steel guide rails, suitable for stainless steel machine beds with a length of 10 m
ZXH9999-0050	cover for guide rail mounting surface, 250 mm, straight, suitable for 1 x straight stainless steel motor module ATH200x-0250 with/without feed
ZXH9999-0051	cover for guide rail mounting surface, 500 mm, 180° curve (clothoid, radius not constant), suitable for 1 x stainless steel motor module ATH2050-0500

XPlanar | eXtended planar motor system

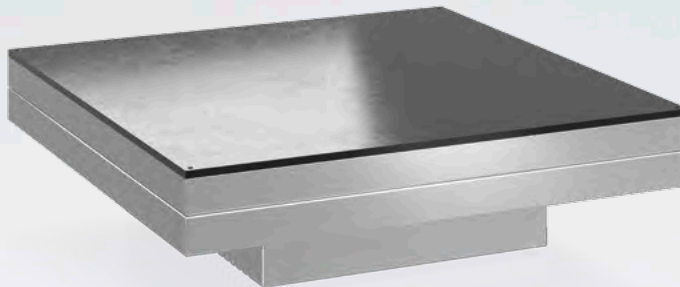
► www.beckhoff.com/xplanar

XPlanar®



XPlanar | **Floor**

- needs-based layout
- choice of surface finishes
- no wear



XPlanar | **Tile**

- highly integrated
- flexible use
- simple implementation

See page **499**

XPlanar | **Mover**

- passive component without electronics or mechanics
- carries loads of up to 4.2 kg – even more in a group
- tilting by 5° for transporting and handling liquids
- lifting, lowering, weighing: variable in height by up to 5 mm

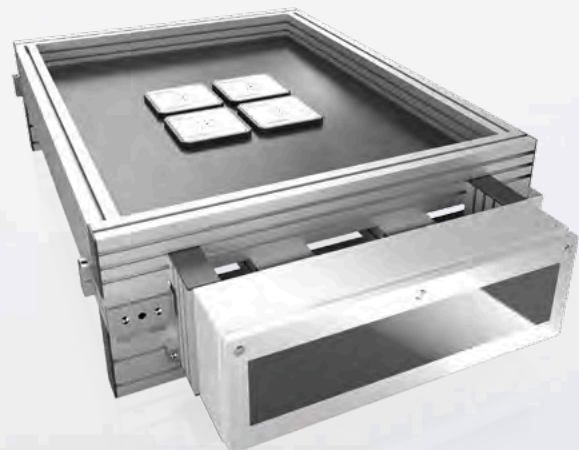
See page **498**



XPlanar | **Starter kit**

- allows fast introduction to the technology
- available in two versions
- fully functional package with all necessary components
- pre-installed software
- XPlanar tiles pre-assembled and installed on carrier frame

See page **500**



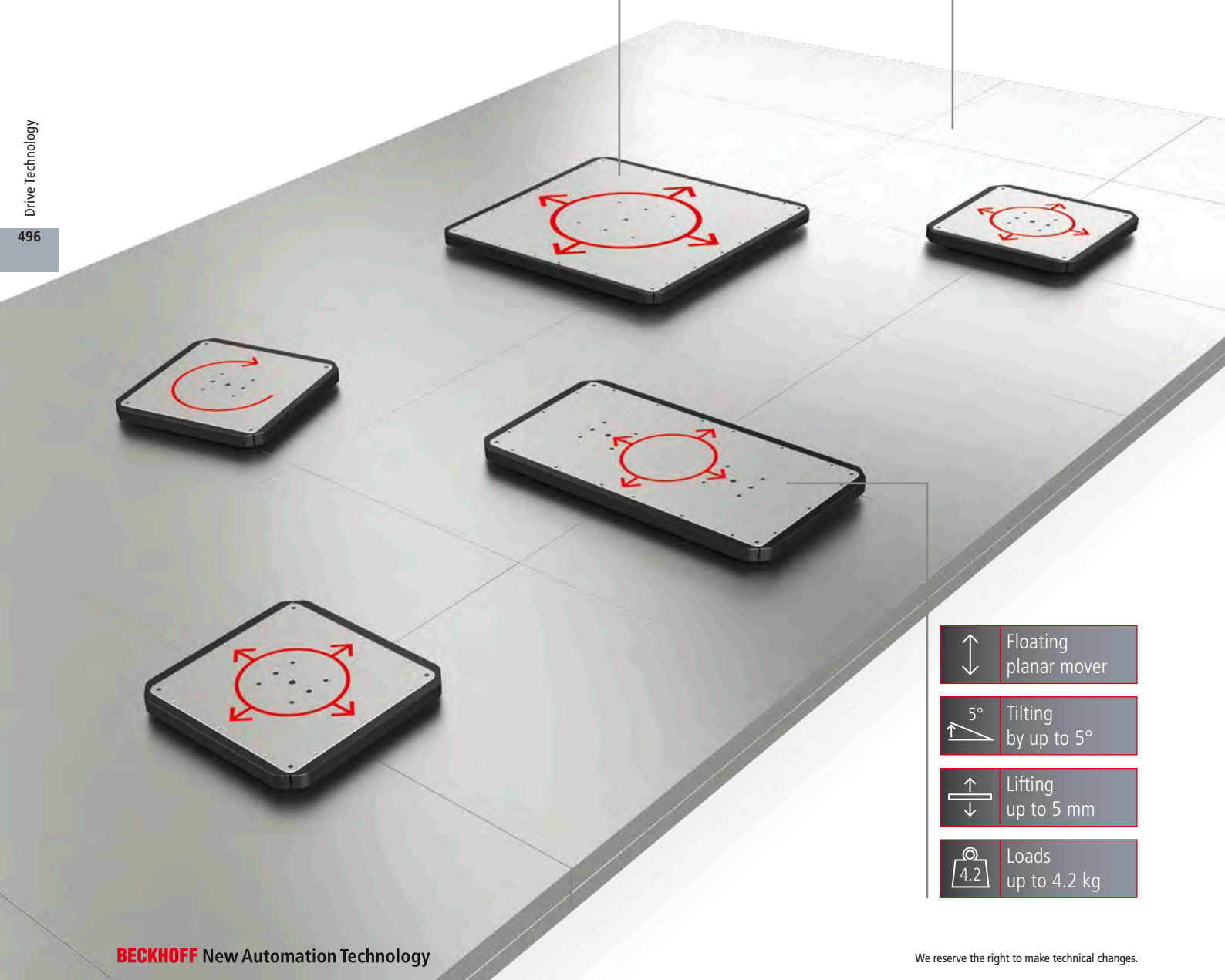
XPlanar | Flying Motion

► www.beckhoff.com/xplanar

XPlanar®





XPlanar mover

XPlanar tile



Drive Technology

496

-  Floating planar mover
-  5° Tilting by up to 5°
-  Lifting up to 5 mm
-  Loads up to 4.2 kg



XPlanar tile



XPlanar movers



XPlanar starter kits

XPlanar principle: Free-floating movers for non-contact movement

As an automation and motion specialist, Beckhoff is setting new benchmarks in drive technology with the eXtended planar motor system.

Free-floating planar movers move jerk-free and contact-free over planar tiles that can be arranged in any desired layout. The movers are kept at a defined distance by electromagnetic forces. Travelling magnetic fields generated in the planar tiles provide for a precise and highly dynamic positioning of the movers. The result: maximum possible flexibility in layout and architecture, maximum positioning flexibility and optimal simplification of machines and plants. Contaminants from transported goods are not spread throughout the plant; liquids can be transported without spilling over; wear and emissions due to friction are eliminated.

The XPlanar system represents a new drive concept with a unique value proposition for general machine manufacturing and in the food and pharmaceutical industries as well as in both vacuums and clean rooms. With appropriate surface finishing, the planar motor system is also available as a hygienic design version.

Flexible use in the food and pharma industry

XPlanar opens up new degrees of flexibility in mechanical engineering, because the system combines the individual arrangement of the tiles with the multi-dimensional positioning capability of the movers on six axes. On top of that, the contact-free process is absolutely noiseless without mechanical abrasion and without the release of particles. All surfaces are smooth, easy to clean and can be coated to meet all application-specific requirements.

The number of movers and tiles is freely selectable.

The possible range of applications of the planar motor system is as wide as its configurability is variable. Due to its usability in a vacuum and in clean rooms, XPlanar is ideally suited for all product transport tasks in the pharmaceutical and food industries with their demanding hygiene requirements. Sorting and order picking are considerably simplified, as is the reliable handling of samples in automated laboratories and the moving of products into and out of contaminated areas. Machines and plants can be smaller dimensioned and the footprint reduced. Production speed and efficiency are considerably increased through the use of Beckhoff XPlanar.



APM4xxx | XPlanar movers

The Beckhoff planar mover fully deserves the title "all-rounder". The movers are available in different formats depending on the application. Each individual mover can be moved highly dynamically without collisions and positioned freely on the system. In addition, movements specific to the transported goods or production are possible,

naturally while travelling: lifting, lowering, weighing, tilting or rotating.

In the conventional form the planar motor system is used horizontally with the movers moving above the tiles. Single movers can move payloads of up to 4.2 kg. When grouped, they can move correspondingly larger loads.

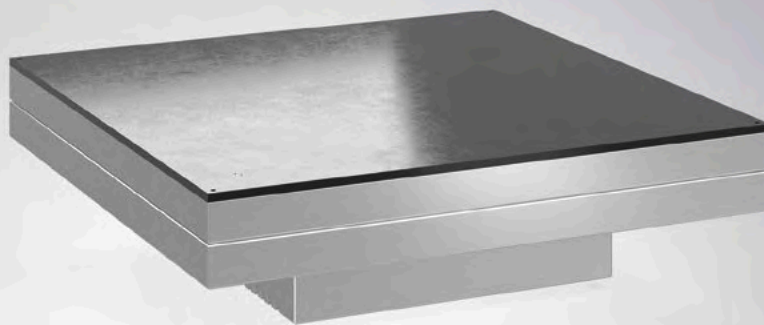
Movers in different sizes

The movers can be selected to suit different loads. The available bandwidth ranges from particularly small and light movers up to large movers for high payloads. Different mover types can be operated on the planar tiles at the same time.

Technical data	i APM4220-0000-0000	i APM4330-0000-0000	i APM4550-0000-0000
Payload	0.4 kg	1.5 kg	4.2 kg
Surface	aluminum body hard coated		
Dimensions (L x W x H)	95 mm x 95 mm x 12 mm	155 mm x 155 mm x 12 mm	235 mm x 235 mm x 12 mm
Further information	www.beckhoff.com/APM4220	www.beckhoff.com/APM4330	www.beckhoff.com/APM4550

The specifications shown in the table represent the maximum values which can be reached.

i For availability status see Beckhoff website at: www.beckhoff.com



APS4322 | XPlanar tile

The XPlanar tiles can be arranged in configurations to suit any need. Laid out in a floor arrangement, they keep distances between processing stations short and provide room to accommodate buffer zones. The floor size and geometry can be configured to suit individual requirements.


Alternatively, XPlanar tiles can be arranged in long linear tracks. This type of setup makes XPlanar a highly flexible transport system. Additional tiles can


be laid along certain sections to create waiting zones, and fast-track lanes can be added just as easily to allow overtaking and avoid congestion. Movers can travel along the same track on outward and return journeys. In other types of applications, the movers travelling in a circle may be better suited to meet the requirements. The tile configuration can support this kind of motion profile, too.

The planar tiles in the 24 x 24 cm format can be

used to form arbitrary track geometries that are precisely adapted to the application at hand. The size and shape of the tile floor can be freely scaled and determined by simply combining the different tiles: oblong, square, rectangular, L-shaped or ring-shaped. The number of movers can also be freely chosen; therefore, there are barely any limits in the application. Every form of product transport is possible: individual positioning at processing stations, collision-

free movement in the clean room and in a vacuum, overtaking in the product flow, product flow division, parking and moving in and out, even between contaminated areas. All planar movers and tiles are easy to clean, there is no carryover of contaminants and the system operates without noise and particle emission. At the same time, the XPlanar system operates with maximum efficiency through continuous software-based path optimisation.

Technical data	 APS4322-0000-0000
Supply voltage power	110...230 V AC
Supply voltage feedback	24 V DC
Weight	5.6 kg
Dimensions (L x W x H)	240 mm x 240 mm x 67 mm
Further information	www.beckhoff.com/APS4322

 For availability status see Beckhoff website at: www.beckhoff.com/APS4322



APS9000 | XPlanar starter kits

XPlanar opens up new avenues in machine and system design. Starter kits that are easy to put into operation facilitate a fast and effective entry into the technology and help experience the new possibilities and fascination of XPlanar hands-on. By trialling the system in their own environments, users can recognise the advantages in their own implementation early on. The great rationalisation potential of XPlanar can be leveraged to

quickly realise competitive and innovative solutions.

All necessary XPlanar components are included, having been pretested. The planar tiles are pre-assembled with cabling on a carrier frame. A small control cabinet contains all electrical components and an Industrial PC with all required software pre-installed. Example applications define basic functions and can be used as a foundation for the individual software implementations.

The fully functional XPlanar tiles and movers included in the starter kit can also be used in later system operation. The starter kit can be updated via internet access; the updates are free of charge.

For quick familiarisation with motion control programming using TwinCAT 3, trainings are available.

Ordering information

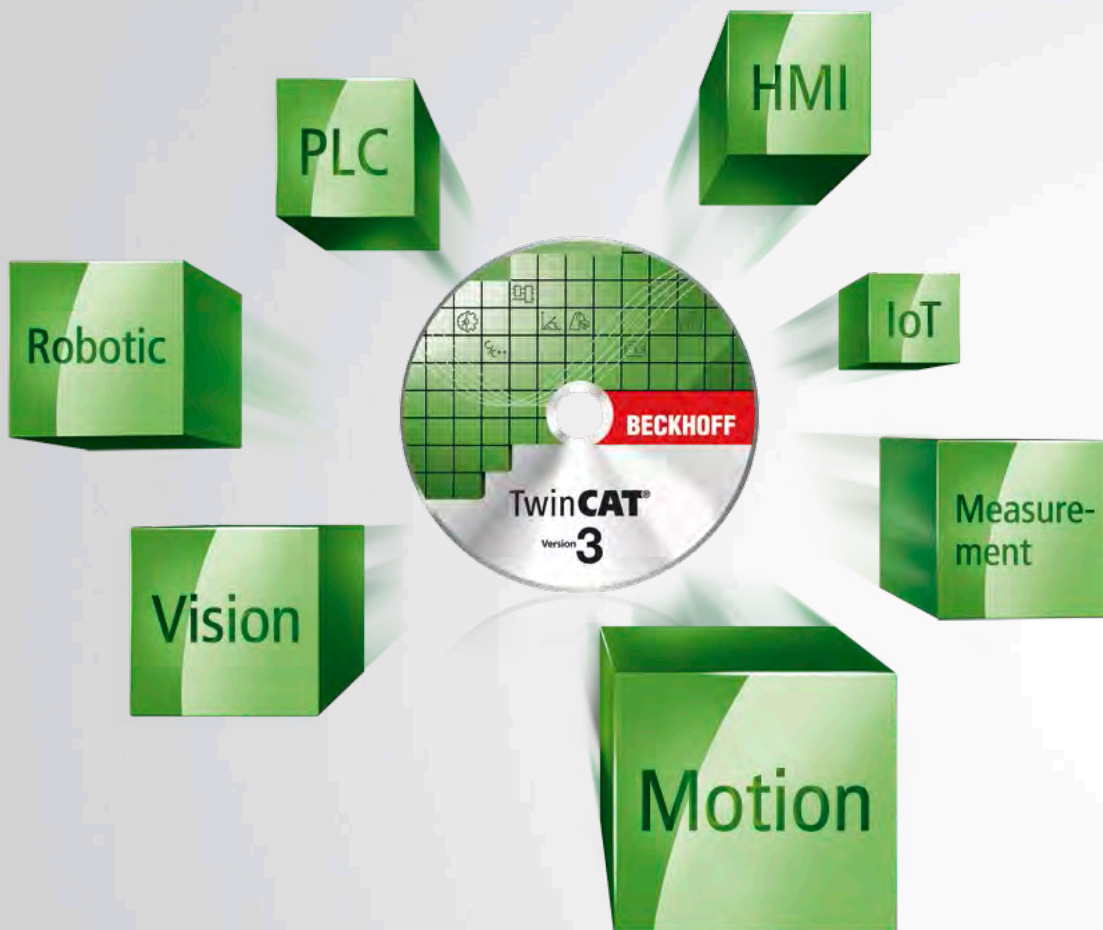
APS9000-0000	starter kit for planar motor technology, 6 (2 x 3) APS4322 planar motor tiles, 2 APM4330 movers, Industrial PC, software, pre-installed, ready for operation
APS9000-0001	starter kit for planar motor technology, 12 (4 x 3) APS4322 planar motor tiles, 4 APM4330 movers, Industrial PC, software, pre-installed, ready for operation

► www.beckhoff.com/APS9000



Software

► www.beckhoff.com/motion-software



The motion software products from Beckhoff offer optimal user support for selecting suitable hardware components for drive solutions. The universal software toolbox provides access to all information in technical product data sheets on motors, servo drives, gear units and cables and helps implement entire drive systems from designing to commissioning.



TE5910 | **TC3 Motion Designer**

- design tool for dimensioning a drive system, including detailed report function
- pre-defined load cases and motion profiles
- optimisation function and parts list generator

See page **504**



TE5950 | **TC3 Drive Manager 2**

- intuitive commissioning of AX8000, AX5000, AMP8000, AMI8100 or the EL72xx, EP72xx and EJ72xx I/O components
- clear display of parameter and start-up lists with integrated search function

See page **506**



TF5890 | **TC3 XPlanar**

- fast, simple commissioning of the XPlanar system via wizard
- calculation of mover position, precise position control as well as monitoring and diagnostics during operation
- simplified diagnostics of the individual mover by extensive additional information
- additional function: weighing of products

See page **510**

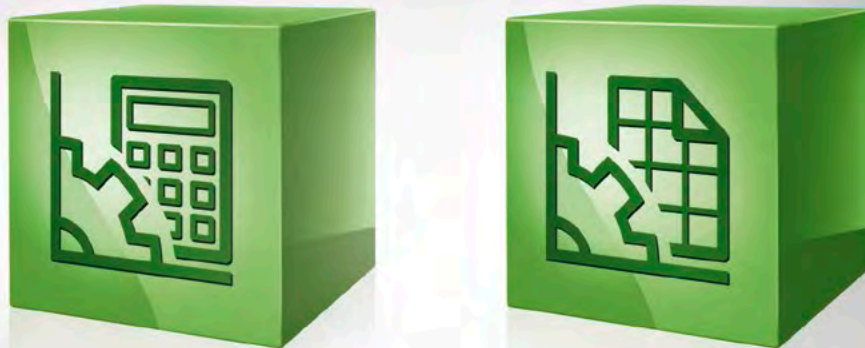


TF5850 | **TC3 XTS Extension**

- mapping of XTS movers as a servo axis
- All motion control functions can be used.
- automated system configuration
- intuitive 2D representation of the movers with XTS Viewer

See page **508**





TE5910 | TC3 Motion Designer

The dimensioning of drive axes, in conjunction with the optimum selection of motor, gear unit, drive controllers and accessories, is the basis for an efficient machine design. The TC3 Motion Designer is optionally integrated in the TwinCAT automation platform, or it can be used as a stand-alone project engineering tool for mechanical design.

Mechanics

The TC3 Motion Designer supports the designer in the configuration of typical mechanical systems such as pinion rack, spindle nut, winder, crank drive, etc.

Motion profiles

Rough estimates for simple load cases with motion profiles, e.g. based on a $1/2$ or $1/3$ rule or a 7-segment profile, are easy to realise with a few mouse clicks. More complex tasks and kine-

matic systems, perhaps in conjunction with more sophisticated motion profiles, including cam gears according to VDI 2143, are also taken account of in the TC3 Motion Designer. Export functions enable the configuration to be transferred directly to the TwinCAT System Manager, without the need for repeated inputs.

Optimisation function

An optimisation algorithm makes the selection of gear units and motors straightforward. It suggests the optimum combination based on mechanical and cost considerations, taking into account adjustable filters. The connected database provides access to all available gear units, motors and servo drives offered by Beckhoff, including the compact Drive Technology range with servo terminals.

The automatic geometry matching feature checks the compatibility of motor and gear unit and prevents selection of unsuitable combinations.

Report functions

The axis configuration is documented in a report. A choice of short or detailed report is available.

With a single click the designer can call up the technical data sheet for the motor and gear unit, and with a further click the corresponding 3D model of the drive components for integration in the design software.

Parts list generator

The integrated parts list generator can be used directly for preparing the purchase order. Accessories such as cables, chokes and installation material are also considered.

Multi-axis design

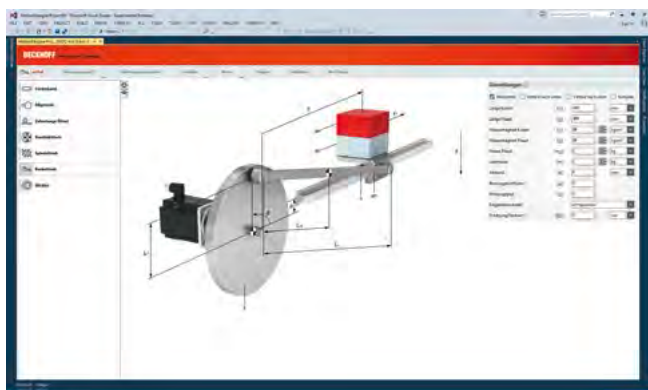
The TC3 Motion Designer regards the machine as a holistic unit, including all drive axes: All load cycles, including their temporal dependence and their influence on the common DC-Link, are taken into account. Selection of the optimum power supply module or the common brake resistor is guaranteed.



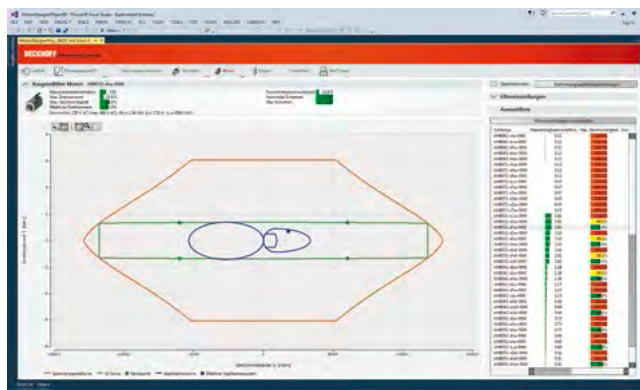
Description	Value	Importance
Desired inertia ratio	1	Low
Maximal velocity utilization	0.7	Low
Maximal torque utilization	0.7	Low
Power		Low
Price		Low

Optimizer settings		
Description	Value	Importance
Maximal velocity utilization	0.7	Low
Maximal torque utilization	0.7	Low

The optimisation algorithm suggests the economically and mechanically optimal motor/gear unit combination according to the criteria that have been set.



The selected mechanism is graphically displayed and can be adapted precisely to the real application through further settings.



The axis utilisation can be directly classified in the 4-quadrant view.



With the parts list editor all required components can be directly added. The complete parts list of all components can be exported in common formats, e.g. Excel.

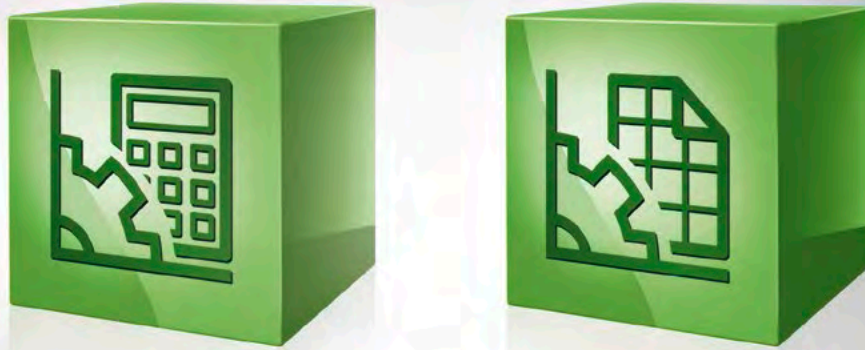


The Motion Designer enables the direct observation of the curves of position, speed, torque and acceleration over time for each axis.

Ordering information

TE5910

TC3 Motion Designer for drive dimensioning



TE5950 | TC3 Drive Manager 2

The TC3 Drive Manager 2 is used for commissioning the AX8000 multi-axis servo system, AX5000 digital compact servo drive, AMP8000 distributed servo drive system, AMI8100 integrated servo drives or the EL72xx, EP72xx and EJ72xx I/O components. It is optionally available as an integrated version in the TwinCAT automation platform or an update version independently of TwinCAT. The TC3 Drive

Manager 2 is integrated into a TwinCAT solution as a project and enables a separate assessment of power supply modules, axis modules and axis channels.

Automatic start-up list

The menu structure enables intuitive axis commissioning. Via the electronic identification plate, TC3 Drive Manager 2 automatically identifies the motor and corresponding parameter data. As a result,

a start-up list is automatically generated for each axis.

Scope View is integrated

Using the Run Motor function, the motor is ready for operation with an NC control system. The combination of NC control with the Scope View tool provides an optimal overview of the motor in operation. A fine-tuning of the axis and a minimisation of the tracking error is easy and straightforward.

Further adaptations are possible directly in the TC3 Drive Manager 2 via the Tune Drive function, such as the adjustment of parameter settings and the configuration of filters.



Detailed visualisation of the motor characteristic according to the electronic identification plate

Structured parameter list with integrated search function



Integrated scope in the NC control overview of the motor

All diagnostic messages at a glance and an additional watch window with individual user options



Direct fine-tuning of the drive during commissioning

Ordering information
 TE5950 TC3 Drive Manager 2

► www.beckhoff.com/TE5950

We reserve the right to make technical changes.

BECKHOFF New Automation Technology



TF5850 | TC3 XTS Extension

The TC3 XTS Extension decouples servo algorithms from the hardware and calculates them centrally. TwinCAT maps each XTS mover as a normal servo axis, enabling simple movement handling. Each output stage/coil is supplied with a current setpoint via EtherCAT.

All motion control functions such as flying saw, electrical

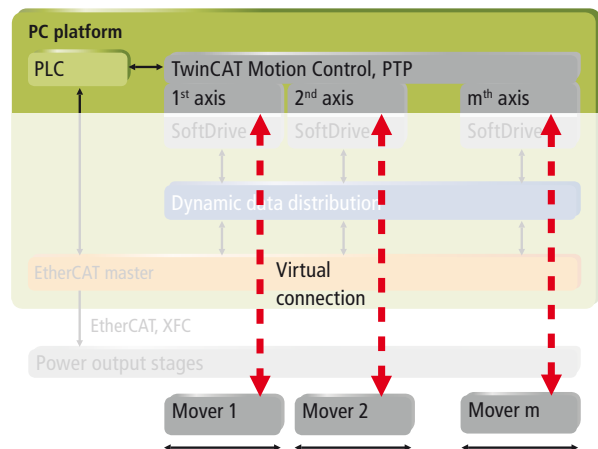
gears and cam plates are usable. Function extensions in TwinCAT take over typical XTS requirements:

- automatic accumulation
- collision avoidance
- jerk avoidance
- centrifugal force limitation
- collision prevention by operating a number of axes with optional package TF5410

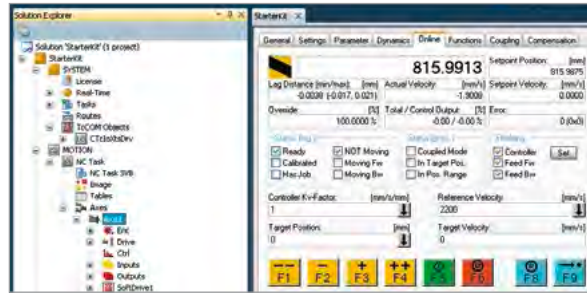
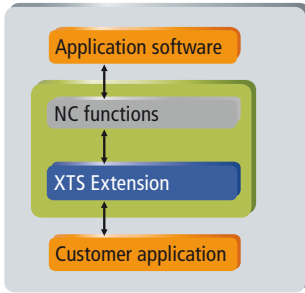
The integration of the XTS system into a production plant is easily possible thanks to support of numerous fieldbuses. All TwinCAT interfaces and functions simplify development and maintenance:

- application-specific programming in IEC 61131
- remote access over Ethernet

- synchronisation (with external application)
- setting of breakpoints
- visualisation of arbitrary variables



In IEC 61131 a mover can be programmed like a servo axis: simple movement commands are sufficient.



TC3 XTS Extension | In application programming, a mover is handled like a conventional servo axis.



The XTS configurator enables largely automated system configuration.



Axis and controller parameters of a mover can simply be copied within the XTS configurator.



The XTS viewer renders an intuitive online 2D representation of the movers in motion and can be used as a diagnostics and simulation tool.

Ordering information	
TF5850-0v50	software license, TwinCAT 3 XTS Extension, TwinCAT 3 platform P50 (Performance Plus)
TF5850-0v60	software license, TwinCAT 3 XTS Extension, TwinCAT 3 platform P60 (Mid Performance)
TF5850-0v70	software license, TwinCAT 3 XTS Extension, TwinCAT 3 platform P70 (High Performance)
TF5850-0v80	software license, TwinCAT 3 XTS Extension, TwinCAT 3 platform P80 (Very High Performance)
TF5850-0v81	software license, TwinCAT 3 XTS Extension, TwinCAT 3 platform P81 (Many-core, 5...8 Cores)
TF5850-0v82	software license, TwinCAT 3 XTS Extension, TwinCAT 3 platform P82 (Many-core, 9...16 Cores)
TF5850-0v83	software license, TwinCAT 3 XTS Extension, TwinCAT 3 platform P83 (Many-core, 17...32 Cores)
TF5850-0v84	software license, TwinCAT 3 XTS Extension, TwinCAT 3 platform P84 (Many-core, 33...64 Cores)

► www.beckhoff.com/TF5850



TF5890 | TC3 XPlanar

A wizard makes initial commissioning fast and simple: scan the system, configure the geometry of the modules with the mouse, identify the movers, automatically link in TwinCAT. In ongoing operation, the software carries out the calculation of the mover position, precise position control, as well as monitoring and diagnostics. Each mover is identified by the application software with an axis number and the XYZ coordinates as well as

the angles of rotation α , β , or γ of these three axes. Helpful items of information such as current consumption, lag errors, temperature and many others simplify diagnostics and enable integration of additional functions, such as weighing of products.

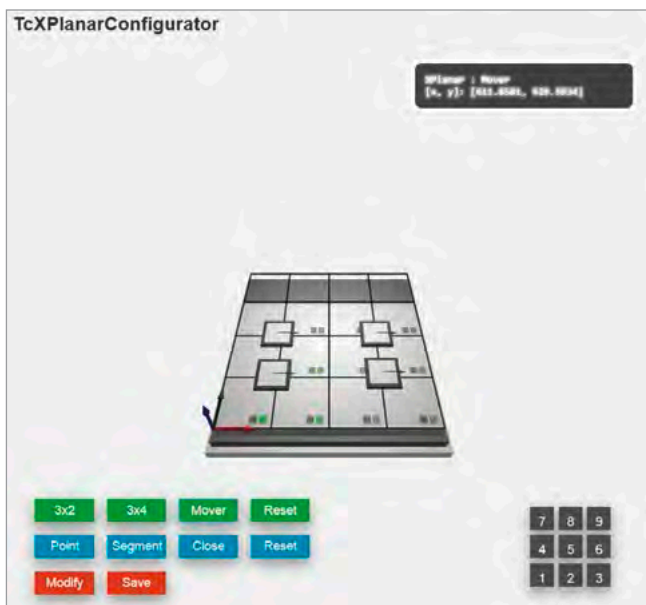
The mover motion is controlled by TwinCAT software. The system supports different levels of automation in three expansion stages.

Stage 1: The movers can be moved on a predefined 2D path with simple motion commands. All functions of the XTS system are available. In addition, movers can be lifted or lowered.

Stage 2: Different 2D paths can be defined. The movers can switch between these paths. All functions from stage 1 are included.

Stage 3: Fully automatic path calculation: The application software sends commands such as

“Drive to Station 1” or “Wait in Zone B”. The software executes all other tasks such as path optimisation, collision avoidance, energy-saving operation and congestion avoidance. All functions from stage 2 are included.



Configuration of the movers with axis number and the XYZ coordinates as well as the rotation angles of the three axes.

MoveToPosition

Once all objects are ready to receive motion commands, you may begin to send your movers to different sections of your environment. The most straight forward command is probably to assign a new spatial position that should be reached without breaking any dynamic limits such as maximum velocity. For such point-to-point commands linking the current position with a set target position by a straight line, you should use the `Start_MoveToPosition`-method of a mover instance.

PLC Declaration

```

VAR
  // the destination of the mover
  targetLocation : PositionXYC;

  // the dynamic limits
  // of the point-to-point command
  maxVelocity : LREAL;
  minMaxAcceleration : LREAL;
  minMaxJerk : LREAL;

  // the coordinates to change
  coords : Coordinates;

  success : BOOL;
END_VAR
    
```

PLC Implementation

```

targetLocation.SetValueXYC (x, y, c);

success := mover.Start_MoveToPosition(
  targetLocation,
  maxVelocity,
  minMaxAcceleration,
  minMaxJerk,
  coords);
    
```

Movement commands are programmed by calling the `MoveToPosition` method.

Technical data	TF5890
Required	TC1250
Target system	Windows 7/8/10
Further information	www.beckhoff.com/TF5890

Ordering information	
i TF5890-0v80	software license, TwinCAT 3 XPlanar, TwinCAT 3 platform P80 (Very High Performance)
i TF5890-0v81	software license, TwinCAT 3 XPlanar, TwinCAT 3 platform P81 (Many-core, 5...8 Cores)
i TF5890-0v82	software license, TwinCAT 3 XPlanar, TwinCAT 3 platform P82 (Many-core, 9...16 Cores)
i TF5890-0v83	software license, TwinCAT 3 XPlanar, TwinCAT 3 platform P83 (Many-core, 17...32 Cores)
i TF5890-0v84	software license, TwinCAT 3 XPlanar, TwinCAT 3 platform P84 (Many-core, 33...64 Cores)

i For availability status see Beckhoff website at: www.beckhoff.com/TF5890



Highlights

- one software platform for engineering and runtime
- integrated real-time support
- software modules for PLC, NC, CNC, robotics, HMI, measurement technology, analytics, safety

TwinCAT

PLC and Motion Control on the PC

► www.beckhoff.com/TwinCAT

514 Product overviews

524 **TwinCAT 3**

- 526 eXtended Automation Engineering (XAE)
- 529 eXtended Automation Runtime (XAR)
- 530 TwinCAT Cloud Engineering

532 **TwinCAT 3 Engineering TExxxx**

538 **TwinCAT 3 Base TC1xxx**

542 **TwinCAT 3 Functions**

- 542 System TF1xxx
- 543 HMI TF2xxx
- 545 Measurement TF3xxx
- 549 Controller TF4xxx
- 550 Motion Control TF5xxx
- 560 Connectivity TF6xxx
- 568 Vision TF7xxx
- 570 Industry specific TF8xxx

572 **TwinCAT 2**

- 574 **TwinCAT 2 PLC TX1200**
- 574 **TwinCAT 2 NC PTP TX1250**
- 575 **TwinCAT 2 NC I TX1260**
- 575 **TwinCAT 2 CNC TX1270**
- 576 **TwinCAT 2 I/O TX1100**
- 576 **TwinCAT 2 CP TX1000**

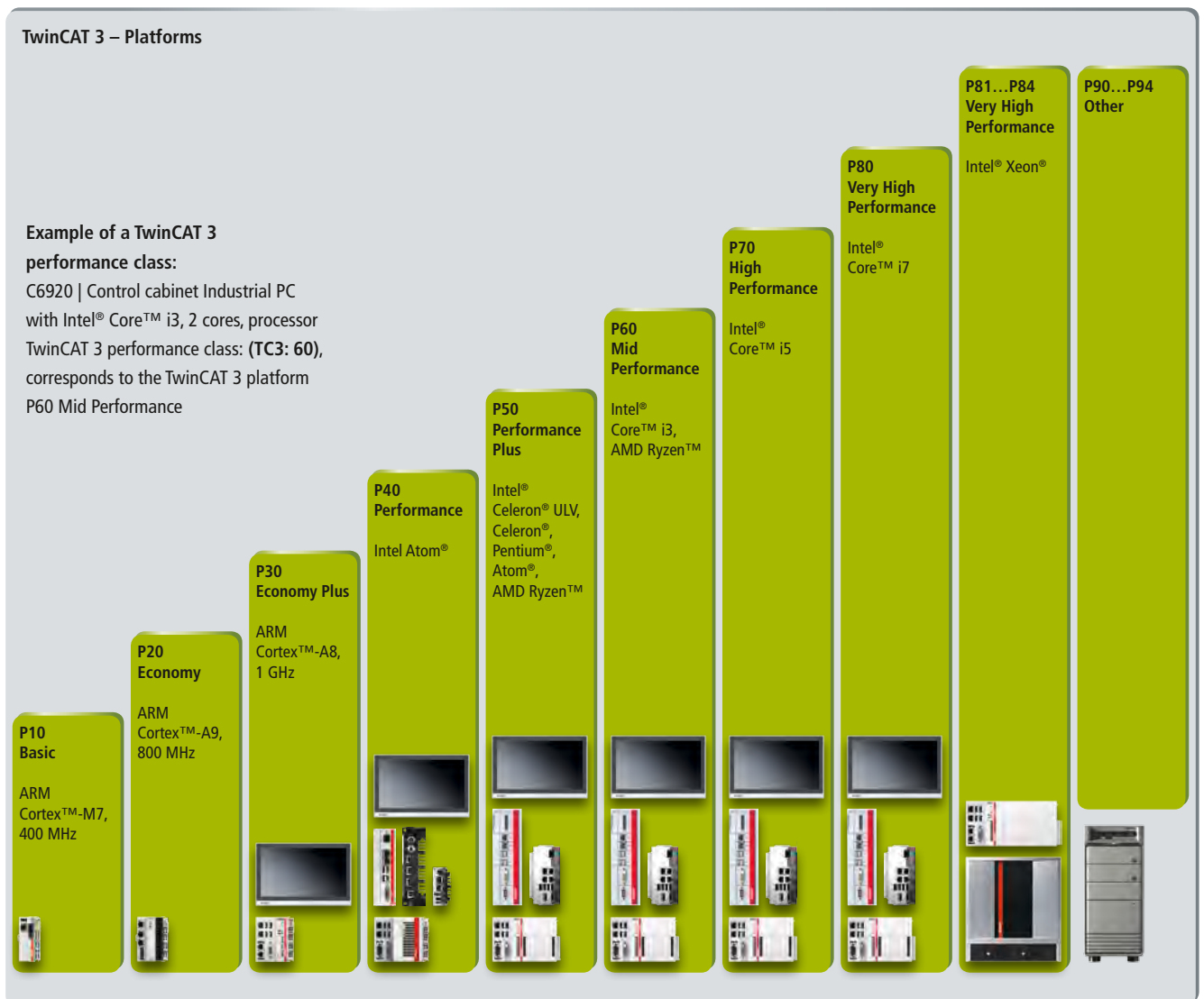
577 **TwinCAT 2 Supplements**

- 577 System TSxxx
- 580 Controller TS4xxx
- 581 Motion TS5xxx
- 584 Communication TS6xxx
- 588 Building Automation TS8xxx

Product overview TwinCAT 3

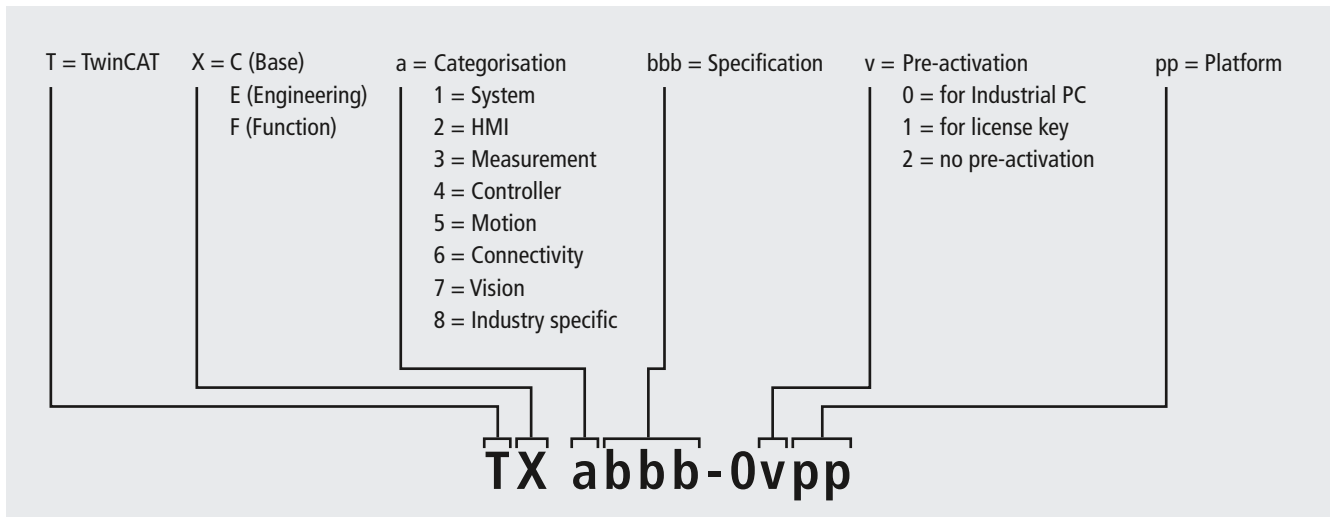
The TwinCAT 3 runtime components are available for different platforms. The platform levels correspond to the various TwinCAT 3 performance classes of the Beckhoff PCs. The TwinCAT 3 performance class of a Beckhoff PC depends on the configuration and the technical data of the PC (including the processor).

The following overview shows the various TwinCAT 3 platforms. The controllers integrated in the platform classifications represent sample configurations. The TwinCAT 3 performance class required for a TwinCAT 3 Runtime component can be found in the product description of the respective Beckhoff PC.

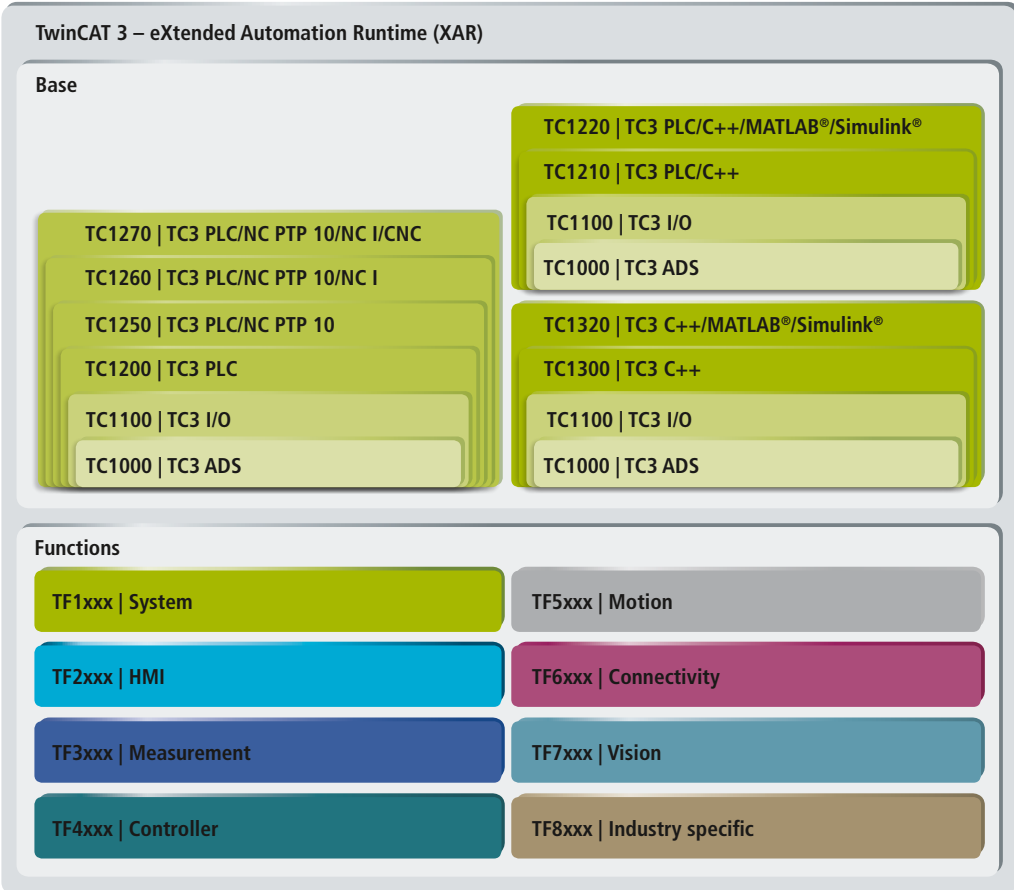


The controllers integrated in the platform categorization are only example configurations.

TwinCAT 3 designation system



TwinCAT 3 – eXtended Automation Engineering (XAE)



TwinCAT 3 is divided into components. The TwinCAT 3 engineering components enable the configuration, programming and debugging of applications. The TwinCAT 3 runtime consists of further components – basic components and functions. The basic components can be extended by functions.

TwinCAT 3 Engineering			
TE1000	TC3 Engineering	TwinCAT 3 engineering environment	532
TE1010	TC3 Realtime Monitor	tool for precise diagnostics and optimization of the runtime behavior of tasks in the TwinCAT 3 runtime	532
TE1111	TC3 EtherCAT Simulation	easy configurations of simulation environments with several EtherCAT slaves	532
TE1120	TC3 XCAD Interface 2	interface between ECAD tools and TwinCAT 3	533
TE1130	TC3 CAD Simulation Interface	link between TwinCAT and a 3D CAD system for SiL simulation	533
TE1200	TC3 PLC Static Analysis	analysis tool that tests PLC software on the basis of coding rules	533
TE1300	TC3 Scope View Professional	software oscilloscope for the graphical display of data captured from several target systems	534
TE1310	TC3 Filter Designer	graphic engineering tool for determining coefficient digital filters	534
TE1400	TC3 Simulink® Target	TwinCAT target for Simulink® for generating TwinCAT 3 modules	534
TE1401	TC3 MATLAB® Target	TwinCAT target for MATLAB® for generating TwinCAT 3 modules	535
TE1410	TC3 MATLAB®/Simulink® Interface	communication interface between MATLAB®/Simulink® and the TwinCAT 3 runtime	535
TE1420	TC3 Target for FMI	interface for simulation tools that support the Functional Mockup Interface (FMI)	535
TE1500	TC3 Valve Diagram Editor	graphical tool for designing the characteristic curve of a hydraulic valve	536
TE1510	TC3 Cam Design Tool	graphic design tool for electronic cam plates	536
TE1610	TC3 EAP Configurator	a tool for visualizing and configuring communication networks, in which data exchange based on the EtherCAT Automation Protocol (EAP) takes place or is to be established	536
TE2000	TC3 HMI Engineering	tool for developing platform-independent user interfaces	537
TE3500	TC3 Analytics Workbench	complete solution for 24/7 monitoring of machines and systems incl. visualization on analysis dashboards	537
TE3520	TC3 Analytics Service Tool	process data analysis tool for commissioning and service technicians	537
TE5910	TC3 Motion Designer	TC3 Motion Designer for drive dimensioning	504
TE5950	TC3 Drive Manager 2	for commissioning the AX8000, AX5000, AMI8100, AMP8000 or the I/O components EL72xx, EP72xx and EJ72xx	506

TwinCAT 3 Base			
TC1000	TC3 ADS	TwinCAT 3 ADS	538
TC1100	TC3 I/O	TwinCAT 3 I/O	538
TC1200	TC3 PLC	TwinCAT 3 PLC	539
TC1210	TC3 PLC/C++	TwinCAT 3 PLC and C++	539
TC1220	TC3 PLC/C++/MATLAB®/Simulink®	TwinCAT 3 PLC, C++ and modules generated in MATLAB®/Simulink®	539
TC1250	TC3 PLC/NC PTP 10	TwinCAT 3 PLC and NC PTP 10	540
TC1260	TC3 PLC/NC PTP 10/NC I	TwinCAT 3 PLC, NC PTP 10 and NC I	540
TC1270	TC3 PLC/NC PTP 10/NC I/CNC	TwinCAT 3 PLC, NC PTP 10, NC I and CNC	541
TC1275	TC3 PLC/NC PTP 10/NC I/CNC E	TwinCAT 3 PLC, NC PTP 10, NC I and CNC E	541
TC1300	TC3 C++	TwinCAT 3 C++	541
TC1320	TC3 C++/MATLAB®/Simulink®	TwinCAT 3 C++ and modules generated in MATLAB®/Simulink®	541

TwinCAT 3 | Functions

System

TF1800	TC3 PLC HMI	stand-alone tool for displaying visualizations from the PLC development environment	542
TF1810	TC3 PLC HMI Web	display of visualizations from the PLC development environment in a web browser	542
TF1910	TC3 UML	UML (Unified Modeling Language) for modeling of PLC software	542

HMI

TF2000	TC3 HMI Server	modular web server, includes a client connection and a target connection	543
TF20xx	TC3 HMI Clients Packs	optional extension of the TC3 HMI Server with up to 100 additional client connections	543
TF20xx	TC3 HMI Targets Packs	optional extension of the TC3 HMI Server with up to 100 additional control systems	543
TF2110	TC3 HMI OPC UA	server extension for access to TwinCAT target systems or other controllers via OPC UA	544
TF2200	TC3 HMI Extension SDK	software development kit (C++/.NET) for programming application-specific solutions	544
TF2300	TC3 HMI Scope	software oscilloscope for graphic display of time sequences	544

Measurement

TF3300	TC3 Scope Server	data preparation for visual display in the TwinCAT 3 Scope View	545
TF3500	TC3 Analytics Logger	The TwinCAT Analytics Logger enables the cyclic archiving of the process image.	545
TF3510	TC3 Analytics Library	PLC library used for online or offline analysis in the PLC runtime of the TwinCAT Analytics Workbench	545
TF3520	TC3 Analytics Storage Provider	IoT client: interface to one or more storage facilities for raw and analysis data from various sources	545
TF3550	TC3 Analytics Runtime	runtime "container" for the Analytics application, which was configured and developed in the Analytics Workbench	546
TF356x	TC3 Analytics Controller Packs	extension of the TC3 Analytics Workbench for the analysis of up to 128 additional controllers	546
TF3600	TC3 Condition Monitoring Level 1	PLC library for the implementation of condition monitoring for machines	546
TF3650	TC3 Power Monitoring	TwinCAT Power Monitoring PLC library	547
TF3680	TC3 Filter	PLC library for implementing digital filters	547
TF3710	TC3 Interface for LabVIEW™	enables the exchange of data between LabVIEW™ and the TwinCAT runtime	547
TF3800	TC3 Machine Learning Inference Engine	execution module of trained classical machine learning algorithms	548
TF3810	TC3 Neural Network Inference Engine	execution module of trained neural networks	548
TF3900	TC3 Solar Position Algorithm	precise calculation of the sun's position	548

Controller

TF4100	TC3 Controller Toolbox	basic controllers (P, I, D), complex controllers (PI, PID), pulse width modulation, ramps, signal generators and filters	549
TF4110	TC3 Temperature Controller	temperature control for monitoring and controlling different temperature ranges	549
TF4500	TC3 TwinCAT Speech	enables the multilingual input and output of queries or information implemented in an industrially compatible way	549

Motion

TF5000	TC3 NC PTP 10 Axes	NC PTP (point-to-point movements) for up to 10 axes	550
TF5010	TC3 NC PTP Axes Pack 25	extension of TwinCAT 3 NC PTP to up to 25 axes	550
TF5020	TC3 NC PTP Axes Pack unlimited	extension of TwinCAT 3 NC PTP to over 25 axes	551
TF5050	TC3 NC Camming	using the TwinCAT NC cam plate functionality (table coupling)	551
TF5055	TC3 NC Flying Saw	implementing flying saw functionality	551
TF5060	TC3 NC FIFO Axes	implementation of a pre-defined user setpoint generator for an NC axis	551
TF5065	TC3 Motion Control XFC	high-precision logging and switching of digital signals in relation to axis positions	552

TwinCAT 3 | Functions

Motion

TF5100	TC3 NC I	NC I with 3 interpolating axes and 5 additional axes	552
TF5110	TC3 Kinematic Transformation L1	realization of different kinematic transformations Level 1	553
TF5111	TC3 Kinematic Transformation L2	realization of different kinematic transformations Level 2	553
TF5112	TC3 Kinematic Transformation L3	realization of different kinematic transformations Level 3	553
TF5113	TC3 Kinematic Transformation L4	realization of different kinematic transformations Level 4	553
TF5120	TC3 Robotics mxAutomation	direct communication between the PLC and the KUKA KR C4 robot control	554
TF5130	TC3 Robotics uniVAL PLC	direct communication between the PLC and the CS8C robotics controller from Stäubli	554
TF5200	TC3 CNC	CNC path control software	554
TF5210	TC3 CNC E	CNC path control software export version	555
TF5220	TC3 CNC Axes Pack	extension to up to a total of 64 axes/controlled spindles, of which a maximum of 32 can be path axes and a maximum of 12 can be controlled spindles	555
TF5225	TC3 CNC Measurement	optional package of CNC cycles that supports the measurement of tools or workpieces directly on the machine	555
TF5230	TC3 CNC Channel Pack	further CNC channel, extension to a maximum of 12 channels, channel synchronization, axis transfer between channels	556
TF5240	TC3 CNC Transformation	transformation functionality (5-axis functionality)	556
TF5245	TC3 CNC Kinematic Optimization	optional CNC package that optimizes the determination of kinematic parameters for rotary axes in 5-axis kinematics	556
TF5250	TC3 CNC HSC Pack	extending the CNC with HSC technology (high-speed cutting)	557
TF5260	TC3 CNC Spline Interpolation	path programming via splines with programmable spline type, Akima-spline, B-spline	557
TF5270	TC3 CNC Virtual NCK Basis	virtual TwinCAT CNC for simulation in a Windows environment	557
TF5271	TC3 CNC Virtual NCK Options	virtual TwinCAT CNC for simulation in a Windows environment	557
TF5280	TC3 CNC Volumetric Compensation	extension for compensating geometric machine errors based on an ISO-standardized parametric model	558
TF5290	TC3 CNC Cutting Plus	technology package for extending the CNC functionality for cutting operations	558
TF5410	TC3 Motion Collision Avoidance	collision avoidance and controlled accumulation when operating a number of linearly and/or translationally dependent axes with TC3 NC PTP	559
TF5420	TC3 Motion Pick-and-Place	for handling tasks carried out by gantry robots and other kinematics	559
TF5810	TC3 Hydraulic Positioning	algorithms for control and positioning of hydraulic axes	559
TF5850	TC3 XTS Extension	decouples servo algorithms from the hardware and calculates them centrally	508
TF5890	TC3 XPlanar	calculation of the mover position, precise position control, as well as monitoring and diagnostics	510

Connectivity

TF6010	TC3 ADS Monitor	recording and diagnostics functions for the communication of TwinCAT systems	560
TF6020	TC3 JSON Data Interface	interface for the exchange of data in JSON format between the TwinCAT system and custom applications	560
TF6100	TC3 OPC UA	access to TwinCAT in accordance with OPC UA with UA server (DA/HA/AC) and UA client (DA)	560
TF6220	TC3 EtherCAT Redundancy 250	extension of the TwinCAT EtherCAT master with cable redundancy capability for up to 250 slaves	561
TF6221	TC3 EtherCAT Redundancy 250+	extension of the TwinCAT EtherCAT master with cable redundancy capability for more than 250 slaves	561
TF6225	TC3 EtherCAT External Sync	extension of the TwinCAT EtherCAT master with an option to synchronize the Beckhoff real-time communication with external signals	561
TF6250	TC3 Modbus TCP	communication with Modbus TCP devices (server and client functionality)	561
TF6255	TC3 Modbus RTU	serial communication with Modbus end devices	562
TF6270	TC3 PROFINET RT Device	communication via PROFINET (PROFINET slave)	562
TF6271	TC3 PROFINET RT Controller	communication via PROFINET (PROFINET master)	562
TF6280	TC3 Ethernet/IP Adapter	communication via EtherNet/IP (EtherNet/IP adapter)	562
TF6281	TC3 Ethernet/IP Scanner	communication via EtherNet/IP (EtherNet/IP scanner)	563

TwinCAT 3 | Functions

Connectivity

TF6300	TC3 FTP	easy access from TwinCAT PLC to FTP server	563
TF6310	TC3 TCP/IP	communication via generic TCP/IP server	563
TF6311	TC3 TCP/UDP Realtime	direct access from real-time to Ethernet communication	563
TF6340	TC3 Serial Communication	communication via serial Bus Terminals or PC COM ports with the 3964R and RK512 protocol	563
TF6350	TC3 SMS/SMTP	sending SMS and e-mails from the PLC	564
TF6360	TC3 Virtual Serial COM	virtual serial COM driver for Windows platforms	564
TF6420	TC3 Database Server	accessing databases from the PLC	564
TF6421	TC3 XML Server	read and write access to XML files from the PLC	564
TF6500	TC3 IEC 60870-5-10x	communication according to IEC 60870-101, -102, -103, -104	565
TF6510	TC3 IEC 61850/IEC 61400-25	communication according to IEC 61850 and IEC 61400-25	565
TF6600	TC3 RFID Reader Communication	connection of RFID readers to the TwinCAT PLC	565
TF6650	TC3 DBC File Import for CAN	reading of DBC file formats	565
TF6701	TC3 IoT Communication (MQTT)	provides basic publisher/subscriber-based data connectivity via MQTT	566
TF6710	TC3 IoT Functions	provides connectivity for cloud-based communication services	566
TF6720	TC3 IoT Data Agent	gateway application for data connectivity between TwinCAT runtime and IoT services	566
TF672x	TC3 IoT Data Agent Packs	extension of the TC3 IoT Data Agent for up to 256 additional ADS target runtimes or OPC UA namespaces	566
TF6730	TC3 IoT Communicator	sends process data and push notifications from TwinCAT to smartphones and tablets through a messaging service	567
TF6735	TC3 IoT Communicator App	smartphone and tablet app to receive and visualize live data and push notifications sent from TwinCAT	567
TF6760	TC3 IoT HTTPS/REST	basic functions for HTTP/HTTPS communication in the form of a PLC library providing the ability to address REST APIs as a client	567

Vision

TF700x	TC3 GigE Vision Connector	interface for the configuration and integration of GigE Vision cameras directly into TwinCAT	568
TF7100	TC3 Vision Base	extensive PLC library with a large number of widely varying functions and algorithms for solving image processing tasks	568
TF7200	TC3 Vision Matching 2D	extension to find and compare objects based on learned references, contours, feature points or other properties	569
TF7250	TC3 Vision Code Reading	functions for reading various 1D and 2D codes	569
TF7300	TC3 Vision Metrology 2D	detection of edges, holes and circular arcs as well as the determination of lengths, distances, diameters, angles and coordinates, all with sub-pixel accuracy	569

Industry specific

TF8000	TC3 HVAC	library covering all technical systems in building automation	570
TF8010	TC3 Building Automation Basic	executing basic room automation functions	570
TF8020	TC3 BACnet	communication with data networks of building automation and building control systems	570
TF8040	TC3 Building Automation	software package covering all technical building automation services	570
TF8050	TC3 Lighting Solution	software package for simple commissioning of DALI lighting controllers	571
TF8310	TC3 Wind Framework	framework for the development of operational management software for wind turbines	571
TF8810	TC3 AES70 (OCA)	communication library for the operation of a system as an OCA (Open Control Architecture) controller or OCA device in an OCA network	571

Product overview TwinCAT 2

TX1200 TwinCAT PLC 574	
PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows 7/10, Windows CE*
Real-time	Beckhoff real-time kernel
I/O system	EtherCAT, Lightbus, PROFIBUS DP/MC, Interbus, CANopen, DeviceNet, SERCOS, Ethernet
Runtime system	4 multi-tasking PLCs each with 4 tasks in each PLC runtime system, development and runtime systems on one PC or separately (CE: only runtime)
Memory	process image size, flags area, program size, POU size, number of variables only limited by the size of the user memory (max. 2 GB with NT/2000/XP/Vista)
Cycle time	adjustable from 50 µs
Link time	1 µs (Intel® Core™ 2 Duo)
Programming	IEC 61131-3: IL, FBD, LD, SFC, ST, powerful library management, convenient debugging

TX1250 TwinCAT NC PTP 574	
TwinCAT PLC	inclusive 574
PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows 7/10, Windows CE*
Real-time	Beckhoff real-time kernel
I/O system	EtherCAT, Lightbus, PROFIBUS DP/MC, Interbus, CANopen, DeviceNet, SERCOS, Ethernet
Programming	performed using function blocks for TwinCAT PLC according to IEC 61131-3 (standardized PLCopen Motion Control libraries), convenient axis commissioning menus in the System Manager
Runtime system	NC point-to-point including TwinCAT PLC
Number of axes	up to 255
Axis types	electrical and hydraulic servo drives, frequency converter drives, stepper motor drives, switched drives (fast/crawl axes)
Cycle time	50 µs upwards, typically 1 ms (selectable)
Axis functions	standard axis functions: start/stop/reset/reference, velocity override, special functions: master/slave cascading, cam plates, electronic gearings, online distance compensation of segments, flying saw

TX1100 TwinCAT I/O 576	
PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows 7/10, Windows CE*
Real-time	Beckhoff real-time kernel

Multi-purpose I/O interface for all common fieldbus systems, PC Fieldbus Cards and interfaces with integrated real-time driver

TX1000 TwinCAT CP 576	
PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows 7/10, Windows Embedded WES2009/WES7*
Real-time	Beckhoff real-time kernel

Windows driver for Beckhoff Control Panel

*Version-dependent/older operating system versions are available on request from our service department.

TX1260 TwinCAT NC I		575
TwinCAT PLC	inclusive	574
TwinCAT NC PTP	inclusive	574
PC hardware	standard PC/IPC hardware, no extras	
Operating systems	Windows 7/10, Windows CE*	
Real-time	Beckhoff real-time kernel	
I/O system	EtherCAT, Lightbus, PROFIBUS DP/MC, Interbus, CANopen, DeviceNet, SERCOS, Ethernet	
Programming	DIN 66025 programs for NC interpolation, access via function blocks from TwinCAT PLC according to IEC 61131-3	
Runtime system	NC interpolation, including TwinCAT NC PTP and PLC	
Number of axes	max. 3 axes and up to 5 auxiliary axes per group, 1 group per channel, max. 31 channels	
Axis types	electrical servo axes, stepper motor drives	
Interpreter functions	subroutines and jumps, programmable loops, zero shifts, tool compensations, M and H functions	
Geometries	straight lines and circular paths in 3D space, circular paths in all main planes, helices with base circles in all main planes linear, circular, helical interpolation in the main lanes and freely definable planes, Bezier splines, look-ahead function	
Axis functions	online reconfiguration of axes in groups, path override, slave coupling to path axes, auxiliary axes, axis error and sag compensation, measuring functions	
Operation	automatic operation, manual operation (jog/inching), single block operation, referencing, handwheel operation (motion/superposition)	

TS511x TwinCAT NC I Options		583
Options	TS511x TwinCAT Kinematic Transformation	

TX1270 TwinCAT CNC		575
TwinCAT PLC	inclusive	574
TwinCAT NC PTP	inclusive	574
TwinCAT NC I	inclusive	575
PC hardware	standard PC/IPC hardware, no extras	
Operating systems	Windows 7/10*	
Real-time	Beckhoff real-time kernel	
I/O system	EtherCAT, Lightbus, PROFIBUS DP/MC, CANopen, DeviceNet, SERCOS, Ethernet	
Programming	DIN 66025 programming language with high-level language extensions, access via function blocks from TwinCAT PLC according to IEC 61131-3	
Runtime system	CNC, including TwinCAT NC I, NC PTP, PLC	
Number of axes/spindles	8 path axes/controlled spindles, max. of 64 axes/controlled spindles (optional), max. 12 channels (optional)	
Axis types	electrical servo-axes, analog/encoder interface via fieldbus, digital interface via fieldbus	
Interpreter functions	subroutines and jumps, programmable loops, zero shifts, tool compensations, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and help functions, tool functions	
Geometries	linear, circular, helical interpolation in the main planes and freely definable planes, max. 32 interpolating path axes per channel, look-ahead function	
Axis functions	coupling and gantry axis function, override, axis error and sag compensation, measuring functions	
Operation	automatic operation, manual operation (jog/inching), single block operation, referencing, block search, handwheel operation (motion/superposition)	

TS52xx TwinCAT CNC Options	
Options	TS5220 TwinCAT CNC Axes Pack
	TS5230 TwinCAT CNC Channel Pack
	TS5240 TwinCAT CNC Transformation
	TS5250 TwinCAT CNC HSC Pack
	TS5260 TwinCAT CNC Spline Interpolation

TwinCAT 2 Supplements | System

TS1110	TwinCAT Simulation Manager	simplified preparation and configuration of a simulation environment	578
TS1120	TwinCAT ECAD Import	importing engineering results from an ECAD program	577
TS1140	TwinCAT Management Server	central administration of Beckhoff CE control systems	579
TS1150	TwinCAT Backup	backing up and restoring files, operating system and TwinCAT settings	577
TS1600	TwinCAT Engineering Interface Server	co-ordinating programming tasks via a central source code management system	577
TS1800	TwinCAT PLC HMI	displaying visualizations created in PLC Control	578
TS1810	TwinCAT PLC HMI Web	displaying visualizations created in PLC Control in a web browser	578
TS3300	TwinCAT Scope 2	graphical analysis tool for displaying time-continuous signals	579
TS3900	TwinCAT Solar Position Algorithm	precise calculation of the sun's position	579
TS622x	TwinCAT EtherCAT Redundancy	extension of the TwinCAT EtherCAT master with cable redundancy capability	579
TS6420	TwinCAT Database Server	accessing databases from the PLC	578
TS6421	TwinCAT XML Data Server	reading and writing of XML-based data by the PLC	577

TwinCAT 2 Supplements | Controller

TS4100	TwinCAT PLC Controller Toolbox	modules for basic controllers (P, I, D), complex controllers (PI, PID), pulse width modulation, ramps, signal generators and filters	580
TS4110	TwinCAT PLC Temperature Controller	instanced temperature control function block for monitoring and controlling different temperature ranges	580

TwinCAT 2 Supplements | Motion

TS1500	TwinCAT Valve Diagram Editor	graphical tool for designing the characteristic curve of a hydraulic valve	583
TS1510	TwinCAT Cam Design Tool	graphic design tool for electronic cam plates	583
TS5050	TwinCAT NC Camming	using the TwinCAT NC cam plate functionality (table coupling)	582
TS5055	TwinCAT NC Flying Saw	implementing flying saw functionality	582
TS5060	TwinCAT NC FIFO Axes	implementation of a pre-defined user setpoint generator for an NC axis	582
TS5065	TwinCAT PLC Motion Control XFC	high-precision logging and switching of digital signals in relation to axis positions	581
TS511x	TwinCAT Kinematic Transformation	implementation of different kinematic transformations for TwinCAT PTP or TwinCAT NC I	583
TS5800	TwinCAT Digital Cam Server	software implementation of fast cam controller	583
TS5810	TwinCAT PLC Hydraulic Positioning	control and adjustment of hydraulic axes	581

TwinCAT 2 Supplements | Communication

TS6100	TwinCAT OPC UA Server	access to TwinCAT in accordance with OPC UA with UA server (DA/HA/AC) and UA client (DA)	586
TS6250	TwinCAT Modbus TCP Server	communication with Modbus TCP devices (server and client functionality)	584
TS6255	TwinCAT PLC Modbus RTU	serial communication with Modbus end devices	584
TS6270	TwinCAT PROFINET RT Device	TwinCAT PROFINET RT device turns every PC-based controller into a PROFINET RT device.	587
TS6271	TwinCAT PROFINET RT Controller	TwinCAT PROFINET RT controller turns every PC-based controller into a PROFINET RT controller.	586
TS6280	TwinCAT EtherNet/IP Adapter	TwinCAT EtherNet/IP Adapter turns every PC-based controller into an EtherNet/IP adapter.	587
TS6300	TwinCAT FTP Client	basic access from TwinCAT PLC to FTP server	587
TS6310	TwinCAT TCP/IP Server	communication via generic TCP servers	586
TS6340	TwinCAT PLC Serial Communication	communication via serial Bus Terminals or PC COM ports	584
TS6341	TwinCAT PLC Serial Communication 3964R/RK512	communication via serial Bus Terminals or PC COM ports with the 3964R and RK512 protocol	584
TS6350	TwinCAT SMS/SMTP Server	sending SMS and e-mails from the PLC	586
TS6360	TwinCAT Virtual Serial COM Driver	virtual serial COM driver for Windows and Windows CE platforms	587
TS6370	TwinCAT DriveCOM OPC Server	fieldbus-independent communication connections between the engineering tool and the drive	585
TS6371	TwinCAT DriveTop Server	configuring Indramat SERCOS drives with DriveTop software on TwinCAT systems	585
TS650x	TwinCAT PLC IEC 60870-5-101, -102, -103, -104 Master	implementation of IEC 60870-101, -102, -103 and -104 masters	585
TS6507	TwinCAT PLC IEC 60870-5-101, -104 Slave	implementation of IEC 60870-101 and -104 slaves	585
TS6509	TwinCAT PLC IEC 61400-25 Server	IEC 61400-25 communication	585
TS6511	TwinCAT PLC IEC 61850 Server	IEC 61850 communication	585
TS6600	TwinCAT PLC RFID Reader Communication	connection of RFID readers to the TwinCAT PLC	587

TwinCAT 2 Supplements | Building Automation

TS8000	TwinCAT PLC HVAC	automation of HVAC and sanitary installations	588
TS8010	TwinCAT PLC Building Automation Basic	executing basic room automation functions	588
TS8020	TwinCAT BACnet/IP	communication with the data networks of the building automation and building control systems	588
TS8035	TwinCAT FIAS Server	communication between TwinCAT PLC and a system using the FIAS standard	589
TS8036	TwinCAT Crestron Server	communication between a TwinCAT PLC and a Crestron controller	589
TS8040	TwinCAT Building Automation	software package covering all technical building automation services	589
TS8100	TwinCAT Building Automation Framework	configuration and commissioning of building automation projects	589

TwinCAT 3 | eXtended Automation Technology (XAT)

► www.beckhoff.com/TwinCAT3



With TwinCAT 3 a PC-based control software is available which will expand the standard automation world considerably. In addition to the object-oriented IEC 61131-3 extensions, the languages of the IT world are available in C and C++. The integration of MATLAB® and Simulink® enables the application in scientific fields. And all of that in just one engineering

environment. The modules run in different languages in a common runtime. The advantage of this modularity is the improved reuse of modules, once they have been written and tested. The runtime runs under harsh real-time conditions with the use of multi-core technology and the support of 32- or 64-bit operating systems.

Current operating systems can be found in the respective product tables. Older operating systems are available on request from our service department.

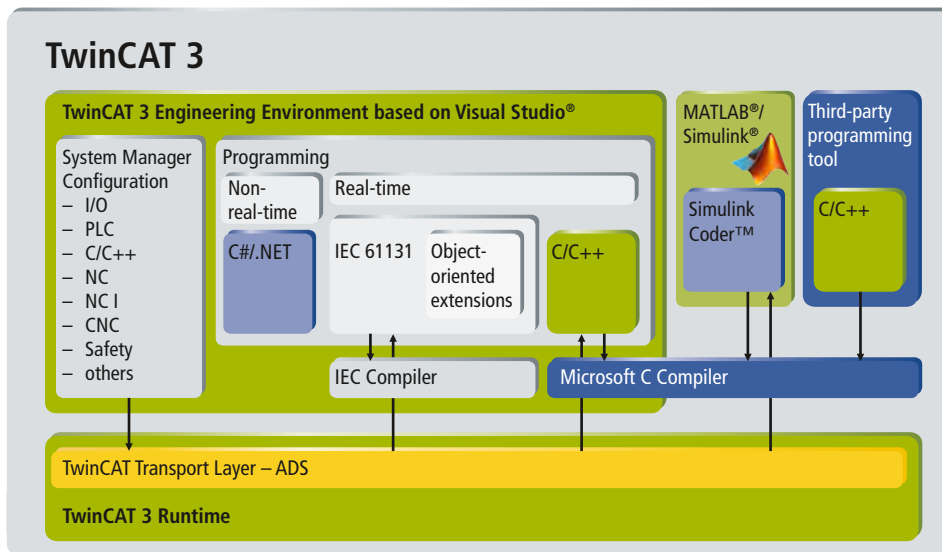
TwinCAT 3 highlights

- only one software for programming and configuration
- Visual Studio® integration
- more freedom in selecting programming languages
- support for the object-oriented extension of IEC 61131-3
- use of C/C++ as the programming language for real-time applications
- link to MATLAB® and Simulink®
- open interfaces for expandability and adaptation to the tools landscape
- flexible runtime environment
- active support of multi-core and 64-bit systems
- migration of TwinCAT 2 projects
- automatic code generation and project implementation with the TwinCAT Automation Interface



TwinCAT 3 | eXtended Automation Engineering (XAE)

Integration in Microsoft Visual Studio® makes it possible to program automation objects in parallel with the aid of the 3rd edition of IEC 61131-3 and the C or C++ languages. The objects (modules) generated can exchange data with each other and call each other independently of the language they were written in. The TwinCAT System Manager has been integrated into the development environment. This way, only one software is required to configure, parameterise, program and to diagnose automation devices.



Visual Studio® integration can be accomplished in two different ways. TwinCAT Standard only uses the basic framework of Visual Studio® with all its benefits in terms of handling, connection to source code control software, etc., while TwinCAT Integrated, as the name implies, integrates itself into Visual Studio®. In this version, the C/C++ programming languages and link to MATLAB®/Simulink® are available.

TwinCAT 3 extends the standard automation world

eXtended Automation Engineering

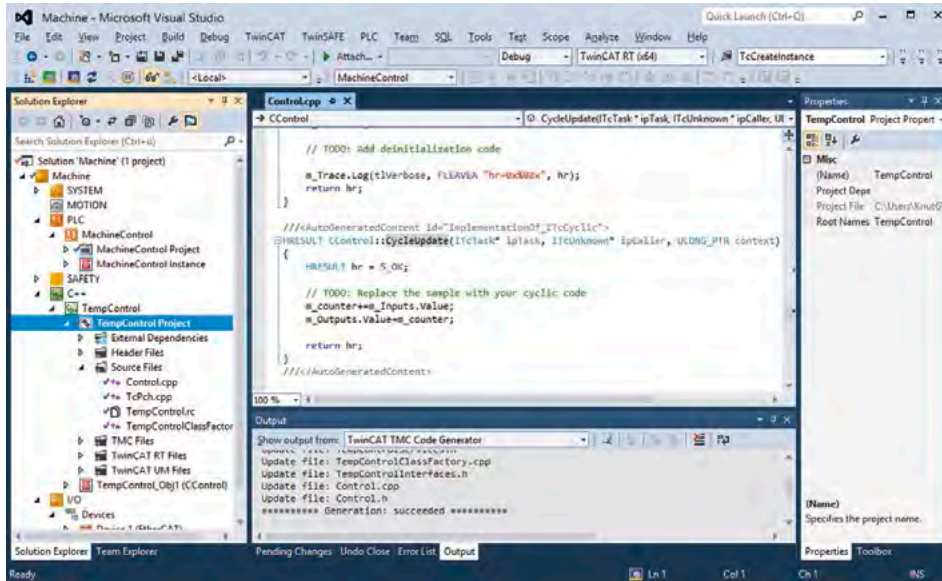
- one tool – Microsoft Visual Studio®
- integrated: IEC 61131 – worldwide standard in automation
- integrated: C/C++ – worldwide standard in IT
- integrated: TwinCAT System Manager – well-known configuration tool
- link to MATLAB®/Simulink®: worldwide standard in science
- FMI interface: worldwide standard in simulation
- expandable with other tools: editors, compilers
- TwinCAT 2 projects can be migrated.
- TwinCAT 3 modules: standardised programming frames
- using the .NET programming languages for non-real-time capable applications (e.g. HMI)



TwinCAT 3 | eXtended Automation Language Support

Real-time

- System Manager
- LD editor
- FBD editor
- SFC editor
- IL editor
- ST editor
- CFC editor
- Visual C/C++ editor
- MATLAB®/Simulink®
- FMI



Flexible use of programming languages

IEC 61131-3 programming

- supplier-independent programming standard
- PLCopen certification
- portable, reusable software
- 5 graphic and text-based programming languages
 - Structured Text and Instruction List
 - Function Block Diagram and Ladder Diagram
 - Sequential Function Chart

- data encapsulation by user-defined data types

Extended options in TwinCAT 3

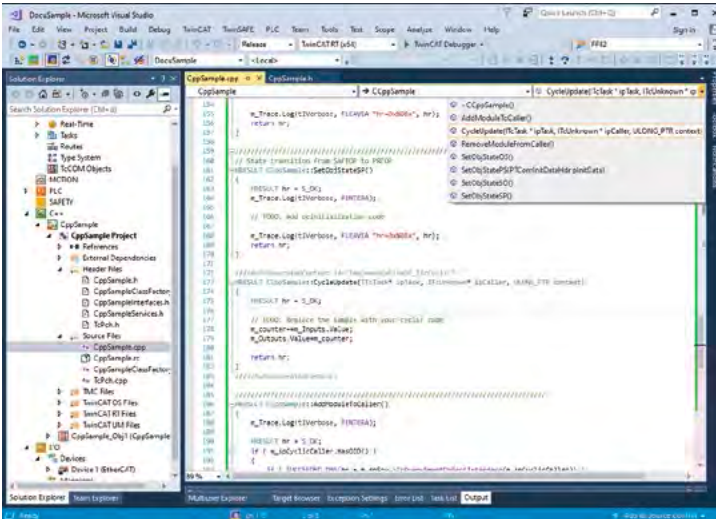
- improved usability
 - auto-complete
 - marking of associated keywords
 - collapsing of programming structures

- extended debugging
 - use of conditional break points
 - improved inline monitoring
- object-oriented extensions
 - single inheritance
 - interfaces
 - methods
 - attributes

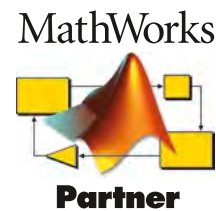
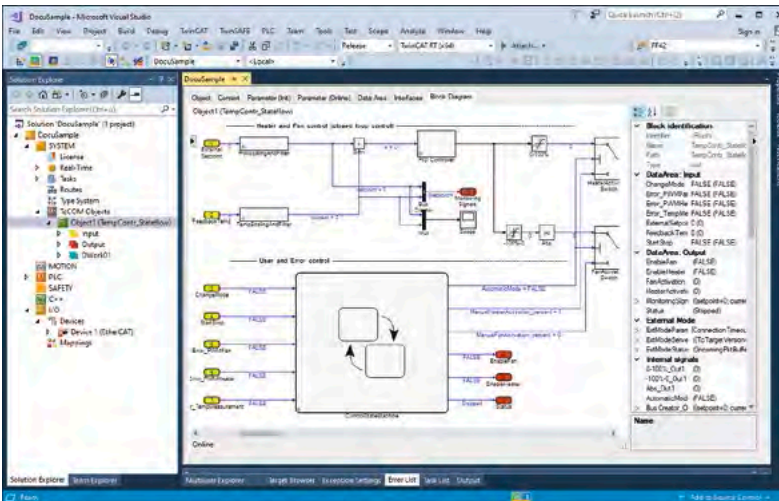


TwinCAT 3 | eXtended Automation Language Support

TwinCAT 3 offers the possibility to program TwinCAT runtime modules in C/C++ languages. For code generation, the C compiler integrated in Microsoft Visual Studio® is used. With TwinCAT 3 C++ libraries, functions for reading/writing files, starting threads, allocating memory or communicating with a database are provided. This corresponds to the IEC 61131-3 mechanism when using libraries. In addition, the C++ interface provides a connection to the MATLAB® and Simulink® tool chain or to the Functional Mockup Interface (FMI).



The routine CycleUpdate is processed cyclically. Even without setting breakpoints, the internal variables are available for monitoring in the TwinCAT online watch window.



Example of a TcCom module generated from MATLAB® or Simulink®. The block diagram from Simulink® is used as an interactive user view, allowing easy parameter adjustment in the real-time module.

C and C++ programming languages

- extended debugging
- standardised
- widely used programming languages
- very powerful programming languages
- run under the same runtime as PLC programs
- for the implementation of drivers

Link to MATLAB® and Simulink®

- great variety of toolboxes
- application
 - building of control circuits
 - in simulation
 - in optimisation
- automatic code generation
- debug interface between MATLAB® or Simulink® and TwinCAT

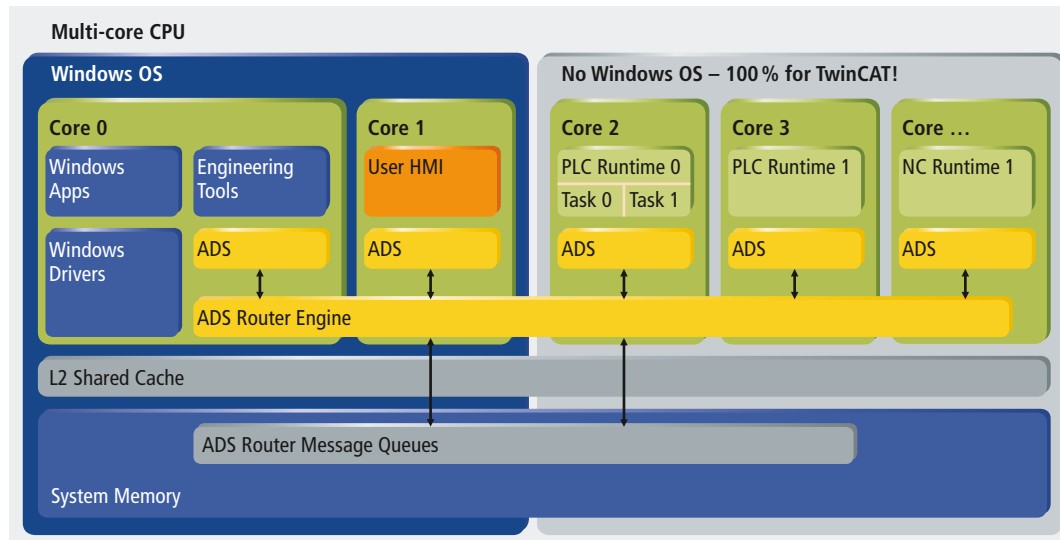
Link to FMI interface

- great variety of simulation tools
- application: physical simulation of machines and plants
- automatic code generation

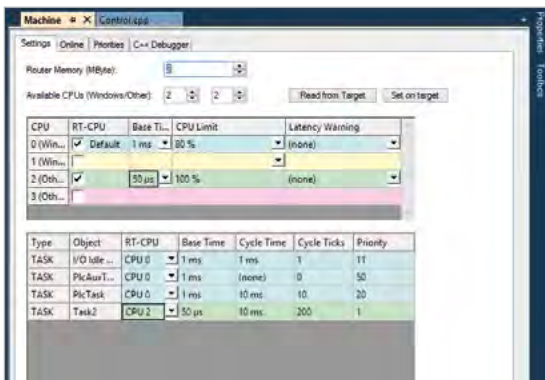


TwinCAT 3 | eXtended Automation Runtime (XAR)

Developments in computer technology, which offer CPUs with more and more cores, enable the distribution of tasks across different cores. The TwinCAT 3 runtime environment follows this concept. It can be used to distribute functional units such as HMI, PLC runtime or MC to dedicated cores. For each of the cores used by the runtime environment the maximum load as well as the base time and therefore the possible cycle times can be set separately.



Due to the use of multi-core systems, functional units (e.g. PLC and NC runtimes, HMI) are distributed to individual processor cores.



Dialog for the distribution of tasks to processor cores: Moreover, in the so-called "core isolation" mode it is possible to make individual cores exclusively available for the use of TwinCAT. The context change between TwinCAT and the Windows operating system is avoided for these cores, which increases the attainable performance still further.

Multi-core and multi-tasking support

Support of multi-core systems

- distribution from applications to cores (e.g. PLC, NC and HMI can run on different cores)

Support of core isolation

- no need to switch to host operating system
- TwinCAT receives the complete computing time on these cores.

Support of multi-tasking

- preemptive multi-tasking
- parallel processing of tasks

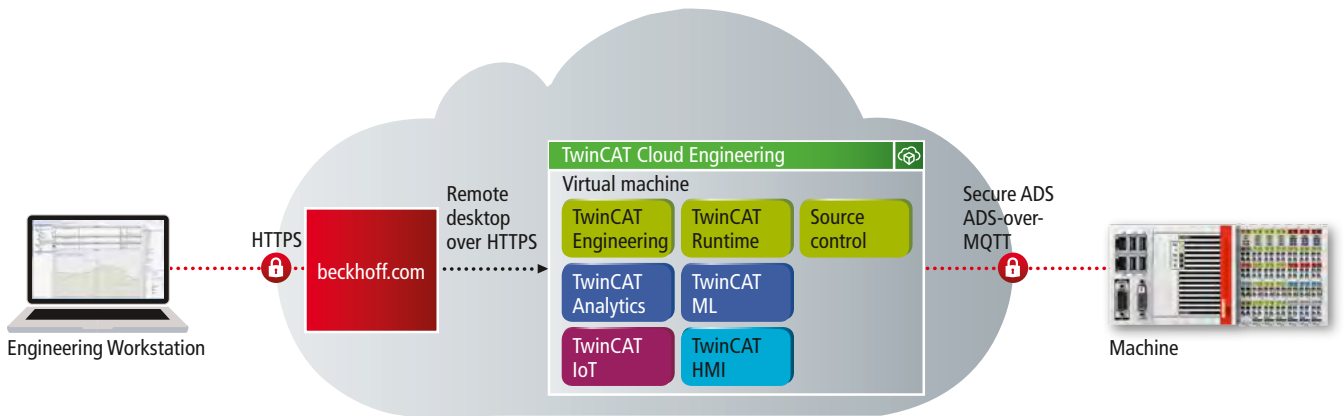
Support of 64-bit operating systems

- usage of more resources (memory)



TwinCAT 3 | TwinCAT Cloud Engineering

For businesses in the industrial sector, the ability to use cloud services efficiently is becoming an increasingly critical competitive factor. Cloud services now make it possible to implement scalable applications easily and with significantly less effort than in the past. At the same time, information technology, operational technology and automation technology continue to converge, creating new challenges for machine builders. Here, PC-based control technology offers a way forward, providing a comprehensive platform that enables them to exploit IoT infrastructures to advance globalized industrial production. Setting up secure and scalable connections between geographically distributed control systems – to support big data or analytics scenarios, for example – is only the first step; the second is to ensure that these interconnected systems are as easy as possible to operate and maintain remotely. And this is where TwinCAT Cloud Engineering comes in: It enables the TwinCAT Engineering and Runtime products from Beckhoff to be instantiated and operated directly in the cloud. With easy access through the Beckhoff website, this cloud-based solution allows registered users to perform a range of tasks, including the creation of TwinCAT Cloud Engineering instances; these instances can connect to physical control hardware over a secure transport channel. Access is charged for according to a fair pricing model under which users can initially try the cloud service for free, then choose whether to continue using their instance once the trial phase expires. Users also enjoy all the benefits of the TwinCAT control architecture, plus location-independent collaboration options based on a source control repository.





The key benefits of TwinCAT Cloud Engineering

- instantiation and operation as a virtual machine in the cloud
- direct access through the Beckhoff website
- simple, secure access to control hardware
- all the benefits of the TwinCAT architecture
- simplified collaboration
- a choice of user models

Engineering benefits for professional users

- automation project engineering in Visual Studio®
- built-in connection to source control systems
- expandable with add-ons for features such as data connectivity
- right engineering software version always available for any given machine

Benefits for new TwinCAT users

- to help new TwinCAT users getting started, the engineering system includes tutorials and samples that are instantly available on start-up
- tutorials are organized according to levels of difficulty
- TwinCAT software and tools available are quick and easy to learn
- an all-in-one engineering system with a full suite of tools integrated into Visual Studio®

► www.beckhoff.com/cloud-engineering

i For availability status see Beckhoff website at: www.beckhoff.com/cloud-engineering

TE1xxx | TwinCAT 3 Engineering



	TC3 Engineering	TC3 Realtime Monitor	TC3 EtherCAT Simulation
Technical data	TE1000	TE1010	TE1111
	<p>TwinCAT Engineering contains the engineering environment of the TwinCAT 3 control software:</p> <ul style="list-style-type: none"> – integration into Visual Studio® 2010/2012/2013/2015/2017 (if available) – support for the native Visual Studio® interfaces (e.g. connection to source code management systems) – IEC 61131-3 (IL, ST, LD, FBD, SFC) and CFC editors – IEC 61131-3 compiler – integrated system manager for the configuration of the target system – instancing and parameterisation of TwinCAT modules – integrated C++ debugger – user interface for the parameterisation of modules generated by MATLAB® or Simulink® – if integrated into Visual Studio®, instancing of .NET projects in the same solution (e.g. for HMI) – integrated Scope View Base as charting tool for machine commissioning in Visual Studio® – integrated Bode Plot Base for the optimisation of drive axes <p>The basic version of TC3 Engineering is free of charge.</p>	<p>The TwinCAT 3 Realtime Monitor enables precise diagnostics and optimisation of the runtime behaviour of tasks in the TwinCAT 3 runtime. It offers a graphic representation of the temporal processing of real-time tasks and their modules across all processor cores. In addition to that, user-defined processes and their dependencies can also be visualised through appropriate implementation of the control software.</p> <p>The real-time monitor makes the temporal behaviour of the control software on a target system fully transparent and enables a comprehensive time analysis. It thus supports both error diagnostics and a temporal optimisation of the configuration, in particular for multi-core systems.</p>	<p>Virtual machine commissioning becomes possible if the EtherCAT cable of the machine computer can simply be plugged into a simulation computer, without the need for reconfiguration. With the TC3 EtherCAT Simulation function and a network adapter the simulation computer can simulate a number of EtherCAT slaves. For configuration purposes the EtherCAT slaves of the original machine configuration are inverted. All EtherCAT features necessary for machine simulation are modelled – including distributed clocks. Since the communication protocols CoE and SoE are implemented, acyclic commands can also be processed in the simulation environment.</p>
Required	TC1000	TC1000	TC1000
Operating system	Windows 7, Windows 10	Windows 7, Windows 10	Windows 7, Windows 10
Further information	www.beckhoff.com/TE1000	www.beckhoff.com/TE1010	www.beckhoff.com/TE1111

i For availability status see Beckhoff website at: www.beckhoff.com/TE1130

TC3 XCAD Interface 2	TC3 CAD Simulation Interface	TC3 PLC Static Analysis
TE1120	TE1130	TE1200
<p>TC3 XCAD Interface 2 is the latest version of the interface between ECAD tools and TwinCAT 3. Based on the standardized AutomationML (AML) format, I/O topologies created in ECAD tools can easily be imported into TwinCAT and created automatically. This saves the effort required for manual transfer to TwinCAT and avoids the associated possible sources of error and therefore increases the effectiveness of the engineering process.</p> <p>Advantages of the standardized exchange format AutomationML</p> <p>On the basis of the AML format it is possible to exchange data incrementally and bidirectionally. The variable names used for this purpose can be adapted automatically using previously defined conversion rules. This means that an import into TwinCAT can be done at a very early stage of the electrical design and can be simply updated at any time. If changes to the I/O topology should become necessary, for example during the commissioning, they can be transferred back to the ECAD tool via AML. Change management is thus considerably simplified.</p> <p>Automatic creation of a PLC project with previously linked variables</p> <p>When importing the AML file, the CreateGVLWithLinks plugin can be used to create a PLC project with a global variable list (GVL), in which the variables are already linked to the I/O channels. The variable names used for this purpose can be adapted automatically using previously defined conversion rules. Complicated manual linking is not necessary.</p> <p>Switching without update on the ECAD tool side</p> <p>TC3 XCAD Interface 2 continues to support the existing Beckhoff XML as exchange format, so that this new version can be used without the need for an update on the ECAD tool side. If necessary, the update to the AML format can be carried out at a later stage or for new projects to take advantage of the benefits of the AML format.</p>	<p>The TC3 CAD Simulation Interface is a user-friendly tool that can be used to configure a link between TwinCAT and a 3D CAD system. The aim of this connection is a software-in-the-loop simulation (SiL) of the intended sequence on a machine or system to support virtual commissioning.</p> <p>The 3D simulation of machine and system components is a key element in the implementation of virtual commissioning. In the simulation, the movements and interactions of all individual installed components are represented in combination, so that collisions as well as critical system states can be determined in advance. In addition, simulation can be used to train operators and maintenance personnel in advance for regular operation and to define troubleshooting instructions based on simulated critical machine states. Another typical application would be presales training courses on machines or machine components for sales personnel using 3D simulations.</p> <p>The TC3 CAD Simulation interface facilitates the implementation of a 3D simulation, in that it uses the design data of the CAD tool and establishes links to the corresponding automation data. As usual, convenient drag-and-drop functions can be used for link configuration. The parameterisation can be extended to map complex relationships if required. This means that software-in-the-loop simulation of machines, systems or installed components is easily and conveniently possible, even in the event of system expansions.</p>	<p>With the integration of the static code analysis, a further tool is available in TwinCAT 3.1 that supports the PLC software development process.</p> <p>The static code analysis is an analysis tool that tests PLC software on the basis of coding rules and identifies potential weak points of an implementation even during the development stage. The analysis extends from checking compliance with naming conventions through to examining the use of objects and operators. Easier readability and an improved program structure are achieved through the analysis. Furthermore, the user's attention is drawn to possibly unintentional and faulty implementations, so that these program points can be optimised at an early stage.</p>
TC1000	TC1000	TC1200
Windows 7, Windows 10	Windows 7, Windows 10	Windows 7, Windows 10
www.beckhoff.com/TE1120	www.beckhoff.com/TE1130	www.beckhoff.com/TE1200

TE1xxx | TwinCAT 3 Engineering



	TC3 Scope View Professional	TC3 Filter Designer	TC3 Target for Simulink®
Technical data	TE1300	TE1310	TE1400
	<p>TwinCAT 3 Scope View is a software oscilloscope for the graphical display of data in a YT, XY or bar chart. Scope View Professional extends the Scope View Base version which is included in TwinCAT 3 XAE by further functionalities. It can be used for tracking and monitoring processes over a longer period of time.</p> <p>Long-term recordings, print-out function, trigger-controlled data logging are part of the functionality. With multi-core support Scope View ensures optimised performance in the display of signals.</p> <p>Like TwinCAT 3 XAE, Scope View integrates itself into Microsoft Visual Studio®. It can be used as a stand-alone project or in combination with a TwinCAT project within a solution.</p> <p>Furthermore, Scope View Professional can be integrated into a user's .NET-based visualisation. Thus, seamless integration into an existing machine visualisation is possible.</p>	<p>The TC3 Filter Designer is a graphic engineering tool for determining coefficient digital filters. In Microsoft Visual Studio® it integrates seamlessly with the existing TwinCAT engineering landscape.</p> <p>Selectable filter designs are Butterworth, Chebyshev and Inverse-Chebyshev, while the possible filter types are lowpass, highpass, bandpass and bandstop. The filter coefficients can be modified graphically or by means of a tabular specification. Once the filter coefficients have been determined, they can be used in the PLC as an input for digital filter function blocks or transferred into the ELM measurement modules by drag-and-drop. Each channel of an ELM measurement module has two freely configurable digital filters connected in series, which as a result are very easy to adjust using the Filter Designer.</p>	<p>The TwinCAT Simulink® Target offers System Target Files for the use of the Simulink® coder. It enables the generation of TwinCAT 3 runtime modules, which can be instanced and parameterised in the TwinCAT 3 engineering environment.</p>
Required	TC1000	TC1000	TC1000
Operating system	Windows 7, Windows 10	Windows 7, Windows 10	Windows 7, Windows 10
Further information	www.beckhoff.com/TE1300	www.beckhoff.com/TE1310	www.beckhoff.com/TE1400

 For availability status see Beckhoff website at: www.beckhoff.com

TC3 Target for MATLAB®	TC3 Interface for MATLAB®/Simulink®	TC3 Target for FMI
<u>i</u> TE1401	TE1410	<u>i</u> TE1420
<p>The TwinCAT MATLAB® Target offers System Target Files for the use of the MATLAB® coder. It enables the generation of TwinCAT 3 runtime modules, which can be instantiated and parameterised in the TwinCAT 3 engineering environment.</p>	<p>The Interface for MATLAB®/Simulink® provides a communication interface between MATLAB®/Simulink® and the TwinCAT 3 runtime. It supports the acquisition and visualisation of real-time parameters. It can be used both for software-in-the-loop simulation (SiL) and (in combination with TE1400) hardware-in-the loop simulation (HiL) of the controller.</p> <p>Features</p> <ul style="list-style-type: none"> – data exchange between fieldbus devices and MATLAB®/Simulink®, for example for the simple realisation of control loops with low real-time requirements – Data exchange between the TwinCAT controller and MATLAB®/Simulink®; this enables controller testing by SiL simulation, for example. – acquisition and visualisation of process data via MATLAB®/Simulink® – configuration via graphic editor – various data exchange options, access via: <ul style="list-style-type: none"> – symbol name of a variable – configurable interface module 	<p>The TC3 Target for FMI provides an interface for simulation tools that support the Functional Mockup Interface (FMI). The interface enables the generation of TwinCAT 3 runtime modules, which can be instantiated and parameterised in the TwinCAT 3 engineering environment. Models exported with FMI 2.0 – both Model Exchange and Co-Simulation – are supported. There are already a number of solvers available in TwinCAT 3 for the calculations of models exported as Model Exchange.</p>
TC1000	TC1000	TC1000
Windows 7, Windows 10, TwinCAT/BSD	Windows 7, Windows 10, TwinCAT/BSD	Windows 7, Windows 10
www.beckhoff.com/TE1401	www.beckhoff.com/TE1410	www.beckhoff.com/TE1420

TExxxx | TwinCAT 3 Engineering



	TC3 Valve Diagram Editor	TC3 Cam Design Tool	TC3 EAP Configurator
Technical data	TE1500	TE1510	TE1610
	<p>The TwinCAT Valve Diagram Editor allows the linearisation of non-linear curves of hydraulic valves with the aid of a graphical editor. On the basis of a few base points, straight lines or 5th degree polynomials can be determined that connect the points. The characteristic linearisation curve thus determined can be loaded into the TwinCAT NC real-time and taken into account when the voltages are output in the drive.</p>	<p>The TC3 Cam Design Tool allows the generation and modification of cam plates with the aid of a graphical editor. These are composed of sections of laws of motion such as modified sine waves, harmonic combinations, or of various polynomial functions. Velocity, acceleration and jerk are displayed in addition to the slave position. The generated cam plates can be transferred to the NC as tables with specified step size or as so-called motion functions.</p>	<p>The TwinCAT 3 EAP Configurator is a tool for visualising and configuring communication networks, in which data exchange based on the EtherCAT Automation Protocol (EAP) takes place or is to be established. EAP is used for master/master communication.</p>
Required	TC1000	TC1000	TC1000
Operating system	Windows 7, Windows 10	Windows 7, Windows 10	Windows 7, Windows 10
Further information	www.beckhoff.com/TE1500	www.beckhoff.com/TE1510	www.beckhoff.com/TE1610

TC3 HMI Engineering	TC3 Analytics Workbench	TC3 Analytics Service Tool
TE2000	TE3500	TE3520
<p>The TC3 HMI (human-machine interface) integrates itself into the well-known Visual Studio® development environment. Based on the latest web technologies (HTML5, JavaScript), it allows the user to develop platform-independent user interfaces that are “responsive”, i.e. they automatically adapt to the screen resolution, size and orientation at hand. With the graphical WYSIWYG (what-you-see-is-what-you-get) editor, controls can be easily arranged via drag-and-drop and linked with real-time variables.</p> <p>The HMI is extensible on all levels. Mixing standard controls with custom design elements makes designing your own HMI easy. User controls can also be created and configured by modifying the standard controls to create your own toolbox. To create more complex pages, pre-defined designer templates can be integrated.</p> <p>On the client side, the HMI logic can be implemented in JavaScript or as a so-called server extension in C++ or .NET, which allows users to protect their know-how.</p> <p>TC3 HMI Engineering is free of charge.</p>	<p>The TwinCAT 3 Analytics Workbench is a TC3 engineering product for the creation of continual data analyses from various spatially distributed machine controllers. The configuration of the workbench is integrated in Microsoft Visual Studio® and serves as the graphic user interface. Many algorithms are available in a toolbox for the configuration of the analysis, such as cycle time monitoring, life count, life-time and minimum/maximum/mean value.</p> <p>The TC3 Analytics Workbench contains the TE1300 TC3 Scope View Professional for the simple visualisation of the signal curves: The user can drag the analysis results from the analytics configurator and drop them into the charting tool in order to mark significant points in the data stream. Such markings can be simple minima or maxima, counter values or, for example, the results of a logic operator that logically links the results from the machine controller so that they can be found in the data stream. Correlation with other signals in the Scope View is thus possible to the exact cycle.</p> <p>The MQTT input data are selected via the TwinCAT Target Browser, in which live data and, via the TF3520 TC3 Analytics Storage Provider, historical data are available. If the created analysis is complete and has been tested in the graphic editor, this configuration can be converted into readable PLC code with just one click. The automatically generated PLC code can be downloaded directly to a device with the TF3550 TC3 Analytics Runtime, where it can run 24/7 in parallel to the actual production machine and supply analysis results. The use of Beckhoff standard PLC libraries is also possible. In conjunction with TwinCAT 3 HMI, individual HTML5 dashboards can be created and used to display the results for machine operators, production managers and machine manufacturers.</p>	<p>The TwinCAT 3 Analytics Service Tool is used for commissioning the machine and for service engineers. Live and historical data can be retrieved for an analysis via the IoT connection. The analysis is configured in Microsoft Visual Studio® where the user has access to a toolbox of algorithms for implementing the relevant life time, cycle time, envelope or component counter analysis. The outputs of the algorithms can be used as inputs for other algorithms or can be output as a result directly in the graphical editor. Signal paths can be visualised with ease by means of parallel recording with the TwinCAT Scope. Analysis results can be dragged by the user from the analytics configurator and dropped in the charting tool so as to mark the significant positions in the data stream. The interaction between the product components offers advantages in particular for diagnosing machine behavior and can highlight optimisation potential. The user's location is immaterial owing to the IoT technologies used, which means that service technicians can perform system and machine diagnostics from practically any location.</p>
TC1000	TC1000	TC1000
Windows 7, Windows 10	Windows 7, Windows 10	Windows 7, Windows 10
www.beckhoff.com/TE2000	www.beckhoff.com/TE3500	www.beckhoff.com/TE3520

TC1xxx | TwinCAT 3 Base



TC3 ADS

TC3 I/O

Technical data

TC1000-0vpp

TC1100-0vpp

The Automation Device Specification (ADS) is the communication protocol of TwinCAT. It enables the data exchange and the control of TwinCAT systems. ADS is media-independent and can communicate via serial or network connections.

ADS enables:

- access to the process image
- consistent data exchange
- access to I/O tasks
- detection of status changes
- read-out of the PLC symbol information
- access by variable name
- sum commands
- synchronous and asynchronous access
- cyclic and event-based messages

Libraries and runtime components are provided for common programming languages (including .NET, C/C++, Delphi and Java). In addition, interfaces are provided for communication with third-party software (e.g. MATLAB®, NI LabVIEW™, Office). The ADS web services enable the development of device-independent web applications (HTML5, WCF).

The message router manages multiple connections and efficiently distributes the messages. The data packets can be recorded via the ADS monitor using the integrated diagnostic interface.

The free TC3 ADS supplies the basic components required in order to communicate with TwinCAT systems. The setup can be integrated in your own installation routines.

Using TwinCAT I/O, cyclic data can be collected by different fieldbuses in process images. Cyclic tasks drive the corresponding fieldbuses. Various fieldbuses can be operated with different cycle times on one CPU. Applications can directly access the process image. The fieldbuses and the process images are configured in TwinCAT Engineering.

- provides variable-oriented linkage of I/O devices to tasks
- tasks are variable-oriented among each other
- the smallest unit is one bit
- supports both synchronous and asynchronous relationships
- consistent exchange of data areas and process images
- online display in the directory tree
- online watch window
- "Force and Write" for commissioning and for testing task variables and I/O devices
- supported fieldbuses:
 - EtherCAT
 - Lightbus
 - PROFIBUS DP (master and slave)
 - Interbus
 - CANopen
 - SERCOS interface
 - DeviceNet
 - Ethernet
 - USB
- SMB (System Management Bus)

Performance class (pp)

10

20

30

40

50

10

20

30

40

50

x

x

x

x

x

x

x

x

x

x

x

60

70

8x

9x

60

70

8x

9x

x

x

x

x

x

x

x

x

Operating system

Windows 7, Windows 10,
Windows CE, TwinCAT/BSD

Windows 7, Windows 10,
Windows CE, TwinCAT/BSD

Further information

www.beckhoff.com/TC1000

www.beckhoff.com/TC1100

TC3 PLC					TC3 PLC/C++				TC3 PLC/C++/MATLAB®/Simulink®			
TC1200-0vpp					TC1210-0vpp				TC1220-0vpp			
<p>TwinCAT PLC realises one or more PLCs with the international standard IEC 61131-3 3rd edition on one CPU. All programming languages described in the standard can be used for programming. The blocks of the type PROGRAM can be linked with real-time tasks. Various convenient debugging options facilitate fault-finding and commissioning. Program modifications can be carried out at any times and in any size online, i.e. when the PLC is running. All variables are available symbolically by ADS and can be read and written in appropriate clients.</p> <ul style="list-style-type: none"> – process image size, flag range, program size, POU size and number of variables are limited only by size of RAM – cycle times from 50 µs – link time: typically 1 µs (Intel® Core™ 2 Duo) – IEC 61131-3: IL, FBD, LD, SFC, ST, CFC – online changes in programs and variables – remote debugging via TCP/IP – online connection with PLC runtime system worldwide via TCP/IP or fieldbus – online monitoring of variables in variable lists, watch windows, editors – online status and powerflow (accumulator contents) of programs and instances – triggering, forcing and setting variables – powerful debugging with single cycle, break points, step in, step over, display of the current call stack, watchlist shows selection of variable, trace functions – online management of all variable names and structures across the whole system – remanent and persistent data, UPS supported storage on hard disk, storage in NOVRAM as option – variable reading and writing access via ADS, OPC – certified in accordance with PLCopen base level (IL/ST) – structured programming with modular program management – source code is stored in the target system – convenient library management – powerful compiler with incremental compilation – all common data types, structures, arrays, including multi-dimensional arrays – convenient creation of programs with: autoformat, autodeclare, cross-reference, search/replace, project comparison – simple linking to source code administration tools by embedding in Microsoft Visual Studio® 					<p>Extension of the TwinCAT PLC TC1200 with additional C++ functionalities:</p> <ul style="list-style-type: none"> – online connection to PLC/C++ runtime system locally or worldwide via TCP/IP or via fieldbus – online monitoring of variables in variable lists, watch windows and editors without setting break points – online setting of variables 				<p>Extension of the TwinCAT PLC/C++ TC1210 by the possibility to execute modules generated in MATLAB®/Simulink®:</p> <ul style="list-style-type: none"> – contains the TwinCAT 3 PLC and C++ runtime – allows the execution of modules generated in MATLAB®/Simulink® – multiple instancing of modules – parameterisation of these modules at runtime – online access to all parameters (can be deactivated) – generic modules (no hardware connection necessary within the models) – connection to the external mode of Simulink® – connection to the TwinCAT C++ debugger, with graphical representation of the blocks – modules can be called from other modules or directly by tasks 			
10	20	30	40	50	20	30	40	50	20	30	40	50
x	x	x	x	x	–	–	x	x	–	–	x	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	x	x	x	x	x
Windows 7, Windows 10, Windows CE, TwinCAT/BSD					Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD			
www.beckhoff.com/TC1200					www.beckhoff.com/TC1210				www.beckhoff.com/TC1220			

TC1xxx | TwinCAT 3 Base



	TC3 PLC/NC PTP 10				TC3 PLC/NC PTP 10/NC I			
Technical data	TC1250-0vpp				TC1260-0vpp			
	<p>Extension of the TwinCAT PLC TC1200 by the possibility to realise point-to-point movements in software (TwinCAT Motion Control PTP 10). The axes are represented by axis objects and provide a cyclic interface, e.g. for the PLC. This axis object is then linked to a corresponding physical axis. In this way the most diverse axis types with the most diverse fieldbus interfaces can be connected abstractly with the axis objects, which always offer an identical configuration interface. The control of the axes can be configured in various constellations (position or velocity interface) and various controllers. The axes are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – up to a maximum of 255 axes on one CPU – supports electrical and hydraulic Servo Drives, frequency converter drives, stepper motor drives, DC drives, switched drives (fast/slow axes), simulation axes and encoder axes – supports various encoders such as incremental encoder, absolute encoder, digital interface to the drives such as EtherCAT, SERCOS, SSI, Lightbus, PROFIBUS DP/MC, pulse train – standard axis functions such as start/stop/reset/reference, velocity override, master/slave couplings, electronic gearbox, online distance compensation, programming is carried out via PLCopen-compliant IEC 61131-3 function blocks – convenient axis commissioning options – online monitoring of all axis state variables such as actual/set values, releases, control values – online axis tuning – forcing of axis variables – configuration of all axis parameters, such as measuring system, drive parameters and position controller – configurable controller structures: P control, PID control, PID with velocity pre-control, PID with velocity and acceleration pre-control – online master/slave and slave/master conversion – flying saw (diagonal saw [optional]) – cam plates (support by TC3 Cam Design Tool [optional]) – FIFO axes (optional) – external set value generators – multi-master coupling 				<p>Extension of the TwinCAT PLC/NC PTP 10 by the possibility to realise movements with up to three interpolating and up to five auxiliary axes. Various axis types with various fieldbus interfaces are supported. The movement is usually programmed in DIN 66025, but it can also alternatively be carried out via PLC function blocks.</p> <ul style="list-style-type: none"> – max. 3 path axes and up to 5 auxiliary axes per group – 1 group per channel, max. 31 channels – supports electric servo axes, stepper motor drives – interpreter functions such as subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions – geometry functions: straight lines and circles in 3D space, circles at all main levels, helices with base circles at all main levels, linear, circular and helical interpolation at the main levels and freely definable levels, Bezier splines, look-ahead function – online reconfiguration of axes in groups, path override, slave coupling to path axes, auxiliary axes, axis error and sag compensation, measuring functions – programming in DIN 66025 – access alternatively via function blocks according to IEC 61131-3 – operation in automatic mode, manual mode (jog/inch), single block mode, referencing, handwheel mode (movement/overlay) – convenient debugging with online monitoring of current set/actual position (position lag of all axes), NC program line currently being processed, NC program line currently being interpreted, channel status – support of kinematic transformations in combination with TF511x 			
Performance class (pp)	20	30	40	50	20	30	40	50
	–	x	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x
Operating system	Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, Windows CE, TwinCAT/BSD			
Further information	www.beckhoff.com/TC1250				www.beckhoff.com/TC1260			

	TC3 PLC/NC PTP 10/NC I/CNC				TC3 PLC/NC PTP 10/NC I/CNC E				TC3 C++				TC3 C++/ MATLAB®/Simulink®			
	TC1270-0vpp				TC1275-0vpp				TC1300-0vpp				TC1320-0vpp			
	<p>Extension of the TwinCAT PLC/NC PTP 10 by the possibility to realise an interpolation with up to 32 simultaneously interpolating axes. The number of axes and/or the number of channels can be adapted to the requirements of the application via the option packages. Various transformations can be supplemented via option packages. Programming takes place according DIN 66025. The axes and channels are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – 8 path axes/controlled spindles, max. 64 axes/controlled spindles (optional), max. 12 channels (optional) – supports electric servo axes, stepper motor drives subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and auxiliary functions, zero point shifts, tool functions – geometry functions: linear, circular and helical interpolation at the main levels and freely definable levels, max. 32 interpolating path axes per channel (optional), look-ahead function – axis functions, coupling and gantry axis function, override, axis error and sag compensation, measuring functions – programming in DIN 66025 with high-level language extension – access via function blocks from TwinCAT PLC according to IEC 61131-3 – operation with automatic mode, manual mode (jog/inch), single block mode, referencing, block advance, handwheel mode (movement/overlay) – convenient debugging with online monitoring of all states 				<p>TwinCAT CNC export version (E version): extension of the TwinCAT PLC/NC PTP 10 by the possibility to realise an interpolation with up to 4 simultaneously interpolating axes. The number of axes and/or the number of channels can be adapted to the requirements of the application via the option packages. Various transformations can be supplemented via option packages. Programming takes place according DIN 66025. The axes and channels are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – max. 8 path axes/controlled spindles, max. 64 axes/controlled spindles (optional), max. 12 channels (optional) – max. 4 simultaneously interpolating path axes – supports electric servo axes, stepper motor drives subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and auxiliary functions, zero point shifts, tool functions – geometry functions: linear, circular and helical interpolation at the main levels and freely definable levels, max. 4 interpolating path axes per channel (optional), look-ahead function – axis functions, coupling and gantry axis function, override, axis error and sag compensation, measuring functions – programming in DIN 66025 with high-level language extension – access via function blocks from TwinCAT PLC according to IEC 61131-3 – operation with automatic mode, manual mode (jog/inch), single block mode, referencing, block advance, handwheel mode (movement/overlay) – convenient debugging with online monitoring of all states 				<p>The TwinCAT 3 C++ runtime environment enables the execution of real-time modules written in C++. The following functions are supported, among others:</p> <ul style="list-style-type: none"> – online connection to C++ runtime system locally or worldwide via TCP/IP or via fieldbus – online monitoring of variables in variable lists, watch windows and editors without setting break points – online setting of variables 				<p>Extension of the TC1300 by the possibility to execute modules generated by MATLAB®/Simulink®.</p> <ul style="list-style-type: none"> – contains the TwinCAT 3 C++ runtime – allows the execution of modules generated in MATLAB®/Simulink® – multiple instancing of modules – parameterisation of these modules at runtime – online access to all parameters (can be deactivated) – generic modules (no hardware connection necessary within the models) – connection to the external mode of Simulink® – connection to the TwinCAT C++ debugger with graphical representation of the blocks – modules can be called from other modules or directly by tasks 			
	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	–	x	–	–	–	x	–	–	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD			
	www.beckhoff.com/TC1270				www.beckhoff.com/TC1275				www.beckhoff.com/TC1300				www.beckhoff.com/TC1320			

TF1xxx | TwinCAT 3 System



	TC3 PLC HMI				TC3 PLC HMI Web				TC3 UML			
Technical data	TF1800-0vpp				TF1810-0vpp				TF1910-0vpp			
	<p>TC3 PLC HMI is a stand-alone tool for the presentation of visualisations which are created in the TwinCAT PLC development environment. They are shown in full-screen as soon as the system starts up.</p>				<p>TC3 PLC HMI Web is a web-based visualisation system. The TwinCAT PLC development environment can be used as an editor for creating web pages. The web pages are hosted by the Internet Information Server (IIS). For display of the web pages HTML5 and JavaScript is needed.</p>				<p>With the integration of UML (Unified Modeling Language) in TwinCAT 3.1, two additional editors for modelling of PLC software are available. The existing TwinCAT PLC programming languages are extended with the UML state and UML class diagrams.</p> <p>Generally speaking, UML is a modelling language for software analysis, design and documentation. UML is particularly suitable for object-oriented implementations. The unified modelling of the PLC application creates an easy to follow software documentation, which can also be analysed by other departments.</p> <p>The UML class diagram belongs to the group of UML structure diagrams and can be used for schematic representation of the software architecture. In this way, it is possible to represent object classes and the elements contained within them, as well as object relationships in a transparent manner. The UML state diagram is part of the UML behaviour diagrams and is used for dynamic software modelling. It can be used for a graphic specification of the dynamic response or the state-dependent system behaviour. Compilation of the state diagram generates program code, so that the state machine can be executed directly. The development process is supported by an online debugging option.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	x	x	x	x	x	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1200				TC1200				TC1200			
Operating system	Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE			
Further information	www.beckhoff.com/TF1800				www.beckhoff.com/TF1810				www.beckhoff.com/TF1910			

TF2xxx | TwinCAT 3 HMI



	TC3 HMI Server				TC3 HMI Clients Pack				TC3 HMI Targets Pack			
Technical data	TF2000-0vpp				TF2010-0vpp, TF2015-0vpp, TF2020-0vpp, TF2025-0vpp, TF2030-0vpp, TF2035-0vpp, TF2040-0vpp, TF2045-0vpp				TF2050-0vpp, TF2055-0vpp, TF2060-0vpp, TF2065-0vpp, TF2070-0vpp, TF2075-0vpp, TF2080-0vpp, TF2090-0vpp			
	<p>The TC3 HMI Server is a modular web server that provides the human-machine interface (HMI). It supports all CPU classes from ARM to multi-core. The powerful architecture enables a wide range of application scenarios from local panel solutions to multi-client, multi-server and multi-runtime concepts.</p> <p>All that is needed to start an HMI Client is an HTML5-capable browser, which is available for all major operating systems. Accordingly, clients can run on PCs as well as on mobile devices such as tablets and smartphones. Whatever the platform, security is of the utmost importance, which is why the data traveling between client and server is encrypted. The integrated user management features a configurable user rights system that can be linked to the user's own IT infrastructure.</p> <p>The HMI is linked to respective controllers via automation protocols like the Automation Device Specification (ADS) or OPC UA.</p> <p>The HMI Server can be extended with so-called server extensions like an alarms & events system or a recipe management system. Server extensions can also be developed in C++ or .NET with a software development kit, which allows users to develop their own logic and implement additional communication protocols.</p> <p>The TC3 HMI Server includes a connection to one client (browser) and a connection to one controller as standard.</p>				<p>The TC3 HMI Server includes a connection to one client (browser) as standard. Optional client packages are available for establishing further connections at the same time, e.g. to a mobile device or panel. Optional packets are available for 1, 2, 3, 5, 10, 20, 25 or 100 clients. The number of supported clients is not tied to the devices employed, the HMI Server only counts simultaneous (browser) connections.</p>				<p>The TC3 HMI Server includes a connection to one controller as standard. Optional target packages for 1, 2, 3, 5, 10, 20, 25 or 100 targets are available for connecting further control systems. The HMI Server only stores the number of physical targets, based on the unique addressing. The engineering process can be more flexible and modular, and the efficiency increased.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	–	–	x	x	–	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1000				TF2000				TF2000			
Operating system	Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE			
Further information	www.beckhoff.com/TF2000				www.beckhoff.com/TF2010				www.beckhoff.com/TF2050			

TF2xxx | TwinCAT 3 HMI



	TC3 HMI OPC UA				TC3 HMI Extension SDK				TC3 HMI Scope			
Technical data	TF2110-0vpp				TF2200-0vpp				TF2300-0vpp			
	<p>OPC Unified Architecture is a vendor-independent communication interface for linking TwinCAT or other controllers. The extension includes the OPC UA client, which enables integration of an OPC UA server.</p>				<p>The TwinCAT HMI Server can be expanded modularly and flexibly via extensions. The software development kit (C++/.NET) can be used for programming application-specific solutions (e.g. business logics, proprietary protocols). In addition, user IP (intellectual property) is protected, and existing functions can be accessed by the server (e.g. ADS, logging).</p>				<p>The TwinCAT Scope software oscilloscope can be used to display time sequences with high resolution. The extension enables integration of the software oscilloscope into the TwinCAT HMI and provides ready-made scope control.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	–	x	x	x	–	x	x	x	–	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TF2000				TF2000				TF2000			
Operating system	Windows 7, Windows 10				Windows 7, Windows 10				Windows 7, Windows 10			
Further information	www.beckhoff.com/TF2110				www.beckhoff.com/TF2200				www.beckhoff.com/TF2300			

i For availability status see Beckhoff website at: www.beckhoff.com/TF2300

TF3xxx | TwinCAT 3 Measurement



	TC3 Scope Server				TC3 Analytics Logger				TC3 Analytics Library				TC3 Analytics Storage Provider			
Technical data	TF3300-0vpp				TF3500-0vpp				TF3510-0vpp				TF3520-0vpp			
	<p>The TwinCAT 3 Scope Server prepares data for visual display in the TwinCAT 3 Scope View. It can be used for autarkic data recordings in distributed systems within production, plant or machine networks. The Scope Server not only features TwinCAT-specific communication interfaces, it also offers support for the OPC UA communication standard.</p>				<p>The TwinCAT 3 Analytics Logger records process and application data of the machine controller in synchronisation with machine cycles. The logger is characterised by its high performance as it operates directly in the real-time context of the TwinCAT controller.</p> <p>The recorded data can optionally be stored locally in a file on the hard disk of the machine controller and played back with ring buffer functionality or transmitted to a message broker by means of the IoT communication protocol. The configuration required in this instance is performed in Microsoft Visual Studio®. All variables of the process image and the PLC application can be added easily to the configuration via a check box without the need for programming.</p>				<p>The TwinCAT 3 Analytics Library is a PLC library with analysis functions and application data. The library can be used locally on the machine controller or on a remote analysis system with IoT communication connection. In particular for the second application, PLC code can be generated automatically on the basis of this library with the engineering tool TE3500 TC3 Analytics Workbench.</p> <p>Function modules are available with simple and more complex functions. The spectrum ranges from flank counters, life time monitoring, machine cycle analysis through to mathematical functions and envelope curve monitoring. Minimum and maximum input signal values can be calculated in just the same way and linked together by means of logical operators. All modules are suitable for object-oriented application design and use the features of IEC 61131-3 programming.</p>				<p>The TwinCAT 3 Analytics Storage Provider is an IoT client and forms the interface to one or more storage facilities or databases for raw and analysis data from various sources. The data is stored as a binary blob in the storage medium. Microsoft Azure Blob supports a public cloud, while Microsoft SQL supports an on-premises database. In this way, both applications can be covered. The Analytics Storage Provider automatically structures and stores the data. The storage interface can be configured via TwinCAT Engineering in Microsoft Visual Studio®. Data is selected centrally for reading and writing via the TwinCAT Target Browser. The user selects the data via the user-defined variable name in the machine application and the corresponding time period; no complex SQL commands are required. Historical data can be sourced via the TF3500 TC3 Analytics Logger, the TF6720 TC3 IoT Data Agent or the EK9160 IoT Bus Coupler. The corresponding data sinks are the TE3520 TC3 Analytics Service Tool and the TE3500 TC3 Analytics Workbench.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	x	x	–	x	x	x	–	x	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1000				TC1000				TC1200				TC1000			
Operating system	Windows 7, Windows 10				Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10			
Further information	www.beckhoff.com/TF3300				www.beckhoff.com/TF3500				www.beckhoff.com/TF3510				www.beckhoff.com/TF3520			

TF3xxx | TwinCAT 3 Measurement



	TC3 Analytics Runtime				TC3 Analytics Controller Packs				TC3 Condition Monitoring Level 1			
Technical data	TF3550-0vpp				TF3560-0vpp, TF3561-0vpp, TF3562-0vpp, TF3563-0vpp, TF3564-0vpp, TF3565-0vpp				TF3600-0vpp			
	<p>The TwinCAT 3 Analytics Runtime is the runtime “container” for the Analytics application, which was configured and developed in the TE3500 TC3 Analytics Workbench. The runtime can be installed locally, on remote hardware or in a virtual machine. It also contains the TF2000 TC3 HMI Server, which hosts the analytics dashboard. In summary, the TC3 Analytics Runtime represents a bundle of different licenses. It contains a PLC runtime, the Analytics PLC library, the IoT connection, the TC3 HMI Server and a corresponding client package, so that several users can view the designed Analytics Dashboard simultaneously.</p>				<p>The TC3 Analytics Runtime enables the parallel analysis of up to four controllers as standard. With the TC3 Analytics Controller Packs, the analysis can be extended to further controllers for each application individually. Optional packs are available for 4, 8, 16, 32, 64 or 128 further controllers.</p>				<p>In order to implement Condition Monitoring for machines and plants, the TwinCAT Condition Monitoring library offers a modular construction kit of mathematical algorithms using which measured values can be analysed. The functionality of the library is independent of the physical background of the measured data, however, a focus is placed on vibration measurement. From the available range of components, users can select software modules to suit specific application requirements and to develop solutions that are scaled to different platforms. The library’s functions primarily cover the areas of signal analysis or signal transformation, statistics and classification. In addition to spectral analysis via FFT or using, for instance, an envelope spectrum, it is possible to calculate key statistical values such as the kurtosis or the crest factor. Combining these algorithms with limit value monitoring is, for instance, ideally suited to monitoring roller bearings. Moreover, it is possible to implement an evaluation of machine vibrations according to DIN ISO 10816. Condition Monitoring Level 1 contains the following algorithms:</p> <ul style="list-style-type: none"> – signal processing – statistics – classification – frame-based buffer handling 			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	x	x	–	–	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1000				TE3500				TC1200			
Operating system	Windows 7, Windows 10				Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD			
Further information	www.beckhoff.com/TF3550				www.beckhoff.com/TF3560				www.beckhoff.com/TF3600			

TC3 Power Monitoring					TC3 Filter				TC3 Interface for LabVIEW™				
TF3650-0vpp					TF3680-0vpp				TF3710-0vpp				
<p>The TwinCAT Power Monitoring function is a PLC library for the evaluation of raw current and voltage data, which are usually supplied by EL3773 and EL3783 EtherCAT Terminals. Function blocks are available for the calculation of RMS values for current, voltage and power. These can be output as a momentary or average values. Maximum and minimum values are also available on the function block. Frequency and frequency spectra can be determined, such as e.g. harmonics in the network and their load in the form of the Total Harmonic Distortion (THD).</p> <p>All function blocks are available for single-phase and three-phase systems. The TwinCAT products TE1300 Scope View Professional and TF6420 Database Server are suitable for displaying or permanently saving acquired data.</p>					<p>The TwinCAT 3 function TF3680 TC3 Filter provides various function blocks for implementing digital filters. Digital filters are used to manipulate digitized signals. They can be used, for example, to boost or to repress certain signal components in the frequency range.</p> <p>The library comprises function blocks for realizing filters with Butterworth or Chebyshev characteristics as well as function blocks for general use with freely definable filter coefficients. Furthermore, the library includes delay elements of different orders and a moving average filter.</p>				<p>The TF3710 TwinCAT 3 function TC3 Interface for LabVIEW™ enables the exchange of data between LabVIEW™ and the TwinCAT runtime. ADS Client VIs for LabVIEW™ are provided, which enable ADS communication with the TwinCAT 3 runtime. In addition, the TC3 Interface for LabVIEW™ contains an NTP Client VI that enables the time synchronization between LabVIEW™ and TwinCAT on the basis of the Network Time Protocol. TF3710 uses ADS communication and is also suitable for TwinCAT 2.</p> <p>LabVIEW™ programs are called virtual instruments, or VIs, because their appearance and operation imitate physical instruments, such as oscilloscopes and multimeters. LabVIEW™ contains a comprehensive set of tools for acquiring, analyzing, displaying, and storing data, as well as tools to help you troubleshoot code you write.</p> <p>The TC3 Interface for LabVIEW™ is used when automation technology and measurement technology exchange data in a system. For example, the EtherCAT measurement modules and TwinCAT are used for the acquisition of measured data in a test bench; the test bench is operated via a higher-level LabVIEW™ visualization.</p> <p>Using the TF3710 function, the test bench operator can access the TwinCAT data of the Beckhoff measurement technology hardware and generate additional measurement functions via the familiar user interface. The communication between TwinCAT and LabVIEW™ is bidirectional: TwinCAT data can be streamed to LabVIEW™, processed and displayed. LabVIEW™ data such as a start event or an external measuring signal can be transmitted from LabVIEW™ to TwinCAT.</p> <p>The NTP Client VI is used with a test setup for the cost-optimized time synchronization of the high-end measurement controller of NI™ with the peripheral automation technology. The EL6688 EtherCAT Terminal (IEEE 1588 external synchronization interface) enables the exact time synchronization of the two systems.</p> <p>LabVIEW™ and NI™ are trademarks of National Instruments. Neither Beckhoff, nor any software programs or other goods or services offered by Beckhoff, are affiliated with, endorsed by, or sponsored by National Instruments.</p>				
20	30	40	50		20	30	40	50		20	30	40	50
–	–	x	x		x	x	x	x		x	x	x	x
60	70	8x	9x		60	70	8x	9x		60	70	8x	9x
x	x	x	x		x	x	x	x		x	x	x	x
TC1200					TC1200				TC1000				
Windows 7, Windows 10, TwinCAT/BSD					Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, TwinCAT/BSD				
www.beckhoff.com/TF3650					www.beckhoff.com/TF3680				www.beckhoff.com/TF3710				

TF3xxx | TwinCAT 3 Measurement



	TC3 Machine Learning Inference Engine	TC3 Neural Network Inference Engine	TC3 Solar Position Algorithm
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Technical data	TF3800-0vpp	TF3810-0vpp	TF3900-0vpp
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The TF3800 TwinCAT 3 function is a high-performance execution module (inference machine) for trained classic machine learning algorithms. The algorithms are trained in established frameworks such as SciKit-Learn, libSVM or MATLAB®. The information of the learned model is loaded to the inference machine as a description file. The execution module can be called in TwinCAT 3 from the PLC, from C++ and via a cyclic task. The loaded algorithm is executed directly on the machine controller in the TwinCAT real-time cycle.

The TF3810 TwinCAT 3 function is a high-performance execution module (inference machine) for trained neural networks. The neural networks are trained in established frameworks such as PyTorch, TensorFlow or MATLAB®. The information of the learned network is loaded to the inference machine as a description file. The execution module can be called in TwinCAT 3 from the PLC, from C++ and via a cyclic task. The neural network is executed directly on the machine controller in the TwinCAT real-time cycle.

With the TwinCAT Solar Position Algorithm it is possible to determine the sun angle using the date, time, geographical longitude and latitude as well as further parameters (depending on the desired accuracy). The function block works with a maximum inaccuracy of $\pm 0.001^\circ$.

Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	x	x	–	–	x	x	x	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1000				TC1000				TC1200			
Operating system	Windows 7, Windows 10				Windows 7, Windows 10				Windows 7, Windows 10, Windows CE, TwinCAT/BSD			
Further information	www.beckhoff.com/TF3800				www.beckhoff.com/TF3810				www.beckhoff.com/TF3900			

TF4xxx | TwinCAT 3 Controller



	TC3 Controller Toolbox				TC3 Temperature Controller				TC3 TwinCAT Speech			
Technical data	TF4100-0vpp				TF4110-0vpp				<i>i</i> TF4500-0vpp			
	<p>The TwinCAT Controller Toolbox covers all essential blocks for control applications.</p> <ul style="list-style-type: none"> – controllers satisfy industrial requirements such as anti-reset windup – simple basic controllers (P, I, D) – complex controllers (PI, PID, switching controllers) – filter blocks – control value generators (limiters, PWM) – ramp and signal generator blocks 				<p>Temperature controllers can be simply implemented using TwinCAT Temperature Controller. Simple commissioning through self-adjustment of the controller (auto-tuning) is included.</p> <ul style="list-style-type: none"> – automatic and manual operation with shock-free set up – control value analog or pulse-width modulated signal – tolerance monitoring, absolute value monitoring – scalable reaction to sensor error and heating power faults – limitation of set and control values – optional ramping of the set value – optional start-up phase for the setpoint variables – industrial PID controller as base control algorithm inside the temperature controller 				<p>TC3 TwinCAT Speech enables the multi-lingual input and output of queries or information implemented in an industrially compatible way. This makes interaction with TwinCAT much more efficient and convenient – in the widest variety of applications across all industries, from mechanical engineering to building automation.</p> <p>The speech input is available as an offline function implemented via built-in functions of the Windows operating system, i.e. without Internet and cloud connection. The speech output of TC3 TwinCAT Speech is available both as an offline and an online function. In the first case this is supported by the corresponding Windows functions and in the second case by the Polly text-to-speech service from Amazon. Realistic sounding speech output is synthesised with the aid of deep-learning technologies. Different voices are supported as well as caching of audio files generated online.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	x	x	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1200				TC1200				TC1200			
Operating system	Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 10			
Further information	www.beckhoff.com/TF4100				www.beckhoff.com/TF4110				www.beckhoff.com/TF4500			

i For availability status see Beckhoff website at: www.beckhoff.com/TF4500

TF5xxx | TwinCAT 3 Motion Control



TC3 NC PTP
10 Axes

TC3 NC PTP
Axes Pack 25

Technical data

TF5000-0vpp

TF5010-0vpp

TC3 NC PTP 10 Axes implements Motion Control for point-to-point movements in software. The axes are represented by axis objects and provide a cyclic interface, e.g. for the PLC. This axis object is then linked to a corresponding physical axis. In this way, the most diverse axis types with the most diverse fieldbus interfaces can be connected abstractly with the axis objects, which always offer an identical configuration interface. The control of the axes can be configured in various conformations (position or velocity interface) and various controllers. The axes are configured in TwinCAT Engineering.

- up to 10 axes, developable to a maximum of 255 axes
- supports electrical and hydraulic servo drives, frequency converter drives, stepper motor drives, DC drives, switched drives (fast/slow axes), simulation axes and encoder axes
- supports various encoders such as incremental encoder, absolute encoder, digital interface to the drives such as EtherCAT, SERCOS, SSI, Lightbus, PROFIBUS DP/MC, pulse train
- standard axis functions such as start/stop/reset/reference, velocity override, master/slave couplings, electronic gearbox, online distance compensation
- programming is carried out via PLCopen-compliant IEC 61131-3 function blocks
- convenient axis commissioning options
- online monitoring of all axis state variables such as actual/setpoint values, releases, control values, online axis tuning
- forcing of axis variables
- configuration of all axis parameters, such as measuring system, drive parameters and position controller
- configurable controller structures: P control, PID control, PID with velocity pre-control, PID with velocity and acceleration pre-control
- online master/slave and slave/master conversion
- flying saw (diagonal saw)
- cam plates (support by TC3 Cam Design Tool [optional])
- FIFO axes (optional)
- external set point value generators
- multi-master coupling
- OMAC PackML PLC library

Extension of TF5000 up to a maximum of 25 axes

Performance class (pp)

	20	30	40	50	20	30	40	50
	–	x	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x

Required

TC1200

TC1250

Operating system

Windows 7, Windows 10,
Windows CE, TwinCAT/BSD

Windows 7, Windows 10,
Windows CE, TwinCAT/BSD

Further information

www.beckhoff.com/TF5000

www.beckhoff.com/TF5010

TC3 NC PTP Axes Pack unlimited					TC3 NC Camming				TC3 NC Flying Saw				TC3 NC FIFO Axes			
TF5020-0vpp					TF5050-0vpp				TF5055-0vpp				TF5060-0vpp			
Extension of TF5000 up to a maximum of 255 axes					<p>TwinCAT NC Camming (cam plate) is a non-linear relationship between a master and a slave axis. The camming package offers various options for the storage of cam plates. Convenient PLC blocks enable the loading, coupling and uncoupling of cam plates. It is possible to load new cam plates or to modify cam plates during operation. The TwinCAT Cam Design Tool offers support for the creation of the cam plates.</p> <ul style="list-style-type: none"> – position tables with master interpolation points and corresponding slave positions; interpolation between the points is done linearly or by splines – motion function table describing a cam plate via motion laws according to VDI guideline 2143 – cyclic or linear processing – cam plate with offset and scale, can be modified on the master or slave side – high flexibility through online change of the motion functions 				<p>TwinCAT NC Flying Saw implements the coupling of a slave axis to a master axis in a certain synchronous position (flying saw). PLC function blocks enable coupling and uncoupling as well as parameterisation.</p> <ul style="list-style-type: none"> – The master axis can be a real axis, a virtual axis, or some other external source of actual values. – synchronisation of the slave axis from any motion situation (stop, forward or reverse travel) with the master in motion – simple synchronisation with the master velocity – precise position synchronisation with the master axis (velocity and position) – synchronous velocity can be set via a coupling factor – optional return prevention as additional safety function – superimposed section compensation during the synchronous phase for dynamic position correction 				<p>Using TwinCAT NC FIFO Axes, externally generated set position values can be output to the axes in the form of a velocity pre-control. The set value generation is designed in such a way that both the set position and the set velocity are determined as the FIFO inputs are worked through in sequence. It is also possible, if necessary, to interpolate between two neighbouring FIFO inputs.</p>			
20	30	40	50		20	30	40	50	20	30	40	50	20	30	40	50
–	–	x	x		–	–	x	x	–	–	x	x	–	–	x	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
TC1250					TC1250				TC1250				TC1250			
Windows 7, Windows 10, Windows CE, TwinCAT/BSD					Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, Windows CE, TwinCAT/BSD			
www.beckhoff.com/TF5020					www.beckhoff.com/TF5050				www.beckhoff.com/TF5055				www.beckhoff.com/TF5060			

TF5xxx | TwinCAT 3 Motion Control



TC3 Motion Control XFC

TC3 NC I

Technical data

TF5065-0vpp

TF5100-0vpp

eXtreme Fast Control (XFC) is the technique that enables very fast, temporally high-precision reactions using EtherCAT, special I/O terminals and TwinCAT on the PC. Using EtherCAT Distributed Clocks (DC) and appropriate terminals, distributed latches or cam controllers can be implemented simply in this way.

- function blocks for the high-precision acquisition and switching of digital signals related to axis positions
- EtherCAT Distributed Clocks with the timestamp-based EtherCAT EL1252, EL2252 or EL2262 input and output terminals
- blocks for the conversion of DC time to position and vice versa
- convenient PLCopen-compliant TouchProbe block
- digital cam controller as PLCopen-compliant block

In conjunction with TwinCAT NC I, function blocks are available for high-precision switching of signals depending on the path position.

Using TwinCAT NC I, movements can be implemented with up to three interpolating and up to five auxiliary axes in the interpolation package. Various axis types with various fieldbus interfaces are supported. The movement is usually programmed in DIN 66025, but it can also alternatively be carried out via PLC function blocks.

- max. 3 path axes and up to 5 auxiliary axes per group
- 1 group per channel, max. 31 channels
- supports electric servo axes, stepper motor drives
- interpreter functions such as subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions
- geometry functions: straight lines and circles in 3D space, circles at all main levels, helices with base circles at all main levels, linear, circular and helical interpolation at the main levels and freely definable levels, Bezier splines, look-ahead function
- online reconfiguration of axes in groups, path override, slave coupling to path axes, auxiliary axes, axis error and sag compensation, measuring functions
- programming in DIN 66025
- access alternatively via function blocks according to IEC 61131-3
- operation of automatic mode, manual mode (jog/inch), single block mode, referencing, handwheel mode (movement/overlay)
- convenient debugging with online monitoring of current setpoint/actual position (position lag of all axes), NC program line currently being processed, NC program line currently being interpreted, channel status
- support of kinematic transformations in combination with TF511x

Performance class (pp)

	20	30	40	50	20	30	40	50
	–	–	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x

Required

TC1250, TC1260

TC1250

Operating system

Windows 7, Windows 10, Windows CE, TwinCAT/BSD

Windows 7, Windows 10, Windows CE, TwinCAT/BSD

Further information

www.beckhoff.com/TF5065

www.beckhoff.com/TF5100

TC3 Kinematic Transformation L1					TC3 Kinematic Transformation L2				TC3 Kinematic Transformation L3				TC3 Kinematic Transformation L4			
TF5110-0vpp					TF5111-0vpp				TF5112-0vpp				TF5113-0vpp			
<p>Various robot types kinematics can be realised using TwinCAT Kinematic Transformation. The programming of the robot movements takes place in Cartesian coordinates using either DIN 66025 instructions or the PLCopen-compliant blocks from the PLC. An integrated dynamic pre-control ensures high precision of the movement even at high accelerations and speeds. Configuration takes place in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – supports various parallel and also serial kinematics, e.g. for pick-and-place tasks – supports the programming of interpolating movements in G-code (DIN 66025) – alternatively, standard PTP and cam plate applications can be realised – simple programming in the Cartesian coordinate system – automatic calculation of the inverse kinematic for the relevant motor positions – kinematics configured in TwinCAT 3 Engineering; in addition to the type (e.g. delta), the bar lengths and offsets must also be parameterised – mass and mass inertia values can be specified for dynamic pre-control – optimised for the Beckhoff Servo Drives – basic package integrating the following kinematics: cartesian portals 					<p>Extension of the TwinCAT Kinematic Transformation L1 with additional kinematics:</p> <ul style="list-style-type: none"> – 2D parallel kinematics – shear kinematics – crane and roll kinematics 				<p>Extension of the TwinCAT Kinematic Transformation L1/L2 with additional kinematics:</p> <ul style="list-style-type: none"> – 3D Delta – SCARA 				<p>Extension of the TwinCAT Kinematic Transformation L1/L2/L3 with additional kinematics:</p> <ul style="list-style-type: none"> – 5D kinematics – serial 6-axis kinematics – Stewart platform 			
20	30	40	50		20	30	40	50	20	30	40	50	20	30	40	50
–	–	x	x		–	–	x	x	–	–	x	x	–	–	x	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
TC1260					TC1260				TC1260				TC1260			
Windows 7, Windows 10, TwinCAT/BSD					Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD			
www.beckhoff.com/TF5110					www.beckhoff.com/TF5111				www.beckhoff.com/TF5112				www.beckhoff.com/TF5113			

TF5xxx | TwinCAT 3 Motion Control



TC3 Robotics mxAutomation

TC3 Robotics uniVAL PLC

TC3 CNC

Technical data

TF5120-0vpp

TF5130-0vpp

TF5200-0vpp

TC3 Robotics mxAutomation allows direct communication between the PLC and the KUKA KR C4 robot control via a common interface. The robot movements can be programmed directly in the PLC, and the actual values of the robot can be synchronised in real time. TC3 Robotics mxAutomation combines PLC control and robot on a single platform and enables programming from an existing system without knowledge of a specific robot programming language.

Communication takes place via EtherCAT, with the TwinCAT EtherCAT master and the KR C4 controller from KUKA exchanging data via the EL6695-1001 EtherCAT bridge terminal. In doing so, drive commands are transmitted from the controller to the robot and actual values from the robot to the controller. The robot position data are transmitted to the PLC in every cycle. In addition, the PLC programmer has access to the robot position data at all times in real-time.

The TC3 Robotics uniVAL PLC allows direct communication between the PLC and the robot controller from Stäubli via a common interface. The robot's movements can be programmed directly in the PLC and compared with the robot's actual values in real-time. The TC3 Robotics uniVAL PLC combines PLC control and robotics on a single platform and enables programming from a single system without having to know a special robot programming language.

The communication takes place via EtherCAT, with TwinCAT and the robotics controller from Stäubli exchanging the data as master and slave, respectively.

TwinCAT sends the motion commands to the robot via EtherCAT. Thanks to this efficient communication, commands can be sent from the PLC to the robot at high speed. In addition, the PLC programmer has real-time access to the robot's position data at all times. Other motion programs which are located in the robot controller's database can also be activated via this interface.

TwinCAT CNC offers the option to implement interpolation with up to 32 simultaneously interpolating axes. The number of axes and/or the number of channels can be adapted to the requirements of the application via the option packages. Various transformations can be supplemented via option packages. Programming takes place according to DIN 66025. The axes and channels are configured in TwinCAT Engineering.

- 8 path axes/controlled spindles, max. 64 axes/controlled spindles (optional), max. 12 channels (optional)
- supports electric servo axes, stepper motor drives
- subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and auxiliary functions, tool functions
- geometry functions linear, circular and helical interpolation at the main levels and freely definable levels, max. 32 interpolating path axes per channel (optional), look-ahead function
- axis functions, coupling and gantry axis function, override, axis error and sag compensation, measuring functions
- programming in DIN 66025 with high-level language extension
- access via function blocks from TwinCAT PLC according to IEC 61131-3
- operation with automatic mode, manual mode (jog/inch), single block mode, referencing, block advance, handwheel mode (movement/overlay)
- convenient debugging with online monitoring of all states

Performance class (pp)

	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	–	x	–	–	–	x	–	–	–	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x

Required

TC1200

TC1200

TC1260

Operating system

Windows 7, Windows 10, Windows CE, TwinCAT/BSD

Windows 7, Windows 10, Windows CE, TwinCAT/BSD

Windows 7, Windows 10, TwinCAT/BSD

Further information

www.beckhoff.com/TF5120

www.beckhoff.com/TF5130

www.beckhoff.com/TF5200

TC3 CNC E				TC3 CNC Axes Pack				TC3 CNC Measurement			
TF5210-0vpp				TF5220-0vpp				TF5225-0vpp			
<p>TwinCAT CNC in the export version (E-version) offers the option to implement an interpolation with up to four simultaneously interpolating axes. The number of axes and/or the number of channels can be adapted to the requirements of the application via the option packages. Various transformations can be supplemented via option packages. Programming takes place according to DIN 66025. The axes and channels are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> - max. 8 path axes/controlled spindles, max. 64 axes/controlled spindles (optional), max. 12 channels - max. 4 interpolating path axes - supports electric servo axes, stepper motor drives - subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and auxiliary functions, tool functions - geometry functions linear, circular and helical interpolation at the main levels and freely definable levels, max. 64 path axes per channel, look-ahead function - axis functions, coupling and gantry axis function, override, axis error and sag compensation, measuring functions - programming in DIN 66025 with high-level language extension - access via function blocks from TwinCAT PLC according to IEC 61131-3 - operation with automatic mode, manual mode (jog/inch), single block mode, referencing, block advance, handwheel mode (movement/overlay) - convenient debugging with online monitoring of all states 				<p>Using the TwinCAT CNC Axes Pack, extension is possible up to a total of 64 axes/controlled spindles, of which a maximum of 32 can be path axes and a maximum of 12 can be controlled spindles.</p>				<p>The TwinCAT 3 function CNC Measurement is an optional package of CNC cycles that supports the measurement of tools or workpieces directly on the machine. The package consists of cycles for the calibration of the measuring system, for measuring the tool or for measuring the position and geometry of the workpiece:</p> <ul style="list-style-type: none"> - calibration cycles <ul style="list-style-type: none"> - measuring probe - measuring probe for tool measurement - tool measurement <ul style="list-style-type: none"> - length and radius - calibrating workpiece zero point <ul style="list-style-type: none"> - 1-, 2- and 3-point measurement - circle measurement <ul style="list-style-type: none"> - inner diameter/with 3 points/with obstacle - outer diameter/with 3 points - groove/gutter <ul style="list-style-type: none"> - groove X/with obstacle - groove Y/with obstacle - gutter X/Y - angle <ul style="list-style-type: none"> - X/Y (C-axis) - between 2 holes/tenons (C-axis) - between hole and tenon (C-axis) - between point in X and hole/tenon (C-axis) - between point in Y and hole/tenon (C-axis) - Z (A-/B-axis) - rectangle measurement <ul style="list-style-type: none"> - inside - outside - extra measurement <ul style="list-style-type: none"> - 4 holes - center of a pitch circle - CS measurement <ul style="list-style-type: none"> - manual/semi-automatic/automatic teach-in 			
20	30	40	50	20	30	40	50	20	30	40	50
-	-	-	x	-	-	-	x	-	-	-	x
60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
x	x	x	x	x	x	x	x	x	x	x	x
TC1260				TC1270				TC1270, TC1275			
Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD			
www.beckhoff.com/TF5210				www.beckhoff.com/TF5220				www.beckhoff.com/TF5225			

TF5xxx | TwinCAT 3 Motion Control



	TC3 CNC Channel Pack				TC3 CNC Transformation				TC3 CNC Kinematic Optimization			
Technical data	TF5230-0vpp				TF5240-0vpp				TF5245-0vpp			
	Using TwinCAT CNC Channel Pack, a further CNC channel can be extended to a maximum of 12 channels. <ul style="list-style-type: none"> – channel synchronisation – axis transfer between channels 				TwinCAT CNC Transformation is an optional function for the TwinCAT CNC. <ul style="list-style-type: none"> – transformation functionality (5-axis functionality) – kinematics selection from the kinematics library – RTCP function – TLC function – definition of different coordinate systems, linking/transition of coordinate systems 				TwinCAT CNC Kinematic Optimization is an optional package for TwinCAT 3 CNC that is used to optimize the control parameters for rotary axes in 5-axis kinematics. The package includes NC programs/cycles for measuring with a sensor or calibration sphere as well as for computing the kinematic parameters. In addition to determining offsets, it also provides for the option to define the TCP position with other measuring devices. <p>Application Optimization of machine accuracy and related production accuracy</p> <p>Requirements</p> <ul style="list-style-type: none"> – The machine must be equipped with appropriate measuring devices: <ul style="list-style-type: none"> – measuring sensor with absolute accuracy – calibration sphere – axis labels according to specification – kinematic type is supported; currently available: <ul style="list-style-type: none"> – 9: CA head kinematics – 57: BC table kinematics – 58: AC table kinematics – 59: CA cardan head – 60: CB cardan head – 80: AB table kinematics – 90-0: Cartesian AB head – 90-2: Cartesian CA head – 90-8: Cardanic AB head 			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	–	x	–	–	–	x	–	–	–	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1270				TC1270				TC1270, TF5240			
Operating system	Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD			
Further information	www.beckhoff.com/TF5230				www.beckhoff.com/TF5240				www.beckhoff.com/TF5245			

TC3 CNC HSC Pack				TC3 CNC Spline Interpolation				TC3 CNC Virtual NCK Basis				TC3 CNC Virtual NCK Options			
TF5250-0vpp				TF5260-0vpp				TF5270-0vpp				TF5271-0vpp			
<p>TwinCAT CNC HSC Pack is an optional high-speed cutting solution for the TwinCAT CNC:</p> <ul style="list-style-type: none"> – cross-block velocity and acceleration control for optimum utilisation of the axis dynamics and thus higher path speeds – high surface quality through smoothed dynamics and associated reduction of vibrational excitation of the machine – effective control of specified contour tolerances – path programming via splines with programmable spline type (Akima-spline, B-spline) for reduction of NC blocks for free-form surfaces 				<p>TwinCAT CNC Spline Interpolation is an optional package for the TwinCAT CNC for path programming via splines with programmable spline type, Akima-spline, B-spline.</p>				<p>TwinCAT CNC Virtual NCK Basis is a virtual TwinCAT CNC for simulation in a Windows environment as an option for the TwinCAT CNC.</p>				<p>TwinCAT CNC Virtual NCK Options is a virtual TwinCAT CNC for simulation in a Windows environment as a further option package for the TwinCAT CNC and TwinCAT CNC Virtual NCK Basis.</p>			
20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
–	–	–	x	–	–	–	x	–	–	–	x	–	–	–	x
60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
TC1270				TC1270				TC1000				TC1000			
Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10				Windows 7, Windows 10			
www.beckhoff.com/TF5250				www.beckhoff.com/TF5260				www.beckhoff.com/TF5270				www.beckhoff.com/TF5271			

TF5xxx | TwinCAT 3 Motion Control



TC3 CNC Volumetric Compensation

TC3 CNC Cutting Plus

Technical data

TF5280-0vpp

TF5290-0vpp

TC3 CNC Volumetric Compensation is an optional package for compensating geometric machine errors based on an ISO-standardised parametric model.

Application

- highly effective option for increasing the machine accuracy and therefore the manufacturing accuracy, simply through control measures
- correction of the TCP position through dynamic calculation of axis correction values
- suitable for machines with 3 Cartesian and up to 3 rotary axes
- any kinematic axis order (head/table kinematics)

Features

- several parameter files per compensation, several compensations per controller
- parameter update via NC command or HMI
- interpolation of parameter sets (sag compensation, etc.)
- smoothing of parameter step changes during modulo transitions
- diagnostics possible via ADS, Microsoft Excel file

Safety

- configurable limitation of the compensating values
- configurable limitation of the travel-out velocity of the compensating values

Supported file formats

- tabular CSV format
- Etalon exchange format

Standards

- DIN ISO 230 "Test code for machine tools"
- ISO/TR 16907 "Machine tools – Numerical compensation of geometric errors"

TC3 CNC Cutting Plus is a technology package and enhances the CNC functionality for cutting.

Automatic lifting/lowering of an axis (lifts)

- block-overlapping automatic lifting and lowering of an axis
- to prevent collisions between the tool head and ridges or cut-out parts
- jerk-limited profile without affecting the path speed

Microsteps, fast laser switching signal

- highly accurate output of an M function (1 µs) at a certain position
- use of timestamps
- supports various types of synchronization
- parameterization by configuration of the M functions or programming the M functions via NC programs

Tube transformation

- multi-axis transformation for sheath surface processing
- supports various profiles such as multi-edge pipes and profile pipes
- processing of the programmed contour on the surface of the profile

Performance class (pp)

	20	30	40	50	20	30	40	50
	–	–	–	x	–	–	–	x
	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x

Required

TC1270

TC1270

Operating system

Windows 7, Windows 10, TwinCAT/BSD

Windows 7, Windows 10, TwinCAT/BSD

Further information

www.beckhoff.com/TF5280

www.beckhoff.com/TF5290

TC3 Motion Collision Avoidance					TC3 Motion Pick-and-Place				TC3 Hydraulic Positioning				
TF5410-0vpp					TF5420-0vpp				TF5810-0vpp				
<p>TC3 Motion Collision Avoidance is an optional package that prevents collisions when operating a number of linearly and/or translationally dependent axes with TC3 NC PTP. The underlying algorithm ensures the maintenance of a minimum distance from the previous axis. In this way, TC3 Motion Collision Avoidance actively prevents collisions when a number of motors are using e.g. the same rail. As well as active collision avoidance, TF5410 can also be used to allow axes to accumulate in a controlled way, for example when carrying out linear movements such as with XTS (eXtended Transport System).</p> <p>Programming of the PLC's movement commands is based on the standard PTP motion library with an additional input "gap". For example, when using TC3 Motion Collision Avoidance, all the axes can be given the same target position. The algorithm then ensures that only the first axis actually moves to that position. The remaining axes automatically line up while maintaining their minimum distance. This means that no further programming effort is needed in order to implement a dynamic buffer in which products can accumulate.</p>					<p>TC3 Motion Pick-and-Place is an extension of TC3 NC I (TF5100) and was especially designed for handling tasks carried out by gantry robots and other kinematics. It smooths the transition of complex path segments. Special methods are used to blend movement commands, facilitating optimised cycle times when they are processed. This reduces the bumpiness of motion along the path, making it run more smoothly, which is vital for high cycle times, gentle treatment of the robot and careful handling of the products.</p> <p>The TF5420 is programmed using a PLC library. There is no limit on the number of axes in a pick-and-place group, the only limiting factor is the processing power of the controller. Given an appropriate level of processing power, interpolating movement commands can be processed even for complex machines with more than three or eight axes (three path plus five auxiliary axes).</p>				<p>Algorithms for the control and positioning of hydraulic axes are combined in TwinCAT Hydraulic Positioning and are available as PLCopen-compliant PLC blocks.</p> <ul style="list-style-type: none"> – programming via certified PLCopen motion blocks – set value generators especially for hydraulic applications – coupling of the set value generators to NC PTP/NC I/CNC possible – free profile design through connection of customer-specific set value generators – support of non-linear gears – multiple-segmented movements (blending) – support of all necessary interfaces via Beckhoff I/O system – support of all common fieldbus systems – all process values in physical units, determination of force true to surface – support of standardised and application-specific controllers for position, force/pressure – bumpless transfer of force and position control – automatic identification of valve characteristics and axis properties – linearisation of characteristic curves – maintenance and commissioning tool for <ul style="list-style-type: none"> – axis parameterisation – valve parameterisation incl. characteristic curves – controller parameterisation – triggering of test commands – display of actual values 				
20	30	40	50		20	30	40	50		20	30	40	50
–	–	x	x		–	–	x	x		–	x	x	x
60	70	8x	9x		60	70	8x	9x		60	70	8x	9x
x	x	x	x		x	x	x	x		x	x	x	x
TC1250					TC1260				TC1200				
Windows 7, Windows 10, TwinCAT/BSD					Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, Windows CE				
www.beckhoff.com/TF5410					www.beckhoff.com/TF5420				www.beckhoff.com/TF5810				

TF6xxx | TwinCAT 3 Connectivity



	TC3 ADS Monitor				TC3 JSON Data Interface				TC3 OPC UA			
Technical data	TF6010-0vpp				TF6020-0vpp				TF6100-0vpp			
	<p>The free-of-charge TC3 ADS Monitor provides recording and diagnostics functions for the communication of TwinCAT systems. It is integrated into the TwinCAT 3 engineering environment. In addition, it can be used to configure and execute user-specific commands for testing ADS servers.</p>				<p>The TC3 JSON Data Interface is an interface for the exchange of data in JSON format between the TwinCAT system and custom applications. The JSON format enables access with different programming languages to the ADS interface. It is possible to access all symbols of the runtime that are also available with the standard ADS interface.</p> <p>Communication between the TwinCAT system and the custom applications can be realised in different ways. An integrated MQTT client in the TwinCAT system enables the communication with MQTT brokers. The MQTT broker is configured in the TwinCAT system and supports TLS encryption.</p>				<p>OPC UA offers secure, reliable and manufacturer-neutral transport of raw data and pre-processed information from the manufacturing level into the production planning or ERP system. With OPC UA, all desired information is available to every authorised application and every authorised person at any time and in any place.</p> <p>TwinCAT OPC UA Server</p> <ul style="list-style-type: none"> – supports the following OPC UA functions: Data Access, Historical Data Access, Alarms & Conditions – Intermediate storage of data on the server: interruption of the communication connection does not lead to loss of data. – graphical configurator for simple handling of local and remote OPC UA servers – definition of user/groups-based access rights at namespace and node level – support of client/server certificates to establish secure communication <p>TwinCAT OPC UA Gateway</p> <ul style="list-style-type: none"> – high-performance, free-of-charge OPC COM DA server – enables aggregation of multiple, subordinate TwinCAT OPC UA servers – support of client/server certificates to establish secure communication <p>TwinCAT OPC UA Client</p> <ul style="list-style-type: none"> – supports OPC UA communication with remote OPC UA servers – available as PLCopen-compliant PLC function block or as TwinCAT I/O device – support of client/server certificates to establish secure communication 			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	–	–	x	x	x	x	x	x	x	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TE1000				TC1000				TC1000			
Operating system	Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE			
Further information	www.beckhoff.com/TF6010				www.beckhoff.com/TF6020				www.beckhoff.com/TF6100			

TC3 EtherCAT Redundancy 250				TC3 EtherCAT Redundancy 250+				TC3 EtherCAT External Sync				TC3 Modbus TCP			
TF6220-0vpp				TF6221-0vpp				TF6225-0vpp				TF6250-0vpp			
TwinCAT EtherCAT Redundancy 250 extends the TwinCAT EtherCAT Master by the possibility to implement cable redundancy for up to 250 EtherCAT devices: from the last logical device a cable is returned back to the master. Configuration and diagnostics take place in the TwinCAT 3 engineering environment.				TwinCAT EtherCAT Redundancy 250+ extends the TwinCAT EtherCAT Master by the possibility to implement cable redundancy for more than 250 EtherCAT devices: from the last logical device a cable is returned back to the master. Configuration and diagnostics take place in the TwinCAT 3 engineering environment.				TC3 EtherCAT External Sync extends the TwinCAT EtherCAT master with an option to synchronise the Beckhoff real-time communication with external digital signals. The digital signals are read via terminals supporting timestamping, such as the EL1252 EtherCAT Terminal.				TwinCAT Modbus acts as gateway between Modbus TCP devices and TwinCAT runtime systems. It provides both server and client functionalities. In server mode the memory areas of several TwinCAT runtime systems can be mapped directly to the Modbus memory areas. A PLC library is provided for implementing a Modbus TCP client, so that the memory areas of a Modbus TCP device can be accessed.			
20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
–	–	x	x	–	–	x	x	x	x	x	x	x	x	x	x
60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
TC1100				TC1100				TC1100				TC1200			
Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE, TwinCAT/BSD			
www.beckhoff.com/TF6220				www.beckhoff.com/TF6221				www.beckhoff.com/TF6225				www.beckhoff.com/TF6250			

TF6xxx | TwinCAT 3 Connectivity



	TC3 Modbus RTU	TC3 PROFINET RT Device	TC3 PROFINET RT Controller	TC3 EtherNet/IP Adapter																																																																
Technical data	TF6255-0vpp	TF6270-0vpp	TF6271-0vpp	TF6280-0vpp																																																																
	<p>TwinCAT Modbus RTU implements Modbus RTU communication via a serial RS232, RS422 or RS485 interface and is thus suitable both for the PC/CX interfaces and for operation with the KL6xxx serial Bus Terminals. It contains function blocks for master and slave operating mode with simple configuration.</p>	<p>The TwinCAT PROFINET RT Device (slave) is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into a PROFINET RT device. By installing the function, a standard Ethernet interface becomes a PROFINET slave.</p>	<p>The TwinCAT PROFINET RT Controller (master) is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into a PROFINET RT controller. By installing the function, a standard Ethernet interface becomes a PROFINET master.</p>	<p>The TwinCAT EtherNet/IP Adapter is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into an EtherNet/IP adapter. Through this supplement the Ethernet interface becomes an EtherNet/IP adapter. The product can be used on all PC controllers and Embedded PC controllers with an Intel® chipset.</p> <p>A further feature of the supplements is that it enables up to eight adapters to be parameterised using a single physical interface. For this purpose, a virtual MAC address is created in order to be able to operate a total of up to eight EtherNet/IP adapters on one PC via a single Ethernet interface. This feature can be used, for example, to exchange larger amounts of data using one EtherNet/IP scanner or to establish a connection to several EtherNet/IP scanners in different subnets.</p>																																																																
Performance class (pp)	<table border="1"> <tr><td>20</td><td>30</td><td>40</td><td>50</td></tr> <tr><td>x</td><td>x</td><td>x</td><td>x</td></tr> <tr><td>60</td><td>70</td><td>8x</td><td>9x</td></tr> <tr><td>x</td><td>x</td><td>x</td><td>x</td></tr> </table>	20	30	40	50	x	x	x	x	60	70	8x	9x	x	x	x	x	<table border="1"> <tr><td>20</td><td>30</td><td>40</td><td>50</td></tr> <tr><td>–</td><td>–</td><td>x</td><td>x</td></tr> <tr><td>60</td><td>70</td><td>8x</td><td>9x</td></tr> <tr><td>x</td><td>x</td><td>x</td><td>x</td></tr> </table>	20	30	40	50	–	–	x	x	60	70	8x	9x	x	x	x	x	<table border="1"> <tr><td>20</td><td>30</td><td>40</td><td>50</td></tr> <tr><td>–</td><td>–</td><td>x</td><td>x</td></tr> <tr><td>60</td><td>70</td><td>8x</td><td>9x</td></tr> <tr><td>x</td><td>x</td><td>x</td><td>x</td></tr> </table>	20	30	40	50	–	–	x	x	60	70	8x	9x	x	x	x	x	<table border="1"> <tr><td>20</td><td>30</td><td>40</td><td>50</td></tr> <tr><td>–</td><td>–</td><td>x</td><td>x</td></tr> <tr><td>60</td><td>70</td><td>8x</td><td>9x</td></tr> <tr><td>x</td><td>x</td><td>x</td><td>x</td></tr> </table>	20	30	40	50	–	–	x	x	60	70	8x	9x	x	x	x	x
20	30	40	50																																																																	
x	x	x	x																																																																	
60	70	8x	9x																																																																	
x	x	x	x																																																																	
20	30	40	50																																																																	
–	–	x	x																																																																	
60	70	8x	9x																																																																	
x	x	x	x																																																																	
20	30	40	50																																																																	
–	–	x	x																																																																	
60	70	8x	9x																																																																	
x	x	x	x																																																																	
20	30	40	50																																																																	
–	–	x	x																																																																	
60	70	8x	9x																																																																	
x	x	x	x																																																																	
Required	TC1200	TC1100	TC1100	TC1100																																																																
Operating system	Windows 7, Windows 10, Windows CE, TwinCAT/BSD	Windows 7, Windows 10, Windows CE, TwinCAT/BSD	Windows 7, Windows 10, Windows CE, TwinCAT/BSD	Windows 7, Windows 10, Windows CE, TwinCAT/BSD																																																																
Further information	www.beckhoff.com/TF6255	www.beckhoff.com/TF6270	www.beckhoff.com/TF6271	www.beckhoff.com/TF6280																																																																



TC3 EtherNet/IP Scanner					TC3 FTP Client				TC3 TCP/IP				TC3 TCP/UDP Realtime				TC3 Serial Communication			
TF6281-0vpp					TF6300-0vpp				TF6310-0vpp				TF6311-0vpp				TF6340-0vpp			
<p>The TwinCAT EtherNet/IP Scanner is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into an EtherNet/IP scanner. Through this supplement, the Ethernet interface becomes an EtherNet/IP scanner. The product can be used on all PC controllers and Embedded PC controllers with an Intel® chipset.</p> <p>The process data is configured using TwinCAT 3 allowing various process data and various sizes. The supplement supports both multicast and unicast connections. Up to 16 simple EtherNet/IP adapter devices can be connected via one generic node.</p>					<p>TwinCAT FTP enables easy access from the PLC to one or several FTP servers with the aid of various function blocks. Files can be loaded to or from a server after the establishment of a connection (optional with authentication). Additional function blocks allow files or directories to be searched for, created, deleted and renamed.</p>				<p>TwinCAT TCP/IP enables the implementation and realisation of one or several TCP/IP servers and/or TCP/IP clients within the TwinCAT 3 PLC. Corresponding blocks exist for the establishment/disconnection of communication as well as for the pure exchange of data (send and receive). The function blocks also support the use of multicast addresses.</p>				<p>TwinCAT 3 already offers an option to access the network card of the operating system (TF6310) from the PLC via the user mode. As an enhancement, TC3 TCP/UDP Realtime (TF6311) now enables fast and convenient access from the real-time directly to the network card. The TwinCAT 3 network card driver handles the access via a dedicated stack. The implementation facilitates cooperative use of the network card by the operating system. TF6311 provides both server and client functionality, so that the TCP/IP, UDP/IP and Ping/ARP protocols can be implemented.</p> <p>Unlike the TF6310 function modules, TF6311 is realised as a TcCOM (TwinCAT Component Object Model) module and directly implements the TwinCAT 3 philosophy: modules encapsulate functionality and can be used without knowledge of the internal workings. In addition, this approach enables seamless integration of the module in the two PLC and C++ programming environments. Examples of client and server applications in different protocols illustrate the use of the TcCOM module, making implementation of an application efficient and easy.</p>				<p>TwinCAT Serial Communication implements communication with serial devices such as printers, bar code scanners, etc. The serial interface of the PC and the serial Beckhoff EL6xxx EtherCAT Terminals and KL6xxx Bus Terminals are supported.</p> <p>Via the network-based fieldbus system from Beckhoff the serial terminals can be accessed over a distance of up to 100 m. In addition, it is possible to address virtual COM interfaces of the operating system from the PLC.</p>			
20	30	40	50		20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
–	–	x	x		x	x	x	x	x	x	x	x	–	x	x	x	x	x	x	x
60	70	8x	9x		60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
TC1100					TC1200				TC1200				TC1200, TC1300				TC1200			
Windows 7, Windows 10, Windows CE, TwinCAT/BSD					Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, Windows CE, TwinCAT/BSD			
www.beckhoff.com/TF6281					www.beckhoff.com/TF6300				www.beckhoff.com/TF6310				www.beckhoff.com/TF6311				www.beckhoff.com/TF6340			

TF6xxx | TwinCAT 3 Connectivity



	TC3 SMS/SMTP				TC3 Virtual Serial COM				TC3 Database Server				TC3 XML Server			
Technical data	TF6350-0vpp				TF6360-0vpp				TF6420-0vpp				TF6421-0vpp			
	<p>TwinCAT SMS/SMTP enables the transmission of SMS messages or e-mails using PLC function blocks. The latter also allows the transmission of file attachments, HTML texts and the setting of message priorities. Support for STARTTLS/SSL enables encrypted e-mail communication to be configured.</p>				<p>TwinCAT Virtual Serial COM allows the EL60xx EtherCAT Terminals or EP60xx EtherCAT Box modules to be integrated into Windows 7/10 or Windows CE as normal serial interfaces. The computer on which a serial interface is to be generated for it is defined individually for each EL60xx/EP60xx. Access to the device connected to the terminal takes place via Windows API for serial interfaces.</p>				<p>TwinCAT Database Server enables the exchange of data between databases and the TwinCAT system. PLC variables or direct values of the EtherCAT I/Os can be logged cyclically when changes occur or event-controlled by means of PLC function blocks.</p> <p>A TwinCAT 3 PLC library for the Database Server utilises the object-oriented extensions of the IEC 61131-3. As a result, the program code is more structured and much simpler to extend. The performance of command processing is also considerably higher. Furthermore, a C++ interface is implemented for the Database Server. This allows the user to communicate with the Database Server not just from the PLC, but also directly from a C++ application.</p>				<p>The TwinCAT XML Server provides a PLC library enabling write/read access for XML data. The user-friendly XML Server facilitates e.g. the loading of initialisation data, which is often required at machine startup.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	–	x	x	x	x	x	x	x	x	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1200				TC1100				TC1200				TC1200			
Operating system	Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE			
Further information	www.beckhoff.com/TF6350				www.beckhoff.com/TF6360				www.beckhoff.com/TF6420				www.beckhoff.com/TF6421			

i For availability status see Beckhoff website at: www.beckhoff.com

TC3 IEC 60870-5-10x				TC3 IEC 61850/ IEC 61400-25				TC3 RFID Reader Communication				TC3 DBC File Import for CAN			
TF6500-0vpp				 TF6510-0vpp				TF6600-0vpp				 TF6650-0vpp			
<p>TwinCAT IEC 60870-5-10x enables communication according to the IEC standard 60870-5-10x from the PLC. Both server and client operating modes are possible.</p> <p>PLC library for the realisation of masters for</p> <ul style="list-style-type: none"> – IEC 60870-5-101 – IEC 60870-5-102 – IEC 60870-5-103 – IEC 60870-5-104 <p>PLC library for the realisation of slaves for</p> <ul style="list-style-type: none"> – IEC 60870-5-101 – IEC 60870-5-104 				<p>For the standard-compliant communication between client and server, corresponding servers can be realised directly in the TwinCAT PLC with IEC 61850/IEC 61400-25 Telecontrol in TwinCAT 3. IEC 61850 provides data models for substation communication. IEC 61400-25 is based on IEC 61850 and offers specific extensions of the data model for wind farm communication. The respective server is configured using the TwinCAT Telecontrol configurator. This decouples the configuration work from the programming work in the PLC and generates the corresponding PLC code. The PLC code can be imported into new or existing PLC projects.</p>				<p>RFID Reader Communication allows various RFID readers to be addressed via a serial interface. The new TwinCAT RFID reader library offers a general abstract interface that can be used for all readers. The configuration can easily be adapted to a specific reader.</p>				<p>The TwinCAT 3 function enables the reading of DBC file formats (.dbc). The DBC data format is a CAN network description and allows the definition of attributes as well as the assignment of these attributes to the elements of a network. DBC files are text files that contain e.g. scaling information for CAN data and signal definitions. The TF6650 function can be used for data import and pre-processing according to the parameters that are stored in the DBC file. As an additional function, network nodes can also be simulated according to the DBC files. The function uses the EL6751 CANopen master terminal as hardware interface.</p>			
20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
TC1200				TC1200				TC1200				TC1100, EL6751			
Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE			
www.beckhoff.com/TF6500				www.beckhoff.com/TF6510				www.beckhoff.com/TF6600				www.beckhoff.com/TF6650			

TF6xxx | TwinCAT 3 Connectivity



	TC3 IoT Communication (MQTT)				TC3 IoT Functions				TC3 IoT Data Agent			
Technical data	TF6701-0vpp				TF6710-0vpp				TF6720-0vpp			
	<p>TC3 IoT Communication provides basic functionalities in the form of PLC libraries for sending and receiving data via the so-called MQ Telemetry Transport (MQTT) protocol.</p> <p>By enabling the transmission and receipt of publisher/subscriber-based MQTT messages directly from the controller, this function makes easy data communication between diverse devices possible. MQTT is an open, standardised communication protocol that is becoming increasingly popular for fast and efficient data transmission applications due to its low overhead. Many IT providers, but particularly those in the cloud computing field, provide access to their services via this protocol.</p>				<p>The TC3 IoT Functions can be used to establish connectivity for cloud-based communication services.</p> <p>The focus is not on the protocol implementation itself (such as with the TF6701, for example), but on targeted communication with a cloud-based system, e.g. the Microsoft Azure IoT hub or Amazon Web Services IoT. Several PLC function blocks are available for sending process data from the TwinCAT runtime to such cloud-based communication services or receiving data from such services.</p>				<p>The TC3 IoT Data Agent provides IoT communication functions bi-directional in the form of a gateway application that can be configured and operated independently from the TwinCAT real-time environment.</p> <p>The data agent picks up configured process data and transmits it to a specific communication or data service in the Microsoft Azure or Amazon Web Services (AWS) cloud, or it sends the process data to an MQTT or AMQP message broker. To pick up the process data, both TwinCAT ADS and the OPC UA IEC standard with their security mechanisms are available. This ensures data protection down to the controller or the respective end device.</p> <p>To reduce the amount of traffic and associated costs, the data agent supports advanced sampling mechanisms, such as on-data-change transmissions.</p> <p>If the connection is interrupted, buffering algorithms are available to prevent the loss of data. The entire parameterisation of the data agent can be done via a graphical editor. This makes it easy to use and reduces set-up times when commissioning the system.</p> <p>The TF672x TC3 IoT Data Agent Packs extend the TC3 IoT Data Agent with 4, 16, 64 or 256 additional ADS target runtimes or OPC UA namespaces.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	x	x	x	x	–	–	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1200				TC1200				TC1000			
Operating system	Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10			
Further information	www.beckhoff.com/TF6701				www.beckhoff.com/TF6710				www.beckhoff.com/TF6720			

TC3 IoT Communicator					TC3 IoT Communicator App					TC3 IoT HTTPS/REST								
TF6730-0vpp					TF6735					TF6760-0vpp								
<p>The TC3 IoT Communicator makes it possible to easily transmit process data to multiple end devices, monitor status changes, and send information back to the machine.</p> <p>The TC3 IoT Communicator connects the TwinCAT controller to a messaging service, making it easy to set it up within the TwinCAT engineering environment to send and receive push messages and process data between the PLC and mobile operating systems. Since each end device is registered with a unique ID, messages can be transmitted to specific people and/or controllers. A flag within the message indicates whether messages and status data is buffered in the messaging service and available on demand.</p> <p>Since the TC3 IoT Communicator is based on the publish-subscribe pattern, it does not require any special firewall settings but can be easily integrated into an existing IT network. To receive, send and display such messages, apps can be downloaded from the app stores free of charge.</p>					<p>The TC3 IoT Communicator App provides a simple solution for monitoring and analysing TwinCAT process data on mobile end devices. To receive, send and display selected TwinCAT messages, apps can be downloaded from the app stores free of charge.</p> <p>The TC3 IoT Communicator App communicates with the TwinCAT controller via a messaging service in the cloud or in a local network. Various mechanisms are available for authentication and encryption.</p>					<p>So-called REST (Representational State Transfer) APIs are frequently offered by web servers in IoT communication in order to channel certain communication processes via a uniform and stateless interface.</p> <p>The TwinCAT 3 function TF6760 TC3 IoT HTTPS/REST provides users with basic functions for HTTP/HTTPS communication in a PLC library enabling them to address REST APIs as a client and providing HTTP commands such as GET, PUT and POST. The communication channel (HTTPS) is secured by SSL/TLS mechanisms, which are also provided. Message contents can be defined, interpreted and used for communication directly from the PLC context via XML and JSON parsers.</p>								
20	30	40	50		–	20	30	40	50	x	x	x	x		x	x	x	x
60	70	8x	9x			60	70	8x	9x	x	x	x	x		x	x	x	x
TC1200					TF6730					TC1200								
Windows 7, Windows 10, Windows CE, TwinCAT/BSD					–					Windows 7, Windows 10, Windows CE, TwinCAT/BSD								
www.beckhoff.com/TF6730					www.beckhoff.com/TF6735					www.beckhoff.com/TF6760								

TF7xxx | TwinCAT 3 Vision



TC3 GigE Vision Connector



TC3 Vision Base

Technical data

TF7000-0vpp, TF7001-0vpp,
TF7002-0vpp, TF7003-0vpp

TF7100-0vpp

TC3 GigE Vision Connector offers the possibility to integrate GigE Vision cameras directly into the TwinCAT architecture. TF700x is also GigE Vision certified. The cameras are configured in the same development environment as fieldbus components or axes without any third-party software. Triggered from the real-time, image capture and PLC or motion control can be operated in a highly synchronised way.

The configuration is carried out completely in TwinCAT Engineering. Wizards are available for setting the camera parameters and for calibration and simulation. Via the source control file it is possible to read images stored on a drive and to make them available to the real-time. The programming of image processing tasks can be prepared and tested offline in advance.

TF7000 TC3 GigE Vision Connector Base provides the basis for communication and features two camera connections. Optional packages are available for two, four or eight additional cameras.

TC3 Vision Base provides an extensive PLC library with a large number of widely varying functions and algorithms for solving image processing tasks, such as e.g. algebraic image operations, filters, Fourier analyses, colour image processing, segmentation, contour and blob analysis or results presentation, as well as for reading and writing camera parameters. In addition to PLC, motion control, robotics and measurement technology, image processing is now also available as directly integrated functionality in the TwinCAT system.

The image processing algorithms are computed in the TwinCAT real-time environment, executed task-synchronously and monitored in real time via watchdogs. TwinCAT Vision is multi-core capable and executes algorithms automatically on several cores if available. Direct response to image processing results is possible in the PLC without the time loss that would be caused by additional interfaces to external devices.

PLC programming is carried out in the IEC 61131-3 languages so that no knowledge of specific programming languages is required. All known debugging options in the PLC are available. Intermediate results and associated images can be displayed at any time in the engineering or in the TwinCAT HMI.

Performance class (pp)

	20	30	40	50	20	30	40	50
	–	–	–	x	–	–	–	x
	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x

Required

TC1200, TC1300

TC1200

Operating system

Windows 7, Windows 10

Windows 7, Windows 10

Further information

www.beckhoff.com/TF7000

www.beckhoff.com/TF7100

TC3 Vision Matching 2D					TC3 Vision Code Reading				TC3 Vision Metrology 2D					
TF7200-0vpp					TF7250-0vpp				TF7300-0vpp					
<p>TC3 Vision Matching 2D expands the TwinCAT Vision functionality by the possibility to find and compare objects based on learned references, contours, feature points or other properties (template matching/keypoint detection and descriptor matching).</p> <p>These functions enable the controller to determine whether certain objects or features exist in an image in order to implement functions such as good/bad part detection, for example. In the same way, objects can be recognised to be sorted or individually handled and further processed in the production process.</p>					<p>TC3 Vision Code Reading includes functions for reading various 1D and 2D codes. This provides the basis for being able to check code content directly in real time and to track products during the manufacturing process. It eliminates the need for additional interfaces and runtime delays in communication with external devices.</p> <p>The reading results can be displayed as an image at any time for process monitoring purposes or saved for continuous quality assurance.</p>				<p>TC3 Vision Metrology 2D offers various options for the detection of edges, holes and circular arcs as well as the determination of lengths, distances, diameters, angles and coordinates, all with sub-pixel accuracy.</p> <p>By means of various calibration functions, it is possible to correct, for example, optical distortions or distortions of perspective that may be caused by the geometrical structure, and to convert pixel values to world coordinates, lengths or distances. This enables, for example, the metric display or output of values as well as the direct presetting of gripping points for robots in their coordinate systems.</p>					
20	30	40	50		20	30	40	50		20	30	40	50	
–	–	–	x		–	–	–	x		–	–	–	x	
60	70	8x	9x		60	70	8x	9x		60	70	8x	9x	
x	x	x	x		x	x	x	x		x	x	x	x	
TF7100					TF7100				TF7100					
Windows 7, Windows 10					Windows 7, Windows 10				Windows 7, Windows 10					
www.beckhoff.com/TF7200					www.beckhoff.com/TF7250				www.beckhoff.com/TF7300					

TF8xxx | TwinCAT 3 Industry specific

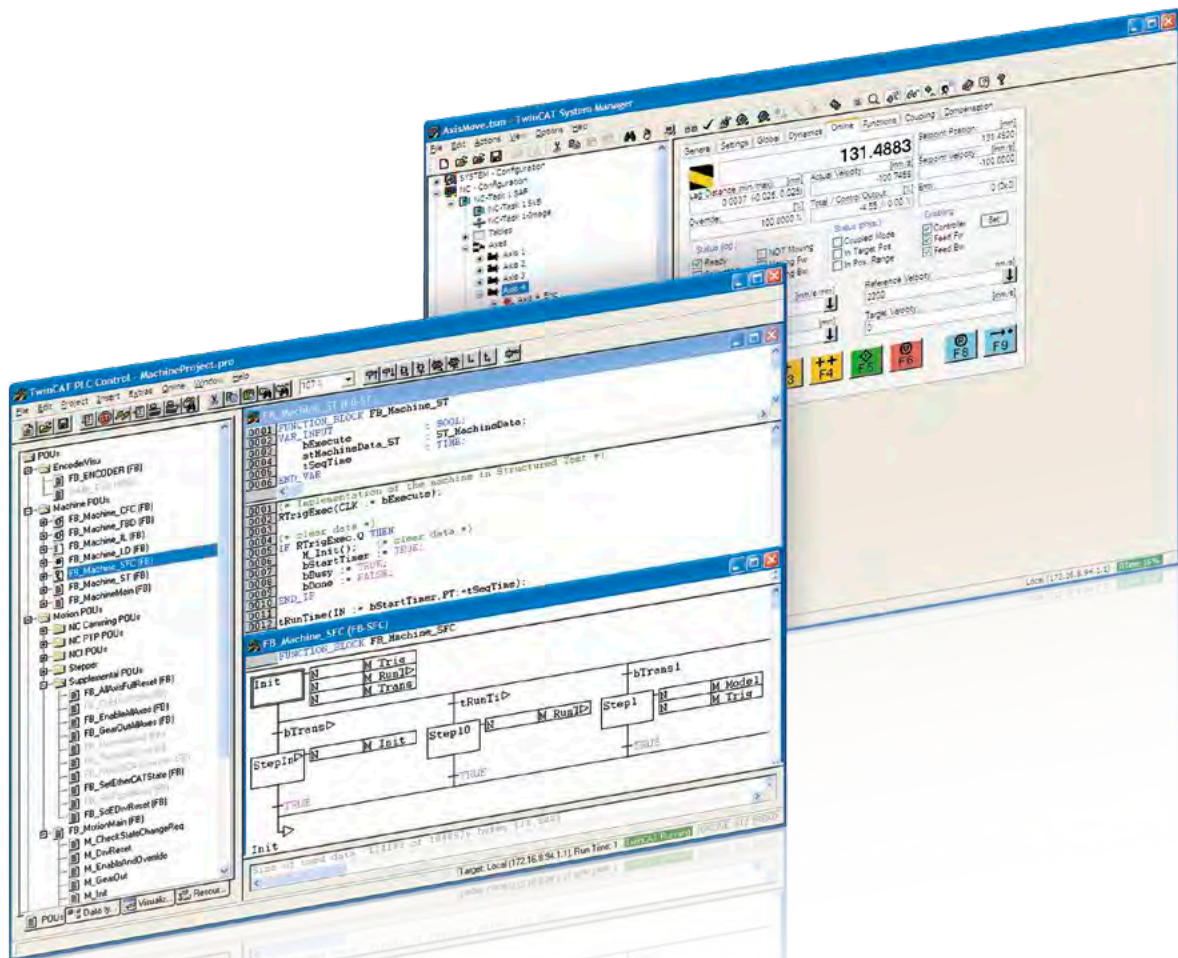


	TC3 HVAC				TC3 Building Automation Basic				TC3 BACnet				TC3 Building Automation			
Technical data	TF8000-0vpp				TF8010-0vpp				TF8020-0vpp				TF8040-0vpp			
	<p>The TF8000 TC3 HVAC software library allows the implementation of all functions for automating all building services. In addition to conventional HVAC functions relating to energy generation and distribution, it also includes room automation functions for lighting, shading and air-conditioning.</p>				<p>The TC3 Building Automation Basic software library allows the implementation of all functions which are important for room automation. Among these are lighting (constant light control, light dimmer...), facade control, scaling functions, filter blocks, timer functions and peak load limiter for energy optimisation.</p>				<p>BACnet (Building Automation Control Network) is a standardised, manufacturer-independent communication protocol for building automation. Areas of application include HVAC, lighting control, safety and fire alarm technology. Implementation of this protocol is carried out as server as well as client and can be run on all Beckhoff Industrial PCs and Embedded PCs. All services of a B-BC (BACnet Building Controller) are supported such as for example, common data use (DS), alarm and event processing (AE), time-tabling (SCHED), trend recording (T) as well as device and network management (DM). TF8020 requires TC1100 from Build 4022.25.</p>				<p>The TF8040 TC3 Building Automation is the latest and most comprehensive software package for building automation applications. The library contains around 180 function blocks. The wide range of functions covered by this library enables system integrators to implement all conceivable heating, ventilation, air conditioning and room automation projects. Extensive templates offer support for system integrators in familiarisation and application. TF8040 meets the high requirements of advanced, interoperable building automation and provides the basis for safe and energy-efficient operation of building services such as HVAC, lighting, air conditioning and shading devices.</p>			
Performance class (pp)	20	30	40	50	20	30	40	50	20	30	40	50	20	30	40	50
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	70	8x	9x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Required	TC1200				TC1200				TC1100				TC1200			
Operating system	Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE				Windows 7, Windows 10, Windows CE, TwinCAT/BSD				Windows 7, Windows 10, Windows CE			
Further information	www.beckhoff.com/TF8000				www.beckhoff.com/TF8010				www.beckhoff.com/TF8020				www.beckhoff.com/TF8040			

TC3 Lighting Solution					TC3 Wind Framework				TC3 AES70 (OCA)				
TF8050-0vpp					TF8310-0vpp				TF8810-0vpp				
<p>The Beckhoff lighting solution offers many advantages, among them the simple commissioning of DALI lighting controllers. With extensive lighting systems, the use of decentralized bus couplers installed in the network infrastructure considerably reduces cabling requirements. The Lighting Solution supports functions such as remote control via web, the import and export of Excel data or simple maintenance measures. The solution also includes functions for the Human Centric Lighting (HCL) concept and the integration of DALI-2 sensors. All these functions are easy to configure without specific programming skills.</p>					<p>The TwinCAT 3 Wind Framework is based on the modular architecture of TwinCAT 3 and provides control technology and industry expertise in the form of encapsulated modules and an application template. TcCOM modules provide higher-level system services. The status module enables the monitoring of all components and includes error detection, event management, error handling and reporting. The parameter and command modules provide services for configuration and interaction with the system.</p> <p>The acquisition of signals and their statistical analysis is supported by the capture and statistic module. The user module checks, manages and logs all interactions by the user. The recording of all events and signals as well as the saving and loading of the entire configuration are enabled by the database module, which is based on an SQL database.</p> <p>The programming of the operational management using these services is simplified by a PLC library and a complete sample application. When using the TC3 Wind Framework, each subsystem of the wind turbine system (such as converters, pitch, etc.) is representing an individual module. Each subsystem module comes with a specific set of information and settings. These properties integrate themselves via specific objects from the framework into the higher-level services and operational management.</p> <p>When replacing a subsystem module, the associated objects are automatically integrated into the services. In this way a group of objects is created that represent the complete system and enable the monitoring and parametrisation of the turbine. Nevertheless, these subsystem modules are self-contained and reusable in another operational management or test environment.</p>				<p>The TC3 AES70 (OCA) communication library provides functions for the operation of a system as an OCA (Open Control Architecture) controller in an OCA network. Such various function modules as gain, mute or switch are available. These function modules can be used to map any OCA structures and OCA devices. With the TF8810, OCA-enabled audio systems can be connected to the PC-based control platform from Beckhoff and combined with components from the wide range of operating panels and I/O components.</p> <p>More information on our webpage Applications & Solutions for Stage and Show Technology.</p>				
20	30	40	50		20	30	40	50		20	30	40	50
x	x	x	x	–	–	–	x	x	x	x	x	x	x
60	70	8x	9x	60	70	8x	9x	60	70	8x	9x	60	
x	x	x	x	x	x	x	x	–	x	x	x	x	x
TC1200					TC1000				TC1200				
Windows 7, Windows 10, Windows CE					Windows 7, Windows 10, TwinCAT/BSD				Windows 7, Windows 10, Windows CE				
www.beckhoff.com/TF8050					www.beckhoff.com/TF8310				www.beckhoff.com/TF8810				

TwinCAT 2

► www.beckhoff.com/TwinCAT2



The Windows Control and Automation Technology

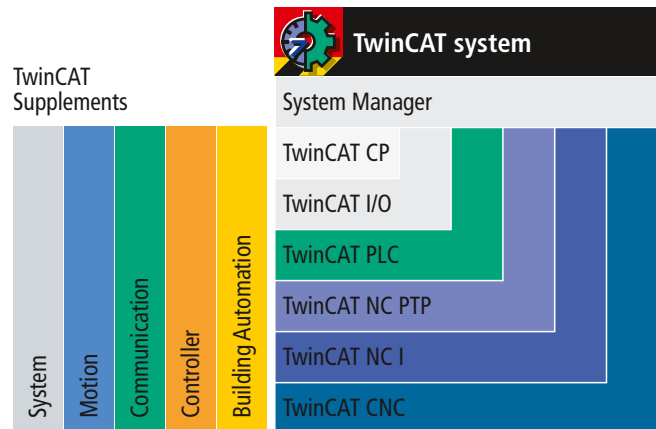
The Beckhoff TwinCAT software system transforms almost any compatible PC into a real-time controller with multi-PLC system, NC axis control, programming environment and operating station. At the same time, TwinCAT integrates the programming environment for all Beckhoff controllers: from high-end Industrial PC control to embedded controller.

TwinCAT architecture

TwinCAT consists of runtime systems for real-time execution of control programs and development environments for programming, configuration and diagnostics:

- TwinCAT I/O: versatile I/O interface for all common fieldbuses
- TwinCAT PLC: enables programming of up to four PLC runtimes on a single PC. The PLC program can optionally be written in one or several IEC 61131-3 languages (IL, LD, FBD, SFC, ST) or CFC.
- TwinCAT NC: enables simultaneous positioning of many axes. The levels NC PTP (point-to-point positioning), NC I (linear and circular interpolating movements of axis groups with up to eight drives) and CNC (extension of NC I with conventional CNC features for up to 32 interpolating axes per channel) are available for this purpose.

Current operating systems can be found in the respective product tables. Older operating systems are available on request from our service department.



TX12xx | TwinCAT 2



	TwinCAT PLC	TwinCAT NC PTP
Technical data	TX1200	TX1250
	<p>TwinCAT PLC realises one or more PLCs with the international standard IEC 61131-3 on one CPU. All programming languages described in the standard can be used for programming. The blocks of the type PROGRAM can be linked with real-time tasks. Various convenient debugging options facilitate fault-finding and commissioning. Program modifications can be carried out at any times and in any size online, i.e. when the PLC is running. All variables are available symbolically by ADS and can be read and written in appropriate clients.</p> <ul style="list-style-type: none"> – process image size, flag range, program size, POU size and number of variables are limited only by size of RAM – cycle times from 50 µs – link time: typically 1 µs (Intel® Core™ 2 Duo) – IEC 61131-3: IL, FBD, LD, SFC, ST, CFC – online changes in programs and variables – remote debugging via TCP/IP – online connection with PLC runtime system worldwide via TCP/IP or fieldbus – online monitoring of variables in variable lists, watch windows, editors – online status and powerflow (accumulator contents) of programs and instances – triggering, forcing and setting variables – powerful debugging with single cycle, break points, step in, step over, display of the current call stack, watchlist shows selection of variable, trace functions – online management of all variable names and structures across the whole system – remanent and persistent data, UPS supported storage on hard disk, storage in NOVRAM as option – variable reading and writing access via ADS, OPC – certified in accordance with PLCopen base level (IL/ST) – source code is stored in the target system – structured programming with modular program management – convenient library management – powerful compiler with incremental compilation – all common data types, structures, arrays, including multi-dimensional arrays – convenient creation of programs with autoformat, autodeclare, cross-reference, search/replace, project comparison 	<p>TwinCAT NC PTP implements Motion Control for point-to-point movements in software. The axes are represented by axis objects and provide a cyclic interface, e.g. for the PLC. This axis object is then linked to a corresponding physical axis. In this way, the most diverse axis types with the most diverse fieldbus interfaces can be connected abstractly with the axis objects, which always offer an identical configuration interface. The control of the axes can be configured in various conformations (position or velocity interface) and various controllers. The axes are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – max. 255 axes – supports electrical and hydraulic servo drives, frequency converter drives, stepper motor drives, DC drives, switched drives (fast/slow axes), simulation axes and encoder axes – supports various encoders such as incremental encoder, absolute encoder, digital interface to the drives such as EtherCAT, SERCOS, SSI, Lightbus, PROFIBUS DP/MC, pulse train – standard axis functions such as start/stop/reset/reference, velocity override, master/slave couplings, electronic gearbox, online distance compensation – programming is carried out via PLCopen-compliant IEC 61131-3 function blocks – convenient axis commissioning options – online monitoring of all axis state variables such as actual/setpoint values, releases, control values, online axis tuning – forcing of axis variables – configuration of all axis parameters, such as measuring system, drive parameters and position controller – configurable controller structures: P control, PID control, PID with velocity pre-control, PID with velocity and acceleration pre-control – online master/slave and slave/master conversion – flying saw (diagonal saw [optional]) – cam plates (support by TwinCAT Cam Design Tool [optional]) – FIFO axes – external set point value generators – multi-master coupling
Operating system	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
Further information	www.beckhoff.com/TX1200	www.beckhoff.com/TX1250

TwinCAT NC I	TwinCAT CNC
TX1260	TX1270
<p>Using TwinCAT NC I, movements can be implemented with up to three interpolating and up to five auxiliary axes in the interpolation package. Various axis types with various fieldbus interfaces are supported. The movement is usually programmed in DIN 66025, but it can also alternatively be carried out via PLC function blocks.</p> <ul style="list-style-type: none"> – max. 3 path axes and up to 5 auxiliary axes per group – 1 group per channel, max. 31 channels – supports electric servo axes, stepper motor drives – interpreter functions such as subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions – geometry functions: straight lines and circles in 3D space, circles at all main levels, helices with base circles at all main levels, linear, circular and helical interpolation at the main levels and freely definable levels, Bezier splines, look-ahead function – online reconfiguration of axes in groups, path override, slave coupling to path axes, auxiliary axes, axis error and sag compensation, measuring functions – programming in DIN 66025 – access alternatively via function blocks according to IEC 61131-3 – operation of automatic mode, manual mode (jog/inch), single block mode, referencing, handwheel mode (movement/overlay) – convenient debugging with online monitoring of current setpoint/actual position (position lag of all axes), NC program line currently being processed, NC program line currently being interpreted, channel status 	<p>TwinCAT CNC offers the option to implement interpolation with up to 32 simultaneously interpolating axes. The number of axes and/or the number of channels can be adapted to the requirements of the application via the option packages. Various transformations can be supplemented via option packages. Programming takes place according to DIN 66025. The axes and channels are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – 8 path axes/controlled spindles, max. 64 axes/controlled spindles (optional), max. 12 channels (optional) – supports electric servo axes, stepper motor drives – subroutine and jump technology, programmable loops, zero point shifts, tool corrections, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and auxiliary functions, tool functions – geometry functions linear, circular and helical interpolation at the main levels and freely definable levels, max. 32 interpolating path axes per channel (optional), look-ahead function – axis functions, coupling and gantry axis function, override, axis error and sag compensation, measuring functions – programming in DIN 66025 with high-level language extension – access via function blocks from TwinCAT PLC according to IEC 61131-3 – operation with automatic mode, manual mode (jog/inch), single block mode, referencing, block advance, handwheel mode (movement/overlay) – convenient debugging with online monitoring of all states
Windows 7, Windows 10, Windows CE www.beckhoff.com/TX1260	Windows 7, Windows 10 www.beckhoff.com/TX1270

TX1xxx | TwinCAT 2



	TwinCAT I/O	TwinCAT CP
Technical data	TX1100	TX1000
	<p>Using TwinCAT I/O, cyclic data can be collected by different fieldbuses in process images. Cyclic tasks drive the corresponding fieldbuses. Various fieldbuses can be operated with different cycle times on one CPU. Applications can directly access the process image. The fieldbuses and the process images are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – provides variable-oriented linkage of I/O devices to tasks – tasks are variable-oriented among each other – the smallest unit is one bit – supports both synchronous and asynchronous relationships – consistent exchange of data areas and process images – online display in the directory tree – online watch window – “Force and Write” for commissioning and for testing task variables and I/O devices – supported fieldbuses: <ul style="list-style-type: none"> – EtherCAT – Lightbus – PROFIBUS DP (master and slave) – Interbus – CANopen – SERCOS interface – DeviceNet – Ethernet – USB – SMB (System Management Bus) 	<p>TwinCAT CP is a driver for the Beckhoff Control Panels CP6xxx and CP7xxx, the industrial operating and display devices.</p> <p>Control Panels are optimised for use as a human-machine interface. Operating and display elements create an independent unit, separated from the PC by a simple cable link.</p> <p>TwinCAT CP creates the driver connection between general Windows programs and the operating and display elements on the Beckhoff Control Panel:</p> <ul style="list-style-type: none"> – direct switches for fast machine functions – switch feedback by LEDs – UPS support <p>The driver permits variable-oriented operation of the Control Panel’s functions by the Windows programs.</p>
Operating system	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
Further information	www.beckhoff.com/TX1100	www.beckhoff.com/TX1000

TSxxxx | TwinCAT 2 Supplements, System



	TwinCAT ECAD Import	TwinCAT Engineering Interface Server	TwinCAT XML Data Server	TwinCAT Backup
Technical data	TS1120	TS1600	TS6421	TS1150
	<p>TwinCAT ECAD Import serves the purpose of importing already existing engineering results from an ECAD program. It enables the import of information about the structure of the I/Os and their links to PLC variables, which is exported from the ECAD tool by means of XML description. On the basis of this information a system manager configuration and a basic PLC program with the I/O variables used are generated. The generation of NC devices is also possible.</p>	<p>With the TwinCAT Engineering Interface (ENI) Server it is possible for the work of a number of programmers to be coordinated via a central source code management system. The TwinCAT ENI Server offers interfaces with Microsoft Visual Source Safe and a driver for Subversion (SVN). A user and rights management is as much part of the product as a database-independent diagnostic tool, which gives an overview of all current tasks of the various users.</p>	<p>The TwinCAT XML Data Server permits direct access to an XML file from the PLC. The values of variables can be read by the PLC or written to the XML file. Access to structures in the PLC is also possible.</p>	<p>Files, directories, OS-specific information, settings and TwinCAT configurations can be backed up and restored using the TwinCAT Backup Server. This can be carried out on all connected media and also via the network.</p>
Operating system	Windows 7, Windows 10	Windows 7, Windows 10	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10
Min. TwinCAT level	TwinCAT PLC/ TwinCAT NC PTP (for NC devices)	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
Further information	www.beckhoff.com/TS1120	www.beckhoff.com/TS1600	www.beckhoff.com/TS6421	www.beckhoff.com/TS1150

TSxxxx | TwinCAT 2 Supplements, System



	TwinCAT Simulation Manager	TwinCAT Database Server	TwinCAT PLC HMI	TwinCAT PLC HMI Web
Technical data	TS1110	TS6420	TS1800	TS1810
	<p>The TwinCAT Simulation Manager is a tool for simplified configuration of a simulation environment, which integrates into the TwinCAT system environment. It supports the creation of a "virtual machine", which corresponds to a real one in its runtime performance.</p>	<p>TwinCAT Database Server enables the exchange of data between databases and the TwinCAT system. PLC variables or direct values of the EtherCAT I/Os can be logged cyclically when changes occur or event-controlled by means of PLC function blocks.</p>	<p>TwinCAT PLC HMI is a stand-alone tool for the presentation of visualisations which are created in TwinCAT PLC Control. They are shown in full-screen as soon as the system starts up.</p>	<p>TwinCAT PLC HMI Web is a web-based visualisation system. The TwinCAT PLC Control acts as an editor for the generation of web pages. Activation is carried out simply by setting an option in the TwinCAT PLC Control. The web pages are hosted by the Internet Information Server (IIS). For display of the web pages a Java VM is needed.</p>
Operating system	Windows 7, Windows 10	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
Min. TwinCAT level	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
Further information	www.beckhoff.com/TS1110	www.beckhoff.com/TS6420	www.beckhoff.com/TS1800	www.beckhoff.com/TS1810

TwinCAT Management Server	TwinCAT Scope 2	TwinCAT EtherCAT Redundancy	TwinCAT Solar Position Algorithm
TS1140	TS3300	TS622x	TS3900
<p>The TwinCAT Management Server enables the central administration of Beckhoff CE controllers. Software updates, for example, can thus be loaded onto controllers in the network from a central location. In addition to operating system updates, device-specific components (PLC boot projects) can also be loaded. By the option of separating known network devices into groups, individual actions can be defined for each group.</p>	<p>With the TwinCAT Scope 2 Beckhoff offers a graphical tool for signal analysis and data collection. Due to the separation of the data logger and viewer it is possible to show the signal processes of multiple systems in the field in a central Scope 2 view. 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 values. Alongside the possibility of long-term recording, various trigger functionalities and cursors are available in the TwinCAT Scope 2.</p>	<p>With TwinCAT EtherCAT Redundancy the TwinCAT EtherCAT master offers the possibility of implementing cable redundancy. From the last logical device a cable is returned back to the master. The TwinCAT System Manager is used for configuration and diagnostics.</p>	<p>With the TwinCAT Solar Position Algorithm it is possible to determine the sun angle using the date, time, geographical longitude and latitude as well as further parameters (depending on the desired accuracy). The function block works with a maximum inaccuracy of $\pm 0.001^\circ$.</p>
Windows 7, Windows 10	Windows 7, Windows 10	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
TwinCAT I/O	TwinCAT I/O	TwinCAT I/O	TwinCAT PLC
www.beckhoff.com/TS1140	www.beckhoff.com/TS3300	www.beckhoff.com/TS622x	www.beckhoff.com/TS3900

TS4xxx | TwinCAT 2 Supplements, Controller



	TwinCAT PLC Controller Toolbox	TwinCAT PLC Temperature Controller
Technical data	TS4100	TS4110
	<p>The TwinCAT Controller Toolbox covers all essential blocks for control applications.</p> <ul style="list-style-type: none"> – controllers satisfy industrial requirements such as anti-reset windup – simple basic controllers (P, I, D) – complex controllers (PI, PID, switching controllers) – filter blocks – control value generators (limiters, PWM) – ramp and signal generator blocks 	<p>Temperature controllers can be simply implemented using TwinCAT Temperature Controller. Simple commissioning through self-adjustment of the controller (auto-tuning) is included.</p> <ul style="list-style-type: none"> – automatic and manual operation with shock-free set up – control value analog or pulse-width modulated signal – tolerance monitoring, absolute value monitoring – scalable reaction to sensor error and heating power faults – limitation of set and control values – optional ramping of the set value – optional start-up phase for the setpoint variables – industrial PID controller as base control algorithm inside the temperature controller
Operating system	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
Min. TwinCAT level	TwinCAT PLC	TwinCAT PLC
Further information	www.beckhoff.com/TS4100	www.beckhoff.com/TS4110

TS5xxx | TwinCAT 2 Supplements, Motion



	TwinCAT PLC Motion Control XFC	TwinCAT PLC Hydraulic Positioning
Technical data	TS5065	TS5810
	<p>eXtreme Fast Control (XFC) is the technique that enables very fast, temporally high-precision reactions using EtherCAT, special I/O terminals and TwinCAT on the PC. Using EtherCAT Distributed Clocks (DC) and appropriate terminals, distributed latches or cam controllers can be implemented simply in this way.</p> <ul style="list-style-type: none"> – function blocks for the high-precision acquisition and switching of digital signals related to axis positions – EtherCAT Distributed Clocks with the timestamp-based EtherCAT EL1252, EL2252 or EL2262 input and output terminals – blocks for the conversion of DC time to position and vice versa – convenient PLCopen-compliant TouchProbe block – digital cam controller as PLCopen-compliant block 	<p>Algorithms for the control and positioning of hydraulic axes are combined in TwinCAT Hydraulic Positioning and are available as PLCopen-compliant PLC blocks.</p> <ul style="list-style-type: none"> – programming via certified PLCopen motion blocks – set value generators especially for hydraulic applications – coupling of the set value generators to NC PTP/NC I/CNC possible – free profile design through connection of customer-specific set value generators – support of non-linear gears – multiple-segmented movements (blending) – support of all necessary interfaces via Beckhoff I/O system – support of all common fieldbus systems – all process values in physical units, determination of force true to surface – support of standardised and application-specific controllers for position, force/pressure – bumpless transfer of force and position control – automatic identification of valve characteristics and axis properties – linearisation of characteristic curves – maintenance and commissioning tool for <ul style="list-style-type: none"> – axis parameterisation – valve parameterisation incl. characteristic curves – controller parameterisation – triggering of test commands – display of actual values
Operating system	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
Min. TwinCAT level	TwinCAT NC PTP	TwinCAT PLC
Further information	www.beckhoff.com/TS5065	www.beckhoff.com/TS5810

TSxxx | TwinCAT 2 Supplements, Motion



	TwinCAT NC FIFO Axes	TwinCAT NC Flying Saw	TwinCAT NC Camming
Technical data	TS5060 <p>Using TwinCAT NC FIFO Axes, externally generated set position values can be output to the axes in the form of a velocity pre-control. The set value generation is designed in such a way that both the set position and the set velocity are determined as the FIFO inputs are worked through in sequence. It is also possible, if necessary, to interpolate between two neighbouring FIFO inputs.</p>	TS5055 <p>TwinCAT NC Flying Saw implements the coupling of a slave axis to a master axis in a certain synchronous position (flying saw). PLC function blocks enable coupling and uncoupling as well as parameterisation.</p> <ul style="list-style-type: none"> – The master axis can be a real axis, a virtual axis, or some other external source of actual values. – synchronisation of the slave axis from any motion situation (stop, forward or reverse travel) with the master in motion – simple synchronisation with the master velocity – precise position synchronisation with the master axis (velocity and position) – synchronous velocity can be set via a coupling factor – optional return prevention as additional safety function – superimposed section compensation during the synchronous phase for dynamic position correction 	TS5050 <p>TwinCAT NC Camming (cam plate) is a non-linear relationship between a master and a slave axis. The camming package offers various options for the storage of cam plates. Convenient PLC blocks enable the loading, coupling and uncoupling of cam plates. It is possible to load new cam plates or to modify cam plates during operation. The TwinCAT Cam Design Tool offers support for the creation of the cam plates.</p> <ul style="list-style-type: none"> – position tables with master interpolation points and corresponding slave positions; interpolation between the points is done linearly or by splines – motion function table describing a cam plate via motion laws according to VDI guideline 2143 – cyclic or linear processing – cam plate with offset and scale, can be modified on the master or slave side – high flexibility through online change of the motion functions
Operating system	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
Min. TwinCAT level	TwinCAT NC PTP	TwinCAT NC PTP	TwinCAT NC PTP
Further information	www.beckhoff.com/TS5060	www.beckhoff.com/TS5055	www.beckhoff.com/TS5050

	TwinCAT Cam Design Tool	TwinCAT Digital Cam Server	TwinCAT Valve Diagram Editor	TwinCAT Kinematic Transformation
	TS1510	TS5800	TS1500	TS511x
	<p>The TwinCAT CAM Design Tool allows the generation and modification of cam plates with the aid of a graphical editor. These are composed of sections of laws of motion such as modified sine waves, harmonic combinations, or of various polynomial functions. Velocity, acceleration and jerk are displayed in addition to the slave position. The generated cam plates can be transferred to the NC as tables with specified step size or as so-called motion functions.</p>	<p>The TwinCAT Digital Cam Server is a fast cam controller with monitoring for various fieldbuses. The cams are configured in TwinCAT Engineering.</p> <ul style="list-style-type: none"> – high-performance fieldbus-independent cam controller with many functions – up to 320 outputs – up to 180 cams per output – path-path cams, path-time cams, brake cams – dynamic speed correction – measurement and monitoring of rotary speed 	<p>The TwinCAT Valve Diagram Editor allows the linearisation of non-linear curves of hydraulic valves with the aid of a graphical editor. On the basis of a few base points, straight lines or 5th degree polynomials can be determined that connect the points. The characteristic linearisation curve thus determined can be loaded into the TwinCAT NC real-time and taken into account when the voltages are output in the drive.</p>	<p>Various robot types kinematics can be realised using TwinCAT Kinematic Transformation. The programming of the robot movements takes place in Cartesian coordinates using either DIN 66025 instructions or the PLCopen-compliant blocks from the PLC. An integrated dynamic pre-control ensures high precision of the movement even at high accelerations and speeds. Configuration takes place in the TwinCAT Engineering Interface Server.</p> <ul style="list-style-type: none"> – supports various parallel and also serial kinematics, e.g. for pick-and-place tasks – supports the programming of interpolating movements in G-code (DIN 66025) – alternatively, standard PTP and cam plate applications can be realised – simple programming in the Cartesian coordinate system – automatic calculation of the inverse kinematic for the relevant motor positions – kinematics configured in the TwinCAT Engineering Interface Server; in addition to the type (e.g. delta), the bar lengths and offsets must also be parameterised – mass and mass inertia values can be specified for dynamic pre-control – tracking with the aid of flying saw and cam plates for synchronisation (e.g. to conveyor belts) – optimised for the Beckhoff Servo Drives from the AX5000 series – The following kinematics are integrated: <ul style="list-style-type: none"> – cartesian portals – 2D parallel kinematics – shear kinematics – crane and roll kinematics – 3D Delta – SCARA – separated in different product levels, depending on the complexity of the kinematics
	Windows 7, Windows 10	Windows 7, Windows 10	Windows 7, Windows 10	Windows 7, Windows 10
	TwinCAT NC PTP	TwinCAT NC PTP	TwinCAT NC PTP	TwinCAT NC I
	www.beckhoff.com/TS1510	www.beckhoff.com/TS5800	www.beckhoff.com/TS1500	www.beckhoff.com/TS511x

TS6xxx | TwinCAT 2 Supplements, Communication



	TwinCAT PLC Serial Communication	TwinCAT PLC Serial Communication 3964R/RK512	TwinCAT PLC Modbus RTU	TwinCAT Modbus TCP Server
Technical data	TS6340	TS6341	TS6255	TS6250
	<p>TwinCAT Serial Communication implements communication with serial devices such as printers, bar code scanners, etc. The serial interface of the PC and the serial Beckhoff EL6xxx EtherCAT Terminals and KL6xxx Bus Terminals are supported.</p> <p>Via the network-based fieldbus system from Beckhoff the serial terminals can be accessed over a distance of up to 100 m. In addition, it is possible to address virtual COM interfaces of the operating system from the PLC.</p>	<p>Serial communication via the 3964R or the RK512 protocols is implemented via the TwinCAT PLC Serial Communication 3964R/RK512 software library. The PCs serial interface and the Beckhoff KL6xxx serial Bus Terminals are supported. The library also contains the TwinCAT PLC Serial Communication library.</p> <p>The TwinCAT Serial Communication RK512 PLC library supports transmission and reception of PLC variables of any type. Data up to 128 bytes long is transferred transparently in the form of data blocks. To ensure secure data transmission, the 3964R protocol is used underneath the RK512 protocol.</p>	<p>TwinCAT Modbus RTU implements Modbus RTU communication via a serial RS232, RS422 or RS485 interface and is thus suitable both for the PC/CX interfaces and for operation with the KL6xxx serial Bus Terminals. It contains function blocks for master and slave operating mode with simple configuration.</p>	<p>TwinCAT Modbus TCP Server acts as gateway between Modbus TCP devices and TwinCAT runtime systems. It provides both server and client functionalities. In server mode the memory areas of several TwinCAT runtime systems can be mapped directly to the Modbus memory areas. A PLC library is provided for implementing a Modbus TCP client, so that the memory areas of a Modbus TCP device can be accessed.</p>
Operating system	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
Min. TwinCAT level	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
Further information	www.beckhoff.com/TS6340	www.beckhoff.com/TS6341	www.beckhoff.com/TS6255	www.beckhoff.com/TS6250

	TwinCAT PLC IEC 60870-5-10x	TwinCAT PLC IEC 61850 Server	TwinCAT PLC IEC 61400-25 Server	TwinCAT DriveTop Server	TwinCAT DriveCOM OPC Server
	TS650x	TS6511	TS6509	TS6371	TS6370
	<p>The TS650x enable IEC 60870-5-10x-compliant communication from the TwinCAT PLC. Both master and slave libraries are available.</p> <p>PLC library for the realisation of masters for</p> <ul style="list-style-type: none"> – IEC 60870-5-101 – IEC 60870-5-102 – IEC 60870-5-103 – IEC 60870-5-104 <p>PLC library for the realisation of slaves for</p> <ul style="list-style-type: none"> – IEC 60870-5-101 – IEC 60870-5-104 	<p>IEC 61850 defines a communication protocol which is used particularly in electrical switchgears. Such standardised communication can be implemented using the PLC library TwinCAT IEC 61850 Server. The communication stack developed by Beckhoff is based on the MMS protocol and as well as the basic IEC 61850 standard also supports the related specialisations. For easy configuration the TwinCAT Telecontrol Configurator can be used, which is delivered with the PLC library. Thanks to the created configuration a PLC code export can be carried out, which can be integrated into existing PLC projects.</p>	<p>IEC 61400-25 is a specialisation of IEC 61850 for wind turbines. The data model is especially extended for objects, such as, for example wind turbine generators. The TwinCAT Telecontrol Configurator can also be used here. Beside PLC codes it can also generate TwinCAT Scope 2 configurations.</p>	<p>The TwinCAT DriveTop Server is a communication server for linking the Indramat DriveTop Tools to TwinCAT. This means that the DriveTop tool can be used for configuration and commissioning of Indramat drives. Configuration with a number of SERCOS rings is also supported.</p>	<p>The DriveCOM user organisation has set itself the aim of facilitating uniform, standardised communication between configuration, commissioning and diagnostic tools from different drive manufacturers, independent of the fieldbus. The TwinCAT DriveCOM OPC Server offers precisely this type of communication connection. It enables data flow from the engineering tool to the drive, independent of the fieldbus. Based on the network-capable ADS TwinCAT communication system, distributed drives can be configured and diagnosed from a central point.</p> <p>The TwinCAT DriveCOM OPC Server requires a subordinate TwinCAT system with an FCxxx-type Beckhoff fieldbus card. The TwinCAT DriveCOM configurator finds supported drives in the TwinCAT configuration and makes this information available for the engineering tool. The configurator features an automation interface and can therefore be operated remotely by other tools.</p>
	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10	Windows 7, Windows 10
	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC	TwinCAT NC PTP	TwinCAT NC PTP
	www.beckhoff.com/TS650x	www.beckhoff.com/TS6511	www.beckhoff.com/TS6509	www.beckhoff.com/TS6371	www.beckhoff.com/TS6370

TS6xxx | TwinCAT 2 Supplements, Communication



	TwinCAT OPC UA Server	TwinCAT SMS/SMTP Server	TwinCAT TCP/IP Server	TwinCAT PROFINET RT Controller
Technical data	TS6100	TS6350	TS6310	TS6271
	<p>OPC Unified Architecture (IEC 62541) is the newest technology generation of the OPC Foundation for the secure, reliable and manufacturer-neutral transport of raw data and pre-processed information from the manufacturing level into the production planning or ERP system. With OPC UA, all desired information is available to every authorised application and every authorised person at any time and in any place.</p> <p>TwinCAT OPC UA Server</p> <ul style="list-style-type: none"> – certified in the OPC Laboratory, Europe – functions: Data Access/ Historical Data Access/ Alarms & Conditions – PLC blocks for diagnosis and restart – intermediate storage of data on the server: interruption of the communication connection does not lead to loss of data <p>TwinCAT OPC UA Client</p> <ul style="list-style-type: none"> – PLC function blocks for UA Data Access – Demo UA client for diagnostic purposes 	<p>TwinCAT SMS/SMTP Server enables the transmission of SMS messages or e-mails using PLC function blocks. The latter also allows the transmission of file attachments, HTML texts and the setting of message priorities. Support for STARTTLS/SSL enables encrypted e-mail communication to be configured.</p>	<p>TwinCAT TCP/IP Server enables the implementation and realisation of one or several TCP/IP servers and/or clients within the TwinCAT PLC. Corresponding blocks exist for the establishment/ disconnection of communication as well as for the pure exchange of data (send and receive). The SNMP library provided enables messages to be sent (traps) and queries to be answered (get) for monitoring TwinCAT run-times.</p>	<p>The TwinCAT PROFINET RT Controller (master) is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into a PROFINET RT controller. An Ethernet interface becomes a PROFINET controller by enabling a key. The PROFINET supplement is part of the TwinCAT installation and can be operated without key in Config mode. It runs on PCs and Embedded PCs and can be used from TwinCAT 2.11 R3. In conjunction with the EL6631 PROFINET terminal for the EtherCAT I/O system, PROFINET can also be tunnelled via EtherCAT. In this case the supplement is not required. In this way, any EtherCAT network can exchange data with PROFINET RT devices.</p>
Operating system	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
Min. TwinCAT level	TwinCAT I/O	TwinCAT PLC	TwinCAT PLC	TwinCAT I/O
Further information	www.beckhoff.com/TS6100	www.beckhoff.com/TS6350	www.beckhoff.com/TS6310	www.beckhoff.com/TS6271

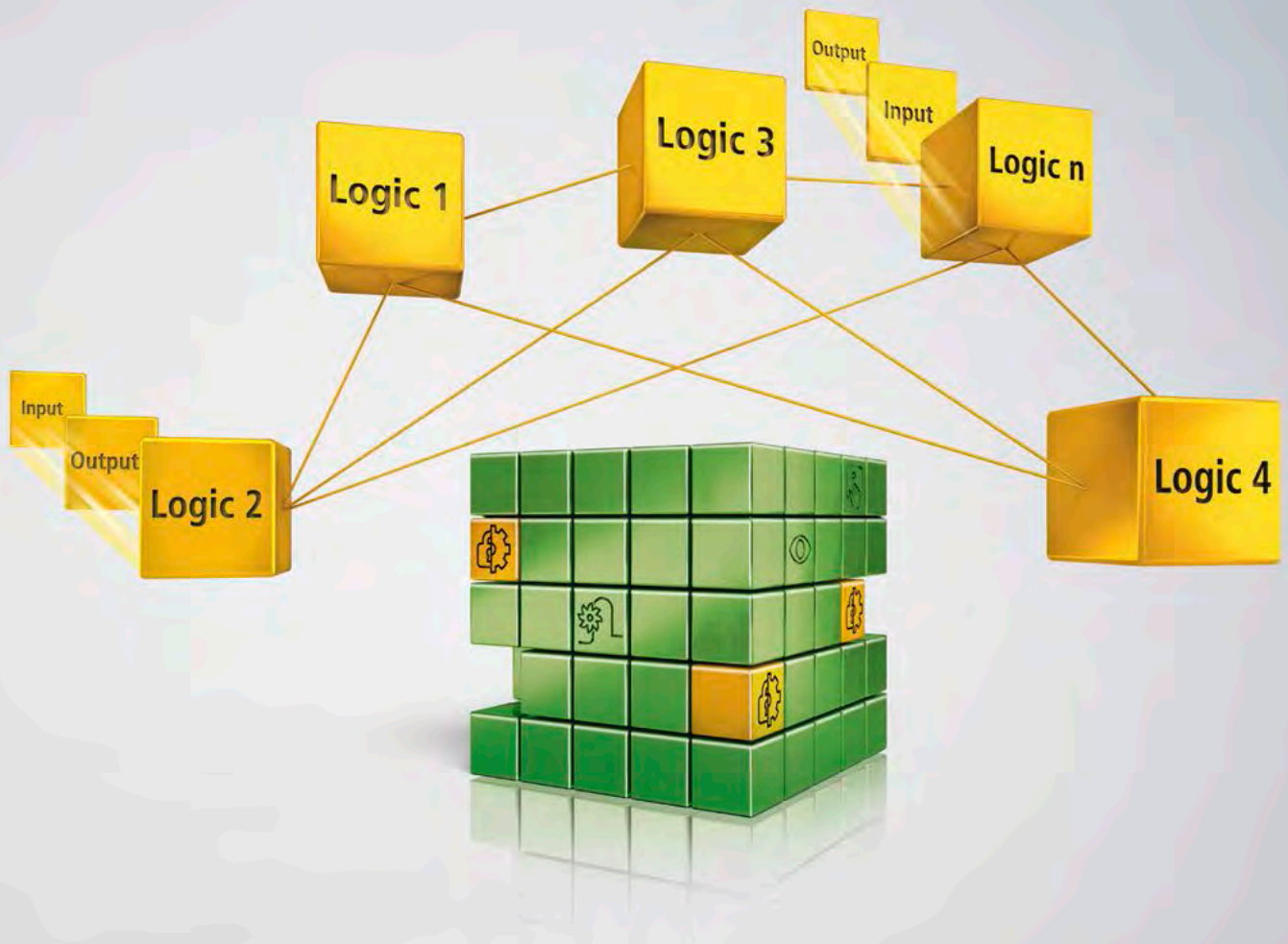
TwinCAT PROFINET RT Device	TwinCAT EtherNet/IP Adapter	TwinCAT Virtual Serial COM Driver	TwinCAT FTP Client	TwinCAT PLC RFID Reader Communication
TS6270	TS6280	TS6360	TS6300	TS6600
<p>The TwinCAT PROFINET RT Device (slave) is a supplement that turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into a PROFINET RT device. By installing the supplement, an Ethernet interface becomes a PROFINET slave. The supplement can be used on PCs and Embedded PCs. PROFINET can also be tunnelled via EtherCAT in conjunction with the EL6631-0010 PROFINET terminal for the EtherCAT I/O system. In this way, any EtherCAT network can exchange data with PROFINET IO controllers. If the EL6631-0010 is used, the TwinCAT PROFINET RT controller supplement is not required.</p>	<p>The TwinCAT EtherNet/IP Adapter is a supplement turns any PC-based controller with an Intel® chipset and the real-time Ethernet driver developed by Beckhoff into an EtherNet/IP adapter. By installing the supplement, the Ethernet interface becomes an EtherNet/IP adapter.</p>	<p>TwinCAT Virtual Serial COM Driver allows the EL60xx EtherCAT Terminals or EP6002 EtherCAT Box modules to be integrated into Windows CE or Windows as normal serial interfaces. The computer on which a serial interface is to be generated for it is defined individually for each EL60xx/EP6002. Access to the device connected to the terminal takes place via Windows API for serial interfaces.</p>	<p>TwinCAT FTP Client enables simple access from the PLC to several FTP servers with the aid of various function blocks. This way, files can be loaded to or from a server after the establishment of a connection (optional with authentication). Additional function blocks allow files or directories to be searched for, created, deleted and renamed.</p>	<p>TwinCAT PLC RFID Reader Communication allows various RFID readers to be addressed via a serial interface. The new TwinCAT RFID reader library offers a general abstract interface that can be used for all readers. The configuration can easily be adapted to a specific reader.</p>
Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
TwinCAT I/O	TwinCAT I/O	TwinCAT I/O	TwinCAT PLC	TwinCAT PLC
www.beckhoff.com/TS6270	www.beckhoff.com/TS6280	www.beckhoff.com/TS6360	www.beckhoff.com/TS6300	www.beckhoff.com/TS6600

TS8xxx | TwinCAT 2 Supplements, Building Automation



	TwinCAT PLC HVAC	TwinCAT PLC Building Automation Basic	TwinCAT BACnet/IP
Technical data	TS8000	TS8010	TS8020
	<p>TwinCAT PLC HVAC is an extensive TwinCAT PLC library with function blocks for automating all building services. In addition to conventional HVAC functions relating to energy generation and distribution, it also includes room automation functions for lighting, shading and air-conditioning.</p>	<p>The TwinCAT PLC Building Automation Basic software library allows the implementation of all functions which are important for room automation. Among these are lighting (constant light control, light dimmer...), facade control, scaling functions, filter blocks, timer functions and peak load limiter for energy optimisation.</p>	<p>BACnet (Building Automation Control Network) is a standardised, manufacturer-independent communication protocol for building automation. Areas of application include HVAC, lighting control, safety and fire alarm technology. Implementation of this protocol is carried out as server as well as client and can be run on all Beckhoff Industrial PCs and Embedded PCs. All services of a B-BC (BACnet Building Controller) are supported such as for example, common data use (DS), alarm and event processing (AE), time-tabling (SCHED), trend recording (T) as well as device and network management (DM). BACnet revisions 6 and 12 are supported for TwinCAT 2. Therefore the use for new projects is not recommended.</p> <p>BACnet revision 12</p> <p>Ordering information CX8091 and CX9020 with BACnet/IP image (license key included)</p> <ul style="list-style-type: none"> – ordering number of the CX8091 (no further ordering option necessary) (see page 217) – ordering number of the CX9020-xxxx (see page 224) + CX1800-1052 <p>Ordering information CX5010/CX5020 (see page 248)</p> <ul style="list-style-type: none"> – CX50x0 with Windows CE Ordering number of the CX + CX1800-1052 (BACnet/IP image, license key included) – CX50x0 with Windows XPe Ordering number of the CX + supplement TwinCAT BACnet/IP (TS8020, license key necessary), TwinCAT 2.11 R3 <p>BACnet revision 6</p> <p>Ordering information CX5010/CX5020 (see page 248)</p> <ul style="list-style-type: none"> – CX50x0 with Windows CE Ordering number of the CX + CX1800-1044 (BACnet/IP image, license key included) – CX50x0 with Windows XPe Ordering number of the CX + Supplement TwinCAT BACnet/IP (TS8020, license key necessary), TwinCAT 2.11 R3
Operating system	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
Min. TwinCAT level	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
Further information	www.beckhoff.com/TS8000	www.beckhoff.com/TS8010	www.beckhoff.com/TS8020

TwinCAT FIAS Server	TwinCAT Crestron Server	TwinCAT Building Automation	TwinCAT Building Automation Framework
TS8035	TS8036	TS8040	TS8100
<p>The FIAS (Fidelio Interface and Application Specification) interface is a world-leader in hotel management software. The TwinCAT FIAS Server is a software package for communication between TwinCAT PLC and a system with a FIAS standard interface. The communication takes place using TCP/IP. The connection of hotel management software and automation system helps to optimise the energy consumption: e.g. the climate control is automatically adjusted for an unoccupied room; if there is strong sunlight the shading is automatically activated.</p>	<p>Crestron is one of the leading manufacturers of AV control systems. The TwinCAT Crestron Server enables communication between a TwinCAT PLC and a Crestron control. Both systems are connected by Ethernet. SIMPL user macros are available for programming the Crestron controller. The required function blocks are included in the TwinCAT PLC library. Read and write access to the other device is available from the Crestron controller and the TwinCAT PLC.</p>	<p>TwinCAT Building Automation is a software package that covers all technical building automation services. In addition to modules for conventional HVAC applications it also covers room automation including lighting, air-conditioning and shading. Essentially, the software package consists of three components:</p> <p>TwinCAT BA PLC Libraries The TwinCAT BA PLC libraries contain basic functions for control, signal processing, special mathematical functions, alarm processing and general system functions.</p> <p>TwinCAT BA PLC Templates TwinCAT BA PLC templates consist of ready-made TwinCAT program blocks for sensors, actuators, complete modules for system components and for entire heating, ventilation and air-conditioning system installations/plants.</p> <p>TwinCAT BA Project Builder The TwinCAT BA Project Builder is a configuration program for defining system components and assigning them to individual templates. Based on this information, the project files for TwinCAT PLC Control functions and the TwinCAT System Manager can be generated for each controller.</p>	<p>The TwinCAT Building Automation Framework includes a configuration program (TwinCAT Building Automation Manager) and a PLC library. The PLC library is configured such that a complete application program with the main room automation functions is available, including lighting, shading, climate control, time switching functions, scene management, weather stations and energy consumption monitoring. All actuators and sensors are registered in the TwinCAT Building Automation Manager, grouped together and linked with the Bus Terminals. The logical ordering of sensors to actuators is also done in the TwinCAT Building Automation Manager. From this information the configuration program generates and activates the I/O links for all devices entered in the system and writes all necessary parameters in the controller.</p>
Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE	Windows 7, Windows 10, Windows CE
TwinCAT PLC	TwinCAT PLC	TwinCAT PLC	TwinCAT PLC
www.beckhoff.com/TS8035	www.beckhoff.com/TS8036	www.beckhoff.com/TS8040	www.beckhoff.com/TS8100



Highlights

- integrated safety system from I/Os to drives
- compact safety PLC
- safety engineering integrated into TwinCAT 3

TwinSAFE

Open and scalable safety technology

► www.beckhoff.com/TwinSAFE

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608	EtherCAT Terminals EL19xx
608	EtherCAT Box EP19xx
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609	Bus Terminal KL1904

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610	EtherCAT Box EP2918
611	EtherCAT Plug-in Modules EJ291x
611	Bus Terminal KL2904

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Product overview TwinSAFE

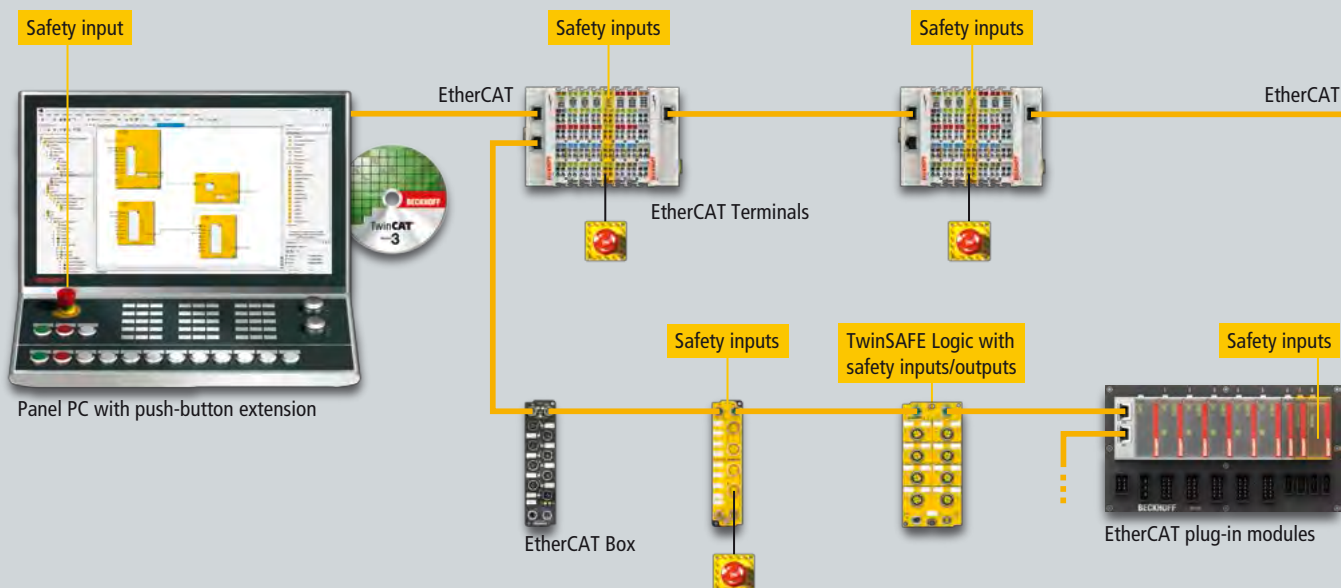
TwinSAFE		
Dedicated controller		Integrated controller
EtherCAT Terminals	EL6900 606 TwinSAFE Logic	EtherCAT Terminals EK1960 605 TwinSAFE Logic, 20 safe inputs, 24 safe outputs
	EL6910 606 TwinSAFE Logic, PROFIsafe master and slave support	EL1918 608 TwinSAFE Logic, 8 safe inputs
	EL6930 607 TwinSAFE Logic, PROFIsafe slave support	EL2911 612 TwinSAFE Logic, 4 safe inputs, 1 safe output
EtherCAT Plug-in Modules	EJ6910 607 TwinSAFE Logic	EL2912 610 TwinSAFE Logic, 2 safe outputs
Bus Terminals	KL6904 607 TwinSAFE Logic, 4 safe outputs	EtherCAT Box EP1918-0002 609 TwinSAFE Logic, 8 safe inputs
		EP1957-0022 604 TwinSAFE Logic, 8 safe inputs, 4 safe outputs
		EP2918-0032 610 TwinSAFE Logic, 8 safe outputs
		EtherCAT Plug-in Modules EJ1914 609 TwinSAFE Logic, 4 safe inputs
		EJ1918 609 TwinSAFE Logic, 8 safe inputs
		EJ1957 612 TwinSAFE Logic, 8 safe inputs, 4 safe outputs
		EJ2914 611 TwinSAFE Logic, 4 safe outputs
		EJ2918 611 TwinSAFE Logic, 8 safe outputs
		Drive Technology AX81xx-0100, AX82xx-0100 618 TwinSAFE Logic, feedback: OCT, TwinSAFE: STO/SS1
		AX81xx-0200, AX82xx-0200 616 TwinSAFE Logic, feedback: OCT, TwinSAFE: Safe Motion

I/O

EtherCAT Terminals	EK1914	613	4 standard inputs, 4 standard outputs, 2 safe inputs, 2 safe outputs
	EK1960	605	TwinSAFE Logic, 20 safe inputs, 24 safe outputs
	EL1904	608	TwinSAFE, 4 safe inputs
	EL1918	608	TwinSAFE Logic, 8 safe inputs
	EL2904	610	TwinSAFE, 4 safe outputs
	EL2911	612	TwinSAFE Logic, 4 safe inputs, 1 safe output
	EL2912	610	TwinSAFE Logic, 2 safe outputs
	EtherCAT Box	EP1908-0002	608
EP1918-0002		609	TwinSAFE Logic, 8 safe inputs
EP1957-0022		604	TwinSAFE Logic, 8 safe inputs, 4 safe outputs
EP2918-0032		610	TwinSAFE Logic, 8 safe outputs
EtherCAT Plug-in Modules		EJ1914	609
	EJ1918	609	TwinSAFE Logic, 8 safe inputs
	EJ1957	612	TwinSAFE Logic, 8 safe inputs, 4 safe outputs
	EJ2914	611	TwinSAFE Logic, 4 safe outputs
	EJ2918	611	TwinSAFE Logic, 8 safe outputs
	Bus Terminals	KL1904	609
KL2904		611	TwinSAFE, 4 safe outputs
KL6904		607	TwinSAFE Logic, 4 safe outputs

Drive Technology

Option cards	AX5801-0200	618	drive-integrated safety functions: STO, SS1
	AX5805, AX5806	616	drive-integrated safety functions: STO, SOS, SS1, SS2, SLS, SSM, SSR, SMS, SLP, SCA, SLI, SAR, SMA, SDIp and SDIn
	AX81xx-0100, AX82xx-0100	618	TwinSAFE Logic, feedback: OCT, TwinSAFE: STO/SS1
Axis modules	AX81xx-0110, AX82xx-0110	618	TwinSAFE Logic, feedback: OCT, TwinSAFE: STO/SS1 + multi-feedback
	AX81xx-0200, AX82xx-0200	616	TwinSAFE Logic, feedback: OCT, TwinSAFE: Safe Motion
	AX81xx-0210, AX82xx-0210	365	TwinSAFE Logic, feedback: OCT, TwinSAFE: Safe Motion + multi-feedback
	Combined power supply and axis modules	AX85xx-0100	619
AX85xx-0110		619	TwinSAFE Logic, feedback: OCT, TwinSAFE: STO/SS1 + multi-feedback
AX85xx-0200		617	TwinSAFE Logic, feedback: OCT, TwinSAFE: Safe Motion
AX85xx-0210		617	TwinSAFE Logic, feedback: OCT, TwinSAFE: Safe Motion + multi-feedback
Distributed servo drives	AMP804x, AMP805x	620	TwinSAFE Logic, TwinSAFE: STO/SS1, standstill torque 2.25...10.75 Nm
Servomotor terminals	EL7201-9014	614	$I_{ms} = 2.8 \text{ A}$, 48 V DC, OCT, STO
	EL7211-9014	614	$I_{ms} = 4.5 \text{ A}$, 48 V DC, OCT, STO
	EL7221-9014	614	$I_{ms} = 7 \dots 8 \text{ A}$ with ZB8610, 48 V DC, OCT, STO
Servomotor module	EP7211-0034	614	$I_{ms} = 4.5 \text{ A}$, 48 V DC, OCT, STO
Servomotor output stage	EJ7211-9414	615	$I_{ms} = 4.5 \text{ A}$, 48 V DC, OCT, STO, TwinSAFE SC
Stepper motor terminal	EL7047-9014	615	$I_{max} = 5.0 \text{ A}$, 48 V DC, incremental encoder, vector control, STO
Stepper motor module	EP7047-0032	615	$I_{max} = 5.0 \text{ A}$, 48 V DC, STO
DC motor output stage	EL7411-9014	615	$I_{ms} = 4.5 \text{ A}$, 48 V DC, STO



TwinSAFE | Open and scalable safety solution

The TwinSAFE integrated safety solution represents the consistent continuation of the open and PC-based control philosophy from Beckhoff. Due to their modularity and versatility, the TwinSAFE terminals fit seamlessly into the Beckhoff control system. The I/O components are available as Bus Terminals, EtherCAT Terminals, EtherCAT plug-in modules and EtherCAT Box modules.

With the fieldbus-neutral safety protocol (TwinSAFE/Safety over EtherCAT), TwinSAFE devices can be integrated into any desired fieldbus system. To this end, the IP 20 TwinSAFE Bus Terminals are integrated into existing stations with K-bus or EtherCAT or used directly in the machine as IP 67 modules. These safety I/Os provide the interfaces to safety-relevant sensors and actuators.

The possibility to transmit safety-relevant signals over a standard bus system creates significant advantages in terms of planning, installation, operation, maintenance, diagnostics and costs.

The safety-relevant application is configured or programmed in TwinCAT software. This application is then transmitted over the bus system to a TwinSAFE Logic terminal. These logic terminals are at the heart of the TwinSAFE system. Due to the enormous flexibility of the system, however, several TwinSAFE Logic terminals can be operated simultaneously in one network. All safety devices in an installation communicate with these logic terminals.

Communication via independent safety circuits

Communication between distributed TwinSAFE Logic terminals is very simple to implement with TwinCAT software. This applies not only to terminals in a network, but also to devices connected to different controllers. Safety-relevant data and signals can also be exchanged as soon as the controllers have established a communication connection via a fieldbus or via network variables. Of course, the response times and capabilities of the systems employed need to be considered.

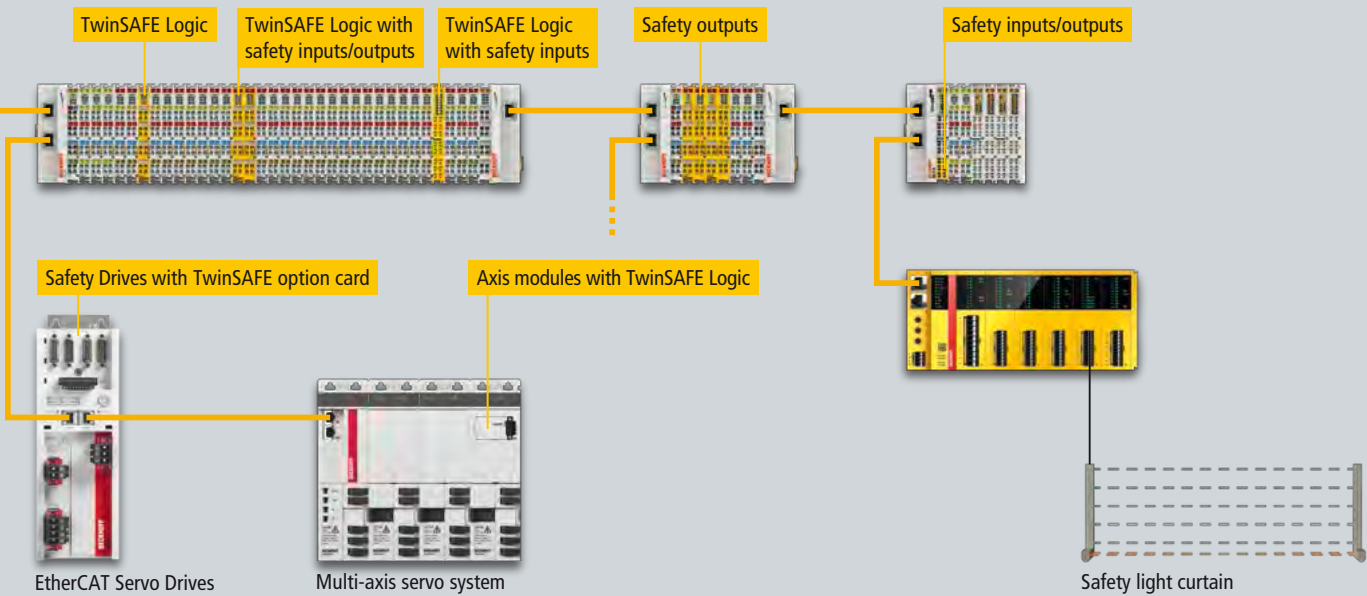
For this purpose, TwinCAT software assumes the task of distributing the data. This central distribution of the data has two significant advantages:

- Since all safety-relevant data are fed via the functional controller, it can be used by the controller for diagnostic purposes. The generation of diagnostic data on the safety controller is not necessary. That saves programming effort as well as computing performance and thus costs.
- All fieldbus systems that are interoperable with TwinCAT software are also accessible to the safety equipment. The TwinSAFE/Safety over EtherCAT protocol is so safe that even heterogeneous fieldbus environments as well as the safety-relevant exchange of data between modules on different fieldbus systems are not a problem.

Certified safety function blocks and customising options facilitate configuration

The certified safety function blocks of the TwinSAFE Logic terminals allow the simple, error-free and inexpensive implementation of all safety tasks: from the simple monitoring of a safety door to complex muting functions based on digital signals and the safe control of highly complex process based on analog signals. It's also possible to implement connected and daisy-chained systems in compliance with safety requirements. For this purpose, the so-called customising capability is especially useful: Within a safety application, safety-relevant subgroups can be formed. Subsequently they can be deactivated or passivated permanently or temporarily during ongoing operation. These are essential functions that are required to reliably operate networked safety systems. Without these functions, commissioning, maintenance and partial operation of linked machines is not possible or a highly complex task.

With the TwinSAFE Logic terminals, all diagnostic and status data of the function blocks can be merged into the cyclic EtherCAT telegram. In addition, diagnostic data are stored directly in the logic component to enable asynchronous access. Extensive diagnostics is thus easy to implement without additional application requirements.



A backup and restore mechanism facilitates exchange in the event of a fault

Since all parameters and settings as well as the application software are stored on TwinSAFE Logic components, the safety controller can be programmed either in the plant over the bus system or at the workstation and then simply plugged into the system.

The logic components provide a special backup and restore mechanism. Therefore, no additional exchangeable storage medium is required as in other systems. The user can activate this function in TwinCAT software or by the application.

If the original terminal has been exchanged, e.g. due to a defect, the system automatically recognises a new TwinSAFE

Logic component and the valid TwinSAFE application is loaded automatically into the new terminal. The safety-related check takes place fully automatically and requires no intervention by the user.

The maintenance staff only needs to exchange the Bus Terminal, everything else is accomplished reliably and securely by the TwinSAFE system.

Safety over EtherCAT – Open safety protocol according to IEC 61784-3

The open Safety over EtherCAT protocol (FSoE for short: "Failsafe over EtherCAT") defines a safety-related communication layer for EtherCAT. It meets the requirements of IEC 61508 SIL 3 and enables the transmission of secure and standard information on the same communication system without restrictions regarding transmission rates and cycle time.

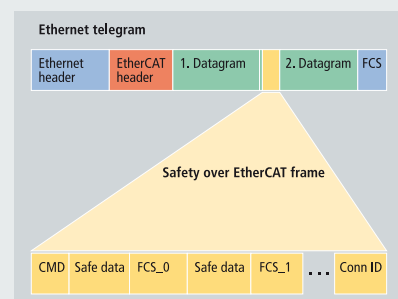
Thanks to this openness any transmission media and transmission path can be used with Safety over EtherCAT. FSoE is focused on EtherCAT, the high-performance Ethernet fieldbus, and the transmission of safety-related process data is based on the Black Channel principle.

Thus, Safety over EtherCAT is also supported by other fieldbus systems and protocols such as PROFIBUS, CANopen or Ethernet. Copper or optical fibre cables, radio links or transmission technologies such as data light barriers can be used as transmission path. The telegram is arranged in such a way that a minimal container length of 6 bytes is sufficient for the transmission of all safety information including one byte of safe process data.

Safe data are cyclically exchanged between a Safety over EtherCAT master and a Safety over EtherCAT slave. This mechanism is called a connection (TwinSAFE connection). A master can

establish and monitor several connections to different slaves.

Further information see page **2 75**





Stand-alone controller, small controller and classic architecture (from left to right)

TwinSAFE | Free choice of architecture

With the introduction of the new Logic generation in the I/O level (from EL6910), Beckhoff has triggered a revolution in safety technology. The functionality of the TwinSAFE Logic is integrated in all new TwinSAFE components, which results in a great variety of possible architectures of TwinSAFE applications.

Stand-alone

As the first step after introducing the new Logic generation, the functionality of the EL6910 TwinSAFE Logic was transferred to the EK1960 Compact Controller. This is a TwinSAFE Logic component with safe local inputs and outputs. Unlike previous TwinSAFE components, the EK1960 can also be operated without EtherCAT connection.

The same applies to the EP1957 EtherCAT Box. In addition to the availability of safe outputs in an IP 67 environment, Beckhoff provides the possibility of implementing a complete safety loop in an IP 67 environment through integration of the TwinSAFE Logic in this component. Like the EK1960, the EP1957 can also be operated in stand-alone mode.

Possible components for stand-alone architectures:

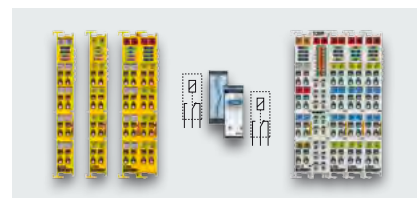
- EK1960 Compact Controller
- EP1957 digital combi module

Small controllers

Following the introduction of stand-alone architectures in addition to classic safety architectures, Beckhoff is now also closing the gap between these two solutions. Whereas the stand-alone components can be used integrated in the EtherCAT network as usual, they are often oversized for very small applications. For this reason Beckhoff has introduced further small controllers enabling highly efficient and cost-effective implementation of very small safety applications.

As a small controller, the EL2911 terminal has four safe inputs and one safe output rated at 10 A. It allows very simple implementation of safe potential groups within a terminal segment. Standard terminals can be placed in the safe state with the help of the EL2911. Note, however, that this is only possible for non-reactive components (a corresponding list of possible components can be found on the Beckhoff website). The EL2911 allows the cost-effective substitution of previous solutions for this function. For an existing architecture as shown in the illustration, the following components can be replaced by the simple use of an EL2911:

- 1 x EL69x0
- 1 x EL1904
- 1 x EL2904
- 2 contactors
- 1 potential supply terminal



Before



After

Possible small controllers:

- EK1960 Compact Controller
- EP1957 digital combi module
- EL2911 potential supply terminal
- EJ1957 digital combi plug-in module

Classic architecture

The classic architecture is based on a safety application with a dedicated safety controller, which can exchange data with 1 to n safe communication devices. In this architecture, all safety-relevant data is transmitted to this controller and processed there. As a general rule, all components with logic functionality can be used; however, below please find a list of components that do not have safe inputs as well as safe outputs.



Distributed controllers

Possible components for classic architectures:

- EtherCAT Terminals
 - EL6910 TwinSAFE Logic, PROFI-safe master and slave support
 - EL1918 8-channel digital input terminal
 - EL6900 TwinSAFE Logic
 - EL6930 TwinSAFE Logic, PROFI-safe slave support
- EtherCAT plug-in modules
 - EJ6910 TwinSAFE Logic
 - EJ1914 4-channel digital input
 - EJ1918 8-channel digital input
 - EJ2914 4-channel digital output
 - EJ2918 8-channel digital output
- AX8911 TwinSAFE drive option

Distributed controllers

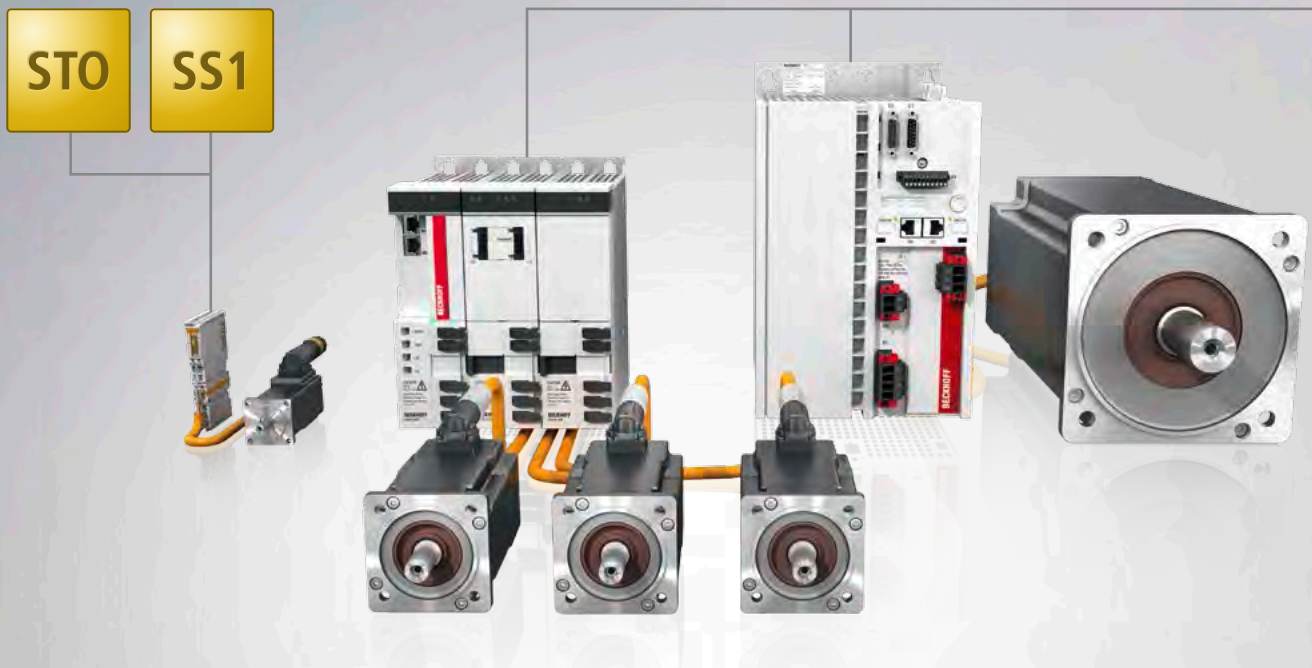
The integration of the TwinSAFE Logic functionality in all new TwinSAFE components also provides an additional option to adopt a further method of modularisation. Based on the customising functionality, fine-granular modularisation is already possible at software level and also flexibly at runtime. This modularity can now also be implemented at the safety project level in TwinCAT 3 and at the hardware level. Whereas in a classic architecture all safety-relevant data is processed in the form of a large, complex safety project by a dedicated safety controller, the introduction of the new possibilities allows

safety applications to be distributed directly to the individual and possibly to a certain degree independent modules. With previous components this is possible only by using additional dedicated safety controllers in these modules, which means an additional cost expense. In future it will be very simple to implement this by providing individual components in these modules with a safety project. For example, a classic architecture can be used inside the modules. A module can thus be individually developed, validated and verified, whereas any from a safety aspect central safety controller that exists only has to process aggregated data from a defined interface to the modules. Through customisation, modules can be individually developed very efficiently and the commissioning of the partial or complete system is very easy to accomplish.

The distribution of the safety controller is not only very useful for the modularisation of the complete system. It may also be used, for example, for a simplified pre-processing of sensor data. Whereas previously the specific processing of input data was only possible in the dedicated safety controller, if an input component was not able to provide adequate functions, this can now be implemented very simply directly inside the input component. In this way, the actual safety project becomes less complex and is easier to manage, because any special treatment is no longer necessary.

Possible components for distributed controllers:

- EtherCAT Terminals
 - EK1960 Compact Controller
 - EL6910 TwinSAFE Logic
 - EL1918 digital input terminal
 - EL2911 potential supply terminal
 - EL2912 digital output terminal
- EtherCAT Box
 - EP1957 digital combi module
 - EP1918-0002 digital input module
- EtherCAT plug-in modules
 - EJ6910 TwinSAFE Logic
 - EJ1914 4-channel digital input
 - EJ1918 8-channel digital input
 - EJ2914 4-channel digital output
 - EJ2918 8-channel digital output
 - EJ1957 8-channel digital input, 4-channel digital output
- AX8911 TwinSAFE drive option



TwinSAFE | Safe drive technology

Dynamic movements of the electrical drive technology used in a machine can create considerable hazards to people and the environment. From a normative point of view, drive technology components must be considered in a safety-oriented manner by co-ordinating and monitoring certain movements and motion sequences. The integrated safety solution TwinSAFE enables the implementation of safe drive technology in three levels corresponding to the complexity of the machine.

The safe drive components are able to switch the motor torque-free or to monitor speed, position and direction of rotation. No further devices such as contactors or circuit breakers are necessary in the supply lines for this. This enables a very lean installation and helps to lower costs and control cabinet space requirements.

Even safe position monitoring or position range monitoring is simple to implement with the aid of the safe drive technology. This does not require any additional wiring, because the EtherCAT communication is used in the servo drives, enabling seamless communication between TwinSAFE Logic components and the safe drive technology.

Like the programming or configuration of a safety application, the entire parameterisation of the safe drive technology is performed from the TwinCAT software. All system-specific settings are stored together with the application

in the TwinSAFE Logic components. For that reason, the safe drive components can be exchanged at any time without software modification. The respective component receives all the parameters necessary for operation at the next power-on or boot-up.

STO/SS1 according to IEC 61800-5-2

The safety functions Safe Torque Off (STO) and Safe Stop 1 (SS1 | Monitored braking, STO after time or standstill) in accordance with IEC 61800-5-2 can be implemented with the following TwinSAFE components:

- stand-alone AX5000 Servo Drive with AX5801-0200 option card
- AX8000 multi-axis servo system with TwinSAFE AX81xx-x1xx, AX82xx-x1xx axis modules and with AX85xx-x1xx combined power supply and axis modules
- EL72xx-9014 servo terminal variant
- EP7211-0034 servomotor box variant
- EP7047-0032 stepper motor box variant
- AMP8000 distributed Servo Drives

Safe Motion according to IEC 61800-5-2

More complex safety functions can be implemented with the aid of the Safe Motion function package:

- Stop functions (STO, SOS, SS1, SS2)
- Speed functions (SLS, SSM, SSR, SMS) with up to 8 speeds

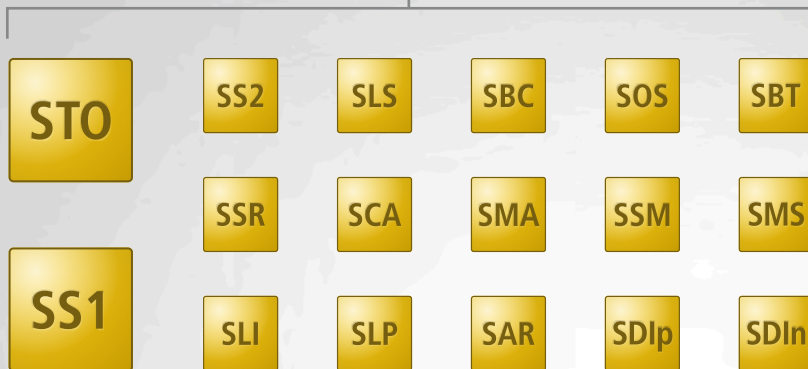
- Position functions (SLP, SCA, SLI) with reference cams
- Acceleration functions (SAR, SMA)
- Direction of rotation functions (SDIp, SDIn)
- Brake functions (SBC, SBT)

The following TwinSAFE components support the Safe Motion function package:

- stand-alone AX5000 Servo Drive with AX5805-0200 and AX5806-0020 option cards
- AX8000 multi-axis servo system with TwinSAFE AX81xx-x2xx, AX82xx-x2xx axis modules and with AX85xx-x2xx combined power supply and axis modules

The above-mentioned safety functions can be implemented with AX58xx option cards for the AX5000. No special encoder system is necessary in order to implement the safety functions SDI (Safe Direction) or SLS (Safely Limited Speed); many standard motors from Beckhoff support these functions without further expense and without additional encoder system when the AX5000 is used. A detailed list of permissible motors can be found under ► www.beckhoff.com/Documentation

The SBC function (Safe Brake Control) can additionally be implemented with the AX8000 and the ordering option AX8xxx-x2xx.



Programmable, safe drive technology through integrated logic

The AX8000 multi-axis servo drive encompasses new functions of safe drive technology with TwinSAFE: With the ordering options -0100 and -0200, the AX8108, AX8118 and AX8206 axis modules feature a programmable TwinSAFE Logic corresponding to an EL6910 and enable the direct implementation of safety applications in the servo drives. The number of TwinSAFE connections is limited to eight. The user achieves greater degrees of freedom in the implementation of a drive technology safety application and the flexibility of programming allows the design of safe drive technology to suit the specific system requirements.

The STO and SS1 safety functions can be implemented with TwinSAFE axis modules selecting the ordering option -0100 (STO/SS1). These functions can be initiated both via hard wiring and via FSoE. For TwinSAFE axis modules with the ordering option -0200 (Safe Motion), various drive-integrated signals are available for the implementation of an application-specific safety function. As is familiar from the EL6910, internal and external signals can be used inside the TwinSAFE axis modules -0100 and -0200 in conjunction with the well-known pre-certified function blocks in order to implement complex drive functions. Depending on the application, the safety-oriented information can be pre-processed directly in the drive so that the central TwinSAFE

Logic needs only process the aggregated information.

For AX8000 multi-axis Servo Drive system see page [360](#)

For AX5000 Digital Compact Servo Drives see page [372](#)

For compact Drive Technology see page [454](#)

For distributed Servo Drive system see page [384](#)



Safety Engineering

- FBD
- Safety C

TwinCAT Safety PLC



With a safety development environment and a safety runtime, the next step in the field of safety solutions is completed with TwinCAT 3.

TwinCAT 3 and Safety | Simplified engineering

TwinCAT 3 as a universal development tool creates further possibilities for safety-relevant fields of application. First, TwinCAT 3 offers additional functionality for creating and managing safety-relevant applications with the safety editor. Second, a standard Industrial PC can be used as a safety controller for the first time. This is possible due to the new safety runtime.

Safety editor

The safety editor integrated in TwinCAT 3 allows the implementation of a safety application in a graphical environment. The desired logic is programmed according to a function block diagram (FBD). The application can be represented in the network infrastructures for increased clarity. The functions blocks known from the logic components can be used as logic elements (digital function blocks for KL6904 and EL69xx; additional analog function blocks for EL6910, EJ6910, EK1960, AX8xxx-x1xx, AX8xxx-x2xx etc.).

The safety editor offers increased flexibility and portability. This is achieved by initially programming independently of the actual hardware used. To this end, both the target system and all input and output devices are made available as so-called alias devices. At this level, all safety-relevant settings can be selected in advance. Before the project is finally transferred to the executing hardware, these alias devices must be assigned to the actually installed physical devices.

In addition to using pre-specified function blocks, there is also the possibility to create custom function blocks. These can be created by combining existing – pre-certified – function blocks or by using Safety C (this can only be done for the safety runtime). Safety C is an almost unrestricted derivative of standard C. This allows well-known control structures such as IF-THEN-ELSE, SWITCH CASE and the data types usual in C to be used for safety applications.

An important novelty in the programming of safety-relevant applications in TwinCAT 3 is the extended user management. In the so-called basic mode, the user can create an application exclusively from pre-specified – and thus certified – function blocks. These also include function blocks that the user has created on the basis of pre-certified function blocks. In the expert mode on the other hand, it is possible to create function blocks in Safety C and thus to create custom libraries. Before loading it into the safety controller, a check is made as to whether the programmed logic consists of already certified function blocks or whether the created application requires renewed examination.

In addition to programming, improved tools optimally support the debugging and test phase. Programs can be debugged as usual in the Visual Studio® environment: the online values of variables and states of the function blocks are displayed directly in the graphical environment, enabling fast and

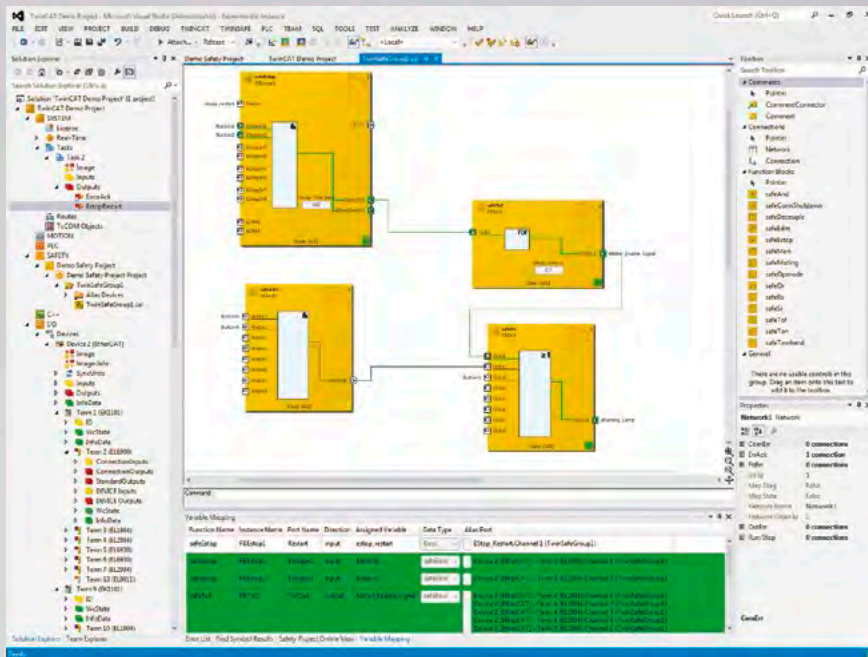
simple debugging of the application. Furthermore, the project can be simulated offline in order to considerably speed up and simplify commissioning.

The editor is equipped with an automatic verification mechanism which automatically checks whether the saved project corresponds to the one created in the editor. The previously required manual comparison by uploading the project back to the safety controller is no longer necessary.

In addition, the safety editor automatically generates documentation containing a detailed view of all relevant project data. From the representation of the hardware terminals with their safety-relevant settings through to an exact listing of the function blocks used and their interconnections, this documentation contains all important data required to facilitate the wiring of the plant, debugging and maintenance.

TwinCAT Safety PLC

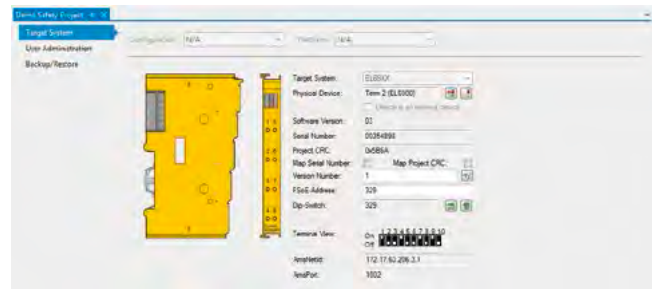
The enormous advances in the field of Industrial PCs and the associated increase in reliability and quality allow a standard IPC to be used as a safety controller. This is enabled on a strictly mathematical basis, so that the proof of safety does not only hold for a specific processor and its environment. The independence from the hardware component used that this creates, enables the use of standard components up to a SIL 3 safety level according to IEC 61508.



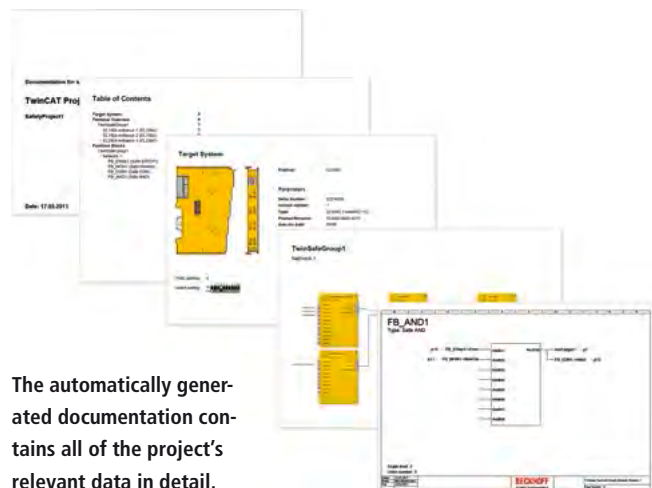
View of the fully graphical safety editors in TwinCAT 3

For this purpose, mathematical coding is used that creates diverse data redundancy, which ensures that the correct execution of operations within the safety application can be verified and a safe reaction initiated in the case of an error. In addition to pre-specified function blocks, the use of Safety C allows custom function blocks to be created and saved in a library for later use.

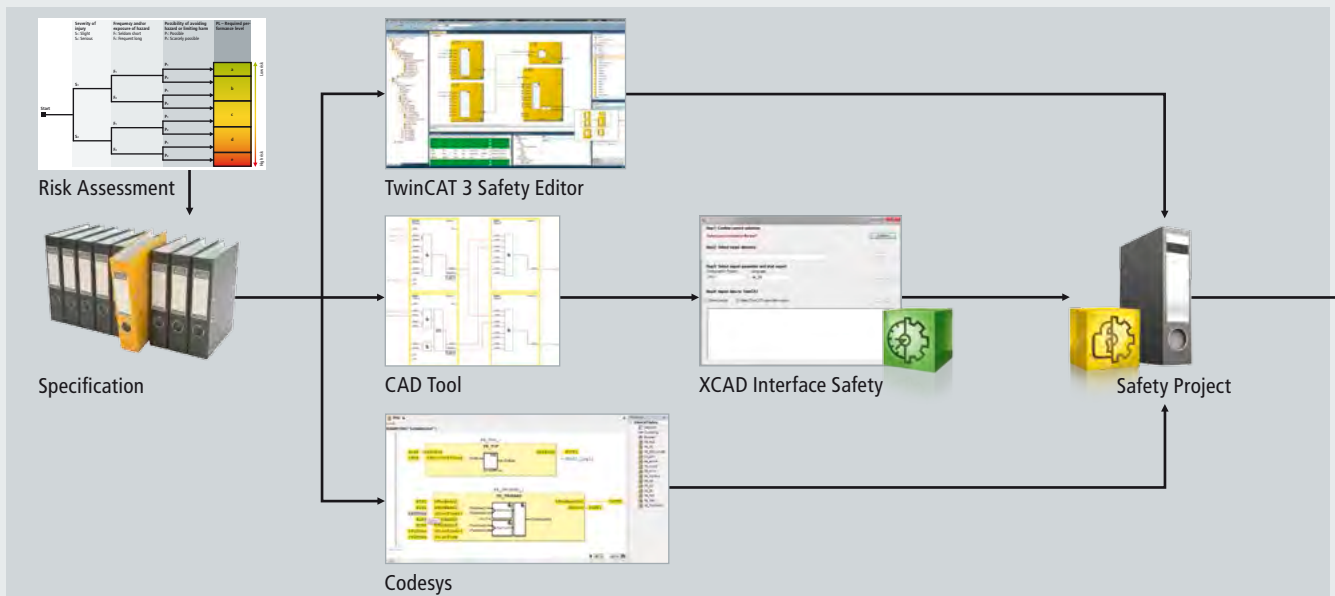
Further information on TwinCAT 3 see page 524 or www.beckhoff.com/TwinCAT3



Configuring the target system



The automatically generated documentation contains all of the project's relevant data in detail.



Development

TwinSAFE | Workflow support

Application manual

To simplify the design of safety functions, Beckhoff has made the TwinSAFE application manual available for download via the website. The user-friendly manual contains a compilation of application samples for TwinSAFE with a collection of widely used safety functions. Each sample shows the interconnection of the hardware components and the corresponding mapping inside the safety application itself, i.e. the implementation with the help of pre-certified function blocks and the parameterisation of the input and output components. For further support the verification of the respective safety level as confirmed by the TÜV SÜD authority is executed for each sample, so that the samples can either be adopted 1:1 or adapted very simply to specific application requirements.

TwinCAT 3 and TwinCAT 2

In the Beckhoff world the safety application is implemented either with TwinCAT 2 or 3. Whereas TwinCAT 2 can be used exclusively for the TwinSAFE Logic components EL6900, EL6930 and KL6904, all Logic components with the exception of the KL6904 can be configured with TwinCAT 3.

XCAD Interface Safety

Beckhoff provides the possibility to create a safety application directly in a CAD tool. With the help of XCAD Interface Safety the application can subsequently be converted into a functional safety project in TwinCAT 3.

Codesys

The Beckhoff TwinSAFE Logic components can also be configured with Codesys Safety.

TwinSAFE Loader

The TwinSAFE Loader tool represents a possibility to download the safety project entirely without the TwinCAT development environment. It is a command line tool that can be integrated into customer-specific processes. It enables, for example, the loading of TwinSAFE Logic components during series production without the use of a development environment. Furthermore, an existing system can be customised at runtime with the help of the TwinSAFE Loader.

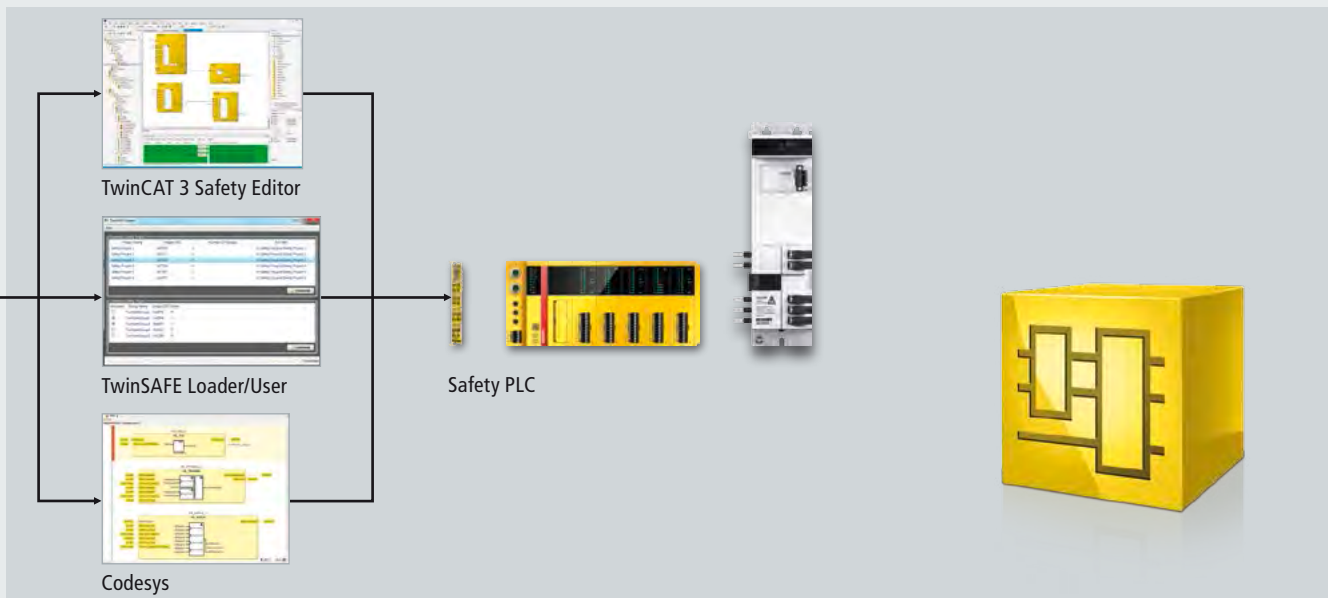
When using the TwinSAFE Loader in the context of a customer-specific process, the FMEDA given in the user manual must always be observed.

TwinSAFE User

The TwinSAFE User tool is used to handle the user administration of a TwinSAFE Logic component. For example, the user administration on a TwinSAFE Logic component can be configured during series production without the use of a development environment.

Deployment on TwinSAFE Logic components

The safety project generated with the help of the TwinSAFE workflow can be transferred to the TwinSAFE Logic components using the tools described above. The TwinSAFE components listed in the table are available as target systems.



Deployment

Ordering information	Integrated TwinSAFE Logic: modularity and scalability on all levels	
I/O Components		
EK1960	TwinSAFE Compact Controller, 20 safe inputs, 24 safe outputs (2 A), TwinSAFE Logic	605
EL1918	8-channel digital input terminal, TwinSAFE Logic, 24 V DC	608
EL2911	potential supply terminal, TwinSAFE Logic, 24 V DC, 10 A, 4 safe inputs, 1 safe output	612
EL2912	2-channel digital output terminal, TwinSAFE Logic, 24 V DC, 2 A	610
EL6900	TwinSAFE Logic	606
EL6910	TwinSAFE Logic, PROFIsafe master and slave support	606
EL6930	TwinSAFE Logic, PROFIsafe slave support	607
EP1918-0002	digital input module, TwinSAFE Logic, 24 V DC, 8 safe inputs	609
EP1957-0022	digital combi module, TwinSAFE Logic, 24 V DC, 0.5 A, 8 safe inputs, 4 safe outputs	604
EP2918-0032	digital output module, TwinSAFE Logic, 24 V DC, 8 safe outputs, 2 A	610
EJ1914	4-channel digital input, TwinSAFE Logic, 24 V DC	609
EJ1918	8-channel digital input, TwinSAFE Logic, 24 V DC	609
EJ1957	8 fail-safe inputs, 4 fail-safe outputs, TwinSAFE Logic, 24 V DC	612
EJ2914	4-channel digital output, TwinSAFE Logic, 24 V DC, 0.5 A	611
EJ2918	8-channel digital output, TwinSAFE Logic, 24 V DC, 0.5 A	611
EJ6910	TwinSAFE Logic	607
Drive Technology		
AX81xx-0100	single-axis module, 8 A/18 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic	618
AX81xx-0110	single-axis module, 8 A/18 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic, multi-feedback interface	618
AX81xx-0200	single-axis module, 8 A/18 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic	616
AX81xx-0210	single-axis module, 8 A/18 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic, multi-feedback interface	365
AX82xx-0100	dual-axis module 2 x 6 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic	619
AX82xx-0110	dual-axis module 2 x 6 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic, multi-feedback interface	619
AX82xx-0200	dual-axis module 2 x 6 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic	617
AX82xx-0210	dual-axis module 2 x 6 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic, multi-feedback interface	365
AX85xx-0100	combined power supply and axis module, 80 A DC, for supply voltage 200...480 V AC and axis module 25 A/40 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic	619
AX85xx-0110	combined power supply and axis module, 80 A DC, for supply voltage 200...480 V AC and axis module 25 A/40 A, feedback: OCT, TwinSAFE: STO/SS1, integrated TwinSAFE Logic, multi-feedback interface	619
AX85xx-0200	combined power supply and axis module, 80 A DC, for supply voltage 200...480 V AC and axis module 25 A/40 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic	617
AX85xx-0210	combined power supply and axis module, 80 A DC, for supply voltage 200...480 V AC and axis module 25 A/40 A, feedback: OCT, TwinSAFE: Safe Motion, integrated TwinSAFE Logic, multi-feedback interface	617
AMP804x	distributed servo drive 2.25...5.35 Nm (standstill torque), integrated TwinSAFE Logic	620
AMP805x	distributed servo drive 4.55...10.75 Nm (standstill torque), integrated TwinSAFE Logic	620

Stand-alone | TwinSAFE Logic without EtherCAT network

The EK1960 TwinSAFE Compact Controller extends the application range of the integrated TwinSAFE safety solution. Based on its compact design with 20 safe digital inputs and 24 safe digital outputs, it is ideal to cover the safety requirements of compact machines in particular. The EK1960 can be operated in stand-alone mode or it can be networked with other controllers via the EtherCAT connections. Like every EtherCAT Coupler, the EK1960 can be extended by all EL/ES terminals if operated in an EtherCAT network. It can, however, not be extended by terminals when operated as a stand-alone device.

The TwinSAFE Compact Controller is programmed via the TwinCAT Safety Editor in the same way as other TwinSAFE components. A TwinSAFE project is created and loaded over EtherCAT into the EK1960. The EK1960 supports the establishment of 128 TwinSAFE connections. For flexible adaptation to different safety tasks, the TwinSAFE Compact Controller can be combined with the TwinSAFE I/O components with IP 20 and IP 67 protection and the TwinSAFE drive option cards.

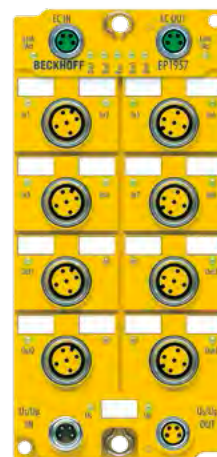
The EP1957-0022 TwinSAFE box is a safe small controller for the IP 67 environment with eight safe digital inputs, four safe digital outputs and integrated TwinSAFE Logic for pre-processing of safety-related information directly in the field. Apart from use within an EtherCAT network, it can also be used in stand-alone mode outside the control cabinet without a connection to an EtherCAT master.



EK1960 with M8 bus interface

TwinSAFE Logic,
EtherCAT Box,
8 safe inputs,
4 safe outputs

Technical data	EP1957-0022
Connection technology	M12, screw type
Specification	link unit between safe input and output signals
Number of inputs	8
Number of outputs	4
Max. output current	0.5 A



Protocol	TwinSAFE/Safety over EtherCAT
Cycle time	approx. 1 ms/according to project size
Fault response time	≤ watchdog time (parameterizable)
Current consumption from U_S/U_P	max. 120 mA/max. 60 mA
Installation position	variable
Protection class	IP 67 (according to EN 60529)
Further information	www.beckhoff.com/EP1957-0022
Variants	
Distinguishing features	

TwinSAFE Compact Controller,
 EtherCAT Coupler,
 20 safe inputs,
 24 safe outputs (4 optional relay outputs)

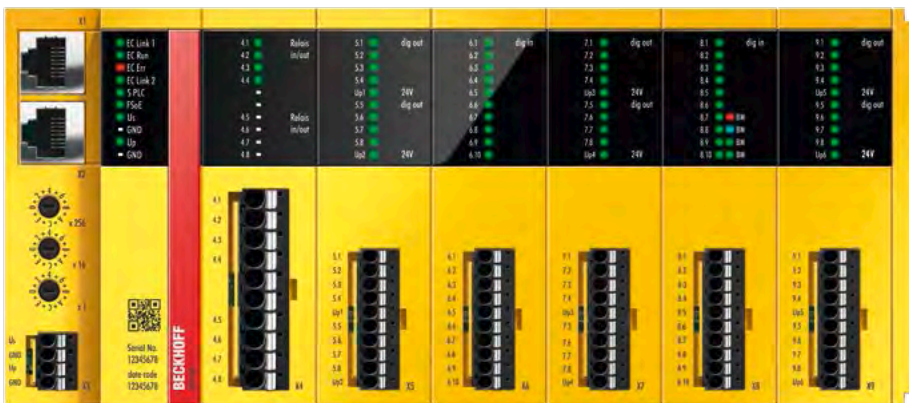
EK1960-0000

1-wire

20

24 (4 optional relay outputs)

2 A (simultaneity factor 50 % at 2 A)



TwinSAFE/Safety over EtherCAT
 approx. 1 ms/according to project size
 ≤ watchdog time (parameterizable)
 typ. 80 mA/typ. 2 mA

horizontal

IP 20

www.beckhoff.com/EK1960

EK1960-0008

without relay outputs, M8 bus interface

EK1960-2600

with relay outputs, RJ45 bus interface

EK1960-2608

with relay outputs, M8 bus interface



TwinSAFE | TwinSAFE Logic in the EtherCAT network




With the new generation of safety controllers based on the EL6910, Beckhoff ushers in a new era in safety technology by further expanding the concept of modularity within the TwinSAFE system. Apart from adding functionalities for the highly granular and flexible modularisation of each safety project in order to optimally meet the respective safety requirements, Beckhoff enables all new safe I/O modules to directly execute customer-specific safety projects, including communication with multiple devices. Since the intelligence of the entire safety application can be distributed over the involved safety-relevant devices, the user can adapt the TwinSAFE system even more specifically to the needs of each machine concept.

For an overview of all products with integrated TwinSAFE Logic see page **603**




TwinSAFE Logic,
PROFIsafe master
and slave support,
EtherCAT Terminal

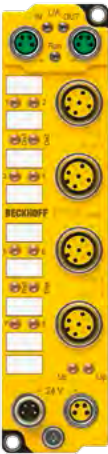



TwinSAFE Logic,
EtherCAT Terminal

Technical data	EL6910	EL6900
Connection technology	–	
Specification	link unit between safe input and output signals	
Number of outputs	–	–
Max. output current	–	–
	 <p>The TwinSAFE Logic can establish 212 connections to other TwinSAFE devices.</p>	 <p>The TwinSAFE Logic can establish 128 connections to other TwinSAFE devices.</p>
Protocol	TwinSAFE/ Safety over EtherCAT	TwinSAFE/ Safety over EtherCAT
Cycle time	approx. 1 ms/according to project size	approx. 500 µs/according to project size
Fault response time	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)
Current consumption power contacts	–	–
Current consumption E-bus	typ. 160 mA	typ. 188 mA
Current consumption K-bus	–	–
Installation position	horizontal	horizontal
Protection class	IP 20	IP 20
Further information	www.beckhoff.com/EL6910	www.beckhoff.com/EL6900
Special terminals		
Distinguishing features		



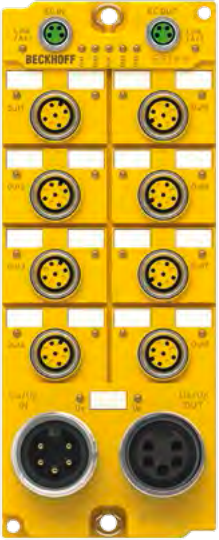
	TwinSAFE Logic, PROFIsafe slave support, EtherCAT Terminal	TwinSAFE Logic, EtherCAT plug-in module	TwinSAFE Logic, Bus Terminal, 4 safe outputs
	EL6930	EJ6910	KL6904
		distribution board	2-wire
	–	–	4
	–	–	0.5 A/20 mA min. (per channel)
			
	The EL6930 logic terminal can establish 127 connections to other TwinSAFE/Safety over EtherCAT devices and one PROFIsafe slave connection to a PROFIsafe master.	The TwinSAFE Logic can establish 212 connections to other TwinSAFE devices.	The KL6904 can establish up to 15 connections (TwinSAFE connections).
	TwinSAFE/Safety over EtherCAT, PROFIsafe	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT
	approx. 500 µs/according to project size	approx. 1 ms/according to project size	4...100 ms
	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)
	–	–	load-dependent
	typ. 188 mA	typ. 222 mA	–
	–	–	max. 250 mA
	horizontal	horizontal	horizontal
	IP 20	IP 20	IP 20
	www.beckhoff.com/EL6930	www.beckhoff.com/EJ6910	www.beckhoff.com/KL6904
			KL6904-0001
			pre-configured ex factory to 15 TwinSAFE connections




TwinSAFE | Digital inputs

	TwinSAFE, EtherCAT Terminal, 4 safe inputs	TwinSAFE Logic, EtherCAT Terminal, 8 safe inputs	TwinSAFE, EtherCAT Box, 8 safe inputs
Technical data	EL1904	EL1918	EP1908-0002
Connection technology	1-/2-wire		M12, screw type
Specification	recording of input signals	link unit between safe input and output signals	recording of input signals
Number of inputs	4	8	8
			
Protocol	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT
Response time	typ. 4 ms (read input/write to E-bus)	typ. 4 ms (read input/write to E-bus)	typ. 5.5 ms (read input/write to bus)
Fault response time	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)
Current consumption power contacts	see documentation	see documentation	–
Current consumption E-bus	typ. 200 mA	typ. 165 mA	–
Current consumption from U_s/U_p	–	–	max. 87 mA/max. 27 mA
Current consumption K-bus	–	–	–
Installation position	horizontal	horizontal	variable
Protection class	IP 20	IP 20	IP 65/66/67 (according to EN 60529)
Further information	www.beckhoff.com/EL1904	www.beckhoff.com/EL1918	www.beckhoff.com/EP1908



	TwinSAFE Logic, EtherCAT Box, 8 safe inputs	TwinSAFE Logic, EtherCAT plug-in module, 4 safe inputs	TwinSAFE Logic, EtherCAT plug-in module, 8 safe inputs	TwinSAFE, Bus Terminal, 4 safe inputs
	EP1918-0002	EJ1914	EJ1918	KL1904
		distribution board		2-wire
	link unit between safe input and output signals			recording of input signals
	8	4	8	4
				
	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT
	–	typ. 4 ms (read input/write to E-bus)	typ. 4 ms (read input/write to E-bus)	typ. 4 ms (read input/write to K-bus)
	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)
	–	–	–	–
	–	typ. 260 mA	typ. 290 mA	–
	–	–	–	–
	–	–	–	48 mA
	variable	horizontal	horizontal	horizontal
	IP 67 (according to EN 60529)	IP 20	IP 20	IP 20
	www.beckhoff.com/EP1918-0002	www.beckhoff.com/EJ1914	www.beckhoff.com/EJ1918	www.beckhoff.com/KL1904

TwinSAFE | Digital outputs

	TwinSAFE, EtherCAT Terminal, 4 safe outputs	TwinSAFE Logic, EtherCAT Terminal, 2 safe outputs	TwinSAFE Logic, EtherCAT Box, 8 safe outputs
Technical data	EL2904	EL2912	EP2918-0032
Connection technology	1-/2-wire		M12, screw type
Specification	output of output signals		link unit between safe input and output signals
Number of outputs	4	2	8
Max. output current	0.5 A (per channel), min. 20 mA (with active current measurement)	2 A	2 A
			
Protocol	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT
Fault response time	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)
Current consumption power contacts	load-dependent	load-dependent	–
Current consumption E-bus	typ. 221 mA	typ. 200 mA	–
Current consumption K-bus	–	–	–
Installation position	horizontal	horizontal	variable
Protection class	IP 20	IP 20	IP 67 (according to EN 60529)
Further information	www.beckhoff.com/EL2904	www.beckhoff.com/EL2912	www.beckhoff.com/EP2918-0032

	TwinSAFE Logic, EtherCAT plug-in module, 4 safe outputs	TwinSAFE Logic, EtherCAT plug-in module, 8 safe outputs	TwinSAFE, Bus Terminal, 4 safe outputs
	EJ2914	EJ2918	KL2904
	distribution board		2-wire
			output of output signals
	4	8	4
	0.5 A	0.5 A	0.5 A/20 mA min. (per channel)
			
	TwinSAFE/Safety over EtherCAT ≤ watchdog time (parameterizable)	TwinSAFE/Safety over EtherCAT ≤ watchdog time (parameterizable)	TwinSAFE/Safety over EtherCAT ≤ watchdog time (parameterizable)
	–	–	load-dependent
	typ. 260 mA	typ. 310 mA	–
	–	–	250 mA
	horizontal	horizontal	horizontal
	IP 20	IP 20	IP 20
	www.beckhoff.com/EJ2914	www.beckhoff.com/EJ2918	www.beckhoff.com/KL2904

TwinSAFE | Digital combi

	TwinSAFE Logic, EtherCAT Terminal, 4 safe inputs, 1 safe output, potential power supply terminal	TwinSAFE Logic, EtherCAT plug-in module, 8 safe inputs, 4 safe outputs
Technical data	EL2911	EJ1957
Connection technology	1-/2-wire and/or via power contacts	distribution board
Specification	link unit between safe input and output signals	
Number of inputs	4	8
Number of outputs	1	4
Max. output current	10 A	0.5 A
		
Protocol	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT
Fault response time	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)
Current consumption power contacts	load-dependent	–
Current consumption E-bus	typ. 180 mA	typ. 330 mA
Installation position	horizontal	horizontal
Protection class	IP 20	IP 20
Further information	www.beckhoff.com/EL2911	www.beckhoff.com/EJ1957

TwinSAFE | E-bus coupler





The EK1914 EtherCAT Coupler combines the functionalities of the EK1100 EtherCAT Coupler with standard and safe digital I/Os. This results in a compact design that is especially suitable for applications with a low number of I/Os.





Like the EK1100, the EK1914 can be extended by all EL/ES terminals. The EK1914 has four digital inputs and four digital outputs as well as two fail-safe inputs and two fail-safe outputs.

TwinSAFE,
EtherCAT Coupler,
4 standard inputs, 4 standard outputs,
2 safe inputs, 2 safe outputs




Technical data	EK1914
Connection technology	1-/2-wire
Specification	EtherCAT Coupler with standard and safety I/Os
Number of inputs	6 digital inputs, 2 of which are fail-safe inputs
Number of outputs	6 digital outputs, 2 of which are fail-safe outputs
Max. output current	per standard output: 0.5 A, per safe output: 0.5 A, min. 20 mA
	
Protocol	EtherCAT
Fault response time	≤ watchdog time
Current consumption power contacts	–
Current consumption E-bus	–
Installation position	horizontal
Protection class	IP 20
Further information	www.beckhoff.com/EK1914



STO/SS1 | Compact Drive Technology

	Servomotor terminal with OCT and STO, 48 V DC, 2.8 A (I _{rms})	Servomotor terminal with OCT and STO, 48 V DC, 4.5 A (I _{rms})	Servomotor terminal with OCT and STO, 48 V DC, 7...8 A (I _{rms}), for operation with the ZB8610 fan cartridge	Servomotor module with OCT suitable for STO applications, 48 V DC, 4.5 A (I _{rms})
Technical data	EL7201-9014	EL7211-9014	EL7221-9014	EP7211-0034
Technology	compact drive technology			
Function	servo drive in IP 20 for one drive axis			servo drive in IP 67 for one drive axis
Number of channels	1	1	1	1
Number of inputs	2 x end position, 1 x feedback, 1 x STO	2 x end position, 1 x feedback, 1 x STO	2 x end position, 1 x feedback, 1 x STO	2 x end position, 1 x feedback, 1 x STO
Number of outputs	1 x servomotor, 1 x motor brake	1 x servomotor, 1 x motor brake	1 x servomotor, 1 x motor brake	1 x servomotor, 1 x motor brake
				
Output current (rms)	2.8 A	4.5 A	7...8 A only with ZB8610	4.5 A
Realisation STO	hard-wired via safe output	hard-wired via safe output	hard-wired via safe output	hard-wired via safe output
Safe stop functions	Safe Torque Off (STO), Safe Stop 1 (SS1)	Safe Torque Off (STO), Safe Stop 1 (SS1)	Safe Torque Off (STO), Safe Stop 1 (SS1)	Safe Torque Off (STO), Safe Stop 1 (SS1)
Protocol	EtherCAT	EtherCAT	EtherCAT	EtherCAT
Fault response time	see documentation	see documentation	see documentation	see documentation
Approvals/markings	CE, UL, TÜV SÜD	CE, UL, TÜV SÜD	CE, UL, TÜV SÜD	CE, UL, TÜV SÜD
Further information	www.beckhoff.com/EL7201-9014	www.beckhoff.com/EL7211-9014	www.beckhoff.com/EL7221-9014	www.beckhoff.com/EP7211-0034




	Servomotor module with OCT, STO and TwinSAFE SC, 48 V DC, 4.5 A (I_{rms})	Stepper motor terminal with STO, 48 V DC, 5 A, with incremental encoder, vector control	Stepper motor module suitable for STO applications, 48 V DC, 5 A	BLDC motor terminal with incremental encoder and STO, 48 V DC, 4.5 A (I_{rms})
	EJ7211-9414	EL7047-9014	EP7047-0032	EL7411-9014
	servo drive in IP 20 for one drive axis	stepper motor output stage in IP 20 for one drive axis	stepper motor output stage in IP 67 for one drive axis	BLDC motor output stage in IP 20 for one drive axis
	1	1	1	1
	2 x end position, 1 x feedback, 1 x STO	2 x end position, 1 x feedback, 1 x STO	2 x end position, 1 x feedback, 1 x STO	2 x end position, 1 x encoder, 1 x STO, 1 x fan diag, 3 x Hall effect sensor
	1 x servomotor, 1 x motor brake	1 x stepper motor, 1 x motor brake	1 x stepper motor, 1 x motor brake	1 x BLDC motor, 1 x motor brake, 1 x fan supply, 1 x fan mode, 1 x sensor supply, 1 x encoder supply
				
	4.5 A	–	–	4.5 A
	hard-wired via safe output	hard-wired via safe output	hard-wired via safe output	hard-wired via safe output
	Safe Torque Off (STO), Safe Stop 1 (SS1)	Safe Torque Off (STO), Safe Stop 1 (SS1)	Safe Torque Off (STO), Safe Stop 1 (SS1)	Safe Torque Off (STO), Safe Stop 1 (SS1)
	EtherCAT	EtherCAT	EtherCAT	EtherCAT
	see documentation	see documentation	see documentation	see documentation
	CE, UL, TÜV SÜD	CE, TÜV SÜD (certification in preparation)	CE, UL in preparation, TÜV SÜD (certification in preparation)	CE, UL in preparation, TÜV SÜD (certification in preparation)
	www.beckhoff.com/EJ7211-9414	www.beckhoff.com/EL7047-9014	www.beckhoff.com/EP7047-0032	www.beckhoff.com/EL7411-9014




Safe Motion | Drive Technology

	TwinSAFE drive option card for AX5000 up to 40 A, TwinSAFE: Safe Motion	TwinSAFE drive option card for AX5000 from 60 A, TwinSAFE: Safe Motion	Single-axis module, 8 A/18 A, feedback: OCT, TwinSAFE: Safe Motion, TwinSAFE Logic
Technical data	AX5805-0000	AX5806-0000	AX81xx-0200
Technology	digital compact servo drives		multi-axis servo system
Function	safety option card		axis module with TwinSAFE Logic
Number of channels	1	1	1
Number of inputs	–	–	2 x digital inputs per channel (X15, X25)
Output current (rms)	servo drives up to 40 A	servo drives from 60 A	AX8108: 8 A, AX8118: 18 A
			
Realisation STO	initiated by TwinSAFE Logic via FSoE	initiated by TwinSAFE Logic via FSoE	by local TwinSAFE Logic, via FSoE or hard-wired via safe inputs
Safe stop functions	Safe Torque Off (STO), Safe Stop 1 (SS1), Safe Stop 2 (SS2), Safe Operating Stop (SOS)	Safe Torque Off (STO), Safe Stop 1 (SS1), Safe Stop 2 (SS2), Safe Operating Stop (SOS)	Safe Torque Off (STO), Safe Stop 1 (SS1), Safe Stop 2 (SS2), Safe Operating Stop (SOS)
Safe position functions	Safely Limited Position (SLP), Safe CAM (SCA), Safely Limited Increment (SLI)	Safely Limited Position (SLP), Safe CAM (SCA), Safely Limited Increment (SLI)	Safely Limited Position (SLP), Safe CAM (SCA), Safely Limited Increment (SLI)
Safe speed functions	Safe Speed Range (SSR), Safely Limited Speed (SLS), Safe Speed Monitor (SSM)	Safe Speed Range (SSR), Safely Limited Speed (SLS), Safe Speed Monitor (SSM)	Safe Speed Range (SSR), Safely Limited Speed (SLS), Safe Speed Monitor (SSM)
Safe direction functions	Safe Direction positive (SDIp), Safe Direction negative (SDIn)	Safe Direction positive (SDIp), Safe Direction negative (SDIn)	Safe Direction positive (SDIp), Safe Direction negative (SDIn)
Safe acceleration functions	Safe Maximum Acceleration (SMA), Safe Acceleration Range (SAR)	Safe Maximum Acceleration (SMA), Safe Acceleration Range (SAR)	Safe Maximum Acceleration (SMA), Safe Acceleration Range (SAR)
Safe braking functions	–	–	Safe Brake Control (SBC), Safe Brake Test (SBT)
Protocol	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT
Fault response time	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)
Further information	www.beckhoff.com/AX5805	www.beckhoff.com/AX5806	www.beckhoff.com/AX8108



	Dual-axis module 2 x 6 A, feedback: OCT, TwinSAFE: Safe Motion, TwinSAFE Logic	Combined power supply (80 A DC) and axis module (25 A/40 A), feedback: OCT, TwinSAFE: Safe Motion, TwinSAFE Logic	Combined power supply (80 A DC) and axis module (25 A/40 A), feedback: OCT, TwinSAFE: Safe Motion, TwinSAFE Logic, multi-feedback interface
	AX82xx-0200	AX85xx-0200	AX85xx-0210
		combined power supply and axis module with TwinSAFE Logic	combined power supply and axis module with TwinSAFE Logic and multi-feedback interface
	2	1	1
	2 x digital inputs per channel (X15, X25)	2 x digital inputs per channel (X15, X25)	2 x digital inputs per channel (X15, X25)
	2 x 6 A	AX8525: 25 A, AX8540: 40 A	AX8525: 25 A, AX8540: 40 A
			
	by local TwinSAFE Logic, via FSoE or hard-wired via safe inputs	by local TwinSAFE Logic, via FSoE or hard-wired via safe inputs	by local TwinSAFE Logic, via FSoE or hard-wired via safe inputs
	Safe Torque Off (STO), Safe Stop 1 (SS1), Safe Stop 2 (SS2), Safe Operating Stop (SOS)	Safe Torque Off (STO), Safe Stop 1 (SS1), Safe Stop 2 (SS2), Safe Operating Stop (SOS)	Safe Torque Off (STO), Safe Stop 1 (SS1), Safe Stop 2 (SS2), Safe Operating Stop (SOS)
	Safely Limited Position (SLP), Safe CAM (SCA), Safely Limited Increment (SLI)	Safely Limited Position (SLP), Safe CAM (SCA), Safely Limited Increment (SLI)	Safely Limited Position (SLP), Safe CAM (SCA), Safely Limited Increment (SLI)
	Safe Speed Range (SSR), Safely Limited Speed (SLS), Safe Speed Monitor (SSM)	Safely Limited Speed (SLS), Safe Speed Range (SSR), Safe Speed Monitor (SSM), Safe Maximum Speed (SMS)	Safely Limited Speed (SLS), Safe Speed Range (SSR), Safe Speed Monitor (SSM), Safe Maximum Speed (SMS)
	Safe Direction positive (SDIp), Safe Direction negative (SDIn)	Safe Direction positive (SDIp), Safe Direction negative (SDIn)	Safe Direction positive (SDIp), Safe Direction negative (SDIn)
	Safe Maximum Acceleration (SMA), Safe Acceleration Range (SAR)	Safe Maximum Acceleration (SMA), Safe Acceleration Range (SAR)	Safe Maximum Acceleration (SMA), Safe Acceleration Range (SAR)
	Safe Brake Control (SBC), Safe Brake Test (SBT)	Safe Brake Control (SBC), Safe Brake Test (SBT)	Safe Brake Control (SBC), Safe Brake Test (SBT)
	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT
	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)
	www.beckhoff.com/AX8206	www.beckhoff.com/AX8525	www.beckhoff.com/AX8525

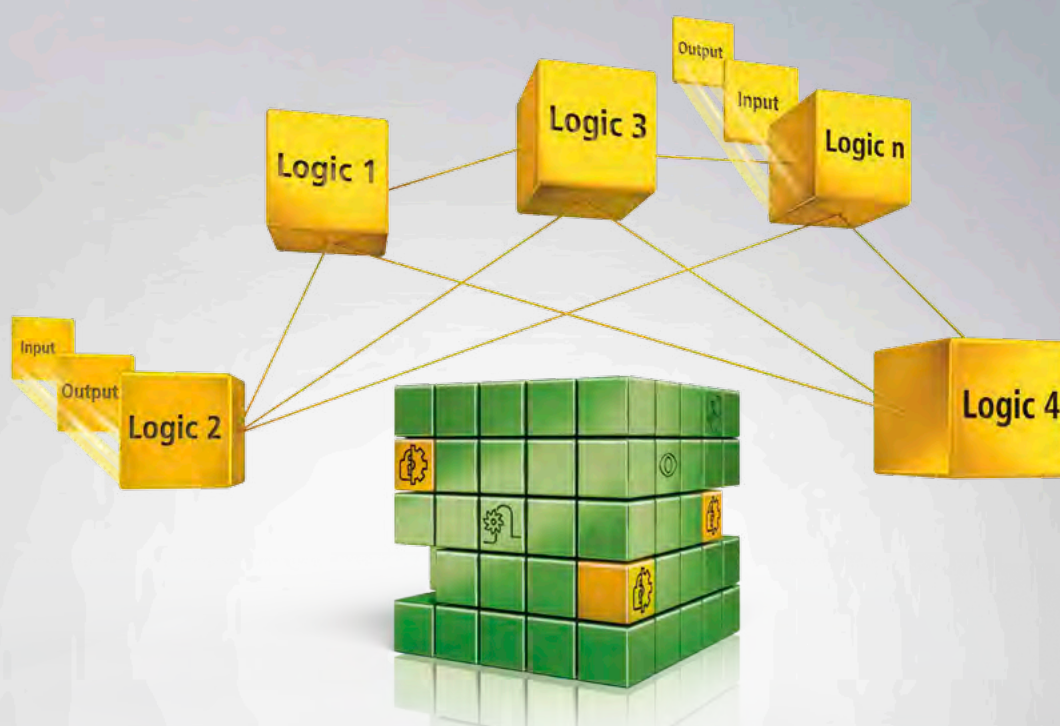
STO/SS1 | Drive Technology

	TwinSAFE drive option card for AX5000 up to 40 A, TwinSAFE: STO/SS1	Single-axis module, 8 A/18 A, feedback: OCT, TwinSAFE: STO/SS1, TwinSAFE Logic	Single-axis module, 8 A/18 A, feedback: OCT, TwinSAFE: STO/SS1, TwinSAFE Logic, multi-feedback interface
Technical data	AX5801-0200	AX81xx-0100	AX81xx-0110
Technology	digital compact servo drives	multi-axis servo system	
Function	safety option card	axis module with TwinSAFE Logic	axis module with TwinSAFE Logic and multi-feedback interface
Number of channels	1	1	1
Number of inputs	1 x STO (2 channel), 1 x feedback loop	2 x digital inputs per channel (X15, X25)	2 x digital inputs per channel (X15, X25)
Output current (rms)	servo drives up to 40 A	AX8108: 8 A, AX8118: 18 A	AX8108: 8 A, AX8118: 18 A
			
Realisation STO	hard-wired via safe inputs	by local TwinSAFE Logic, via FSoE or hard-wired via safe inputs	by local TwinSAFE Logic, via FSoE or hard-wired via safe inputs
Safe stop functions	Safe Torque Off (STO)	Safe Torque Off (STO), Safe Stop 1 (SS1)	Safe Torque Off (STO), Safe Stop 1 (SS1)
Protocol	–	TwinSAFE/ Safety over EtherCAT	TwinSAFE/ Safety over EtherCAT
Fault response time	–	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)
Further information	www.beckhoff.com/AX5801	www.beckhoff.com/AX8108	www.beckhoff.com/AX8108

	Dual-axis module 2 x 6 A, feedback: OCT, TwinSAFE: STO/SS1, TwinSAFE Logic	Dual-axis module 2 x 6 A, feedback: OCT, TwinSAFE: STO/SS1, TwinSAFE Logic, multi-feedback interface	Combined power supply (80 A DC) and axis module (25 A/40 A), feedback: OCT, TwinSAFE: STO/SS1, TwinSAFE Logic	Combined power supply (80 A DC) and axis module (25 A/40 A), feedback: OCT, TwinSAFE: STO/SS1, TwinSAFE Logic, multi-feedback interface
	AX82xx-0100	AX82xx-0110	AX85xx-0100	AX85xx-0110
	axis module with TwinSAFE Logic	axis module with TwinSAFE Logic and multi-feedback interface	combined power supply and axis module with TwinSAFE Logic	combined power supply and axis module with TwinSAFE Logic and multi-feedback interface
	2	2	1	1
	2 x digital inputs per channel (X15, X25) 2 x 6 A	2 x digital inputs per channel (X15, X25) 2 x 6 A	2 x digital inputs per channel (X15, X25) AX8525: 25 A, AX8540: 40 A	2 x digital inputs per channel (X15, X25) AX8525: 25 A, AX8540: 40 A
				
	by local TwinSAFE Logic, via FSoE or hard-wired via safe inputs	by local TwinSAFE Logic, via FSoE or hard-wired via safe inputs	by local TwinSAFE Logic, via FSoE or hard-wired via safe inputs	by local TwinSAFE Logic, via FSoE or hard-wired via safe inputs
	Safe Torque Off (STO), Safe Stop 1 (SS1)	Safe Torque Off (STO), Safe Stop 1 (SS1)	Safe Torque Off (STO), Safe Stop 1 (SS1)	Safe Torque Off (STO), Safe Stop 1 (SS1)
	TwinSAFE/ Safety over EtherCAT	TwinSAFE/ Safety over EtherCAT	TwinSAFE/ Safety over EtherCAT	TwinSAFE/ Safety over EtherCAT
	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)	≤ watchdog time (parameterizable)
	www.beckhoff.com/AX8206	www.beckhoff.com/AX8206	www.beckhoff.com/AX8525	www.beckhoff.com/AX8525

STO/SS1 | Distributed servo drives

	Distributed servo drives 2.25...5.35 Nm (standstill torque), flange code F4, motor length 1-3, TwinSAFE: STO/SS1	Distributed servo drives 4.55...10.75 Nm (standstill torque), flange code F4, motor length 1-3, TwinSAFE: STO/SS1
Technical data	AMP804x	AMP805x
Technology	distributed servo drives	
Function	servomotor	
Standstill torque	2.25...5.35 Nm	4.55...10.75 Nm
Rated speed	2500...6000 min ⁻¹	2000...5000 min ⁻¹
Rated power	0.69...1.44 kW	1.14...2.17 kW
		
Realisation STO	by local TwinSAFE Logic or by FSoE	by local TwinSAFE Logic or by FSoE
Safe stop functions	Safe Torque Off (STO), Safe Stop 1 (SS1)	Safe Torque Off (STO), Safe Stop 1 (SS1)
Protocol	TwinSAFE/Safety over EtherCAT	
Fault response time	≤ watchdog time (parameterizable)	
Further information	www.beckhoff.com/AMP804x	www.beckhoff.com/AMP805x



Overview of TwinSAFE certifications

All certifications and confirmations of the TwinSAFE products are provided in a PDF document available for download at:

► www.beckhoff.com/TwinSAFE-certifications

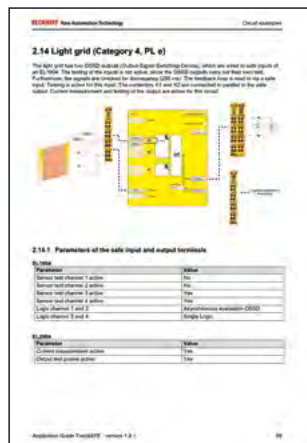
Application manual

Comprehensive support in conceptual design and implementation:

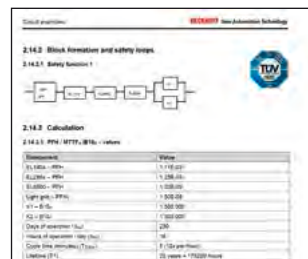
- continuously expanded collection of relevant application examples
- best-possible support to enable correct implementation of safety applications
- simple adaptation to modified applications through detailed documentation of the safety acceptance

The complete application manual as a PDF document is available for download at:

► www.beckhoff.com/applicationmanual



Collection of safety functions



Block formation and output parameters



Calculation of safety parameters



Identification of safety category



- comprehensive technical assistance in the application of individual Beckhoff products or with wide-ranging services
- support in all matters of after-sales service
- worldwide training for Beckhoff system components

Support, Service, Training

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633 Compact programming TR1000
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633 Maintenance, repairs and service TR1010, TR1012

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634 NC Point-to-Point TR2020
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634 BACnet training: Basics of BACnet communication TR5030

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Individual



Support, Service

► www.beckhoff.com/support

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- design, programming and commissioning of complex automation systems
- training program for Beckhoff system components

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- hotline service

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► www.beckhoff.com/training

Beckhoff offers a comprehensive training program worldwide for Beckhoff system components. The training takes place at training centres at the headquarters in Germany or at the Beckhoff subsidiaries. Please contact the appropriate companies in your country with regard to training with the partner firms around the world. For addresses see page **20**



TwinCAT 3 Training

TR3010, TR3012 | Maintenance, repairs and service

Information	TR3010	TR3012
Content	TwinCAT PLC: introduction to TwinCAT eXtended Automation Technology (XAT); TwinCAT system architecture: configuration and diagnostics, basics of IEC 61131-3 programming; TwinCAT NC PTP: basics of axis commissioning and Motion Control blocks	same as TR3010, additionally overview of Structured Text programming
Requirements	sound knowledge of basic Windows functionalities; basics of PLC systems	
Duration	4 days	5 days
Further information	www.beckhoff.com/TR3010	www.beckhoff.com/TR3012

TR3020 | Basic PLC programming

Information	TR3020
Content	basic PLC principles: introduction to TwinCAT eXtended Automation Technology (XAT); eXtended Automation Engineering environment (XAE), Microsoft Visual Studio® integration; hardware configuration; IEC 61131-3 programming; FBD and ST editors; basic principles of ADS communication; TwinCAT NC PTP: basis of axis commissioning, motion control function blocks, TcMC2 library
Requirements	sound knowledge of PLC programming; no prior knowledge of TwinCAT 2 or IEC 61131-3 is necessary
Duration	5 days
Further information	www.beckhoff.com/TR3020

TR3030 | PLC basics, NC PTP, ADS

Information	TR3030
Content	TwinCAT PLC: introduction to TwinCAT eXtended Automation Technology (XAT), eXtended Automation Engineering environment (XAE), Microsoft Visual Studio® integration, hardware configuration, IEC 61131-3 programming, FBD and ST editors, TwinCAT NC PTP: principles of axis commissioning, motion control components: TcMC2 library, basics in ADS communication, ADS: communication interface, high-level language link
Requirements	sound knowledge of PLC or high-level language concepts such as declaration of variables, variable classes and structures; no prior knowledge of TwinCAT 2 is necessary
Duration	5 days
Further information	www.beckhoff.com/TR3030

TR3040 | How to switch from TC2 to TC3

Information	TR3040
Content	TwinCAT PLC: introduction to TwinCAT eXtended Automation Technology (XAT), eXtended Automation Engineering environment (XAE), Microsoft Visual Studio® integration, basic differences between TC2 and TC3, principles of object-oriented programming in the PLC, integration of TcCOM modules, MATLAB®/Simulink®, C/C++
Requirements	sound knowledge of TwinCAT 2 programming; basics of high-level language programming
Duration	2 days
Further information	www.beckhoff.com/TR3040

TR3042 | C++ module creation, wizards, TMC editor

Information	TR3042
Content	TwinCAT PLC: TwinCAT architecture, TwinCAT XAE (Engineering) and XAR (Runtime), opportunities and limitations of C++ programming in the TwinCAT 3 real-time environment, requirements on the development PC; TwinCAT Class Wizard: creating and debugging examples, TwinCAT TMC editor, real-time settings, task configuration multi-core support, consolidation of the above topics using practical examples
Requirements	sound knowledge of the C++ programming language
Duration	2 days
Further information	www.beckhoff.com/TR3042

TR3044 | Object-oriented programming with the PLC

Information	TR3044
Content	introduction to OOP, keywords of IEC 61131-3 3 rd edition, implementation of a PLC example in a FB with OOP elements, inheritance, overwrite, interfaces, abstract classes
Requirements	sound knowledge of PLC programming with TwinCAT 3, training contents of TR3020 or TR3030
Duration	1 day
Further information	www.beckhoff.com/TR3044

TR3050 | NC Point-to-Point

Information	TR3050
Content	operation of TwinCAT NC: functional plan, operating modes; NC control with NC MC2 library, cyclic interface, axis function blocks; TwinCAT Measurement: recording of set value profiles; programming examples; TwinCAT cam plates and MC function blocks for cam plate functionality
Requirements	assured handling of TwinCAT 3 PLC programming; solid knowledge of PLC programming; level of knowledge corresponding to courses TR3020/TR3030, or corresponding experience in IEC 61131-3 programming; programming languages: ST
Duration	2 days
Further information	www.beckhoff.com/TR3050

TR3052 | NC Point-to-Point and NC Interpolation

Information	TR3052
Content	TwinCAT NC PTP: same as TR3050 without cam plates; TwinCAT NC I: creation of interpolation channels for single axes, creating CNC programs in accordance with DIN 66025, sequential control with the System Manager, PLC libraries for creating NC channels and for controlling the interpreter, sequential control from the PLC, communication between NC and PLC program (M functions), exchange of parameters between NC program and PLC (H, S and T), set value path monitoring with TwinCAT Scope
Requirements	assured handling of TwinCAT PLC programming; solid knowledge of PLC programming; level of knowledge corresponding to courses TR3020/TR3030, or corresponding experience in IEC 61131-3 programming; programming languages: ST
Duration	3 days
Further information	www.beckhoff.com/TR3052

TR3054 | CNC

Information	TR3054
Content	introduction to TwinCAT CNC, creating and processing CNC configurations in the System Manager, creating NC programs compliant with DIN 66025 and extensions of the CNC kernel, operating CNC interfaces via structures in the PLC, data and communication exchange between PLC and CNC using M functions and V.E. variables, recording and displaying CNC quantities using ScopeView, system diagnostics facilities, operation and use of the "HLI" (high level interface), kinematic transformations, commissioning of servo drives using the CNC
Requirements	basics of programming and automation technology using TwinCAT; familiarity with TwinCAT 3 system configuration and programming; in-depth knowledge of PLC programming; contents of the courses TR3030/TR3020, or equivalent experience of IEC 61131-3 programming (we recommend advanced TwinCAT 2 users to first take the course "TR3040 How to switch from TC2 to TC3" as a basis); ST programming language
Duration	2 days
Further information	www.beckhoff.com/TR3054

TR3056 | XTS – Basic configuration and programming

Information	TR3056
Content	presentation of the XTS system: mechanical structure, initial commissioning, module diagnostics, integration of the TcIoXts TcCOM module, configuration with the help of the XTS wizard, encoder system teaching procedure, error diagnostics, introduction and tuning of the TcSoftDrive, introduction to the TC3 XTS extension: automatic accumulation, collision avoidance, diagnostic options
Requirements	confidence in dealing with TwinCAT 3 NC PTP; solid knowledge of PLC programming; knowledge level of the TR3020/TR3030 courses; programming languages: ST and Sequential Function Chart
Duration	2 days
Further information	www.beckhoff.com/TR3056

TR3059 | XTS – Maintenance, repairs and service

Information	TR3059
Content	TwinCAT 3 and EtherCAT diagnostics refresher: opening a configuration from the target system, signals of the bus configuration, EtherCAT diagnostics; NC principles; diagnostics in the XTS system: structure and communication, error patterns, event log, module history, XTS diagnostic tools; mechanical error patterns: mover control (magnets, brushes, rollers, flag), roller wear/replacement, rail soiling/damage, module damage; electrical error patterns: defective module, incorrect fusing, incorrect connection
Requirements	confident handling of basic Windows functions; basic knowledge of PLC and servo systems
Duration	2 days
Further information	www.beckhoff.com/TR3059

TR3060 | Basic training: TwinSAFE Terminals

Information	TR3060
Content	introduction to the TwinSAFE system, integration of TwinSAFE Terminals, development of a TwinSAFE project, overview of the TwinSAFE function blocks
Requirements	experience in handling of TwinCAT 3 software, experience in dealing with EtherCAT
Duration	1 day
Further information	www.beckhoff.com/TR3060

TR3061 | TwinSAFE AX5805 drive option card

Information	TR3061
Content	overview of the functions of the AX5805 option card, development of an example project, configuration of the option card
Requirements	experience in handling of TwinCAT 3 software, experience in TwinCAT NC PTP, training contents of TR3060, experience in TwinSAFE Terminals
Duration	1 day
Further information	www.beckhoff.com/TR3061

TR3064 | Extended training: TwinSAFE Terminals

Information	TR3064
Content	presentation of new analog function blocks; TwinSAFE SC; group parameterisation, replacement values and deactivation; user management
Requirements	experience in handling TwinCAT 3 software, experience in dealing with EtherCAT, training contents TR3060
Duration	1 day
Further information	www.beckhoff.com/TR3064

TR3066 | TwinSAFE: Servicing and maintenance

Information	TR3066
Content	introduction to the EtherCAT bus system; diagnostics and service; introduction to the TwinSAFE system; development of a TwinSAFE project; diagnostics of the TwinSAFE system; hardware exchange service case
Requirements	training contents TR3010/TR3012
Duration	2 days
Further information	www.beckhoff.com/TR3066

TR3072 | OPC UA

Information	TR3072
Content	overview and benefits of OPC Unified Architecture (OPC UA); basic components of TF6100 TC3 OPC UA; operating principle of the TwinCAT OPC UA Server (architecture, configuration, symbol files, communication patterns, security, setup scenarios); operating principle of the TwinCAT OPC UA Configurator with examples (online panel, diagnostics, data access, historical access, alarms, RPC call, certificate management, security access); operating principle of the TwinCAT OPC UA Client (function blocks of the PLCopen_Opc_Ua library, read/write workflow, MethodCall workflow, security)
Requirements	knowledge of handling the TwinCAT system is required, such as I/O configuration, PLC handling, linking of PLC variables
Duration	1 day
Further information	www.beckhoff.com/TR3072

TR3075 | Internet of Things

Information	TR3075
Content	introduction to cloud computing; principles of broker-based communication; explanation of the data format JSON and the use of the TwinCAT 3 library "Tc3_JsonXml"; presentation of the MQTT-based TwinCAT IoT Functions, incl. configuration and programming examples: TF6701 TC3 IoT Communication (MQTT), TF6710 TC3 IoT Functions, TF6720 TC3 IoT Data Agent, TF6730 TC3 IoT Communicator, TF6735 TC3 IoT Communicator App, TF6020 TC3 JSON Data Interface, TF6760 TC3 IoT HTTPS/REST; visualization, analysis and further processing of the data: MQTT.fx (open source software), Node-RED (open source software); presentation incl. example configuration of "ADS over MQTT"; presentation and configuration of the EK9160 IoT coupler
Requirements	assured handling of TwinCAT 3
Duration	2 days
Further information	www.beckhoff.com/TR3075

TR3076 | EtherCAT

Information	TR3076
Content	EtherCAT basics, diagnostics, Hot Connect, XFC, redundancy, simulation
Requirements	knowledge of handling the TwinCAT 3 software
Duration	1 day
Further information	www.beckhoff.com/TR3076

TR3077 | EtherCAT – Diagnostics and extended functionalities

Information	TR3077
Content	EtherCAT in conjunction with TwinCAT: diagnostics concept, synchronization/response times, Ethernet devices in EtherCAT network, topology options, further topology options via PLC, best-practice EtherCAT infrastructure
Requirements	experience in handling TwinCAT 3 software, knowledge of TR3076
Duration	2 days
Further information	www.beckhoff.com/TR3077

TR3080 | Automation Interface

Information	TR3080
Content	basic functions of the TwinCAT Automation Interface (combination of two technologies: Visual Studio® and TwinCAT XAE, adding TwinCAT configurations); using TwinCAT I/O functions (adding I/O devices, managing I/O templates); using TwinCAT PLC functions (adding PLC projects, adding POU, modifying PLC program code, managing libraries, placeholders and repositories); using TwinCAT TcCOM functions (adding and parameterising TcCOM modules); using TwinCAT measurement functions (adding TwinCAT measurement projects, adding and parameterising charts, axes and channels); mapping between I/O, PLC and TcCOM modules
Requirements	knowledge of handling the TwinCAT system is required, such as I/O configuration, PLC handling, linking of PLC variables
Duration	1 day
Further information	www.beckhoff.com/TR3080

TR3090 | Vision

Information	TR3090
Content	introduction to the functionality of TwinCAT Vision; creation and setup of TwinCAT Vision configurations; introduction to the TwinCAT Vision library; system diagnostics options; examples of the analysis of more complex image data; recognition of contours, colours, codes, and the measurement of objects
Requirements	confidence in dealing with the TwinCAT 3 system configuration and programming; level of knowledge of the TR3030/TR3020 course or corresponding experience in IEC 61131-3 programming; programming language: ST
Duration	3 days
Further information	www.beckhoff.com/TR3090

TR5041 | Fieldbus systems in building automation programming

Information	TR5041
Content	TwinCAT PLC: TwinCAT handling, IEC 61131-3 programming; TwinCAT ADS: communication interface, high-level language communication; introduction to the communication between TwinCAT control systems; introduction to building fieldbus systems and programming concepts; network analysis with Wireshark; functions in room automation
Requirements	assured handling of Windows operating systems, experience in PLC programming
Duration	5 days
Further information	www.beckhoff.com/TR5041

TR5042 | Connectivity in building automation programming

Information	TR5042
Content	TwinCAT PLC: TwinCAT handling, IEC 61131-3 programming; TwinCAT ADS: communication interface, high-level language communication; introduction to the communication between TwinCAT control systems; introduction to building automation protocols and libraries; basic knowledge of the Modbus/RTU, Modbus/TCP and M-Bus communication protocols; network analysis with Wireshark; programming of building automation functions with the HVAC library
Requirements	assured handling of Windows operating systems, basic knowledge of PLC systems
Duration	5 days
Further information	www.beckhoff.com/TR5042

TR5050 | Building automation programming with BACnet and TwinCAT HMI

Information	TR5050
Content	TwinCAT PLC: TwinCAT handling, IEC 61131-3 programming; TwinCAT ADS: communication interface, high-level language communication; introduction to the communication between TwinCAT control systems; BACnet basics and possible implementation scenarios; BACnet basics in the TwinCAT 3 development environment
Requirements	assured handling of Windows operating systems, experience in PLC programming, knowledge of PLC programming with high-level languages, such as e.g. variable declaration, variable classes and structures, basic knowledge of BACnet
Duration	5 days
Further information	www.beckhoff.com/TR5050

TR7050 | Basics TwinCAT HMI

Information	TR7050
Content	presentation of the system architecture; introduction to the development environment of TE2000 TC3 HMI; page switching and navigation; language and unit switching; creation of user controls; creation of specific themes; administration of alarms and messages; administration of users and groups; historical data and trend charts; responsive and fluid design; creation of own logic functions; presentation of diagnostic options; transfer of HMI to TF2000 TC3 HMI Server; configuration of TF2000 TC3 HMI Server
Requirements	assured handling of Windows operating systems
Duration	3 days
Further information	www.beckhoff.com/TR7050

TR7060 | Add-on TwinCAT HMI Controls

Information	TR7060
Content	teaching the principles of HTML, CSS and JavaScript; introduction of TypeScript (more effective programming and debugging of JavaScript); structure and introduction of the HMI Framework and the HMI Framework API; creation of various Framework Controls; inheritance - extension of the functions of existing controls; integration of external libraries; introduction to Package Management with NuGet
Requirements	assured handling of Windows operating systems; experience with high-level languages; experiences with HTML, CSS and JavaScript are of advantage; contents of TR7050
Duration	1 day
Further information	www.beckhoff.com/TR7060

TR7065 | Add-on TwinCAT HMI Server Extension

Information	TR7065
Content	presentation of TF2000 TC3 HMI Server; introduction to the TF2200 TC3 HMI Server Extension SDK; creating your own Server Extension in C# .NET; introduction to Package Management with NuGet; extension of the extension by a settings page, messages and your own error codes; generation of dynamic server symbols at runtime; integration of external libraries
Requirements	assured handling of Windows operating systems; experience with high-level languages; experiences with C# .NET are of advantage; contents of TR7050
Duration	1 day
Further information	www.beckhoff.com/TR7065



TwinCAT 2 Training

TR1000 | Compact programming

Information	TR1000
Content	TwinCAT PLC: TwinCAT handling, IEC 61131-3 programming; TwinCAT NC PTP: basics of axis commissioning; TwinCAT ADS: communication interface, high-level language communication
Requirements	sound knowledge of Windows operating systems; experience in PLC programming; knowledge of PLC or high-level language concepts such as declaration of variables, variable classes and structures
Duration	5 days
Further information	www.beckhoff.com/TR1000

TR1020 | Programming for those switching from PLCs

Information	TR1020
Content	TwinCAT PLC: TwinCAT handling, IEC 61131-3 programming; TwinCAT NC PTP: basics of axis commissioning
Requirements	sound knowledge of Windows operating systems; experience in PLC programming
Duration	5 days
Further information	www.beckhoff.com/TR1020

TR1010, TR1012 | Maintenance, repairs and service

Information	TR1010	TR1012
Content	TwinCAT PLC: TwinCAT handling, commissioning, IEC 61131-3 programming; TwinCAT NC PTP: basics of axis commissioning; TwinCAT ScopeView for diagnostics	same as TR1010, additionally overview of Structured Text programming
Requirements	sound knowledge of Windows basic functionalities; handling of PLC systems, such as logging in and out, saving PLC programmes, etc.	
Duration	4 days	5 days
Further information	www.beckhoff.com/TR1010	www.beckhoff.com/TR1012

TR2020 | NC Point-to-Point

Information	TR2020
Content	operation of TwinCAT NC: functional plan, operating modes; NC control with NC MC2 library, cyclic interface, axis function blocks; TwinCAT ScopeView: recording of set value profiles; programming examples; TwinCAT cam plates and MC function blocks for cam plate functionality
Requirements	assured handling of TwinCAT PLC programming; solid knowledge of PLC programming; level of knowledge corresponding to courses TR1000/TR1020, or corresponding experience in IEC 61131-3 programming; programming languages: ST, Structured Text
Duration	2 days
Further information	www.beckhoff.com/TR2020

TR2030 | NC Point-to-Point and NC Interpolation

Information	TR2030
Content	TwinCAT NC PTP: same as TR2020 without cam plates; TwinCAT NC I: creation of interpolation channels for single axes, creating NC programs in accordance with DIN 66025, sequential control with the System Manager, PLC libraries for creating NC channels and for controlling the interpreter, sequential control from the PLC, communication between NC program and PLC program (M functions), exchange of parameters between NC program and PLC (H, S and T), set value path monitoring with TwinCAT Scope
Requirements	assured handling of TwinCAT PLC programming, solid knowledge of PLC programming, level of knowledge corresponding to courses TR1000/TR1020 or corresponding experience in IEC 61131-3 programming, programming languages: ST
Duration	3 days
Further information	www.beckhoff.com/TR2030

TR5030 | BACnet training: Basics of BACnet communication

Information	TR5030
Content	BACnet – the idea of an open standard for building automation; BACnet network media (data link layer); BACnet objects, structure and areas of application; services for data processing; alarms in BACnet; calendar and timer functions; logging objects (trendlog, eventlog); device and network management; analysis tools, diagnostic options; planning and tendering; BACnet certificate: what are the key issues?; Common directives and customer requirements for BACnet projects: What is required?; PICS, BIBBS – How is interoperability specified?; Integration of BACnet/IP in IT infrastructures; current status of BACnet for IPv4; IPv6 outlook; BBMD – area of use and application; MS/TP – The BACnet master/slave fieldbus; outlook on future developments: Web services, new objects, CSML
Requirements	beginner's seminar; no special knowledge required
Duration	2 days
Further information	www.beckhoff.com/TR5030

TR8010 | TwinSAFE

Information	TR8010
Content	integration of TwinSAFE Terminals, handling the TwinSAFE configurator, using the TwinSAFE library
Requirements	experience in handling TwinCAT software
Duration	1 day
Further information	www.beckhoff.com/TR8010

TR8011 | TwinSAFE AX5805 drive option card

Information	TR8011
Content	overview of the AX5805 option card functions, development of an example project, configuration of the option card
Requirements	experience in handling of TwinCAT software, experience in TwinCAT NC PTP, training contents of TR8010 or experience in TwinSAFE Terminals
Duration	1 day
Further information	www.beckhoff.com/TR8011

TR8016 | TwinSAFE: Servicing and maintenance

Information	TR8016
Content	introduction to the EtherCAT bus system; diagnostics and service; introduction to the TwinSAFE system; development of a TwinSAFE project; diagnostics of the TwinSAFE system; hardware exchange service case
Requirements	training contents TR1010/TR1012
Duration	2 days
Further information	www.beckhoff.com/TR8016

TR8020 | EtherCAT

Information	TR8020
Content	EtherCAT basics, configuration in the System Manager, EtherCAT diagnostics (topology view, emergency scan), oversampling terminals
Requirements	experience in handling of TwinCAT software
Duration	1 day
Further information	www.beckhoff.com/TR8020

TR1900 | TwinCAT Training: Individual

Information	TR1900
Content	agreed upon with the customer
Requirements	agreed upon with the customer
Duration	by arrangement
Further information	www.beckhoff.com/TR1900

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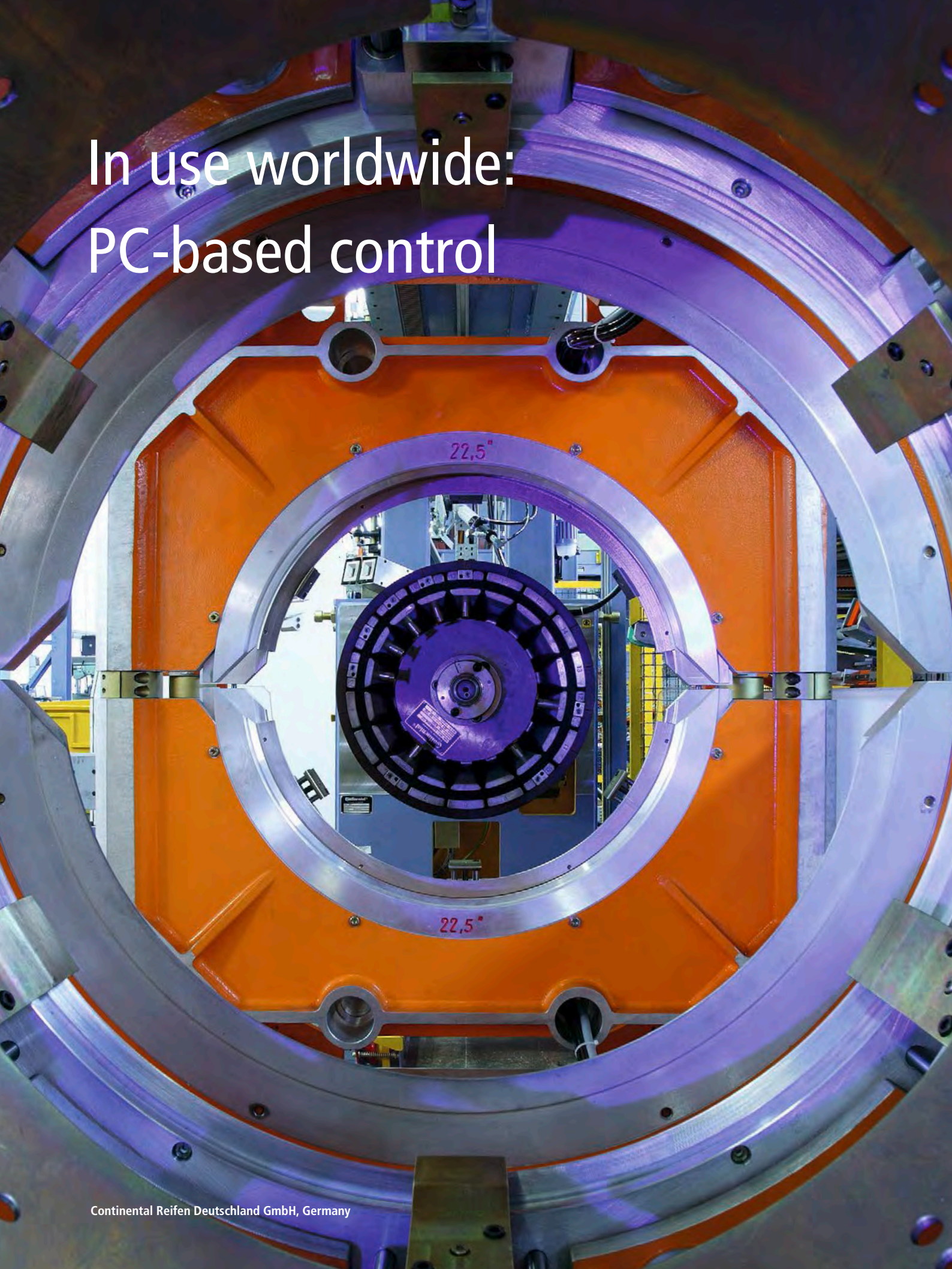
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In use worldwide:
PC-based control





MKT AG, Germany

© Changi Airport Group Singapore



AREVA Wind, Germany

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Borrmann GmbH, Germany



Dentsply Sirona, Switzerland



Goldfuß Engineering, Germany



Jilin City People's Grand Theatre, China

International units | Measures, weights and temperature

Linear measures	
1 inch (in)	25.4 mm
1 foot (ft)	30.48 cm

Square measures	
1 square inch (sq in)	6.4516 cm ²
1 square foot (sq ft)	0.09290306 m ²

Weights	
1 pound (lb)	453.59237 g
1 ounce (oz)	28.3495 g

Fahrenheit (°F)	Celsius (°C)
$t_f = 9/5 * t_c + 32$	$t_c = 5/9 * (t_f - 32)$

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Beckhoff Main Catalogs 2021



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IPC
Motion
Automation



Volume 2
I/O