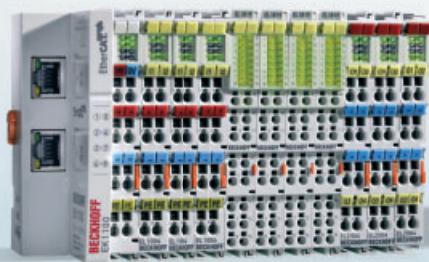


BECKHOFF New Automation Technology

Product Overview | 2012



■ **IPC**
Industrial PC
Embedded PC

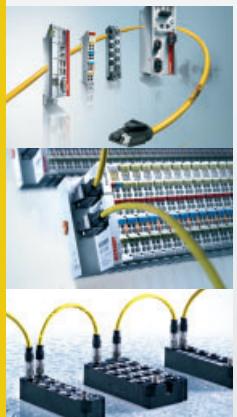
■ **I/O**
EtherCAT
EtherCAT Terminal
EtherCAT Box
Bus Terminal
Fieldbus Box
Lightbus
PC Fieldbus Cards

■ **Motion**
Drive Technology

■ **Automation**
TwinCAT
TwinSAFE

**8 Industrial PC, Control Panel**

PC Control for all applications

**26 Fieldbus Components**

I/Os for all common fieldbus systems

**34 EtherCAT Terminal**

Ultra high-speed communication

**46 Fieldbus Box**

The compact IP 67 modules

**49 PC Fieldbus Cards, Switches**

The intelligent interface generation

**50 Drive Technology**

The drive system for high dynamic positioning tasks

58 TwinCAT

PLC and Motion Control on the PC

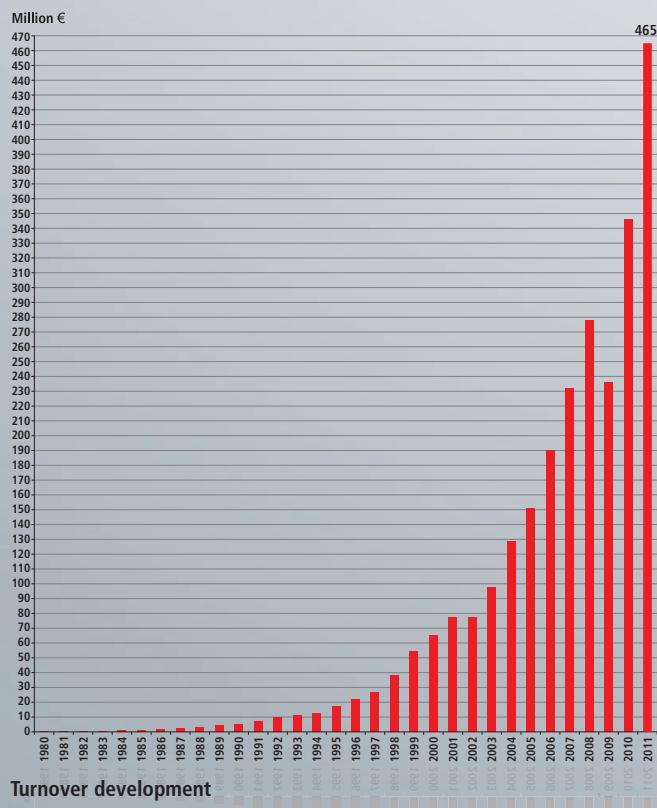
59 TwinSAFE

Open and scalable safety technology



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.



Beckhoff Automation

- Headquarters Verl, Germany
- Sales 2011: 465 million €
- Staff worldwide: over 2,100
- Branch Offices Germany: 11
- Subsidiaries/Branch Offices worldwide: 30
- Distributors worldwide:
in more than 60 countries

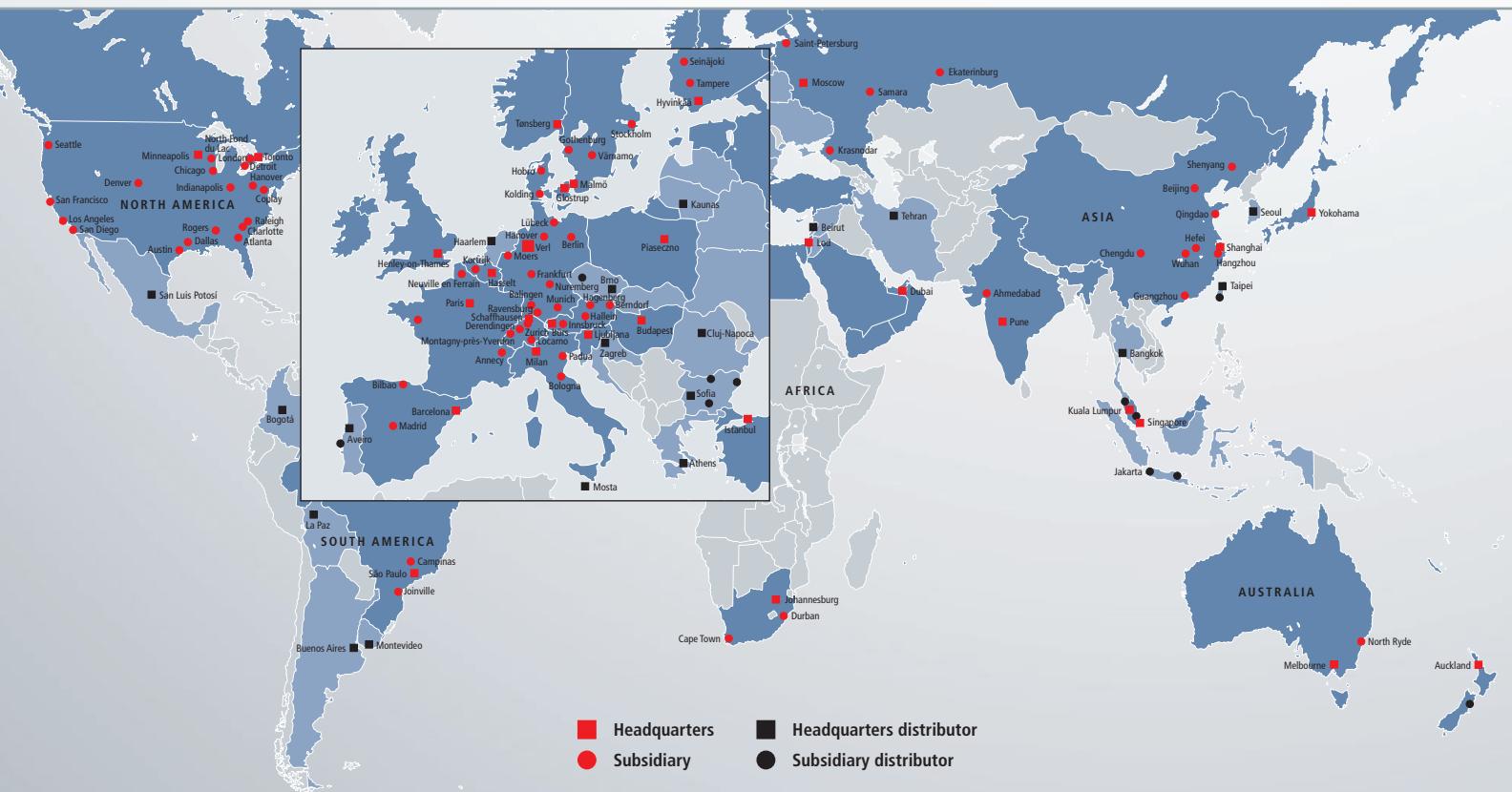
PC-based control technology

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 conceptualised 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

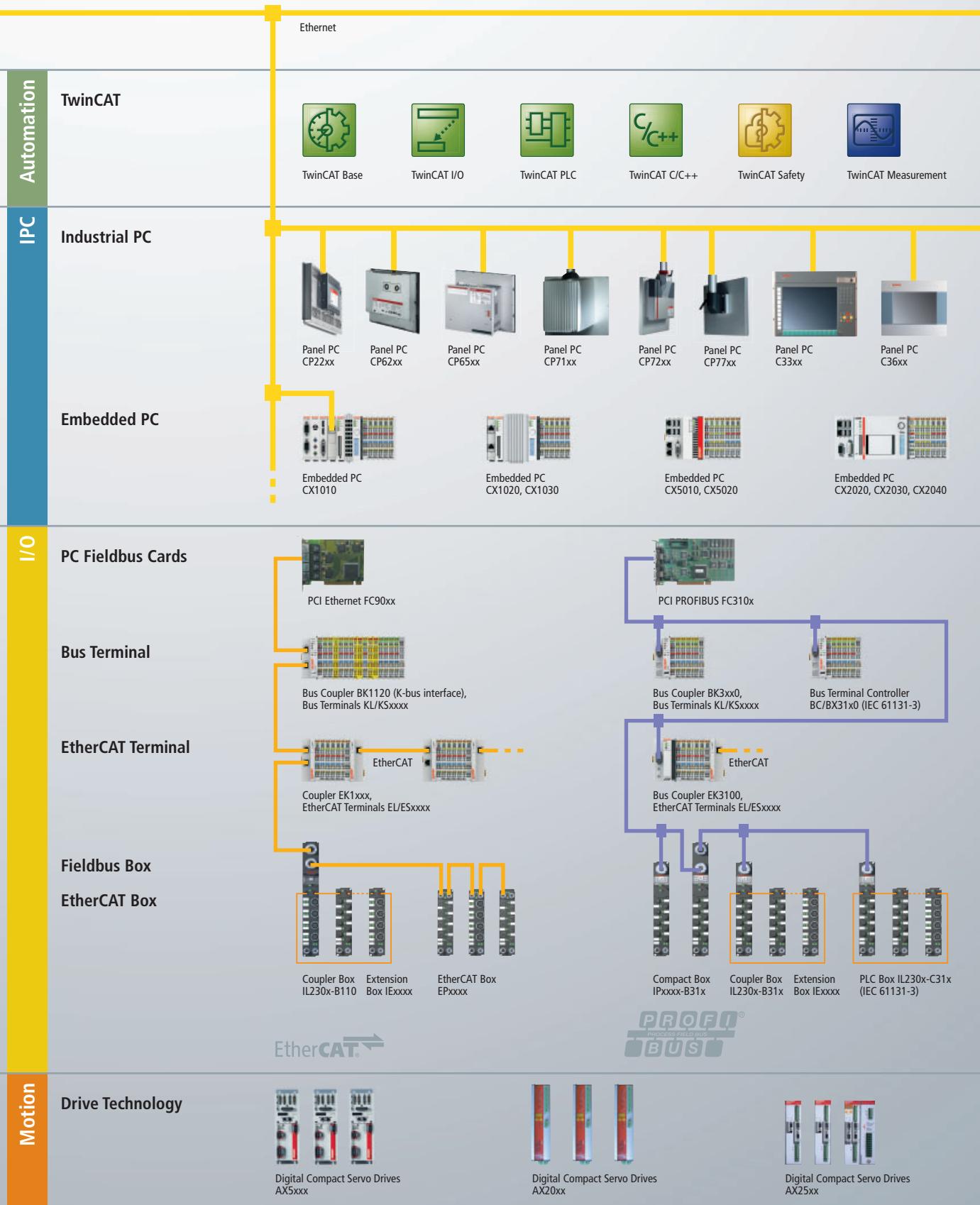
1982	P1000 – single-board motion controller	1999	Fieldbus Box – the I/O system in IP 67
1986	PC Control – first PC-based machine controller	2002	CX1000 – modular Embedded PCs for DIN rail mounting
1988	S1000 – software PLC/NC on PC (DOS)	2003	EtherCAT – real-time Ethernet fieldbus system
1989	Lightbus – high-speed fieldbus utilising optical fibre	2005	TwinSAFE – the compact safety solution
1990	All-in-one PC motherboard	2005	AX5000 – EtherCAT Servo Drive
1995	Bus Terminal – fieldbus technology in terminal block format	2007	Industrial Motherboards – made in Germany
1996	TwinCAT – real-time software package under Windows with PLC and Motion Control functions	2008	XFC – eXtreme Fast Control Technology
1998	Control Panel – remote IPC Control Panels	2009	HD Bus Terminals – 16-channel terminals in 12 mm
		2010	TwinCAT 3 – eXtended Automation Technology

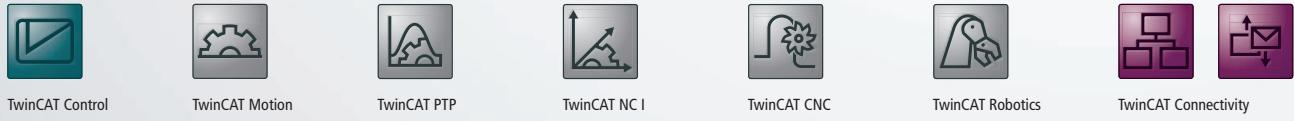


Worldwide presence on all continents

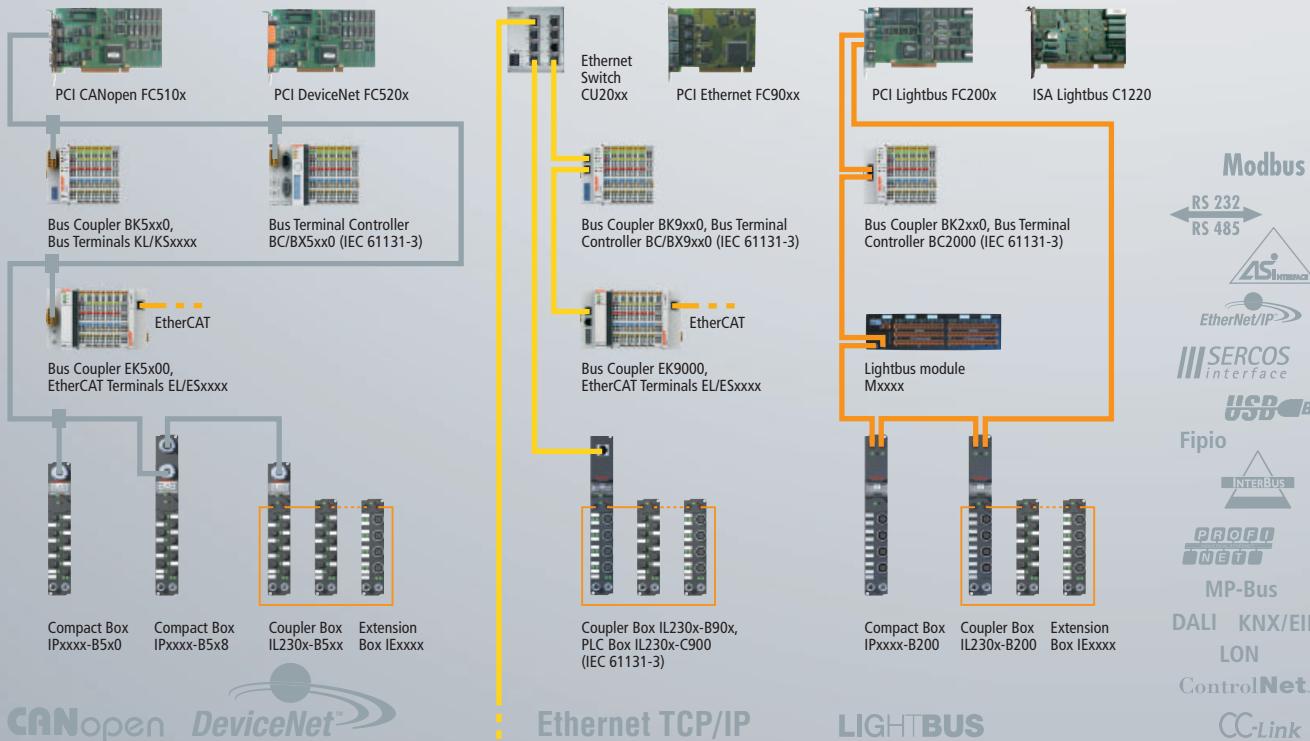
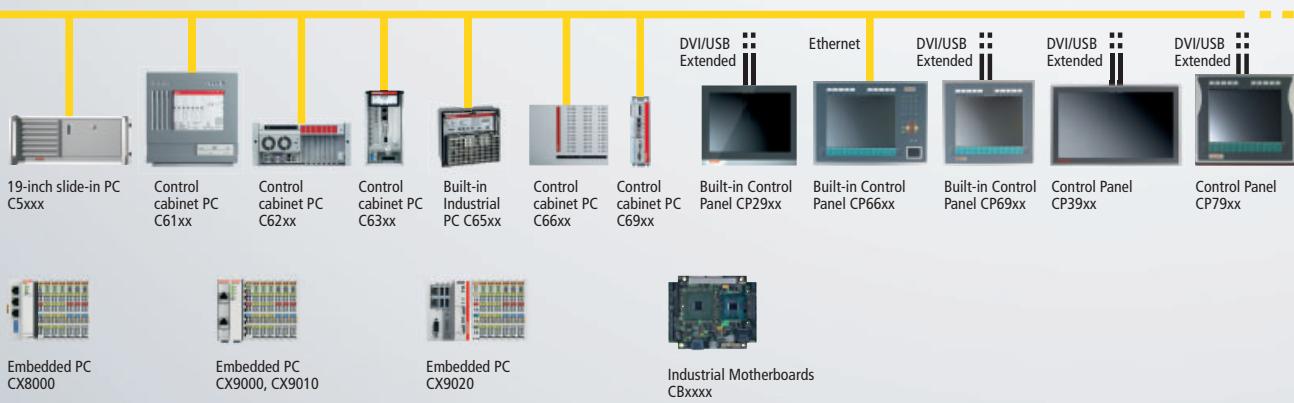
The central divisions of Beckhoff, such as development, production, administration, distribution, marketing, support and service are located at the Beckhoff Automation GmbH headquarters in Verl, Germany. Rapidly growing presence in the international market is taking place through subsidiaries in Austria, Belgium, Denmark, Finland, France, Hungary, Italy, Norway, Poland, Russia, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, as well as in Australia, Brazil, Canada, China, India, Israel, Japan, Malaysia, New Zealand, Singapore, South Africa, the United Arab Emirates and the USA. Through worldwide co-operation with partners, Beckhoff is represented in more than 60 countries.

System overview





TwinCAT Control TwinCAT Motion TwinCAT PTP TwinCAT NC I TwinCAT CNC TwinCAT Robotics TwinCAT Connectivity



CANopen DeviceNet



Synchronous Servomotors
AM80xx



Stainless steel servomotors
AM88xx



Synchronous Servomotors
AM3xxx, AM3xxx



Linear Servomotors
AL2xxx, AL3xxx



Stepper Motors
AS1xxx

The IPC Company



Control cabinet Industrial PCs 14

- scalable size (paperback format up to 14-slot passive backplane)
- scalable performance class (Intel® Atom™ up to Core™ i7, quad-core)
- good balance between latest PC technology and long-term component availability
- developed for machine-oriented use

► www.beckhoff.com/Control-cabinet-PC



Panel PCs 12

- Control Panel + PC = Panel PC
- built-in Panel PCs or mounting arm system
- display sizes between 5.7-inch and 24-inch
- processors from Intel® Atom™ to Core™ i7, quad-core
- multi-touch
- customer-specific design

► www.beckhoff.com/Panel-PC

Beckhoff supplies the right Industrial PC for every application. The high-quality components, based on open standards, and the individual construction of the 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. The fact that Beckhoff develops motherboards in-house enables the company to respond quickly to new technologies on the PC market and to customer-specific requirements.

► www.beckhoff.com/IPC

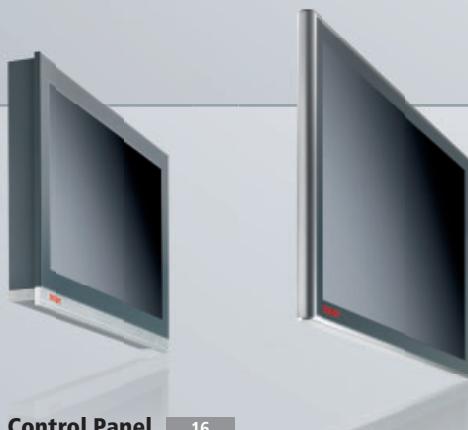


Embedded PCs

20

- link the worlds of Industrial PCs and hardware PLC on a DIN rail
- scalable performance classes from ARM to quad-core processors
- direct I/O interface for Beckhoff I/O systems

► www.beckhoff.com/Embedded-PC



Control Panel

16

- human-machine interface
- built-in Control Panel or mounting arm system
- display sizes between 5.7-inch and 24-inch
- customer-specific design
- multi-touch

► www.beckhoff.com/ControlPanel

Industrial Motherboards

24

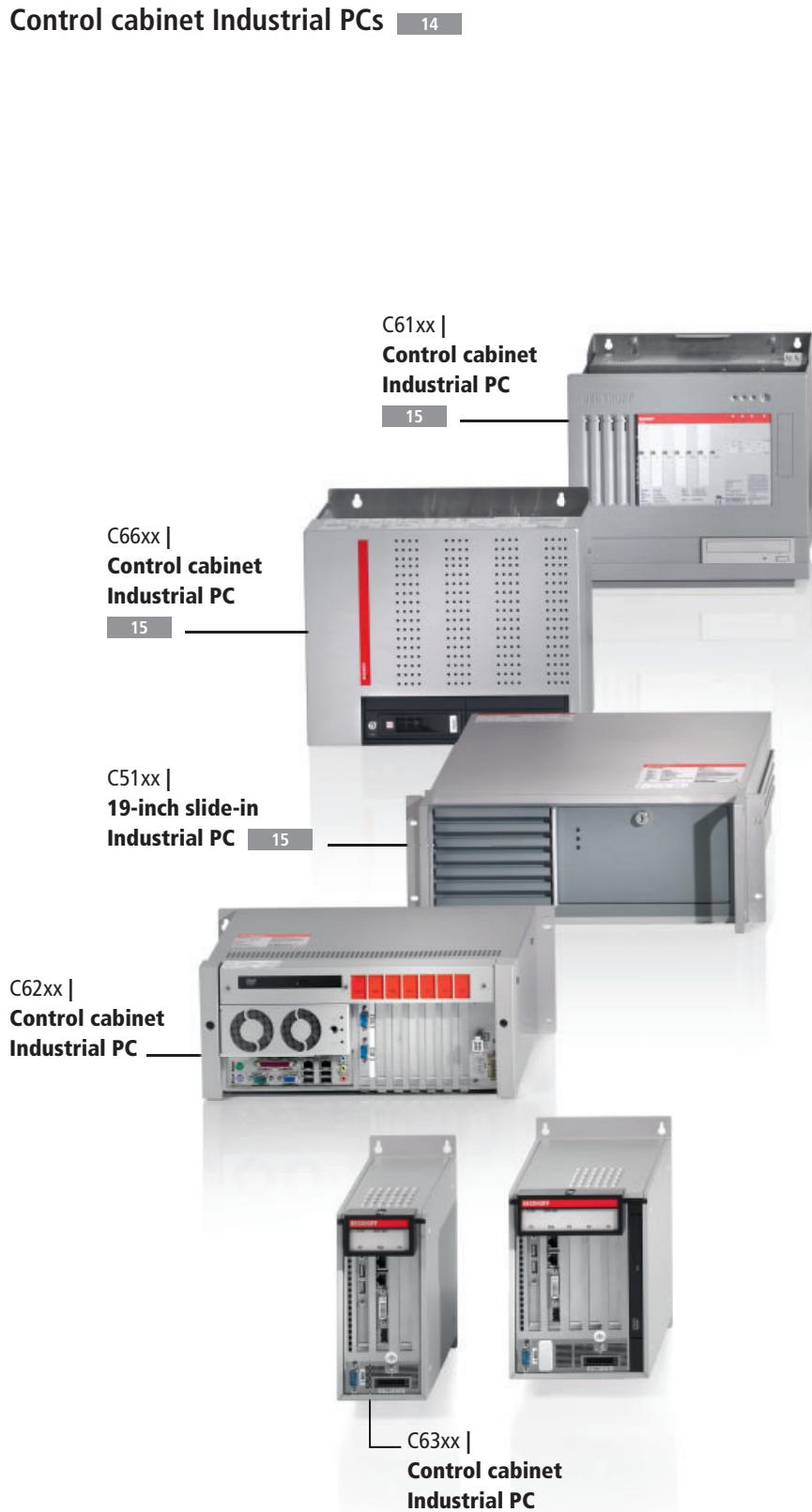
- motherboards with Intel® x86 and ARM architecture
- form factors: ATX, slot CPU, 3½-inch, PC/104
- Made in Germany
- long-term availability

► www.beckhoff.com/Motherboards

Industrial PC

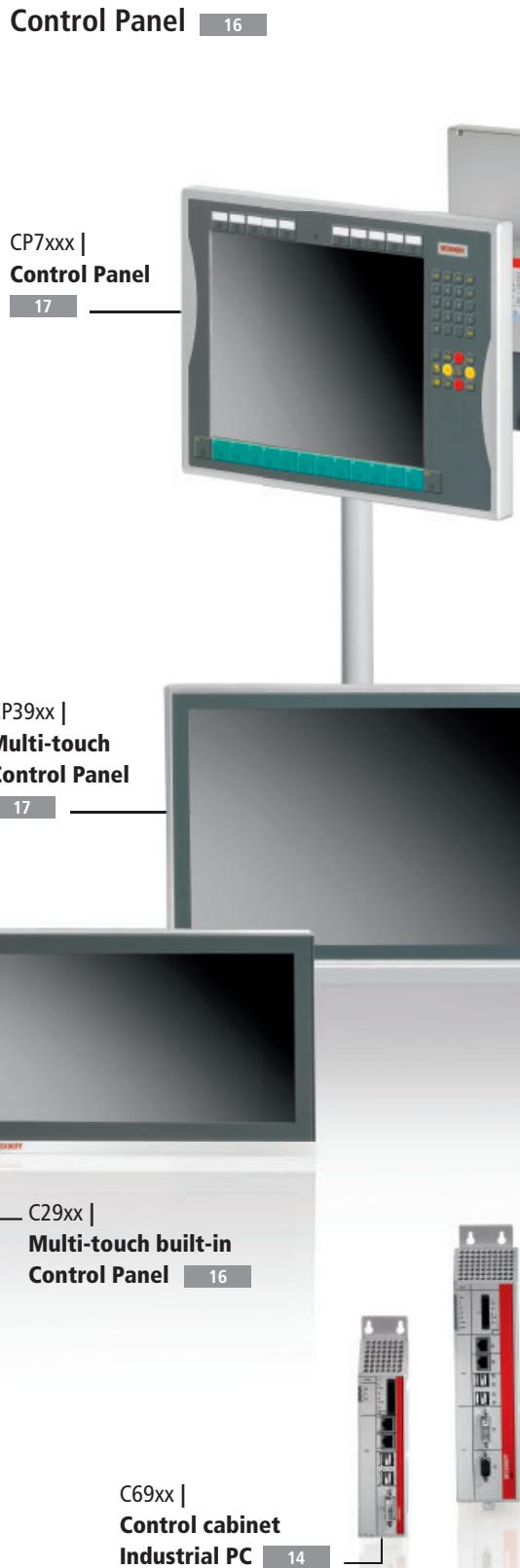
Control cabinet Industrial PCs

14



Control Panel

16



Panel PCs

12



The right Industrial PC for every application

Beckhoff Industrial PCs satisfy industry's demands:

- the right Industrial PC for every controller
- highest performance PCs from Intel® Celeron® to Core™ i7
- PCs with low power consumption with Intel® Atom™ processors
- open standards following the norm ATX
- components carefully tested to ensure appropriateness for industrial applications
- appealing industrial design housings
- easy access to PC components
- Individual housing construction allows optimum adaptation to controller requirements.
- integration of electromechanical buttons, switches, scanner, handwheel and other components in the Control Panel
- designed for machine-oriented use
- long-term availability of components

► www.beckhoff.com/IPC

Panel PCs

CP22xx | Multi-touch built-in Panel PC



CP2212

CP2215

CP2216

CP2218

CP2219

CP2224

	Display	12-inch	15-inch	15.6-inch	18.5-inch	19-inch	24-inch
	Resolution	800 x 600 4:3	1024 x 768 4:3	1366 x 768 widescreen	1366 x 768 widescreen	1280 x 1024 4:3	1920 x 1080 widescreen
<ul style="list-style-type: none"> - 3½-inch motherb. - up to Core™ i3/i5/i7 2nd Gen. - 1 Mini PCI slot free 	multi-finger touch screen	CP2212-0000	CP2215-0000	CP2216-0000	CP2218-0000	CP2219-0000	CP2224-0000

► www.beckhoff.com/CP22xx

CP62xx | Built-in Panel PC



CP6207

CP6219

CP6211

CP6202

CP6233

CP6204

	Display	5.7-inch	6.5-inch	12-inch	15-inch	19-inch	24-inch
	Resolution	640 x 480 4:3	640 x 480 4:3	800 x 600 4:3	1024 x 768 4:3	1280 x 1024 4:3	1920 x 1200 widescreen
CP62xx-0010	without keys			CP6201	CP6202	CP6203	
- 3½-inch motherb.	function keys			CP6211	CP6212	CP6213	
- up to Core™2 Duo	numerical			CP6221	CP6222	CP6223	
- depth 58–67 mm	alphanumeric			CP6231	CP6232	CP6233	
- 1 Mini PCI slot free				CP6242			
CP62xx-0020	without keys	CP6207	CP6209	CP6201	CP6202	CP6203	
- 3½-inch motherb.	function keys		CP6219	CP6211	CP6212	CP6213	
- Atom™ processor	numerical		CP6229	CP6221	CP6222	CP6223	
- depth 58–67 mm	alphanumeric			CP6231	CP6232	CP6233	
- 1 Mini PCI slot free				CP6242			
CP62xx-0030/35/40	without keys			CP6201	CP6202	CP6203	CP6204
- 3½-inch motherb.	function keys			CP6211	CP6212	CP6213	
- up to Core™ i3/i5/i7 2 nd Gen.	numerical			CP6221	CP6222	CP6223	
- depth 58–67 mm	alphanumeric			CP6231	CP6232	CP6233	
- 1 Mini PCI slot free				CP6242			

► www.beckhoff.com/CP62xx



CP22xx



CP62xx



CP72xx



CP77xx

CP72xx | IP 65 Panel PC for mounting arm installation



CP7211



CP7222



CP7233



CP7204

Display Resolution Format	12-inch 800 x 600 4:3	15-inch 1024 x 768 4:3	19-inch 1280 x 1024 4:3	24-inch 1920 x 1200 widescreen
– 3½-inch motherb.	without keys	CP7201	CP7202	CP7203
– up to Core™ i3/i5/i7 2 nd Gen.	function keys	CP7211	CP7212	CP7213
– depth 107–123 mm	numerical	CP7221	CP7222	CP7223
– 1 Mini PCI slot free	alphanumeric	CP7231	CP7232	CP7233
		CP7242		

► www.beckhoff.com/CP72xx

CP77xx | IP 65 Panel PC for mounting arm installation



CP7709



CP7711



CP7722



CP7733

Display Resolution Format	6.5-inch 640 x 480 4:3	12-inch 800 x 600 4:3	15-inch 1024 x 768 4:3	19-inch 1280 x 1024 4:3
CP77xx-0020	without keys	CP7709	CP7701	CP7702
– CP motherboard	function keys	CP7719	CP7711	CP7712
– AMD LX800	numerical	CP7729	CP7721	CP7722
– depth 28–45 mm	alphanumeric		CP7731	CP7732
CP77xx-0030	without keys	CP7709	CP7701	CP7702
– CP motherboard	function keys	CP7719	CP7711	CP7712
– Atom™ processor	numerical	CP7729	CP7721	CP7722
– depth 28–45 mm	alphanumeric		CP7731	CP7732

► www.beckhoff.com/CP77xx

For further Panel PC series see ► www.beckhoff.com/Panel-PC

Control cabinet Industrial PCs

C69xx | Control cabinet Industrial PC with 3½-inch motherboard



	1 Mini PCI slot	1 Mini PCI, fanless	1 Mini PCI, RAID
Intel® Atom™		C6915-0000	
Celeron® ULV 1.2 GHz		C6925-0010	
Intel® Core™2 Duo	C6920-0010		C6930-0010
Intel® Celeron® 1.9 GHz, Intel® Core™2 Duo	C6920-0020 C6920-0030		C6930-0020 C6930-0030
Intel® Celeron® 1.6 GHz up to Core™ i7 2 nd Gen.	C6920-0040		C6930-0040

► www.beckhoff.com/C69xx

C65xx | Fanless built-in Industrial PC with 3½-inch motherboard



	1 Mini PCI slot	1 Mini PCI, RAID
Intel® Core™2 Duo	C6515-0010	C6525-0010
Intel® Celeron® 1.9 GHz, Intel® Core™2 Duo	C6515-0020 C6515-0030	C6525-0020 C6525-0030
Intel® Celeron® 1.6 GHz up to Core™ i7 2 nd Gen.	C6515-0040	C6525-0040

► www.beckhoff.com/C65xx

C5xxx | 19-inch slide-in Industrial PC with ATX or 3½-inch motherboard



C5102



C5210

ATX motherboard, 7 slots, 4 rack units		3½-inch motherboard, 1 Mini PCI slot, 1 rack unit
Intel® Core™ Duo, Intel® Core™2 Duo	C5102-0030	
Intel® Celeron® 1.9 GHz, Intel® Core™2 Duo	C5102-0040	C5210-0000
Intel® Celeron® 1.6 GHz up to Core™ i7 2 nd Gen.	C5102-0050	C5210-0010

► www.beckhoff.com/C5xxx

C6xxx | Control cabinet Industrial PC with ATX motherboard



C6640



C6650



C6140



C6150

	7 slots	7 slots	7 slots, 2 removable frames
Intel® Core™ Duo, Intel® Core™2 Duo	C6140-0030 C6150-0030	C6640-0010	C6650-0010
Intel® Celeron® 1.9 GHz, Intel® Core™2 Duo	C6140-0040 C6150-0040	C6640-0020	C6650-0020
Intel® Celeron® 1.6 GHz up to Core™ i7 2 nd Gen.	C6140-0050 C6150-0040	C6640-0030	C6650-0030

► www.beckhoff.com/C66xx ► www.beckhoff.com/C61xx

For further control cabinet Industrial PC series see ► www.beckhoff.com/Control-cabinet-PC

Control Panels

CP29xx | Multi-touch built-in Control Panel

CP2907	CP2912	CP2915	CP2916	CP2918	CP2919	CP2924		
Display Resolution Format	7-inch 800 x 480 widescreen	12-inch 800 x 600 4:3	15-inch 1024 x 768 4:3	15.6-inch 1366 x 768 widescreen	18.5-inch 1366 x 768 widescreen	19-inch 1280 x 1024 4:3	24-inch 1920 x 1080 widescreen	
DVI/USB Extended interface, 50 m	multi-finger touch screen	CP2907	CP2912	CP2915	CP2916	CP2918	CP2919	CP2924

► www.beckhoff.com/CP29xx

CP6xxx | Built-in Control Panel

CP6607	CP6x19	CP6x11	CP6x22	CP6933	CP6904	
Display Resolution Format	5.7-inch 640 x 480 4:3	6.5-inch 640 x 480 4:3	12-inch 800 x 600 4:3	15-inch 1024 x 768 4:3	19-inch 1280 x 1024 4:3	24-inch 1920 x 1200 widescreen
Ethernet interface (Embedded PC) – Intel® IXP420 CPU, 533 MHz	without keys	CP6607	CP6609	CP6601	CP6602	
	function keys		CP6619	CP6611	CP6612	
	numerical		CP6629	CP6621	CP6622	
	alphanumeric			CP6631	CP6632	
DVI/USB Extended interface, 50 m	without keys	CP6907	CP6909	CP6901	CP6902	CP6903
	function keys		CP6919	CP6911	CP6912	CP6913
	numerical		CP6929	CP6921	CP6922	CP6923
	alphanumeric			CP6931	CP6932/42	CP6933

► www.beckhoff.com/CP66xx ► www.beckhoff.com/CP69xx

CP39xx | IP 65 multi-touch Control Panel



	CP3907	CP3912	CP3915	CP3916	CP3918	CP3919	CP3924	
Display Resolution Format	7-inch 800 x 480 widescreen 4:3	12-inch 800 x 600 4:3	15-inch 1024 x 768 4:3	15.6-inch 1366 x 768 widescreen	18.5-inch 1366 x 768 widescreen	19-inch 1280 x 1024 4:3	24-inch 1920 x 1080 widescreen	
DVI/USB Extended interface, 50 m	multi-finger touch screen	CP3907	CP3912	CP3915	CP3916	CP3918	CP3919	CP3924

► www.beckhoff.com/CP39xx

CP79xx | IP 65 Control Panel



	CP7909	CP7911	CP7922	CP7933	CP7904
Display Resolution Format	6.5-inch 640 x 480 4:3	12-inch 800 x 600 4:3	15-inch 1024 x 768 4:3	19-inch 1280 x 1024 4:3	24-inch 1920 x 1200 widescreen
DVI/USB Extended interface, 50 m	without keys CP7909	function keys CP7919	CP7901 CP7911	CP7902 CP7912	CP7903 CP7913
	numerical CP7929		CP7921	CP7922	CP7923
	alphanumeric CP7931			CP7932/42	CP7933

► www.beckhoff.com/CP79xx

For further Control Panel series see ► www.beckhoff.com/ControlPanel

Options for Panel PCs and Control Panels

Options

- stainless steel housing
- special membrane keyboards
- integration of electro-mechanical keyboards
- flush-mounted touch screen
- adaptation of membrane colours
- integration of customer logos



Stainless steel panel



Stainless steel panel with emergency stop



Ethernet panel with individual front laminate



Control Panel with CNC push-button extension



Control Panel with push-button extension

Adaptation of extensive customer-specific requirements



Keyboard with larger number and higher density of membrane keys



Customer-specific front laminate



Individual housing construction

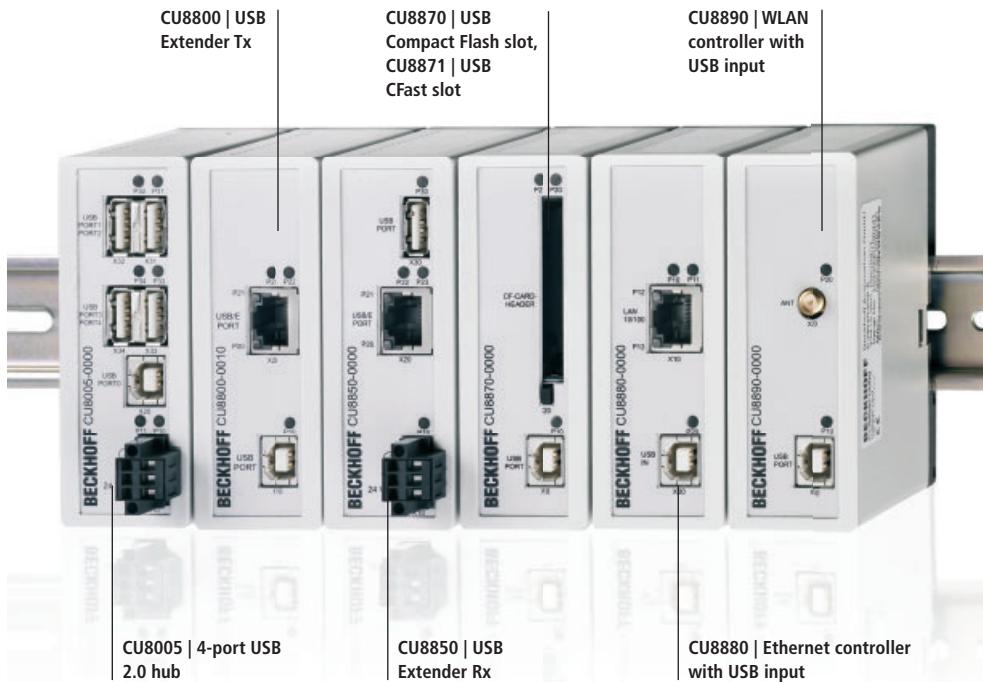


Customer-specific Control Panel

Industrial PC accessories

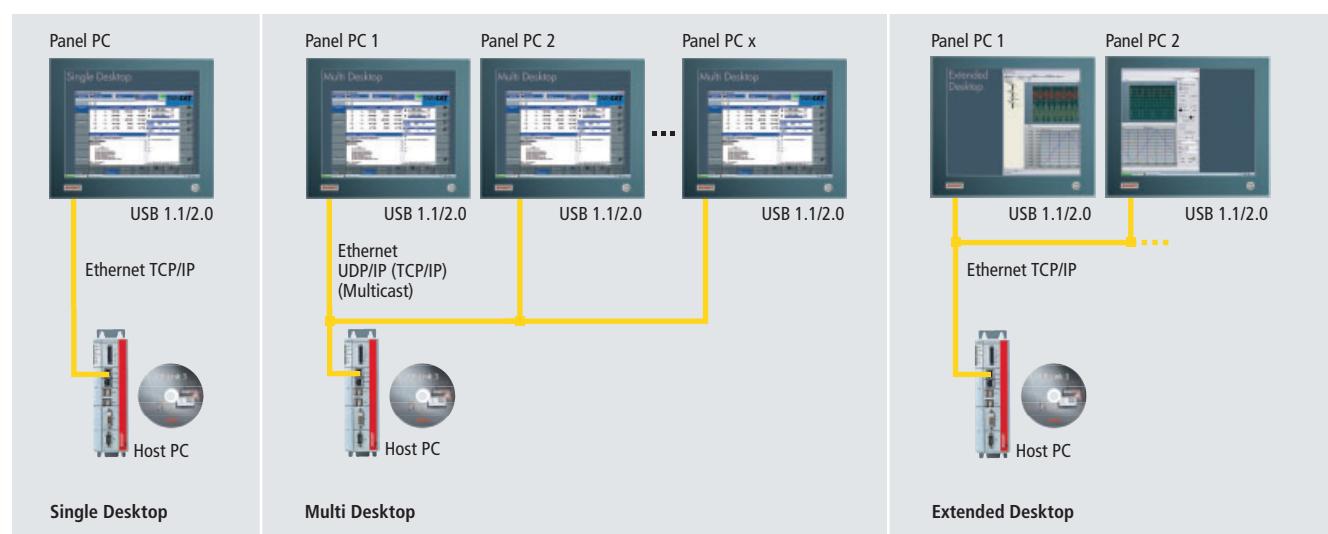
CU8xxx modules

Different modules enable the use of various technologies in the industrial environment. All modules are intended for DIN rail mounting.



CP-Link 3: Ethernet-based desktop transfer software

CP-Link 3 transfers the desktop of a PC via Ethernet to several Panel PCs and the operator mouse and keyboard entries to the host PC. The screen contents are captured by a virtual graphic adapter in the host PC and sent using Ethernet to one or more Panel PCs with Windows operating systems (CE, XP, Windows 7 Embedded Standard or Embedded 7). Networking can be done using cost-effective standard Ethernet cables (CAT 5) which are suitable for drag chains.



► www.beckhoff.com/CP-Link3

Embedded PC



Product overview Embedded PC

Basic CPU	CX80xx	CX9000, CX9010
Processor	32 bit, 400 MHz, ARM9	Intel® IXP420 with XScale® technology, 266/533 MHz clock frequency, ARM9
Flash memory	256 MB microSD	32 MB Flash (internal, not expandable)
Internal main memory	64 MB RAM (internal, not expandable)	128 MB RAM (internal, not expandable)
Interfaces	1 x Ethernet 10/100 Mbit/s, 1 x USB device (behind the front flap)	2 x RJ 45 (Ethernet, internal switch), 10/100 Mbit/s
I/O interface	direct connection for K-bus or E-bus, automatic recognition	direct connection for K-bus or E-bus
System interfaces	via EtherCAT Terminals	modularly expandable
DVI/USB	–	CX90x0-N010
RS232	EL6001, EL6002	CX9000-N030 CX9010-N030
RS422/RS485	EL6021, EL6022	CX9000-N031 CX9010-N031
Audio	–	–
Ethernet	–	–
4-port USB hub	–	CX90x0-N070
Memory medium	–	CX90x0-A001
Fieldbus interfaces	optionally integrated or via EtherCAT Terminals	via EtherCAT Terminals
EtherCAT	–	–
Lightbus	EL6720 master	EL6720 master
PROFIBUS	EL6731 master EL6731-0010 slave	EL6731 master EL6731-0010 slave
Interbus	EL6740-0010 slave	EL6740-0010 slave
CANopen	EL6751 master EL6751-0010 slave	EL6751 master EL6751-0010 slave
DeviceNet	EL6752 master EL6752-0010 slave	EL6752 master EL6752-0010 slave
SERCOS interface	–	–
PROFINET RT	–	–
EtherNet/IP	–	–
UPS	1-second UPS	–

► www.beckhoff.com/Embedded-PC



Performance Comparison		
CX9020	CX1010	CX5010, CX5020
ARM Cortex™-A8, 1 GHz	Pentium® MMX-compatible, 500 MHz clock frequency	Intel® Atom™, 1.1/1.6 GHz clock frequency
256 MB microSD (optionally expandable), 2 x microSD card slot	64 MB Compact Flash card (optionally expandable)	64 MB Compact Flash card (optionally expandable)
1 GB DDR3 RAM	256 MB DDR RAM (internal, not expandable)	CX5010: 512 MB RAM (internal, not expandable) CX5020: 512 MB RAM (optional expandable to 1 GB)
2 x RJ 45 (Ethernet, internal switch), 10/100 Mbit/s, DVI-D, 4 x USB 2.0, optional 1 x RS232/RS422/RS485	1 x RJ 45 (Ethernet), 10/100 Mbit/s	2 x RJ 45, 10/100/1,000 Mbit/s, DVI, 4 x USB 2.0, optional 1 x RS232/RS422/RS485
direct connection for K-bus or E-bus, automatic recognition	via power supply module (K-bus, K-bus/IP-Link, E-bus)	direct connection for K-bus or E-bus, automatic recognition
optionally expandable	modularly expandable	optionally expandable
—	CX1010-N010	in the basic CPU
CX9020-N030	CX1010-N030 (COM 1/2)	CX50x0-N030
	CX1010-N040 (COM 3/4)	
CX9020-N031	CX1010-N031 (COM 1/2)	CX50x0-N031
	CX1010-N041 (COM 3/4)	
CX9020-N020	CX1010-N020	CX50x0-N020
—	CX1010-N060	in the basic CPU
—	—	in the basic CPU
—	—	in the basic CPU
optionally integrated or via EtherCAT Terminals	modularly expandable	optionally integrated or via EtherCAT Terminals
CX9020-B110 slave	—	CX50x0-B110 slave
EL6720 master	CX1500-M200 master	EL6720 master
	CX1500-B200 slave	
CX9020-M310 master	CX1500-M310 master	CX50x0-M310 master
CX9020-B310 slave	CX1500-B310 slave	CX50x0-B310 slave
EL6740-0010 slave	—	EL6740-0010 slave
CX9020-M510 master	CX1500-M510 master	CX50x0-M510 master
CX9020-B510 slave	CX1500-B510 slave	CX50x0-B510 slave
—	CX1500-M520 master	—
	CX1500-B520 slave	
—	CX1500-M750 master	—
CX9020-M930 master	—	CX50x0-M930 master
CX9020-B930 slave		CX50x0-B930 slave
CX9020-B950 slave	—	CX50x0-B950 slave
—	CX1100-0910, -0900	1-second UPS

Embedded PC



CX1020



CX1030

Product overview Embedded PC

Basic CPU	CX1020	CX1030
Processor	Intel® Celeron® M ULV, 1 GHz clock frequency	Intel® Pentium® M, 1.8 GHz clock frequency
Flash memory	64 MB Compact Flash card (optionally expandable)	64 MB Compact Flash card (optionally expandable)
Internal main memory	256 MB DDR RAM (expandable to 512 MB, 1 GB)	256 MB DDR RAM (expandable to 512 MB, 1 GB)
Interfaces	2 x RJ 45 (Ethernet, internal switch)	2 x RJ 45 (Ethernet, internal switch), 10/100 Mbit/s
I/O interface	via power supply module (K-bus, K-bus/IP-Link, E-bus)	via power supply module (K-bus, K-bus/IP-Link, E-bus)
System interfaces	modularly expandable	modularly expandable
DVI/USB	CX1020-N010	CX1030-N010
RS232	CX1020-N030 (COM 1/2) CX1020-N040 (COM 3/4)	CX1030-N030 (COM 1/2) CX1030-N040 (COM 3/4)
RS422/RS485	CX1020-N031 (COM 1/2) CX1020-N041 (COM 3/4)	CX1030-N031 (COM 1/2) CX1030-N041 (COM 3/4)
Audio	CX1020-N020	CX1030-N020
Ethernet	CX1020-N060	CX1030-N060
4-port USB hub	–	–
Memory medium	–	–
Fieldbus interfaces	modularly expandable	modularly expandable
EtherCAT	–	–
Lightbus	CX1500-M200 master CX1500-B200 slave	CX1500-M200 master CX1500-B200 slave
PROFIBUS	CX1500-M310 master CX1500-B310 slave	CX1500-M310 master CX1500-B310 slave
Interbus	–	–
CANopen	CX1500-M510 master CX1500-B510 slave	CX1500-M510 master CX1500-B510 slave
DeviceNet	CX1500-M520 master CX1500-B520 slave	CX1500-M520 master CX1500-B520 slave
SERCOS interface	CX1500-M750 master	CX1500-M750 master
PROFINET RT	–	–
EtherNet/IP	–	–
UPS	CX1100-0920	CX1100-0930

► www.beckhoff.com/Embedded-PC



CX2020	CX2030	CX2040
Intel® Celeron® 1.4 GHz, single-core	Intel® Core™ i7 1.5 GHz, dual-core	Intel® Core™ i7 2.1 GHz, quad-core
4 GB CFast flash card (optionally extendable)	4 GB CFast flash card (optionally extendable)	4 GB CFast flash card (optionally extendable)
2 GB DDR3 RAM	2 GB DDR3 RAM	4 GB DDR3 RAM
2 x RJ 45 (10/100/1,000 Mbit/s), DVI-I, 4 x USB 2.0, optional 1 x RS232/RS422/RS485	2 x RJ 45 (10/100/1,000 Mbit/s), DVI-I, 4 x USB 2.0, optional 1 x RS232/RS422/RS485	2 x RJ 45 (10/100/1,000 Mbit/s), DVI-I, 4 x USB 2.0, optional 1 x RS232/RS422/RS485
via power supply module (K-bus or E-bus, automatic recognition)	via power supply module (K-bus or E-bus, automatic recognition)	via power supply module (K-bus or E-bus, automatic recognition)
modularly expandable	modularly expandable	modularly expandable
in the basic CPU	in the basic CPU	in the basic CPU
CX2020-N030 or CX2500-0030	CX2030-N030 or CX2500-0030	CX2040-N030 or CX2500-0030
CX2020-N031 or CX2500-0040	CX2030-N031 or CX2500-0040	CX2040-N031 or CX2500-0040
—	—	—
in the basic CPU, CX2500-0060	in the basic CPU, CX2500-0060	in the basic CPU, CX2500-0060
in the basic CPU, CX2500-0070	in the basic CPU, CX2500-0070	in the basic CPU, CX2500-0070
in the basic CPU, CX2250-0010	in the basic CPU, CX2250-0010	in the basic CPU, CX2250-0010
optionally integrated or via EtherCAT Terminals	optionally integrated or via EtherCAT Terminals	optionally integrated or via EtherCAT Terminals
CX2020-B110 slave	CX2030-B110 slave	CX2040-B110 slave
—	—	—
CX2020-M310 master	CX2030-M310 master	CX2040-M310 master
CX2020-B310 slave	CX2030-B310 slave	CX2040-B310 slave
—	—	—
CX2020-M510 master	CX2030-M510 master	CX2040-M510 master
CX2020-B510 slave	CX2030-B510 slave	CX2040-B510 slave
—	—	—
—	—	—
CX2020-M930 master	CX2030-M930 master	CX2040-M510 master
CX2020-B930 slave	CX2030-B930 slave	CX2040-B510 slave
CX2020-B950 slave	CX2030-B950 slave	CX2040-B950 slave
CX2100-0904, CX2100-0914	CX2100-0904, CX2100-0914	CX2100-0904, CX2100-0914

Industrial Motherboards



	ATX			Slot	3½-inch		
	CB1051	CB1052	CB1056	CB2051	CB3051	CB3052	CB3053
CPU type							
CPU	Intel® Celeron®/ Core™ Duo/ Core™2 Duo	Intel® Celeron®/ Core™2 Duo/ Core™2 Quad	Intel® Celeron®/ Core™ i3/Core™ i5/Core™ i7	Intel® Celeron®/ Core™ Duo/ Core™2 Duo	Intel® Celeron®/ Core™ Duo/ Core™2 Duo	Intel® Celeron®/ Core™2 Duo	Intel® Atom™
FSB	667 MHz	1,066 MHz	–	667 MHz	667 MHz	1,066 MHz	max. 533 MHz
Performance	1.07...2.16 GHz	1.07...2.53 GHz	1.1...2.5 GHz	1.07...2.16 GHz	1.07...2.16 GHz	2...2.53 GHz	1.1...1.6 GHz
Chipset							
Controller	Intel® 945GME and Intel® ICH7R	Intel® GM45 and Intel® ICH9R	Intel® QM67	Intel® 945GME and Intel® ICH7R	Intel® 945GME and Intel® ICH7R	Intel® GS45 and Intel® ICH9M-E	Intel® System Controller Hub US15W
ISA	–	–	–	–	–	–	–
Memory							
Type	2 x DIMM240– 1.8 V/DDR2	2 x SODIMM204– 1.5 V/DDR3	2 x SODIMM204– 1.5 V/DDR3	2 x SODIMM200– 1.8 V/DDR2	2 x SODIMM200– 1.8 V/DDR2	2 x SODIMM204– 1.5 V/DDR3	SODIMM200– 1.8 V/DDR2
Speed max.	DDR2 667	DDR3 1066	DDR3 1066	DDR2 667	DDR2 667	DDR3 1066	DDR2 533
Graphic							
Controller	Intel® 945GME integrated	Intel® GM45 integrated	CPU integrated	Intel® 945GME integrated	Intel® 945GME integrated	Intel® GS45 integrated	Intel® IGD integrated
Memory	8 MB UMA/ 224 MB DVMT	128 MB UMA/ 352 MB DVMT	512 MB DVMT	8 MB UMA/ 224 MB DVMT	8 MB UMA/ 224 MB DVMT	128 MB UMA/ 352 MB DVMT	8 MB UMA/ 256 MB DVMT

► www.beckhoff.com/Motherboards



PC/104

CB3054	CB3056	CB4021	CB4051	CB4052	CB4053	CB4055	CB4057
Intel® Celeron®/ Core™2 Duo	Intel® Celeron®/ Core™ i3/ Core™ i5/ Core™ i7	AMD LX800	Intel® Celeron®/ Core™ Duo/ Core™2 Duo	Intel® Celeron®/ Core™2 Duo (SFF)	Intel® Atom™	Intel® Celeron®/ Core™ i5/ Core™ i7	Intel® Atom™ D425/D525
1,066 MHz	–	133 MHz	667 MHz	1.066 MHz	max. 533 MHz	–	N/A
1.9...2.53 GHz	1.1...2.5 GHz	500 MHz	1.07...2.16 GHz	1.2...2.26 GHz	1.1...1.6 GHz	1.1...2.5 GHz	1.8 GHz
Intel® GS45 and Intel® ICH9M-E	Intel® QM67	AMD Geode CS5536	Intel® 945GME and Intel® ICH7R	Intel® GS45 and Intel® ICH9M-E	Intel® System Controller Hub	Intel® QM67	Intel® ICH9M-E
–	–	Winbond W83626F LPC	–	–	Fintek F85226F	–	–
2 x SODIMM204– 1.5 V/DDR3	2 x SODIMM204– 1.5 V/DDR3	SODIMM200– 2.5 V/DDR	SODIMM200– 1.8 V/DDR2	SODIMM204– 1.5 V/DDR3	SODIMM200– 1.8 V/DDR2	SODIMM204– 1.5 V/DDR3	SODIMM204– 1.5 V/DDR3
DDR3 1066	DDR3 1600	DDR 400	DDR2 667	DDR3 1066	DDR2 533	DDR3 1600	DDR3 800
Intel® GS45 integrated	CPU integrated	AMD LX800 integrated	Intel® 945GME integrated	Intel® GS45 integrated	Intel® IGD integrated	CPU integrated	CPU integrated
128 MB UMA/ 352 MB DVMT	512 MB DVMT	254 MB UMA	8 MB UMA/ 224 MB DVMT	128 MB UMA/ 352 MB DVMT	8 MB UMA/ 256 MB DVMT	512 MB DVMT	8 MB UMA/ 256 MB DVMT

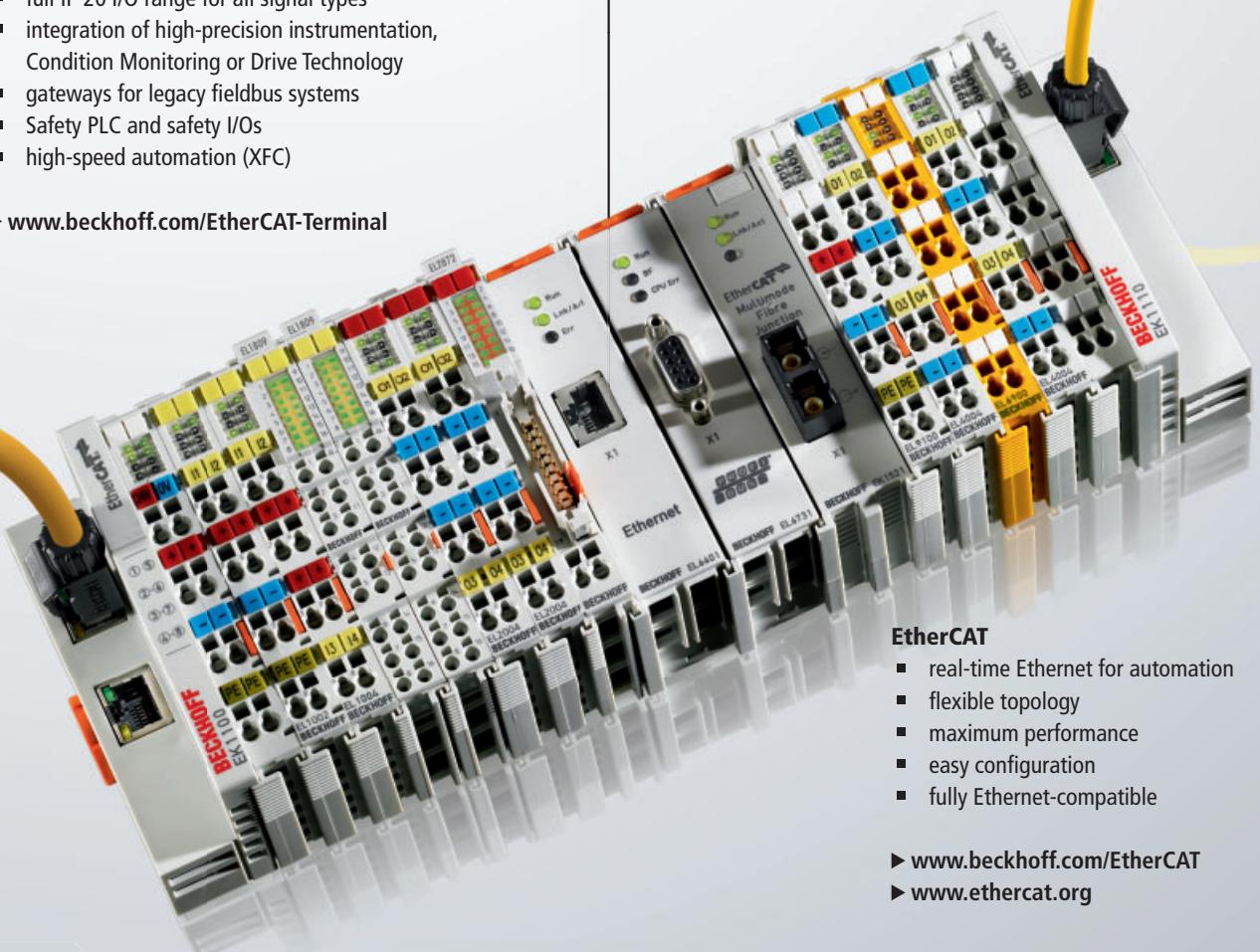
The I/O Company

EtherCAT®

EtherCAT Terminals 34

- EtherCAT right down to each terminal
- full IP 20 I/O range for all signal types
- integration of high-precision instrumentation, Condition Monitoring or Drive Technology
- gateways for legacy fieldbus systems
- Safety PLC and safety I/Os
- high-speed automation (XFC)

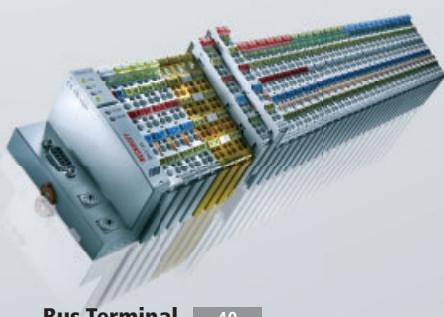
► www.beckhoff.com/EtherCAT-Terminal



EtherCAT

- real-time Ethernet for automation
- flexible topology
- maximum performance
- easy configuration
- fully Ethernet-compatible

► www.beckhoff.com/EtherCAT
► www.ethercat.org



Bus Terminal 40

- open, fieldbus-neutral IP 20 I/O system
- 17 fieldbuses, free signal mix
- around 400 different Bus Terminals
- all common sensors and actuators can be connected

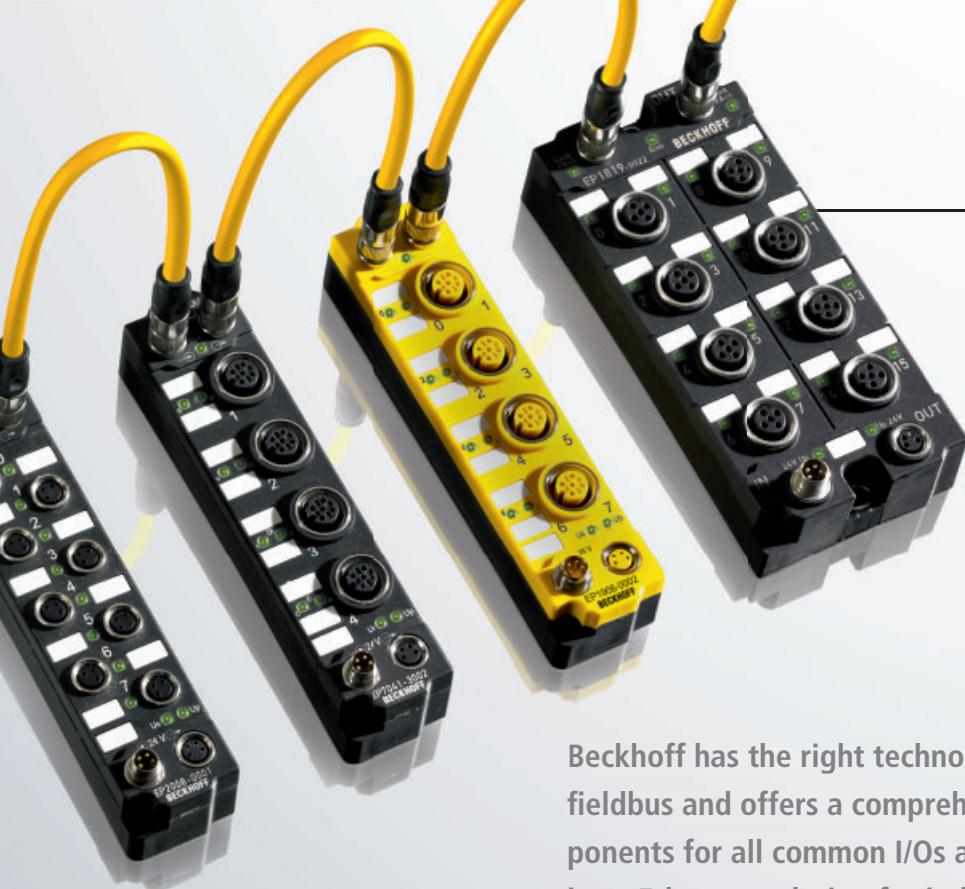
► www.beckhoff.com/BusTerminal



Fieldbus Box 46

- open, fieldbus-neutral IP 67 I/O system
- 12 fieldbuses, 24 signal types
- compact and robust
- can be mounted directly on machines, without control cabinets and terminal boxes

► www.beckhoff.com/FieldbusBox



EtherCAT Box 38

- IP 67 EtherCAT I/O system
- high performance for harsh environments
- compact and robust
- can be mounted directly on machines, without control cabinets and terminal boxes

► www.beckhoff.com/EtherCAT-Box

Beckhoff has the right technology for each signal and each fieldbus and offers a comprehensive range of fieldbus components for all common I/Os and fieldbus systems. EtherCAT is an Ethernet solution for industrial automation, which is characterised by outstanding performance and simple handling. Beckhoff offers versatile I/O systems in the form of the IP 20 EtherCAT Terminals and the IP 67 EtherCAT Box modules. The Bus Terminals (IP 20) and Fieldbus Box modules (IP 67) are fieldbus-neutral and enable an open control technology.

► www.beckhoff.com/IO



Lightbus 48

- fast fibre optic fieldbus
- interference-proof fieldbus communication



PC Fieldbus Cards 49

- PCI/PCIe and Mini PCIe fieldbus cards for all common fieldbus systems
- optimised for fast control and real-time tasks



Switches 49

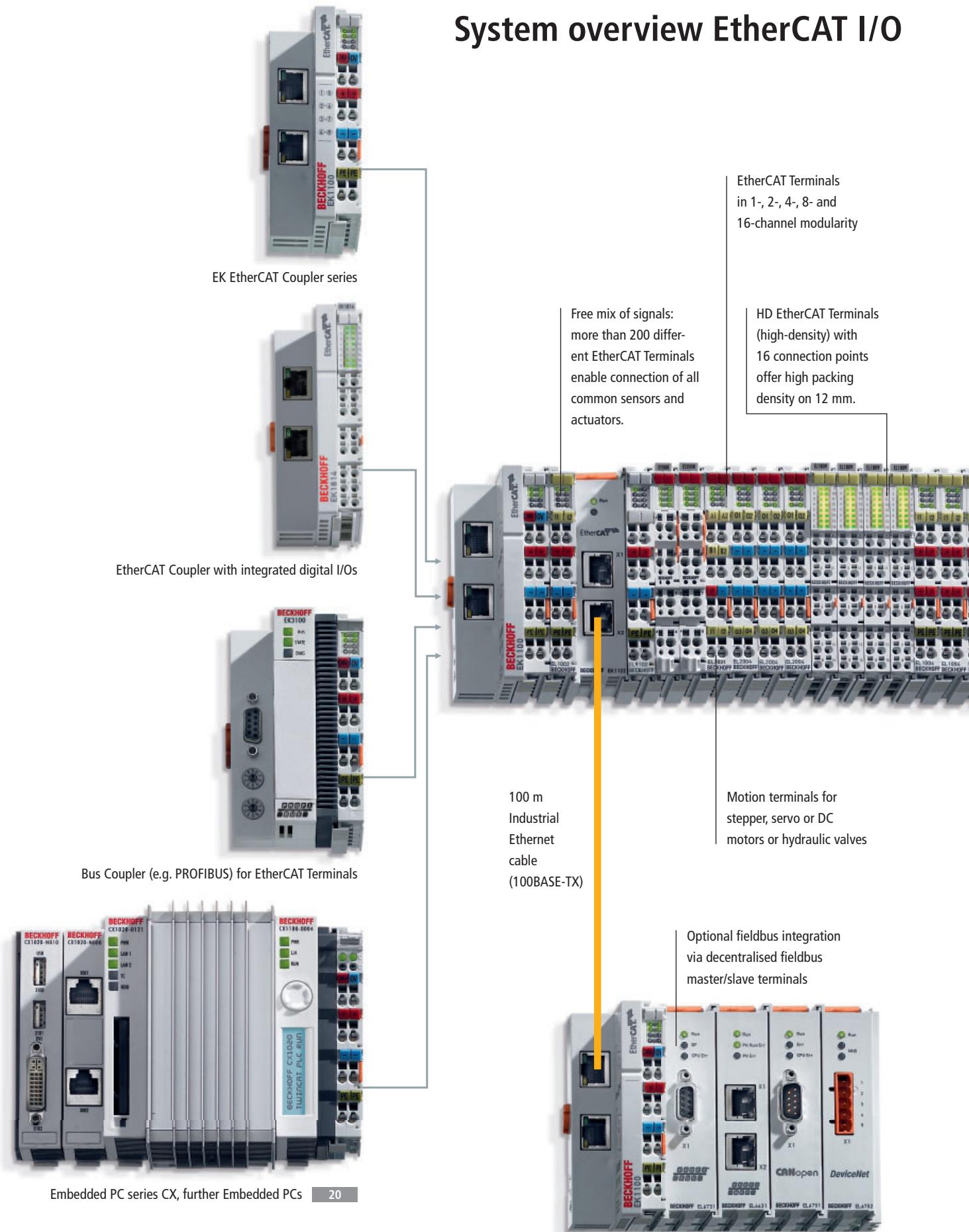
- Industrial Ethernet switches for 10/100/1,000 Mbit/s
- real-time Ethernet port multiplier for independent Ethernet networks
- universally applicable in automation and office networks

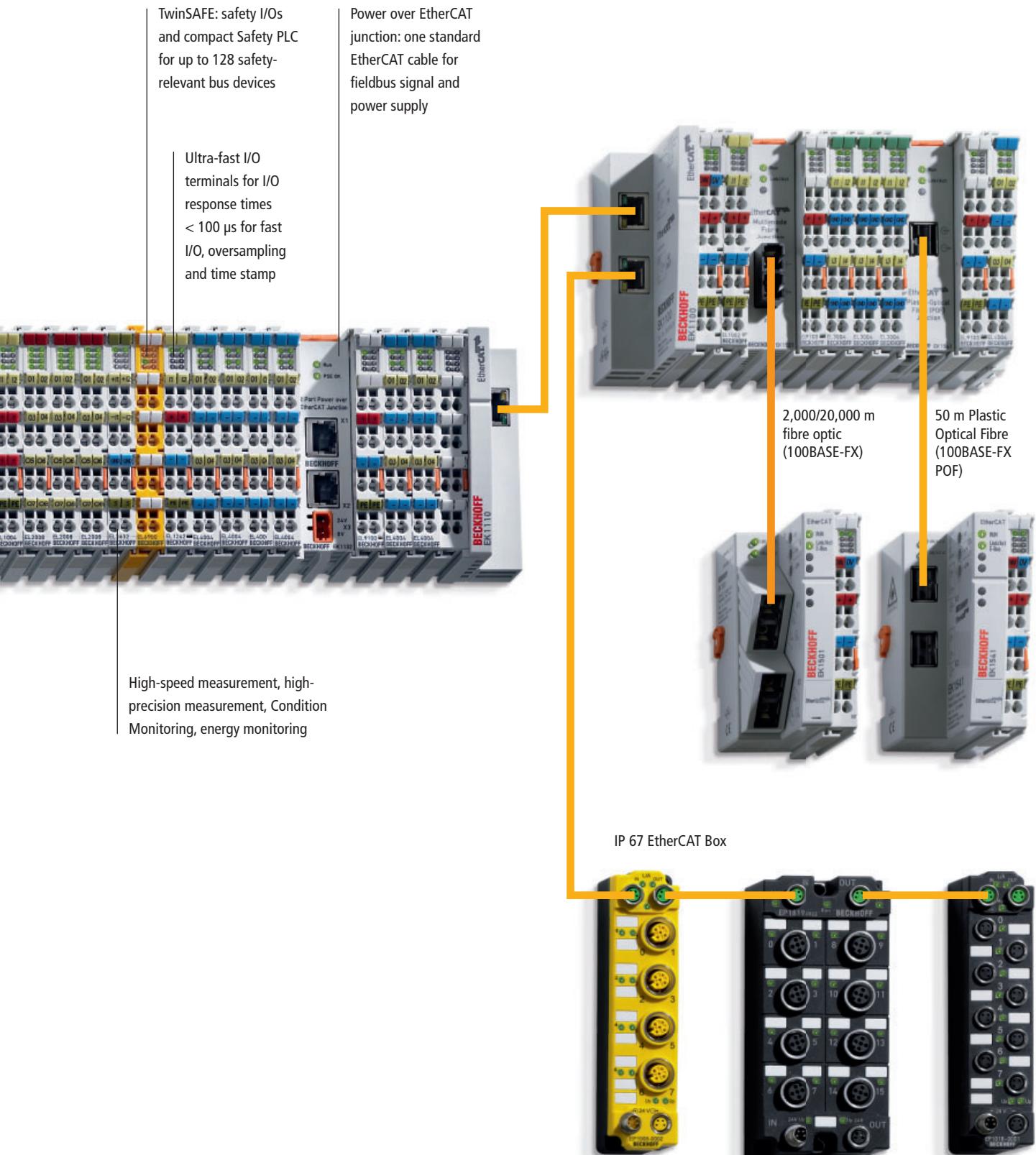
► www.beckhoff.com/Switches

► www.beckhoff.com/Lightbus

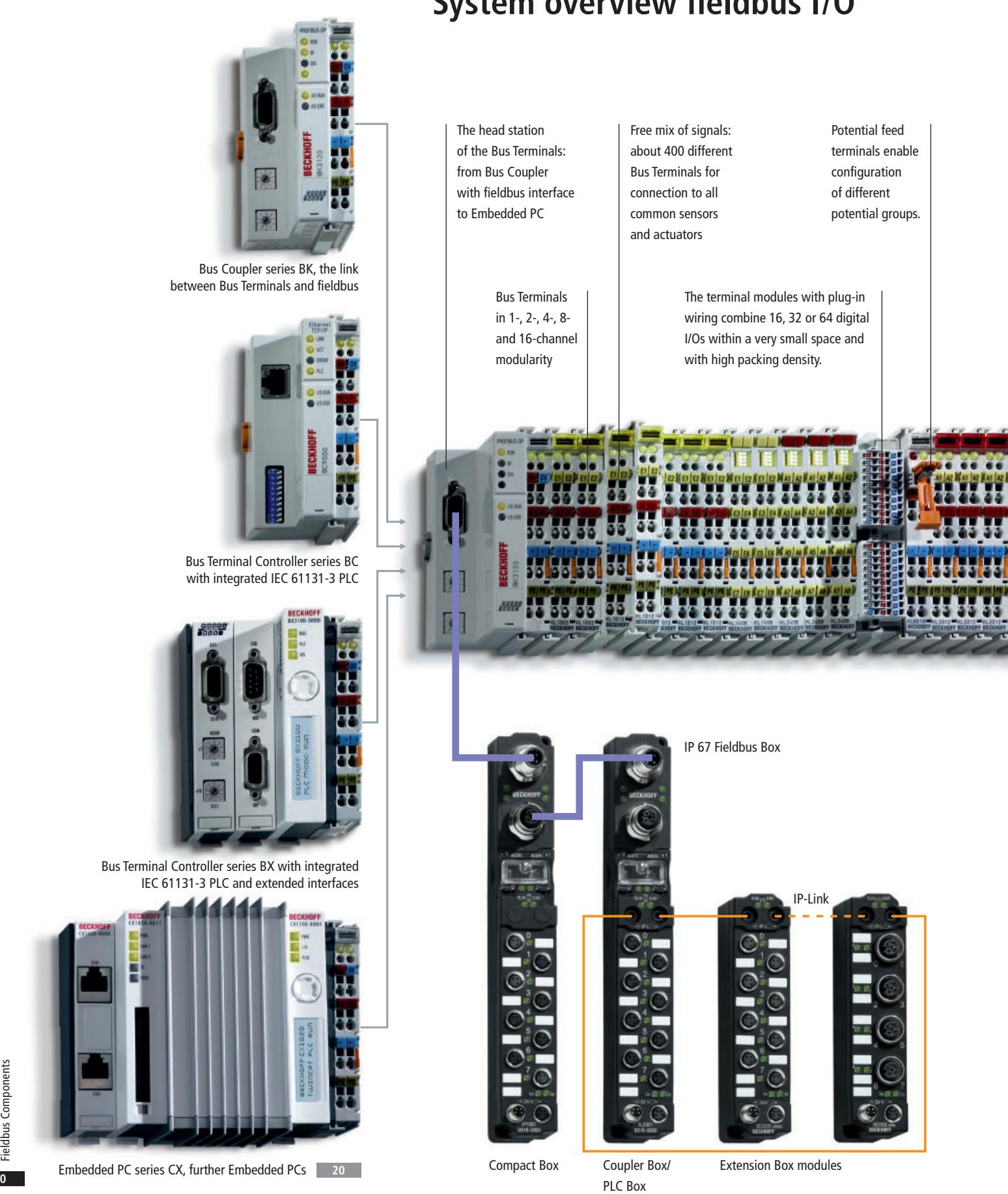
► www.beckhoff.com/FieldbusCards

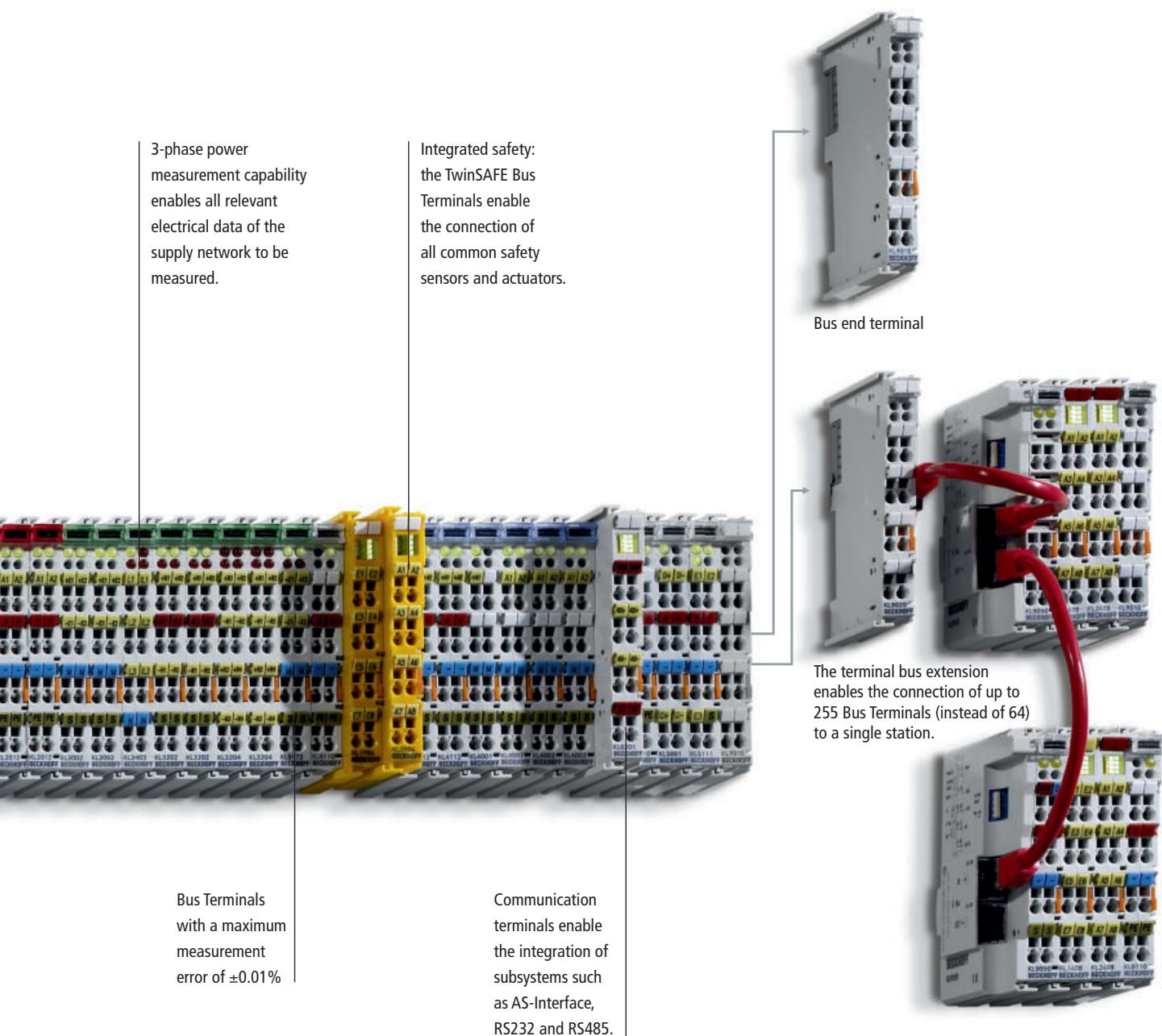
System overview EtherCAT I/O





System overview fieldbus I/O

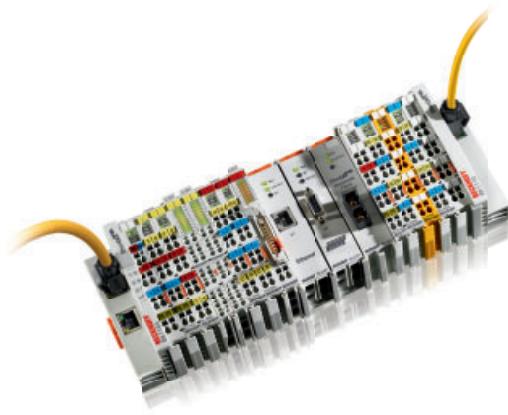




Product overview fieldbus systems

Fieldbus	Bus Terminal		EtherCAT Terminal	Fieldbus Box		
	Bus Couplers	PLC (IEC 61131-3)	Couplers/Gateways	Compact Box	Coupler Box	PLC Box (IEC 61131-3)
 EtherCAT	BK1120		EK1xxx	IL230x-B110		
	BK1150					
	BK1250					
 LIGHTBUS	BK2xx0	BC2000	EL6720 master terminal	IPxxxx-B200	IL230x-B200	
 PROFIBUS	BK3xx0	BC31x0	EK3100	IPxxxx-B31x	IL230x-B31x	IL230x-C31x
	LC3100	BX3100	EL6731 master/slave terminal			
 INTERBUS	BK4xx0	BC4000	EL6740 slave terminal	IPxxxx-B400	IL230x-B400	
 CANopen	BK51xx	BC5150	EK5100	IPxxxx-B51x	IL230x-B51x	
	LC5100	BX5100	EL6751 master/slave terminal			
 DeviceNet	BK52x0	BC5250	EK5200	IPxxxx-B52x	IL230x-B52x	
	LC5200	BX5200	EL6752 master/slave terminal			
ControlNet	BK7000					
CC-Link	BK7150					
Modbus	BK73x0	BC7300		IPxxxx-B730	IL230x-B730	
Fipio	BK7420					
 SERCOS Interface	BK75x0		EK9700			
RS485	BK8000	BC80x0	EL6021, EL6022	IPxxxx-B800	IL230x-B800	
		BX8000				
RS232	BK8100	BC81x0	EL6001, EL6002	IPxxxx-B810	IL230x-B810	IL230x-C810
Ethernet TCP/IP	BK9xx0	BC9xxx	EK9000		IL230x-B90x	IL230x-C900
		BX9000	EL6601, EL6614 switch port			
 PROFINET	BK9xx3		EK9300, EK9310		IL230x-B903	
			EL6631 IO controller/device terminal			
			EL6632 IRT controller terminal			
 EtherNet/IP	BK9xx5		EK9500		IL230x-B905	
 USB	BK9500					
 AS-i	KL/KS62x1	master terminal	EL6201 master terminal			
	KL6224	master terminal	EL6224 master terminal			
KNX/EIB	KL6301	KNX/EIB Bus Terminal				
LON	KL6401	LON Bus Terminal				
MP-Bus	KL/KS6771	master terminal				
M-Bus	KL6781	master terminal				
DALI/DSI	KL/KS6811	master terminal				
IEEE 1588			EL6688 master/slave terminal			
DMX			EL6851 master/slave terminal			

EtherCAT Terminal



EtherCAT Coupler			Embedded PC	
EtherCAT Coupler E-bus	EK1100 EtherCAT Coupler E-bus	EK1101 ID switch	Embedded PC with E-bus interface	CX80xx with directly integrated E-bus interface
	EK1501 ID switch, multimode fibre optic	EK1501-0010 ID switch, singlemode fibre optic		CX9000, CX9010, CX9020 with directly integrated E-bus interface
	EK1541 ID switch, POF			CX1010 EtherCAT Terminal integration via power supply CX1100-00x4
EtherCAT Coupler E-bus with integrated digital I/Os	EK1814 4 inputs + 4 outputs	EK1818 8 inputs + 4 outputs		CX5010, CX5020 with directly integrated E-bus interface
	EK1828 4 inputs + 8 outputs	EK1828-0010 8 outputs		CX1020, CX1030 EtherCAT Terminal integration via power supply CX1100-00x4
EtherCAT Coupler K-bus	BK1120	BK1150 "Compact"		CX2020, CX2030, CX2040 EtherCAT Terminal integration via power supply CX2100-0xxx
		BK1250 between E-bus and K-bus terminals		
Bus Coupler (for ELxxxx)	EK3100 PROFIBUS	EK9300 PROFINET IO		
	EK5100 CANopen	EK9310 PROFINET IRT		
	EK5200 DeviceNet	EK9500 EtherNet/IP		
	EK9000 Ethernet	EK9700 Sercos III		
Extension system and junctions	EK1110 extension end terminal	EK1122 2-port EtherCAT junction		
	EK1521 multimode fibre optic junction	EK1132 2-port Power over EtherCAT junction		
	EK1521-0010 singlemode fibre optic junction	EK1561 POF junction		

EtherCAT Terminal | Digital input: EL1xxx/ES1xxx

Signal	2-channel	4-channel	8-channel	16-channel
5/12 V DC		EL1124 5 V DC	EL1144 12 V DC	
24 V DC (filter 3.0 ms)	EL1002 type 3	EL1004 type 3	EL1004-0020 > 2,500 V	EL1008 type 3
		EL1804 8 x 24 V, 4 x 0 V, type 3	EL1104 with sensor supply	EL1808 8 x 24 V DC, type 3
		EL1084 negative switching	EL1024 type 2	EL1859 type 3, 8 inputs, 8 outputs, $I_{MAX} = 0.5 \text{ A}$
				EL1088 negative switching
24 V DC (filter 10 µs)	EL1012 type 3	EL1014 type 3	EL1034 potential-free	EL1018 type 3
		EL1114 with sensor supply	EL1814 8 x 24 V, 4 x 0 V, type 3	EL1819 type 3
			EL1094 negative switching	EL1872 flat-ribbon cable, type 3
24 V DC (XFC, $T_{ON}/T_{OFF} 1 \mu\text{s}$)	EL1202 fast input			
	EL1252 time stamp			
	EL1262 oversampling			
24 V DC (safe inputs)		EL1904 TwinSAFE	EL1934 PROFIsafe	
48 V DC		EL1134 filter 10 µs		
120 V AC/DC	EL1712 power contacts			
230 V AC	EL1702 power contacts			
	EL1722 no power contacts			
Counter	EL1502 100 kHz, 32 bit			
	EL1512 1 kHz, 16 bit			

EtherCAT Terminal | Digital output: EL2xxx/ES2xxx, EM2xxx

Signal	2-channel	4-channel	8-channel	16-channel
5 V DC		EL2124 $I_{MAX} = \pm 20 \text{ mA}$		
12 V DC		EL2024-0010 $I_{MAX} = 2.0 \text{ A}$		
24 V DC	EL2042 2 x 4 A/1 x 8 A			
24 V DC ($I_{MAX} = 0.5 \text{ A}$)	EL2002	EL2004	EL2008	EM2042 D-sub connection
			EL2808 8 x 0 V	EL2872 flat-ribbon cable
		EL2084 negative switching	EL2088 negative switching	EL2889 negative switching
			EL1859 filter 3.0 ms, 8 inputs, 8 outputs, type 3	EL2872-0010 flat-ribbon cable, negative switching
24 V DC ($I_{MAX} = 2.0 \text{ A}$)	EL2022	EL2024		
	EL2032 with diagnostic	EL2034 with diagnostic		
24 V DC (XFC, $T_{ON}/T_{OFF} 1 \mu\text{s}$)	EL2202 push-pull outputs	EL2212 overexcitation, time stamp		
	EL2252 time stamp	EL2262 oversampling		
24 V DC (safe outputs)	EL2902 TwinSAFE	EL2904 TwinSAFE		
		EL2934 PROFIsafe		
24 V AC/DC			EL2798	
Relay (up to 230 V AC)	EL2602 $I_{MAX} = 2.0 \text{ A}$, make contact, power contacts	EL2622 $I_{MAX} = 2.0 \text{ A}$, make contact, no power contacts	EL2624 make contact, no power contacts	
	EL2612 $I_{MAX} = 1.0 \text{ A}$, change-over, no power contacts			
Triac (up to 230 V AC)	EL2712 12...230 V AC, 0.5 A, power contacts	EL2722 12...230 V AC, 1.0 A, mutually locked outputs		
	EL2732 12...230 V AC, 0.5 A, no power contacts			
PWM	EL2502 24 V DC, 1.0 A	EL2535 24 V DC, 50 mA, 1 A or 2 A		
		EL2545 50 V DC, 3.5 A		
Frequency outp.	EL2521 1...500 kHz			

The standard EtherCAT Terminals (ELxxxx) can be optionally ordered as ESxxxx with pluggable wiring level.
EN 61131-2 specification: www.beckhoff.com/EN61131-2

EtherCAT Terminal | Analog input: EL3xxx/ES3xxx

Signal	1-channel		2-channel			4-channel		8-channel		
±75 mV, 24 bit			EL3602-0010							
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, 12 bit			EL3062-0030							
±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 16 bit	EL3602 24 bit	EL3702 16 bit, oversampling	EL3104 16 bit				
0...20 mA	EL3041 single-ended, 12 bit	EL3141 single-ended, 16 bit	EL3042 single-ended, 12 bit	EL3142 single-ended, 16 bit	EL3742 differential input, 16 bit, oversampling	EL3044 single-ended, 12 bit	EL3144 single-ended, 16 bit	EL3048 single-ended, 12 bit		
	EL3011 differential input, 12 bit	EL3111 16 bit	EL3012 12 bit	EL3112 16 bit	EL3612 24 bit	EL3014 12 bit	EL3114 16 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 16 bit	EL3022 12 bit	EL3122 16 bit		EL3024 12 bit	EL3124 16 bit			
±10 mA			EL3142-0010 single-ended, 16 bit							
Thermo-couples/mV	EL3311 16 bit	EL3312 16 bit			EL3314 16 bit	EL3314-0010 24 bit	EL3318 16 bit			
Resistance thermometer (RTD)	EL3201 16 bit	EL3202 16 bit			EL3204 16 bit					
Potentiometer						EL3255 5-channel				
Resistor bridge	EL3351	EL3356 self-calibration								
3-phase power measurement			EL3403 500 V AC, 1 A	EL3413 690 V AC, 1 A	EL3433 500 V AC, 10 A					
Measurement	EL3681 digital multimeter terminal, 18 bit	EL3692 resistance measurement, 10 mΩ...10 MΩ			EL3773 power monitoring					
Condition Monitoring			EL3632 IEPE terminal, acceleration sensors							

EtherCAT Terminal | Analog output: EL4xxx/ES4xxx

Signal	1-channel	2-channel	4-channel	8-channel
0...10 V	EL4001 12 bit	EL4002 12 bit	EL4004 12 bit	EL4008 12 bit
		EL4102 16 bit	EL4104 16 bit	
±10 V	EL4031 12 bit	EL4032 12 bit	EL4034 12 bit	EL4038 12 bit
		EL4132 16 bit	EL4134 16 bit	
		EL4732 16 bit, oversampling		
0...20 mA	EL4011 12 bit	EL4012 12 bit	EL4014 12 bit	EL4018 12 bit
		EL4112 16 bit	EL4114 16 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	
±10 mA			EL4112-0010 16 bit	

The standard EtherCAT Terminals (ELxxxx) can be optionally ordered as ESxxxx with pluggable wiring level.

EtherCAT Terminal Special functions: EL/ES5xxx, EL/ES6xxx, EL/ES7xxx, EM7xxx				Safety EtherCAT Terminals	
Signal	1-channel	2-channel	4-channel	Signal	
Position measurement	EL5001 SSI encoder interface	EL5021 1 V _{PP} , SinCos encoder interface	EL5002 SSI encoder interface	24 V DC	EL1904 TwinSAFE, 4 safe inputs
	EL5001-0011 SSI monitor terminal	EL5101 differential inputs, RS485, incremental encoder interface			EL1934 PROFIsafe, 4 safe inputs
Position measurement (32 bit)		EL5151 24 V DC, incremental encoder interface	EL5152 24 V DC, incremental encoder interface		EL2902 TwinSAFE, 2 safe outputs
Communication	EL6001 RS232, 115.2 kbaud	EL6021 RS422/RS485, 115.2 kbaud	EL6002 RS232, 115.2 kbaud, D-sub	EL2904 TwinSAFE, 4 safe outputs	
	EL6080 memory terminal 128 kbyte		EL6022 D-sub, RS422/RS485, 115.2 kbaud		EL2934 PROFIsafe, 4 safe outputs
	EL6601 switch port	EL6688 IEEE 1588 master/slave	EL6692 EtherCAT bridge terminal		EL6900 TwinSAFE PLC
Communication (master terminal)	EL6201 AS-Interface	EL6631 PROFINET IO		EL6930 TwinSAFE/PROFIsafe logic and gateway terminal	
	EL6632 PROFINET IRT	EL6720 Lightbus			
	EL6731 PROFIBUS	EL6751 CANopen			
	EL6752 DeviceNet	EL6851 DMX			
Communication (slave terminal)	EL6631 PROFINET IO	EL6731 PROFIBUS			
	EL6740 Interbus	EL6751 CANopen			
	EL6752 DeviceNet	EL6851 DMX			
Motion	EL7031 24 V DC, stepper motor ter., I _{MAX} = 1.5 A	EL7201 servomotor terminal, 50 V, 4 A	EL7332 24 V DC, DC motor output stage, 1 A		
	EL7041 stepper motor terminal, I _{MAX} = 5.0 A, 50 V, incremental encoder interface	EL7051 stepper motor terminal, I _{MAX} = 8.0 A, 80 V, incremental encoder interface	EL7342 DC motor output stage, incremental encoder	EM7004 3 incremental encoders, 16 digital inputs 24 V DC, 16 digital outputs 24 V DC, 4 analog inputs ±10 V	

EtherCAT Terminal System terminals: EL9xxx/ES9xxx					
Signal	System	Signal	Potential supply	Power supply and accessories	
System	EL9011 bus end cap	24 V DC	EL9100	EL9400	EL9410
	EL9070 shield terminal			input 24 V DC, E-bus power supply, 2 A	input 24 V DC, output 5 V/2 A
	EL9080 isolation terminal		EL9110	EL9505	
	EL9195 shield terminal		diagnostic	input 24 V DC, output 5 V DC, 0.5 A	
Potential distribution terminal	EL9180 2 clamping units per power contact	50 V DC	EL9200	EL9508	
	EL9181 2 x 8 terminal points		with fuse	input 24 V DC, output 8 V DC, 0.5 A	
	EL9182 8 x 2 terminal points		EL9210	EL9510	EL9512
	EL9183 1 x 16 terminal points		diagnostic, with fuse	input 24 V DC, output 10 V DC, 0.5 A	input 24 V DC, output 12 V DC, 0.5 A
	EL9184 8 x 24 V DC, 8 x 0 V DC		EL9520 AS-Interface potential supply with filter	EL9515	
	EL9185 4 clamping units at 2 power contacts			input 24 V DC, output 15 V DC, 0.5 A	
	EL9186 8 x 24 V			EL9540 surge filter terminal for field supply	EL9550 surge filter terminal for system/field supply
	EL9187 8 x 0 V				
	EL9188 16 x 24 V DC		EL9560	input 24 V DC, output 24 V DC, 0.1 A with electrical isolation	
	EL9189 16 x 0 V DC				
			EL9570 50 V DC, buffer capacitor terminal, 500 µF		
		120...	EL9150 with LED		
		230 V AC	EL9160 diagnostic		
			EL9190		
			EL9250 with fuse, with LED		
			EL9260 diagnostic, with fuse		
			EL9290 with fuse		

EtherCAT Box



EtherCAT Box | Digital I/O

Input	M8	M12	Other
24 V DC	8-channel filter 3.0 ms	EP1008-0001	EP1008-0002, -0022
	8-channel filter 10 µs	EP1018-0001	EP1018-0002
	8-channel filter 10 µs, negative switching	EP1098-0001	
	8-channel 2-channel time stamp	EP1258-0001	EP1258-0002
	8-channel multi-function input	EP1518-0001	EP1518-0002
	8-channel TwinSAFE, 8 safe inputs		EP1908-0002
	16-channel filter 3.0 ms	EP1809-0021	EP1809-0022
	16-channel filter 10 µs	EP1819-0021	EP1819-0022
16-channel filter 10 µs, D-sub socket, 25-pin			EP1816-0008
Output	M8	M12	Other
24 V DC	8-channel $I_{MAX} = 0.5 \text{ A}$	EP2008-0001	EP2008-0002, -0022
	8-channel $I_{MAX} = 2 \text{ A}, \sum 4 \text{ A}$	EP2028-0001	EP2028-0002
	8-channel $I_{MAX} = 2 \text{ A}, \sum 4 \text{ A}$, diagnostics	EP2038-0001	EP2038-0002
	16-channel $I_{MAX} = 0.5 \text{ A}, \sum 4 \text{ A}$	EP2809-0021	EP2809-0022
	16-channel $I_{MAX} = 0.5 \text{ A},$ $\sum 4 \text{ A}$, D-sub socket, 25-pin		EP2816-0008
	16-channel $I_{MAX} = 0.5 \text{ A},$ $\sum 4 \text{ A}$, 2 x D-sub socket, 9-pin		EP2816-0010
125 V AC/30 V DC	4-channel relay output		EP2624-0002
Combi	M8	M12	Other
24 V DC	8-channel 4 input + 4 output, filter 3.0 ms, $I_{MAX} = 0.5 \text{ A}$	EP2308-0001	EP2308-0002
	8-channel 4 input + 4 output, filter 10 µs, $I_{MAX} = 0.5 \text{ A}$	EP2318-0001	EP2318-0002
	8-channel 4 input + 4 output, filter 3.0 ms, $I_{MAX} = 2 \text{ A}$		EP2328-0002
	8-channel 8 input/output, freely configurable, filter 10 µs, $I_{MAX} = 0.5 \text{ A}$	EP2338-0001	EP2338-0002
	16-channel 16 input/output, freely configurable, filter 3.0 ms, $I_{MAX} = 0.5 \text{ A}, \sum 4 \text{ A}$	EP2339-0021	EP2339-0022
	16-channel 16 input/output, freely configurable, filter 10 µs, $I_{MAX} = 0.5 \text{ A}, \sum 4 \text{ A}$	EP2349-0021	EP2349-0022
	16-channel 8 input + 8 output, filter 10 µs, $I_{MAX} = 0.5 \text{ A}$, D-sub socket, 25-pin		EP2316-0008
	16-channel 8 input + 8 output, filter 10 µs, $I_{MAX} = 0.5 \text{ A}$, IP 20 plug		EP2316-0003

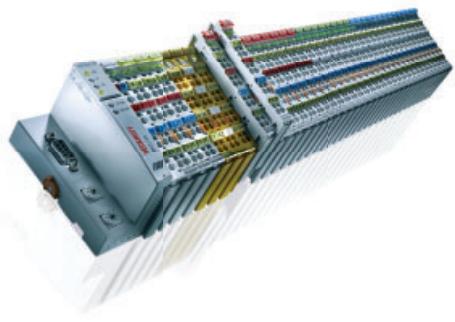
EtherCAT Box Analog I/O		
Input		M12
±10 V, 0/4...20 mA	4-channel parameterisable, differential input, 16 bits	EP3174-0002
	4-channel parameterisable, single-ended, 16 bits	EP3184-0002
Resistance thermometer	4-channel resistance thermometer (RTD), PT100, PT200, PT500, PT1000, Ni100, Ni120, Ni1000, 16 bits	EP3204-0002
Thermocouples/mV	4-channel thermocouple, type J, K, L, B, E, N, R, S, T, U, 16 bits	EP3314-0002
Output		M12
±10 V, 0/4...20 mA	4-channel parameterisable, 16 bits	EP4174-0002
	4-channel 2 input + 2 output, parameterisable, 16 bits	EP4374-0002

EtherCAT Box Special functions			
Function		M12	Other
Position measurement	Incremental encoder interface 32 or 16 bits, binary	EP5101-0002	EP5101-0011 D-sub
Communication	Serial interface 2-channel, RS232, RS422/RS485 IO-Link master	EP6002-0002 EP6224-0002 EP6224-2022	
Motion	Stepper motor module 50 V DC, 5 A, incremental encoder, 2 digital inputs, 1 digital output	EP7041-0002 EP7041-2002 EP7041-3002	
	Stepper motor module 50 V DC, 1.5 A, incremental encoder, 2 digital inputs, 1 digital output	EP7041-1002	
	DC motor output stage 2-channel, 50 V DC, 3.5 A	EP7342-0002	
System	Power distribution for EtherCAT Box modules 4/4-channel		EP9214-0023 7/8" plug, 7/8" socket

EtherCAT Box Infrastructure		
EtherCAT		M8
EtherCAT Box with ID switch	EtherCAT Box 3 decimal ID switches	EP1111-0000
EtherCAT junction	2-channel EtherCAT junction	EP1122-0001

► www.beckhoff.com/EtherCAT-Box

Bus Terminal



Bus Coupler						PLC	
Fieldbus slave	Standard	Economy only digital I/Os	Economy plus	Compact	Low Cost only digital I/Os	Controller (IEC 61131-3)	
EtherCAT			BK1120	BK1150			
				BK1250			
LIGHTBUS	BK2000	BK2010	BK2020			BC2000	
PROFIBUS		BK3010 1.5 Mbaud					
	BK3100 12 Mbaud	BK3110 12 Mbaud	BK3120 12 Mbaud	BK3150 12 Mbaud	LC3100 12 Mbaud	BC3100 12 Mbaud	BC3150 12 Mbaud
	BK3500 1.5 Mbaud, fibre optic		BK3520 12 Mbaud, fibre optic				
INTERBUS	BK4000	BK4010	BK4020			BC4000	
	BK4500 fibre optic						
CANopen		BK5110	BK5120	BK5150	LC5100		BC5150
				BK5151			
DeviceNet	BK5200	BK5210	BK5220	BK5250	LC5200		BC5250
ControlNet	BK7000						
CC-Link				BK7150			
Modbus	BK7300			BK7350		BC7300	BC8050
							BC8150
Fipio			BK7420				
SERCOS	BK7500		BK7520				
RS485	BK8000					BC8000	BC8050
RS232	BK8100					BC8100	BC8150
Ethernet TCP/IP	BK9000			BK9050		BC9000	BC9050
	BK9100 2-channel switch					BC9100	BC9191 room controller
PROFINET	BK9103 2-channel switch			BK9053			
EtherNet/IP	BK9105 2-channel switch			BK9055			
USB	BK9500						

► www.beckhoff.com/BusTerminal

		Embedded PC						
Program memory 128 kbyte	Program memory 256 kbyte	CX80xx	CX900x, CX9010	CX9020	CX1010	CX50xx	CX1020, CX1030	CX20xx
		CX8010		optional ⁽²⁾		optional ⁽²⁾		optional ⁽²⁾
					optional ⁽¹⁾		optional ⁽¹⁾	
		CX8031		optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾
BX3100 12 Mbaud								
BX5100	CX8051			optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾	optional ⁽¹⁾	optional ⁽²⁾
BX5200								
				optional ⁽³⁾				
BX8000			optional ⁽²⁾					
BX8000			optional ⁽²⁾					
BC9020	BX9000	CX8090	CX9000	CX9020	CX1010	CX5010	CX1020	CX2020
BC9120 2-channel switch			CX9010			CX5020	CX1030	CX2030
								CX2040
		CX8093	optional ⁽³⁾	optional ⁽²⁾	optional ⁽³⁾	optional ⁽²⁾	optional ⁽³⁾	optional ⁽²⁾
		CX8095	optional ⁽³⁾	optional ⁽²⁾	optional ⁽³⁾	optional ⁽²⁾	optional ⁽³⁾	optional ⁽²⁾

Bus Terminal Digital input: KL1xxxx/KS1xxx						KM1xxx	
Signal	2-channel		4-channel		8-channel	16-channel	4-, 16-, 32-, 64-ch.
5 V DC			KL1124 filter 0.2 ms				
24 V DC (filter 3.0 ms)	KL1002		KL1104	KL1304 type 2	KL1408	KL1809 type 3	
	KL1302 type 2	KL1402 type 3	KL1154 positive/negative switching	KL1184 negative switching	KL1488 negative switching	KL1862 flat-ribbon cable, type 3	KM1002 16-channel
	KL1052 positive/negative switching	KL1352 Namur	KL1404 4 x 2-wire connection	KL1804 8 x 24 V, 4 x 0 V, type 3	KL1808 8 x 24 V DC, type 3	KL1889 negative switching	KM1004 32-channel
	KL1212 short-circuit-protected sensor supply	KL1362 break-in alarm			KL1859 8 inputs, 8 outputs, type 3, $I_{MAX} = 0.5 \text{ A}$	KL1862-0010 flat-ribbon cable, type 3, negative switching	KM1008 64-channel
24 V DC (filter 0.2 ms)	KL1012	KL1312 type 2	KL1114	KL1314 type 2	KL1418	KL1819 type 3	
		KL1412 type 3	KL1164 positive/negative switching	KL1194 negative switching	KL1498 negative switching	KL1872 flat-ribbon cable, type 3	KM1012 16-channel
			KL1414 4 x 2-wire connection	KL1434 type 2, 4 x 2-wire connection			KM1014 32-channel
			KL1814 8 x 24 V, 4 x 0 V, type 3				KM1018 64-channel
24 V DC	KL1232 pulse expansion	KL1382 thermistor	KL1904 TwinSAFE, 4 safe inputs				KM1644 manual operation, 4-channel
≥ 48 V DC	KL1032 filter 3.0 ms	KL1712-0060					
120 V AC/DC	KL1712						
230 V AC	KL1702	KL1722 no power contacts					
Counter (24 V DC)	KL1501 up/down, 100 kHz	KL1512 up/down, 1 kHz, 16 bit					

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 Terminal Digital output: KL2xxx/KS2xxx						KM2xxx
Signal	1-channel	2-channel	4-channel	8-channel	16-channel	4-, 16-, 32-, 64-ch.
5 V DC			KL2124			
24 V DC (I _{MAX} = 0.5 A)	KL2012		KL2114	KL2408	KL2809	KM2002 16-channel
	KL2032 reverse voltage protection		KL2184 negative switching	KL2488 negative switching	KL2889 negative switching	KM2004 32-channel
			KL2134 reverse voltage protection	KL2808 8 x 0 V	KL2872 flat-ribbon cable	KM2008 64-channel
	KL2212 diagnostic, protected sensor supply		KL2404 4 x 2-wire	KL1859 8 inputs, 8 outputs, filter 3.0 ms, type 3	KL2872-0010 flat-ribbon cable, negative switching	KM2042 16-channel, D-sub connection
24 V DC (I _{MAX} = 2.0 A)	KL2022		KL2424 4 x 2-wire			
24 V AC/DC (I _{MAX} = 2.0 A)			KL2784 solid state relay			
			KL2794 solid state relay, potential-free			
24 V DC	KL2442 2 x 4 A/1 x 8 A		KL2904 TwinSAFE, 4 safe outputs			
Relay 125/400 V AC	KL2631 400 V AC, make contact	KL2612 125 V AC, change-over				
230 V AC	KL2641 relay, make contact, manual operation, 16 A	KL2602 relay, make contact	KL2622 relay, make contact, no power contacts			KM2604 relay, 16 A, 4-channel
	KL2751 universal dimmer, 300 W	KL2652 relay, change-over	KL2702 solid state relay, 0.3 A			KM2614 relay, 16 A, 4-channel, manual operation
	KL2761 universal dimmer, 600 W	KL2712 triac	KL2722 triac, mutually locked outputs			KM2774 triac outputs
	KL2701 solid state relay, 3 A	KL2732 triac, mutually locked outputs, no power contacts	KL2692 cycle monitoring (watchdog)			KM2642 relay, 6 A, manual/ automatic operation, relay state readable
						KM2652 relay, 6 A, manual/auto- matic operation, switch and relay state readable
PWM	KL2502 24 V DC, 0.1 A		KL2512 24 V DC, 1.5 A, negative switching			
	KL2535 1 A, 24 V DC, current-control.		KL2545 3.5 A, 50 V DC, current-control.			
Frequency outp.	KL2521					
Stepper motor	KL2531 I _{MAX} = 1.5 A					
	KL2541 I _{MAX} = 5 A					
DC motor output stage	KL2532 24 V DC, 1 A	KL2552 50 V DC, 5 A	KL2284 I _{MAX} = 2.0 A, reverse switching			
AC motor speed controller	KL2791 230 V AC, 200 VA					

► www.beckhoff.com/BusTerminal

Bus Terminal | 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	KL3404 single-ended, 12 bit
			KL3132 16 bit, 0.05 %	
0...20 mA	KL3011 differential input, 12 bit	KL3041 with sensor supply, 12 bit	KL3012 differential input, 12 bit	KL3112 differential input, 16 bit
			KL3042 with sensor supply, 12 bit	KL3444 single-ended, 12 bit
4...20 mA	KL3021 differential input, 12 bit	KL3051 with sensor supply, 12 bit	KL3022 differential input, 12 bit	KL3122 differential input, 16 bit
			KL3052 with sensor supply, 12 bit	KL3454 single-ended, 12 bit
Resistance thermometer (RTD)	KL3201 PT100...1000, Ni100, 16 bit		KL3202 PT100...1000, Ni100, 16 bit	KL3222 PT100, 4-wire, high-precision
				KL3204 PT100...1000, Ni100, 16 bit
				KL3228 PT1000, Ni1000
Thermo-couples/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
Resistor bridge	KL3351 strain gauge, 16 bit	KL3356 strain gauge, 16 bit, self-calibration		
Oscilloscope	KL3361 oscilloscope terminal, ±16 mV		KL3362 oscilloscope terminal, ±10 V	
Measurement technology	KL3681 digital multimeter terminal, 18 bit		KL3403 3-phase power measurement terminal, 1 A	KL3403-0010 3-phase power measurement terminal, 5 A
Pressure measuring	KM3701 differential pressure measuring, -100...+100 hPa	KM3701-0340 differential pressure measuring, up to 340 hPa	KL3702 relative pressure measuring, 7,500 hPa	KM3712 relative pressure measuring, -1,000...+1,000 hPa

Bus Terminal | Analog output: KL4xxx/KS4xxx

KM4xxx

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	KL4438 12 bit	
			KL4494 12 bit, 2 x input, 2 x output		
0...20 mA	KL4011 12 bit	KL4012 12 bit	KL4414 12 bit	KL4418 12 bit	
		KL4112 16 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 Terminal | Special functions: KL/KS5xxx, KL/KS6xxx, KL8xxx

Safety terminals: KLx904

Signal			
Position measurement	KL5001 SSI encoder interface	KL5051 bidirectional SSI encoder interface	KL5121 incremental encoder interface
	KL5101 incremental encoder interface, differential input	KL5152 32 bit, 2-channel incremental encoder interface	KL5151 32 bit, incremental encoder interface
	KL5111 incremental encoder interface		
Communication	KL6001 serial interface RS232, 19.2 baud	KL6031 serial interface RS232, 115.2 baud	KL6011 serial interface TTY, 20 mA current loop
	KL6051 data exchange terminal, 32 bit	KL6021 serial interface RS422/RS485, 19.2 baud	KL6041 serial interface RS422/RS485, 115.2 baud
	KL6023 wireless adapter for EnOcean radio technology	KL6021-0023 RS485 interface for EnOcean signals	
	KL6581 EnOcean master	KL6583 EnOcean transmitter/receiver	KL6224 IO-Link master
	KL6201 AS-Interface master terminal	KL6211 AS-Interface master terminal with power contacts	KM6551 wireless data exchange terminal
	KL6301 KNX/EIB Bus Terminal	KL6401 LON Bus Terminal	
	KL6771 MP-Bus master terminal	KL6811 DALI/DSI master/power supply term.	KL6781 M-Bus master terminal

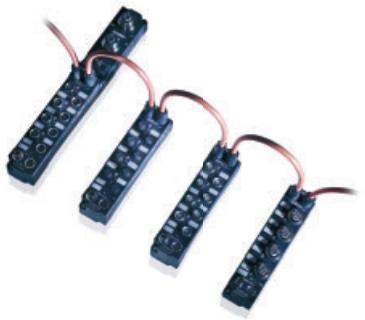
Signal		Signal	
Manual operation	KL8519 16-channel digital input signal module	24 V DC	KL1904 TwinSAFE, 4-channel digital input terminal, IEC 61508 SIL 3 and DIN EN ISO 13849-1: 2008 PLe
	KL8524 4 x 2-channel digital output, 24 V DC, 0.5 A		
	KL8528 8-channel digital output, 24 V DC, 0.5 A		
	KL8548 8-channel analog output, 0...10 V		
Power terminals	KL8001 switching capacity 5.5 kW, nominal current 0.9 to 9.9 A, connection mechanism for Siemens contactors (Sirius 3R series)	Controller	KL6904 TwinSAFE Logic Bus Terminal, with 4 digital outputs, IEC 61508 SIL 3 and DIN EN ISO 13849-1: 2008 PLe
	KL8601 communication module for Schneider TeSys U		
	KL8610 adapter terminal for Schneider TeSys U		

Bus Terminal | System terminals: KL9xxx/KS9xxx

Signal	System	
System	KL9010 bus end terminal	KL9070 shield terminal
	KL9020 terminal bus extension end terminal	KL9050 terminal bus extension coupler terminal
	KL9060 adapter terminal for power terminal KL8xxx	KL9309 Adapter terminal for KL85xx manual operating modules
	KL9080 isolation terminal	KL9195 shield terminal
Potential distribution terminal	KL9180	KL9181 2 x 8 terminal points
	KL9182 8 x 2 terminal points	KL9183 1 x 16 terminal points
	KL9184 8 x 24 V DC, 8 x 0 V DC	KL9185 only 2 power contacts
	KL9186 8 x 24 V	KL9187 8 x 0 V
	KL9188 16 x 24 V DC	KL9189 16 x 0 V DC
Filter	KL9540 surge filter terminal for field supply	
	KL9540-0010 surge filter field supply for analog terminals	KL9550 surge filter terminal for system/field supply
Diode array	KL9300 4 diodes, potential-free	
	KL9301 7 diodes, common cathode	KL9302 7 diodes, common anode

Signal	Potential supply	Power supply and accessories
24 V DC	KL9100	KL9400 K-bus power supply, 2 A
	KL9110 diagnostic	KL9505 output 5 V DC, 0.5 A
	KL9200 with fuse	KL9508 output 8 V DC, 0.5 A
	KL9210 diagnostic, with fuse	KL9510 output 10 V DC, 0.5 A
		KL9512 output 12 V DC, 0.5 A
		KL9515 output 15 V DC, 0.5 A
	KL9520 AS-Interface potential supply	KL9528 AS-Interface power supply terminal
		KL9560 output 24 V DC, 0.1 A
50 V DC		KL9570 buffer capacitor terminal, 500 µF
120...	KL9150	
230 V AC	KL9160 diagnostic	
	KL9250 with fuse	
	KL9260 diagnostic, with fuse	
up to 400 V AC	KL9190	
	KL9290 with fuse	

Fieldbus Box



Fieldbus Box	Compact Box	Coupler Box	PLC Box		
Fieldbus	Fieldbus Box without IP-Link interface	Fieldbus Box with IP-Link interface	Controller IEC 61131-3 with IP-Link interface		
EtherCAT®		IL230x-B110			
LIGHTBUS	IPxxxx-B200	IL230x-B200			
PROFINET BUS	IPxxxx-B310	IPxxxx-B318 with integrated tee-connector	IL230x-B310	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 I/O				
Input	8 mm	M8	M12	
24 V DC	8-channel filter 3.0 ms	IP1000-Bxxx, IE1000	IP1001-Bxxx, IE1001	IP1002-Bxxx, IE1002
	8-channel filter 0.2 ms	IP1010-Bxxx, IE1010	IP1011-Bxxx, IE1011	IP1012-Bxxx, IE1012
Counter	2-channel up/down counter 24 V DC, 100 kHz			IP1502-Bxxx, IE1502
Output				
Output	8 mm	M8	M12	
24 V DC	8-channel $I_{MAX} = 0.5 \text{ A}$	IP2000-Bxxx, IE2000	IP2001-Bxxx, IE2001	IP2002-Bxxx, IE2002
	8-channel $I_{MAX} = 2 \text{ A}, \sum 4 \text{ A}$	IP2020-Bxxx, IE2020	IP2021-Bxxx, IE2021	IP2022-Bxxx, IE2022
	8-channel $I_{MAX} = 2 \text{ A}, \sum 12 \text{ A}$	IP2040-Bxxx, IE2040	IP2041-Bxxx, IE2041	IP2042-Bxxx, IE2042
	16-channel $I_{MAX} = 0.5 \text{ A}, \sum 4 \text{ A}$, D-sub socket			IE2808 IE2808-0001
	PWM	2-channel PWM, 24 V DC, $I_{MAX} = 2.5 \text{ A}$		IP2512-Bxxx, IE2512

Fieldbus Box | Digital I/O

Combi		8 mm	M8	M12
24 V DC	8-channel	IL2300-Bxxx IL2300-Cxxx IP2300-Bxxx, IE2300	IL2301-Bxxx IL2301-Cxxx IP2301-Bxxx, IE2301	IL2302-Bxxx IL2302-Cxxx IP2302-Bxxx, IE2302
	4 input + 4 output, filter 3.0 ms, $I_{MAX} = 0.5 \text{ A}$			
	8-channel 4 input + 4 output, filter 0.2 ms, $I_{MAX} = 0.5 \text{ A}$	IP2310-Bxxx IE2310	IP2311-Bxxx IE2311	IP2312-Bxxx IE2312
	8-channel 4 input + 4 output, filter 3.0 ms, $I_{MAX} = 2 \text{ A}, \sum 4 \text{ A}$	IP2320-Bxxx IE2320	IP2321-Bxxx IE2321	IP2322-Bxxx IE2322
	8-channel 4 input + 4 output, filter 0.2 ms, $I_{MAX} = 2 \text{ A}, \sum 4 \text{ A}$	IP2330-Bxxx IE2330	IP2331-Bxxx IE2331	IP2332-Bxxx IE2332
	16-channel combi input/output, filter 3.0 ms, $I_{MAX} = 0.5 \text{ A}$	IP2400-Bxxx IE2400	IP2401-Bxxx IE2401	
	16-channel combi input/output, filter 3.0 ms, $I_{MAX} = 0.5 \text{ A}$	IE2403 (IP 20 connector)		

Fieldbus Box | Analog I/O

Input		M12
$\pm 10 \text{ V}$	4-channel differential inputs, 16 bit	IP3102-Bxxx, IE3102
0/4...20 mA	4-channel differential inputs, 16 bit	IP3112-Bxxx, IE3112
Resistance thermometer	4-channel resistance thermometer (RTD), PT100, PT200, PT500, PT1000, Ni100, 16 bit	IP3202-Bxxx, IE3202
Thermocouples/mV	4-channel thermocouple, type J, K, L, B, E, N, R, S, T, U, 16 bit	IP3312-Bxxx, IE3312
Output		M12
$\pm 10 \text{ V}$	4-channel 16 bit	IP4132-Bxxx, IE4132
0/4...20 mA	4-channel 16 bit	IP4112-Bxxx, IE4112

Fieldbus Box | Special functions

Function		M12	M23
Position measurement	1-channel SSI encoder interface		IP5009-Bxxx, IE5009
	1-channel incremental encoder interface, 1 MHz		IP5109-Bxxx, IE5109
	1-channel SinCos encoder interface		IP5209-Bxxx (1 V _{pp}) IP5209-Bxxx-1000 (11 μA _{pp})
Communication	1-channel serial interface, RS232	IP6002-Bxxx, IE6002	
	1-channel serial interface, 0 ... 20 mA (TTY)	IP6012-Bxxx, IE6012	
	1-channel serial interface, RS422/RS485	IP6022-Bxxx, IE6022	
Valve terminal	16-channel Festo valve terminal with IP-Link connection, size 10 mm	CPV10-VI-IP-8*	
	16-channel Festo valve terminal with IP-Link connection, size 14 mm	CPV14-VI-IP-8*	
	16-channel SMC valve terminal with IP-Link interface	EX250*	

* The CPV1x-VI-IP-8 valve terminals can be ordered only from Festo AG & Co. (www.festo.com); the EX250 valve terminals can be ordered only from SMC (www.smceu.com).

► www.beckhoff.com/FieldbusBox

Lightbus



Lightbus							
Interface Cards		Modules		Bus Terminal		Drive Technology	
PCI bus	FC2001 1-channel	Interface module	M1200, M1210 CMOS interface	Bus Coupler	BK2000 standard	Servo Drives with Lightbus interface	AX20xx-B200 $I_N = 3 \dots 80 A$, $P_N = 2 \dots 50 kVA$
	FC2002 2-channel				BK2010 Economy		
ISA bus	C1200	Digital I/O	M1110 16-channel digital I/O (configurable), 24 V DC, 0.5 A, IP 65	PLC	BK2020 Economy plus	Servo Drives with Lightbus interface	AX25xx-B200 master module, $I_N = 3/6 A$, $P_N = 7/12 kVA$
	C1220 with communication processor		M1400, M1410 16/32-channel digital I/O (configurable), 24 V DC, 0.5 A		BC2000		AX252x-B200 axis module, $I_N = 3/6 A$
VME bus	C1300	Combi I/O	M2400 16-channel digital I/O, 24 V DC, 0.5 A, 4-channel analog output, 12 bit	EtherCAT Terminal		EtherCAT Terminals	EL6720 master terminal
Embedded PC		Analog input	M2510 4-channel analog input, 12 bit				
Master	CX1500-M200	Special functions	M3000 absolute encoder, 24 bit	Fieldbus Box		Compact Box	IPxxxx-B200
			M3100 incremental encoder interface, 24 bit, IP 65				
Slave	CX1500-B200	Operation panels	M3120 incremental encoder interface, 1–4-channel, 24 bit	Coupler Box		IL230x-B200	
			M3200 incremental encoder, 24 bit, IP 65				

PC Fieldbus Cards, Switches



PC Fieldbus Cards

Fieldbus	1-channel	2-channel	4-channel
LIGHTBUS	FC2001-0000 (PCI interface)	FC2002-0000 (PCI interface)	
PROFIBUS	FC3101-0000 (PCI interface) FC3101-0002 (PCI interface) configuration with 32 kbytes NOVRAM FC3121 (PCIe interface) FC3151-0000 (Mini PCI interface) FC3151-0002 (Mini PCI interface) configuration with 128 kbytes NOVRAM	FC3102-0000 (PCI interface) FC3102-0002 (PCI interface) configuration with 32 kbytes NOVRAM FC3122 (PCIe interface)	
CANopen	FC5101-0000 (PCI interface) FC5101-0002 (PCI interface) configuration with 32 kbytes NOVRAM FC5121 (PCIe interface) FC5151-0000 (Mini PCI interface) FC5151-0002 (Mini PCI interface) configuration with 128 kbytes NOVRAM	FC5102-0000 (PCI interface) FC5102-0002 (PCI interface) configuration with 32 kbytes NOVRAM FC5122 (PCIe interface)	
DeviceNet	FC5201-0000 (PCI interface) FC5201-0002 (PCI interface) configuration with 32 kbytes NOVRAM FC5251-0000 (Mini PCI interface) FC5251-0002 (Mini PCI interface) configuration with 128 kbytes NOVRAM	FC5202-0000 (PCI interface) FC5202-0002 (PCI interface) configuration with 32 kbytes NOVRAM	
SERCOS interface	FC7501-0000 (PCI interface) FC7551-0000 (Mini PCI interface) FC7551-0002 (Mini PCI interface) configuration with 128 kbytes NOVRAM	FC7502-0000 (PCI interface)	
Ethernet	FC9001-0010 (PCI interface), 10/100 Mbit FC9011-0000 (PCI interface), 10/100/1,000 Mbit FC9051-0000 (Mini PCI interface), 10/100 Mbit FC9151-0000 (Mini PCI interface), 10/100/1,000 Mbit	FC9002-0000 (PCI interface) FC9022-0000 (PCI Express interface), 10/100/1,000 Mbit	FC9004-0000 (PCI interface)
EtherCAT	FC1100 (PCI slave card) FC1121 (PCIe slave card)		

► www.beckhoff.com/FieldbusCards

We reserve the right to make technical changes.

Ethernet infrastructure

Switches

Switches	CU2005 Ethernet Switch with 5 ports
	CU2008 Ethernet Switch with 8 ports
	CU2016 Ethernet Switch with 16 ports
	CU2208 Gbit Ethernet Switch with 8 ports
Real-time Ethernet port multiplier	CU2508 real-time Ethernet port multiplier

► www.beckhoff.com/Switches

BECKHOFF New Automation Technology

The Motion Company

Digital Compact Servo Drives AX5000

52

- 1- or 2-channel servo drives
- high-speed EtherCAT communication
- wide range of rated current types up to 170 A (315 A in preparation)
- flexible motor type selection
- optimised for multi-axis applications

► www.beckhoff.com/AX5000



In combination with the Motion Control solutions offered by the TwinCAT automation software, Beckhoff Drive Technology represents a 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 Servo Drive series with high-performance EtherCAT system communication offers maximum performance and dynamics. Servomotors with single-cable technology, which combines power and feedback system in a standard motor cable, reduce material and commissioning costs.

► www.beckhoff.com/DriveTechnology

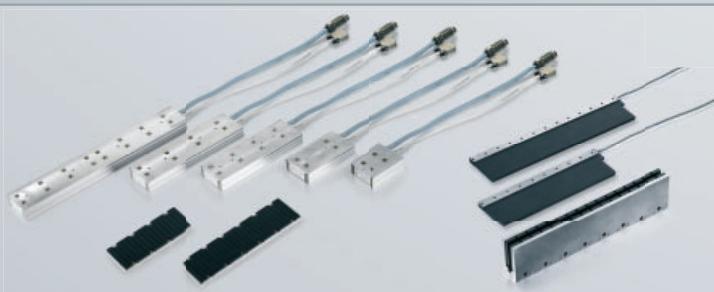


Synchronous Servomotors

54

- for positioning task with high demands on dynamics and performance
- brushless three-phase motors with permanent magnets in the rotor

► www.beckhoff.com/Servomotors



Linear Servomotors

56

- for the highest requirements with regard to dynamics and acceleration
- up to quadruple overload capacity
- no mechanical wear
- maximum positioning accuracies achievable

► www.beckhoff.com/Linear-motors



Compact drive technology

57

- solutions up to 8 A in the I/O system
- connection of stepper, servo, DC or AC motors
- IP 20 or IP 67 connection options
- matching motors and gearboxes

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

Drive Technology



AX51xx, AX52xx | Digital Compact Servo Drives

Technical data	AX5101	AX5103	AX5106	AX5112	AX5118	AX5125	AX5140
Number of channels	1-channel						
Rated output current	1 x 1.5 A ⁽¹⁾	1 x 3 A ⁽¹⁾	1 x 6 A ⁽¹⁾	1 x 12 A ⁽¹⁾	1 x 18 A ⁽¹⁾	1 x 25 A ⁽¹⁾	1 x 40 A ⁽¹⁾
Peak output current	4.5 A ⁽⁴⁾	7.5 A ⁽⁴⁾	13 A ⁽⁴⁾	26 A ⁽⁴⁾	36 A ⁽⁴⁾	50 A ⁽⁴⁾	80 A ⁽⁴⁾
Rated supply voltage	100... 480 V AC						
Rated apparent power for S1 operation 400 V (only 3-phase connection)	1.0 kVA	2.1 kVA	4.2 kVA	8.3 kVA	12.5 kVA	17.3 kVA	28.0 kVA
Voltage connection	1...3-phase	1...3-phase	1...3-phase	3-phase	3-phase	3-phase	3-phase
Feedback system	BiSS, EnDat, Hiperface, 1 V _{PP} , TTL, resolver						
Safety	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5805

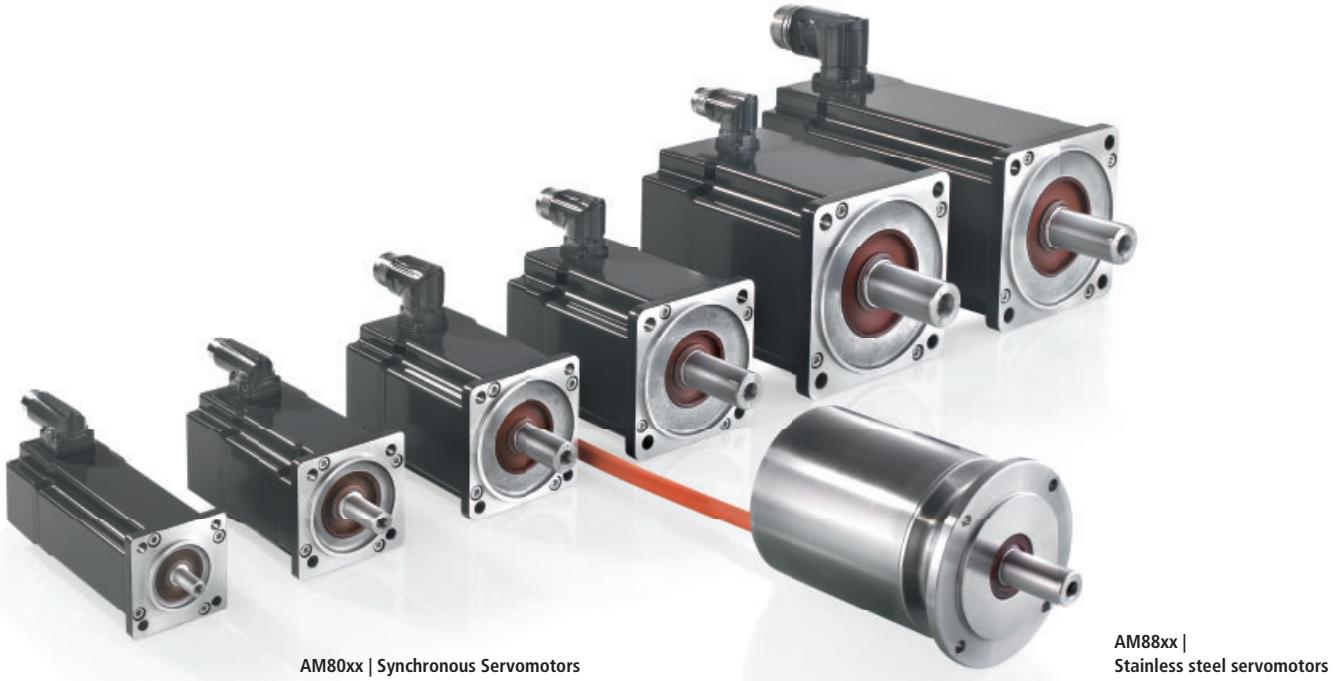
⁽¹⁾ at 50 °C (3-phase connection), ⁽²⁾ at 40 °C (3-phase connection), ⁽³⁾ at 50 °C,

⁽⁴⁾ RMS for max. 7 seconds, ⁽⁵⁾ RMS for max. 3 seconds, ^(*) For 1-phase mains the total current is limited to 9 A.



The AX-Bridge quick connection system enables simple and fast connection of several AX5000 devices to form a multi-axis system.

AX5160	AX5172	AX5190	AX5191	AX5192	AX5193	AX5201	AX5203	AX5206
1-channel	1-channel	1-channel	1-channel	1-channel	1-channel	2-channel	2-channel	2-channel
60 A ⁽²⁾	72 A ⁽²⁾	90 A ⁽²⁾	110 A ⁽²⁾	143 A ⁽²⁾	170 A ⁽²⁾	2 x 1.5 A ⁽³⁾	2 x 3 A ⁽³⁾	2 x 6 A ⁽³⁾ (*)
120 A ⁽⁵⁾	144 A ⁽⁵⁾	135 A ⁽⁵⁾	165 A ⁽⁵⁾	215 A ⁽⁵⁾	221 A ⁽⁵⁾	2 x 5 A ⁽⁴⁾	2 x 10 A ⁽⁴⁾	2 x 13 A ⁽⁴⁾
400... 480 V AC	100... 480 V AC	100... 480 V AC	100... 480 V AC					
42.0 kVA	50.0 kVA	62.0 kVA	76.0 kVA	99.0 kVA	118.0 kVA	2.1 kVA	4.2 kVA	8.3 kVA
3-phase	3-phase	3-phase	3-phase	3-phase	3-phase	1...3-phase	1...3-phase	1...3-phase
BiSS, EnDat, Hiperface, 1 V _{PP} , TTL, resolver								
AX5805	AX5805	AX5805	AX5805	AX5805	AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805



AM80xx | Synchronous Servomotors

AM88xx |
Stainless steel servomotors

AM80xx, AM88xx | Synchronous Servomotors with single-cable technology

Technical data	AM8022	AM8023	AM8031	AM8032	AM8033	AM8041	AM8042
Standstill torque (M_0)	0.9 Nm	1.3 Nm	1.38 Nm	2.38 Nm	3.22 Nm	2.45 Nm	4.1 Nm
Standstill current (I_0)	1.7 A _{rms}	2.3 A _{rms}	1...1.9 A _{rms}	1.7...5.1 A _{rms}	2.1...6.8 A _{rms}	1.65...5.25 A _{rms}	2.15...6.9 A _{rms}
Rated speed (n_N)	8,000 min ⁻¹	8,000 min ⁻¹	3,000... 6,000 min ⁻¹	3,000... 6,000 min ⁻¹	3,000... 6,000 min ⁻¹	3,000... 6,000 min ⁻¹	2,500... 5,000 min ⁻¹

Technical data	AM8043	AM8051	AM8052	AM8053	AM8061	AM8062	AM8063
Standstill torque (M_0)	5.65 Nm	4.9 Nm	8.2 Nm	11.4 Nm	12.8 Nm	21.1 Nm	29 Nm
Standstill current (I_0)	2.9...9.3 A _{rms}	2.7...8.5 A _{rms}	3.3...11.3 A _{rms}	4.7...15.6 A _{rms}	4...13.1 A _{rms}	6.2...20.3 A _{rms}	8.7...29.5 A _{rms}
Rated speed (n_N)	2,500... 5,000 min ⁻¹	2,500... 5,000 min ⁻¹	2,500... 4,000 min ⁻¹	2,500... 4,000 min ⁻¹	1,500... 3,000 min ⁻¹	1,500... 3,000 min ⁻¹	1,500... 3,000 min ⁻¹

► www.beckhoff.com/AM8000

Technical data	AM8831	AM8832	AM8833	AM8841	AM8842	AM8843	AM8851	AM8852	AM8853
Standstill torque (M_0)	1 Nm	1.7 Nm	2.3 Nm	1.9 Nm	3.1 Nm	4.5 Nm	3.3 Nm	6.0 Nm	8.1 Nm
Standstill current (I_0)	0.7 A _{rms}	1.2 A _{rms}	1.6 A _{rms}	1.3 A _{rms}	1.7 A _{rms}	2.4 A _{rms}	1.9 A _{rms}	2.7 A _{rms}	3.5 A _{rms}
Rated speed (n_N)	3,000 min ⁻¹	3,000 min ⁻¹	3,000 min ⁻¹	3,000 min ⁻¹	2,500 min ⁻¹	2,500 min ⁻¹	2,500 min ⁻¹	2,000 min ⁻¹	2,000 min ⁻¹

► www.beckhoff.com/AM88xx



AM35xx | Synchronous Servomotors



AM30xx | Synchronous Servomotors



AG2200 | Planetary gear units
for Servomotors AM30xx/AM35xx/AM8xxx

AM30xx, AM35xx | Synchronous Servomotors

Technical data	AM301x	AM302x	AM303x	AM304x	AM305x	AM306x	AM307x	AM308x
Standstill torque	0.18 Nm... 0.41 Nm	0.48 Nm... 1.41 Nm	1.15 Nm... 2.79 Nm	1.95 Nm... 6.00 Nm	4.70 Nm... 14.90 Nm	11.90 Nm... 25.00 Nm	29.40 Nm... 53.00 Nm	75.00 Nm... 180.00 Nm
Standstill current	1.16 A... 1.51 A	1.39 A... 2.21 A	1.37 A... 2.99 A	1.46 A... 8.80 A	2.75 A... 9.70 A	5.40 A... 18.60 A	9.30 A... 26.20 A	48.00 A... 67.00 A
Rated speed (n_N)	8,000 min ⁻¹ 8,000 min ⁻¹	4,500... 5,500 min ⁻¹	3,000... 6,000 min ⁻¹	2,500... 6,000 min ⁻¹	2,500... 6,000 min ⁻¹	2,000... 6,000 min ⁻¹	1,500... 3,500 min ⁻¹	1,800... 2,500 min ⁻¹

► www.beckhoff.com/AM30xx

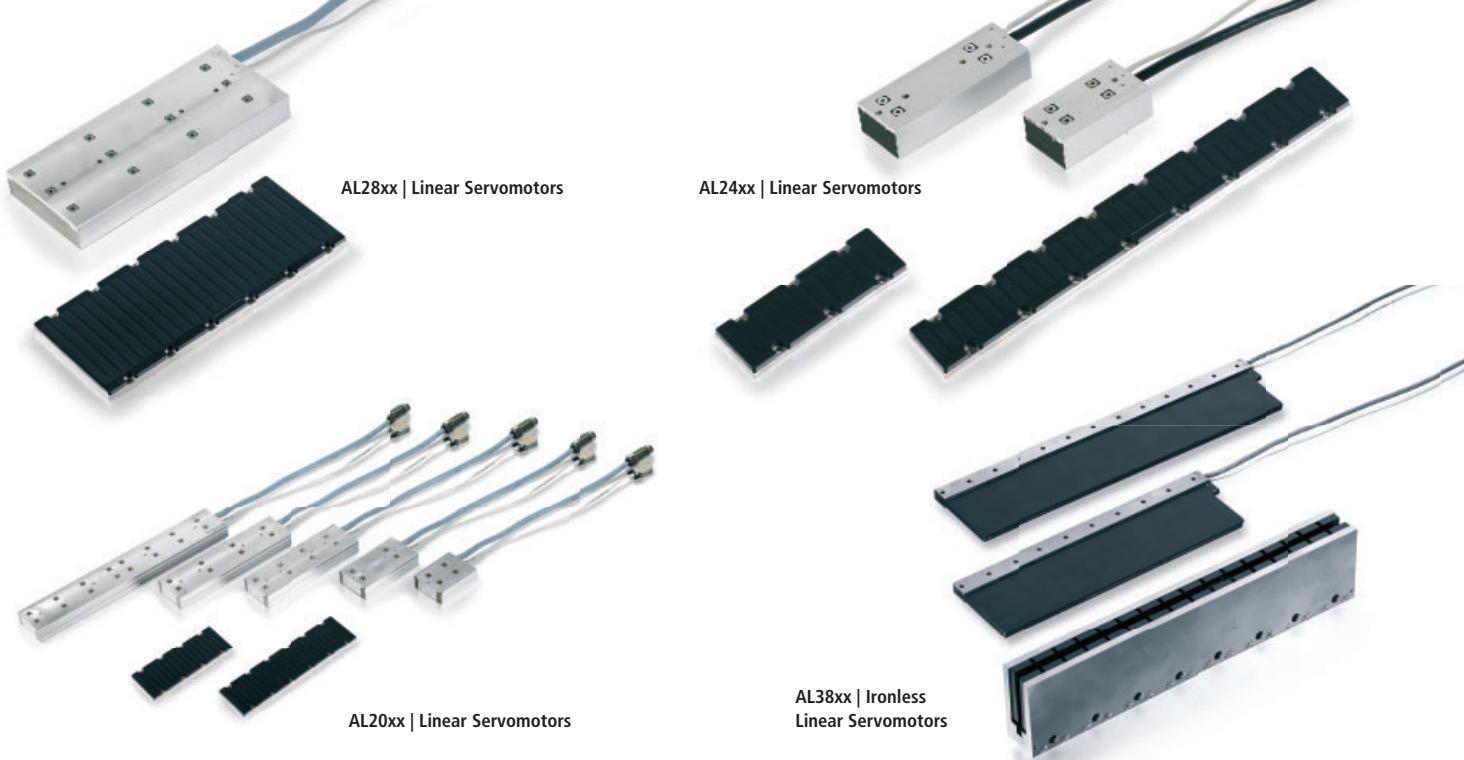
Technical data	AM354x	AM355x	AM356x
Standstill torque	1.9 Nm...6.1 Nm	4.1 Nm...8.6 Nm	11.6 Nm...14.9 Nm
Standstill current	1.7 A...5.2 A	3.4 A...6.4 A	10.3 A...12.5 A
Rated speed (n_N)	3,000...6,000 min ⁻¹	3,000...6,000 min ⁻¹	3,000 min ⁻¹

► www.beckhoff.com/AM35xx

AG2200 | Planetary gear units for Servomotors AM30xx/AM35xx/AM8xxx

Technical data	AG2200-+ LP050-M0x-x-w1y	AG2200-+ LP070-M0x-x-w1y	AG2200-+ LP090-M0x-x-w1y	AG2200-+ LP120-M0x-x-w1y	AG2200-+ LP155-M0x-x-w1y
Gear ratio	4, 5, 7, 10/16, 20, 25, 35, 50, 70, 100	3, 4, 5, 7, 10/15, 16, 20, 25, 30, 35, 50, 70, 100	3, 4, 5, 7, 10/15, 16, 20, 25, 30, 35, 50, 70, 100	3, 4, 5, 7, 10/15, 16, 20, 25, 30, 35, 50, 70, 100	5, 10/25, 50, 100
Acceleration torque	12 Nm max.	35 Nm max.	90 Nm max.	220 Nm max.	450 Nm max.

► www.beckhoff.com/AG2200



AL20xx, AL24xx, AL28xx, AL38xx | Linear Servomotors

Technical data	AL2003	AL2006	AL2009	AL2012	AL2015	AL2018	AL2024
Peak force 3 sec. (F_{PA})	225 N	450 N	675 N	900 N	1125 N	1350 N	1800 N
Peak current (I_{PA})	5 A	6.5 A 13 A	8 A 15 A	13 A 26 A	13 A 33 A	20 A 41 A	26 A 52 A
Design concept	iron core	iron core	iron core	iron core	iron core	iron core	iron core
Magnetic path width	80 mm	80 mm	80 mm	80 mm	80 mm	80 mm	80 mm

► www.beckhoff.com/AL20xx

Technical data	AL2403	AL2406
Peak force 3 sec. (F_{PA})	120 N	240 N
Peak current (I_{PA})	3.9 A	7.9 A
Design concept	iron core	iron core
Magnetic path width	51 mm	51 mm

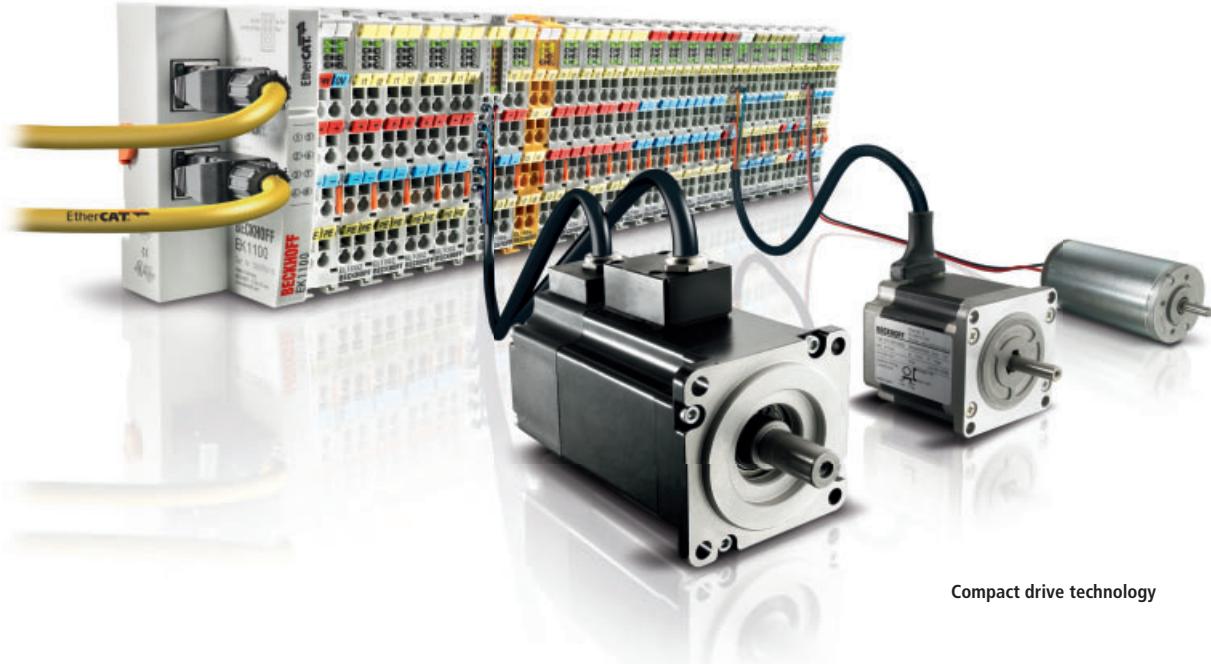
► www.beckhoff.com/AL24xx

Technical data	AL2812	AL2815	AL2830	AL2845
Peak force 3 sec. (F_{PA})	1800 N	2250 N	4500 N	6750 N
Peak current (I_{PA})	13 A 26 A	13.5 A 33 A	26 A 66 A	39 A 99 A
Design concept	iron core	iron core	iron core	iron core
Magnetic path width	130 mm	130 mm	130 mm	130 mm

► www.beckhoff.com/AL28xx

Technical data	AL3803	AL3806	AL3809	AL3812	AL3818
Peak force 3 sec. (F_{PA})	700 N	1400 N	2100 N	2800 N	4200 N
Peak current (I_{PA})	5.6 A 13.9 A	11.3 A 28 A	16.9 A 42 A	22.6 A 56 A	34 A
Design concept	ironless	ironless	ironless	ironless	ironless
Magnetic yoke width	48 mm	48 mm	48 mm	48 mm	48 mm

► www.beckhoff.com/AL38xx



Compact drive technology

AM31xx | Synchronous Servomotors

Technical data	AM3111-030x	AM3112-040x	AM3121-020x
Standstill torque	0.21 Nm	0.34 Nm	0.69 Nm
Standstill current	3.22 A	3.4 A	4.6 A
Rated speed (n_N)	5,000 min ⁻¹	3,500 min ⁻¹	2,000 min ⁻¹

► www.beckhoff.com/AM31xx

AG2250 | Planetary gear units for Servomotors AM31xx

Technical data	AG2250+-PLE40-M01-x-1B1	AG2250+-PLE60-M01-x-1B1	AG2250+-WPLE40-M01-x-1B1	AG2250+-WPLE60-M01-x-1B1
Gear ratio	3, 4, 5, 7, 10	3, 4, 5, 7, 10	3, 4, 5, 7, 10	3, 4, 5, 7, 10
Acceleration torque	15 Nm max.	40 Nm max.	7.5 Nm max.	24 Nm max.

► www.beckhoff.com/AG2250

AS10xx | Stepper Motors

Technical data	AS1010-0000	AS1020-0xyz	AS1030-0000	AS1050-0xyz	AS1060-wxyz
Rated supply voltage	24...50 V DC				
Rated current (per phase)	1.0 A	1.0 A	1.5 A	5.0 A	5.0 A
Standstill torque	0.38 Nm	0.5 Nm	0.6 Nm	1.2 Nm	5.0 Nm

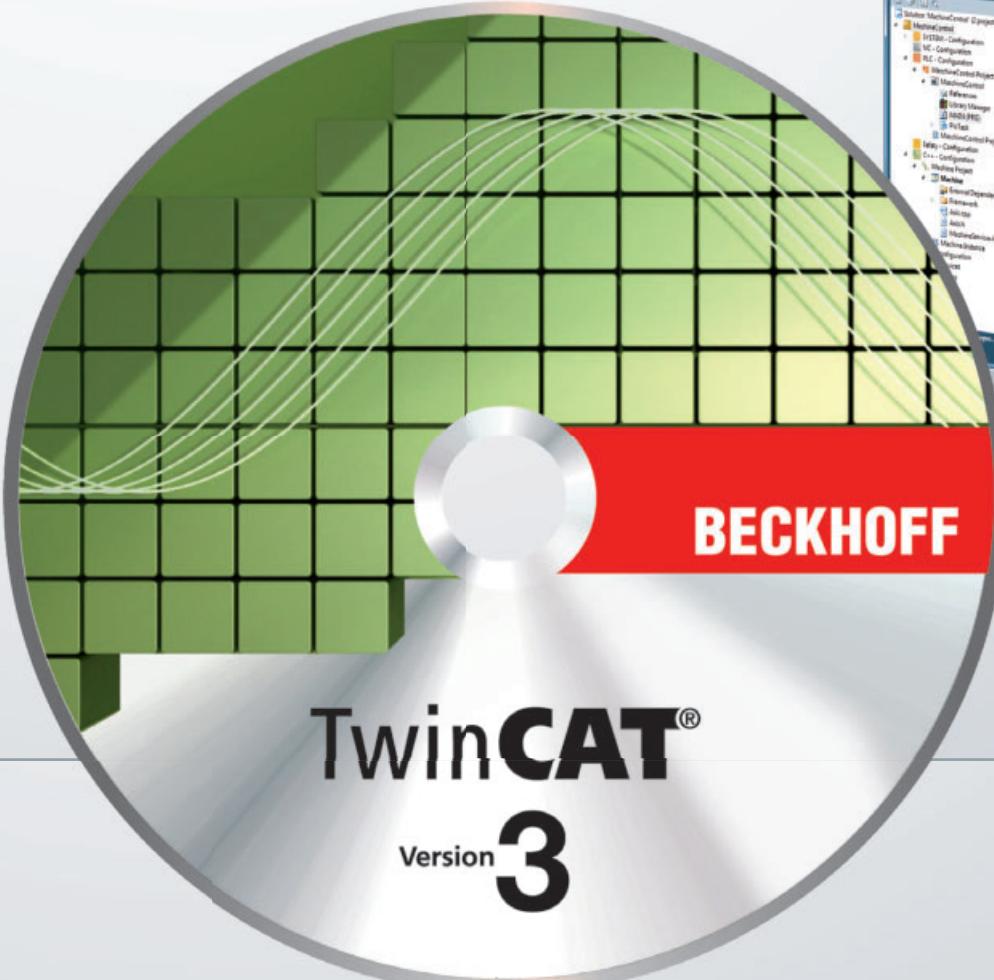
► www.beckhoff.com/AS1010

AG1000 | Planetary gear units for Stepper Motors

Technical data	AG1000-+PM52.x to AS1030/AS1050	AG1000-+PM81.x to AS1060
Gear ratio	4 (3.7 exactly), 7 (6.75 exactly)	4 (3.7 exactly), 7 (6.75 exactly)
Acceleration torque	6 Nm	30 Nm

► www.beckhoff.com/AG1000

The Automation Company

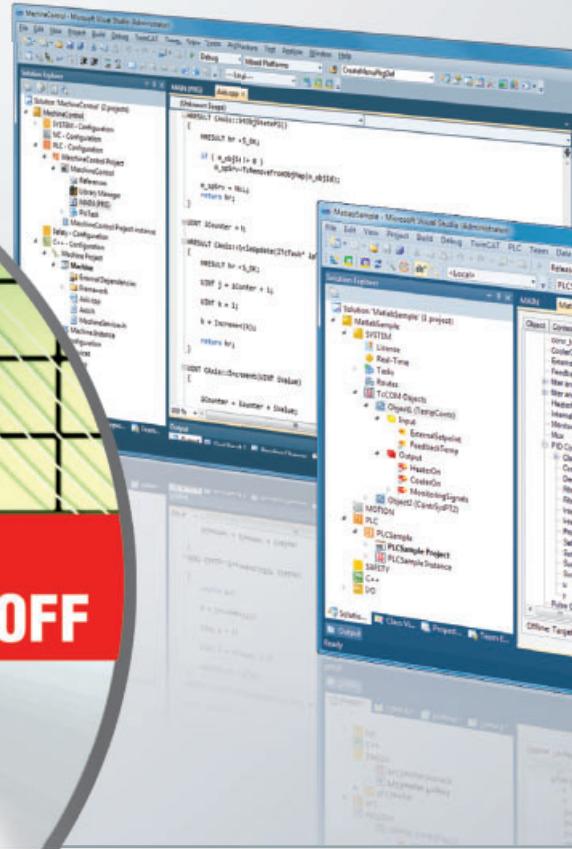


TwinCAT 3

60

- one engineering environment – based on Microsoft Visual Studio®
- IEC 61131, C/C++, Matlab®/Simulink®
- integrated modules:
 - real-time
 - PLC, NC, CNC
 - robotics
 - measurement technology
 - Safety
- TwinCAT 3 modules: standardised programming frame for modular programming
- multi-core support

► www.beckhoff.com/TwinCAT3



TwinCAT 2

64



TwinCAT 2

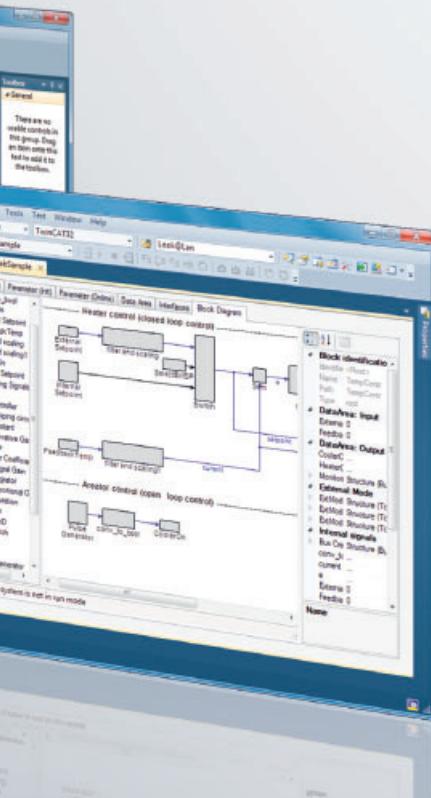
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- engineering and runtime
- IEC 61131-3 programming environment
- integrated modules:
 - real-time
 - PLC, NC, CNC
 - robotics
 - measurement technology
 - Safety

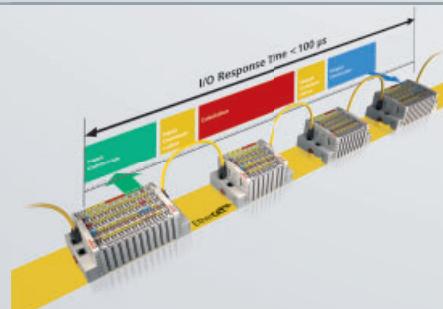
► www.beckhoff.com/TwinCAT2

Beckhoff offers comprehensive system solutions in different performance classes for all areas of automation. The control technology is scalable – from high-performance Industrial PC to mini-PLC – 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.

► www.beckhoff.com/TwinCAT



TwinSAFE



XFC (eXtreme Fast Control)

- integrated safety system from I/Os to drives
- compact safety PLC in a 12 mm terminal block for EtherCAT Terminal system
- fieldbus-neutral communication
- certified for solutions up to IEC 61508 SIL 3 and DIN EN ISO 13849-1:2008 PLe
- graphical programming editor
- Safety Engineering integrated into TwinCAT 3

► www.beckhoff.com/TwinSAFE

- XFC is entirely based on standard components: IPC, fast I/Os, EtherCAT and TwinCAT.
- XFC enables I/O response times of < 100 µs.
- XFC increases the speed of reaction of a machine controller by a factor of 10 compared to market standards.
- Depending on the machine type, this can make the machine faster and more efficient, resulting in a significant increase in productivity.

► www.beckhoff.com/XFC

Scientific Automation

- integration of additional functions in the automation environment
- functions that used to be based on special hardware become part of the PC platform, e.g.:
 - measurement technology
 - Condition Monitoring
 - robotics
- The basis is the constantly increasing PC processor power.

► www.beckhoff.com/Scientific-Automation

TwinCAT 3

TwinCAT 3 realises a new approach for the engineering and extends the runtime by many features. The engineering is embedded completely in the Microsoft Visual Studio® framework. This way, C/C++ or Matlab®/Simulink® are available in a single environment with programming and debugging in addition to the configuration of system, motion, I/O and the IEC61131 PLC programming languages.

With these programming languages it is possible to create modules that can be executed in the TwinCAT 3 runtime. The number of modules that can be executed is almost unlimited. The number of tasks in TwinCAT 3 has also been significantly extended. The TwinCAT 3 runtime environment allows modules to be loaded to different cores of a multi-core CPU.

TwinCAT 3 – eXtended Automation Engineering (XAE)

TwinCAT 3 – eXtended Automation Runtime (XAR)

Base

TC1270 | TC3 PLC/NC PTP 10/NC I/CNC

TC1260 | TC3 PLC/NC PTP 10/NC I

TC1250 | TC3 PLC/NC PTP 10

TC1200 | TC3 PLC

TC1100 | TC3 I/O

TC1000 | TC3 ADS

TC1220 | TC3 PLC/C++/Matlab®/Simulink®

TC1210 | TC3 PLC/C++

TC1100 | TC3 I/O

TC1000 | TC3 ADS

TC1320 | TC3 C++/Matlab®/Simulink®

TC1300 | TC3 C++

TC1100 | TC3 I/O

TC1000 | TC3 ADS

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.

Functions

TF1xxx | System

TF5xxx | Motion

TF3xxx | Measurement

TF6xxx | Connectivity

TF4xxx | Control

TF8xxx | Industry specific

TwinCAT 3 | TwinCAT Base

 TC1000 TC3 ADS	The TwinCAT Automation Device Specification (ADS) is the medium-independent protocol for the reading and writing of data and for instruction transmission within TwinCAT. An ADS router is made available for communication links. ADS clients can be connected to TwinCAT controllers in the network via ADS.
 TC1100 TC3 I/O	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.
 TC1200 TC3 PLC	TwinCAT PLC realises one or more PLCs with the international standard IEC 61131-3 3 rd edition on one CPU. All programming languages described in the standard can be used for programming. 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.
 TC1300 TC3 C++	The TwinCAT 3 C++ runtime environment enables the execution of real-time modules written in C++. 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.

TwinCAT 3

TwinCAT 3 | Engineering

TE1000 TC3 Engineering	TwinCAT 3 engineering environment
TE1110 TC3 Simulation Manager	simplified configuration of a simulation environment
TE1120 TC3 ECAD Import	import of engineering results from an ECAD program
TE1140 TC3 Management Server	central administration of Beckhoff CE controllers
TE1150 TC3 Backup	backing up and restoring files, operating system and TwinCAT settings
TE1400 TC3 Matlab®/Simulink® Target	TwinCAT target for Matlab®/Simulink® for generating TwinCAT 3 modules
TE1500 TC3 Valve Diagram Editor	graphical tool for designing the characteristic curve of a hydraulic valve
TE1510 TC3 CAM Design Editor	graphic design tool for electronic cam plates

TwinCAT 3 | TwinCAT Base

TC1210 TC3 PLC/C++	TwinCAT 3 PLC and C++
TC1220 TC3 PLC/C++/Matlab®/Simulink®	TwinCAT 3 PLC, C++ and modules generated in Matlab®/Simulink®
TC1250 TC3 PLC/NC PTP 10	TwinCAT 3 PLC and NC PTP 10
TC1260 TC3 PLC/NC PTP 10/NC I	TwinCAT 3 PLC, NC PTP 10 and NC I
TC1270 TC3 PLC/NC PTP 10/NC I/CNC	TwinCAT 3 PLC, NC PTP 10, NC I and CNC
TC1320 TC3 C++/Matlab®/Simulink®	TwinCAT 3 C++ and modules generated in Matlab®/Simulink®

TwinCAT 3 | Functions

Measurement

TF3600 TC3 Condition Monitoring Level 1	Condition Monitoring Level 1
TF3601 TC3 Condition Monitoring Level 2	Condition Monitoring Level 2
TF3602 TC3 Condition Monitoring Level 3	Condition Monitoring Level 3
TF3900 TC3 Solar Position Algorithm	precise calculation of the sun's position

Controller

TF4100 TC3 Controller Toolbox	basic controllers (P, I, D), complex controllers (PI, PID), pulse width modulation, ramps, signal generators and filters
TF4110 TC3 Temperature Controller	temperature control for monitoring and controlling different temperature ranges

Motion

TF5000 TC3 NC PTP 10 Axes	NC PTP (point-to-point movements) for up to 10 axes
TF5010 TC3 NC PTP 25 Axes	extension of TwinCAT 3 NC PTP to up to 25 axes
TF5020 TC3 NC PTP 25+ Axes	extension of TwinCAT 3 NC PTP to over 25 axes
TF5050 TC3 NC Camming	using the TwinCAT NC cam plate functionality (table coupling)
TF5055 TC3 NC Flying Saw	implementing "flying saw" functionality
TF5060 TC3 NC FIFO Axes	implementation of a pre-defined user setpoint generator for an NC axis
TF5065 TC3 Motion Control XFC	high-precision logging and switching of digital signals in relation to axis positions

TwinCAT 3 | Functions

Motion

TF5100 TC3 NC I	NC I with 5 interpolating axes and 3 additional axes
TF5110 TC3 Kinematic Transformation L1	realisation of different kinematic transformations Level 1
TF5111 TC3 Kinematic Transformation L2	realisation of different kinematic transformations Level 2
TF5112 TC3 Kinematic Transformation L3	realisation of different kinematic transformations Level 3
TF5200 TC3 CNC	CNC path control software
TF5210 TC3 CNC E	CNC path control software export version
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
TF5230 TC3 CNC Channel Pack	further CNC channel, extension to a maximum of 12 channels, channel synchronisation, axis transfer between channels
TF5240 TC3 CNC Transformation	transformation functionality (5-axis functionality)
TF5250 TC3 CNC HSC Pack	extending the CNC with HSC technology (high-speed cutting)
TF5260 TC3 CNC Spline Interpolation	path programming via splines with programmable spline type, Akima spline, B-spline
TF5270 TC3 CNC Virtual NCK Basis	virtual TwinCAT CNC for simulation in a Windows environment
TF5271 TC3 CNC Virtual NCK Options	virtual TwinCAT CNC for simulation in a Windows environment
TF5800 TC3 Digital Cam Server	software implementation of fast cam controller
TF5810 TC3 Motion Control Hydraulics	control and adjustment of hydraulic axes

Connectivity

TF6000 TC3 ADS Communication Library	ADS communication components
TF6100 TC3 OPC UA	access to TwinCAT in accordance with OPC UA with UA server (DA/HA/AC) and UA client (DA)
TF6120 TC3 OPC DA	access to TwinCAT variables, in accordance with OPC DA and OPC XML DA specification
TF6220 TC3 EtherCAT Redundancy 250	extension of the TwinCAT EtherCAT master with cable redundancy capability for up to 250 slaves
TF6221 TC3 EtherCAT Redundancy 250+	extension of the TwinCAT EtherCAT master with cable redundancy capability for more than 250 slaves
TF6250 TC3 Modbus TCP	communication with Modbus TCP devices (server and client functionality)
TF6255 TC3 Modbus RTU	serial communication with Modbus end devices
TF6300 TC3 FTP	easy access from TwinCAT PLC to FTP server
TF6310 TC3 TCP/IP	communication via generic TCP server
TF6340 TC3 Serial Communication	communication via serial Bus Terminals or PC COM ports with the 3964R and RK512 protocol
TF6350 TC3 SMS/SMTP	sending SMS and e-mails from the PLC
TF6360 TC3 Virtual Serial COM	virtual serial COM driver for Windows platforms
TF6420 TC3 Database Server	accessing databases from the PLC
TF6500 TC3 IEC 60870-5-10x	communication according to IEC 60870-101, -102, -103, -104
TF6510 TC3 IEC 61850/400-25	communication according to IEC 61850 and IEC 61400-25
TF6600 TC3 RFID Reader Communication	connection of RFID readers to the TwinCAT PLC
TF6610 TC3 S5/S7 Communication	communication with S5/S7 controllers

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TwinCAT 2

TwinCAT 2 | Software PLC



TwinCAT PLC

PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows NT/2000/XP/Vista, Windows 7, NT/XP/Windows 7 Embedded, 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) for 1,000 PLC commands
Programming	IEC 61131-3: IL, FBD, LD, SFC, ST, powerful library management, convenient debugging

TwinCAT 2 | Software NC PTP



TwinCAT NC PTP

TwinCAT PLC	inclusive
PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows NT/2000/XP/Vista, Windows 7, NT/XP/Windows 7 Embedded, 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 (standardised 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, speed override, special functions: master/slave cascading, cam plates, electronic gearings, online distance compensation of segments, "flying saw"

TwinCAT 2 | Level



TwinCAT I/O

PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows NT/2000/XP/Vista, Windows 7, NT/XP/Windows 7 Embedded, CE (only runtime)*
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

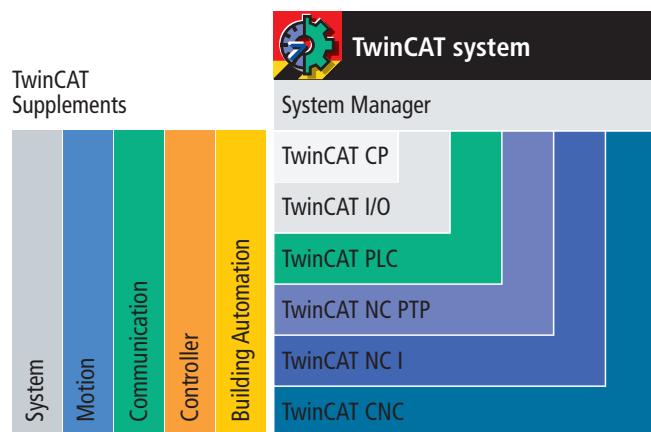
TwinCAT 2 | Level



TwinCAT CP

PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows NT/2000/XP/Vista, Windows 7, NT/XP/Windows 7 Embedded*
Real-time	Beckhoff real-time kernel

Windows driver for Beckhoff Control Panel



TwinCAT 2 | Software NC I

TwinCAT NC I	
TwinCAT PLC	inclusive
TwinCAT NC PTP	inclusive
PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows NT/2000/XP/Vista, Windows 7, NT/XP/Windows 7 Embedded, 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, zeroshifts, tool compensations, M and H functions
Geometries	straight lines and circular paths in 3-D space, circular paths in all main planes, helixes with base circles in all main planes linear, circular, helical interpolation in the main planes 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)

TwinCAT NC I | Options

Options	TwinCAT Kinematic Transformation
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* version-dependent

TwinCAT 2 | Software CNC

TwinCAT CNC	
TwinCAT PLC	inclusive
TwinCAT NC PTP	inclusive
TwinCAT NC I	inclusive
PC hardware	standard PC/IPC hardware, no extras
Operating systems	Windows NT/2000/XP/Vista, Windows 7, Windows NT/XP/Windows 7 Embedded*
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
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)

TwinCAT CNC | Options

Options	TwinCAT CNC Axes Pack
	TwinCAT CNC Channel Pack
	TwinCAT CNC Transformation
	TwinCAT CNC HSC Pack
	TwinCAT CNC Spline Interpolation

TwinCAT 2 Supplements

TwinCAT 2 Supplements | System

TwinCAT ECAD Import	importing engineering results from an ECAD program
TwinCAT Engineering Interface Server	co-ordinating programming tasks via a central source code management system
TwinCAT Eventlogger	alarm and diagnostic system for logging events which occur in the TwinCAT system
TwinCAT XML Data Server	reading and writing of XML-based data by the PLC
TwinCAT Backup	backing up and restoring files, operating system and TwinCAT settings
TwinCAT Simulation Manager	simplified preparation and configuration of a simulation environment
TwinCAT Database Server	accessing databases from the PLC
TwinCAT Database Server CE	accessing databases from the PLC for Windows CE platforms
TwinCAT PLC HMI	displaying visualisations created in PLC Control
TwinCAT PLC HMI CE	displaying visualisations created in PLC Control on Windows CE platforms
TwinCAT PLC HMI Web	displaying visualisations created in PLC Control in a web browser
TwinCAT Management Server	central administration of Beckhoff CE control systems
TwinCAT Scope 2	graphical analysis tool for displaying time-continuous signals
TwinCAT EtherCAT Redundancy	extension of the TwinCAT EtherCAT master with cable redundancy capability
TwinCAT Solar Position Algorithm	precise calculation of the sun's position

TwinCAT 2 Supplements | Motion

TwinCAT PLC Motion Control XFC	high-precision logging and switching of digital signals in relation to axis positions
TwinCAT PLC Hydraulic Positioning	control and adjustment of hydraulic axes
TwinCAT NC FIFO Axes	implementation of a pre-defined user setpoint generator for an NC axis
TwinCAT NC Flying Saw	implementing "flying saw" functionality
TwinCAT PLC Remote Synchronisation	remote synchronisation
TwinCAT NC Camming	using the TwinCAT NC cam plate functionality (table coupling)
TwinCAT Cam Design Tool	graphic design tool for electronic cam plates
TwinCAT Digital Cam Server	software implementation of fast cam controller
TwinCAT Valve Diagram Editor	graphical tool for designing the characteristic curve of a hydraulic valve
TwinCAT Kinematic Transformation	implementation of different kinematic transformations for TwinCAT PTP or TwinCAT NC I

TwinCAT 2 Supplements | Communication

TwinCAT PLC Serial Communication	communication via serial Bus Terminals or PC COM ports
TwinCAT PLC Serial Communication 3964R/RK512	communication via serial Bus Terminals or PC COM ports with the 3964R and RK512 protocol
TwinCAT PLC Modbus RTU	serial communication with Modbus end devices
TwinCAT Modbus TCP Server	communication with Modbus TCP devices (server and client functionality)
TwinCAT PLC IEC 60870-5-101, -102, -103, -104 Master	implementation of IEC 60870-101, -102, -103 and -104 masters
TwinCAT PLC IEC 60870-5-104 Master CE	implementation of IEC 60870-104 masters under Windows CE

TwinCAT 2 Supplements | Communication

TwinCAT PLC IEC 60870-5-101, -104 Slave	implementation of IEC 60870-101 and -104 slaves
TwinCAT PLC IEC 60870-5-104 Slave CE	implementation of IEC 60870-104 slaves under Windows CE
TwinCAT PLC IEC 61850 Server	IEC 61850 communication
TwinCAT PLC IEC 61400-25 Server	IEC 61400-25 communication
TwinCAT DriveTop Server	configuring Indramat SERCOS drives with DriveTop software on TwinCAT systems
TwinCAT DriveCOM OPC Server	fieldbus-independent communication connections between the engineering tool and the drive
TwinCAT OPC Server	access to TwinCAT variables in accordance with the OPC DA/OPC XML DA specification
TwinCAT OPC UA Server	access to TwinCAT in accordance with OPC UA: DA/HA/AC
TwinCAT ADS Communication Library	ADS communication components
TwinCAT SMS/SMTP Server	sending SMS and e-mails from the PLC
TwinCAT TCP/IP Server	communication via generic TCP server
TwinCAT PROFINET IO Controller	TwinCAT PROFINET IO controller turns every PC-based controller into a PROFINET IO controller.
TwinCAT PROFINET IO Device	TwinCAT PROFINET IO device turns every PC-based controller into a PROFINET IO device.
TwinCAT EtherNet/IP Slave	TwinCAT EtherNet/IP slave turns every PC-based controller into an EtherNet/IP slave.
TwinCAT Virtual Serial COM Driver	virtual serial COM driver for Windows XP and Windows CE platforms
TwinCAT FTP Client	basic access from TwinCAT PLC to FTP server
TwinCAT PLC RFID Reader Communication	connection of RFID readers to the TwinCAT PLC
TwinCAT PLC S5/S7 Communication	communication with S5/S7 controllers

TwinCAT 2 Supplements | Controller

TwinCAT PLC Controller Toolbox	modules for basic controllers (P, I, D), complex controllers (PI, PID), pulse width modulation, ramps, signal generators and filters
TwinCAT PLC Temperature Controller	instanced temperature control function block for monitoring and controlling different temperature ranges

TwinCAT 2 Supplements | Building Automation

TwinCAT PLC Building Automation	executing basic room automation functions
TwinCAT PLC Building Automation DALI	communication with the KL6811 DALI master Bus Terminal
TwinCAT PLC Serial Communication	processing of signals from battery-less sensors with EnOcean technology
EnOcean	
TwinCAT Building Automation Framework	configuration and commissioning of building automation projects
TwinCAT PLC HVAC	automation of HVAC and sanitary installations
TwinCAT PLC M-Bus	use of the M-Bus for the acquisition of consumption data
TwinCAT Crestron Server	communication between a TwinCAT PLC and a Crestron controller
TwinCAT BACnet/IP	communication with the data networks of the building automation and building control systems
TwinCAT FIAS Server	communication between TwinCAT PLC and a system using the FIAS standard

► www.beckhoff.com/supplements

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