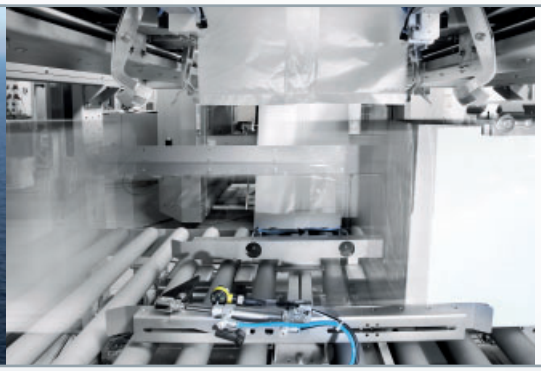
BECKHOFF New Automation Technology

Product Overview | 2013

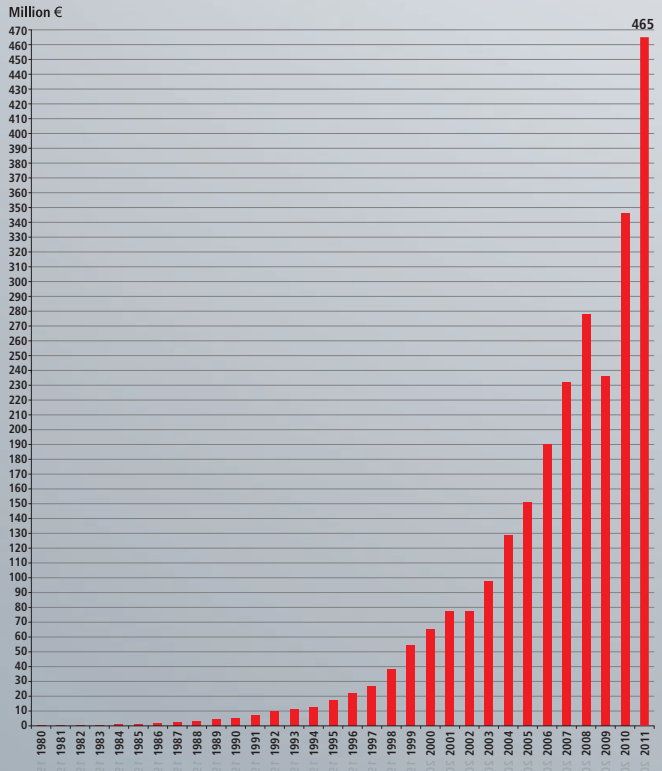
IPC	Industrial PC | Embedded PC
I/O	EtherCAT | EtherCAT Terminal | EtherCAT Box | Bus Terminal | Fieldbus Box | Infrastructure Components
Motion	Drive Technology
Automation	TwinCAT | TwinSAFE

Picture: AREVA Wind/Jan Oelker



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.



Turnover development

Beckhoff Automation

- Headquarters Verl, Germany
- Sales 2011: **465** million €
- Staff worldwide: over **2,200**
- Branch Offices Germany: **11**
- Subsidiaries/Branch Offices worldwide: **30**
- Distributors worldwide:
  in more than 60 countries
  (as of 11/2012)

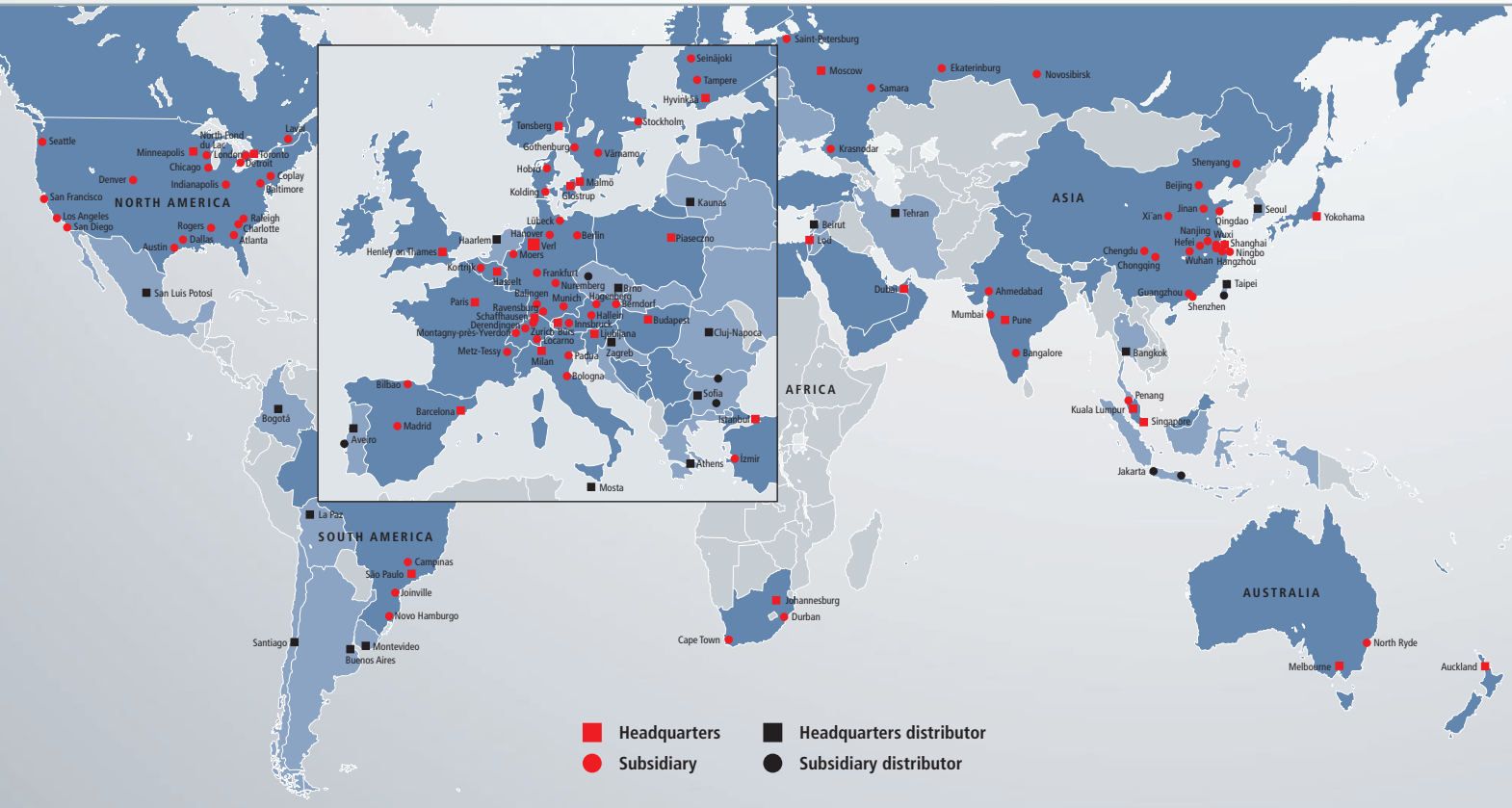
PC-based control technology

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
1986 PC Control – first PC-based machine controller
1988 S1000 – software PLC/NC on PC (DOS)
1989 Lightbus – high-speed fieldbus utilising optical fibre
1990 All-in-one PC motherboard
1995 Bus Terminal – fieldbus technology in terminal block format
1996 TwinCAT – real-time software package under Windows with PLC and Motion Control functions
1998 Control Panel – remote IPC Control Panels
1999 Fieldbus Box – the I/O system in IP 67
2002 CX1000 – modular Embedded PCs for DIN rail mounting
2003 EtherCAT – real-time Ethernet fieldbus system
2005 TwinSAFE – the compact safety solution
2005 AX5000 – EtherCAT Servo Drives
2007 Industrial Motherboards – made in Germany
2008 XFC – eXtreme Fast Control Technology
2009 HD Bus Terminals – 16-channel terminals in 12 mm
2010 TwinCAT 3 – eXtended Automation Technology
2011 AM8000 – Synchronous Servomotors with One Cable Technology
2012 2nd generation of Control Panels – Panel PCs and Control Panels with multi-touch technology
2012 XTS – eXtended Transport System



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

Ethernet

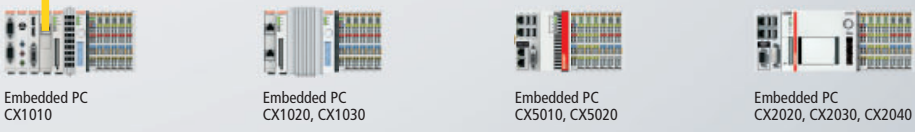
Automation

TwinCAT

IPC

Industrial PC

Embedded PC

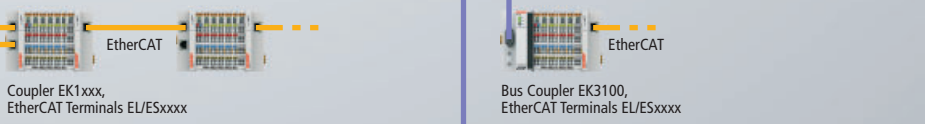


I/O

Infrastructure Components

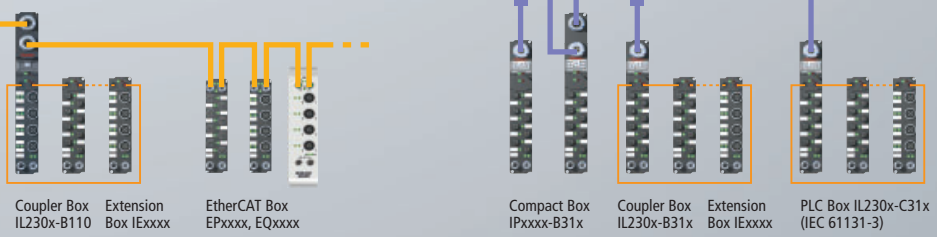
Bus Terminal

EtherCAT Terminal



Fieldbus Box

EtherCAT Box



EtherCAT

PROFIBUS

Motion

Drive Technology

TwinCAT Control

TwinCAT Motion

TwinCAT PTP

TwinCAT NC I

TwinCAT CNC

TwinCAT Robotics

TwinCAT Connectivity

19-inch slide-in PC
C5xxx

Control cabinet PC
C61xx

Control cabinet PC
C62xx

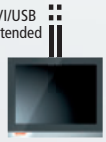
Control cabinet PC
C63xx

Built-in Industrial PC C65xx

Control cabinet PC
C66xx

Control cabinet PC
C69xx

DVI/USB Extended



Built-in Control Panel CP29xx

Ethernet

DVI/USB Extended

Built-in Control Panel CP66xx

DVI/USB Extended

Built-in Control Panel CP69xx

DVI/USB Extended

Control Panel CP39xx

DVI/USB Extended

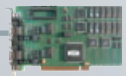
Control Panel CP79xx

Embedded PC
CX8000

Embedded PC
CX9000, CX9010

Embedded PC
CX9020

Industrial Motherboards
CBxxxx

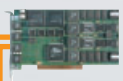


PCI CANopen FC510x

PCI DeviceNet FC520x

Ethernet Switch CU20xx

PCI Ethernet FC90xx



PCI Lightbus FC200x

Bus Coupler BK5xx0,
Bus Terminals KL/KSxxxx

Bus Terminal Controller
BC/BX5xx0 (IEC 61131-3)

Bus Coupler BK9xx0, Bus Terminal
Controller BC/BX9xx0 (IEC 61131-3)

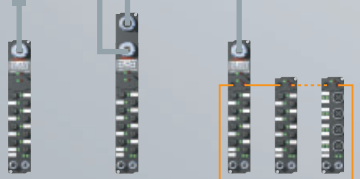
Bus Coupler BK2xx0, Bus Terminal
Controller BC2000 (IEC 61131-3)

EtherCAT

Bus Coupler EK5x00,
EtherCAT Terminals EL/ESxxxx

EtherCAT

Bus Coupler EK9000,
EtherCAT Terminals EL/ESxxxx

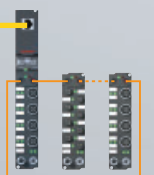


Compact Box
IPxxxx-B5x0

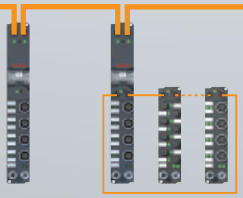
Compact Box
IPxxxx-B5x8

Coupler Box
IL230x-B5xx

Extension
Box IExxxx



Coupler Box IL230x-B90x,
PLC Box IL230x-C900
(IEC 61131-3)



Compact Box
IPxxxx-B200

Coupler Box
IL230x-B200

Extension
Box IExxxx

CANopen

DeviceNet

Ethernet TCP/IP

LIGHTBUS

Modbus

RS 232
RS 485

EtherNet/IP

SERCOS interface

USB

Fipio

INTERBUS

PROFINET

MP-Bus

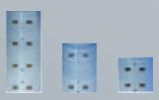
DALI EIB/KNX

LON

ControlNet

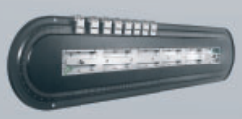
CC-Link

Stainless steel servomotors
AM88xx



Linear Servomotors
ALxxxx

Stepper Motors
AS1xxx



XTS | eXtended Transport System

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**

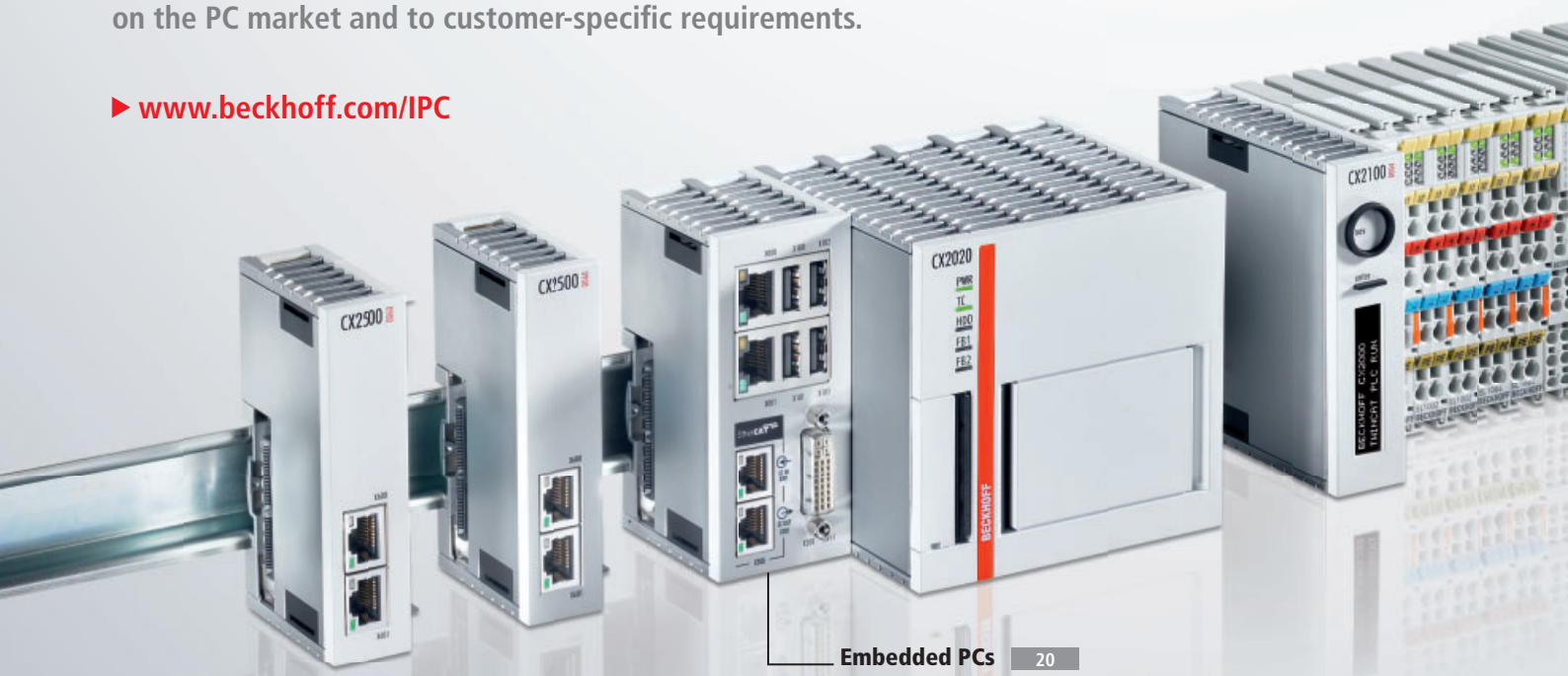
Panel PCs 12

- Control Panel + PC = Panel PC
- built-in Panel PCs or mounting arm system
- display sizes between 5.7-inch and 24-inch
- widescreen or 4:3/5:4
- processors from Intel® Atom™ to Core™ i7, quad-core
- multi-touch or single-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

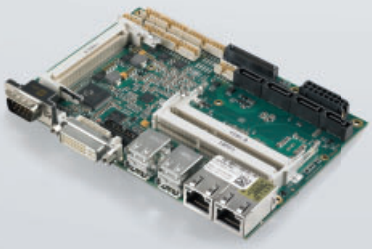
- link the worlds of Industrial PCs and hardware PLC on a DIN rail
- scalable performance classes from ARM to quad-core processors
- direct I/O interface for Beckhoff I/O systems

▶ **www.beckhoff.com/Embedded-PC**

Control Panel 16

- human-machine interface
- built-in Control Panel or mounting arm system IP 65
- display sizes between 5.7-inch and 24-inch
- widescreen or 4:3/5:4
- multi-touch or single-touch
- customer-specific design

▶ **www.beckhoff.com/ControlPanel**



Industrial Motherboards

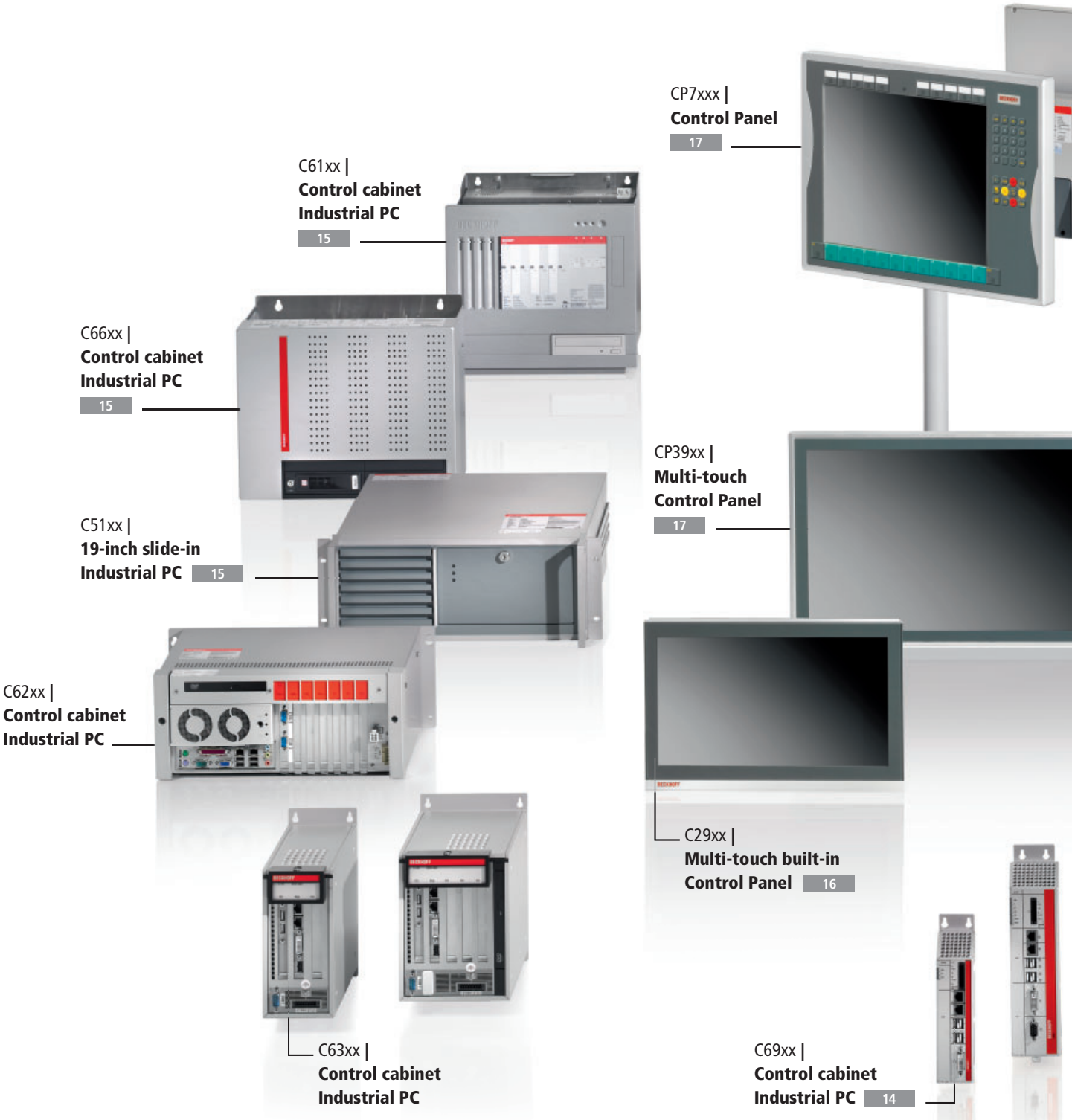
- motherboards with Intel® x86 and ARM architecture
- form factors: ATX, 3½-inch, PC/104
- Made in Germany
- long-term availability

▶ **www.beckhoff.com/Motherboards**

Industrial PC

Control cabinet Industrial PCs 14

Control Panels 16



CP7xxx | **Control Panel** 17

C61xx | **Control cabinet Industrial PC** 15

C66xx | **Control cabinet Industrial PC** 15

CP39xx | **Multi-touch Control Panel** 17

C51xx | **19-inch slide-in Industrial PC** 15

C62xx | **Control cabinet Industrial PC**

C29xx | **Multi-touch built-in Control Panel** 16

C63xx | **Control cabinet Industrial PC**

C69xx | **Control cabinet Industrial PC** 14

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 with Intel® Celeron® up to Intel® Core™ i7 processors
- PCs with low power consumption with Intel® Mobile 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, scanners, handwheels 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 CP2221 CP2224

	Display Resolution Format	12-inch 800 x 600 4:3	15-inch 1024 x 768 4:3	15.6-inch 1366 x 768 16:9	18.5-inch 1366 x 768 16:9	19-inch 1280 x 1024 5:4	21.5-inch 1920 x 1080 16:9	24-inch 1920 x 1080 16:9
– 3½-inch motherb. – up to Core™ i3/i5/ i7 2nd/3rd generation	multi-finger touch screen	CP2212	CP2215	CP2216	CP2218	CP2219	CP2221	CP2224

▶ **www.beckhoff.com/CP22xx**

CP62xx | **Built-in Panel PC**

CP6207 CP6219 CP6211 CP6202 CP6233 CP6204

	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 5:4	24-inch 1920 x 1200 16:10
CP62xx-0010 – 3½-inch motherboard – up to Core™2 Duo – depth 58–67 mm	without keys function keys numerical alphanumerical			CP6201 CP6211 CP6221 CP6231	CP6202 CP6212 CP6222 CP6232 CP6242	CP6203 CP6213 CP6223 CP6233	
CP62xx-0020 – 3½-inch motherboard – Atom™ processor – depth 58–67 mm	without keys function keys numerical alphanumerical	CP6207	CP6209 CP6219 CP6229	CP6201 CP6211 CP6221 CP6231	CP6202 CP6212 CP6222 CP6232 CP6242	CP6203 CP6213 CP6223 CP6233	
CP62xx-0030/35/40/50 – 3½-inch motherb. – up to Core™ i3/i5/ i7 2nd/3rd generation – depth 58–67 mm	without keys function keys numerical alphanumerical			CP6201 CP6211 CP6221 CP6231	CP6202 CP6212 CP6222 CP6232 CP6242	CP6203 CP6213 CP6223 CP6233	CP6204

▶ **www.beckhoff.com/CP62xx**

CP62xx

CP72xx

CP77xx

CP72xx | IP 65 Panel PC for mounting arm installation

CP7211

CP7222

CP7233

CP7204

	Display	12-inch	15-inch	19-inch	24-inch
	Resolution	800 x 600	1024 x 768	1280 x 1024	1920 x 1200
	Format	4:3	4:3	5:4	16:10
– 3½-inch motherboard	without keys	CP7201	CP7202	CP7203	CP7204
	function keys	CP7211	CP7212	CP7213	
– up to Core™ i3/i5/	numerical	CP7221	CP7222	CP7223	
i7 2nd/3rd generation	alphanumerical	CP7231	CP7232	CP7233	
– depth 107–123 mm			CP7242		

▶ **www.beckhoff.com/CP72xx**

CP77xx | IP 65 Panel PC for mounting arm installation

CP7709

CP7711

CP7722

CP7733

	Display	6.5-inch	12-inch	15-inch	19-inch
	Resolution	640 x 480	800 x 600	1024 x 768	1280 x 1024
	Format	4:3	4:3	5:4	4:3
CP77xx-0020/30	without keys	CP7709	CP7701	CP7702	CP7703
– CP motherboard	function keys	CP7719	CP7711	CP7712	CP7713
– up to Atom™	numerical	CP7729	CP7721	CP7722	CP7723
– depth 28–45 mm	alphanumerical		CP7731	CP7732	CP7733
CP77xx-0040	without keys	CP7709	CP7701	CP7702	CP7703
– CP motherboard	function keys	CP7719	CP7711	CP7712	CP7713
– Celeron® 800 MHz	numerical	CP7729	CP7721	CP7722	CP7723
– depth 28–45 mm	alphanumerical		CP7731	CP7732	CP7733

▶ **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**

C6915

C6920
basic configuration

C6920
with PCIe module slots

C6925

C6930
basic configuration

C6930
with PCIe module slots

	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 2nd/3rd generation	C6920-0040		C6930-0040

▶ **www.beckhoff.com/C69xx**

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

C6515
basic configuration

C6515
with PCIe module slots

C6525
basic configuration

C6525
with PCIe module slots

C6525
with plug-in card slots

	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 2nd/3rd generation	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 2nd/3rd generation	C5102-0050	C5210-0010

▶ **www.beckhoff.com/C5xxx**

C6xxx | **Control cabinet Industrial PC with ATX motherboard**

C6140

C6150

C6640

C6650

	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 2nd/3rd generation	C6140-0050 C6150-0040	C6640-0030	C6650-0030

▶ **www.beckhoff.com/C61xx** ▶ **www.beckhoff.com/C66xx**

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 CP2921 CP2924

	Display	7-inch	12-inch	15-inch	15.6-inch	18.5-inch	19-inch	21.5-inch	24-inch
	Resolution	800 x 480	800 x 600	1024 x 768	1366 x 768	1366 x 768	1280 x 1024	1920 x 1080	1920 x 1080
	Format	16:9,6	4:3	4:3	16:9	16:9	5:4	16:9	16:9
DVI/USB Extended interface, 50 m	multi-finger touch screen	CP2907	CP2912	CP2915	CP2916	CP2918	CP2919	CP2921	CP2924

▶ **www.beckhoff.com/CP29xx**

CP6xxx | **Built-in Control Panel**

CP6607 CP6x19 CP6x11 CP6x22 CP6933 CP6904

	Display	5.7-inch	6.5-inch	12-inch	15-inch	19-inch	24-inch
	Resolution	640 x 480	640 x 480	800 x 600	1024 x 768	1280 x 1024	1920 x 1200
	Format	4:3	4:3	4:3	4:3	5:4	16:10
Ethernet interface (Embedded PC) – Intel® IXP420 CPU, 533 MHz	without keys	CP6607	CP6609	CP6601	CP6602		
	function keys		CP6619	CP6611	CP6612		
	numerical		CP6629	CP6621	CP6622		
	alphanumerical			CP6631	CP6632		
DVI/USB Extended interface, 50 m	without keys	CP6907	CP6909	CP6901	CP6902	CP6903	CP6904
	function keys		CP6919	CP6911	CP6912	CP6913	
	numerical		CP6929	CP6921	CP6922	CP6923	
	alphanumerical			CP6931	CP6932 CP6942	CP6933	

▶ **www.beckhoff.com/CP66xx** ▶ **www.beckhoff.com/CP69xx**

CP39xx | **IP 65 multi-touch Control Panel**

CP3907 CP3912 CP3915 CP3916 CP3918 CP3919 CP3921 CP3924

	Display	7-inch	12-inch	15-inch	15.6-inch	18.5-inch	19-inch	21.5-inch	24-inch
	Resolution	800 x 480	800 x 600	1024 x 768	1366 x 768	1366 x 768	1280 x 1024	1920 x 1080	1920 x 1080
	Format	16:9,6	4:3	4:3	16:9	16:9	5:4	16:9	16:9
DVI/USB Extended interface, 50 m	multi-finger touch screen	CP3907	CP3912	CP3915	CP3916	CP3918	CP3919	CP3921	CP3924

▶ **www.beckhoff.com/CP39xx**

CP79xx | **IP 65 Control Panel**

CP7909 CP7911 CP7922 CP7933 CP7904

	Display	6.5-inch	12-inch	15-inch	19-inch	24-inch
	Resolution	640 x 480	800 x 600	1024 x 768	1280 x 1024	1920 x 1200
	Format	4:3	4:3	4:3	5:4	16:10
DVI/USB Extended interface, 50 m	without keys	CP7909	CP7901	CP7902	CP7903	CP7904
	function keys	CP7919	CP7911	CP7912	CP7913	
	numerical	CP7929	CP7921	CP7922	CP7923	
	alphanumerical		CP7931	CP7932 CP7942	CP7933	

▶ **www.beckhoff.com/CP79xx**

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

Options for Panel PCs and Control Panels

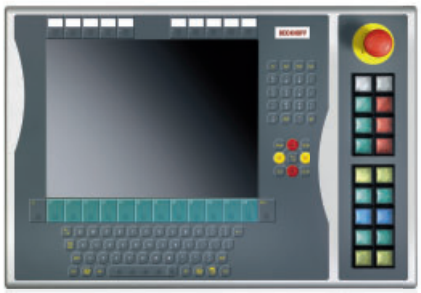
Options

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

Ethernet panel with individual front laminate

Stainless steel panel

Stainless steel panel with emergency stop



Control Panel with push-button extension

Control Panel with CNC push-button extension

Multi-touch Control Panel with push-button extension

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

Adaptation of extensive customer-specific requirements

Keyboard with larger number and higher density of membrane keys

Customer-specific front laminate

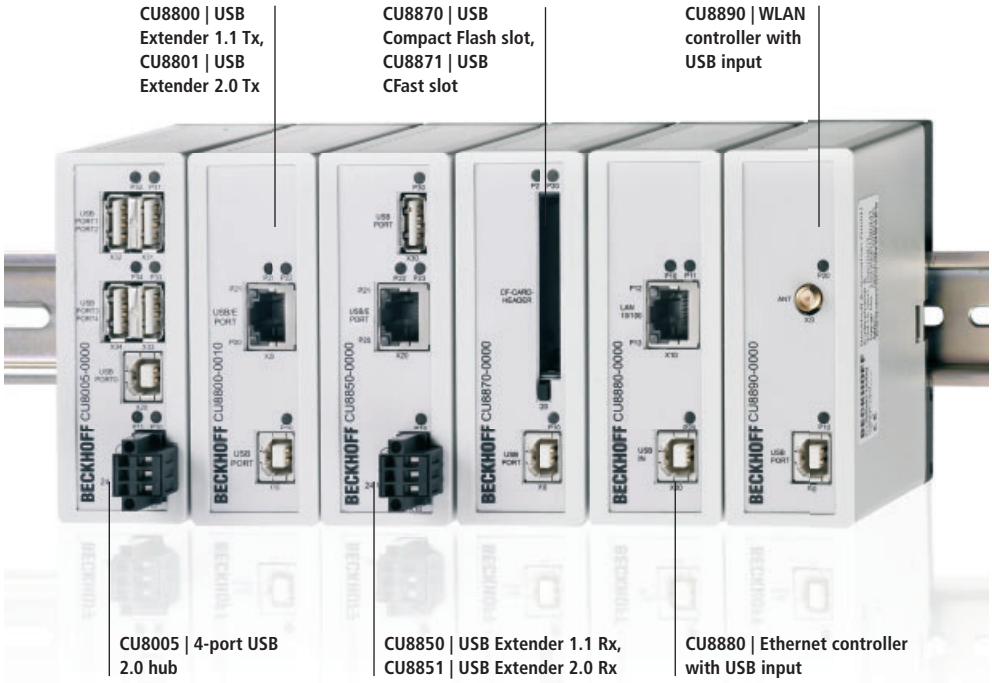
Individual housing construction

Customer-specific Control Panel

Industrial PC accessories

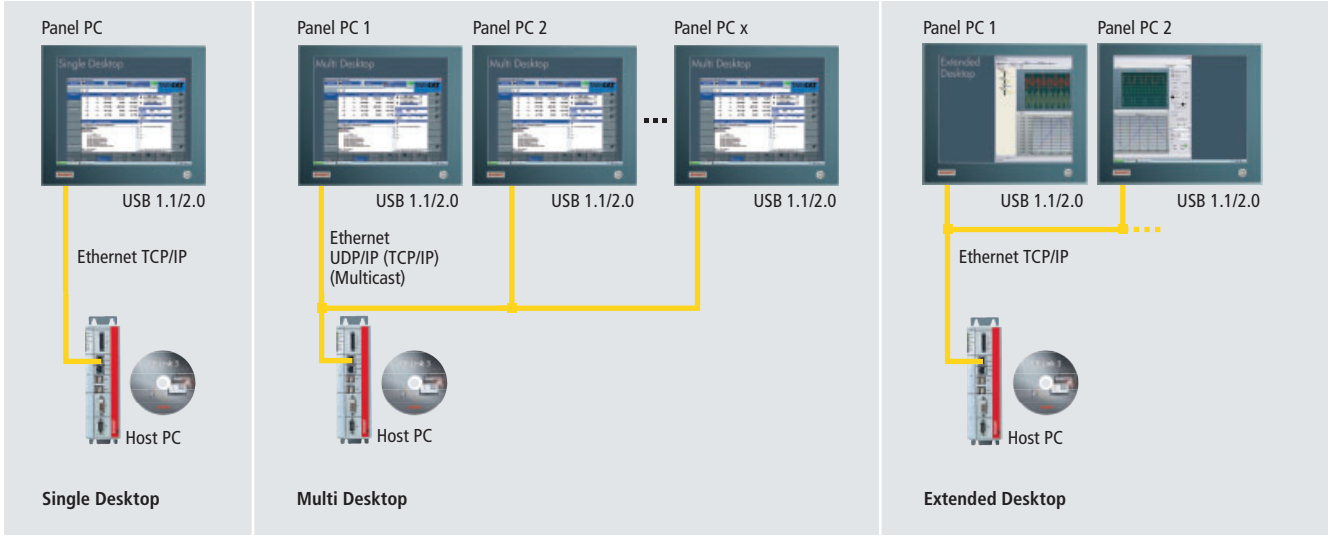
CU8xxx modules

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

CX80xx

CX90xx

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 master
	EL6731-0010 slave	EL6731-0010 slave
Interbus	EL6740-0010 slave	EL6740-0010 slave
CANopen	EL6751 master	EL6751 master
	EL6751-0010 slave	EL6751-0010 slave
DeviceNet	EL6752 master	EL6752 master
	EL6752-0010 slave	EL6752-0010 slave
SERCOS interface	–	–
PROFINET RT	–	–
EtherNet/IP	–	–
UPS	1-second UPS	–

▶ www.beckhoff.com/Embedded-PC

CX9020

CX1010

CX50xx

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, 1 x optional interface	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, 1 x optional interface
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**
in the basic CPU	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
in the basic CPU	CX1010-N060	in the basic CPU
in the basic CPU	–	in the basic CPU
2nd microSD slot 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**

CX1020

CX1030

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)	CX1030-N030 (COM 1/2)
	CX1020-N040 (COM 3/4)	CX1030-N040 (COM 3/4)
RS422/RS485	CX1020-N031 (COM 1/2)	CX1030-N031 (COM 1/2)
	CX1020-N041 (COM 3/4)	CX1030-N041 (COM 3/4)
Audio	CX1020-N020	CX1030-N020
Ethernet	CX1020-N060	CX1030-N060
4-port USB hub	–	–
Memory medium	–	–
USB extension	–	–
Fieldbus interfaces	modularly expandable	modularly expandable
EtherCAT	–	–
Lightbus	CX1500-M200 master	CX1500-M200 master
	CX1500-B200 slave	CX1500-B200 slave
PROFIBUS	CX1500-M310 master	CX1500-M310 master
	CX1500-B310 slave	CX1500-B310 slave
Interbus	–	–
CANopen	CX1500-M510 master	CX1500-M510 master
	CX1500-B510 slave	CX1500-B510 slave
DeviceNet	CX1500-M520 master	CX1500-M520 master
	CX1500-B520 slave	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

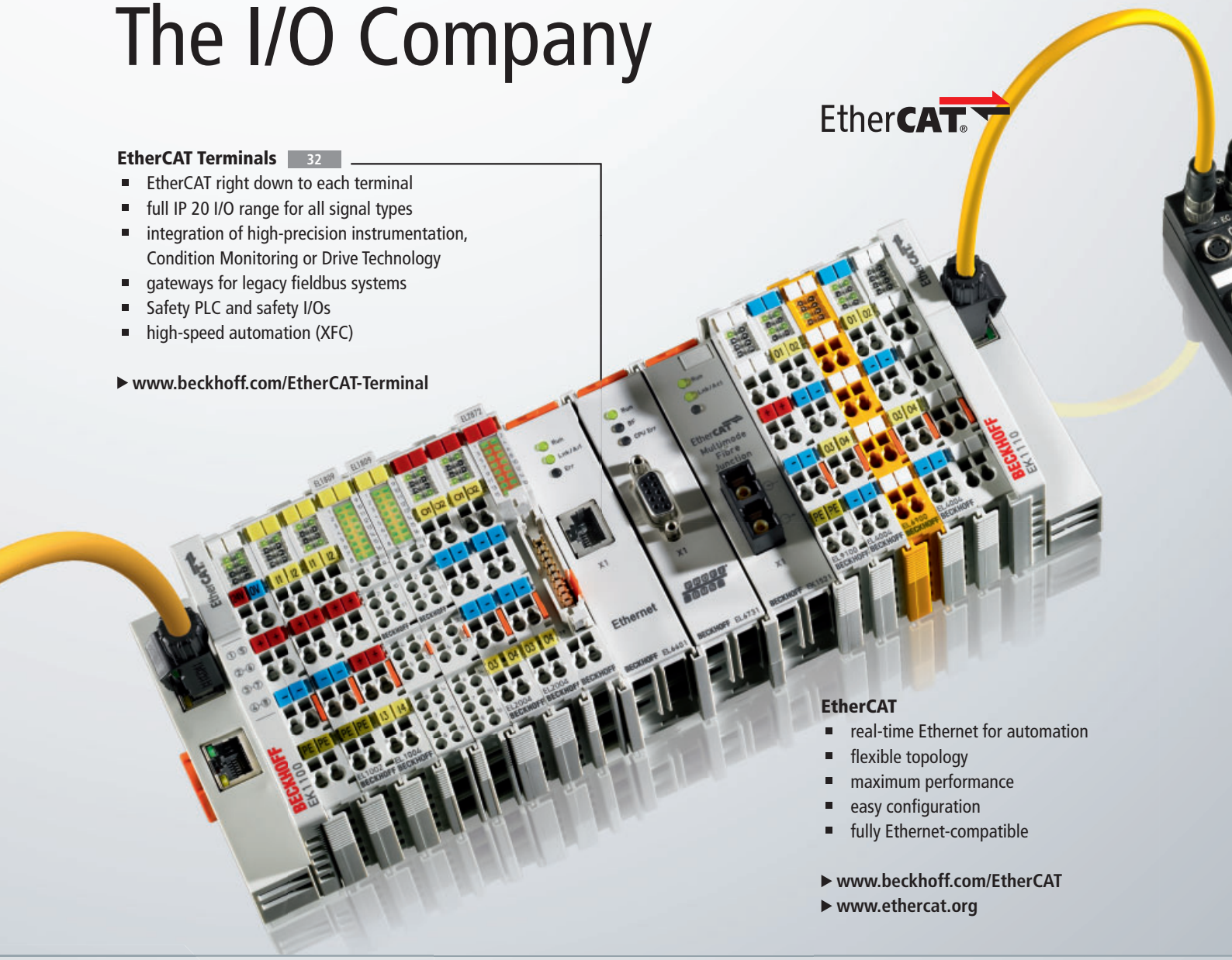
	CX2020	CX2030	CX2040
	Intel® Celeron® 1.4 GHz, single-core	Intel® Core™ i7 1.5 GHz, dual-core	Intel® Core™ i7 2.1 GHz, quad-core
	8 GB CFast flash card (optionally extendable)	8 GB CFast flash card (optionally extendable)	8 GB CFast flash card (optionally extendable)
	2 GB DDR3 RAM	2 GB DDR3 RAM	4 GB DDR3 RAM
	2 x RJ 45 (10/100/1,000 Mbit/s), DVI-I, 4 x USB 2.0, 1 x optional interface	2 x RJ 45 (10/100/1,000 Mbit/s), DVI-I, 4 x USB 2.0, 1 x optional interface	2 x RJ 45 (10/100/1,000 Mbit/s), DVI-I, 4 x USB 2.0, 1 x optional interface
	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, 2nd DVI port as option CX2020-N010	in the basic CPU, 2nd DVI port as option CX2030-N010	in the basic CPU, 2nd DVI port as option CX2040-N010
	CX2020-N030 or CX2500-0030	CX2030-N030 or CX2500-0030	CX2040-N030 or CX2500-0030
	CX2020-N031 or CX2500-0031	CX2030-N031 or CX2500-0031	CX2040-N031 or CX2500-0031
	CX2500-0020	CX2500-0020	CX2500-0020
	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
	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0)	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0)	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0)
	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 or CX2500-M310 master	CX2030-M310 or CX2500-M310 master	CX2040-M310 or CX2500-M310 master
	CX2020-B310 or CX2500-B310 slave	CX2030-B310 or CX2500-B310 slave	CX2040-B310 or CX2500-B310 slave
	–	–	–
	CX2020-M510 or CX2500-M510 master	CX2030-M510 or CX2500-M510 master	CX2040-M510 or CX2500-M510 master
	CX2020-B510 or CX2500-B510 slave	CX2030-B510 or CX2500-B510 slave	CX2040-B510 or CX2500-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**

The I/O Company

EtherCAT Terminals 32

- 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)

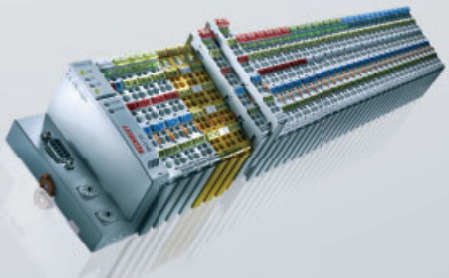
▶ **www.beckhoff.com/EtherCAT-Terminal**



EtherCAT

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

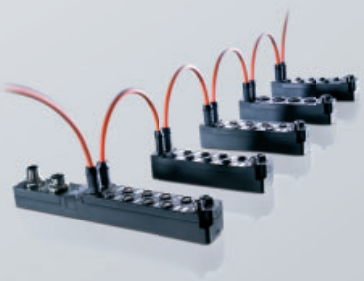
▶ **www.beckhoff.com/EtherCAT**
▶ **www.ethercat.org**



Bus Terminal 38

- 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

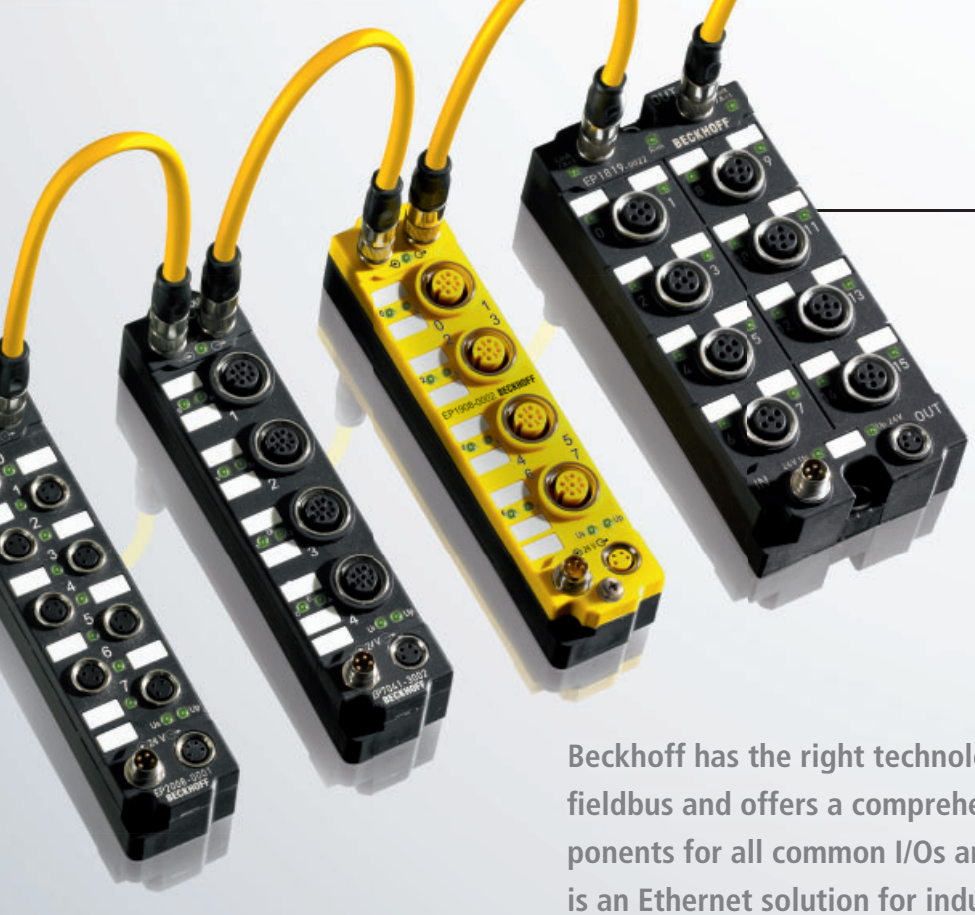
▶ **www.beckhoff.com/BusTerminal**



Fieldbus Box 44

- 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**



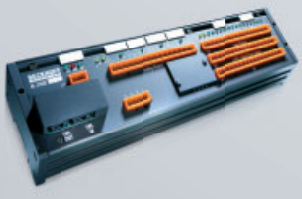
EtherCAT Box 36

- IP 67 (industrial housing) or IP 69K (stainless steel housing) 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

- fast fibre optic fieldbus
- interference-proof fieldbus communication

▶ **www.beckhoff.com/Lightbus**

Infrastructure Components 46

- PCI/PCIe and Mini PCI fieldbus cards for all common fieldbus systems
- Industrial Ethernet switches for 10/100/1,000 Mbit/s
- real-time Ethernet port multiplier for independent Ethernet networks
- EtherCAT junction in IP 20 or IP 67
- EtherCAT media converters (from optical fibre to copper and vice versa) in IP 20 or IP 67

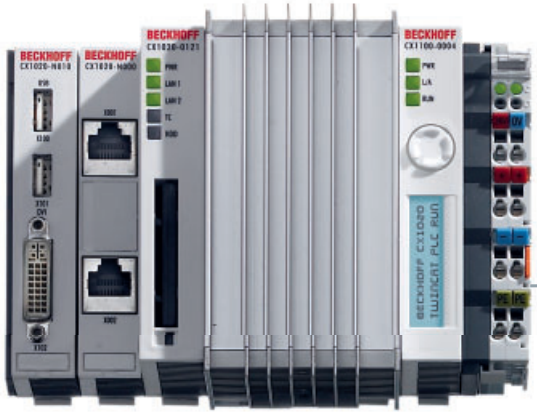
▶ **www.beckhoff.com/Infrastructure-components**

System overview EtherCAT I/O

EK EtherCAT Coupler series

EtherCAT Coupler with integrated digital I/Os

Bus Coupler (e.g. PROFIBUS) for EtherCAT Terminals

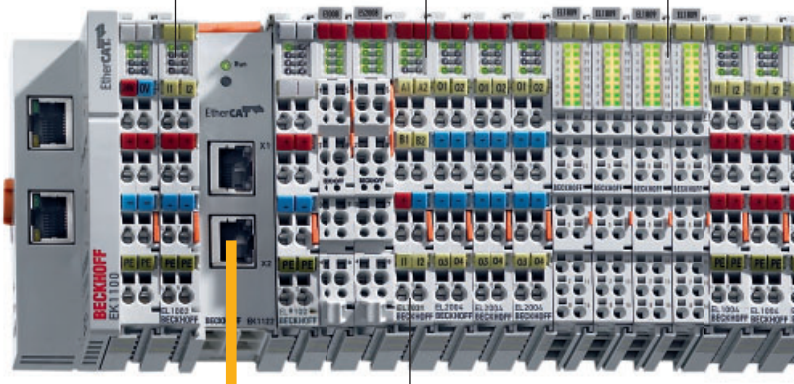


Embedded PC series CX,
further Embedded PCs see page 20

EtherCAT Terminals
in 1-, 2-, 4-, 8- and
16-channel modularity

Free mix of signals:
more than 200 differ-
ent EtherCAT Terminals
enable connection of all
common sensors and
actuators.

HD EtherCAT Terminals
(high-density) with
16 connection points
offer high packing
density on 12 mm.



100 m
Industrial
Ethernet
cable
(100BASE-TX)

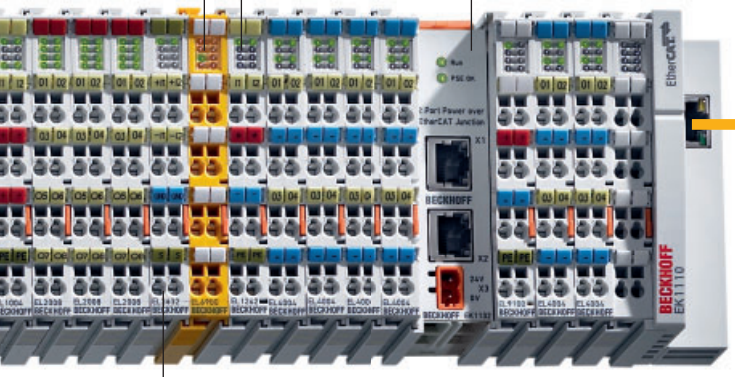
Motion terminals for
stepper, servo or DC
motors or hydraulic valves

Optional fieldbus integration
via decentralised fieldbus
master/slave terminals

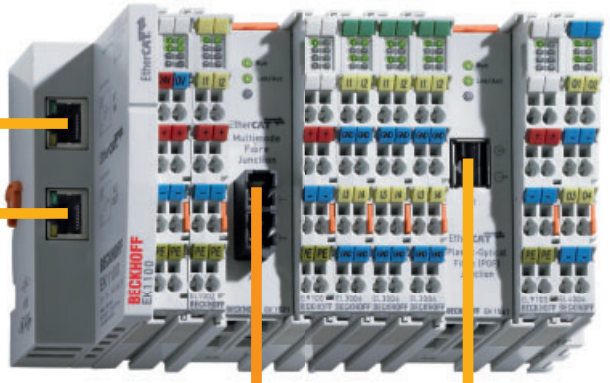
TwinSAFE: safety I/Os and compact Safety PLC for up to 128 safety-relevant bus devices

Power over EtherCAT junction: one standard EtherCAT cable for fieldbus signal and power supply

Ultra-fast I/O terminals for I/O response times < 100 µs for fast I/O, oversampling and time stamp



High-speed measurement, high-precision measurement, Condition Monitoring, energy monitoring



2,000/20,000 m fibre optic (100BASE-FX)

50 m Plastic Optical Fibre (100BASE-FX POF)

IP 67 EtherCAT Box

IP 69K EtherCAT Box

System overview fieldbus I/O

Bus Coupler series BK, the link between Bus Terminals and fieldbus

Bus Terminal Controller series BC with integrated IEC 61131-3 PLC

Bus Terminal Controller series BX with integrated IEC 61131-3 PLC and extended interfaces

Embedded PC series CX,
further Embedded PCs see page 20

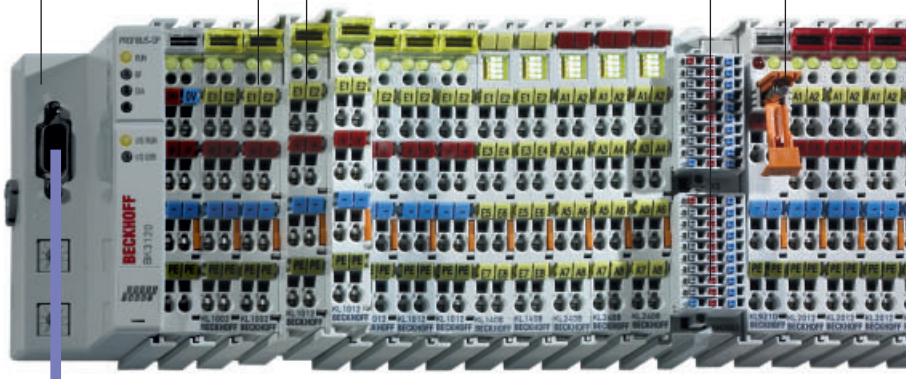
The head station of the Bus Terminals: from Bus Coupler with fieldbus interface to Embedded PC

Free mix of signals: about 400 different Bus Terminals for connection to all common sensors and actuators

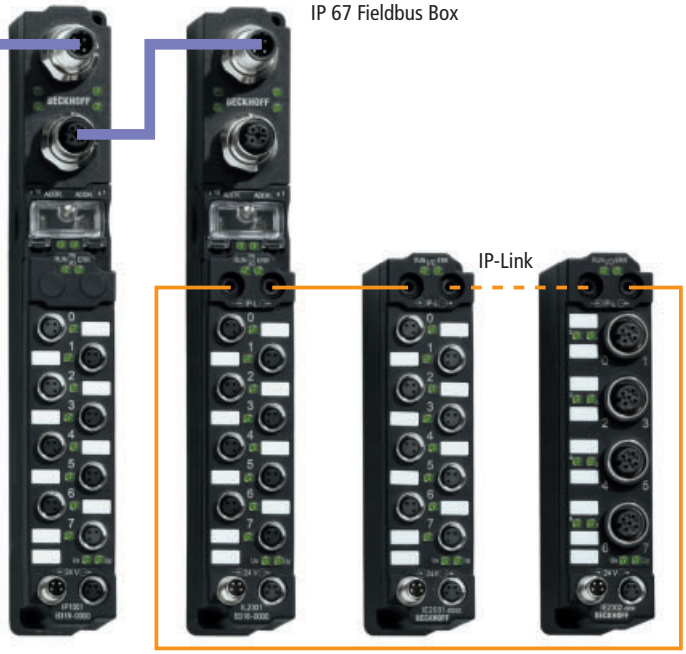
Potential feed terminals enable configuration of different potential groups.

Bus Terminals in 1-, 2-, 4-, 8- and 16-channel modularity

The terminal modules with plug-in wiring combine 16, 32 or 64 digital I/Os within a very small space and with high packing density.



IP 67 Fieldbus Box



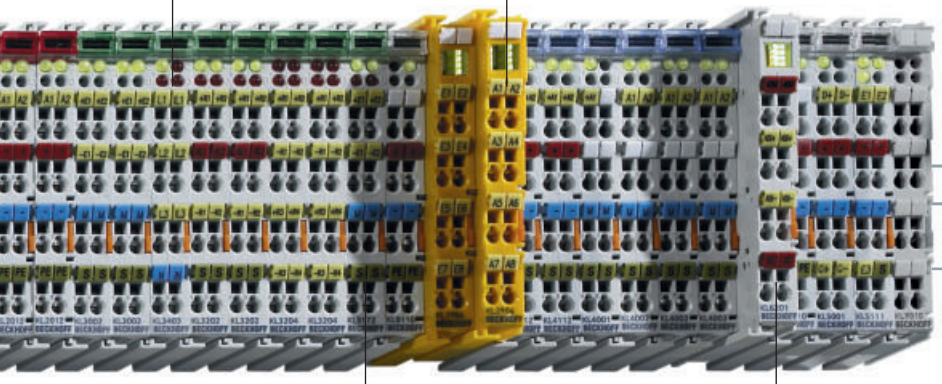
Compact Box

Coupler Box/
PLC Box

Extension Box modules

3-phase power measurement capability enables all relevant electrical data of the supply network to be measured.

Integrated safety: the TwinSAFE Bus Terminals enable the connection of all common safety sensors and actuators.



Bus Terminals with a maximum measurement error of ±0.01%

Communication terminals enable the integration of subsystems such as AS-Interface, RS232 and RS485.

Bus end terminal

The terminal bus extension enables the connection of up to 255 Bus Terminals (instead of 64) to a single station.

Manual operating modules enable switching, controlling and monitoring of digital and analog signals as well as setting and reading of data and values in the event of a controller failure. Process data connection via K-bus interface with K-bus extension (up to 31 modules). Signal connection via KL9309.

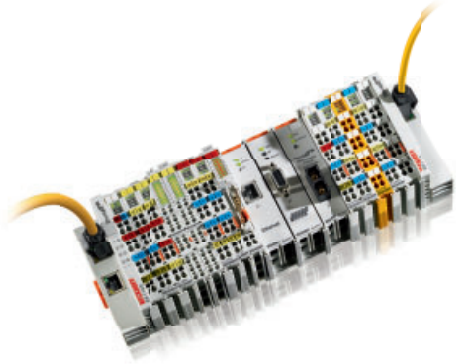
Product overview fieldbus systems

Fieldbus	EtherCAT Terminal	EtherCAT Box	Bus Terminal		Fieldbus Box		
	Couplers/Gateways	Modules	Bus Couplers	PLC (IEC 61131-3)	Compact Box	Coupler Box	PLC Box (IEC 61131-3)
EtherCAT	EK1xxx	EPxxxx	BK1120			IL230x-B110	
		EQxxxx	BK1150				
			BK1250				
LIGHTBUS	EL6720 master terminal		BK2xx0	BC2000	IPxxxx-B200	IL230x-B200	
PROFIBUS	EK3100		BK3xx0	BC31x0	IPxxxx-B31x	IL230x-B31x	IL230x-C31x
	EL6731 master/slave terminal		LC3100	BX3100			
INTERBUS	EL6740 slave terminal		BK4xx0	BC4000	IPxxxx-B400	IL230x-B400	
CANopen	EK5100		BK51xx	BC5150	IPxxxx-B51x	IL230x-B51x	
	EL6751 master/slave terminal		LC5100	BX5100			
DeviceNet	EK5200		BK52x0	BC5250	IPxxxx-B52x	IL230x-B52x	
	EL6752 master/slave terminal		LC5200	BX5200			
ControlNet			BK7000				
CC-Link			BK7150				
Modbus			BK73x0	BC7300	IPxxxx-B730	IL230x-B730	
Fipio			BK7420				
SERCOS interface	EK9700		BK75x0				
RS485	EL6021, EL6022		BK8000	BC80x0	IPxxxx-B800	IL230x-B800	
				BX8000			
RS232	EL6001, EL6002		BK8100	BC81x0	IPxxxx-B810	IL230x-B810	IL230x-C810
Ethernet TCP/IP	EK9000		BK9xx0	BC9xxx		IL230x-B90x	IL230x-C900
	EL6601, EL6614 switch port			BX9000			
PROFINET	EK9300		BK9xx3			IL230x-B903	
	EL6631 IO controller/device terminal						
	EL6632 IRT controller terminal						
EtherNet/IP	EK9500		BK9xx5			IL230x-B905	
USB			BK9500				
AS-Interface	EL6201 master terminal		KL62x1 master terminal				
IO-Link	EL6224 master terminal	EP6224 master module	KL6224 master terminal				
EIB/KNX			KL6301 EIB/KNX Bus Terminal				
LON			KL6401 LON Bus Terminal				
MP-Bus			KL6771 master terminal				
M-Bus			KL6781 master terminal				
DALI/DSI			KL6811 master terminal				
IEEE 1588	EL6688 master/slave terminal						
DMX	EL6851 master/slave terminal						

▶ www.beckhoff.com/FieldbusComponents

	Fieldbus Modules	Infrastructure Components	Embedded PC	Drive Technology	Accessories
	Modules	Interfaces	Master/Slave	Servo Drives	Connectors/ Cables
	FM33xx-B110	FC90xx, FC11xx	CXxxxx	AX5xxx	ZS1090-000x
		CUxxxx		AX20xx-B110	ZK1090-9191
		EP952x			ZK1090-xxxx
		FC200x	CX1500-M/B200	AX2xxx-B200	Z1xxx
	FM33xx-B310	FC31xx	CXxxxx	AX2xxx-B310	ZB3xxx
			CX1500-M/B310		ZK/ZS1031
					ZB4200
		FC51xx	CXxxxx	AX20xx	ZB51xx
			CX1500-M/B510	AX25xx-B510	ZK/ZS1052
		FC52xx	CX1500-M/B520	AX20xx-B520	ZB52xx
					ZK/ZS1052
			CXxxxx		ZK/ZS1031
		FC75xx	CX1500-M750	AX2xxx-B750	
			CXxxxx	AX20xx	ZK/ZS1031
			CXxxxx	AX20xx	ZK/ZS1031
		FC90xx	CXxxxx	AX2xxx-B900	ZS1090
		CU2xxx, CU2508 Ethernet Switch			ZB90x0
					ZK1090-xxxx
		CU2508	CXxxxx		ZS1090
					ZB90x0
					ZK1090-xxxx
		CU2508	CXxxxx		

EtherCAT Terminal



EtherCAT Couplers

EtherCAT Couplers E-bus	**EK1100**	**EK1101** ID switch	**EK1101-0080** ID switch, Fast Hot Connect
	EK1501 ID switch, multimode fibre optic	**EK1501-0010** ID switch, singlemode fibre optic	**EK1541** ID switch, POF
EtherCAT Couplers E-bus with integrated digital I/Os	**EK1814** 4 inputs + 4 outputs	**EK1818** 8 inputs + 4 outputs	**EK1828** 4 inputs + 8 outputs
	EK1828-0010 8 outputs	**EK1914** 4 inputs + 4 outputs, 2 safe inputs + 2 safe outputs	**EK1960** TwinSAFE Compact Controller, 20 safe digital inputs, 10 safe digital outputs
EtherCAT Couplers K-bus	**BK1120**	**BK1150** "Compact"	**BK1250** between E-bus and K-bus terminals
Bus Couplers (for ELxxxx)	**EK3100** PROFIBUS	**EK5100** CANopen	**EK5200** DeviceNet
	EK9000 Ethernet	**EK9300** PROFINET IO	**EK9500** EtherNet/IP
	EK9700 Sercos III		
Extension system and junctions	**EK1110** extension end terminal	**EK1122** 2-port junction	**EK1122-0080** 2-port junction, Fast Hot Connect
	EK1132 2-port Power over EtherCAT junction	**EK1521** multimode fibre optic junction	**EK1521-0010** singlemode fibre optic junction
	EK1561 POF junction		

Embedded PCs, Infrastructure Components

Embedded PCs with E-bus interface	**CX80xx** with directly integrated E-bus interface
	CX9000, CX9010, CX9020 with directly integrated E-bus interface
	CX1010 EtherCAT Terminal integration via power supply CX1100-0004
	CX5010, CX5020 with directly integrated E-bus interface
	CX1020, CX1030 EtherCAT Terminal integration via power supply CX1100-00x4
	CX2020, CX2030, CX2040 EtherCAT Terminal integration via power supply CX2100-0xxx
Infrastructure Components	**CU1128** EtherCAT junction
	CU1521-0000 EtherCAT media converter fibre optic (multimode)
	CU1521-0010 EtherCAT media converter fibre optic (singlemode)
	CU1561 EtherCAT media converter plastic optical fibre

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	**EL1809** 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	**EL1862** flat-ribbon cable, type 3
		EL1084 negative switching	**EL1024** type 2	**EL1859** type 3, 8 inputs, 8 outputs, I_{MAX} = 0.5 A	**EL1862-0010** flat-ribbon cable, negative switching
				EL1088 negative switching	**EL1889** negative switching
24 V DC (filter 10 µs)	**EL1012** type 3	**EL1014** type 3	**EL1034** potential-free	**EL1018** type 3	**EL1819** type 3
		EL1114 with sensor supply	**EL1814** 8 x 24 V, 4 x 0 V, type 3		**EL1872** flat-ribbon cable, type 3
			EL1094 negative switching	**EL1098** negative switching	
24 V DC (XFC, T_{ON}/T_{OFF} 1 µs)	**EL1202** fast input			**EL1258** time stamp	
	EL1252 time stamp			**EL1259** 8 in- + 8 outputs, I_{MAX} = 0.5 A, time stamp	
	EL1262 oversampling				
24 V DC (safe inputs)		**EL1904** TwinSAFE	**EL1934** PROFIsafe	**EL1908** TwinSAFE	
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				

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 | Digital output: EL2xxx/ES2xxx, EM2xxx

Signal	2-channel		4-channel	8-channel	16-channel
5 V DC			**EL2124** I_{MAX} = ±20 mA		
12 V DC			**EL2024-0010** I_{MAX} = 2.0 A		
24 V DC	**EL2042** 2 x 4 A/1 x 8 A				
24 V DC (I_{MAX} = 0.5 A)	**EL2002**		**EL2004**	**EL2008**	**EM2042** D-sub connection
					EL2872 flat-ribbon cable
				EL2808 8 x 0 V	**EL2809**
			EL2084 negative switching	**EL2088** negative switching	**EL2889** negative switching
				EL1859 8 inputs, 8 outputs, filter 3.0 ms, type 3	**EL2872-0010** flat-ribbon cable, negative switching
24 V DC (I_{MAX} = 2.0 A)	**EL2022**		**EL2024**	**EL2828**	
	EL2032 with diagnostic		**EL2034** with diagnostic		
24 V DC (XFC, T_{ON}/T_{OFF} 1 µs)	**EL2202** push-pull outputs	**EL2212** overexcitation, time stamp		**EL1259** 8 in- + 8 outputs, I_{MAX} = 0.5 A, time stamp	
	EL2252 time stamp	**EL2262** oversampling		**EL2258** time stamp	
24 V DC (safe outputs)	**EL2901** TwinSAFE, 1 safe output	**EL2902** TwinSAFE, 2 safe outputs	**EL2904** TwinSAFE		
	EL2964 TwinSAFE, 1 safe output, 3 potential-free contacts		**EL2934** PROFIsafe		
24 V AC/DC				**EL2798**	
Relay (up to 230 V AC)	**EL2602** I_{MAX} = 2.0 A, make contact, power contacts	**EL2622** I_{MAX} = 2.0 A, make contact, no power contacts	**EL2624** make contact, no power contacts		
	EL2612 I_{MAX} = 1.0 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 output	**EL2521** 1…500 kHz, 1-channel				
Current control	**EL2595** LED constant current terminal, 1-channel				

▶ **www.beckhoff.com/EtherCAT-Terminal**

EtherCAT Terminal | Analog input: EL3xxx/ES3xxx

Signal	1-channel		2-channel			4-channel		8-channel
±75 mV, 24 bit			EL3602-0010					
±200 mV			EL3602-0002					
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 differential input, 16 bit	EL3602 differential input, 24 bit	EL3702 differential input, 16 bit, oversampling	EL3104 differential input, 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 differential input, 16 bit	EL3012 differential input, 12 bit	EL3112 differential input, 16 bit	EL3612 differential input, 24 bit	EL3014 differential input, 12 bit	EL3114 differential input, 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 differential input, 16 bit	EL3022 differential input, 12 bit	EL3122 differential input, 16 bit		EL3024 differential input, 12 bit	EL3124 differential input, 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	EL3204-0200 16 bit, 220 kΩ	
Potentiometer								EL3255 5-channel
Resistor bridge	EL3351	EL3356 self-calibration						
3-phase power measurement			EL3403 500 V AC, 1 A	EL3413 690 V AC, 5 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

Signal	1-channel		2-channel	4-channel
Position measurement	**EL5001** SSI encoder interface	**EL5021** SinCos encoder interface, 1 V_{PP}	**EL5002** SSI encoder interface	
	EL5001-0011 SSI monitor terminal	**EL5101** differential inputs, RS485, incremental encoder interface	**EL5032** EnDat 2.2 interface	
Position measurem. (32 bit)		**EL5151** 24 V DC, incremental encoder interface	**EL5152** 24 V DC, incremental encoder interface	
Communication	**EL6001** RS232, 115.2 kbaud	**EL6021** RS422/RS485, 115.2 kbaud	**EL6002** RS232, 115.2 kbaud, D-sub	
	EL6080 memory terminal 128 kbyte		**EL6022** D-sub, RS422/RS485, 115.2 kbaud	**EL6224** IO-Link master
	EL6601 switch port	**EL6688** IEEE 1588 master/slave	**EL6692** EtherCAT bridge terminal	**EL6614** switch port
Communication (master terminal)	**EL6201** AS-Interface	**EL6631** PROFINET IO		
	EL6632 PROFINET IRT	**EL6720** Lightbus		
	EL6731 PROFIBUS	**EL6751** CANopen		
	EL6752 DeviceNet	**EL6851** DMX		
Communication (slave terminal ELxxxx-0010)	**EL6631** PROFINET IO	**EL6731** PROFIBUS	**EL6652** EtherNet/IP	
	EL6740 Interbus	**EL6751** CANopen		
	EL6752 DeviceNet	**EL6851** DMX		
Motion	**EL7031** 24 V DC, stepper motor ter., I_{MAX} = 1.5 A		**EL7332** 24 V DC, DC motor output stage, 1.0 A	
	EL7041 stepper motor terminal, I_{MAX} = 5.0 A, 50 V DC, incremental encoder interface	**EL7051** stepper motor terminal, I_{MAX} = 8.0 A, 80 V DC, incremental encoder interface	**EL7342** DC motor output stage, 50 V DC, 3.5 A, incremental encoder interface	**EM7004** 4 incremental encoders, 16 digital inputs 24 V DC, 16 digital outputs 24 V DC, 4 analog inputs ±10 V
	EL7201 servomotor terminal, 50 V DC, 4 A	**EL7201-0010** OCT, servomotor term., 50 V DC, 4 A		

TwinSAFE: EL69xx

Signal	
24 V DC	**EL6900** TwinSAFE PLC
	EL6930 TwinSAFE/PROFIsafe logic and gateway terminal

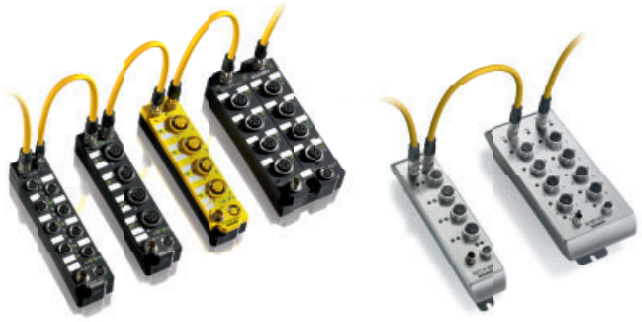
EtherCAT Terminal | System terminals: EL9xxx/ES9xxx

Signal	System
System	**EL9011** bus end cap
	EL9070 shield terminal
	EL9080 isolation terminal
	EL9195 shield terminal
Potential distribution terminal	**EL9180** 2 clamping units per power contact
	EL9181 2 x 8 terminal points
	EL9182 8 x 2 terminal points
	EL9183 1 x 16 terminal points
	EL9184 8 x 24 V DC, 8 x 0 V DC
	EL9185 4 clamping units at 2 power contacts
	EL9186 8 x 24 V DC
	EL9187 8 x 0 V DC
	EL9188 16 x 24 V DC
	EL9189 16 x 0 V DC

Signal	Potential supply	Power supply and accessories	
24 V DC	**EL9100**	**EL9400** input 24 V DC, E-bus power supply, 2 A	**EL9410** input 24 V DC, output 5 V DC/2 A
	EL9110 diagnostic	**EL9505** input 24 V DC, output 5 V DC, 0.5 A	**EL9508** input 24 V DC, output 8 V DC, 0.5 A
	EL9200 with fuse	**EL9510** input 24 V DC, output 10 V DC, 0.5 A	**EL9512** input 24 V DC, output 12 V DC, 0.5 A
	EL9210 diagnostic, with fuse	**EL9515** input 24 V DC, output 15 V DC, 0.5 A	
	EL9520 AS-Interface potential supply with filter	**EL9540** surge filter terminal for field supply	**EL9550** surge filter terminal for system/field supply
		EL9560 input 24 V DC, output 24 V DC, 0.1 A with electrical isolation	
50 V DC		**EL9570** 50 V DC, buffer capacitor terminal, 500 µF	
120... 230 V AC	**EL9150** with LED		
	EL9160 diagnostic		
	EL9190		
	EL9250 with fuse, with LED		
	EL9260 diagnostic, with fuse		
	EL9290 with fuse		

▶ **www.beckhoff.com/EtherCAT-Terminal**

EtherCAT Box



EtherCAT Box | Digital I/O

Input		8 x M8	16 x M8	4 x M12	8 x M12	Other
24 V DC	**8-channel** filter 3.0 ms	EP1008-0001		EP1008-0002 EQ1008-0002*	EP1008-0022	
	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 EQ1809-0022*	
	16-channel filter 10 µs		EP1819-0021		EP1819-0022	
	16-channel filter 10 µs, D-sub socket, 25-pin					EP1816-0008
Output		**8 x M8**	**16 x M8**	**4 x M12**	**8 x M12**	**Other**
24 V DC	**8-channel** I_{MAX} = 0.5 A	EP2008-0001		EP2008-0002 EQ2008-0002*	EP2008-0022	
	8-channel I_{MAX} = 2 A, ∑ 4 A	EP2028-0001		EP2028-0002		
	8-channel I_{MAX} = 2.8 A, ∑ 16 A				EP2028-0032	
	8-channel I_{MAX} = 2 A, ∑ 4 A, diagnostics	EP2038-0001		EP2038-0002		
	16-channel I_{MAX} = 0.5 A, ∑ 4 A		EP2809-0021		EP2809-0022 EQ2809-0022*	
	16-channel I_{MAX} = 0.5 A, ∑ 4 A, D-sub socket, 25-pin					EP2816-0008
	16-channel I_{MAX} = 0,5 A, ∑ 4 A, 2 x D-sub socket, 9-pin					EP2816-0010
	16-channel I_{MAX} = 0.5 A, ∑ 4 A, M16, 19-pin					EP2816-0004
	24-channel I_{MAX} = 0.5 A, ∑ 4 A, D-sub socket, 25-pin					EP2817-0008
25 V AC/ 30 V DC	**4-channel** relay output			EP2624-0002		
Combi		**8 x M8**	**16 x M8**	**4 x M12**	**8 x M12**	**Other**
24 V DC	**8-channel** 4 input + 4 output, filter 3.0 ms, I_{MAX} = 0.5 A	EP2308-0001		EP2308-0002		
	8-channel 4 input + 4 output, filter 10 µs, I_{MAX} = 0.5 A	EP2318-0001		EP2318-0002		
	8-channel 4 input + 4 output, filter 3.0 ms, I_{MAX} = 2 A			EP2328-0002		
	8-channel 8 input/output, freely configurable, filter 10 µs, I_{MAX} = 0.5 A	EP2338-0001		EP2338-0002		
	8-channel 8 input/output, freely configurable, filter 3.0 ms, I_{MAX} = 0.5 A	EP2338-1001		EP2338-1002		
	16-channel 16 input/output, freely configurable, filter 3.0 ms, I_{MAX} = 0.5 A, ∑ 4 A		EP2339-0021		EP2339-0022 EQ2339-0022*	
	16-channel 16 input/output, freely configurable, filter 10 µs, I_{MAX} = 0.5 A, ∑ 4 A		EP2349-0021		EP2349-0022	
	16-channel 8 input + 8 output, filter 10 µs, I_{MAX} = 0.5 A, D-sub socket, 25-pin					EP2316-0008
	16-channel 8 input + 8 output, filter 10 µs, I_{MAX} = 0.5 A, IP 20 plug					EP2316-0003

***EPxxxx: industrial housing in IP 67, EQxxxx: stainless steel housing in IP 69K**

EtherCAT Box | Analog I/O

Input		M12
±10 V, 0/4…20 mA	**4-channel** parameterisable, differential input, 16 bits	EP3174-0002 EQ3174-0002*
	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 EQ3204-0002*
Thermo-couples/mV	**4-channel** thermocouple, type J, K, L, B, E, N, R, S, T, U, 16 bits	EP3314-0002 EQ3314-0002*

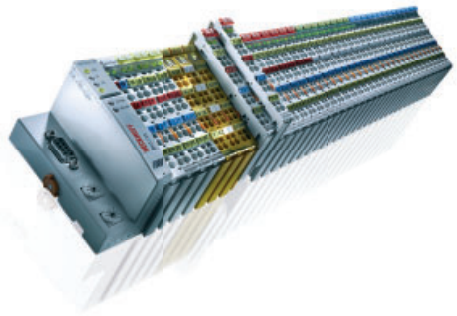
Output		M12
±10 V, 0/4…20 mA	**4-channel** parameterisable, 16 bits	EP4174-0002
	4-channel 2 input + 2 output, parameterisable, 16 bits	EP4374-0002

EtherCAT Box | Special functions

Function		M8	M12	Other
Position measurement	**Incremental encoder interface** 32 or 16 bits, binary		EP5101-0002	EP5101-0011 D-sub
Communi-cation	**Serial interface** 1-channel, RS232, RS422/RS485, 5 V DC/1 A		EP6001-0002	
	Serial interface 2-channel, RS232, RS422/RS485		EP6002-0002	
	IO-Link master		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	
Special functions	**Multi-functional I/O box** 8 digital inputs/outputs, 2 x tacho input, 2 x 0/4…20 mA input, 1 x 0/4…20 mA output,1 x 1.2 A PWMi output		EP8309-1022	
System	**EtherCAT Box** 3 decimal ID switches	EP1111-0000		
	EtherCAT junction 2-channel	EP1122-0001		
	EtherCAT junction 8 ports	EP9128-0021		
	Power distribution for EtherCAT Box modules 4/4-channel			EP9214-0023 7/8" plug, 7/8" socket
	EtherCAT media converter fibre optic 1-channel			EP9521-0020
	EtherCAT media converter fibre optic 2-channel			EP9522-0020

▶ **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) Program memory 32/96 kbyte	 Program memory 48 kbyte
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 interface	BK7500		BK7520				
RS485	BK8000					BC8000	BC8050
RS232	BK8100					BC8100	BC8150
Ethernet TCP/IP	BK9000			BK9050		BC9000	BC9050
	BK9100 2-channel switch					BC9100 2-channel switch	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]	optional [3]	optional [3]	optional [3]	optional [3]	optional [3]
		BX8000		optional [2]	optional [2]	optional [2]	optional [2]	optional [2]	optional [2]
		BX8000		optional [2]	optional [2]	optional [2]	optional [2]	optional [2]	optional [2]
	BC9020	**BX9000**	**CX8090**	**CX9000**	**CX9020**	**CX1010**	**CX5010**	**CX1020**	**CX2020**
	BC9191-0100 Room Controller			**CX9010**			**CX5020**	**CX1030**	**CX2030**
									CX2040
	BC9120 2-channel switch								
			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]

▶ **www.beckhoff.com/Embedded-PC** [1] via modular fieldbus interface, [2] via system interface, [3] via software library

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 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	**KL2828** 8 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	**KL3468** 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	**KL3408** 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	**KL3044** single-ended, 12 bit	**KL3448** single-ended, 12 bit
			KL3042 with sensor supply, 12 bit	**KL3142** 16 bit, 0.05 %	**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	**KL3054** single-ended, 12 bit	**KL3458** single-ended, 12 bit
			KL3052 with sensor supply, 12 bit	**KL3152** 16 bit, 0.05 %	**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	**KL3208-0010** PT1000, Ni1000
						KL3228 PT1000, Ni1000
Thermocouples/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	**KM3702** 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: KL5xxx/KS5xxx, KL6xxx/KS6xxx, KL8xxx

Signal			
Position measurement	**KL5001** SSI encoder interface	**KL5051** bidirectional SSI encoder interface	**KL5121** incremental encoder interface with programmable outputs
	KL5101 differential input, incremental encoder interface	**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 kbaud	**KL6031** serial interface RS232, 115.2 kbaud	**KL6011** serial interface TTY, 20 mA current loop
	KL6051 data exchange terminal, 32 bit	**KL6021** serial interface RS422/RS485, 19.2 kbaud	**KL6041** serial interface RS422/RS485, 115.2 kbaud
	KL6023 wireless adapter for EnOcean radio technology	**KL6021-0023** RS485 interface for EnOcean signals	**KM6551** wireless data exchange terminal
	KL6201 AS-Interface master terminal	**KL6211** AS-Interface master terminal with power contacts	**KL6224** IO-Link master
	KL6301 EIB/KNX Bus Terminal	**KL6401** LON Bus Terminal	**KL6581** EnOcean master
	KL6583 EnOcean transmitter/receiver	**KL6771** MP-Bus master terminal	**KL6781** M-Bus master terminal
	KL6811 DALI/DSI master and power supply terminal	**KL6831** SMI terminal, LoVo	**KL6841** SMI terminal, 230 V AC
Safety	**KL6904** TwinSAFE Logic Bus Terminal, with 4 digital outputs, IEC 61508 SIL 3 and DIN EN ISO 13849-1:2008 PLe		

Signal	
Manual operation	**KL8519** 16-channel digital input signal module
	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)
	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 terminals	**KL9180** 2 terminal points per power contact	**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 DC	**KL9187** 8 x 0 V DC
	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... 230 V AC	**KL9150**	
	KL9160 diagnostic	
	KL9250 with fuse	
	KL9260 diagnostic, with fuse	
Up to 400 V AC	**KL9190**	
	KL9290 with fuse	

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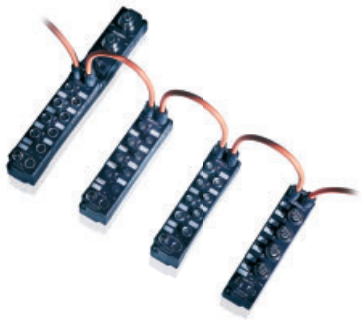
Fieldbus Box



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			
PROFIBUS	IPxxxx-B310	IPxxxx-B318 with integrated tee-connector	IL230x-B310	IL230x-B318 with integrated tee-connector	IL230x-C310	IL230x-C318 with integrated tee-connector
INTERBUS	IPxxxx-B400		IL230x-B400			
CANopen	IPxxxx-B510	IPxxxx-B518 with integrated tee-connector	IL230x-B510	IL230x-B518 with integrated tee-connector		
DeviceNet	IPxxxx-B520	IPxxxx-B528 with integrated tee-connector	IL230x-B520	IL230x-B528 with integrated tee-connector		
Modbus	IPxxxx-B730		IL230x-B730			
RS485	IPxxxx-B800		IL230x-B800			
RS232	IPxxxx-B810		IL230x-B810		IL230x-C810	
Ethernet TCP/IP			IL230x-B900	IL230x-B901	IL230x-C900	
PROFINET			IL230x-B903			
EtherNet/IP			IL230x-B905			

Fieldbus Box | Digital 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		8 mm	M8	M12
24 V DC	8-channel I_{MAX} = 0.5 A	IP2000-Bxxx, IE2000	IP2001-Bxxx, IE2001	IP2002-Bxxx, IE2002
	8-channel I_{MAX} = 2 A, Σ 4 A	IP2020-Bxxx, IE2020	IP2021-Bxxx, IE2021	IP2022-Bxxx, IE2022
	8-channel I_{MAX} = 2 A, Σ 12 A	IP2040-Bxxx, IE2040	IP2041-Bxxx, IE2041	IP2042-Bxxx, IE2042
	16-channel I_{MAX} = 0.5 A, Σ 4 A, D-sub socket			IE2808 IE2808-0001
PWM	2-channel PWM, 24 V DC, I_{MAX} = 2.5 A			IP2512-Bxxx, IE2512

Fieldbus Box | Digital I/O

Combi		8 mm	M8	M12
24 V DC	8-channel	IL2300-Bxxx	IL2301-Bxxx	IL2302-Bxxx
	4 input + 4 output,	IL2300-Cxxx	IL2301-Cxxx	IL2302-Cxxx
	filter 3.0 ms, I_{MAX} = 0.5 A	IP2300-Bxxx, IE2300	IP2301-Bxxx, IE2301	IP2302-Bxxx, IE2302
	8-channel 4 input + 4 output,	IP2310-Bxxx	IP2311-Bxxx	IP2312-Bxxx
	filter 0.2 ms, I_{MAX} = 0,5 A	IE2310	IE2311	IE2312
	8-channel 4 input + 4 output,	IP2320-Bxxx	IP2321-Bxxx	IP2322-Bxxx
	filter 3.0 ms, I_{MAX} = 2 A, Σ 4 A	IE2320	IE2321	IE2322
	8-channel 4 input + 4 output,	IP2330-Bxxx	IP2331-Bxxx	IP2332-Bxxx
	filter 0.2 ms, I_{MAX} = 2 A, Σ 4 A	IE2330	IE2331	IE2332
	16-channel combi input/output,	IP2400-Bxxx	IP2401-Bxxx	
	filter 3.0 ms, I_{MAX} = 0.5 A	IE2400	IE2401	
	16-channel combi input/output,	IE2403		
	filter 3.0 ms, I_{MAX} = 0.5 A	(IP 20 connector)		

Fieldbus Box | Analog I/O

Input		M12
±10 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**
±10 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**

Infrastructure Components

Infrastructure Components | PC Fieldbus Cards

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

Infrastructure Components | Switches, junctions, media converters

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

Junctions, media converters

Junctions	**CU2508**	real-time Ethernet port multiplier
	CU1128	EtherCAT junction
	EP9128	EtherCAT junction (IP 67)
Media converters	**CU1521-0000**	EtherCAT media converter fibre optic (multimode)
	CU1521-0010	EtherCAT media converter fibre optic (singlemode)
	CU1561	EtherCAT media converter plastic optical fibre
	EP952x	EtherCAT media converter fibre optic (IP 67)

▶ **www.beckhoff.com/Infrastructure-components**

The Motion Company

Digital Compact Servo Drives AX5000 50

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

▶ **www.beckhoff.com/AX5000**

Synchronous Servomotors 52

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

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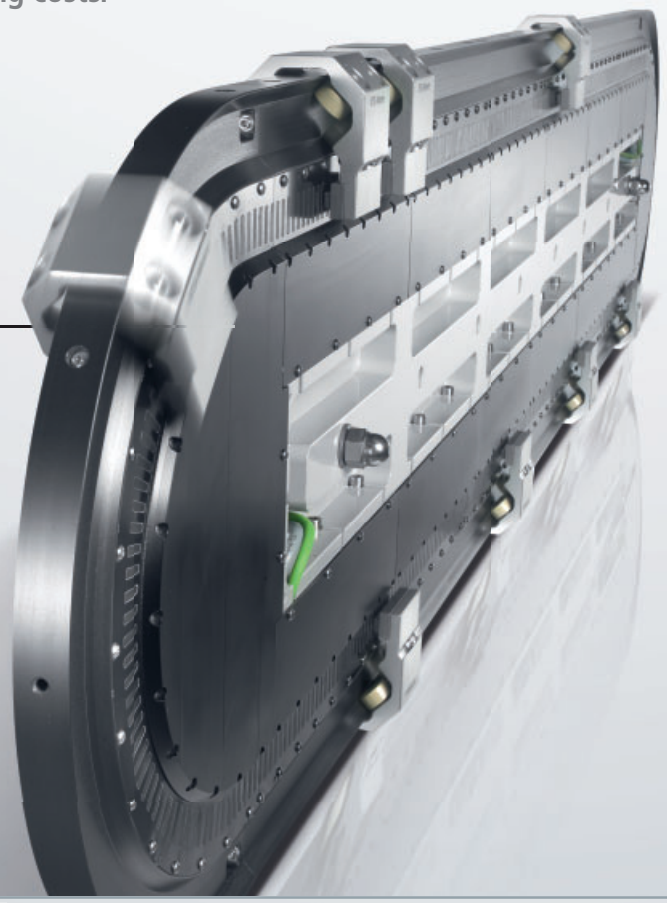
In combination with the Motion Control solutions offered by the TwinCAT automation software, Beckhoff Drive Technology represents a complete drive system. PC-based control technology from Beckhoff is ideally suited for single and multiple axis positioning tasks with highly dynamic requirements. The AX5000 Servo Drive series with high-performance EtherCAT system communication offers maximum performance and dynamics. Servomotors with One Cable Technology (OCT), which combines power and feedback system in a standard motor cable, reduce material and commissioning costs.

▶ **www.beckhoff.com/DriveTechnology**



XTS | eXtended Transport System 57

- linear motor characteristics on an endless path
- replaces classical mechanics with innovative mechatronics
- individual product transport with a continuous flow of material
- modular structure, simple adaptation to the application
- low spatial and power requirements

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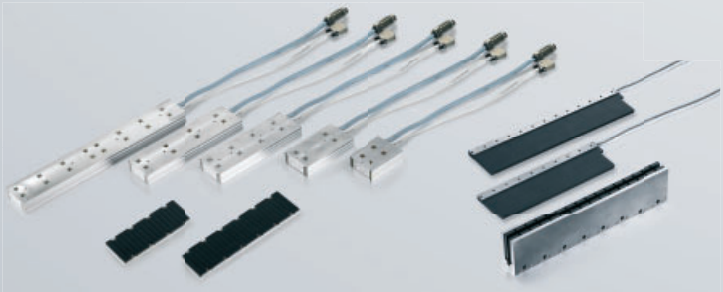

Linear Servomotors 55

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

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Compact drive technology 56

- 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

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Drive Technology

AX51xx, AX52xx | **Digital Compact Servo Drives**

Technical data	AX5101	AX5103	AX5106	AX5112	AX5118	AX5125	AX5140
Number of channels	1-channel	1-channel	1-channel	1-channel	1-channel	1-channel	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	100…480 V AC	100…480 V AC	100…480 V AC	100…480 V AC	100…480 V AC	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, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 $V_{PP,}$ TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 $V_{PP,}$ TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 $V_{PP,}$ TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 $V_{PP,}$ TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 $V_{PP,}$ TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 $V_{PP,}$ TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI
Safety	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805

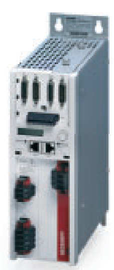
(1) at 50 °C (3-phase connection), (2) at 40 °C (3-phase connection), (3) at 50 °C,
(4) RMS for max. 7 seconds, (5) RMS for max. 3 seconds, (*) For 1-phase mains the total current is limited to 9 A.

▶ www.beckhoff.com/AX5000

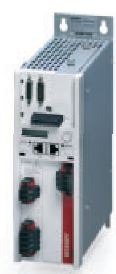
AX5160, AX5172

AX5190, AX5191

AX5192, AX5193



AX52xx



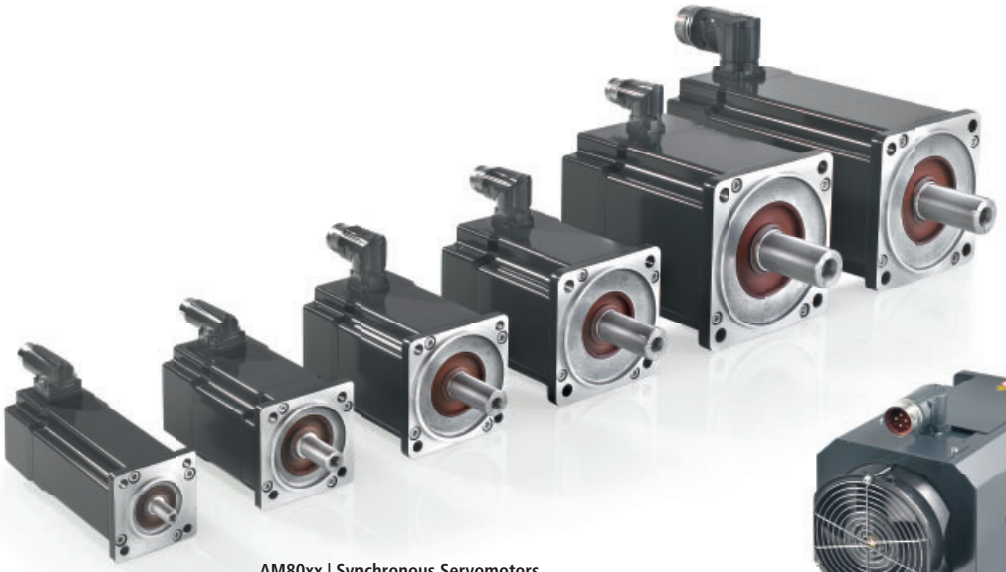
AX5101–AX5112

AX5118–AX5140

AX-Bridge

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	400… 480 V AC	400… 480 V AC	400… 480 V AC	400… 480 V AC	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, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 V_{PP}, TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 V_{PP}, TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 V_{PP}, TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 V_{PP}, TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 V_{PP}, TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 V_{PP}, TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 V_{PP}, TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI	BiSS, EnDat, Hiperface, 1 V_{PP}, TTL, resolver, OCT, BiSS "C", EnDat 2.2, HTL, Hiperface DSL, SSI
	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805	AX5801 AX5805



AM80xx | Synchronous Servomotors
AM85xx | Synchronous Servomotors with higher moment of inertia

AM80xx, AM85xx | Synchronous Servomotors with forced cooling

AM80xx, AM85xx, AM88xx | **Synchronous Servomotors with One Cable Technology (OCT)**

Technical data	AM8021	AM8022	AM8023	AM8031	AM8032	AM8033	AM8041	AM8042	AM8043
Standstill torque (M_0)	0.5 Nm	0.8 Nm	1.2 Nm	1.4 Nm	2.38 Nm	3.22 Nm	2.45 Nm	4.1 Nm	5.65 Nm
Standstill current (I_0)	0.85… 1.6 A_{rms}	1.5… 2.4 A_{rms}	2.2… 3.4 A_{rms}	1… 3.2 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}	2.9… 9.3 A_{rms}
Rated speed (n_N) at 400 V AC	8,000… 9,000 min^{-1}	8,000… 9,000 min^{-1}	8,000… 9,000 min^{-1}	3,000… 9,000 min^{-1}	3,000… 9,000 min^{-1}	3,000… 9,000 min^{-1}	3,000… 8,000 min^{-1}	2,500… 8,000 min^{-1}	2,500… 8,000 min^{-1}

Technical data	AM8051	AM8052	AM8053	AM8061	AM8062	AM8063	AM8071	AM8072	AM8073
Standstill torque (M_0)	4.9 Nm	8.2 Nm	11.4 Nm	12.8 Nm	21.1 Nm	29 Nm	31.8 Nm	52.6 Nm	72.6 Nm
Standstill current (I_0)	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}	17.8 A_{rms}	20.2 A_{rms}	27.9 A_{rms}
Rated speed (n_N) at 400 V AC	2,500… 8,000 min^{-1}	2,500… 4,000 min^{-1}	2,000… 7,500 min^{-1}	2,000… 7,000 min^{-1}	1,500… 5,000 min^{-1}	1,500… 4,000 min^{-1}	3,000 min^{-1}	2,000 min^{-1}	2,000 min^{-1}

▶ **www.beckhoff.com/AM80xx**

Technical data	AM8531	AM8532	AM8533	AM8541	AM8542	AM8543
Standstill torque (M_0)	1.4 Nm	2.38 Nm	3.22 Nm	2.45 Nm	4.1 Nm	5.65 Nm
Standstill current (I_0)	1… 3.2 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}	2.9… 9.3 A_{rms}
Rated speed (n_N) at 400 V AC	3,000… 9,000 min^{-1}	3,000… 9,000 min^{-1}	3,000… 9,000 min^{-1}	3,000… 8,000 min^{-1}	2,500… 8,000 min^{-1}	2,500… 8,000 min^{-1}

AM88xx | Stainless steel servomotors

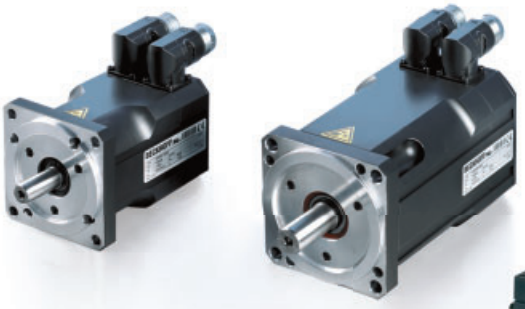
Technical data	AM8551	AM8552	AM8553	AM8561	AM8562	AM8563
Standstill torque (M_0)	4.9 Nm	8.2 Nm	11.4 Nm	12.8 Nm	21.1 Nm	29 Nm
Standstill current (I_0)	2.7… 8.5 A_{rms}	3.3… 11.3 A_{rms}	4.7… 15.6 A_{rms}	4… 13.1 A_{rms}	6.2… 20.3 A_{rms}	8.7… 29.5 A_{rms}
Rated speed (n_N) at 400 V AC	2,500… 8,000 min^{-1}	2,000… 7,500 min^{-1}	2,000… 7,000 min^{-1}	1,500… 5,000 min^{-1}	1,500… 5,000 min^{-1}	1,500… 4,000 min^{-1}

▶ **www.beckhoff.com/AM85xx**

Technical data	AM8831	AM8832	AM8833	AM8841	AM8842	AM8843
Standstill torque (M_0)	0.85 Nm	1.4 Nm	1.85 Nm	1.6 Nm	2.6 Nm	3.45 Nm
Standstill current (I_0)	0.65 A_{rms}	1 A_{rms}	1.25 A_{rms}	1.1 A_{rms}	1.6 A_{rms}	1.9 A_{rms}
Rated speed (n_N) at 400 V AC	3,000 min^{-1}	3,000 min^{-1}	3,000 min^{-1}	3,000 min^{-1}	2,500 min^{-1}	2,500 min^{-1}

Technical data	AM8851	AM8852	AM8853	AM8861	AM8862	AM8863
Standstill torque (M_0)	3.1 Nm	4.8 Nm	6.4 Nm	7.75 Nm	13.1 Nm	16.7 Nm
Standstill current (I_0)	1.8 A_{rms}	2.1 A_{rms}	2.8 A_{rms}	2.53 A_{rms}	4.1 A_{rms}	4.9 A_{rms}
Rated speed (n_N) at 400 V AC	2,500 min^{-1}	2,000 min^{-1}	2,000 min^{-1}	1,500 min^{-1}	1,500 min^{-1}	1,500 min^{-1}

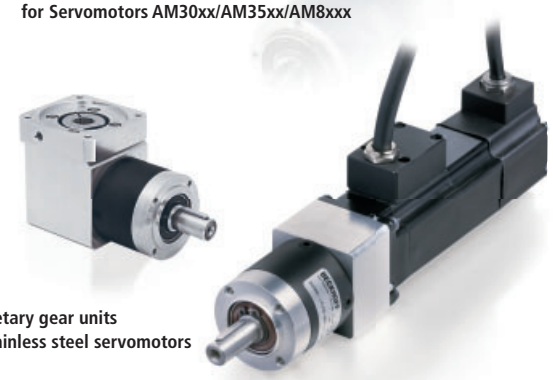
▶ **www.beckhoff.com/AM88xx**



AM35xx | Synchronous Servomotors

AG2210 | Planetary gear units
for Servomotors AM30xx/AM35xx/AM8xxx

AM30xx | Synchronous Servomotors



AG2250 | Planetary gear units
for AM88xx stainless steel servomotors

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}	4,500… 8,000 min^{-1}	3,000… 5,500 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}

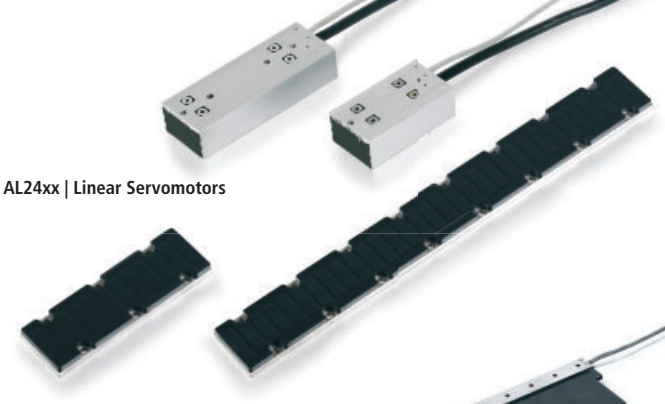
▶ **www.beckhoff.com/AM35xx**

AG2210 | **Planetary gear units for Servomotors AM30xx/AM35xx/AM8xxx**

Technical data	AG2210-+ LP050-MFx-x-wX1	AG2210-+ LP070-MFx-x-wX1	AG2210-+ LP090-MFx-x-wX1	AG2210-+ LP120-MFx-x-wX1	AG2210-+ LP155-MFx-x-wX1
Gear ratios	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	14 Nm max.	55 Nm max.	125 Nm max.	305 Nm max.	500 Nm max.
Torsinal backlash 1-stage	≤ 10 arcmin	≤ 8 arcmin	≤ 8 arcmin	≤ 8 arcmin	≤ 8 arcmin
Torsinal backlash 2-stage	≤ 13 arcmin	≤ 10 arcmin	≤ 10 arcmin	≤ 10 arcmin	≤ 10 arcmin

▶ **www.beckhoff.com/AG2210**

AL28xx | Linear Servomotors



AL24xx | Linear Servomotors

AL20xx | Linear Servomotors

AL38xx | Ironless Linear Servomotors

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	50 mm	50 mm

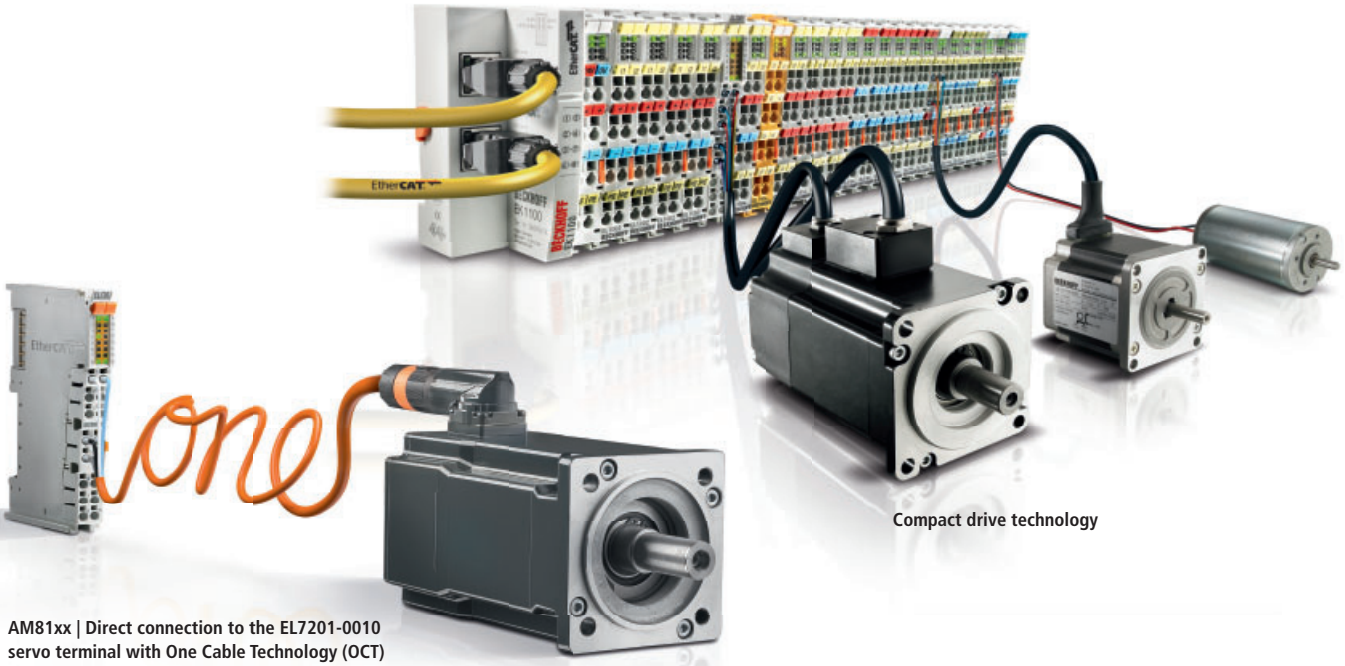
▶ **www.beckhoff.com/AL24xx**

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

AM81xx | Direct connection to the EL7201-0010 servo terminal with One Cable Technology (OCT)

AM81xx | Synchronous Servomotors

Technical data	AM8121-wFyz	AM8122-wFyz	AM8131-wFyz
Standstill torque	0.5 Nm	0.8 Nm	1.13 Nm
Standstill current	4 A	4 A	4 A
Rated speed (n_N) at 48 V DC	3,000 min^{-1}	2,000 min^{-1}	1,000 min^{-1}

▶ www.beckhoff.com/AM81xx

AM31xx | Synchronous Servomotors

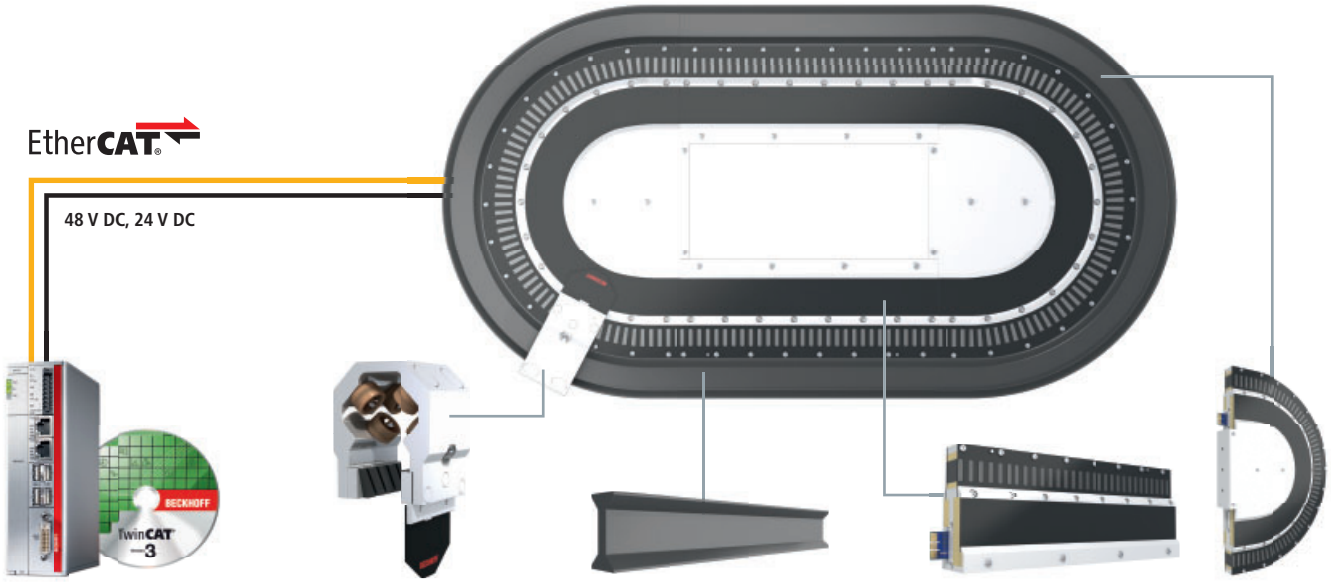
Technical data	AM3111-030x	AM3112-040x	AM3121-020x
Standstill torque	0.16 Nm	0.32 Nm	0.65 Nm
Standstill current	3.22 A	3.4 A	4.6 A
Rated speed (n_N) at 48 V DC	5,000 min^{-1}	3,500 min^{-1}	2,000 min^{-1}

▶ www.beckhoff.com/AM31xx, planetary gear units for Synchronous Servomotors ▶ 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	24…50 V DC	24…50 V DC	24…50 V DC	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, planetary gear units for Stepper Motors ▶ www.beckhoff.com/AG1000



Industrial PC, TwinCAT NC PTP, TwinCAT XTS Extension

Mover

Guide rail

Straight or curve motor module

XTS | eXtended Transport System

XTS | Motor modules	
AT2000-0250	straight motor module
AT2001-0250	straight motor module with infeed
AT2050-0500	curve motor module 180° (clothoid)

▶ **www.beckhoff.com/AT2000**

XTS | Mover	
AT9011-0050	mover suitable for the AT9000/AT9050 guide rail system, optionally with encoder flag for identification of a specific mover

▶ **www.beckhoff.com/AT9011**

XTS | Guide rails	
AT9000-xxxx	straight guide rail
AT9100-xxxx	straight guide rail with lock
AT9050-0500	curve guide rail 180° (clothoid)

▶ **www.beckhoff.com/AT9000**

XTS | Software	
TF5850	TwinCAT TC3 XTS Extension

▶ **www.beckhoff.com/TF5850**

XTS | Starter kit	
AT2000-0500	starter kit small, 500 mm, straight length, 5 movers
AT2000-1000	starter kit medium, 1000 mm, straight length, 10 movers
AT2000-1500	starter kit large, 1500 mm, straight length, 10 movers

▶ **www.beckhoff.com/XTS**

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**

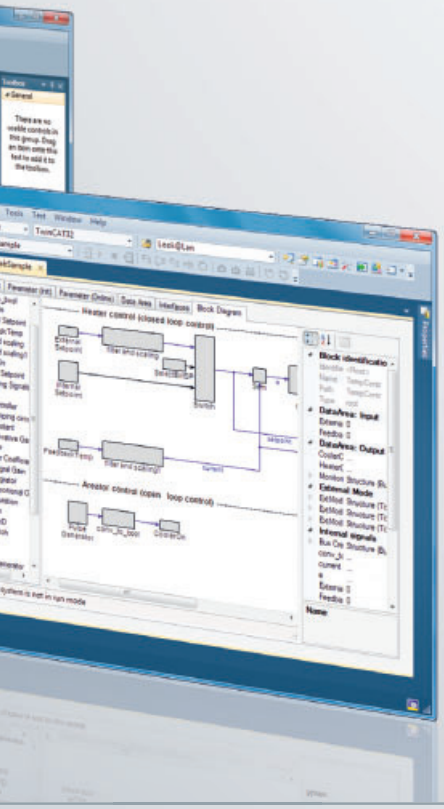
TwinCAT 2 64

- 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.

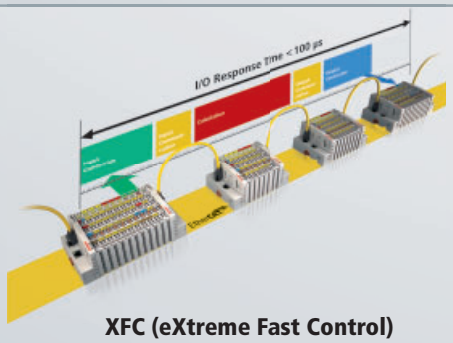
▶ www.beckhoff.com/TwinCAT



TwinSAFE 68

- integrated safety system from I/Os to drives
- compact safety PLC in a 12 mm terminal block for EtherCAT Terminal system
- fieldbus-neutral communication with Safety over EtherCAT
- 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 (eXtreme Fast Control)

- 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

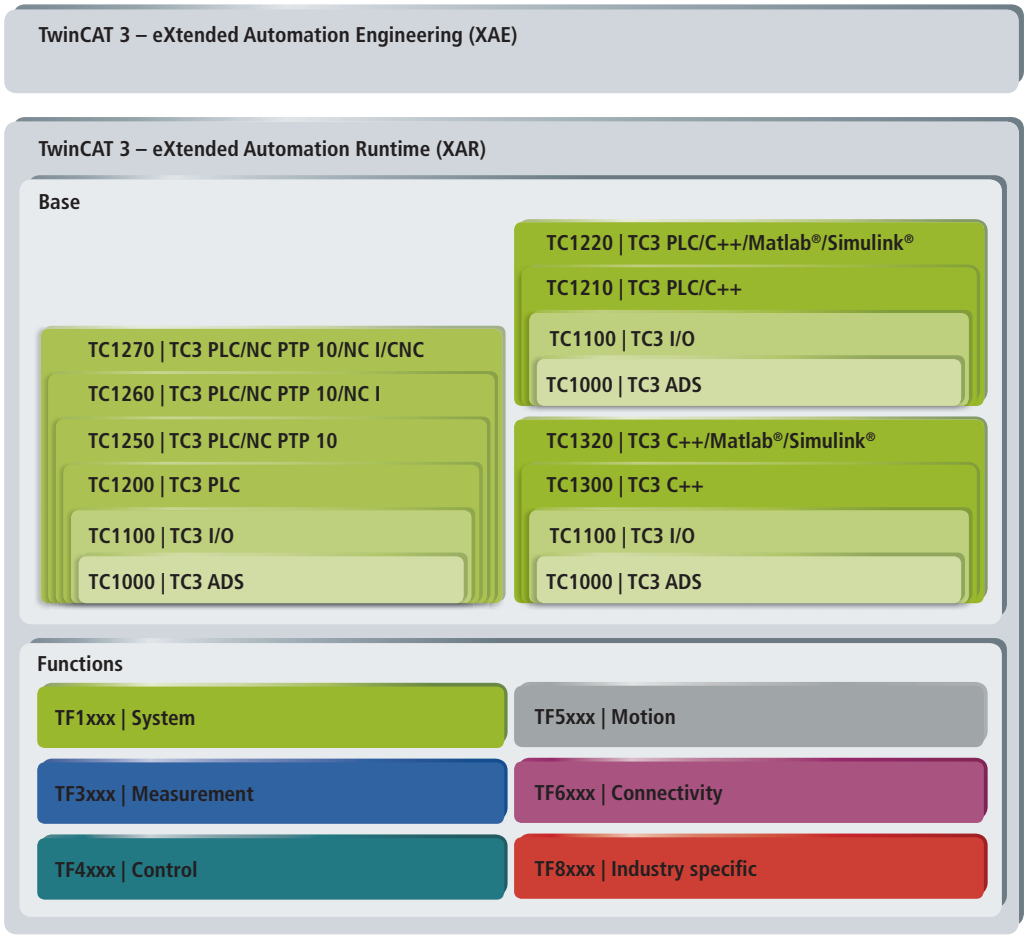
- integration of additional functions in the automation environment
- functions that used to be based on special hardware become part of the PC platform, e.g.:
  - measurement technology
  - Condition Monitoring
  - robotics
- The basis is the constantly increasing PC processor power.

▶ 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 is divided into components. The TwinCAT 3 engineering components enable the configuration, programming and debugging of applications. The TwinCAT 3 runtime consists of further components – basic components and functions. The basic components can be extended by functions.

TwinCAT 3 | 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 3rd 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. PLC program modifications can be carried out at any times and in any size on-line, 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++. Convenient debugging and monitoring options facilitate fault-finding and commissioning. All variables are available symbolically by ADS and can be read and written in appropriate clients.

▶ **www.beckhoff.com/TwinCAT3**

TwinCAT 3 | Engineering	
TE1000 | **TC3 Engineering**	TwinCAT 3 engineering environment
TE1140 | **TC3 Management Server**	central administration of Beckhoff CE controllers
TE1400 | **TC3 Matlab®/Simulink® Target**	TwinCAT target for Matlab®/Simulink® for generating TwinCAT 3 modules
TE1410 | **TC3 Interface for Matlab®/Simulink®**	communication interface between Matlab®/Simulink® and the TwinCAT 3 runtime
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	
TC1000 | **TC3 ADS**	TwinCAT 3 ADS
TC1100 | **TC3 I/O**	TwinCAT 3 I/O
TC1200 | **TC3 PLC**	TwinCAT 3 PLC
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
TC1300 | **TC3 C++**	TwinCAT 3 C++
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 Axes Pack 25**	extension of TwinCAT 3 NC PTP to up to 25 axes
TF5020 | **TC3 NC PTP Axes Pack unlimited**	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

TwinCAT 3 | Functions

Motion

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
TF5070 | **TC3 PackAL**	library for use in packaging applications
TF5100 | **TC3 NC I**	NC I with 3 interpolating axes and 5 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

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
TF6270 | **TC3 PROFINET IO Device**	communication via PROFINET (PROFINET slave)
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

▶ **www.beckhoff.com/TwinCAT3**

TwinCAT 2

TX1200 | 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

TX1250 | 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"

TX1100 | 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

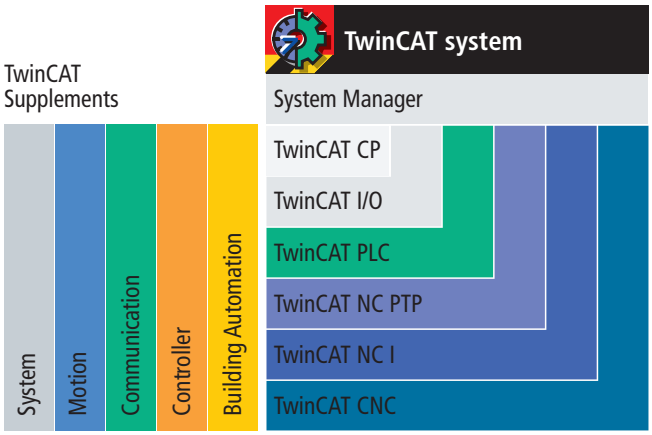
Multi-purpose I/O interface for all common fieldbus systems, PC Fieldbus Cards and interfaces with integrated real-time driver

TX1000 | 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

* version-dependent



TX1260 | 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 lanes and freely definable planes, Bezier splines, look-ahead function
Axis functions	online reconfiguration of axes in groups, path override, slave coupling to path axes, auxiliary axes, axis error and sag compensation, measuring functions
Operation	automatic operation, manual operation (jog/inching), single block operation, referencing, handwheel operation (motion/superposition)

TS511x | TwinCAT NC I Options

Options	TS511x | **TwinCAT Kinematic Transformation**

TX1270 | 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 (optional)
Axis types	electrical servo-axes, analog/encoder interface via fieldbus, digital interface via fieldbus
Interpreter functions	subroutines and jumps, programmable loops, zero shifts, tool compensations, M and H functions, mathematical functions, programming of parameters/variables, user macros, spindle and help functions, tool functions
Geometries	linear, circular, helical interpolation in the main planes and freely definable planes, max. 32 interpolating path axes per channel, look-ahead function
Axis functions	coupling and gantry axis function, override, axis error and sag compensation, measuring functions
Operation	automatic operation, manual operation (jog/inching), single block operation, referencing, block search, handwheel operation (motion/superposition)

TS52xx | TwinCAT CNC Options

Options	TS5220 | **TwinCAT CNC Axes Pack**
	TS5230 | **TwinCAT CNC Channel Pack**
	TS5240 | **TwinCAT CNC Transformation**
	TS5250 | **TwinCAT CNC HSC Pack**
	TS5260 | **TwinCAT CNC Spline Interpolation**

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TwinCAT 2 Supplements | System

TS1010 | **TwinCAT Eventlogger**	alarm and diagnostic system for logging events which occur in the TwinCAT system
TS1110 | **TwinCAT Simulation Manager**	simplified preparation and configuration of a simulation environment
TS1120 | **TwinCAT ECAD Import**	importing engineering results from an ECAD program
TS1140 | **TwinCAT Management Server**	central administration of Beckhoff CE control systems
TS1150 | **TwinCAT Backup**	backing up and restoring files, operating system and TwinCAT settings
TS1600 | **TwinCAT Engineering Interface Server**	co-ordinating programming tasks via a central source code management system
TS1800 | **TwinCAT PLC HMI**	displaying visualisations created in PLC Control
TS1800 | **TwinCAT PLC HMI CE** -0030	displaying visualisations created in PLC Control on Windows CE platforms
TS1810 | **TwinCAT PLC HMI Web**	displaying visualisations created in PLC Control in a web browser
TS3300 | **TwinCAT Scope 2**	graphical analysis tool for displaying time-continuous signals
TS3900 | **TwinCAT Solar Position Algorithm**	precise calculation of the sun's position
TS622x | **TwinCAT EtherCAT Redundancy**	extension of the TwinCAT EtherCAT master with cable redundancy capability
TS6420 | **TwinCAT Database Server**	accessing databases from the PLC
TS6420 | **TwinCAT Database Server CE** -0030	accessing databases from the PLC for Windows CE platforms
TS6421 | **TwinCAT XML Data Server**	reading and writing of XML-based data by the PLC

TwinCAT 2 Supplements | Motion

TS1500 | **TwinCAT Valve Diagram Editor**	graphical tool for designing the characteristic curve of a hydraulic valve
TS1510 | **TwinCAT Cam Design Tool**	graphic design tool for electronic cam plates
TS5050 | **TwinCAT NC Camming**	using the TwinCAT NC cam plate functionality (table coupling)
TS5055 | **TwinCAT NC Flying Saw**	implementing "flying saw" functionality
TS5060 | **TwinCAT NC FIFO Axes**	implementation of a pre-defined user setpoint generator for an NC axis
TS5065 | **TwinCAT PLC Motion Control XFC**	high-precision logging and switching of digital signals in relation to axis positions
TS5066 | **TwinCAT PLC Remote Synchronisation**	remote synchronisation
TS511x | **TwinCAT Kinematic Transformation**	implementation of different kinematic transformations for TwinCAT PTP or TwinCAT NC I
TS5800 | **TwinCAT Digital Cam Server**	software implementation of fast cam controller
TS5810 | **TwinCAT PLC Hydraulic Positioning**	control and adjustment of hydraulic axes

TwinCAT 2 Supplements | Communication

TS6100 | **TwinCAT OPC UA Server**	access to TwinCAT in accordance with OPC UA with UA server (DA/HA/AC) and UA client (DA)
TS6120 | **TwinCAT OPC Server**	access to TwinCAT variables in accordance with the OPC DA/OPC XML DA specification
TS6250 | **TwinCAT Modbus TCP Server**	communication with Modbus TCP devices (server and client functionality)
TS6255 | **TwinCAT PLC Modbus RTU**	serial communication with Modbus end devices
TS6270 | **TwinCAT PROFINET IO Device**	TwinCAT PROFINET IO device turns every PC-based controller into a PROFINET IO device.
TS6271 | **TwinCAT PROFINET IO Controller**	TwinCAT PROFINET IO controller turns every PC-based controller into a PROFINET IO controller.
TS6280 | **TwinCAT EtherNet/IP Slave**	TwinCAT EtherNet/IP slave turns every PC-based controller into an EtherNet/IP slave.

TwinCAT 2 Supplements | Communication

TS6300 | **TwinCAT FTP Client**	basic access from TwinCAT PLC to FTP server
TS6310 | **TwinCAT TCP/IP Server**	communication via generic TCP server
TS6340 | **TwinCAT PLC Serial Communication**	communication via serial Bus Terminals or PC COM ports
TS6341 | **TwinCAT PLC Serial Communication 3964R/RK512**	communication via serial Bus Terminals or PC COM ports with the 3964R and RK512 protocol
TS6350 | **TwinCAT SMS/SMTP Server**	sending SMS and e-mails from the PLC
TS6360 | **TwinCAT Virtual Serial COM Driver**	virtual serial COM driver for Windows and Windows CE platforms
TS6370 | **TwinCAT DriveCOM OPC Server**	fieldbus-independent communication connections between the engineering tool and the drive
TS6371 | **TwinCAT DriveTop Server**	configuring Indramat SERCOS drives with DriveTop software on TwinCAT systems
TS650x | **TwinCAT PLC IEC 60870-5-101, -102, -103, -104 Master**	implementation of IEC 60870-101, -102, -103 and -104 masters
TS6506 | **TwinCAT PLC IEC 60870-5-104 -0030 Master CE**	implementation of IEC 60870-104 masters under Windows CE
TS6507 | **TwinCAT PLC IEC 60870-5-101, -104 Slave**	implementation of IEC 60870-101 and -104 slaves
TS6507 | **TwinCAT PLC IEC 60870-5-104 -0030 Slave CE**	implementation of IEC 60870-104 slaves under Windows CE
TS6509 | **TwinCAT PLC IEC 61400-25 Server**	IEC 61400-25 communication
TS6511 | **TwinCAT PLC IEC 61850 Server**	IEC 61850 communication
TS6600 | **TwinCAT PLC RFID Reader Communication**	connection of RFID readers to the TwinCAT PLC
TS6610 | **TwinCAT PLC S5/S7 Communication**	communication with S5/S7 controllers

TwinCAT 2 Supplements | Controller

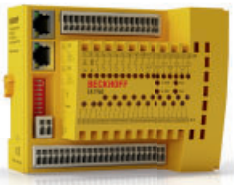
TS4100 | **TwinCAT PLC Controller Toolbox**	modules for basic controllers (P, I, D), complex controllers (PI, PID), pulse width modulation, ramps, signal generators and filters
TS4110 | **TwinCAT PLC Temperature Controller**	instanced temperature control function block for monitoring and controlling different temperature ranges

TwinCAT 2 Supplements | Building Automation

TS1800 | **TwinCAT Building Automation Framework**	configuration and commissioning of building automation projects
TS8000 | **TwinCAT PLC HVAC**	automation of HVAC and sanitary installations
TS8010 | **TwinCAT PLC Building Automation Basic**	executing basic room automation functions
TS8020 | **TwinCAT BACnet/IP**	communication with the data networks of the building automation and building control systems
TS8035 | **TwinCAT FIAS Server**	communication between TwinCAT PLC and a system using the FIAS standard
TS8036 | **TwinCAT Crestron Server**	communication between a TwinCAT PLC and a Crestron controller
TS8037 | **TwinCAT Bang & Olufsen Server**	communication between a TwinCAT PLC and a Bang & Olufsen audio/video installation

▶ **www.beckhoff.com/supplements**

TwinSAFE



EK1960

EL6900

EP1908

AX5000 Servo Drive with AX5805 option card

TwinSAFE

Controller

EtherCAT Terminal

EK1960
TwinSAFE Compact Controller,
20 safe digital inputs,
10 safe digital outputs

EL6900
TwinSAFE PLC

EL6930
TwinSAFE/PROFIsafe
logic and gateway terminal

Bus Terminal

KL6904
TwinSAFE Logic Bus Terminal,
with 4 digital outputs, IEC 61508 SIL 3
and DIN EN ISO 13849-1:2008 PLe

I/O

EtherCAT Terminal

EK1914
EtherCAT Coupler with integrated
digital I/Os: 4 inputs + 4 outputs,
2 safe inputs + 2 safe outputs

EL1904
TwinSAFE, 4 safe inputs

EL1908
TwinSAFE, 8 safe inputs

EL1934
PROFIsafe, 4 safe inputs

EL2901
TwinSAFE, 1 safe output

EL2902
TwinSAFE, 2 safe outputs

EL2904
TwinSAFE, 4 safe outputs

EL2934
PROFIsafe, 4 safe outputs

EL2964
TwinSAFE, 1 safe output,
3 potential-free contacts

EtherCAT Box

EP1908
TwinSAFE, 8 safe inputs

Bus Terminal

KL1904
TwinSAFE, 4 safe inputs

KL2904
TwinSAFE, 4 safe outputs

Drive Technology

Option cards

AX5801-0000, AX5802-0200
TwinSAFE drive option card
for AX5000 Servo Drives,
supported safety functions:
STO, SS1

AX5805
TwinSAFE drive option card
for AX5000 Servo Drives,
supported safety functions:
STO, SOS, SS1, SS2, SLS, SSM, SSR, SMS,
SLP, SCA, SLI, SAR, SMA, SDIp and SDIn
(SLT and SBC in preparation)

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Information media

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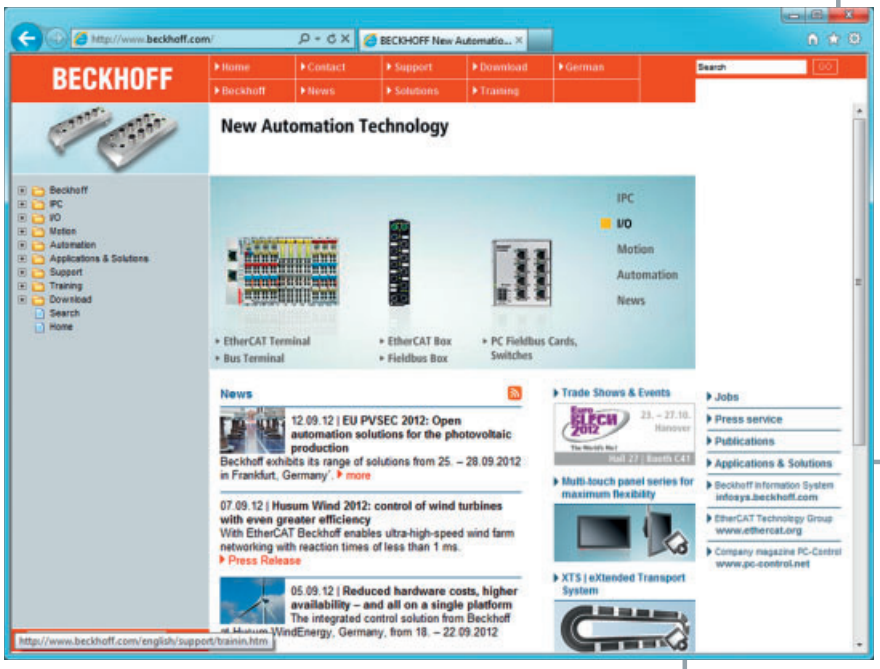
Ordering information	Description
DK1101	Main catalog, German
DK1102	Main catalog, English
DK1301	News catalog, German
DK1302	News catalog, English
DK1401	Product overview, German
DK1402	Product overview, English
DK1405	Product overview, French
DK4000	Main catalog and software products on DVD, German, English, Italian
DK6001	Company magazine PC Control, German
DK6002	Company magazine PC Control, English
DK3501	Flyer Building Automation, German
DK3502	Flyer Building Automation, English
DK3511	Flyer Wood Industry, German
DK3512	Flyer Wood Industry, English
DK3541	Flyer Packaging Industry, German
DK3542	Flyer Packaging Industry, English
DK3551	Flyer Tire and Rubber Industry, German
DK3552	Flyer Tire and Rubber Industry, English
DK3561	Flyer Plastic Industry, German
DK3562	Flyer Plastic Industry, English
DK3571	Flyer Wind Turbines, German
DK3572	Flyer Wind Turbines, English
DK3581	Flyer Robotics, German
DK3582	Flyer Robotics, English
DK3591	Flyer Forming Technology/Sheet Metal Working, German
DK3592	Flyer Forming Technology/Sheet Metal Working, English
DK3631	Flyer Photovoltaic Production, German
DK3632	Flyer Photovoltaic Production, English

www.beckhoff.com

The online manual

The Beckhoff Information System contains information about the Beckhoff products and technical information, manuals, TwinCAT example codes, a knowledge base and much more.

▶ **http://infosys.beckhoff.com**



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In addition to all the information contained in the printed catalog, the online service offers additional information, available in the universal PDF or in CHM (Compiled HTML) file format: detailed documentation and manuals for the Beckhoff products and software updates, technical drawings and configuration files for the fieldbus components.

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The full version of the powerful TwinCAT automation software can be downloaded and tested free of charge for 30 days.

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Headquarters

Beckhoff Automation GmbH
Eiserstraße 5
33415 Verl
Germany
Phone: +49 (0) 52 46 / 963 - 0
info@beckhoff.com
www.beckhoff.com

Europe

Germany

Office Balingen
Beckhoff Automation GmbH
Karlstraße 19
72336 Balingen
Phone: +49 (0) 74 33 / 2 60 24 - 0
balingen@beckhoff.de

Office Berlin
Beckhoff Automation GmbH
Fasanenstraße 81
10623 Berlin
Phone: +49 (0) 30 / 88 71 16 - 0
berlin@beckhoff.de

Office Frankfurt
Beckhoff Automation GmbH
Torhaus Westhafen
Speicherstraße 59
60327 Frankfurt am Main
Phone: +49 (0) 69 / 68 09 88 - 0
frankfurt@beckhoff.de

Office Hanover
Beckhoff Automation GmbH
Podbielskistraße 342
30655 Hanover
Phone: +49 (0) 5 11 / 87 57 58 - 0
hannover@beckhoff.de

Office Lübeck
Beckhoff Automation GmbH
Wahmstraße 56
23552 Lübeck
Phone: +49 (0) 4 51 / 20 39 88 - 0
luebeck@beckhoff.de

Office Munich
Beckhoff Automation GmbH
Oppelner Straße 5
82194 Gröbenzell/Munich
Phone: +49 (0) 81 42 / 41 05 9 - 0
muenchen@beckhoff.de

Office Nuremberg
Beckhoff Automation GmbH
Ostendstraße 196
90482 Nuremberg
Phone: +49 (0) 9 11 / 5 40 56 - 0
nuernberg@beckhoff.de

Sales Office Ravensburg
Beckhoff Automation GmbH
Parkstraße 48
88212 Ravensburg
Phone: +49 (0) 7 51 / 3 54 15 50
ravensburg@beckhoff.de

Office Rhein/Ruhr
Beckhoff Automation GmbH
Eurotec-Ring 7
47445 Moers
Phone: +49 (0) 28 41 / 90 81 6 - 6
rhein-ruhr@beckhoff.de

Austria
Headquarters
Beckhoff Automation GmbH
Hauptstraße 4
6706 Bürs
Phone: +43 (0) 55 52 / 68 81 3 - 0
info@beckhoff.at
www.beckhoff.at

Sales Office Oberösterreich
Beckhoff Automation GmbH
4232 Hagenberg
Phone: +43 (0) 72 36 / 20 92 5 - 0
oberoesterreich@beckhoff.at

Sales Office Niederösterreich
Beckhoff Automation GmbH
2542 Kottingbrunn
Phone: +43 (0) 22 52 / 25 17 23
niederoesterreich@beckhoff.at

Sales Office Salzburg
Beckhoff Automation GmbH
5400 Hallein
Phone: +43 (0) 62 45 / 70 09 6 11
salzburg@beckhoff.at

Sales Office Tirol
Beckhoff Automation GmbH
6020 Innsbruck
Phone: +43 (0) 512 / 236 043
tirol@beckhoff.at

Belgium, Luxembourg
Headquarters
Beckhoff Automation bvba
Kempische Steenweg 305 bus 202
3500 Hasselt
Belgium
Phone: +32 (0) 11 / 24 08 00
info@beckhoff.be
www.beckhoff.be

Sales Office West
Beckhoff Automation bvba
8500 Kortrijk
Phone: +32 (0) 56 / 20 20 37
info@beckhoff.be

Bulgaria
Kastiva GmbH
68-72 Ami Bue Str., 4. Floor
1612 Sofia
Phone: +359 (2) 9 50 44 31
office@kastiva.com
www.kastiva.com

Croatia
Krovel d.o.o.
Barutanski jarak 114
10000 Zagreb
Phone: +385 / 1 230 5788
beckhoff@krovel.hr
www.krovel.hr

Czech Republic, Slovac Republic
Dyger s.r.o.
Vystaviste 1
648 59 Brno
Phone: +420 5 / 41 32 10 04
info@dyger.cz
www.dyger.cz

Denmark, Iceland
Headquarters
Beckhoff Automation ApS
Naverland 2
2600 Glostrup
Phone: +45 43 / 20 15 70
info@beckhoff.dk
www.beckhoff.dk

Office Hobro
Beckhoff Automation ApS
9500 Hobro
Phone: +45 43 / 20 15 70
info@beckhoff.dk

Office Kolding
Beckhoff Automation ApS
6000 Kolding
Phone: +45 43 / 20 15 70
info@beckhoff.dk

Finland, Estonia
Headquarters
Beckhoff Automation Oy
P.O. Box 23
Kankurinkatu 4-6
05801 Hyvinkää
Finland
Phone: +358 (0) 20 / 7 42 38 00
info@beckhoff.fi
www.beckhoff.fi

Sales Office Seinäjoki
Beckhoff Automation Oy
60320 Seinäjoki
Phone: +358 (0) 20 / 7 42 38 50
info@beckhoff.fi

Sales Office Tampere
Beckhoff Automation Oy
33720 Tampere
Phone: +358 (0) 20 / 7 42 38 70
info@beckhoff.fi

France
Headquarters
Beckhoff Automation Sarl
Immeuble "Le Montréal"
ZA de Courtaboeuf
19 bis, avenue du Québec
91140 Villebon-sur-Yvette Cedex
Phone: +33 (0) 1 69 29 83 70
info@beckhoff.fr
www.beckhoff.fr

Sales Office South-East
Beckhoff Automation Sarl
74370 Metz-Tessy
Phone: +33 (0) 4 50 23 22 75
info@beckhoff.fr

Greece, Cyprus
L. J. Skourgialos
Industrial Automation Systems
241 EL. Venizelou
176 73 Kallithea/Athens
Greece
Phone: +30 / 21 09 51 02 60
ias@otenet.gr

Hungary
Beckhoff Automation Kft.
Gubacsi út 6.
H-1097 Budapest
Phone: +36 1 501 9940
info@beckhoff.hu
www.beckhoff.hu

Italy
Headquarters
Beckhoff Automation S.r.l.
Via E. Majorana, 1
20834 Nova Milanese (MB)
Phone: +39 03 62 / 36 51 64
info@beckhoff.it
www.beckhoff.it

Office Bologna
Beckhoff Automation S.r.l.
40011 Anzola dell'Emilia (BO)
Phone: +39 05 1 / 73 15 09
bologna@beckhoff.it

Office Padua
Beckhoff Automation S.r.l.
35127 Padua (PD)
Phone: +39 0 49 / 8 70 48 38
padova@beckhoff.it

Lithuania, Latvia, Belarus
UAB "Santavilte"
Europos pr. 121
LT-46339 Kaunas
Lithuania
Phone: +3 70 37 21 13 60
info@santavilte.lt
www.santavilte.lt

Malta
JMartans Automation
Ivy, Flat 1,
Salvu Barbara Street,
Mosta, MST 2433
Phone: +3 56 21 42 06 55
info@jmartans.com
www.jmartans.com

Netherlands
Industrial Automation Link
Küppersweg 71
2031 EB Haarlem
Phone: +31 23 / 5 18 51 40
sales@ial.nl
www.ial.nl

Norway
Beckhoff Automation AS
Stensarmen 16
3112 Tønsberg
Phone: +47 33 50 46 90
info@beckhoff.no
www.beckhoff.no

Poland
Beckhoff Automation Sp. z o.o.
Żabieniec, ul. Ruczajowa 15
05-500 Piaseczno
Phone: +48 22 / 7 50 47 00
info@beckhoff.pl
www.beckhoff.pl

Portugal
Bresimar Automação, S.A.
Quinta do Simão –
EN109 – Esgueira
Apartado 3080
3801-101 Aveiro
Phone: +351 234 / 30 33 20
bresimar@bresimar.pt
www.bresimar.pt

Romania
Kreatron Automation S.R.L.
Str. Octavian Fodor nr. 113, ap. 13
400434, Cluj-Napoca
jud. Cluj
Phone: +40 364 40 16 12
office@kreatron.ro
www.kreatron.ro

Russia
Headquarters
Beckhoff Automation OOO
Staraya Basmannaya 14/2 str. 2
105064 Moscow
Phone: +7 495 / 9 81 64 54
russia@beckhoff.com
www.beckhoff.ru

Representation North-West Federal District
Beckhoff Automation OOO
199178 Saint-Petersburg
Phone: +7 812 / 332 62 05
north-westfo@beckhoff.ru

Representation Siberian Federal District
Beckhoff Automation OOO
630054 Novosibirsk
Phone: +7 383 / 355 99 51
sibirfo@beckhoff.ru

Representation Southern Federal District
Beckhoff Automation OOO
350051 Krasnodar
Phone: +7 861 / 279 67 23
south@beckhoff.ru

Representation Ural Federal District
Beckhoff Automation OOO
620049 Ekaterinburg
Phone: +7 343 / 379 98 73
uralfo@beckhoff.ru

Representation Volga Federal District
Beckhoff Automation OOO
443010 Samara
Phone: +7 846 / 269 80 67
volgafo@beckhoff.ru

Slovenia, Serbia, Bosnia and Herzegovina, Macedonia, Kosovo, Montenegro
Beckhoff Automatizacija d.o.o.
Zbiljska cesta 4
1215 Medvode
Phone: +386 / 1 361 30 80
info@beckhoff.si
www.beckhoff.si

Spain
Headquarters
Beckhoff Automation S.A.
Edificio Testa Sant Cugat
Avda. Alcalde Barnils, 64-68
08174 Sant Cugat (Barcelona)
Phone: +34 93 / 5 84 49 97
info@beckhoff.es
www.beckhoff.es

Sales Office Bilbao
Beckhoff Automation S.A.
48950 Erandio (Bilbao)
Phone: +34 94 / 4 31 40 75
info@beckhoff.es

Sales Office Madrid
Beckhoff Automation S.A.
28290 Las Matas (Madrid)
Phone: +34 91 / 6 36 43 57
madrid@beckhoff.es

Sweden
Headquarters
Beckhoff Automation AB
Stenåldersgatan 2A
21376 Malmö
Phone: +46 (0) 40 / 6 80 81 60
info@beckhoff.se
www.beckhoff.se

Sales Office Gothenburg
Beckhoff Automation AB
43363 Sävedalen
Phone: +46 (0) 40 / 6 80 81 60
info@beckhoff.se

Sales Office Stockholm
Beckhoff Automation AB
16970 Solna
Phone: +46 (0) 40 / 6 80 81 60
info@beckhoff.se

Sales Office Värnamo
Beckhoff Automation AB
33153 Värnamo
Phone: +46 (0) 40 / 6 80 81 60
info@beckhoff.se

Switzerland
Headquarters
Beckhoff Automation AG
Rheinweg 9
8200 Schaffhausen
Phone: +41 (0) 52 / 6 33 40 40
info@beckhoff.ch
www.beckhoff.ch

Office Zurich
Beckhoff Automation AG
8052 Zurich
Phone: +41 (0) 52 / 633 40 40
info@beckhoff.ch

Office Derendingen
Beckhoff Automation AG
Application/Software Development
4552 Derendingen
Phone: +41 (0) 32 / 566 16 50
info@beckhoff.ch

Sales + Support Center Suisse Romande
Beckhoff Automation AG
1442 Montagny-près-Yverdon
Phone: +41 (0) 24 / 447 27 - 00
yverdon@beckhoff.ch

Support Center Ticino
p.project sagl
Via Pianella 19
6596 Gordola
Phone: +41 (0) 91 / 745 01 11
ticino@beckhoff.ch

Turkey
Headquarters
Beckhoff Otomasyon ltd. şti.
Gardenya-3 Plaza No: 18-19
34758 Ataşehir Istanbul
Phone: +90 216 580 9830
info@beckhoff.com.tr
www.beckhoff.com.tr

Office İzmir
Beckhoff Otomasyon ltd. şti.
35530 Konak İzmir
Phone: +90 232 486 0350
info@beckhoff.com.tr

UK, Ireland
Beckhoff Automation Ltd.
The Boathouse
Station Road
Henley on Thames
Oxon RG9 1AZ
Great Britain
Phone: +44 1491 / 41 05 39
info@beckhoff.co.uk
www.beckhoff.co.uk

North America

USA
Headquarters and Training Center
Beckhoff Automation LLC
13130 Dakota Avenue
Savage, MN 55378
Phone: +1 952 / 890 0000
beckhoff.usa@beckhoff.com
www.beckhoffautomation.com

East Region Headquarters and Training Center
Beckhoff Automation LLC
Charlotte, NC
Phone: +1 704 / 910 4367
east.usa@beckhoff.com

East Region Sales
Beckhoff Automation LLC
Hyannis, MA
Phone: +1 952 / 212 6226
newengland@beckhoff.com

Beckhoff Automation LLC
Hanover, PA
Phone: +1 717 / 634 5536
northeast.sales@beckhoff.com

Beckhoff Automation LLC
Rochester Hills, MI
Phone: +1 248 / 828 5310
michigan@beckhoff.com

Beckhoff Automation LLC
Indianapolis, IN
Phone: +1 317 / 703 9115
midcentral.sales@beckhoff.com

Beckhoff Automation LLC
Lake Wylie, SC
Phone: +1 803 / 746 5491
east.usa@beckhoff.com

Beckhoff Automation LLC
Apex, NC
Phone: +1 952 / 428 7350
southeast.usa@beckhoff.com

Beckhoff Automation LLC
Atlanta, GA
Phone: +1 770 / 403 8868
georgia@beckhoff.com

Central Region Sales and Training Center
Beckhoff Automation LLC
Fond du Lac, WI
Phone: +1 920 / 251 2777
wisconsin@beckhoff.com

Central Region Sales and Technical Center
Beckhoff Automation LLC
Woodridge, IL
Phone: +1 317 / 703 9115
midwest.usa@beckhoff.com

Central Region Sales
Beckhoff Automation LLC
Savage, MN 55378
Phone: +1 952 / 890 0000
north.usa@beckhoff.com

Beckhoff Automation LLC
Rogers, AR
Phone: +1 479 / 925 2951
south.usa@beckhoff.com

Beckhoff Automation LLC
Cedar Park, TX
Phone: +1 512 / 250 9809
southwest.sales@beckhoff.com

Beckhoff Automation LLC
Justin, TX
Phone: +1 817 / 428 5314
southwest.sales@beckhoff.com

West Region Sales
Beckhoff Automation LLC
San Diego, CA
Phone: +1 858 / 546 1111
west.sales@beckhoff.com

Beckhoff Automation LLC
La Cañada, CA
Phone: +1 818 / 224 9065
losangeles@beckhoff.com

Beckhoff Automation LLC
San Francisco Bay Area, CA
Phone: +1 408 / 425 1025
norcal@beckhoff.com

Beckhoff Automation LLC
Phoenix, AZ
Phone: +1 602 / 354 0506
arizona@beckhoff.com

Beckhoff Automation LLC
Arvada, CO
Phone: +1 303 / 429 0758
mountain.sales@beckhoff.com

Beckhoff Automation LLC
Mill Creek, WA
Phone: +1 425 / 451 4444
northwest.sales@beckhoff.com

West Region Technical Center
Beckhoff Automation LLC
San Diego, CA
Phone: +1 858 / 546 1111
west.application@beckhoff.com

Canada
Headquarters
Sales, Training Center and Application Development
Beckhoff Automation Canada Ltd.
2900 Argentia Road, Suite 7
Mississauga, ON L5N 7X9
Phone: +1 289 / 627 1900
canada@beckhoff.com

Canada Sales
Beckhoff Automation Canada Ltd.
Toronto, ON
Phone: +1 905 / 466 4371
canada@beckhoff.com

Beckhoff Automation Canada Ltd.
London, ON
Phone: +1 519 / 451 8572
canada@beckhoff.com

Beckhoff Automation Canada Ltd.
Laval, QC
Phone: +1 450 / 933 8656
canada@beckhoff.com

Mexico
Mexico Sales and Application Development
Integra Automation, SA de CV
Av. Industrias 325-A
78399 Fracc. Talleres
San Luis Potosí, S.L.P.
Phone: +52 444 / 822 2615 al 17
mexico@beckhoff.com

South America

Argentina
eFALCOM
Alcorta 2411
CPA B1744HFM
Moreno / Buenos Aires
Phone: +54 237 / 463 1151
info@efalcom.com
www.efalcom.com

Bolivia
BAVARIA S.R.L.
P.O. Box: 4923
C. Mario Diez de Medina, N° 32
Zona Morocollo
La Paz
Phone: +591 2 277 13 78
alvarobaptista@bavaria.bo
www.bavaria.bo

Brazil
Headquarters
Beckhoff Automação Industrial Ltda.
Rua Caminho do Pilar, 1362
Vila Gilda, Santo André – SP
CEP: 09190-000
Phone: +55 (11) 41 26-3232
info@beckhoff.com.br
www.beckhoff.com.br

Office Campinas
Beckhoff Automação Industrial Ltda.
Campinas 13070-056 – SP
Phone: +55 (19) 3368-7288
info@beckhoff.com.br

Office Joinville
Beckhoff Automação Industrial Ltda.
Joinville 89221-006 – SC
Phone: +55 47 3439 - 0908
info@beckhoff.com.br

Office Novo Hamburgo
Beckhoff Automaçao Industrial Ltda.
Novo Hamburgo – RS
info@beckhoff.com.br

Chile
ELECDRIVE Proyectos Industriales S.A.
San Gerardo 948 (ex 872).
Recoleta. Santiago
Phone: (56-2) 2622 6472 – 2622 0167
Mobile: +56 9 82 94 42 79
elecdrive@elecdrive.cl
www.elecdrive.cl

Colombia
SENTRONIC LTDA
Calle 112 70-B-18
Bogotá
Phone: +57 1 533 4323
sensores@sentronic.com.co
www.sentronic.com.co

Uruguay
Comando Ltda.
Dr. J. de Salterain 1142
Montevideo 11200
Phone: +598 (2) / 400-7923
comando@comandonet.com
www.comandonet.com

Africa

South Africa
Headquarters
Beckhoff Automation (Pty) Ltd
6 Ateljee Street
Randpark Ridge
Randburg
Gauteng
2194
Phone: +27 (0) 11 795 2898
info@beckhoff.co.za
www.beckhoff.co.za

Office Cape Town
Beckhoff Automation (Pty) Ltd
Cape Town
Phone: +27 (0) 861 2325 4633
info@beckhoff.co.za

Office Durban
Beckhoff Automation (Pty) Ltd
Durban
Phone: +27 (0) 861 2325 4633
info@beckhoff.co.za

Asia

China
Headquarters
Beckhoff Automation (Shanghai) Co., Ltd.
5th Floor,
No. 163 JiangChang San Road
Shanghai Shibei Industrial Zone
Shanghai, 200436
Phone: +86 21 / 66 31 26 66
info@beckhoff.com.cn
www.beckhoff.com.cn

Office Beijing
Beckhoff Automation (Shanghai) Co., Ltd.
Beijing, 100044
Phone: +86 10 / 58 30 12 36
beijing@beckhoff.com.cn

Office Guangzhou
Beckhoff Automation (Shanghai) Co., Ltd.
Guangzhou, 510620
Phone: +86 20 / 38 01 03 00
guangzhou@beckhoff.com.cn

Office Chengdu
Beckhoff Automation (Shanghai) Co., Ltd.
Chengdu, Sichuan, 610016
Phone: +86 28 / 86 20 25 81
chengdu@beckhoff.com.cn

Office Wuhan
Beckhoff Automation (Shanghai) Co., Ltd.
Wuhan, Hubei
Phone: +86 27 / 87 71 19 92
wuhan@beckhoff.com.cn

Office Shenyang
Beckhoff Automation (Shanghai) Co. Ltd.
Shenyang City, 11013, Liaoning
Phone: +86 24 / 22 78 88 96
shenyang@beckhoff.com.cn

Office Qingdao
Beckhoff Automation (Shanghai) Co. Ltd.
Qingdao, Shandong Province
Phone: +86 532 / 55 66 38 57
qingdao@beckhoff.com.cn

Office Hefei
Beckhoff Automation (Shanghai) Co. Ltd.
Hefei, Anhui Province
Phone: +86 551 / 55 43 513
hefei@beckhoff.com.cn

Office Hangzhou
Beckhoff Automation (Shanghai) Co. Ltd.
Hangzhou, Zhejiang Province
Phone: +86 571 / 87 65 27 86
hangzhou@beckhoff.com.cn

Office Ningbo
Beckhoff Automation (Shanghai) Co. Ltd.
Ningbo, Zhejiang Province
Phone: +86 574 / 87 20 33 35
ningbo@beckhoff.com.cn

Office Shenzhen
Beckhoff Automation (Shanghai) Co. Ltd.
Shenzhen
Phone: +86 755 / 23 60 32 32
shenzhen@beckhoff.com.cn

Office Nanjing
Beckhoff Automation (Shanghai) Co. Ltd.
Nanjing, Jiangsu Province
Phone: +86 25 / 85 86 22 71

Office Wuxi
Beckhoff Automation (Shanghai) Co. Ltd.
Wuxi, Jiangsu Province
Phone: +86 510 / 85 81 93 06
wuxi@beckhoff.com.cn

Office Xi'an
Beckhoff Automation (Shanghai) Co. Ltd.
Xi'an, Shanxi Province
Phone: +86 29 / 88 49 99 08
xian@beckhoff.com.cn

Suzhou Technical Center
Beckhoff Automation (Shanghai) Co. Ltd.
Suzhou, Jiangsu Province
Phone: +86 512 / 62 85 22 07
suzhou@beckhoff.com.cn

India
Headquarters
Beckhoff Automation Pvt. Ltd.
Suite 4, Level 6, Muttha Towers
Don Bosco Marg
Pune – 411 006
Phone: +91 20 40 00 48 00
info@beckhoff.co.in
www.beckhoff.co.in

Sales Office Ahmedabad
Beckhoff Automation Pvt. Ltd.
Ahmedabad – 380015
Phone: +91 79 40 08 48 00
info@beckhoff.co.in

Sales Office Bangalore
Beckhoff Automation Pvt. Ltd.
Bangalore – 560004
bangalore@beckhoff.co.in

Sales Office Mumbai
Beckhoff Automation Pvt. Ltd.
Thane – 400 601
Phone: +91 22 67 00 48 45
mumbai@beckhoff.co.in

Israel
Beckhoff Automation Ltd.
Beit Golan
Golan St. (corner of Tavor St.)
Airport City
Lod 70151
Phone: 972 3 7 76 44 45
info@beckhoff.co.il
www.beckhoff.co.il

Japan
Beckhoff Automation K.K.
Nisseki Yokohama Building
18th Floor
1-1-8 Sakuragicho, Naka-ku
Yokohama-shi Kanagawa-ken
231-0062
Phone: +81 45 650 1612
info@beckhoff.co.jp
www.beckhoff.co.jp

Lebanon, Jordan, Syria
Industrial Technologies (itec) S.A.L.
Afrah Plaza Center,
Blvd Fouad Chehab
Sin El Fil, Beirut
Phone: +961 (1) 49 11 61
info@iteclb.com
www.iteclb.com

Malaysia
Headquarters
Beckhoff Automation Sdn Bhd
(889044-H)
Unit 2.1, 2nd Floor, Surian Tower
No.1 Jalan PJU 7/3
Mutiara Damansara
47810 Petaling Jaya
Phone: +60 (3) 7731 8388
info@beckhoff.com.my
www.beckhoff.com.my

Office Penang
Beckhoff Automation Sdn Bhd
(889044-H)
Bayan Baru, 11950, Penang
Phone: +60 (4) 6460 388
info@beckhoff.com.my

Singapore, Philippines, Vietnam, Indonesia
Beckhoff Automation Pte. Ltd.
3 International Business Park
#07-08 Nordic European Centre
Singapore 609927
Phone: +65 / 66 35 50 00
info@beckhoff.com.sg
www.beckhoff.com.sg

Thailand
TDS Technology (Thailand) Co., Ltd.
50/962 Moo 2
Bengyeetos Thanyaburi
Pratumthanee
12130 Bangkok
Phone: +66 (0) 2569 5511
sales_th@tdstech.com
www.tdstech.com

T&R Electronic (Thailand) Co., Ltd.
120/62 Moo 8 Bang Sare
Sattahip
Chonburi 20250
Phone: +66 (0) 3873 7487
trthailand@trelectronic.co.th
www.trelectronic.co.th

South Korea
Tri-TEK Corp.
717 DaeRyung TechnoTown III
448 KasanDong Kumcheongu
Seoul 153-803
Phone: +82 2 / 2107-32 42
tritek@tritek.co.kr
www.tritek.co.kr

Taiwan
JI-DIEN Co., Ltd.
9F, No. 22, Sec. 1,
Zhongshan Rd.
Xingzhuang City
Taipei County 242
Phone: +886 (2) 8522 3237
jidien-taipei@jidien.com
www.jidien.com

United Arab Emirates, Oman, Qatar, Bahrain, Kuwait, Saudi Arabia, Egypt
Beckhoff Automation FZE
C# 608, Dubai Silicon Oasis
P.O. Box No. 341007
Dubai
United Arab Emirates
Phone: +971 4 5015480
info@beckhoff.ae
www.beckhoff.ae

Australia

Australia
Headquarters
Beckhoff Automation Pty. Ltd.
Level 16, 10 Queens Road
Melbourne, Victoria, 3004
Phone: +61 (3) 99 12 54 30
info@beckhoff.com.au
www.beckhoff.com.au

Sales Office North Ryde
Beckhoff Automation Pty. Ltd.
North Ryde, NSW, 2113
Phone: +61 (2) 80 69-23 33
info@beckhoff.com.au

New Zealand
Beckhoff Automation Limited
Unit C2, 59 Apollo Drive
Albany, Auckland 0632
Phone: +64 (9) 281 2736
info@beckhoff.co.nz
www.beckhoff.co.nz

DK1402-0213