Highlights

- Scalable performance range
- Compact design
- Direct I/O interface
- Modular extension options
- DIN rail mounting

Embedded PC

Modular DIN rail IPCs and Industrial Motherboards

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Product overview Embedded PC

Embedded PC

Basic CPU	CX80xx		CX81xx		CX9020	
		200		208		210
Processor	ARM9, 400 MHz		ARM Cortex™-A9, 800 MHz		ARM Cortex™-A8, 1 GHz	
Flash memory	slot for microSD card, 512 MB included (expandable)		slot for microSD card, 512 MB included (expandable)		2 x slot for microSD card, 512 MB included (expandable)	
Main memory	64 MB DDR2 RAM (not expandable)		512 MB DDR3 RAM (not expandable)		1 GB DDR3 RAM (not expandable)	
Interfaces	1 x RJ45 10/100 Mbit/s, 1 x USB device (behind the front flap), fieldbus interface		1 x RJ45 10/100 Mbit/s, 1 x USB device (behind the front flap), fieldbus interface		2 x RJ45 10/100 Mbit/s (internal switch), 1 x DVI-D, 4 x USB 2.0, 1 x optional interface	
I/O connection	E-bus or K-bus, automatic recognition		E-bus or K-bus, automatic recognition		E-bus or K-bus, automatic recognition	
System interfaces	**integrated or expandable via EtherCAT Terminals**		**integrated or expandable via EtherCAT Terminals**		**integrated**	
DVI/USB	–		–		in the basic CPU	210
RS232	CX8080	202	CX8180	208	CX9020-N030	210
RS422/RS485	CX8080	202	CX8180	208	CX9020-N031	210
Audio	–		–		CX9020-N020	210
Ethernet	in the basic CPU	200	in the basic CPU	208	in the basic CPU	210
4-port USB hub	–		–		in the basic CPU	210
Memory medium	in the basic CPU	200	in the basic CPU	208	2nd microSD slot in the basic CPU	210
Fieldbus interfaces	**integrated or expandable via EtherCAT Terminals**		**integrated or expandable via EtherCAT Terminals**		**integrated or expandable via EtherCAT Terminals**	
EtherCAT	CX8010 slave	200	CX8110 slave	208	CX9020-B110 slave	210
Lightbus	EL6720 master	2 220	EL6720 master	2 220	EL6720 master	2 220
PROFIBUS	CX8030 master	200	EL6731 master	2 217	CX9020-M310 master	210
	CX8031 slave	201	EL6731-0010 slave	2 217	CX9020-B310 slave	210
CANopen	CX8050 master	201	EL6751 master	2 218	CX9020-M510 master	210
	CX8051 slave	201	EL6751-0010 slave	2 218	CX9020-B510 slave	210
DeviceNet	EL6752 master	2 219	EL6752 master	2 219	EL6752 master	2 219
	EL6752-0010 slave	2 219	EL6752-0010 slave	2 219	EL6752-0010 slave	2 219
PROFINET RT	CX8093 device	203	EL6631 controller	2 215	CX9020-M930 controller	210
			EL6631-0010 device	2 215	CX9020-B930 device	210
EtherNet/IP	CX8095 slave	203	EL6652 master	2 216	CX9020-B950 slave	210
			EL6652-0010 slave	2 216		
SERCOS	–		–		–	
UPS options	1-second UPS		1-second UPS		1-second UPS (optional)	

CX1010 214	CX5010 220	CX5020 220
compatible with Intel® Pentium® MMX, clock frequency 500 MHz	Intel® Atom™ Z510, 1.1 GHz clock frequency	Intel® Atom™ Z530, 1.6 GHz clock frequency
slot for Compact Flash card, 128 MB included (expandable)	slot for Compact Flash card, 128 MB included (expandable)	slot for Compact Flash card, 128 MB included (expandable)
256 MB DDR RAM (not expandable)	512 MB RAM (not expandable)	512 MB RAM (expandable ex factory to 1 GB)
1 x RJ45 10/100 Mbit/s	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-D, 4 x USB 2.0, 1 x optional interface	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-D, 4 x USB 2.0, 1 x optional interface
via power supply module (E-bus, K-bus, K-bus/IP-Link)	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition
modularly expandable	**integrated**	**integrated**
CX1010-N010 216	in the basic CPU 220	in the basic CPU 220
CX1010-N030 (COM 1/2) 216 CX1010-N040 (COM 3/4) 216	CX5010-N030 220	CX5020-N030 220
CX1010-N031 (COM 1/2) 216 CX1010-N041 (COM 3/4) 216	CX5010-N031 220	CX5020-N031 220
CX1010-N020 216	CX5010-N020 220	CX5020-N020 220
CX1010-N060 216	in the basic CPU 220	in the basic CPU 220
–	in the basic CPU 220	in the basic CPU 220
in the basic CPU 216	in the basic CPU 220	in the basic CPU 220
modularly expandable	**integrated or expandable via EtherCAT Terminals**	**integrated or expandable via EtherCAT Terminals**
–	CX5010-B110 slave 220	CX5020-B110 slave 220
CX1500-M200 master 241 CX1500-B200 slave 242	EL6720 master 2 220	EL6720 master 2 220
CX1500-M310 master 241	CX5010-M310 master 220	CX5020-M310 master 220
CX1500-B310 slave 242	CX5010-B310 slave 220	CX5020-B310 slave 220
CX1500-M510 master 241	CX5010-M510 master 220	CX5020-M510 master 220
CX1500-B510 slave 242	CX5010-B510 slave 220	CX5020-B510 slave 220
CX1500-M520 master 241	EL6752 master 2 219	EL6752 master 2 219
CX1500-B520 slave 242	EL6752-0010 slave 2 219	EL6752-0010 slave 2 219
–	CX5010-M930 controller 220	CX5020-M930 controller 220
	CX5010-B930 device 220	CX5020-B930 device 220
–	CX5010-B950 slave 220	CX5020-B950 slave 220
CX1500-M750 SERCOS II master 241	–	–
CX1100-0910, -0900 243	**1-second UPS**	**1-second UPS**



Embedded PC

Basic CPU	CX5120 224	CX5130 226	CX5140 228
Processor	Intel® Atom™ E3815, 1.46 GHz	Intel® Atom™ E3827, 1.75 GHz	Intel® Atom™ E3845, 1.91 GHz
Flash memory	slot for CFast card and for microSD card, cards not included	slot for CFast card and for microSD card, cards not included	slot for CFast card and for microSD card, cards not included
Main memory	2 GB DDR3 RAM (not expandable)	4 GB DDR3 RAM (not expandable)	4 GB DDR3 RAM (not expandable)
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface
I/O connection	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition
System interfaces	integrated	integrated	integrated
DVI/USB	in the basic CPU 224	in the basic CPU 226	in the basic CPU 228
RS232	CX5120-N030 224	CX5130-N030 226	CX5140-N030 228
RS422/RS485	CX5120-N031 224	CX5130-N031 226	CX5140-N031 228
Audio	CX5120-N020 224	CX5130-N020 226	CX5140-N020 228
Ethernet	in the basic CPU 224	in the basic CPU 226	in the basic CPU 228
4-port USB hub	in the basic CPU 224	in the basic CPU 226	in the basic CPU 228
Memory medium	in the basic CPU 224	in the basic CPU 226	in the basic CPU 228
Fieldbus interfaces	integrated or expandable via EtherCAT Terminals	integrated or expandable via EtherCAT Terminals	integrated or expandable via EtherCAT Terminals
EtherCAT	CX5120-B110 slave 224	CX5130-B110 slave 226	CX5140-B110 slave 228
Lightbus	EL6720 master 2 220	EL6720 master 2 220	EL6720 master 2 220
PROFIBUS	CX5120-M310 master 224	CX5130-M310 master 226	CX5140-M310 master 228
	CX5120-B310 slave 224	CX5130-B310 slave 226	CX5140-B310 slave 228
CANopen	CX5120-M510 master 224	CX5130-M510 master 226	CX5140-M510 master 228
	CX5120-B510 slave 224	CX5130-B510 slave 226	CX5140-B510 slave 228
DeviceNet	EL6752 master 2 219	EL6752 master 2 219	EL6752 master 2 219
	EL6752-0010 slave 2 219	EL6752-0010 slave 2 219	EL6752-0010 slave 2 219
PROFINET RT	CX5120-M930 controller 224	CX5130-M930 controller 226	CX5140-M930 controller 228
	CX5120-B930 device 224	CX5130-B930 device 226	CX5140-B930 device 228
PROFINET IRT	CX5120-B931 device 224	CX5130-B931 device 226	CX5140-B931 device 228
EtherNet/IP	CX5120-B950 slave 224	CX5130-B950 slave 226	CX5140-B950 slave 228
SERCOS	–	–	–
UPS options	1-second UPS	1-second UPS	1-second UPS

CX1020	232	CX1030	234
Intel® Celeron® M ULV, 1 GHz clock frequency		Intel® Pentium® M, 1.8 GHz clock frequency	
slot for Compact Flash card, 128 MB included (expandable)		slot for Compact Flash card, 128 MB included (expandable)	
256 MB DDR RAM (expandable ex factory to 1 GB)		256 MB DDR RAM (expandable ex factory to 1 GB)	
2 x RJ45 10/100 Mbit/s (internal switch)		2 x RJ45 10/100 Mbit/s (internal switch)	
via power supply module (E-bus, K-bus, K-bus/IP-Link)		via power supply module (E-bus, K-bus, K-bus/IP-Link)	
modularly expandable		**modularly expandable**	
CX1020-N010	236	CX1030-N010	237
CX1020-N030 (COM 1/2)	236	CX1030-N030 (COM 1/2)	237
CX1020-N040 (COM 3/4)	236	CX1030-N040 (COM 3/4)	237
CX1020-N031 (COM 1/2)	236	CX1030-N031 (COM 1/2)	237
CX1020-N041 (COM 3/4)	236	CX1030-N041 (COM 3/4)	237
CX1020-N020	236	CX1030-N020	237
CX1020-N060	236	CX1030-N060	237
–		–	
–		–	
modularly expandable		**modularly expandable**	
–		–	
CX1500-M200 master	241	CX1500-M200 master	241
CX1500-B200 slave	242	CX1500-B200 slave	242
CX1500-M310 master	241	CX1500-M310 master	241
CX1500-B310 slave	242	CX1500-B310 slave	242
CX1500-M510 master	241	CX1500-M510 master	241
CX1500-B510 slave	242	CX1500-B510 slave	242
CX1500-M520 master	241	CX1500-M520 master	241
CX1500-B520 slave	242	CX1500-B520 slave	242
–		–	
–		–	
–		–	
CX1500-M750 SERCOS II master	241	CX1500-M750 SERCOS II master	241
CX1100-0920	243	**CX1100-0930**	243



Embedded PC

Basic CPU	CX2020 246	CX2030 246	CX2040 246
Processor	Intel® Celeron® 827E 1.4 GHz	Intel® Core™ i7 2610UE 1.5 GHz	Intel® Core™ i7 2715QE 2.1 GHz
Flash memory	slot for CFast card, optionally 4 or 8 GB included (expandable)	slot for CFast card, optionally 4 or 8 GB included (expandable)	slot for CFast card, optionally 4 or 8 GB included (expandable)
Main memory	2 GB DDR3 RAM (expandable ex factory to 4 GB)	2 GB DDR3 RAM (expandable ex factory to 4 GB)	4 GB DDR3 RAM (not expandable)
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface
I/O connection	via power supply module (E-bus or K-bus, automatic recognition)	via power supply module (E-bus or K-bus, automatic recognition)	via power supply module (E-bus or K-bus, automatic recognition)
System interfaces	modularly expandable	modularly expandable	modularly expandable
DVI/USB	in the basic CPU, 2nd DVI port as option CX2020-N010 246	in the basic CPU, 2nd DVI port as option CX2030-N010 246	in the basic CPU, 2nd DVI port as option CX2040-N010 246
RS232	CX2020-N030 or CX2500-0030 246	CX2030-N030 or CX2500-0030 246	CX2040-N030 or CX2500-0030 246
RS422/RS485	CX2020-N031 or CX2500-0031 246	CX2030-N031 or CX2500-0031 246	CX2040-N031 or CX2500-0031 246
Audio	CX2500-0020 253	CX2500-0020 253	CX2500-0020 253
Ethernet	in the basic CPU or CX2500-0060 246	in the basic CPU or CX2500-0060 246	in the basic CPU or CX2500-0060 246
Power over Ethernet	CX2500-0061 253	CX2500-0061 253	CX2500-0061 253
4-port USB hub	in the basic CPU or CX2500-0070 246	in the basic CPU or CX2500-0070 246	in the basic CPU or CX2500-0070 246
Memory medium	in the basic CPU or CX2550-0010/ CX2550-0020 246	in the basic CPU or CX2550-0010/ CX2550-0020 246	in the basic CPU or CX2550-0010/ CX2550-0020 246
USB extension	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0) 255	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0) 255	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0) 255
Fieldbus interfaces	integrated or expandable via EtherCAT Terminals	integrated or expandable via EtherCAT Terminals	integrated or expandable via EtherCAT Terminals
EtherCAT	CX2020-B110 slave 246	CX2030-B110 slave 246	CX2040-B110 slave 246
Lightbus	EL6720 master 2 220	EL6720 master 2 220	EL6720 master 2 220
PROFIBUS	CX2020-M310 or CX2500-M310 master 246	CX2030-M310 or CX2500-M310 master 246	CX2040-M310 or CX2500-M310 master 246
	CX2020-B310 or CX2500-B310 slave 246	CX2030-B310 or CX2500-B310 slave 246	CX2040-B310 or CX2500-B310 slave 246
CANopen	CX2020-M510 or CX2500-M510 master 246	CX2030-M510 or CX2500-M510 master 246	CX2040-M510 or CX2500-M510 master 246
	CX2020-B510 or CX2500-B510 slave 246	CX2030-B510 or CX2500-B510 slave 246	CX2040-B510 or CX2500-B510 slave 246
DeviceNet	EL6752 master 2 219	EL6752 master 2 219	EL6752 master 2 219
	EL6752-0010 slave 2 219	EL6752-0010 slave 2 219	EL6752-0010 slave 2 219
PROFINET RT	CX2020-M930 controller 246	CX2030-M930 controller 246	CX2040-M930 controller 246
	CX2020-B930 device 246	CX2030-B930 device 246	CX2040-B930 device 246
PROFINET IRT	CX2020-B931 device 246	CX2030-B931 device 246	CX2040-B931 device 246
EtherNet/IP	CX2020-B950 slave 246	CX2030-B950 slave 246	CX2040-B950 slave 246
UPS options	CX2100-0904, CX2100-0914 252	CX2100-0904, CX2100-0914 252	CX2100-0904, CX2100-0914 252



CX2042	250	CX2062	250	CX2072	250
Intel® Xeon® D-1527 2.2 GHz, 4 cores		Intel® Xeon® D-1548 2.0 GHz, 8 cores		Intel® Xeon® D-1567 2.1 GHz, 12 cores	
slot for CFast card, card not included		slot for CFast card, card not included		slot for CFast card, card not included	
8 GB DDR4 RAM (expandable ex factory to 32 GB)		8 GB DDR4 RAM (expandable ex factory to 32 GB)		8 GB DDR4 RAM (expandable ex factory to 32 GB)	
2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 3.0, 1 x optional interface		2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 3.0, 1 x optional interface		2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 3.0, 1 x optional interface	
via power supply module (E-bus or K-bus, automatic recognition)		via power supply module (E-bus or K-bus, automatic recognition)		via power supply module (E-bus or K-bus, automatic recognition)	
modularly expandable		**modularly expandable**		**modularly expandable**	
in the basic CPU, 2nd DVI port as option CX2042-N010	250	in the basic CPU, 2nd DVI port as option CX2062-N010	250	in the basic CPU, 2nd DVI port as option CX2072-N010	250
CX2042-N030 or CX2500-0030	250	CX2062-N030 or CX2500-0030	250	CX2072-N030 or CX2500-0030	250
CX2042-N031 or CX2500-0031	250	CX2062-N031 or CX2500-0031	250	CX2072-N031 or CX2500-0031	250
–		–		–	
in the basic CPU or CX2500-0060	250	in the basic CPU or CX2500-0060	250	in the basic CPU or CX2500-0060	250
CX2500-0061	253	CX2500-0061	253	CX2500-0061	253
in the basic CPU or CX2500-0070	250	in the basic CPU or CX2500-0070	250	in the basic CPU or CX2500-0070	250
in the basic CPU or CX2550-0010/ CX2550-0020	250	in the basic CPU or CX2550-0010/ CX2550-0020	250	in the basic CPU or CX2550-0010/ CX2550-0020	250
CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0)	255	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0)	255	CX2550-0179 (USB 1.1) or CX2550-0279 (USB 2.0)	255
integrated or expandable via EtherCAT Terminals		**integrated or expandable via EtherCAT Terminals**		**integrated or expandable via EtherCAT Terminals**	
CX2042-B110 slave	250	CX2062-B110 slave	250	CX2072-B110 slave	250
EL6720 master	2 220	EL6720 master	2 220	EL6720 master	2 220
CX2042-M310 or CX2500-M310 master	250	CX2062-M310 or CX2500-M310 master	250	CX2072-M310 or CX2500-M310 master	250
CX2042-B310 or CX2500-B310 slave	250	CX2062-B310 or CX2500-B310 slave	250	CX2072-B310 or CX2500-B310 slave	250
CX2042-M510 or CX2500-M510 master	250	CX2062-M510 or CX2500-M510 master	250	CX2072-M510 or CX2500-M510 master	250
CX2042-B510 or CX2500-B510 slave	250	CX2062-B510 or CX2500-B510 slave	250	CX2072-B510 or CX2500-B510 slave	250
EL6752 master	2 219	EL6752 master	2 219	EL6752 master	2 219
EL6752-0010 slave	2 219	EL6752-0010 slave	2 219	EL6752-0010 slave	2 219
CX2042-M930 controller	250	CX2062-M930 controller	250	CX2072-M930 controller	250
CX2042-B930 device	250	CX2062-B930 device	250	CX2072-B930 device	250
CX2042-B931 device	250	CX2062-B931 device	250	CX2072-B931 device	250
CX2042-B950 slave	250	CX2062-B950 slave	250	CX2072-B950 slave	250
–		–		–	

Embedded PCs

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CX8100 | **Embedded PC with fieldbus interface**
– CPU: ARM Cortex™-A9 800 MHz
– Windows Embedded Compact 7

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CX9020 | **Ethernet controller**
– CPU: ARM Cortex™-A8 1 GHz
– Windows Embedded Compact 7

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CX5000 | **Embedded PC series with Intel® Atom™ processor**
– CPU: Intel® Atom™ 1.1 GHz or 1.6 GHz
– Windows Embedded CE 6, Windows Embedded Standard 2009

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CX5100 | **Embedded PC series with Intel® Atom™ processor**
– CPU: Intel® Atom™ 1.46 GHz/1 core, Intel® Atom™ 1.75 GHz/2 cores, Intel® Atom™ 1.91 GHz/4 cores
– Windows Embedded Compact 7, Windows Embedded Standard 7 P, Windows 10 IoT Enterprise LSTB

See page 222

CX8000 | **Embedded PC with fieldbus interface**
– CPU: ARM9 400 MHz
– Windows Embedded CE 6

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CX1010 | **Basic CX**
– CPU: Intel® Pentium® MMX-compatible 500 MHz
– Windows Embedded CE 6, Windows Embedded Standard 2009

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CX1020, CX1030 | **High-performance CX**
– CPU: Intel® Celeron® M ULV 1 GHz, Intel® Pentium® M 1.8 GHz
– Windows Embedded CE 6, Windows Embedded Standard 2009

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CX2020, CX2030, CX2040 | **Multi-core CX**
– CPU: Intel® Celeron® 1.4 GHz/1 core, Intel® Core™ i7 1.5 GHz/2 cores, Intel® Core™ i7 2.1 GHz/4 cores
– Windows Embedded Compact 7, Windows Embedded Standard 7 P, Windows 10 IoT Enterprise LTSB

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CX2042, CX2062, CX2072 | **Many-core CX**
– CPU: Intel® Xeon® D-1527 2.2 GHz/4 cores, Intel® Xeon® D-1548 2.0 GHz/8 cores, Intel® Xeon® D-1567 2.1 GHz/12 cores
– Windows 10 IoT Enterprise LTSB

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Beckhoff Embedded PC

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

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

Scalable performance classes
The CX family includes several basic CPU modules with different processors for optimum adaptation to the respective control task. The following list gives an overview, sorted by CPU type and, within the group, in descending order of computing performance:
Devices with x86 CPU:
CX2072: many-core CX with Intel® Xeon® D-1567 2.1 GHz, 12 cores
CX2062: many-core CX with Intel® Xeon® D-1548 2.0 GHz, 8 cores
CX2042: many-core CX with Intel® Xeon® D-1527 2.2 GHz, 4 cores
CX2040: multi-core CX with Intel® Core™ i7 CPU, 2.1 GHz, 4 cores
CX2030: multi-core CX with Intel® Core™ i7 CPU, 1.5 GHz, 2 cores
CX2020: high-performance CX with Intel® Celeron® CPU, 1.4 GHz
CX5140: multi-core CX with Intel® Atom™ CPU, 1.91 GHz, 4 cores
CX5130: multi-core CX with Intel® Atom™ CPU, 1.75 GHz, 2 cores
CX5120: compact CX with Intel® Atom™ CPU, 1.46 GHz
CX5020: compact CX with Intel® Atom™ CPU, 1.6 GHz
CX5010: compact CX with Intel® Atom™ CPU, 1.1 GHz
CX1030: high-performance CX with Intel® Pentium® M CPU, 1.8 GHz
CX1020: high-performance CX with Intel® Celeron® M ULV CPU, 1 GHz
CX1010: basic CX with Intel® Pentium® MMX-compatible CPU, 500 MHz

Devices with ARM CPU:
CX9020: Ethernet controller with ARM Cortex™-A8 CPU, 1 GHz
CX8100: basic CX with ARM Cortex™-A9 CPU, 800 MHz, and integrated fieldbus interface
CX8000: basic CX with ARM9 CPU, 400 MHz, and integrated fieldbus interface

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

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

The components
The individual system components of the CX series come as modules in standard widths of 19 mm or 22 mm, that can be connected in series. The basic unit for the CX20x2, CX2000 and CX10x0 series consists of a CPU module and a separate power supply module. The CX8000, CX8100, CX9020, CX5000 and CX5100 Embedded PCs integrate CPU and power supply in a single unit. Depending on the CX type, the controllers can be expanded through further system interfaces. The range of optional modules is complemented by fieldbus connections for PROFIBUS, CANopen, DeviceNet, SERCOS and Lightbus, both as master or slave versions.

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

The optional interface, a common feature of all second-generation CX devices (CX9020, CX5000, CX5100, CX2000 and CX20x2), is an interface that can be configured ex factory with various signal types. These devices are also characterised by a further important feature: the automatic K-bus/E-bus detection enables the use of both types of I/O terminals without additional expenditure.

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

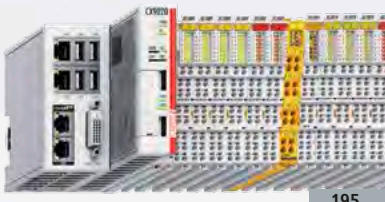
The software
In combination with the TwinCAT 2 or TwinCAT 3 automation software, the CX Embedded PC becomes a powerful IEC 61131-3 PLC. Additionally, Motion Control tasks can also be executed. Depending on the required cycle time, it may be used to control several servo axes. With the CX1010, CX5000, CX5100, CX1020, CX1030 and CX2000 even special functions such as flying saw, electronic gearbox or cam plate can be realised. The CX thus becomes a controller that covers PLC, Motion Control and visualisation tasks with a single hardware. Under Windows Embedded CE, thanks to the real-time capability of the operating system, user tasks written in high-level languages can be processed in real-time in parallel with TwinCAT.

Wide range of applications
Due to the design and the features of an industrial PC control, the Embedded PCs can be used in a wide range of applications. Existing applications include mechanical engineering, process technology, building services and many more.

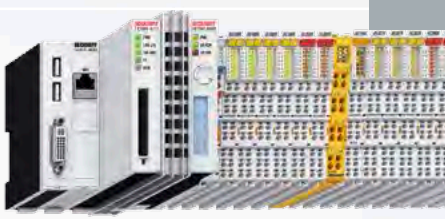
CX8000

CX8100

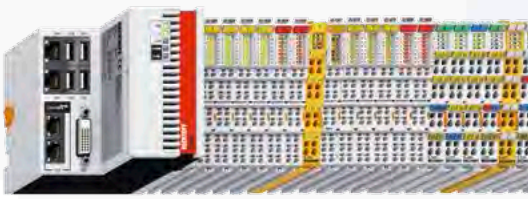
CX9020



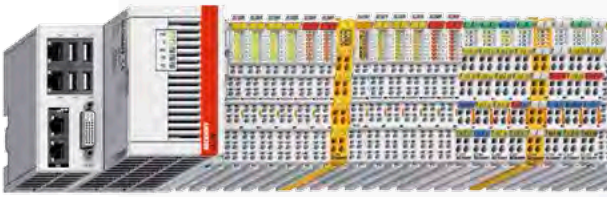
CX1010



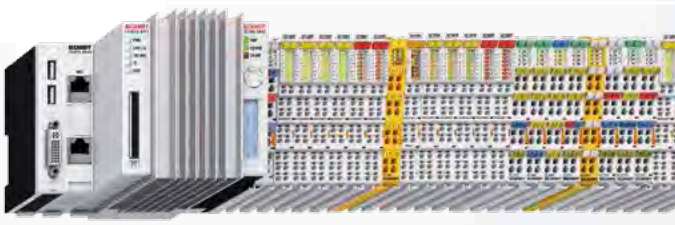
CX5010, CX5020



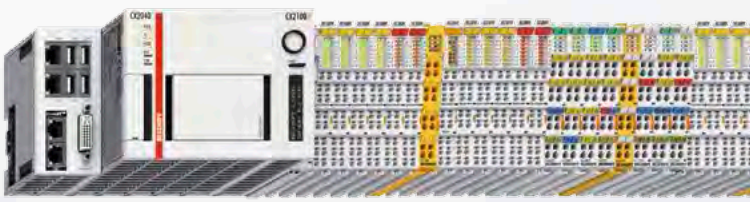
CX5100



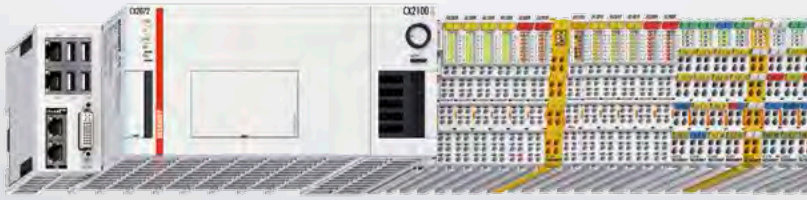
CX1020, CX1030



CX2020, CX2030, CX2040

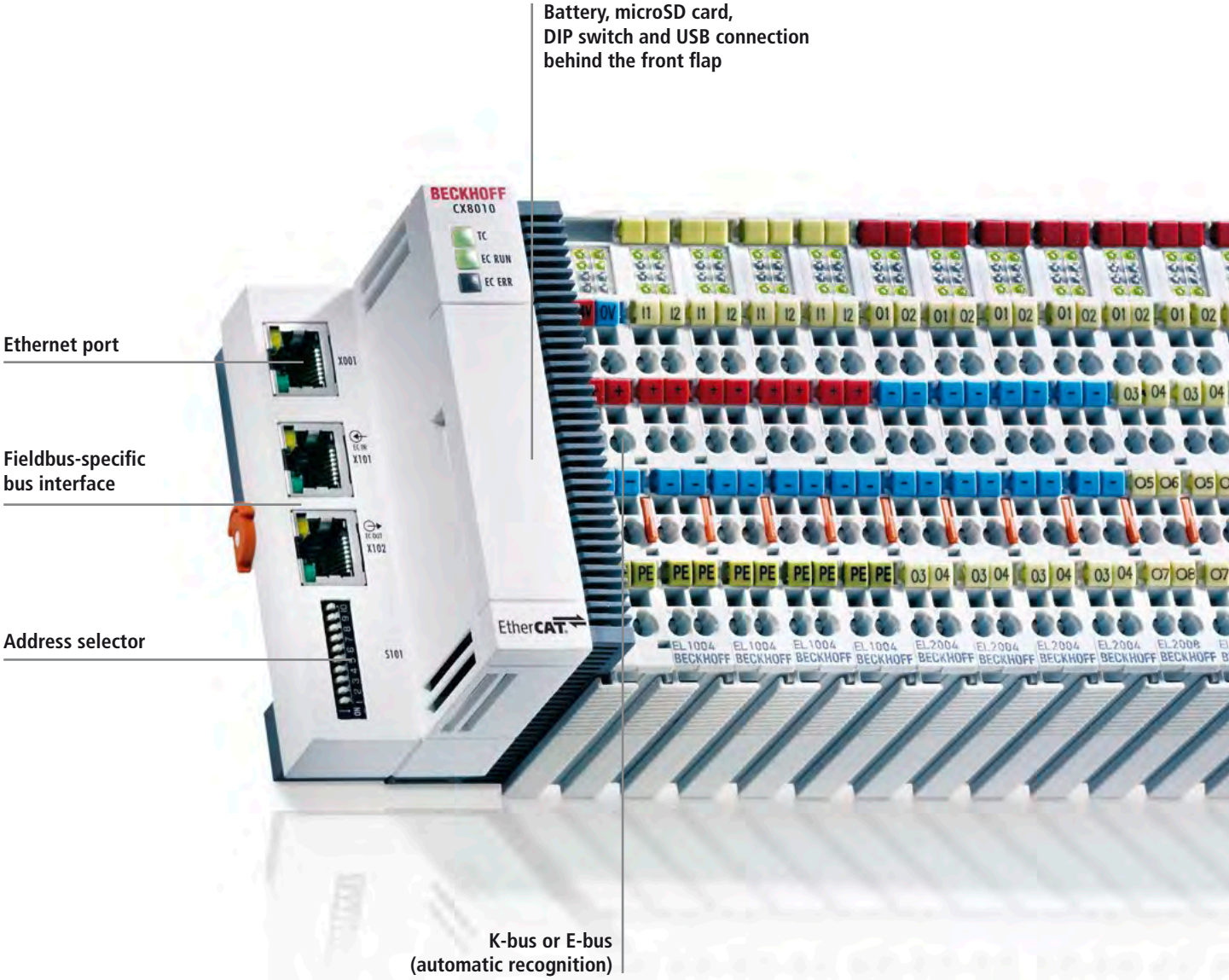


CX2042, CX2062, CX2072



CX8000 | Embedded PCs with fieldbus interface

▶ **www.beckhoff.com/CX8000**

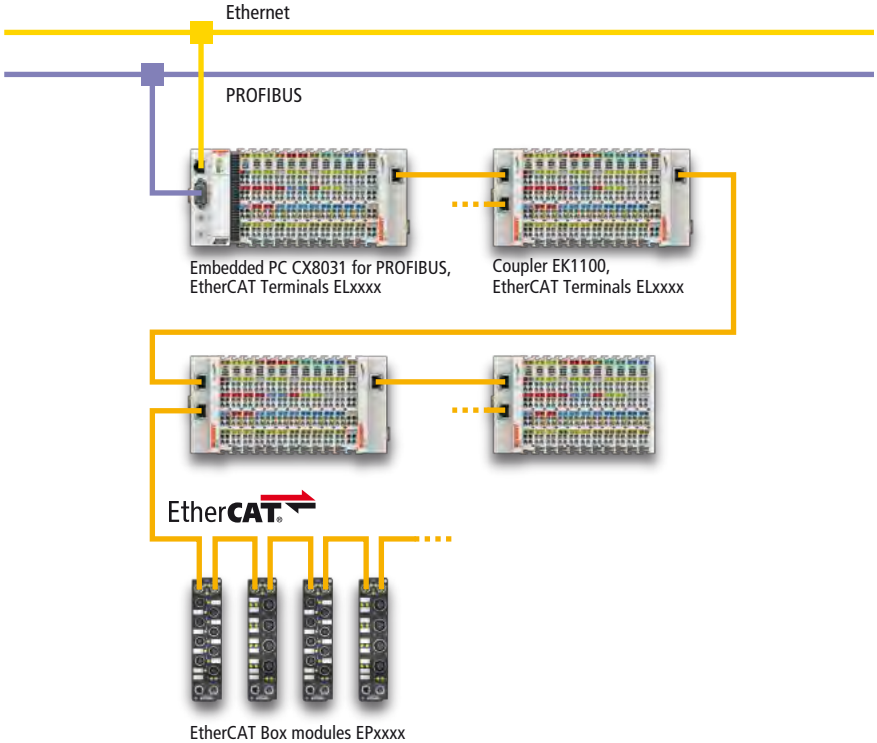


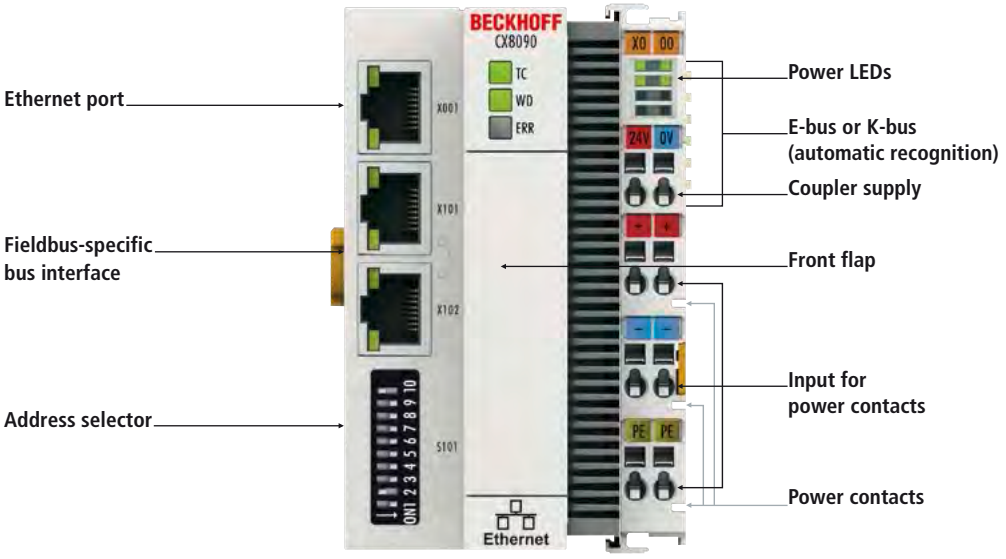
For further information on the individual fieldbuses see page 2 18

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

Like all CX products, the CX8000 devices are programmed and commissioned via the Ethernet interface, which can also be used for connection of the control system with a regular network. Some of the Embedded PCs have further Ethernet interfaces with switch functions, so that a linear "daisy chain" topology can be constructed inexpensively without additional hardware. The other connections on the lower plug level are fieldbus-specific. Thanks to their low power consumption, the devices are fanless. Microsoft Windows Embedded CE 6 is used as the operating system. TwinCAT 2 software is used for system configuration and the programming of the PLC functionality. The CX8000 target device features a pre-installed TwinCAT 2 PLC runtime environment. All software required for operating the device, including the operating system, the TwinCAT files and user files and data, is stored on the microSD flash card. This simplifies exchange in the case of service. Commercial card readers can be used to access the card data. The size of the microSD flash card (e.g. 256 MB) can be chosen depending on the application and the quantity of data to be stored. The CX8000 device family features an integrated, capacitive 1-second UPS, which in the event of a failure of the supply voltage provides sufficient energy for saving persistent data. Important data are thus retained without battery back-up in the event of a loss of power.

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





CX80xx | Basic CPU module

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

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

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

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

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

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

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

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

Although there is no monitor connection, the Windows Embedded CE 6 operating system and its "virtual" display can be accessed via the network. This is not absolutely necessary for the programming of the automation function: any PC or laptop equipped with TwinCAT 2 can be used for PLC programming or online faultfinding via a network connection with the CX8000. All system software is located on the industrially-compatible microSD card. Hardware and software can thus be exchanged simply and quickly in the case of service. In addition, the microSD card can be used in any commercial card reader. The installation and execution of proprietary Windows Embedded CE 6 applications (e.g. parts tracking, data acquisition, Web operating interfaces) is also possible. Access to the microSD card is also possible via the USB connection: if the CX8000 is connected to another PC, then the microSD card becomes visible on this PC as a mass storage device.

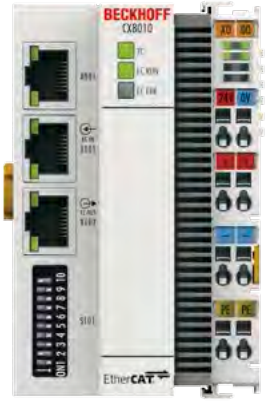
The order identifier is derived as follows:

CX80xx

- 10 = EtherCAT slave
- 30 = PROFIBUS master
- 31 = PROFIBUS slave
- 50 = CANopen master
- 51 = CANopen slave
- 80 = RS232/RS485
- 90 = Ethernet
- 91 = BACnet/IP and OPC UA
- 93 = PROFINET RT device
- 95 = EtherNet/IP slave

Technical data	CX80xx
Processor	ARM9, 400 MHz
Flash memory	slot for microSD card, 512 MB included (expandable)
Main memory	64 MB DDR2 RAM (not expandable)
Programming	TwinCAT 2 PLC
Programming languages	IEC 61131-3
Web visualisation	yes
Online change	yes
Up/down load code	yes/yes
Interfaces	1 x RJ45 10/100 Mbit/s, 1 x USB device (behind the front flap), fieldbus interface
I/O connection	E-bus or K-bus, automatic recognition
Clock	internal battery-backed clock for time and date (battery behind the front flap, exchangeable)
UPS	1-second UPS (for 1 MB of persistent data)
Operating system	Microsoft Windows Embedded CE 6
Web-based management	yes
Current supply E-bus/K-bus	2 A
Max. power loss	3 W
Dimensions (W x H x D)	64 mm x 100 mm x 73 mm
Weight	approx. 170 g
Operating/storage temperature	0…+55 °C/-25…+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Further information	www.beckhoff.com/CX8000

CX80xx | **Embedded PCs with fieldbus interface**

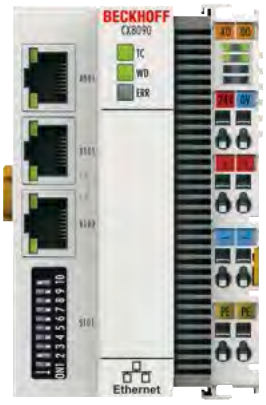
	EtherCAT	PROFIBUS
	Embedded PC for EtherCAT	Embedded PC for PROFIBUS
Technical data	**CX8010**	**CX8030**
Protocol	EtherCAT (slave)	PROFIBUS-DP (master)
Max. number of bytes fieldbus	512 byte input and 512 byte output	only limited by memory
Data transfer rates	100 Mbit/s	up to 12 Mbaud (automatic detection)
Bus interface	EtherCAT IN and OUT (2 x RJ45)	1 x D-sub 9-pin socket with shielding
	 The DIP switch enables the fixed addressing of a hot plug group. Automatic addressing in the EtherCAT network is also possible.	 The CX8030 is a PROFIBUS master device. Optionally it can be operated as a PROFIBUS slave device.
I/O connection	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition
Type/number of peripheral signals	K-bus 2 kByte IN/OUT, E-bus only limited by memory	K-bus 2 kByte IN/OUT, E-bus only limited by memory
Approvals	CE, UL, Ex, IECEx	CE, UL, Ex, IECEx
Further information	www.beckhoff.com/CX8010	www.beckhoff.com/CX8030

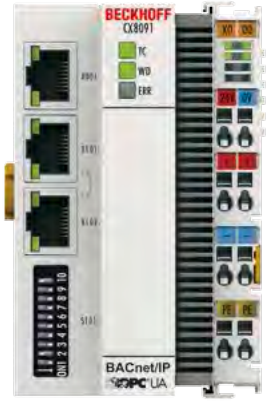
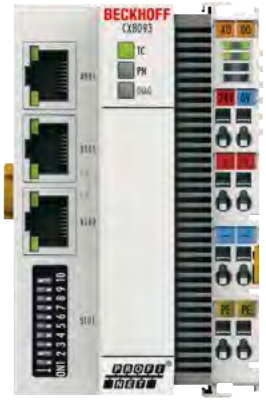
CANopen

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

EtherCAT Terminals see page 2 110, EtherCAT Box modules see page 2 272, Bus Terminals see page 2 442

CX80xx | Embedded PCs with fieldbus interface

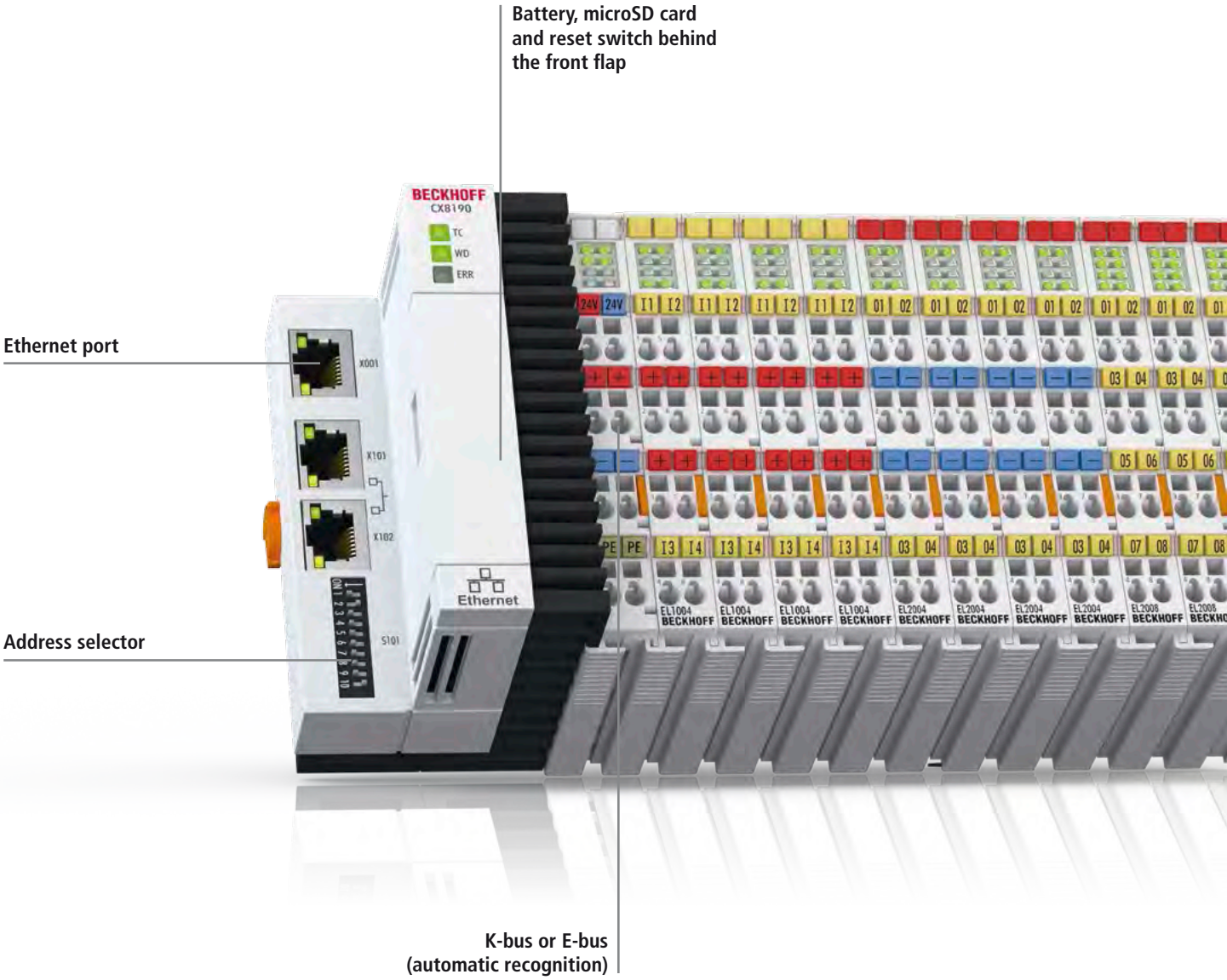
	RS232 RS485	Ethernet
	Embedded PC for RS232/RS485	Embedded PC for different Ethernet protocols
Technical data	**CX8080**	**CX8090**
Protocol	serial communication	real-time Ethernet, ADS TCP, Modbus TCP, TCP/IP, UDP/IP, EAP (EtherCAT Automation Protocol)
Max. number of bytes fieldbus	512 byte input and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

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

EtherCAT Terminals see page 2 110, EtherCAT Box modules see page 2 272, Bus Terminals see page 2 442

CX8100 | Embedded PCs with fieldbus interface

▶ **www.beckhoff.com/CX8100**



For further information on the individual fieldbuses see page 2 18

CX8110

CX8180

CX8190

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

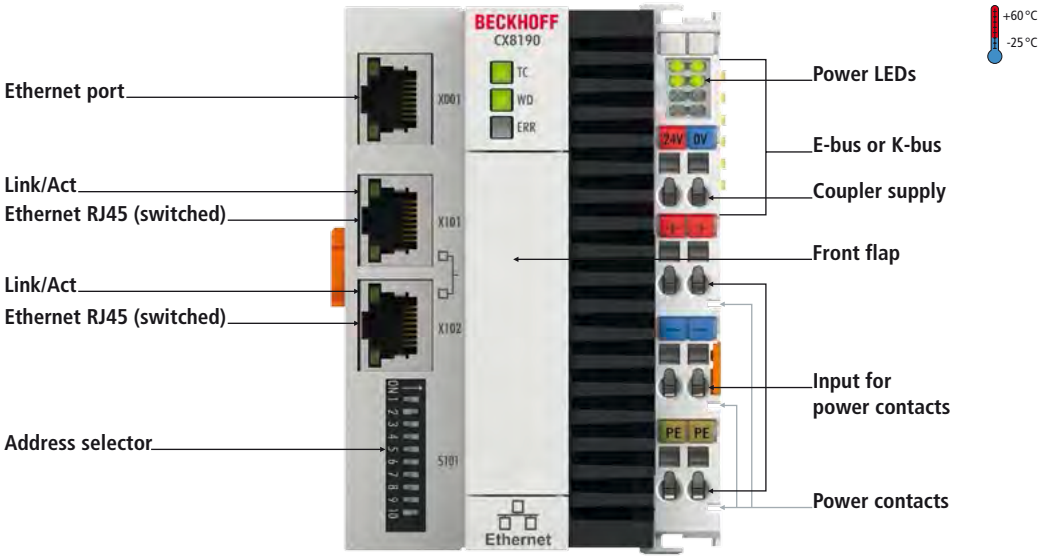
- performance class 20 in TwinCAT 3
- ARM Cortex™ A9 CPU, 800 MHz, 512 MB RAM
- microSD cards up to 8 GB
- 1-second UPS

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

+60 °C
-25 °C

Designed for an extended temperature range of -25 to +60 °C, the CX8100 covers a wide variety of possible applications.

The CX8100 series is being advanced continuously and now has its own real-time driver. The resulting reduction in jitter delivers a noticeable performance increase in distributed-clock applications. As new fieldbus interfaces, the CX8110 EtherCAT slave and the CX8180 for serial protocols were introduced. The fieldbus and communication system support will be extended e.g. PROFINET, EtherNet/IP, CANopen, PROFIBUS.



CX81xx | Embedded PC for Ethernet

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

Like all CX products, the CX8100 devices are programmed and commissioned via the Ethernet interface, which can, of course, also be used for the regular network connection of the control system. Some Embedded PCs have additional Ethernet interfaces with switch functionality, so that a linear "daisy chain" topology can be established cost-effectively without additional hardware. The other connections provided on the lower connection level are fieldbus-specific. A replaceable coin cell for date and time, a reset switch, as well as a slot for microSD flash memory cards can be found under the front flap at the upper housing level. Owing to their low electrical power consumption, the devices are fanless.

Microsoft Windows Embedded Compact 7 is used as the operating system. In the absence of a monitor port, the operating system can only be accessed via network connection and a "virtual" display. TwinCAT 3 software is used for system configuration and the programming of the PLC functionality. The CX8100 target device features a pre-installed TwinCAT 3 I/O runtime environment. TwinCAT 3 Functions from PLC to different functions can be ordered via a licence or reloaded. Commercial card readers can be used to access the SD card data. The size of the microSD Flash card (e.g. 512 MB to 8 GB) can be chosen depending on the application and the quantity of data to be stored.

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

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

The order identifier is derived as follows:

CX81xx

- 10 = EtherCAT slave
- 80 = RS232/RS485
- 90 = Ethernet

Technical data	CX81xx
Processor	ARM Cortex™-A9, 800 MHz (TC3: 20)
Flash memory	slot for microSD card, 512 MB included (expandable)
Main memory	512 MB DDR3 RAM (not expandable)
Programming	TwinCAT 3
Interfaces	1 x RJ45 10/100 Mbit/s, 1 x USB device (behind the front flap), fieldbus interface
I/O connection	E-bus or K-bus, automatic recognition
Clock	internal battery-backed clock for time and date (battery behind the front flap, exchangeable)
UPS	1-second UPS
Operating system	Microsoft Windows Embedded Compact 7
Current supply E-bus/K-bus	2 A
Max. power loss	4 W (including the system interfaces)
Dimensions (W x H x D)	71 mm x 100 mm x 73 mm
Operating/storage temperature	-25…+60 °C/-40…+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
TC3 performance class	Economy (20); for further information on TwinCAT 3 see page 470
Further information	www.beckhoff.com/CX8100

CX81xx | Embedded PCs with fieldbus interface

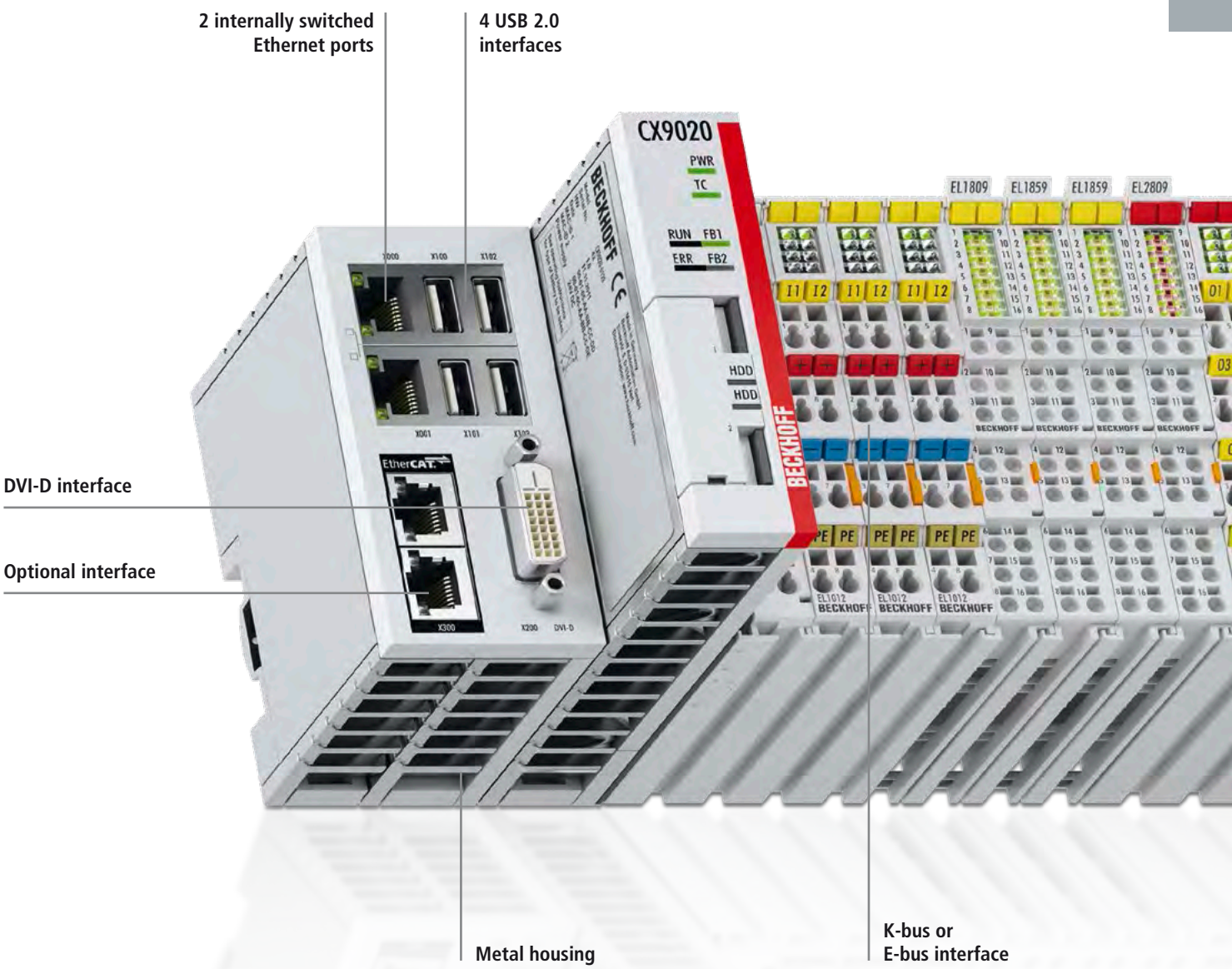
	EtherCAT	RS232 / RS485	Ethernet
	Embedded PC for EtherCAT	Embedded PC for RS232/RS485	Embedded PC for different Ethernet protocols
Technical data	**CX8110**	**CX8180**	**CX8190**
Protocol	EtherCAT (slave)	serial communication	real-time Ethernet, ADS UDP, ADS TCP, EAP (EtherCAT Automation Protocol)
Max. number of bytes fieldbus	512 byte input and 512 byte output	protocol dependency	protocol dependency
Data transfer rates	100 Mbit/s	300 baud…115 kbaud	100 Mbit/s
Bus interface	EtherCAT IN and OUT (2 x RJ45)	D-sub socket, 9-pin, 1 x RS232, 1 x RS485	2 x RJ45 (switched)
	+60 °C -25 °C 	+60 °C -25 °C 	+60 °C -25 °C 
I/O connection	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition	E-bus or K-bus, automatic recognition
Type/number of peripheral signals	K-bus 2 kByte IN/OUT, E-bus only limited by memory	K-bus 2 kByte IN/OUT, E-bus only limited by memory	K-bus 2 kByte IN/OUT, E-bus only limited by memory
Approvals	CE, UL	CE, UL	CE, UL
Further information	www.beckhoff.com/CX8110	www.beckhoff.com/CX8180	www.beckhoff.com/CX8190

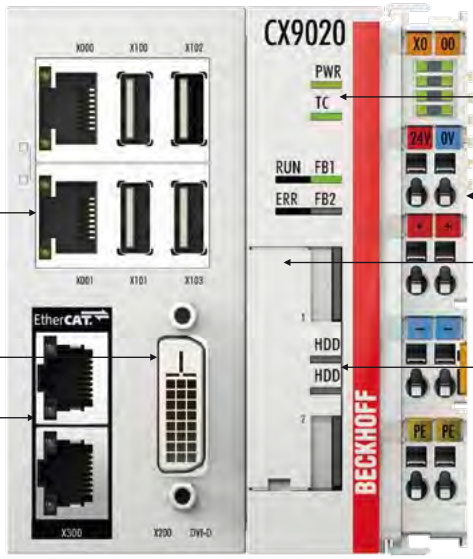
For availability status see Beckhoff website at: www.beckhoff.com

EtherCAT Terminals see page 2 110, EtherCAT Box modules see page 2 272, Bus Terminals see page 2 442

CX9020 | Embedded PCs

▶ www.beckhoff.com/CX9020





CX9020 | Basic CPU module

The CX9020 is a compact, DIN rail-mountable Ethernet control system with 1 GHz ARM Cortex™-A8 CPU. The connection for the Beckhoff I/O systems is directly integrated into the CPU module. The unit offers automatic bus system identification (K-bus or E-bus) and independently switches in the corresponding mode. The CX9020 comprises the CPU with two microSD card slots, the internal RAM and 128 kB NOVRAM as non-volatile memory. The basic configuration also includes two switched Ethernet RJ45 interfaces, four USB 2.0 interfaces and a DVI-D interface. The RJ45 interfaces are connected to an internal switch and offer a simple option for creating a line topology without the need for additional Ethernet switches. The operating system is Microsoft Windows Embedded Compact 7. TwinCAT automation software transforms a CX9020 system into a powerful PLC and Motion Control system that can be operated with or without visualisation. Optionally, the unit can be ordered with a fieldbus, serial or audio interface.

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

The order identifier is derived as follows:

CX9020-01ST

- 0 = no TwinCAT
- 1 = with TwinCAT 2 PLC runtime
- 2 = with TwinCAT 2 PLC/NC PTP runtime
- 5 = TwinCAT 3 runtime (XAR)

- 0 = no operating system
- 1 = operating system Windows Embedded Compact 7

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

Optional interfaces:

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

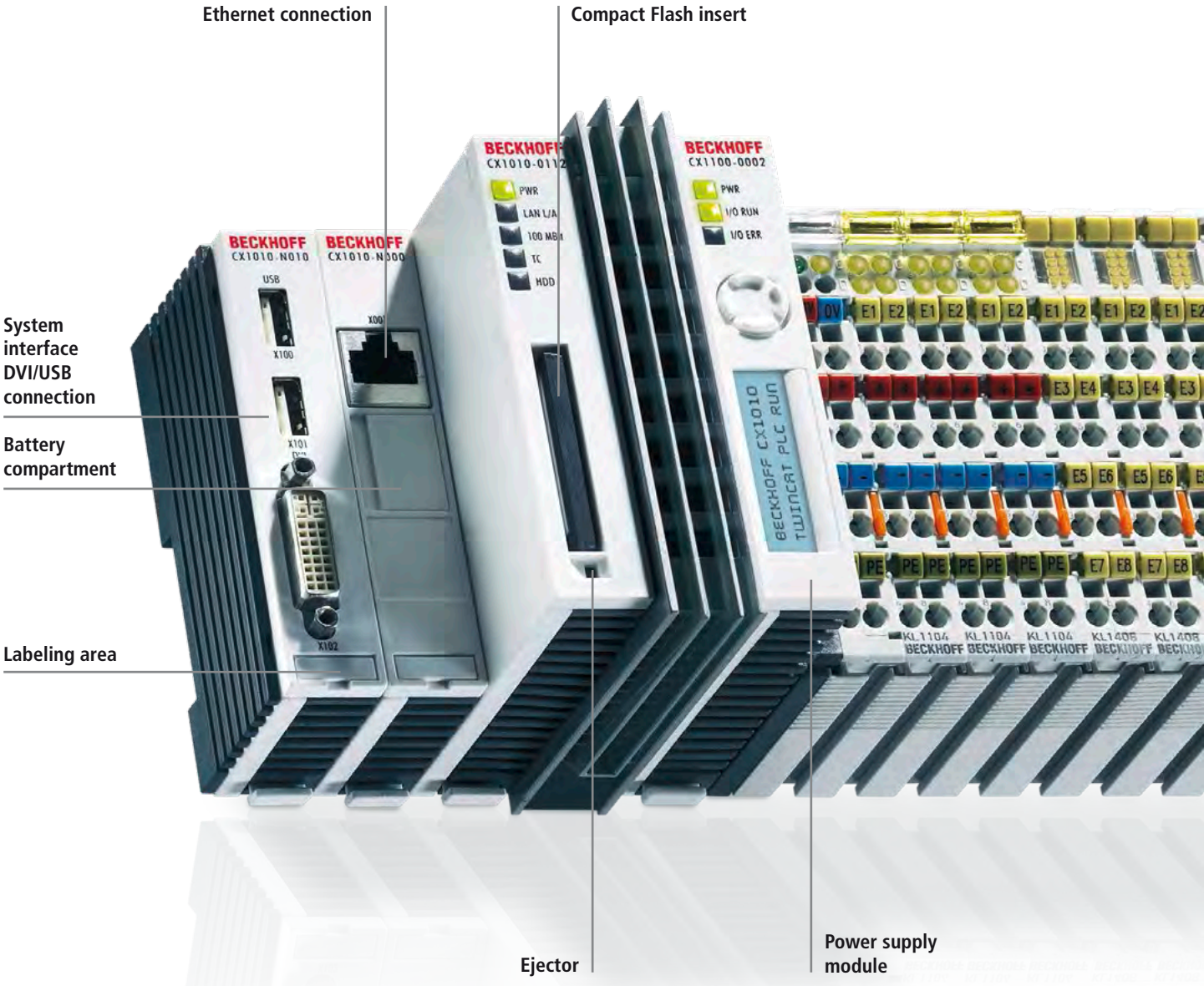
Technical data	CX9020
Processor	ARM Cortex™-A8, 1 GHz
Flash memory	2 x slot for microSD card, 512 MB included (expandable)
Main memory	1 GB DDR3 RAM (not expandable)
Persistent memory	128 KB NOVRAM integrated
Interfaces	2 x RJ45 10/100 Mbit/s (internal switch), 1 x DVI-D, 4 x USB 2.0, 1 x optional interface
Diagnostics LED	1 x power, 1 x TC status, 2 x flash access, 2 x bus status
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded Compact 7, English
Control software	TwinCAT 2 runtime TwinCAT 3 runtime (XAR)
I/O connection	E-bus or K-bus, automatic recognition
Power supply	24 V DC (-15 %/+20 %)
Current supply E-bus/K-bus	2 A
Max. power loss	5 W (including the system interfaces)
Dimensions (W x H x D)	84 mm x 99 mm x 91 mm
Weight	approx. 590 g
Operating/storage temperature	-25…+60 °C/-40…+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals	CE, UL, Ex, GL, IECEx
TC3 performance class	Economy plus (30); for further information on TwinCAT 3 see page 470
Further information	www.beckhoff.com/CX9020

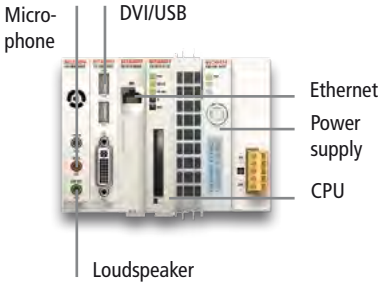
Ordering information	no operating system	Windows Embedded Compact 7	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC PTP runtime	TwinCAT 3 runtime (XAR)
CX9020-0100	x	–	x	–	–	–
CX9020-0110	–	x	x	–	–	–
CX9020-0111	–	x	–	x	–	–
CX9020-0112	–	x	–	–	x	–
CX9020-0115	–	x	–	–	–	x

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

CX1010 | Embedded PCs

▶ www.beckhoff.com/CX1010





Application example multimedia system with audio connection

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

Components

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

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

The components

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

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

– System interfaces: as an option, a DVI and two USB interfaces can be added to the existing Ethernet interface. Further system interfaces for serial communication (2 x RS232 or 2 x RS422/485) or audio signals can be ordered separately.
– Operating system: There is a choice of no operating system, Microsoft Windows Embedded CE 6 or Microsoft Windows Embedded Standard 2009.
– TwinCAT 2 software (pre-installed): without a TwinCAT 2 system, with TwinCAT 2 CE PLC or with TwinCAT 2 CE NC PTP, or with the associated full version of the individual TwinCAT 2 levels for PLC and NC PTP

Power supply unit with integrated I/O interface

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

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

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

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

PLC, Motion Control and visualisation

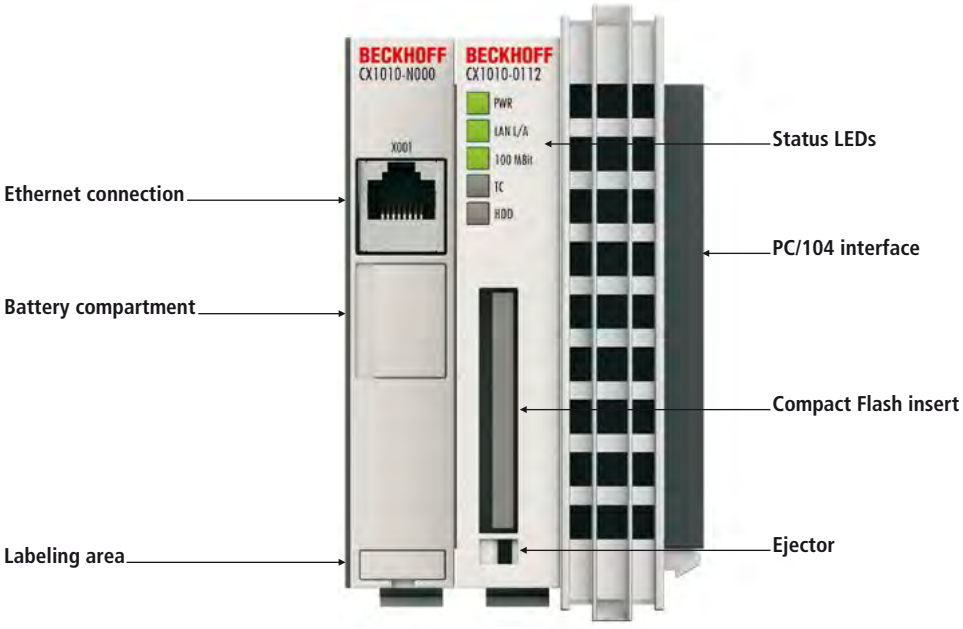
In combination with TwinCAT 2 automation software, the CX1010 Embedded PC becomes a powerful IEC 61131-3 PLC with up to four user tasks. Additionally, Motion Control tasks can also be executed. Depending on the required cycle time, several servo axes can be controlled. Even special functions such as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

Remote programming via Ethernet

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

Operating systems

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



CX1010 | Basic CPU module

The CX1010 CPU module is the basic module of the CX system. It comprises the CPU and the internal flash memory in two implementation levels and offers the option to operate an additional memory medium in Compact Flash format II. An Ethernet interface is part of the basic configuration. All other CX family components can be connected via the PC/104 interface that is available on both sides. The CPU module can be equipped with different hardware and software options: the operating system can be Windows Embedded CE 6 or Windows Embedded Standard 2009.

The basic configuration of the CX1010 includes a 128 MB Compact Flash card. The TwinCAT 2 automation software transforms a CX1010 system into a powerful PLC and Motion Control system that can be operated with or without visualisation. Further system interfaces or fieldbus connections can be added to the basic CPU module. The passive cooling module is included in the scope of supply. The CPU module requires a CX1100 type power supply module.

The order identifier is derived as follows:

CX1010-0CST

- **0 = no TwinCAT**
- **1 = with TwinCAT 2 PLC runtime**
- **2 = with TwinCAT 2 PLC/NC PTP runtime**

- **0 = no operating system**
- **1 = operating system Windows Embedded CE 6**
- **2 = operating system Windows Embedded Standard 2009**

- **0 = CPU with Ethernet**
- **1 = CPU with Ethernet + 2 x USB + DVI**

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

Embedded PC interfaces for CX1010
see page 238

Technical data	CX1010-0xxx
Processor	compatible with Intel® Pentium® MMX, clock frequency 500 MHz
Flash memory	slot for Compact Flash card, 128 MB included (expandable)
Main memory	256 MB DDR RAM (not expandable)
Interfaces	1 x RJ45 10/100 Mbit/s
Diagnostics LED	1 x power, 1 x LAN speed, 1 x LAN activity, TC status, 1 x flash access
Expansion slot	1 x Compact Flash type II insert with ejector
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded CE 6 or Microsoft Windows Embedded Standard 2009
Control software	TwinCAT 2 PLC runtime or TwinCAT 2 NC PTP runtime
System bus	16 bit ISA (PC/104)
I/O connection	via power supply module (E-bus, K-bus, K-bus/IP-Link)
Power supply	via system bus (through CX1100-xxxx power supply modules)
Max. power loss	8 W (including the system interfaces CX1010-N0xx)
Dimensions (W x H x D)	58 mm x 120 mm x 91 mm
Weight	approx. 355 g
Operating/storage temperature	0…+50 °C/-25…+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals	CE, UL
Further information	www.beckhoff.com/CX1010

Ordering information	DVI/USB	no operating system	Windows Embedded CE 6	Windows Embedded Standard 2009	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC PTP runtime
CX1010-0000	–	x	–	–	x	–	–
CX1010-0010	–	–	x	–	x	–	–
CX1010-0011	–	–	x	–	–	x	–
CX1010-0012	–	–	x	–	–	x	x
CX1010-0020	–	–	–	x*	x	–	–
CX1010-0021	–	–	–	x*	–	x	–
CX1010-0022	–	–	–	x*	–	x	x
CX1010-0100	x	x	–	–	x	–	–
CX1010-0110	x	–	x	–	x	–	–
CX1010-0111	x	–	x	–	–	x	–
CX1010-0112	x	–	x	–	–	x	x
CX1010-0120	x	–	–	x*	x	–	–
CX1010-0121	x	–	–	x*	–	x	–
CX1010-0122	x	–	–	x*	–	x	x

*CX1010 systems with Microsoft Embedded Standard 2009 require Compact Flash with a capacity of at least 2 GB (must be ordered separately).

DVI/USB interface

Audio interface

RS232 interface

RS422/RS485 interface

Ethernet interface

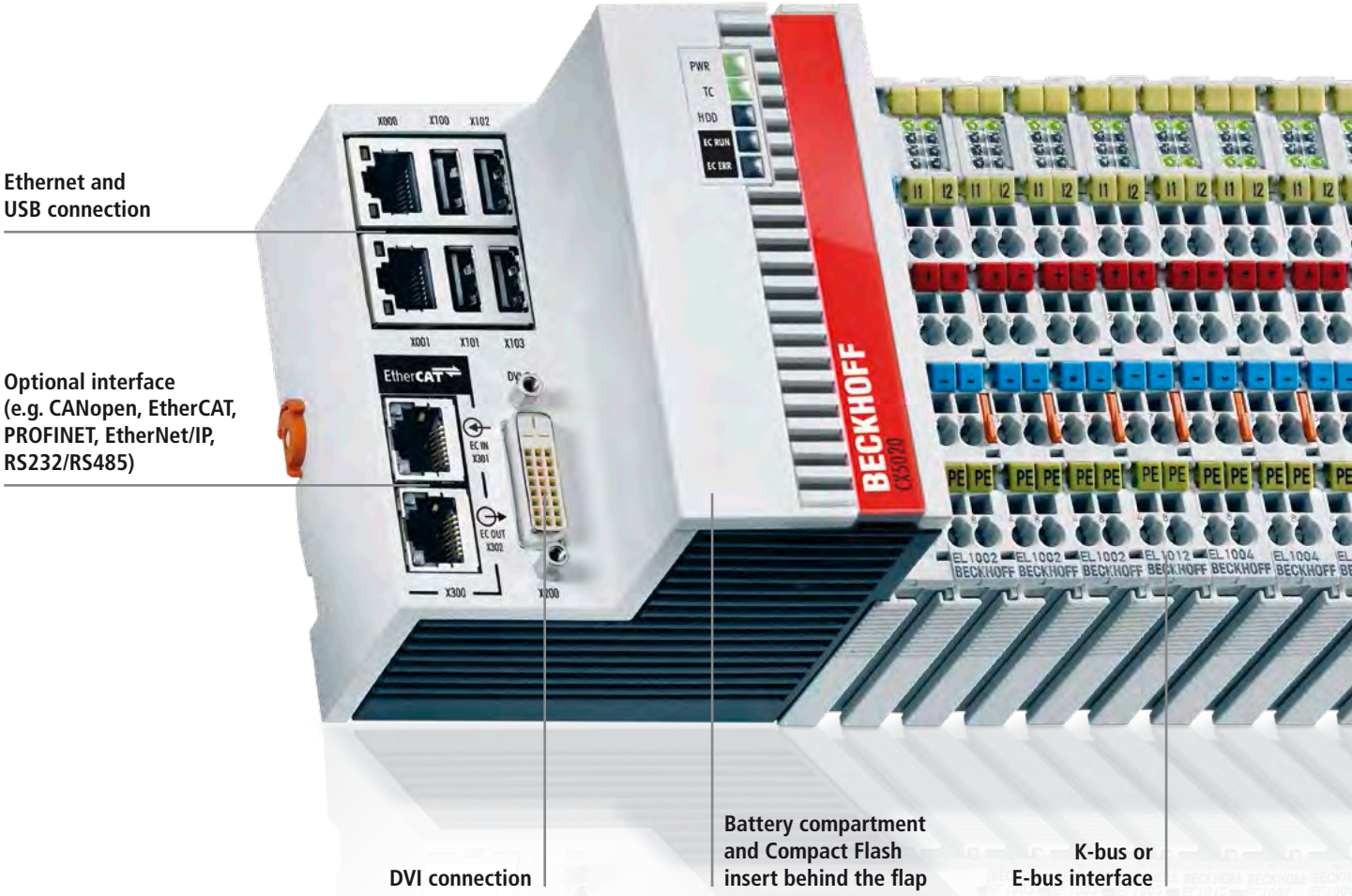
CX1010-N0xx | **System interfaces**

A number of optional interface modules are available for the basic CX1010 CPU module that can be installed ex factory. The CX1010-N010 option connects Beckhoff Control Panels or standard monitors with DVI or VGA input via the DVI or USB interfaces. Devices such as printer, scanner, mouse, keyboard, mass storage, etc. can be connected via the USB 2.0 interfaces. Multimedia capability is realised via the CX1010-N020 audio interface. The modules CX1010-N030 and CX1010-N040 offer a total of four serial RS232 interfaces with a maximum transfer speed of 115 kbaud. These four interfaces can be implemented in pairs as RS422/RS485, in which case they are identified as CX1010-N031 and CX1010-N041 respectively. The system interfaces cannot be retrofitted or expanded in the field. They are supplied ex factory in the specified configuration and cannot be separated from the CPU module. The internal PC/104 bus runs through the system interfaces, so that further CX components can be connected. The power supply of the system interface modules is ensured via the internal PC/104 bus.

Technical data	CX1010-N010	CX1010-N020	CX1010-N030	CX1010-N040	CX1010-N031	CX1010-N041	CX1010-N060
Interfaces	1 x DVI + 2 x USB 2.0 (max. 500 mA per port)	Line IN, Line Mic IN, Line OUT	1 x COM1 + 1 x COM2, RS232	1 x COM3 + 1 x COM4, RS232	1 x COM1 + 1 x COM2, RS422/RS485	1 x COM3 + 1 x COM4, RS422/RS485	1 x Ethernet, 10/100 Mbit/s
Type of connection	DVI-I 29-pin socket + 2 USB ports type A	3.5 mm socket for jack plug	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	2 x D-sub socket, 9-pin	2 x D-sub socket, 9-pin	1 x RJ45
Properties	DVI-I interface also carries out VGA signals (DVI-A)	built-in PC beeper, Line OUT output, max. 200 mW, suitable for earphones	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N030/ N040	max. baud rate 115 kbaud, not combinable with N030/ N040	max. 20 m cable length Cat. 5, not combinable with CX1100-0004
Power supply	via system bus (through CX1100-xxxx power supply modules)						
Dimensions (W x H x D)	19 mm x 100 mm x 51 mm						
Weight	approx. 80 g						
Operating/storage temperature	0…+55 °C/-25…+85 °C						
Relative humidity	95 %, no condensation						
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27						
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4						
Protection class	IP 20						
Approvals	CE, UL						
Further information	www. beckhoff.com/ CX1010-N010	www. beckhoff.com/ CX1010-N020	www. beckhoff.com/ CX1010-N030	www. beckhoff.com/ CX1010-N040	www. beckhoff.com/ CX1010-N031	www. beckhoff.com/ CX1010-N041	www. beckhoff.com/ CX1010-N060

CX5000 | Embedded PC series with Intel® Atom™ processor

▶ **www.beckhoff.com/CX5000**



CX5020 with optional PROFINET interfaces

CX5020 with D-sub plug, 9-pin

CX5020 with audio interface

The CX5000 series devices are DIN rail-mountable, fanless Embedded PCs with direct connection for Beckhoff Bus Terminals or EtherCAT Terminals.

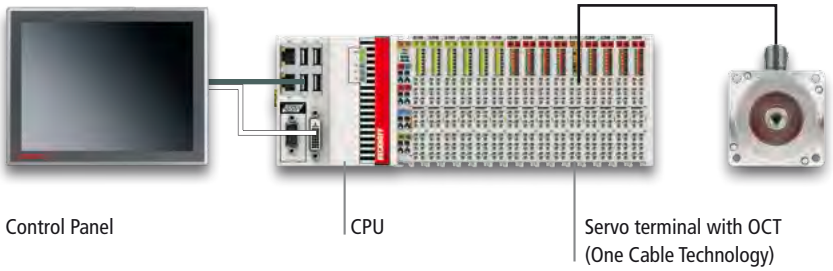
The housing concept of this series is optimised for sturdiness and compactness; the individual housing parts are made of metal (magnesium). Apart from the electrical advantages of better screening and ESD protection, the user also benefits from the weight-saving magnesium construction.

The I/O level can be implemented both with Bus Terminals and with EtherCAT Terminals. The connection of EtherCAT gives rise to many different extension options. Further master/slave fieldbus connections (PROFIBUS, CANopen, DeviceNet) or communication interfaces (RS232, RS422/RS485) and all other signal types accessible via EtherCAT can be directly connected as EtherCAT Terminals.

Two independent Gigabit Ethernet ports and four USB 2.0 interfaces are available. A Beckhoff Control Panel or a commercially available DVI monitor can be connected to the DVI-D interface. Unlike the other CX device families, the CX5000 series has no option for expansion using attachable expansion modules to the left. There is, however, a factory-fitted option slot in the basic housing. For example, a serial port (RS232/RS422/RS485) or a fieldbus connection with master or slave function can be added here as an optional interface as required. Particularly worth mentioning is the function as an EtherCAT slave, as a result of which the CX5000 becomes a programmable local controller within an EtherCAT network.

The operating system can be Windows Embedded CE 6 or Windows Embedded Standard 2009. An exchangeable, industrially-compatible CF card, which can be accessed behind a panel, is used as boot and storage medium. The CF card serves as a substitute for a hard disk; i.e. the operating system as well as TwinCAT and user projects are stored on it. This way, in the case of service, hardware can be exchanged quickly or a software update can be performed on site by simply exchanging the CF card. The builtin capacitive 1-second UPS ensures secure backup of persistent application data on the CF card. The date and time are buffered via a replaceable battery.

TwinCAT automation software transforms a CX5000 system into a powerful PLC and Motion Control system that can be operated with or without visualisation.

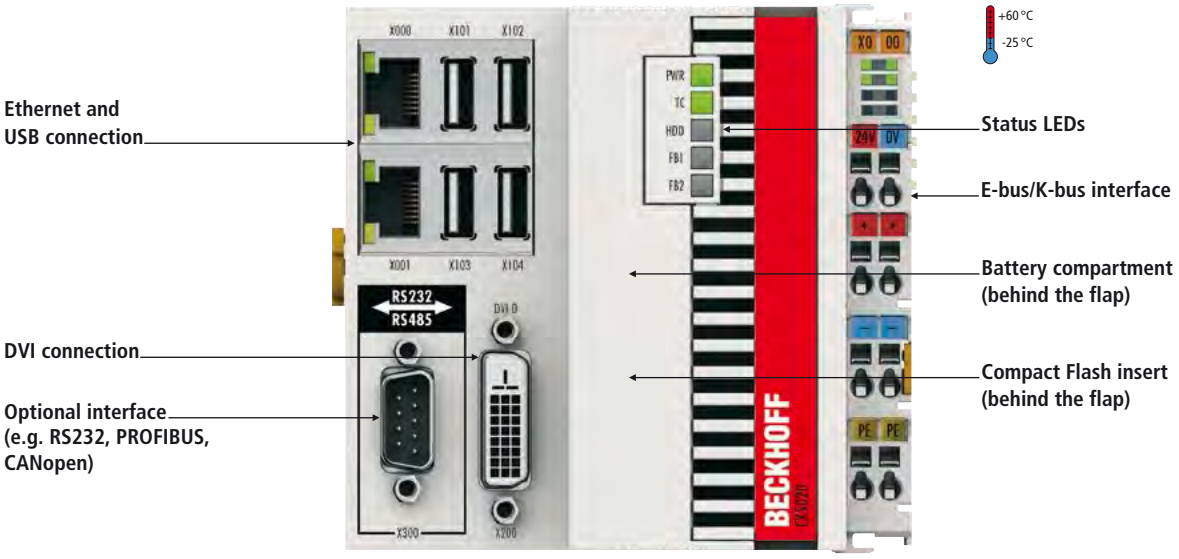


Application example: PLC and Motion Control system with DVI/USB interface

- PLC and Motion Control software
- Control Panel connection via DVI/USB
- Windows Embedded CE 6 and TwinCAT NC

Components

- CPU CX5020-0112
- display CP39xx
- drive: EL7211-0010 servo terminal and AM8131-wF1z motor



CX5000 | Embedded PC series with Intel® Atom™ processor

The CX5010 and CX5020 are Embedded PCs from the CX5000 series based on Intel® Atom™ processors and differ only by the CPU version. The CX5010 has a 1.1 GHz Intel® Atom™ Z510 processor, while the CX5020 has a 1.6 GHz Intel® Atom™ Z530 processor. Apart from the clock speed, the two processors also differ by the fact that the Z530 features hyperthreading technology, i.e. it has two virtual CPU cores for more effective execution of software.

Depending on the installed TwinCAT runtime environment, the CX5010/CX5020 can be used for the implementation of PLC or PLC/Motion Control projects (with or without visualisation).

+60 °C
-25 °C

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

The order identifier is derived as follows:

CX50x0-U1ST

- 0 = no TwinCAT
- 1 = with TwinCAT 2 PLC runtime
- 2 = with TwinCAT 2 NC PTP runtime
- 5 = TwinCAT 3 runtime (XAR)

- 0 = no operating system
- 1 = operating system Windows Embedded CE 6
- 2 = operating system Windows Embedded Standard 2009

- 0 = E-bus interface for EtherCAT Terminals
- 1 = K-bus interface for Bus Terminals

- 1 = Intel® Atom™ processor 1.1 GHz
- 2 = Intel® Atom™ processor 1.6 GHz

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

Optional interfaces:

CX50x0-N020	=	audio interface
CX50x0-N030	=	RS232, D-sub plug
CX50x0-N031	=	RS422/RS485, D-sub socket
CX50x0-M310	=	PROFIBUS master, D-sub socket, 9-pin
CX50x0-B310	=	PROFIBUS slave, D-sub socket, 9-pin
CX50x0-M510	=	CANopen master, D-sub plug, 9-pin
CX50x0-B510	=	CANopen slave, D-sub plug, 9-pin
CX50x0-M930	=	PROFINET RT, controller
CX50x0-B930	=	PROFINET RT, device, Ethernet (2 x RJ45 switch)
CX50x0-B950	=	EtherNet/IP slave, Ethernet (2 x RJ45 switch)
CX50x0-B110	=	EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)

Technical data	CX5010	CX5020
Processor	Intel® Atom™ Z510, 1.1 GHz clock frequency	Intel® Atom™ Z530, 1.6 GHz clock frequency
Flash memory	slot for Compact Flash card, 128 MB included (expandable)	
Main memory	512 MB RAM (not expandable)	512 MB RAM (expandable ex factory to 1 GB)
Persistent memory	integrated 1-second UPS (1 MB on Compact Flash card)	
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-D, 4 x USB 2.0, 1 x optional interface	
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status	
Clock	internal battery-backed clock for time and date (battery exchangeable)	
Operating system	Microsoft Windows Embedded CE 6 or Microsoft Windows Embedded Standard 2009	
Control software	TwinCAT 2 runtime TwinCAT 3 runtime (XAR)	
I/O connection	E-bus or K-bus, automatic recognition	
Power supply	24 V DC (-15 %/+20 %)	
Current supply E-bus/K-bus	2 A	
Max. power loss	12 W (including the system interfaces)	12.5 W (including the system interfaces)
Dimensions (W x H x D)	100 mm x 106 mm x 92 mm	
Weight	approx. 575 g	
Operating/storage temperature	-25…+60 °C/-40…+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals	CE, UL, Ex	
TC3 performance class	Performance (40); for further information on TwinCAT 3 see page 470	
Further information	www.beckhoff.com/CX5010	www.beckhoff.com/CX5020

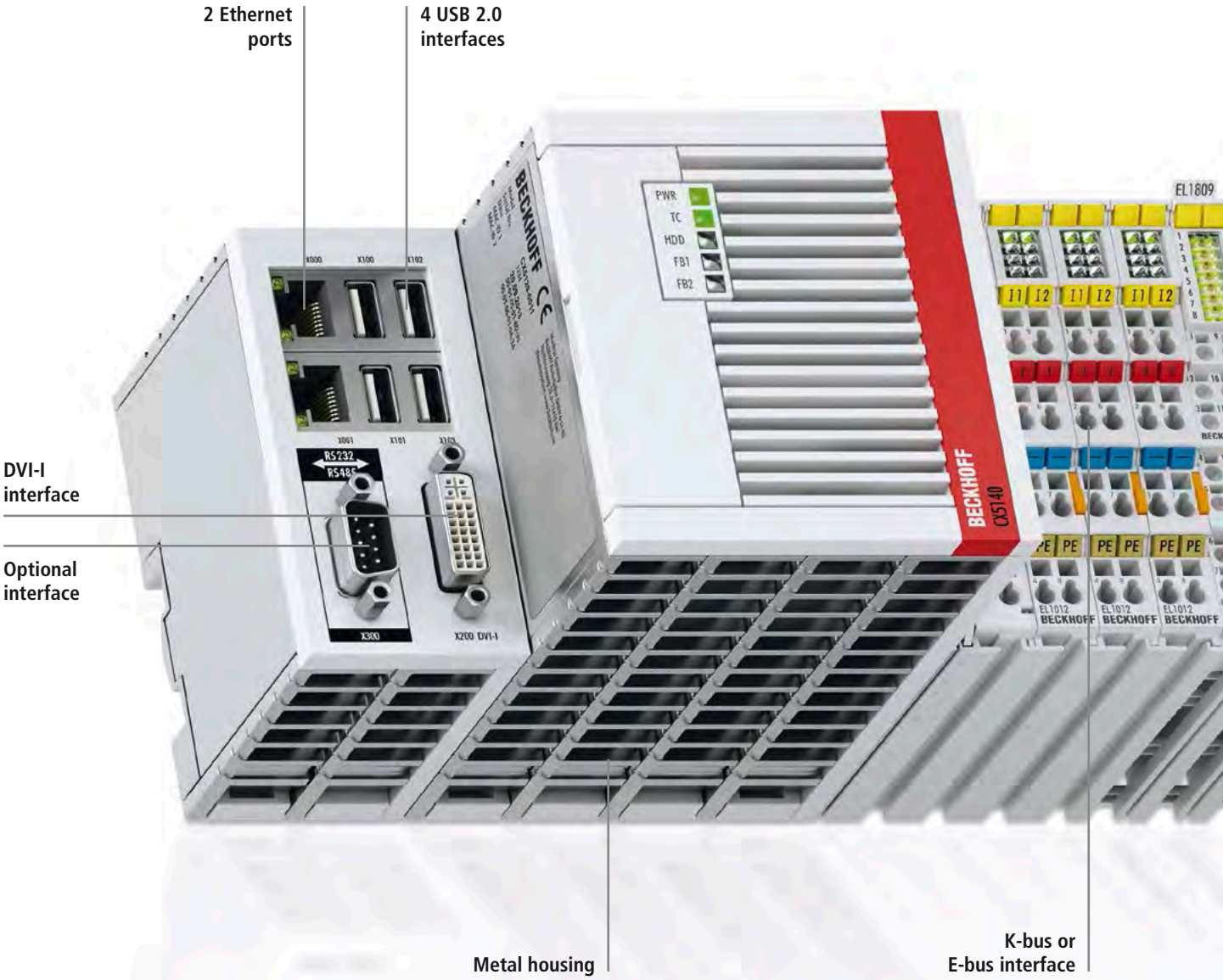
Ordering information	E-bus	K-bus	no operating system	Windows Embedded CE 6	Windows Embedded Standard 2009	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC PTP runtime	TwinCAT 3 runtime (XAR)
CX50x0-0100	x	–	x	–	–	x	–	–	–
CX50x0-0110	x	–	–	x	–	x	–	–	–
CX50x0-0111	x	–	–	x	–	–	x	–	–
CX50x0-0112	x	–	–	x	–	–	x	x	–
CX50x0-0115	x	–	–	x	–	–	–	–	x
CX50x0-0120	x	–	–	–	x*	x	–	–	–
CX50x0-0121	x	–	–	–	x*	–	x	–	–
CX50x0-0122	x	–	–	–	x*	–	x	x	–
CX50x0-0125	x	–	–	–	x*	–	–	–	x
CX50x0-1100	–	x	x	–	–	x	–	–	–
CX50x0-1110	–	x	–	x	–	x	–	–	–
CX50x0-1111	–	x	–	x	–	–	x	–	–
CX50x0-1112	–	x	–	x	–	–	x	x	–
CX50x0-1115	–	x	–	x	–	–	–	–	x
CX50x0-1120	–	x	–	–	x*	x	–	–	–
CX50x0-1121	–	x	–	–	x*	–	x	–	–
CX50x0-1122	–	x	–	–	x*	–	x	x	–
CX50x0-1125	–	x	–	–	x*	–	–	–	x

Options	
CX1900-0204	1 GB DDR2 RAM for CX5020, instead of 512 MB DDR2 RAM; pre-assembled ex factory
CX1800-0401	Microsoft Windows Embedded Standard 7 P 32 bit instead of Microsoft Windows Embedded Standard 2009
CX1900-0105	Device modification for CX5010 and CX5020 Embedded PCs according to the requirements for ATEX certification. The modification is mandatory for the usage of the devices in hazardous areas, Zone 2. It includes the modification and repositioning of the device label as well as a mounting bracket installed ex works for mechanical locking of the connectors. Product labeling: ATEX: II 3 G Ex nA IIC T4 Gc Read the device documentation for use in hazardous areas carefully.

*CX50x0 systems with Microsoft Embedded Standard 2009 require Compact Flash with a capacity of at least 2 GB (must be ordered separately).

CX5100 | Embedded PCs

▶ www.beckhoff.com/CX5100



CX5120

CX5130

CX5140

The DIN-rail-mountable, fanless Embedded PCs from the CX5100 series are equipped with Intel® Atom™ multi-core processors. The series encompasses three devices that differ from each other by processor type, RAM size and housing size. The new CX5100 PCs supplement the existing devices of the CX5000 series which are equipped with processors of the first Intel® Atom™ generation. In direct comparison the new processors are considerably more efficient: the out-of-order architecture and the modern 22-nm technology enable higher clock rates combined with reduced power losses.

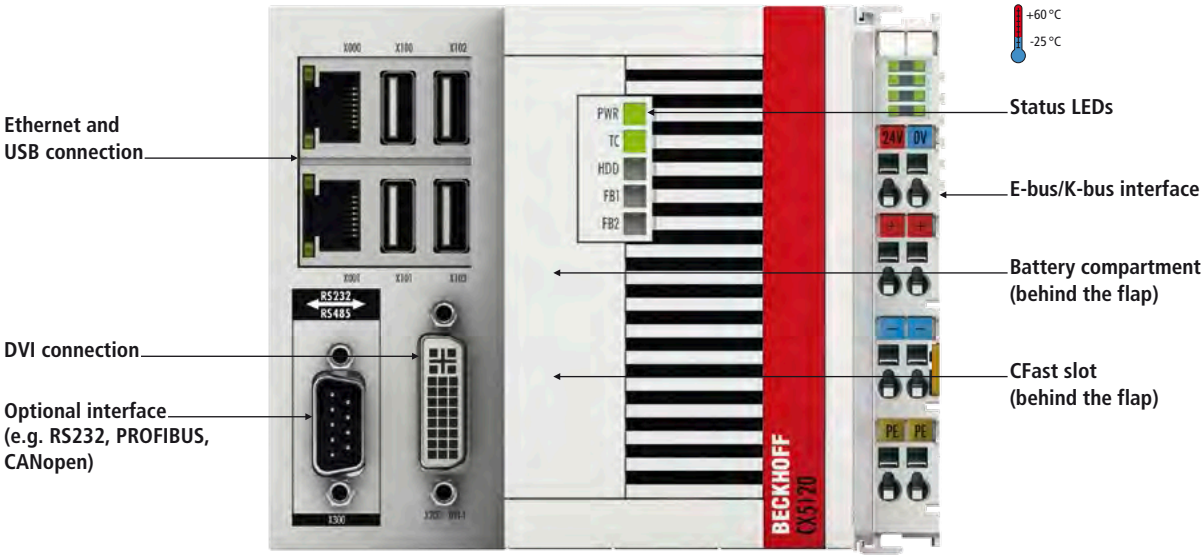
– CX5120: Intel® Atom™ CPU, 1.46 GHz, 1 core
– CX5130: Intel® Atom™ CPU, 1.75 GHz, 2 cores
– CX5140: Intel® Atom™ CPU, 1.91 GHz, 4 cores

The CX5100 has a fixed number of system interfaces, which in the basic version is identical to previous CX5000 devices. Two independent Gigabit Ethernet ports and four USB 2.0 interfaces are available. To the DVI-I interface either a Beckhoff Control Panel or a commercially available DVI or VGA monitor can be connected. Like the CX5000 the CX5100 series has a compact design; a modular device with extension modules like in the CX2000 series is not available. The option interface of the CX5100 can be factory-fitted with various interfaces depending on needs: e.g. with a serial port (RS232/RS422/RS485) or a fieldbus connection for master or slave function. If the EtherCAT Slave option is selected, the CX5100 becomes a programmable, decentralised controller within an EtherCAT network.

At I/O level either Bus Terminals or EtherCAT Terminals can be used. Like all Embedded PCs of the second generation, the CX5100 automatically recognises the I/O type that is plugged-in. With EtherCAT many different extension options are available: further master/slave fieldbus connections (PROFIBUS, CANopen, DeviceNet, etc.) and communication interfaces (RS232, RS422/RS485) as well as all other signal types supported by EtherCAT can be directly connected as EtherCAT Terminals.

The operating system is Windows Embedded Standard 7 P, optionally in a 32-bit or 64-bit version. The boot and storage medium is an interchangeable, industrially compatible CFast card with a slot that is accessible behind a cover. The CFast card serves as a substitute for a hard disk; i.e. the operating system as well as TwinCAT and user projects are stored on it. Fast hardware exchange is thus possible if service is required; a software update can be performed simply by replacing the card on site. The built-in capacitive 1-second UPS ensures secure backup of persistent application data on the CFast card. Date and time are buffered via a replaceable battery.

The new CX5100 Embedded PCs are positioned in terms of both price and performance below the CX2000 series with multi-core-i CPU. If the machine and plant programmer uses the CX5100 in combination with the TwinCAT 3 automation suite, he now benefits from the availability of genuine multi-core processors and the optimised allocation of different program sections to individual cores, even with Intel® Atom™-based devices.



CX5120 | Embedded PC with Intel® Atom™ processor

The CX5120 has an Intel® Atom™ single-core processor with a clock rate of 1.46 GHz. The hardware interfaces in this new series are oriented and implemented identically to those of the existing CX5000 series. Two independent, Gigabit-capable Ethernet interfaces as well as four USB 2.0 and a DVI-I interface are available. A multitude of further connection options or gateway functions are created by an option interface, which can be pre-fitted in the factory, as well as the I/O level, which can selectively consist either of E-Bus or K-Bus terminals.

The CX5120 is characterised by low power consumption and fanless design.

Depending on the installed TwinCAT runtime environment, the CX5120 can be used for implementing PLC or PLC/Motion Control projects with or without visualisation. The execution of Motion Control applications with interpolating axis movements is also possible.

The extended operating temperature range from -25 to +60 °C enables the use in climatically demanding environments.

Like the CX5000, the CX5100 series has a compact design; a modular device with extension modules like in the CX2000 series is not available.

The order identifier is derived as follows:

CX5120-01ST

- 0 = no TwinCAT
- 1 = with TwinCAT 2 PLC runtime
- 2 = with TwinCAT 2 NC PTP runtime
- 3 = with TwinCAT 2 NC I runtime
- 5 = TwinCAT 3 runtime (XAR)

- 0 = no operating system
- 1 = operating system Windows Embedded Compact 7
- 2 = operating system Windows Embedded Standard 7 P 32 bit
- 3 = operating system Windows Embedded Standard 7 P 64 bit
- 4 = Windows 10 IoT Enterprise LTSB 32 bit
- 5 = Windows 10 IoT Enterprise LTSB 64 bit

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

Optional interfaces:

CX5120-N020	=	audio interface
CX5120-N030	=	RS232, D-sub plug
CX5120-N031	=	RS422/RS485, D-sub socket
CX5120-M310	=	PROFIBUS master, D-sub socket, 9-pin
CX5120-B310	=	PROFIBUS slave, D-sub socket, 9-pin
CX5120-M510	=	CANopen master, D-sub plug, 9-pin
CX5120-B510	=	CANopen slave, D-sub plug, 9-pin
CX5120-M930	=	PROFINET RT, controller
CX5120-B930	=	PROFINET RT, device, Ethernet (2 x RJ45 switch)
CX5120-B931	=	PROFINET IRT, device, Ethernet (2 x RJ45 switch)
CX5120-B950	=	EtherNet/IP slave, Ethernet (2 x RJ45 switch)
CX5120-B110	=	EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)

Technical data	CX5120
Processor	Intel® Atom™ E3815, 1.46 GHz
Number of cores	1
Flash memory	slot for CFast card and for microSD card, cards not included
Main memory	2 GB DDR3 RAM (not expandable)
Persistent memory	integrated 1-second UPS (1 MB on CFast card)
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded Compact 7, Microsoft Windows Embedded Standard 7 P or Microsoft Windows 10 IoT Enterprise LTSB
Control software	TwinCAT 2 runtime | TwinCAT 3 runtime (XAR)
I/O connection	E-bus or K-bus, automatic recognition
Power supply	24 V DC (-15 %/+20 %)
Current supply E-bus/K-bus	2 A
Max. power loss	9 W (including the system interfaces)
Dimensions (W x H x D)	124 mm x 100 mm x 92 mm
Weight	approx. 860 g
Operating/storage temperature	-25…+60 °C/-40…+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals	CE, UL, Ex, IECEx
TC3 performance class	Performance (40); for further information on TwinCAT 3 see page 470
Further information	www.beckhoff.com/CX5120

Ordering information	no operating system	Windows Embedded Compact 7	Standard 7 P 32 bit	Standard 7 P 64 bit	Windows 10 IoT Enterprise LTSB 32 bit	Windows 10 IoT Enterprise LTSB 64 bit	no TwinCAT	TwinCAT 2 runtime PLC	TwinCAT 2 runtime NC PTP	TwinCAT 2 runtime NC I	TwinCAT 3 runtime (XAR)
CX5120-0100	x	–	–	–	–	–	x	–	–	–	–
CX5120-0110	–	x	–	–	–	–	x	–	–	–	–
CX5120-0111	–	x	–	–	–	–	–	x	–	–	–
CX5120-0112	–	x	–	–	–	–	–	–	x	–	–
CX5120-0113	–	x	–	–	–	–	–	–	–	x	–
CX5120-0115	–	x	–	–	–	–	–	–	–	–	x
CX5120-0120	–	–	x	–	–	–	x	–	–	–	–
CX5120-0121	–	–	x	–	–	–	–	x	–	–	–
CX5120-0122	–	–	x	–	–	–	–	–	x	–	–
CX5120-0123	–	–	x	–	–	–	–	–	–	x	–
CX5120-0125	–	–	x	–	–	–	–	–	–	–	x
CX5120-0130	–	–	–	x	–	–	x	–	–	–	–
CX5120-0135	–	–	–	x	–	–	–	–	–	–	x
CX5120-0140	–	–	–	–	x	–	x	–	–	–	–
CX5120-0141	–	–	–	–	x	–	–	x	–	–	–
CX5120-0142	–	–	–	–	x	–	–	–	x	–	–
CX5120-0143	–	–	–	–	x	–	–	–	–	x	–
CX5120-0150	–	–	–	–	–	x	x	–	–	–	–
CX5120-0155	–	–	–	–	–	x	–	–	–	–	x

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

CX5130 | Embedded PC with Intel® Atom™ processor

The CX5130 has an Intel® Atom™ multi-core processor with a clock rate of 1.75 GHz. This makes genuine multi-core technology possible in the Embedded PC segment. The hardware interfaces in this new series are oriented and implemented identically to those of the existing CX5000 series. Two independent, Gigabit-capable Ethernet interfaces as well as four USB 2.0 and a DVI-I interface are available. A multitude of further connection options and gateway functions is created by an option interface, which can be pre-equipped ex factory, as well as the I/O level, which can optionally consist of either E-bus or K-bus terminals.

The CX5130 is characterised by low power consumption and fanless design.

Depending on the installed TwinCAT runtime environment, the CX5130 can be used for implementing PLC or PLC/Motion Control projects with or without visualisation. The execution of Motion Control applications with interpolating axis movements is also possible.

The extended operating temperature range from -25 to +60 °C enables the use in climatically demanding environments.

Like the CX5000, the CX5100 series has a compact design; a modular device with extension modules like in the CX2000 series is not available.

The order identifier is derived as follows:

CX5130-01ST

- 0 = no TwinCAT
- 1 = with TwinCAT 2 PLC runtime
- 2 = with TwinCAT 2 NC PTP runtime
- 3 = with TwinCAT 2 NC I runtime
- 5 = TwinCAT 3 runtime (XAR)

- 0 = no operating system
- 1 = operating system Windows Embedded Compact 7
- 2 = operating system Windows Embedded Standard 7 P 32 bit
- 3 = operating system Windows Embedded Standard 7 P 64 bit
- 4 = Windows 10 IoT Enterprise LTSB 32 bit
- 5 = Windows 10 IoT Enterprise LTSB 64 bit

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

Optional interfaces:

CX5130-N020	=	audio interface
CX5130-N030	=	RS232, D-sub plug
CX5130-N031	=	RS422/RS485, D-sub socket
CX5130-M310	=	PROFIBUS master, D-sub socket, 9-pin
CX5130-B310	=	PROFIBUS slave, D-sub socket, 9-pin
CX5130-M510	=	CANopen master, D-sub plug, 9-pin
CX5130-B510	=	CANopen slave, D-sub plug, 9-pin
CX5130-M930	=	PROFINET RT, controller
CX5130-B930	=	PROFINET RT, device, Ethernet (2 x RJ45 switch)
CX5130-B931	=	PROFINET IRT, device, Ethernet (2 x RJ45 switch)
CX5130-B950	=	EtherNet/IP slave, Ethernet (2 x RJ45 switch)
CX5130-B110	=	EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)

Technical data	CX5130
Processor	Intel® Atom™ E3827, 1.75 GHz
Number of cores	2
Flash memory	slot for CFast card and for microSD card, cards not included
Main memory	4 GB DDR3 RAM (not expandable)
Persistent memory	integrated 1-second UPS (1 MB on CFast card)
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded Compact 7, Microsoft Windows Embedded Standard 7 P or Microsoft Windows 10 IoT Enterprise LTSB
Control software	TwinCAT 2 runtime | TwinCAT 3 runtime (XAR)
I/O connection	E-bus or K-bus, automatic recognition
Power supply	24 V DC (-15 %/+20 %)
Current supply E-bus/K-bus	2 A
Max. power loss	11 W (including the system interfaces)
Dimensions (W x H x D)	142 mm x 100 mm x 92 mm
Weight	approx. 960 g
Operating/storage temperature	-25…+60 °C/-40…+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals	CE, UL, Ex, IECEx
TC3 performance class	Performance (40); for further information on TwinCAT 3 see page 470
Further information	www.beckhoff.com/CX5130

Ordering information	no operating system	Windows Embedded Compact 7	Windows Embedded Standard 7 P 32 bit	Windows Embedded Standard 7 P 64 bit	Windows 10 IoT Enterprise LTSB 32 bit	Windows 10 IoT Enterprise LTSB 64 bit	no TwinCAT	TwinCAT 2 runtime PLC	TwinCAT 2 runtime NC PTP	TwinCAT 2 runtime NC I	TwinCAT 3 runtime (XAR)
CX5130-0100	x	–	–	–	–	–	x	–	–	–	–
CX5130-0110	–	x	–	–	–	–	x	–	–	–	–
CX5130-0111	–	x	–	–	–	–	–	x	–	–	–
CX5130-0112	–	x	–	–	–	–	–	–	x	–	–
CX5130-0113	–	x	–	–	–	–	–	–	–	x	–
CX5130-0115	–	x	–	–	–	–	–	–	–	–	x
CX5130-0120	–	–	x	–	–	–	x	–	–	–	–
CX5130-0121	–	–	x	–	–	–	–	x	–	–	–
CX5130-0122	–	–	x	–	–	–	–	–	x	–	–
CX5130-0123	–	–	x	–	–	–	–	–	–	x	–
CX5130-0125	–	–	x	–	–	–	–	–	–	–	x
CX5130-0130	–	–	–	x	–	–	x	–	–	–	–
CX5130-0135	–	–	–	x	–	–	–	–	–	–	x
CX5130-0140	–	–	–	–	x	–	x	–	–	–	–
CX5130-0141	–	–	–	–	x	–	–	x	–	–	–
CX5130-0142	–	–	–	–	x	–	–	–	x	–	–
CX5130-0143	–	–	–	–	x	–	–	–	–	x	–
CX5130-0150	–	–	–	–	–	x	x	–	–	–	–
CX5130-0155	–	–	–	–	–	x	–	–	–	–	x

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

CX5140 | Embedded PC with Intel® Atom™ processor

The CX5140 has an Intel® Atom™ quad-core processor with a clock rate of 1.91 GHz. This makes genuine multi-core technology possible in the Embedded PC segment. The hardware interfaces in this new series are oriented and implemented identically to those of the existing CX5000 series. Two independent, Gigabit-capable Ethernet interfaces as well as four USB 2.0 and a DVI-I interface are available. A multitude of further connection options and gateway functions is created by an option interface, which can be pre-equipped ex factory, as well as the I/O level, which can optionally consist of either E-bus or K-bus terminals.

The CX5140 is characterised by low power consumption and fanless design.

Depending on the installed TwinCAT runtime environment, the CX5140 can be used for implementing PLC or PLC/Motion Control projects with or without visualisation. The execution of Motion Control applications with interpolating axis movements is also possible.

The extended operating temperature range from -25 to +60 °C enables the use in climatically demanding environments.

Like the CX5000, the CX5100 series has a compact design; a modular device with extension modules like in the CX2000 series is not available.

The order identifier is derived as follows:

CX5140-01ST

- 0 = no TwinCAT
- 1 = with TwinCAT 2 PLC runtime
- 2 = with TwinCAT 2 NC PTP runtime
- 3 = with TwinCAT 2 NC I runtime
- 5 = TwinCAT 3 runtime (XAR)

- 0 = no operating system
- 1 = operating system Windows Embedded Compact 7
- 2 = operating system Windows Embedded Standard 7 P 32 bit
- 3 = operating system Windows Embedded Standard 7 P 64 bit
- 4 = Windows 10 IoT Enterprise LTSB 32 bit
- 5 = Windows 10 IoT Enterprise LTSB 64 bit

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

Optional interfaces:

CX5140-N020	=	audio interface
CX5140-N030	=	RS232, D-sub plug
CX5140-N031	=	RS422/RS485, D-sub socket
CX5140-M310	=	PROFIBUS master, D-sub socket, 9-pin
CX5140-B310	=	PROFIBUS slave, D-sub socket, 9-pin
CX5140-M510	=	CANopen master, D-sub plug, 9-pin
CX5140-B510	=	CANopen slave, D-sub plug, 9-pin
CX5140-M930	=	PROFINET RT, controller
CX5140-B930	=	PROFINET RT, device, Ethernet (2 x RJ45 switch)
CX5140-B931	=	PROFINET IRT, device, Ethernet (2 x RJ45 switch)
CX5140-B950	=	EtherNet/IP slave, Ethernet (2 x RJ45 switch)
CX5140-B110	=	EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)

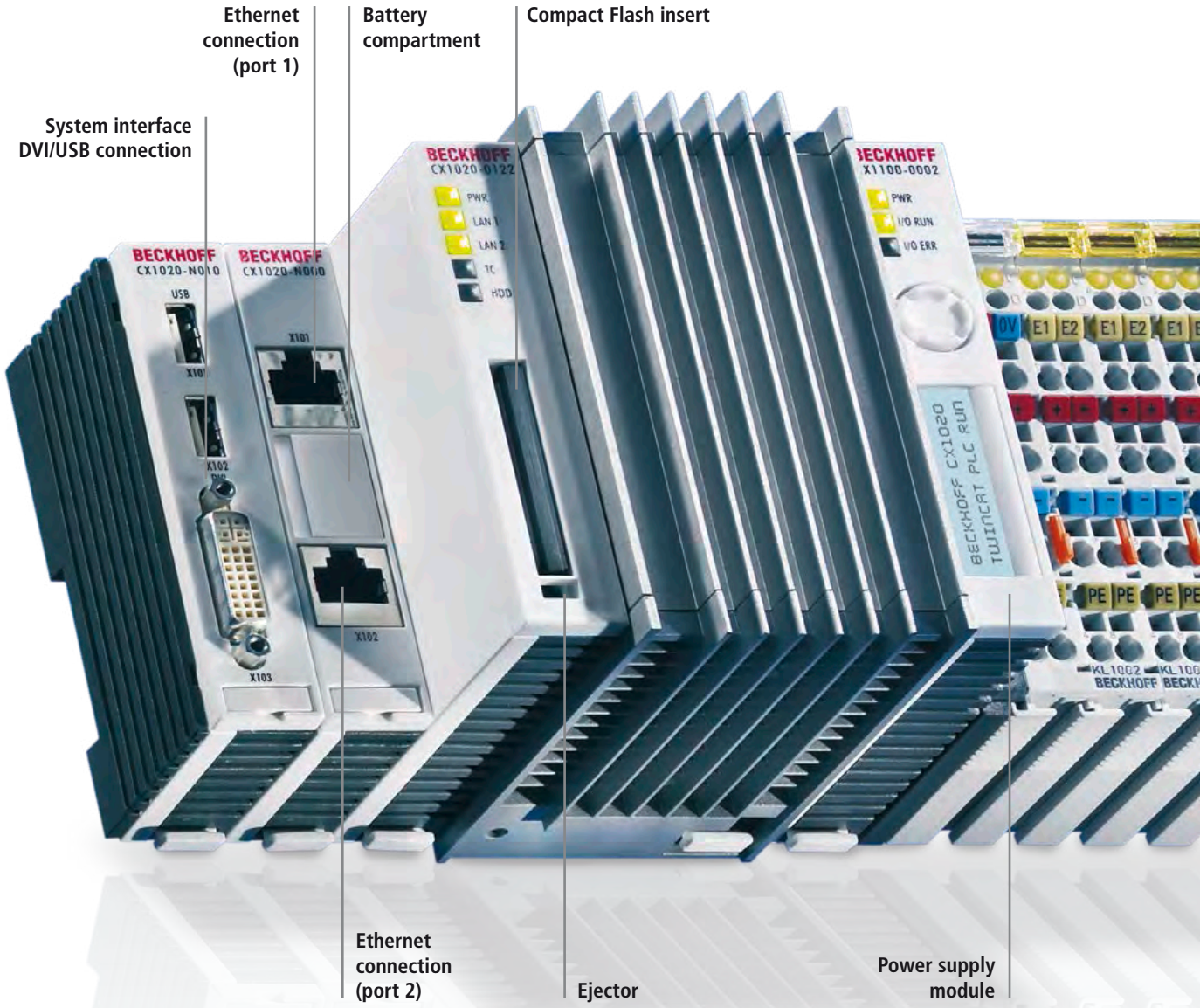
Technical data	CX5140
Processor	Intel® Atom™ E3845, 1.91 GHz
Number of cores	4
Flash memory	slot for CFast card and for microSD card, cards not included
Main memory	4 GB DDR3 RAM (not expandable)
Persistent memory	integrated 1-second UPS (1 MB on CFast card)
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded Compact 7, Microsoft Windows Embedded Standard 7 P or Microsoft Windows 10 IoT Enterprise LTSB
Control software	TwinCAT 2 runtime | TwinCAT 3 runtime (XAR)
I/O connection	E-bus or K-bus, automatic recognition
Power supply	24 V DC (-15 %/+20 %)
Current supply E-bus/K-bus	2 A
Max. power loss	12 W (including the system interfaces)
Dimensions (W x H x D)	142 mm x 100 mm x 92 mm
Weight	approx. 960 g
Operating/storage temperature	-25…+60 °C/-40…+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals	CE, UL, Ex, IECEx
TC3 performance class	Performance plus (50); for further information on TwinCAT 3 see page 470
Further information	www.beckhoff.com/CX5140

Ordering information	no operating system	Windows Embedded Compact 7	Windows Embedded Standard 7 P 32 bit	Windows Embedded Standard 7 P 64 bit	Windows 10 IoT Enterprise LTSB 32 bit	Windows 10 IoT Enterprise LTSB 64 bit	no TwinCAT	TwinCAT 2 runtime PLC	TwinCAT 2 runtime NC PTP	TwinCAT 2 runtime NC I	TwinCAT 3 runtime (XAR)
CX5140-0100	x	–	–	–	–	–	x	–	–	–	–
CX5140-0110	–	x	–	–	–	–	x	–	–	–	–
CX5140-0111	–	x	–	–	–	–	–	x	–	–	–
CX5140-0112	–	x	–	–	–	–	–	–	x	–	–
CX5140-0113	–	x	–	–	–	–	–	–	–	x	–
CX5140-0115	–	x	–	–	–	–	–	–	–	–	x
CX5140-0120	–	–	x	–	–	–	x	–	–	–	–
CX5140-0121	–	–	x	–	–	–	–	x	–	–	–
CX5140-0122	–	–	x	–	–	–	–	–	x	–	–
CX5140-0123	–	–	x	–	–	–	–	–	–	x	–
CX5140-0125	–	–	x	–	–	–	–	–	–	–	x
CX5140-0130	–	–	–	x	–	–	x	–	–	–	–
CX5140-0135	–	–	–	x	–	–	–	–	–	–	x
CX5140-0140	–	–	–	–	x	–	x	–	–	–	–
CX5140-0141	–	–	–	–	x	–	–	x	–	–	–
CX5140-0142	–	–	–	–	x	–	–	–	x	–	–
CX5140-0143	–	–	–	–	x	–	–	–	–	x	–
CX5140-0150	–	–	–	–	–	x	x	–	–	–	–
CX5140-0155	–	–	–	–	–	x	–	–	–	–	x

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

CX1020, CX1030 | Embedded PCs

▶ www.beckhoff.com/CX1020



CX1020

CX1030

The Embedded PCs CX1020 and CX1030 extend the CX product family by versions with higher CPU performance and enable the direct connection of Bus Terminals and EtherCAT Terminals. The CX1020 is equipped with a 1 GHz Intel® Celeron® M CPU. It is an energy-saving device that operates with ultra-low core voltage and features low thermal power dissipation of only 7 W TDP (thermal design power). As a result, no fan is required despite the compact design of the CX1020 Embedded PC. Since Compact Flash is used as boot and memory medium, no rotating media are required in the controller. This is an important aspect for increasing the MTBF (mean time between failures) of the overall system.

The CX1030 is equipped with a 1.8 GHz Intel® Pentium® M. Apart from the cartridge (which is required due to the higher performance) and the CPU, the CX1030 and CX1020 feature identical hardware and software. The high-quality fan is supported by dual ball bearings and mounted in a tray so that it can be replaced in the field without tools or wiring, if required. The fan speed is monitored and can be queried via software. The combination of CX1030, EtherCAT and TwinCAT enables very fast control processes in the sub-millisecond range (eXtreme Fast Control Technology).

The basic CPU modules are equipped with two RJ45 sockets and an integrated 3-port switch as standard.

The components

The modules of the CX series system are connected with each other via the standardised PC/104 bus (16 bit). The individual system components are modules with a width of 19 mm (single) or 38 mm (double) that can be arranged in series. The basic unit consists of a CPU module CX1020/CX1030 and a power supply module (CX1100-00xx).

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

Power supply unit with integrated I/O interface

The following types of 24 V DC power supply units are available:

– CX1100-0001: without I/O interface, CX1020 only
– CX1100-00x2: with terminal bus interface for Beckhoff Bus Terminals
– CX1100-00x3: with terminal bus interface for Beckhoff Bus Terminals and IP-Link interface for Beckhoff Fieldbus Box modules
– CX1100-00x4: with terminal bus interface for Beckhoff EtherCAT Terminals

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

EtherCAT as a fast I/O system

The Embedded PCs CX1020 and CX1030 were developed for optimum interaction with EtherCAT.

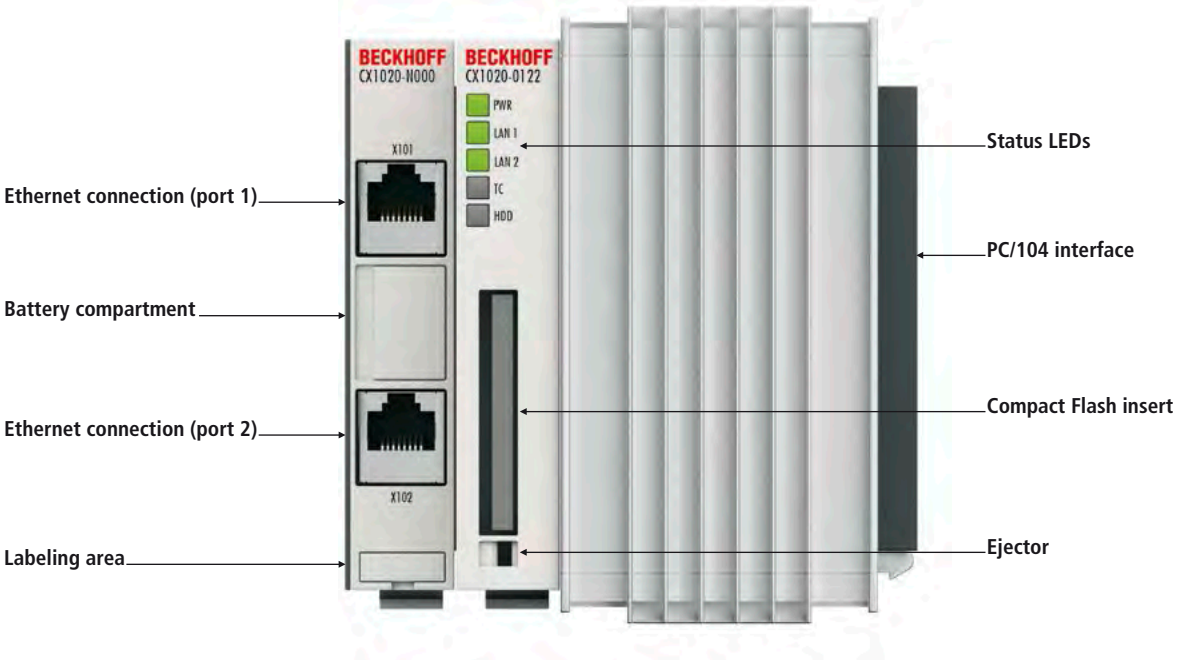
EtherCAT offers several options for connecting traditional fieldbus systems with the CX1020/CX1030: either as a CX1500 module directly at the CPU or as an EtherCAT device in terminal form. The PROFIBUS master is available either as a CX1500-M310 or as an EL6731 EtherCAT Terminal.

PLC, Motion Control, interpolation and visualisation

As a DIN rail IPC and in conjunction with the TwinCAT software from Beckhoff, the CX1020/CX1030 offers the same functionality as large Industrial PCs. In terms of PLC, up to four virtual IEC 61131 CPUs can be programmed with up to four tasks each, with a minimum cycle time of 50 µs. All IEC 61131-3 languages can be used.

Moreover, all TwinCAT functionalities are available for Motion Control applications: in theory, up to 256 axes can be controlled. In addition to simple point-to-point movements, more complex multi-axis functions such as electronic gearbox, cam plate and flying saw can be implemented. Thanks to the more powerful CPU, the CX1020 and CX1030 can also be used for interpolating 3D path movements and DIN 66025 programs.

In addition to real-time execution of control tasks, the TwinCAT real-time kernel ensures that enough time remains for the user interface (HMI) to communicate with the real-time components via software interfaces such as ADS or OPC.



CX1020 | Basic CPU module

The basic CX1020 CPU module has a 1 GHz Intel® CPU. The controller does not require a fan or other rotating components. In addition to the CPU and the chipset, the CX1020 module also contains the main memory, which is available in different sizes. The controller boots from the Compact Flash.

The basic configuration of the CX1020 includes a 128 MB Compact Flash card and two Ethernet RJ45 interfaces. These interfaces are connected to an internal switch and offer a simple option for creating a line topology without the need for additional Ethernet switches. All other CX family components can be connected via the PC/104 interface that is available on both sides. The passive cooling module is included in the scope of supply. The operating system can be Windows Embedded CE 6 or Windows Embedded Standard 2009. The TwinCAT 2 automation software transforms a CX1020 system into a powerful PLC and Motion Control system that can be operated with or without visualisation. In contrast to the CX1010, the CX1020 can also be used for interpolating axis movements with TwinCAT 2 NC I.

Further system interfaces or fieldbus connections can be added to the basic CPU module. The CPU module requires a CX1100 type power supply module. All CX1500 fieldbus modules and all CX1100 power supplies from the CX series can be used in combination with the CX1020.

The Embedded PC CX1020 is also available as the ordering option CX1900-0320 with zero second level cache. Instead of the 1 GHz processor with 512 kB second level cache (L2), a less expensive variant of the processor without a second level cache (L2 = 0 kB) is used. Since the CX1900-0320 has the same 855GME chipset as the CX1020, none of the basic characteristics of the CX1020 are changed, apart from the slightly lower CPU power.

The order identifier is derived as follows:

CX1020-0CST

- 0 = no TwinCAT
- 1 = with TwinCAT 2 PLC runtime
- 2 = with TwinCAT 2 PLC/NC PTP runtime
- 3 = with TwinCAT 2 PLC/NC I runtime

- 0 = no operating system
- 1 = operating system Windows Embedded CE 6
- 2 = operating system Windows Embedded Standard 2009

- 0 = CPU with 2 Ethernet ports
- 1 = CPU with 2 Ethernet ports + 2 x USB + DVI

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

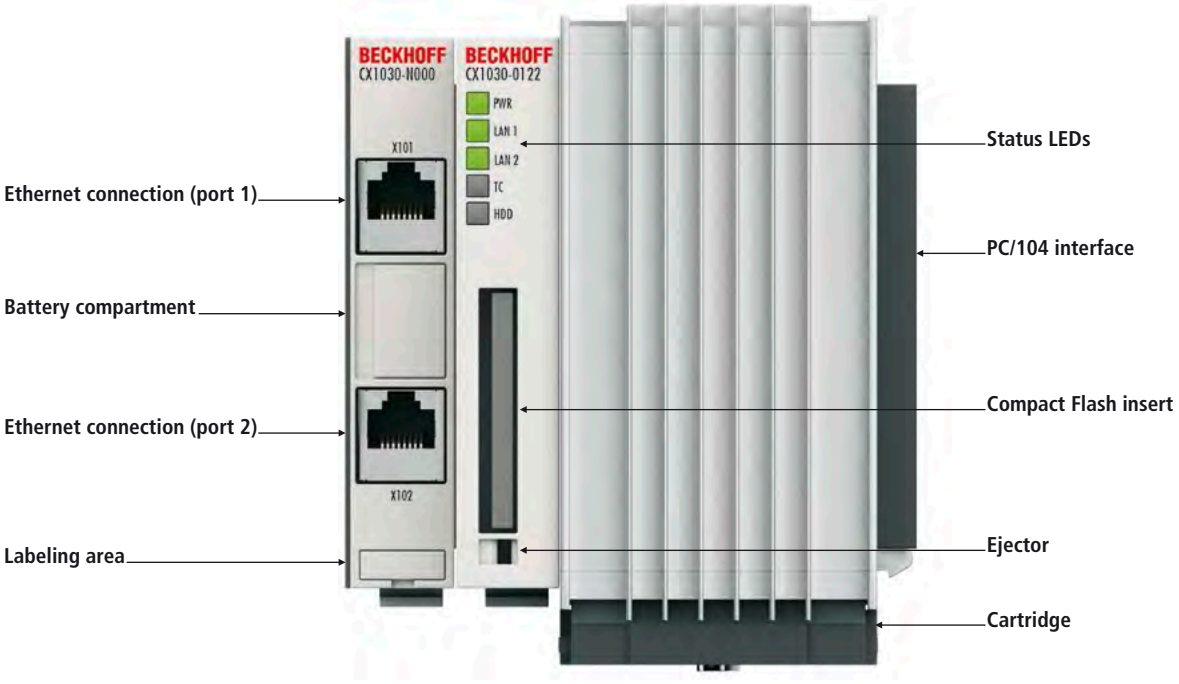
Embedded PC interfaces for CX10x0
see page 238

Technical data	CX1020-0xxx
Processor	Intel® Celeron® M ULV, 1 GHz clock frequency
Flash memory	slot for Compact Flash card, 128 MB included (expandable)
Main memory	256 MB DDR RAM (expandable ex factory to 1 GB)
Interfaces	2 x RJ45 10/100 Mbit/s (internal switch)
Diagnostics LED	1 x power, 2 x LAN link/activity, TC status, 1 x flash access
Expansion slot	1 x Compact Flash type I+II insert with eject mechanism
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded CE 6 or Microsoft Windows Embedded Standard 2009
Control software	TwinCAT 2 PLC runtime, NC PTP runtime, NC I runtime
System bus	16 bit ISA (PC/104)
I/O connection	via power supply module (E-bus, K-bus, K-bus/IP-Link)
Power supply	via system bus (through CX1100-xxxx power supply modules)
Max. power loss	11 W (including CX1020-N0xx system interfaces)
Dimensions (W x H x D)	96 mm x 112 mm x 99 mm
Weight	approx. 550 g
Operating/storage temperature	0…+50 °C/-25…+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals	CE, UL
Further information	www.beckhoff.com/CX1020

Ordering information	DVI/USB	no operating system	Windows Embedded CE 6	Windows Embedded Standard 2009	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC PTP runtime	TwinCAT 2 NC I runtime
CX1020-0000	–	x	–	–	x	–	–	–
CX1020-0010	–	–	x	–	x	–	–	–
CX1020-0011	–	–	x	–	–	x	–	–
CX1020-0012	–	–	x	–	–	x	x	–
CX1020-0013	–	–	x	–	–	x	x	x
CX1020-0100	x	x	–	–	x	–	–	–
CX1020-0110	x	–	x	–	x	–	–	–
CX1020-0111	x	–	x	–	–	x	–	–
CX1020-0112	x	–	x	–	–	x	x	–
CX1020-0113	x	–	x	–	–	x	x	x
CX1020-0020	–	–	–	x*	x	–	–	–
CX1020-0021	–	–	–	x*	–	x	–	–
CX1020-0022	–	–	–	x*	–	x	x	–
CX1020-0023	–	–	–	x*	–	x	x	x
CX1020-0120	x	–	–	x*	x	–	–	–
CX1020-0121	x	–	–	x*	–	x	–	–
CX1020-0122	x	–	–	x*	–	x	x	–
CX1020-0123	x	–	–	x*	–	x	x	x

Options	
CX1900-0320	option for basic CPU module: Intel® Celeron® M processor 1 GHz, zero second level cache
CX1900-0120	"Active cooling": factory conversion of the CX1020 CPU module for active cooling in order to enable flexible installation positions (see documentation). Active cooling takes place via a fan cartridge. This option requires the use of a power supply unit type CX1100-001x.

*CX1020 systems with Microsoft Embedded Standard require Compact Flash with a capacity of at least 2 GB (must be ordered separately).



CX1030 | Basic CPU module

The CX1030 basic CPU module offers Intel® Pentium® M power on the DIN rail. The CX1030 has a 1.8 GHz Intel® Pentium® M CPU. The CPU is cooled via the cooling module and an easily exchangeable fan cartridge located on the underside of the housing. The fan speed can be read via software and can therefore be monitored.

In addition to the CPU and the chipset, the CX1030 module also contains the RAM, which is available in different sizes. The controller boots from the Compact Flash. The basic configuration of the CX1030 includes a 128 MB Compact Flash card and two Ethernet RJ45 interfaces. These are connected to an internal switch and offer a simple option for creating a line topology without the need for additional Ethernet Switches. All other CX family components can be connected via the PC/104 interface that is available on both sides. The passive cooling module is included in the scope of supply.

The operating system can be Windows Embedded CE 6 or Windows Embedded Standard 2009. The TwinCAT 2 automation software transforms a CX1030 system into a powerful PLC and Motion Control system that can be used with or without visualisation. In contrast to the CX1010, the CX1030 can also be used for interpolating axis movements with TwinCAT 2 NC I.

Further system interfaces or fieldbus connections can be added to the basic CPU module. The CPU module requires a CX1100-001x type power supply module. All CX1500 fieldbus modules and all CX1100-001x power supply units from the CX series can be used in combination with the CX1030.

The order identifier is derived as follows:

CX1030-0CST

- **0 = no TwinCAT**
- **1 = with TwinCAT 2 PLC runtime**
- **2 = with TwinCAT 2 PLC/NC PTP runtime**
- **3 = with TwinCAT 2 PLC/NC I runtime**

- **0 = no operating system**
- **1 = operating system Windows Embedded CE 6**
- **2 = operating system Windows Embedded Standard 2009**

- **0 = CPU with 2 Ethernet ports**
- **1 = CPU with 2 Ethernet ports + 2 x USB + DVI**

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

Embedded PC interfaces for CX10x0
see page 238

Technical data	CX1030-0xxx
Processor	Intel® Pentium® M, 1.8 GHz clock frequency
Flash memory	slot for Compact Flash card, 128 MB included (expandable)
Main memory	256 MB DDR RAM (expandable ex factory to 1 GB)
Interfaces	2 x RJ45 10/100 Mbit/s (internal switch)
Cooling	cooling module + fan cartridge featuring speed control with double ball bearing fans, easily replaceable
Diagnostics LED	1 x power, 2 x LAN link/activity, TC status, 1 x flash access
Expansion slot	1 x Compact Flash type I+II insert with eject mechanism
Clock	internal battery-backed clock for time and date (battery exchangeable)
Operating system	Microsoft Windows Embedded CE 6 or Microsoft Windows Embedded Standard 2009
Control software	TwinCAT 2 PLC runtime, NC PTP runtime, NC I runtime
System bus	16 bit ISA (PC/104)
I/O connection	via power supply module (E-bus, K-bus, K-bus/IP-Link)
Power supply	via system bus (through CX1100-0012 [K-bus], CX1100-0013 [K-bus, IP-Link], CX1100-014 [E-bus] power supply module)
Max. power loss	32 W (including CX1030-N0xx system interfaces)
Dimensions (W x H x D)	96 mm x 112 mm x 99 mm
Weight	approx. 580 g
Operating/storage temperature	0…+50 °C/-25…+85 °C
Relative humidity	95 %, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4
Protection class	IP 20
Approvals	CE, UL
Further information	www.beckhoff.com/CX1030

Ordering information	DVI/USB	no operating system	Windows Embedded CE 6	Windows Embedded Standard 2009	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC PTP runtime	TwinCAT 2 NC I runtime
CX1030-0000	–	x	–	–	x	–	–	–
CX1030-0010	–	–	x	–	x	–	–	–
CX1030-0011	–	–	x	–	–	x	–	–
CX1030-0012	–	–	x	–	–	x	x	–
CX1030-0013	–	–	x	–	–	x	x	x
CX1030-0100	x	x	–	–	x	–	–	–
CX1030-0110	x	–	x	–	x	–	–	–
CX1030-0111	x	–	x	–	–	x	–	–
CX1030-0112	x	–	x	–	–	x	x	–
CX1030-0113	x	–	x	–	–	x	x	x
CX1030-0020	–	–	–	x*	x	–	–	–
CX1030-0021	–	–	–	x*	–	x	–	–
CX1030-0022	–	–	–	x*	–	x	x	–
CX1030-0023	–	–	–	x*	–	x	x	x
CX1030-0120	x	–	–	x*	x	–	–	–
CX1030-0121	x	–	–	x*	–	x	–	–
CX1030-0122	x	–	–	x*	–	x	x	–
CX1030-0123	x	–	–	x*	–	x	x	x

*CX1030 systems with Microsoft Embedded Standard 2009 require Compact Flash with a capacity of at least 2 GB (must be ordered separately).

DVI/USB interface

Audio interface

RS232 interface

RS422/RS485 interface

Ethernet interface

CX1020-N0xx | System interfaces

A number of optional interface modules are available for the basic CX1020 CPU module that can be installed ex factory. The CX1020-N010 option connects Beckhoff Control Panels or standard monitors with DVI or VGA input via the DVI or USB interfaces. Devices such as a printer, scanner, mouse, keyboard, mass storage, etc. can be connected via the USB 2.0 interfaces. Multimedia capability is realised via the CX1020-N020 audio interface. The modules CX1020-N030 and CX1020-N040 offer a total of four serial RS232 interfaces with a maximum transfer speed of 115 kbaud. These four interfaces can be implemented in pairs as RS422/RS485, in which case they are identified as CX1020-N031 and CX1020-N041 respectively. The system interfaces cannot be retrofitted or expanded in the field. They are supplied ex factory in the specified configuration and cannot be separated from the CPU module. The internal PC/104 bus runs through the system interfaces, so that further CX components can be connected. The power supply of the system interface modules is ensured via the internal PC/104 bus.

Technical data	CX1020-N010	CX1020-N020	CX1020-N030	CX1020-N040	CX1020-N031	CX1020-N041	CX1020-N060
Interfaces	1 x DVI + 2 x USB 2.0 (max. 500 mA per port)	Line IN, Line Mic IN, Line OUT	1 x COM1 + 1 x COM2, RS232	1 x COM3 + 1 x COM4, RS232	1 x COM1 + 1 x COM2, RS422/RS485	1 x COM3 + 1 x COM4, RS422/RS485	1 x Ethernet, 10/100 Mbit/s
Type of connection	DVI-I 29-pin socket + 2 USB ports type A	3.5 mm socket for jack plug	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	2 x D-sub socket, 9-pin	2 x D-sub socket, 9-pin	1 x RJ45
Properties	DVI-I interface also carries out VGA signals (DVI-A)	built-in PC beeper, Line OUT output, max. 200 mW, suitable for earphones	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N030/ N040	max. baud rate 115 kbaud, not combinable with N030/ N040	max. 20 m cable length Cat. 5, not combinable with CX1100-0004
Power supply	via system bus (through CX1100-xxxx power supply modules)						
Dimensions (W x H x D)	19 mm x 100 mm x 51 mm						
Weight	approx. 80 g						
Operating/storage temperature	0…+55 °C/-25…+85 °C						
Relative humidity	95 %, no condensation						
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27						
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4						
Protection class	IP 20						
Approvals	CE, UL						
Further information	www.beckhoff.com/CX1020-N010	www.beckhoff.com/CX1020-N020	www.beckhoff.com/CX1020-N030	www.beckhoff.com/CX1020-N040	www.beckhoff.com/CX1020-N031	www.beckhoff.com/CX1020-N041	www.beckhoff.com/CX1020-N060

DVI/USB interface

Audio interface

RS232 interface

RS422/RS485 interface

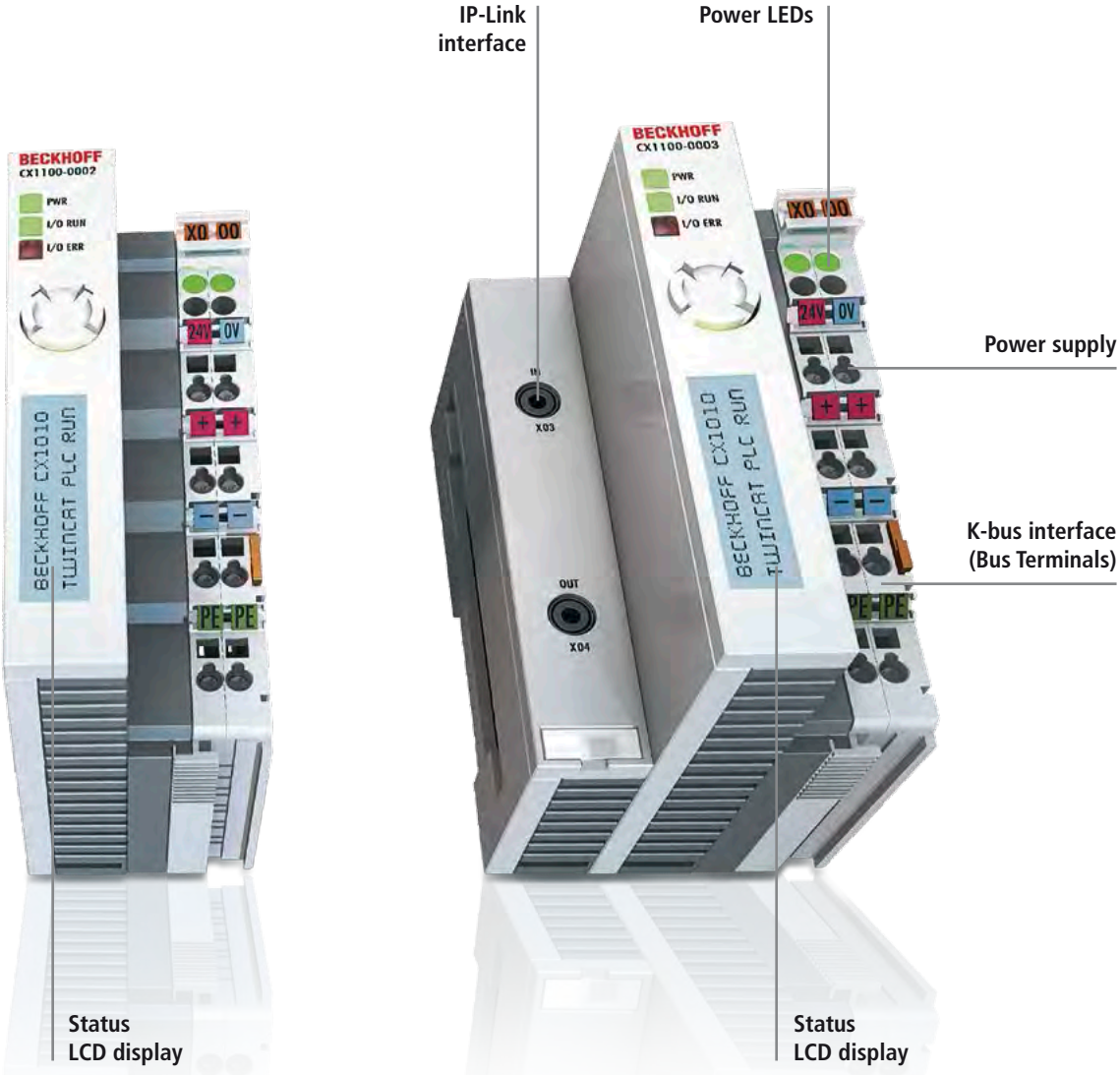
Ethernet interface

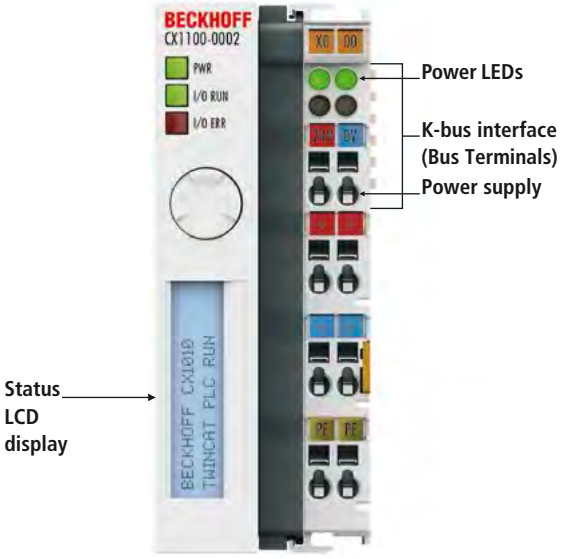
CX1030-N0xx | System interfaces

A number of optional interface modules are available for the basic CX1030 CPU module that can be installed ex factory. The CX1030-N010 option connects Beckhoff Control Panels or standard monitors with DVI or VGA input via the DVI or USB interfaces. Devices such as a printer, scanner, mouse, keyboard, mass storage, etc. can be connected via the USB 2.0 interfaces. Multimedia capability is realised via the CX1030-N020 audio interface. The modules CX1030-N030 and CX1030-N040 offer a total of four serial RS232 interfaces with a maximum transfer speed of 115 kbaud. These four interfaces can be implemented in pairs as RS422/RS485, in which case they are identified as CX1030-N031 and CX1030-N041 respectively. The system interfaces cannot be retrofitted or expanded in the field. They are supplied ex factory in the specified configuration and cannot be separated from the CPU module. The internal PC/104 bus runs through the system interfaces, so that further CX components can be connected. The power supply of the system interface modules is ensured via the internal PC/104 bus.

Technical data	CX1030-N010	CX1030-N020	CX1030-N030	CX1030-N040	CX1030-N031	CX1030-N041	CX1030-N060
Interfaces	1 x DVI + 2 x USB 2.0 (max. 500 mA per port)	Line IN, Line Mic IN, Line OUT	1 x COM1 + 1 x COM2, RS232	1 x COM3 + 1 x COM4, RS232	1 x COM1 + 1 x COM2, RS422/RS485	1 x COM3 + 1 x COM4, RS422/RS485	1 x Ethernet, 10/100 Mbit/s
Type of connection	DVI-I 29-pin socket + 2 USB ports type A	3.5 mm socket for jack plug	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	1 x RJ45
Properties	DVI-I interface also carries out VGA signals (DVI-A)	built-in PC beeper, Line OUT output, max. 200 mW, suitable for earphones	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N031/ N041	max. baud rate 115 kbaud, not combinable with N030/ N040	max. baud rate 115 kbaud, not combinable with N030/ N040	max. 20 m cable length Cat. 5, not combinable with CX1100-0004
Power supply	via system bus (through CX1100-xxxx power supply modules)						
Dimensions (W x H x D)	19 mm x 100 mm x 51 mm						
Weight	approx. 80 g						
Operating/storage temperature	0…+55 °C/-25…+85 °C						
Relative humidity	95 %, no condensation						
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27						
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4						
Protection class	IP 20						
Approvals	CE, UL						
Further information	www.beckhoff.com/CX1030-N010	www.beckhoff.com/CX1030-N020	www.beckhoff.com/CX1030-N030	www.beckhoff.com/CX1030-N040	www.beckhoff.com/CX1030-N031	www.beckhoff.com/CX1030-N041	www.beckhoff.com/CX1030-N060

CX1100-, CX1500-xxxx | Embedded PC interfaces for CX10xx





Power supply
with K-bus interface

Power supply
with E-bus interface

Power supply

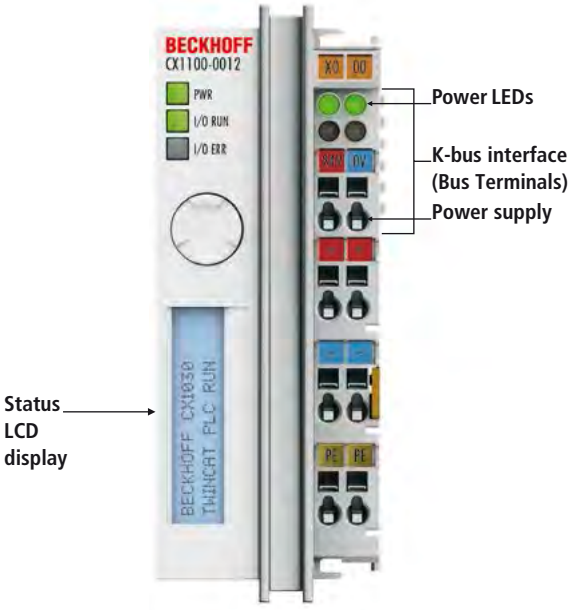
Power supply
with K-bus/IP-Link interface

CX1100-000x | Power supply units and I/O interfaces for CX1010/CX1020

Four power supplies are optionally available for CX1010/CX1020 systems; all other system components are powered via the internal PC/104 bus. Each CX1100-000x power supply module contains an integrated NOVRAM for the non-volatile storage of process data and an LC display (two lines of 16 characters). The CX1100-0002 version is suitable for the direct connection of Beckhoff Bus Terminals (KLxxxx); the Extension Box modules (IExxxx) from the Fieldbus Box range can be connected to the CX1100-0003 in addition to the Bus Terminals. The CX1100-0004 power supply unit is available for the connection of EtherCAT Terminals (ELxxxx). All power supply units for the CX1100-000x system can be exchanged in the field.

Technical data	CX1100-0002	CX1100-0004	CX1100-0001	CX1100-0003
Power supply	24 V DC (-15 %/+20 %)			
E-bus connection	–	yes (adapter terminal)	–	–
K-bus connection	yes (adapter terminal)	–	–	yes (adapter terminal)
IP-Link connection	–	–	–	yes
Current supply E-bus	–	2 A	–	–
Current supply K-bus	up to max. 1.75 A	–	–	1.75 A
Type of connection	spring-loaded technique (adapter terminal)	spring-loaded technique (adapter terminal)	1 x open style connector, 5-pin	spring-loaded technique (adapter terminal)
NOVRAM	8 kbytes			
Display	FSTN display 2 lines x 16 characters of text, illuminated			
I/O-DPRAM	4 kbytes	–	–	4 kbytes
Diagnostics LED	1 x PWR, 1 x I/O Run, 1 x I/O Err	1 x PWR, 1 x L/A, 1 x Run	1 x PWR	1 x PWR, 1 x I/O Run, 1 x I/O Err
Max. power consumption	3.5 W	3.5 W	2.5 W	4 W
Dimensions (W x H x D)	40 mm x 100 mm x 91 mm	40 mm x 100 mm x 91 mm	45 mm x 100 mm x 91 mm	58 mm x 100 mm x 91 mm
Weight	approx. 250 g	approx. 250 g	approx. 180 g	approx. 350 g
Operating/storage temperature	0…+55 °C/-25…+85 °C			
Relative humidity	95 %, no condensation			
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27			
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4			
Protection class	IP 20			
Approvals	CE, UL			
Further information	www.beckhoff.com/CX1100-0002	www.beckhoff.com/CX1100-0004	www.beckhoff.com/CX1100-0001	www.beckhoff.com/CX1100-0003

EtherCAT Terminals see page 2 110, Bus Terminals see page 2 442, Fieldbus Box modules see page 2 576



Power supply
with K-bus interface

Power supply
with E-bus interface

Power supply
with K-bus/IP-Link interface

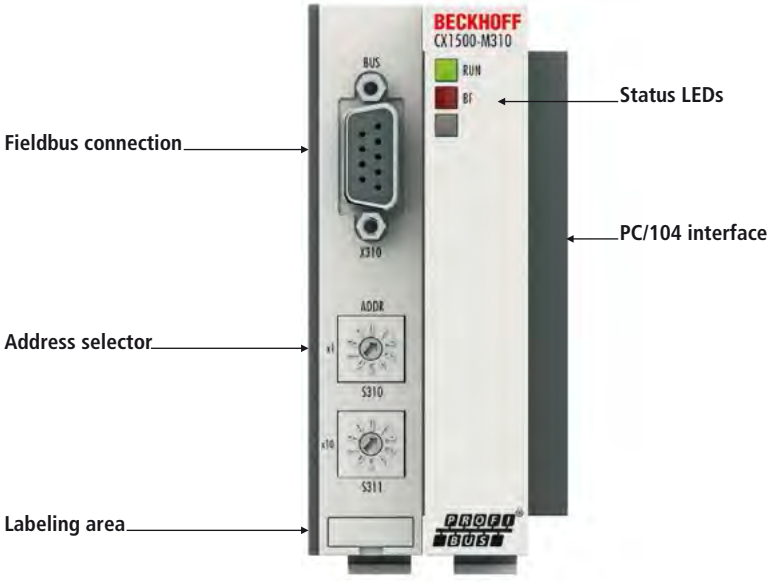
CX1100-001x | Power supply units and I/O interfaces for CX1030

Three power supplies are optionally available for CX1030 systems; all other system components are powered via the internal PC/104 bus. Each CX1100-001x power supply module contains an integrated NOVRAM for the non-volatile storage of process data and an LC display (two lines of 16 characters). The CX1100-0012 version is suitable for the direct connection of Beckhoff Bus Terminals (KLxxxx); the Extension Box modules (IExxxx) from the Fieldbus Box range can be connected to the CX1100-0013 in addition to the Bus Terminals. The CX1100-0014 power supply unit is available for EtherCAT Terminals (ELxxxx). The power supply units of the CX system can be changed in the field.

The CX1100-001x power supply units are electronically identical to the CX1100-000x series, but have an internal heat sink and additional ventilation slits. The CX1100-001x series is suitable for non-standard assembly directions, even when using a CX1020 or a CX1010 (see documentation).

Technical data	CX1100-0012	CX1100-0014	CX1100-0013
Power supply	24 V DC (-15 %/+20 %)		
E-bus connection	–	yes (adapter terminal)	–
K-bus connection	yes (adapter terminal)	–	yes (adapter terminal)
IP-Link connection	–	–	yes
Current supply E-bus	–	2 A	–
Current supply K-bus	up to max. 1.75 A	–	2 A
Type of connection	spring-loaded technique (adapter terminal)		
NOVRAM	8 kbytes		
Display	FSTN display 2 lines x 16 characters of text, illuminated		
I/O-DPRAM	4 kbytes	–	4 kbytes
Diagnostics LED	1 x PWR, 1 x I/O Run, 1 x I/O Err	1 x PWR, 1 x L/A, 1 x Run	1 x PWR, 1 x I/O Run, 1 x I/O Err
Dimensions (W x H x D)	42 mm x 109 mm x 92 mm	42 mm x 109 mm x 92 mm	58 mm x 109 mm x 92 mm
Weight	approx. 240 g	approx. 235 g	approx. 325 g
Operating/storage temperature	0…+55 °C/-25…+85 °C		
Relative humidity	95 %, no condensation		
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27		
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4		
Protection class	IP 20		
Approvals	CE, UL		
Further information	www.beckhoff.com/CX1100-0012	www.beckhoff.com/CX1100-0014	www.beckhoff.com/CX1100-0013

EtherCAT Terminals see page 2 110, Bus Terminals see page 2 442, Fieldbus Box modules see page 2 576




Lightbus master

CANopen master

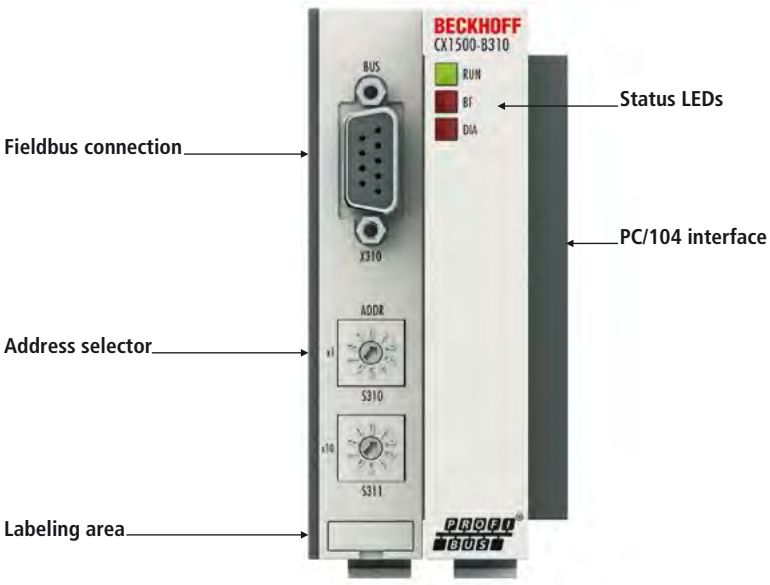

DeviceNet master


SERCOS II master

CX1500-Mxxx | Master fieldbus connections for CX10x0

The fieldbus master modules enable the segment-like construction of control structures in extensive plants and machines. The parallel operation of several identical or different masters is possible, e.g. two PROFIBUS masters or a PROFIBUS master and a SERCOS II master simultaneously in a system. In the case of mixed operation of master and slave connections, CX systems act as intelligent gateways between different fieldbuses: data are received, processed and fed into other fieldbuses. Compared with the PC Fieldbus Cards, the performance data of the fieldbus master modules are almost identical; CX variants are single-channel, however. Master or slave connections network several CX systems with one another strictly deterministically via the fieldbus level. CX fieldbus modules can be retrofitted/exchanged by adding them to existing CX systems. The fieldbus connections are powered via the PC/104 bus. The scanning and recognising of the modules, the parameterisation, the configuration of the connected I/O components and the online diagnosis of the process/fieldbus status take place in the TwinCAT System Manager.

Technical data	CX1500-M200	CX1500-M310	CX1500-M510	CX1500-M520	CX1500-M750
Fieldbus	Lightbus	PROFIBUS DP, DP-V1, DP-V2 (MC)	CANopen	DeviceNet	SERCOS II
Data transfer rates	2.5 Mbaud, 32 bit of process data in 25 µs	9.6 kbaud… 12 Mbaud	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbaud	125, 250, 500 kbaud	2, 4, 8, 16 Mbaud
Bus interface	2 x fibre optic	1 x D-sub socket, 9-pin	open style connector, 5-pin	open style connector, 5-pin	FSMA standard, IEC 872-2
Bus device	max. 254 nodes with a max. of 65,280 I/O points	max. 125 slaves with up to 244 bytes data per slave	max. 127 slaves	max. 63 slaves	max. 254 slaves
Interface to the CPU	ISA plug and play, 2 kbyte DPRAM				
Max. power loss	2 W	1.8 W	1.8 W	1.8 W	1.3 W
Dimensions (W x H x D)	38 mm x 100 mm x 91 mm				
Weight	approx. 190 g				
Operating/storage temperature	0…+55 °C/-25…+85 °C				
Relative humidity	95 %, no condensation				
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27				
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4				
Driver	only compatible with TwinCAT 2	for TwinCAT 2/ TwinCAT 3	for TwinCAT 2/ TwinCAT 3	for TwinCAT 2/ TwinCAT 3	for TwinCAT 2/ TwinCAT 3
Protection class	IP 20				
Approvals	CE, UL				
Further information	www.beckhoff.com/ CX1500-M200	www.beckhoff.com/ CX1500-M310	www.beckhoff.com/ CX1500-M510	www.beckhoff.com/ CX1500-M520	www.beckhoff.com/ CX1500-M750



PROFIBUS slave

Lightbus slave

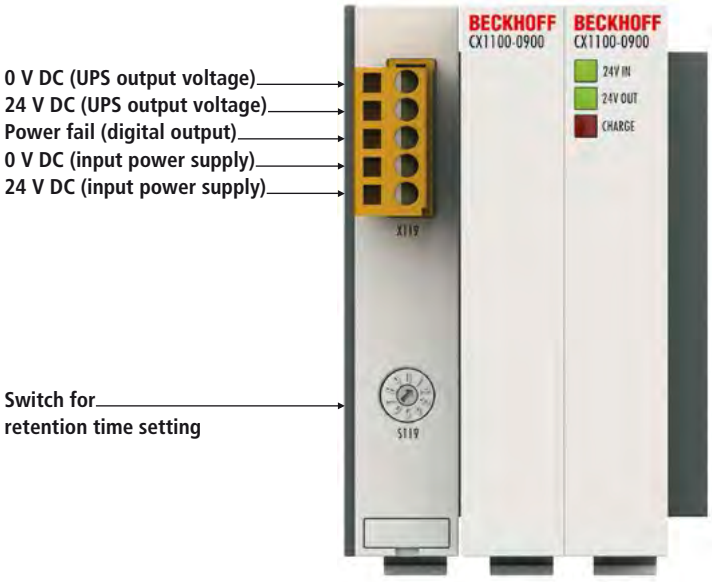
CANopen slave

DeviceNet slave

CX1500-Bxxx | Slave fieldbus connections for CX10x0

Fieldbus slave modules enable the use of a CX system as a subordinate local controller for the construction of complex or modular systems. External process data are received from the master and processed, or data from its own process peripherals are returned to the master controller directly or processed. The interface between the respective bus system and the CX CPU module is the DPRAM, which is addressed by the CPU module via the internal ISA bus. The parallel operation of several identical or different slave connections is possible, e.g. two PROFIBUS slaves or a PROFIBUS slave and a SERCOS slave simultaneously in a system. In the case of mixed operation of master and slave connections, CX systems act as intelligent gateways between different fieldbuses: data are received, processed and fed into other fieldbuses. The CX fieldbus modules are single-channel. Master or slave connections network several CX systems with one another strictly deterministically via the fieldbus level. CX fieldbus modules can be retrofitted/exchanged by adding them to existing CX systems. The fieldbus connections are powered via the PC/104 bus. The integration of the fieldbus connections in TwinCAT automation software is simple, as usual. The scanning and recognising of the modules, the parameterisation, the configuration of the connected I/O components and the online diagnosis of the process/fieldbus status take place in the TwinCAT System Manager.

Technical data	CX1500-B200	CX1500-B310	CX1500-B510	CX1500-B520
Fieldbus	Lightbus	PROFIBUS DP, DP-V1, DP-V2 (MC)	CANopen	DeviceNet
Data transfer rates	2.5 Mbaud, 32 bit of process data in 25 µs	9.6 kbaud…12 Mbaud	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbaud	125, 250, 500 kbaud
Bus interface	2 x fibre optic	1 x D-sub socket, 9-pin	open style connector, 5-pin	open style connector, 5-pin
Bus device	max. 255 slaves	max. 125 slaves	max. 127 slaves	max. 63 slaves
Max. number of bytes	max. 512 byte input/ 512 byte output	max. 244 byte input/ 244 byte output	max. 1536 byte input/ 1536 byte output	max. 255 byte input/ 255 byte output
Max. power loss	1.8 W			
Dimensions (W x H x D)	38 mm x 100 mm x 91 mm			
Weight	approx. 190 g			
Operating/storage temperature	0…+55 °C/-25…+85 °C			
Relative humidity	95 %, no condensation			
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27			
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4			
Driver	only compatible with TwinCAT 2	for TwinCAT 2/ TwinCAT 3	for TwinCAT 2/ TwinCAT 3	for TwinCAT 2/ TwinCAT 3
Protection class	IP 20			
Approvals	CE, UL			
Further information	www.beckhoff.com/ CX1500-B200	www.beckhoff.com/ CX1500-B310	www.beckhoff.com/ CX1500-B510	www.beckhoff.com/ CX1500-B520



UPS CX1100-0900

UPS CX1100-0910

UPS CX1100-0920, CX1100-0930

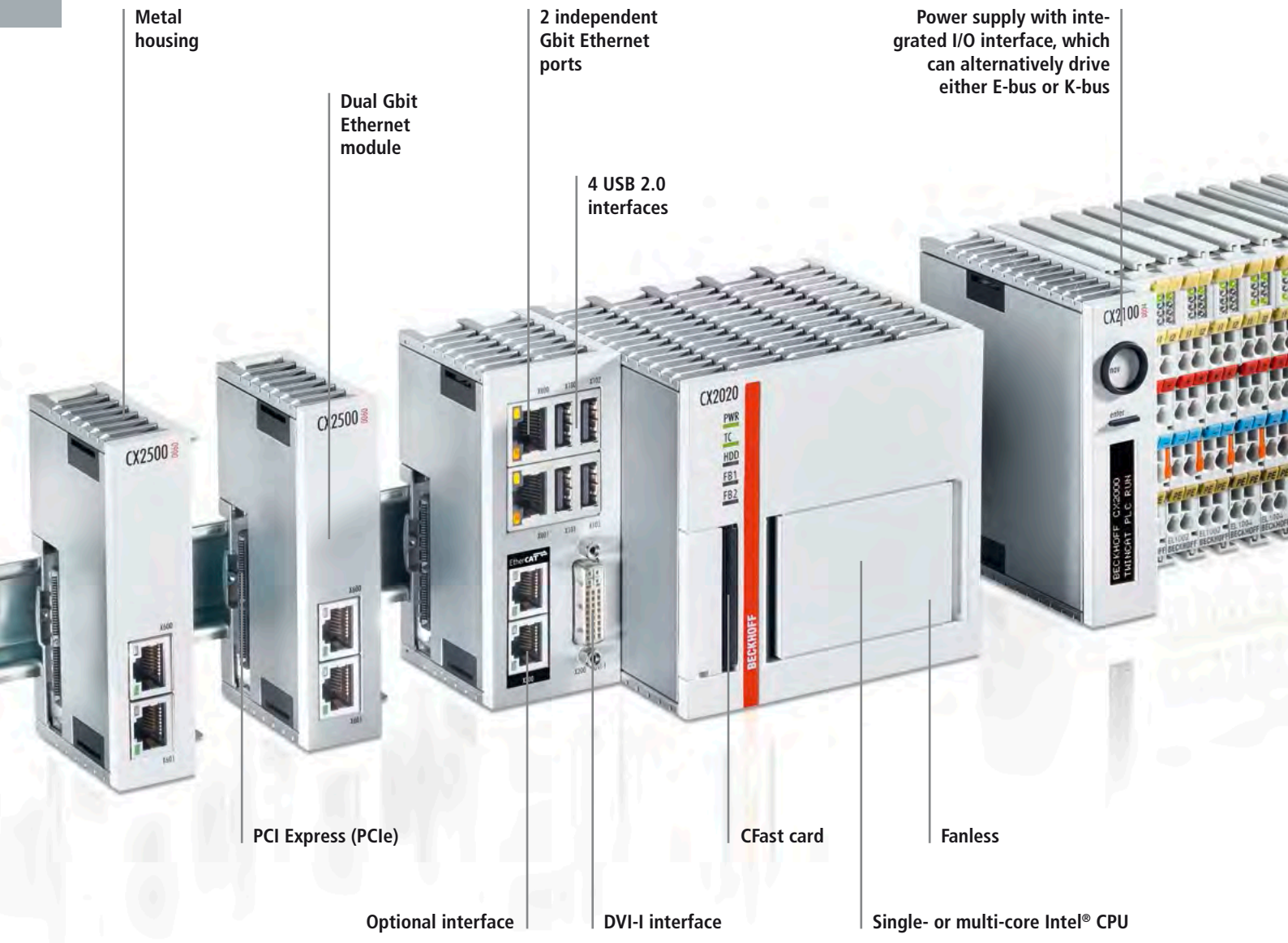
CX1100-09x0 | UPS modules for CX10x0

The CX1100-09x0 UPS module (uninterruptible power supply) for CX CPUs and the connected CX components ensures that important data are stored safely by the user software if the external voltage fails. As opposed to other battery operated methods, the use of the latest capacitor technologies enables absolute freedom from maintenance and fast charging. By storing the data, for example on a Compact Flash card, in NOVRAM or via the network in a database, the machine or the process can be placed in a defined condition during the retention time of the UPS and the operating system can be shut down. The retention time can be set via a rotary switch or via software. UPS settings are made and its status messages are output via a DPRAM interface. The functionality of the UPS is therefore independent of the operating system to be used. No driver software is required. The TwinCAT System Manager recognises the UPS module automatically, and the signals are available to the PLC programmer. The module is installed by simply adding it to a CX system in addition to wiring a 24 V DC supply line, and it can also be retrofitted on site. The 24 V DC output voltage of the UPS is protected against short circuit and overload. When dimensioning the UPS, the power consumption of the CX device being powered must be considered. For the supply, a regulated 24 V DC power supply unit with an output current of at least 4 A is required. The CX1100-0920 UPS is recommended for UPS use with a CX1020 and the CX1100-0930 UPS for use with a CX1030.

Technical data	CX1100-0900	CX1100-0910	CX1100-0920	CX1100-0930
Power supply	24 V DC (-15 %/+20 %)			
Storage technology	capacitive			
Capacity	20 As	20 As	40 As	40 As
Retention time	adjustable, load-dependent			
Max. output current	550 mA (24 V DC)	1.1 A (24 V DC)	1.1 A (24 V DC)	2.0 A (24 V DC)
Charging current	max. 4 A			
Diagnostics LED	24 V DC input, 24 V DC output, Charge			
Interface to the CPU	16 bit ISA (PC/104 standard)			
Max. power loss	2 W			
Dimensions (W x H x D)	57 mm x 100 mm x 91 mm	76 mm x 100 mm x 91 mm	95 mm x 100 mm x 91 mm	95 mm x 100 mm x 91 mm
Weight	approx. 346 g	approx. 465 g	approx. 617 g	approx. 650 g
Operating/storage temperature	0…+55 °C/-25…+85 °C			
Relative humidity	95 %, no condensation			
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27			
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4			
Protection class	IP 20			
Approvals	CE, UL			
Further information	www.beckhoff.com/CX1100-0900	www.beckhoff.com/CX1100-0910	www.beckhoff.com/CX1100-0920	www.beckhoff.com/CX1100-0930

CX2000 | Embedded PCs

▶ www.beckhoff.com/CX2000



CX2020

CX2030

CX2040

The CX2020, CX2030 and CX2040 Embedded PCs extend the CX product family with versions with very high CPU power (optionally with multi-core) and enable direct connection of Bus Terminals or EtherCAT Terminals. The CX2000 in conjunction with EtherCAT and TwinCAT enables very fast control processes in the microsecond range (eXtreme Fast Control Technology).

The basic CPU modules have a CFast card, two independent Gbit Ethernet interfaces, four USB 2.0 interfaces and a DVI-I interface as standard. In addition there are fieldbus or serial connection options. Please note that these have to be specified with the order, i.e. retrospective installation is not possible. Other components from the CX2000 family can be connected via the multi-pin terminals on either side. The multi-pin terminal on the left-hand side enables the connection of up to four further optional modules.

The components

The individual system component are 22 mm wide or a multiple thereof. The basic unit consists of the CX20x0 CPU module and a power supply module (CX2100-0xxx).

Power supply unit with integrated I/O interface and optional UPS

The 24 V DC power supply unit is available in four different versions:

- CX2100-0004: E-bus/K-bus power supply unit with automatic switchover
- CX2100-0014: E-bus/K-bus power supply unit with automatic switchover and passive ventilation
- CX2100-0904: E-bus/K-bus power supply unit with automatic switchover and integrated capacitive UPS
- CX2100-0914: E-bus/K-bus power supply unit with automatic switchover and integrated electronic charging unit for external battery packs in order to maintain UPS functionality

All power supply units feature an illuminated anti-glare LC display with two rows of 16 characters each for displaying status messages.

The application programs can also use the display for displaying application-specific texts.

EtherCAT as a fast I/O system

The Embedded PCs were developed with a view towards optimised interaction with EtherCAT. EtherCAT offers a wide range of application options. The separate Gbit Ethernet interfaces enable EtherCAT to be used with cable redundancy by using one of the Ethernet interfaces as redundancy port. In addition, devices with EtherCAT slave interface can be operated such that several intelligent controllers can be synchronised via an EtherCAT network.

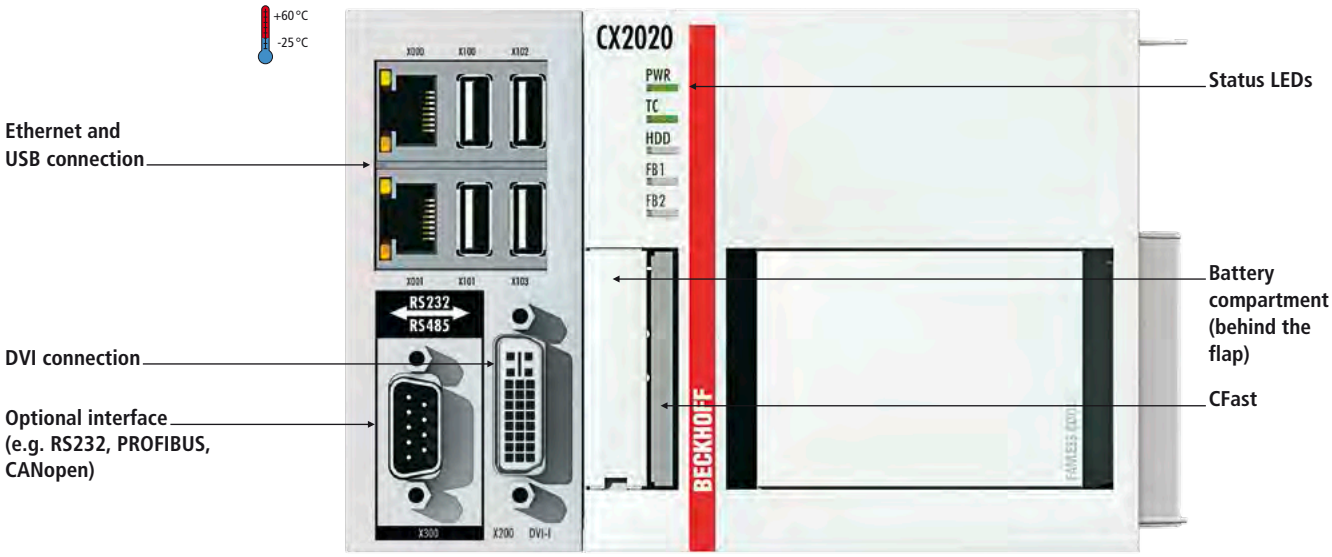
PLC, Motion Control, interpolation and visualisation

As IPC on a DIN rail the CX2000 in conjunction with TwinCAT offers the functionality of large Industrial PCs. Multi-core CPUs in conjunction with TwinCAT 3 enable PLC projects to be distributed to several cores, resulting in significant performance gains.

Moreover, all TwinCAT functionalities are available for Motion Control applications: in theory, up to 256 axes can be controlled. In addition to simple point-to-point movements, more complex multi-axis functions such as electronic gearbox, cam plates and flying saw can be implemented. Due to the high-performance CPUs in the CX2000, interpolating 3D path movements can also be implemented and DIN 66025 programs executed.

In addition to handling real-time control tasks the TwinCAT real-time kernel leaves enough time for the user interface (HMI). The high performance of the graphics kernel integrated in the CPU enables demanding visualisations with advanced user interfaces to be realised.

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



CX2020, CX2030, CX2040 | **Basic CPU module**

The CX2020 has a 1.4 GHz Intel® Celeron® CPU, the CX2030 has a 1.5 GHz Intel® Core™ i7 dual-core CPU and the CX2040 has a 2.1 GHz Intel® Core™ i7 quad-core CPU. In the CX2020 and CX2030 the controller is fanless and has no rotating components. Due to its high power, the CX2040 has a fan with ball bearings and speed monitoring. In addition to the CPU and chipset the basic modules also contain the main memory. For the CX2020 and CX2030 the size is 2 GB. 4 GB is possible as option. The CX2040 has 4 GB of RAM as standard. The controller boots from the CFast card. The CPU has a 128 kB NOVRAM persistent data memory for situations where no UPS is used. Up to four modules can be connected to the basic CPU module. The connection order is irrelevant. Internally the modules are connected via PCI Express and can be connected subsequently to the CPU in the field. The power supply for the CPU module comes from a CX2100 power supply module, which is connected on the right-hand side of the CPU. Two further CFast memory card modules (CX2550-0010) can be connected between the power supply unit and the CPU, so that a total of up to three CFast cards can be used. RAID can be used in situations where more than one CFast card is used.

The order identifier is derived as follows:

CX20x0-01ST

- 0 = no TwinCAT
- 1 = with TwinCAT 2 PLC runtime
- 2 = with TwinCAT 2 NC PTP runtime
- 3 = with TwinCAT 2 NC I runtime
- 5 = TwinCAT 3 runtime (XAR)

- 0 = no operating system
- 1 = operating system Microsoft Windows Embedded Compact 7
- 2 = operating system Microsoft Windows Embedded Standard 7 P 32 bit
- 3 = operating system Microsoft Windows Embedded Standard 7 P 64 bit
- 4 = Windows 10 IoT Enterprise LTSB 32 bit
- 5 = Windows 10 IoT Enterprise LTSB 64 bit

- 2 = Intel® Celeron® processor 1.4 GHz, 1 core
- 3 = Intel® Core™ processor 1.5 GHz, 2 cores
- 4 = Intel® Core™ processor 2.1 GHz, 4 cores

Optional interfaces:

CX20x0-N010 = second DVI connection, DVI-D port
CX20x0-N030 = RS232, D-sub plug
CX20x0-N031 = RS422/RS485, D-sub socket
CX20x0-B110 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)
CX20x0-M310 = PROFIBUS master, D-sub socket, 9-pin
CX20x0-B310 = PROFIBUS slave, D-sub socket, 9-pin
CX20x0-M510 = CANopen master, D-sub plug, 9-pin
CX20x0-B510 = CANopen slave, D-sub plug, 9-pin
CX20x0-M930 = PROFINET RT, controller
CX20x0-B930 = PROFINET RT, device, Ethernet (2 x RJ45 switch)
CX20x0-B931 = PROFINET IRT, device, Ethernet (2 x RJ45 switch)
CX20x0-B950 = EtherNet/IP slave, Ethernet (2 x RJ45 switch)

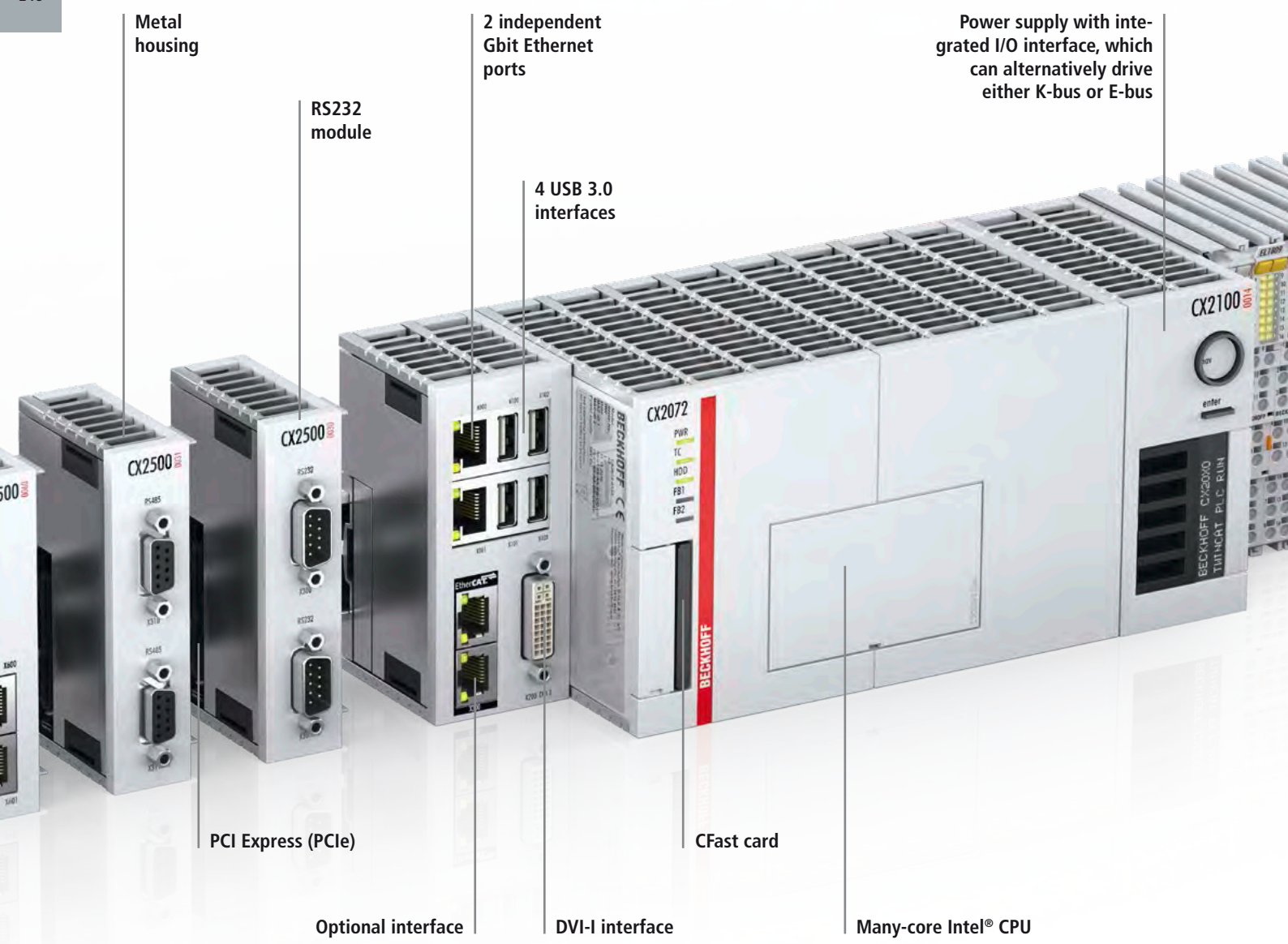
Since not all combinations make sense, the table "Ordering information" contains a breakdown of the permissible combinations.

Technical data	CX2020	CX2030	CX2040
Processor	Intel® Celeron® 827E 1.4 GHz	Intel® Core™ i7 2610UE 1.5 GHz	Intel® Core™ i7 2715QE 2.1 GHz
Flash memory	slot for CFast card, optionally 4 or 8 GB included (expandable)		
Main memory	2 GB DDR3 RAM (expandable ex factory to 4 GB)	2 GB DDR3 RAM (expandable ex factory to 4 GB)	4 GB DDR3 RAM (not expandable)
Persistent memory	128 KB NOVRAM integrated		
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 2.0, 1 x optional interface		
Cooling	passive cooling, optionally with active cooling ex factory	passive cooling, optionally with active cooling ex factory	integrated fan with ball bearings and speed monitoring
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status		
Clock	internal battery-backed clock for time and date (battery exchangeable)		
Operating system	Microsoft Windows Embedded Compact 7, Microsoft Windows Embedded Standard 7 P or Microsoft Windows 10 IoT Enterprise LTSB		
Control software	TwinCAT 2 runtime TwinCAT 3 runtime (XAR)		
I/O connection	via power supply module (E-bus or K-bus, automatic recognition)		
Power supply	24 V DC (-15 %/+20 %)		
Max. power loss	15 W (including the system interfaces)	20 W (including the system interfaces)	42 W (including the system interfaces)
Dimensions (W x H x D)	144 mm x 100 mm x 91 mm		
Weight	approx. 1160 g	approx. 1165 g	approx. 1230 g
Operating/storage temperature	-25…+60 °C/-40…+85 °C		
Relative humidity	95 %, no condensation		
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27		
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4		
Protection class	IP 20		
Approvals	CE, UL		
TC3 performance class	Performance plus (50); for further information on TwinCAT 3 see page 470	Mid performance (60); for further information on TwinCAT 3 see page 470	High performance (70); for further information on TwinCAT 3 see page 470
Further information	www.beckhoff.com/CX2020	www.beckhoff.com/CX2030	www.beckhoff.com/CX2040

Ordering information	no operating system	Windows Embedded			Windows 10 IoT Enterprise LTSB		no TwinCAT	TwinCAT 2 runtime			TwinCAT 3 runtime (XAR)
		Compact 7	Standard 7 P 32 bit	Standard 7 P 64 bit	32 bit	64 bit		PLC	NC PTP	NC I	
CX20x0-0100	x	–	–	–	–	–	x	–	–	–	–
CX20x0-0110	–	x	–	–	–	–	x	–	–	–	–
CX20x0-0111	–	x	–	–	–	–	–	x	–	–	–
CX20x0-0112	–	x	–	–	–	–	–	–	x	–	–
CX20x0-0113	–	x	–	–	–	–	–	–	–	x	–
CX20x0-0115	–	x	–	–	–	–	–	–	–	–	x
CX20x0-0120	–	–	x	–	–	–	x	–	–	–	–
CX20x0-0121	–	–	x	–	–	–	–	x	–	–	–
CX20x0-0122	–	–	x	–	–	–	–	–	x	–	–
CX20x0-0123	–	–	x	–	–	–	–	–	–	x	–
CX20x0-0125	–	–	x	–	–	–	–	–	–	–	x
CX20x0-0130	–	–	–	x	–	–	x	–	–	–	–
CX20x0-0135	–	–	–	x	–	–	–	–	–	–	x
CX20x0-0140	–	–	–	–	x	–	x	–	–	–	–
CX20x0-0141	–	–	–	–	x	–	–	x	–	–	–
CX20x0-0142	–	–	–	–	x	–	–	–	x	–	–
CX20x0-0143	–	–	–	–	x	–	–	–	–	x	–
CX20x0-0150	–	–	–	–	–	x	x	–	–	–	–
CX20x0-0155	–	–	–	–	–	x	–	–	–	–	x

CX20x2 | Embedded PCs

▶ www.beckhoff.com/CX20x2



CX2042, CX2062, CX2072

The CX2042, CX2062 and CX2072 Embedded PCs extend the CX product family with versions with very high CPU power (optionally with many-core) and enable direct connection of Bus Terminals or EtherCAT Terminals. The CX20x2 in conjunction with EtherCAT and TwinCAT enables very fast control processes in the microsecond range (eXtreme Fast Control Technology).

The basic CPU modules have a CFast card, two independent Gbit Ethernet interfaces, four USB 3.0 interfaces and a DVI-I interface as standard. In addition there are fieldbus or serial connection options. Please note that these have to be specified with the order, i.e. retrospective installation is not possible. Other components from the CX2000 family can be connected via the multi-pin terminals on either side. The multi-pin terminal on the left-hand side enables the connection of up to four further optional modules.

The components

The individual system component are 22 mm wide or a multiple thereof. The basic unit consists of the CX20x2 CPU module and a power supply module (CX2100-0xxx).

Power supply unit with integrated I/O interface and optional UPS

The 24 V DC power supply unit is available in two different versions:

– CX2100-0014: E-bus/K-bus power supply unit with automatic switchover and passive ventilation
– CX2100-0914: E-bus/K-bus power supply unit with automatic switchover and integrated electronic charging unit for external battery packs in order to maintain UPS functionality

Both power supply units feature an illuminated anti-glare LC display with two rows of 16 characters each for displaying status messages.

The application programs can also use the display for displaying application-specific texts.

EtherCAT as a fast I/O system

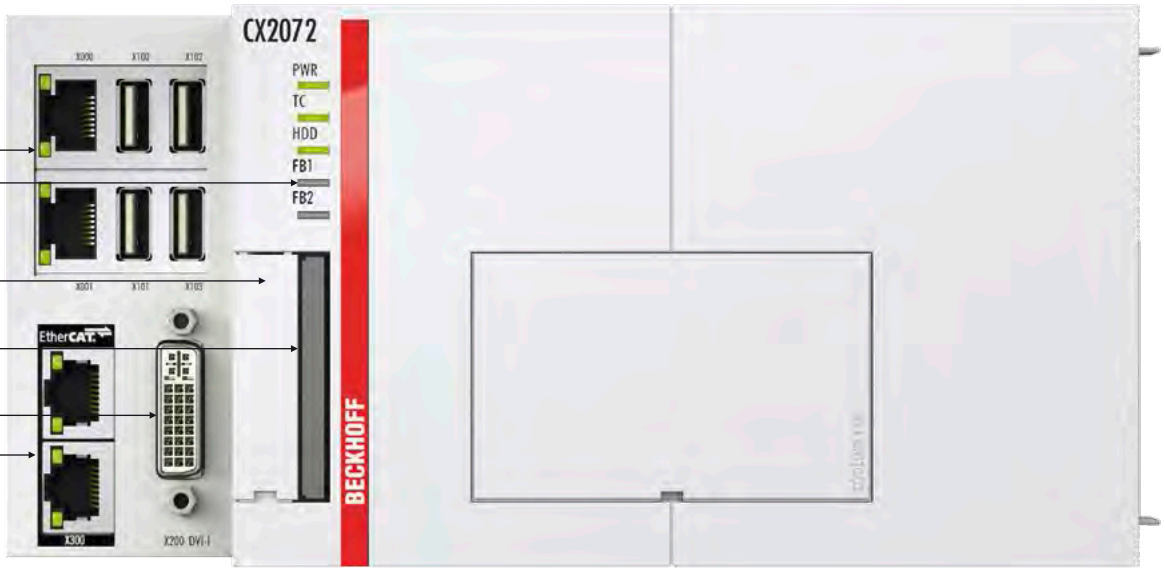
The CX2042, CX2062 and CX2072 Embedded PCs were developed with a view towards optimised interaction with EtherCAT. EtherCAT offers a wide range of application options. The separate Gbit Ethernet interfaces enable EtherCAT to be used with cable redundancy by using one of the Ethernet interfaces as redundancy port. In addition, devices with EtherCAT slave interface can be operated such that several intelligent controllers can be synchronised via an EtherCAT network.

PLC, Motion Control, interpolation and visualisation

As IPC on a DIN rail the CX20x2 in conjunction with TwinCAT offers the functionality of large Industrial PCs. Many-core CPUs in conjunction with TwinCAT 3 enable PLC projects to be distributed to several cores, resulting in significant performance gains.

Moreover, all TwinCAT functionalities are available for Motion Control applications: in theory, up to 256 axes can be controlled. In addition to simple point-to-point movements, more complex multi-axis functions such as electronic gearbox, cam plates and flying saw can be implemented. Due to the high-performance CPUs in the CX20x2, interpolating 3D path movements can also be implemented and DIN 66025 programs executed.

In addition to handling real-time control tasks the TwinCAT real-time kernel leaves enough time for the user interface (HMI). The high performance of the graphics kernel integrated in the CPU enables demanding visualisations with advanced user interfaces to be realised.



CX2042, CX2062, CX2072 | Many-core basic CPU module

Providing many-core performance on the DIN rail, the Embedded PCs CX20x2 make very powerful industrial control systems possible.

The CX2042 has an Intel® Xeon® CPU with a clock rate of 2.2 GHz (four cores), the CX2062 an Intel® Xeon® CPU with a clock rate of 2.0 GHz (eight cores) and the CX2072 an Intel® Xeon® CPU with a clock rate of 2.1 GHz (12 cores). A fan with ball bearings and speed monitoring is integrated into all basic CPU modules. In addition to the CPU, the basic modules also contain the main memory with a size of 8 GB RAM, optionally available with up to 32 GB. The controller boots from a CFast card where both the operating system as well as user programs and data are stored. The CPU has an internal 128 kB NOVRAM, which acts as a persistent data memory if no UPS is used. Microsoft Windows 10 IoT Enterprise LTSB 64 bit is used as operating system. The use of TwinCAT 3 allows automation tasks to be distributed across the various cores of the Intel® Xeon® CPU. All system modules from the CX2000 series for left- or right-sided functional extensions can also be connected to the new Embedded PCs.

Internally the modules are connected via PCI Express and can be plugged to the CPU in the field. The power supply for the CPU module comes from a CX2100-0014 power supply module. Up to two mass storage modules (either CX2550-0010 CFast modules or CX2550-0020 2½-inch SSD modules) can be plugged in between the power supply unit and the CPU, allowing the use of up to three mass storage devices in total.

The order identifier is derived as follows:

CX20x2-01ST

- 0 = no TwinCAT
- 5 = TwinCAT 3 runtime (XAR)

- 0 = no operating system
- 5 = Windows 10 IoT Enterprise LTSB 64 bit

- 4 = Intel® Xeon® processor 2.2 GHz, 4 cores
- 6 = Intel® Xeon® processor 2.0 GHz, 8 cores
- 7 = Intel® Xeon® processor 2.1 GHz, 12 cores

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

Optional interfaces:

CX20x2-N010 = second DVI connection, DVI-D port
CX20x2-N011 = DisplayPort interface
CX20x2-N030 = RS232, D-sub plug
CX20x2-N031 = RS422/RS485, D-sub socket
CX20x2-M310 = PROFIBUS master, D-sub socket, 9-pin
CX20x2-B310 = PROFIBUS slave, D-sub socket, 9-pin
CX20x2-M510 = CANopen master, D-sub plug, 9-pin
CX20x2-B510 = CANopen slave, D-sub plug, 9-pin
CX20x2-M930 = PROFINET RT, controller
CX20x2-B930 = PROFINET RT, device, Ethernet (2 x RJ45 switch)
CX20x2-B931 = PROFINET IRT, device, Ethernet (2 x RJ45 switch)
CX20x2-B950 = EtherNet/IP slave, Ethernet (2 x RJ45 switch)
CX20x2-B110 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ45)

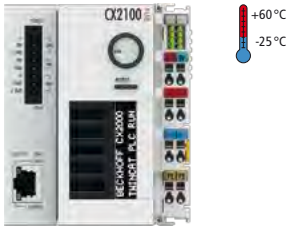
Technical data	CX2042	CX2062	CX2072
Processor	Intel® Xeon® D-1527 2.2 GHz, 4 cores (TC3: 70)	Intel® Xeon® D-1548 2.0 GHz, 8 cores (TC3: 80)	Intel® Xeon® D-1567 2.1 GHz, 12 cores (TC3: 81)
Graphics	AMD E8860, 2 GB GDDR5		
Flash memory	slot for CFast card, card not included		
Main memory	8 GB DDR4 RAM (expandable ex factory to 32 GB)		
Persistent memory	128 KB NOVRAM integrated		
Interfaces	2 x RJ45 10/100/1000 Mbit/s, 1 x DVI-I, 4 x USB 3.0, 1 x optional interface		
Cooling	integrated fan with ball bearings and speed monitoring		
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status		
Clock	internal battery-backed clock for time and date (battery exchangeable)		
Operating system	Microsoft Windows 10 IoT Enterprise, Long Term Servicing Branch (LTSB), 64 bit		
Control software	TwinCAT 3 runtime (XAR)		
I/O connection	via power supply module (E-bus or K-bus, automatic recognition)		
Power supply	24 V DC (-15 %/+20 %)		
Max. power loss	100 W	110 W	130 W
Dimensions (W x H x D)	204 mm x 99 mm x 91 mm		
Weight	approx. 1300 g		
Operating/storage temperature	-25…+50 °C/-40…+85 °C		
Relative humidity	95 %, no condensation		
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27		
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4		
Protection class	IP 20		
Approvals	CE		
TC3 performance class	High performance (70); for further information on TwinCAT 3 see page 470	Very high performance (80); for further information on TwinCAT 3 see page 470	Many Core 5–8 cores (81); for further information on TwinCAT 3 see page 470
Further information	www.beckhoff.com/CX2042	www.beckhoff.com/CX2062	www.beckhoff.com/CX2072

Ordering information	no operating system	Windows 10 IoT Enterprise LTSB 64 bit	no TwinCAT	TwinCAT 3 runtime (XAR)
CX2042-0100	x	–	x	–
CX2042-0150	–	x	x	–
CX2042-0155	–	x	–	x
CX2062-0100	x	–	x	–
CX2062-0150	–	x	x	–
CX2062-0155	–	x	–	x
CX2072-0100	x	–	x	–
CX2072-0150	–	x	x	–
CX2072-0155	–	x	–	x

Power supply unit with E-bus/K-bus interface

Power supply unit with E-bus/K-bus interface and passive ventilation

Power supply unit with integrated capacitive UPS and E-bus/K-bus interface



Power supply unit with integrated Smart Battery charger and E-bus/K-bus interface

CX2100-0xxx | Power supply units and UPS modules for CX2000

Each of the four CX2100 power supply modules has an LC display with 2 x 16 characters. It is controlled via TwinCAT. All power supply modules feature automatic E-bus/K-bus detection and therefore support both I/O systems. The standard power supply CX2100-0004 provides a maximum output of 45 W. The more powerful CX2100-0014 power supply unit offers a maximum output of 130 W. It has to be used for CX2040 or CX20x2 systems with quad-core CPUs or higher. Thanks to its wider housing front the CX2100-0014 also allows passive ventilation through the front and is thus also suitable for horizontal mounting positions. Optionally it can be equipped with active ventilation (fan option) to provide the normally fanless CX2020/CX2030 with a better heat dissipation for operation in different ambient conditions. The CX2100-0904 module also features integrated capacitive UPS. In the event of a power failure this enables the system to save data on the storage medium and then shut down in an orderly manner. The CX2100-0914 module can be used to charge external battery packs in order to provide backup power for the system and external components such as Control Panels. All power supply units from the CX2000 series are in principle passively cooled and fanless.

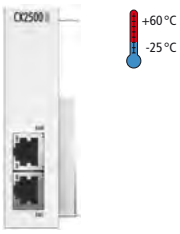
Technical data	CX2100-0004	CX2100-0014	CX2100-0904	CX2100-0914
Power supply	24 V DC (-15 %/+20 %)			
Max. output	45 W	130 W	45 W	100 W
I/O connection	E-bus or K-bus, automatic recognition			
Current supply E-bus/K-bus	2 A			
UPS	–	–	capacitively integrated	external
Capacity	–	–	75 As	dependent on battery
Type of connection	spring-loaded technique (adapter terminal)			
Display	FSTN display 2 lines x 16 characters of text, illuminated			
Diagnostics LED	1 x PWR, 1 x I/O Run, 1 x I/O Err			
Max. power consumption	3.5 W			
Dimensions (W x H x D)	40 mm x 100 mm x 91 mm	60 mm x 100 mm x 91 mm	118 mm x 100 mm x 91 mm	84 mm x 100 mm x 91 mm
Weight	approx. 375 g	approx. 550 g	approx. 1025 g	approx. 695 g
Operating/storage temperature	-25…+60 °C/-40…+85 °C	-25…+60 °C/-40…+85 °C	-25…+50 °C/-25…+60 °C	-25…+60 °C/-40…+85 °C
Relative humidity	95 %, no condensation			
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27			
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4			
Protection class	IP 20			
Approvals	CE, UL			
Further information	www.beckhoff.com/CX2100-0004	www.beckhoff.com/CX2100-0014	www.beckhoff.com/CX2100-0904	www.beckhoff.com/CX2100-0914
Option				
CX2900-0192	battery pack for CX2100-0914			

EtherCAT Terminals see page 2 110, Bus Terminals see page 2 442

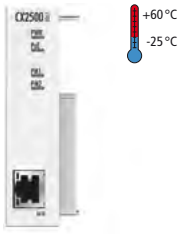
Audio interface

RS232 interface

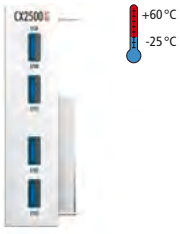
RS422/RS485 interface



Dual Gbit Ethernet interface



Power over Ethernet interface



USB interface

CX2500-00xx | System modules for CX2000

The system modules for the CX2000 family are connected to the CPU on the left-hand side via a multi-pin connector. Internally they are connected via PCI Express. Up to four modules can be connected in any order.

The CX2500-0020 audio module (only for CX2020, CX2030 and CX2040) has a jack plug (5 x 3.5 mm) and a cinch plug for digital signals (SPDIF). Up to 7.1 multi-channel audio can be used. Serial interfaces can be added with the modules CX2500-0030 (RS232) and CX2500-0031 (RS422/RS485). The CX2500-0060 module provides two further independent Gbit Ethernet interfaces.

The CX2500-0061 Power over Ethernet module supports devices with PoE class 0, 1, 2, 3 and 4 in accordance with the PoE standard IEEE 802.3af-2003. The maximum PoE power output is 15.4 W. The PoE supply voltage is generated internally, no external power supply is necessary. In the case of an overload of the CX2500-0061, the PoE supply shuts down for two seconds, then restarts. The diagnostic LEDs PWR, PoE, PM1 and PM2 provide information about the type of PoE supply (mode A or B) as well as about the PoE class reported by the powered device.

The CX2500-0070 module can be used to add up to four further USB 3.0 interfaces.

Technical data	CX2500-0020	CX2500-0030	CX2500-0031	CX2500-0060	CX2500-0061	CX2500-0070
Interfaces	Line IN, Line OUT, Mic IN, 7.1, SPDIF	RS232	RS422/RS485	2 x Ethernet, 10/100/ 1000 Mbit/s	1 x Ethernet, 10/100/ 1000 Mbit/s with Power over Ethernet (PoE)	4 x USB 3.0 (max. 2 A total current)
Type of connection	3.5 mm socket for jack plug, RCA socket	2 x D-sub plug, 9-pin	2 x D-sub plug, 9-pin	2 x RJ45	1 x RJ45	4 x USB 3.0, type A
Power supply	via system bus (through CX2100-0xxx power supply modules)					
Dimensions (W x H x D)	24 mm x 99 mm x 54.5 mm					
Weight	approx. 180 g	approx. 205 g	approx. 203 g	approx. 195 g	approx. 208 g	approx. 195 g
Operating/storage temperature	-25…+60 °C/-40…+85 °C					
Relative humidity	95 %, no condensation					
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27					
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4					
Protection class	IP 20					
Approvals	CE, UL	CE, UL	CE, UL	CE, UL	CE	CE, UL
Further information	www.beckhoff.com/CX2500-0020	www.beckhoff.com/CX2500-0030	www.beckhoff.com/CX2500-0031	www.beckhoff.com/CX2500-0060	www.beckhoff.com/CX2500-0061	www.beckhoff.com/CX2500-0070

CFast slot

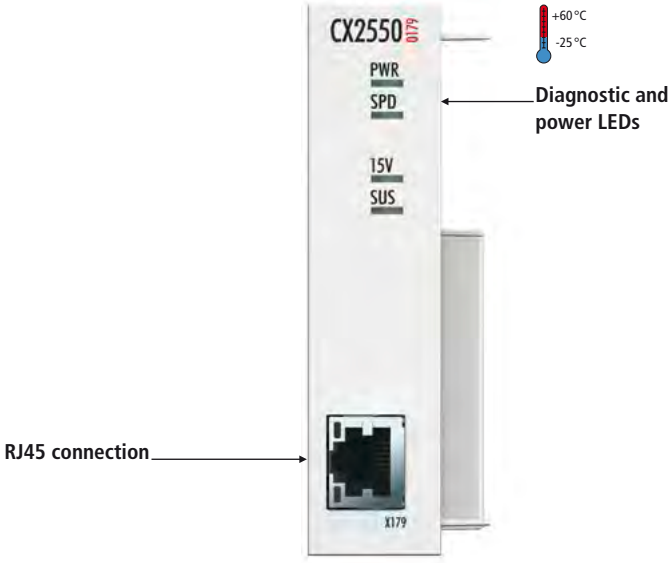
2½-inch HDD/SSD

CX2550-00x0 | Extension modules for CX2000

The extension modules for the CX2000 family are connected to the CPU on the right-hand side via a multi-pin connector. Up to two CX2550-0010 CFast or CX2550-0020 HDD/SSD modules can be connected, so that a total of up to three storage media are available. The storage media can be mounted at the front without tools (CX2550-0010) or by means of a plug-in frame (CX2550-0020), enabling fast and uncomplicated exchange of the storage medium.

The CX2550-0020 module can accept 2½-inch storage media with a thickness of up to 9.5 mm. The internal SATA 6G port offers sufficient bandwidth even for the latest SSD storage media. The storage medium is protected by the attachable cap, which latches to the housing of the module.

Technical data	CX2550-0010	CX2550-0020
Interfaces	SATA	
Type of connection	CFast slot	2½-inch slot
Diagnostics LED	1 x RDY, 1 x HDD	–
Power supply	via system bus (through CX2100-0xxx power supply modules)	
Dimensions (W x H x D)	24 mm x 99 mm x 91 mm	24 mm x 99 mm x 125 mm
Weight	approx. 280 g (without medium)	approx. 290 g (without medium)
Operating/storage temperature	-25…+60 °C/-40…+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals	CE, UL	
Further information	www.beckhoff.com/CX2550-0010	www.beckhoff.com/CX2550-0020



USB Extended 1.1 interface

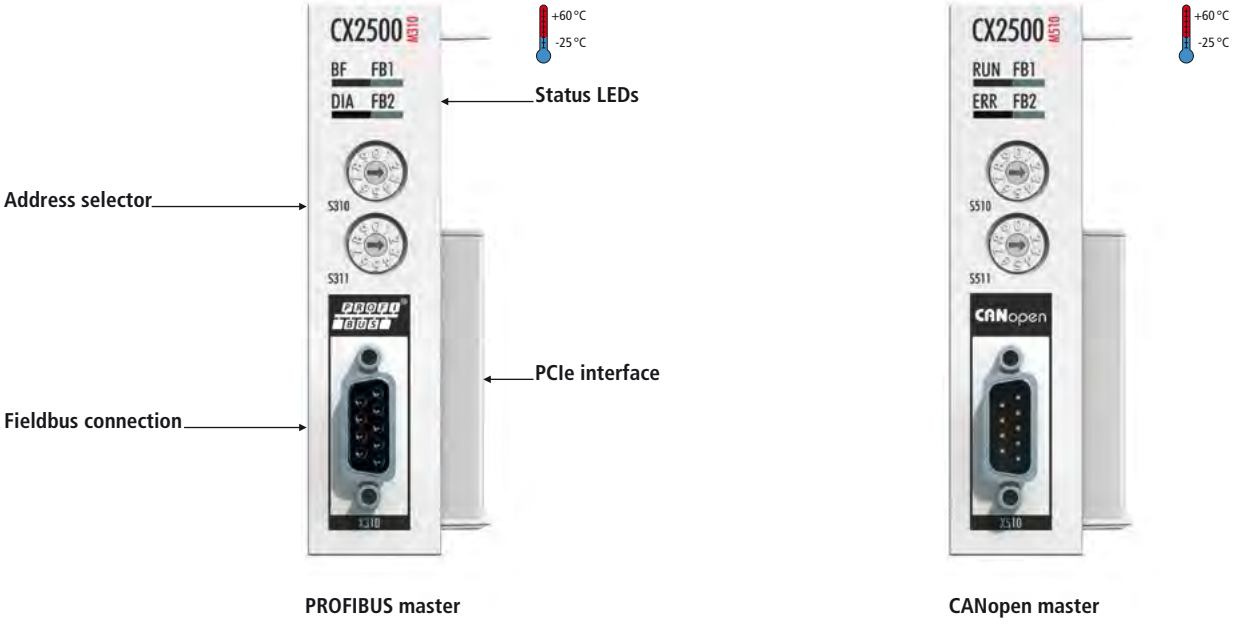
USB Extended 2.0 interface

CX2550-0x79 | System modules USB extension for CX2000

The CX2550-0x79 system modules are attachments for the CX2000 Embedded PC series. They transmit USB signals via a Cat. 5E cable over distances of up to max. 50 m. The CX2550-0179 system module transmits USB signals according to the USB 1.1 standard (full speed, max. 12 Mbit/s) while the CX2550-0279 system module transmits USB signals according to the USB 2.0 standard (high speed, max. 480 Mbit/s). Both modules can be attached at the right-hand side of a CX20x0-CPU and are placed between the power supply unit and the CPU. The internal connection is made via a USB port of the CX20x0-CPU; this way, no PCI Express resources are required or used. No additional drivers are required for operation since signal transformation and forwarding of the USB signals take place at the electrical level and are completely transparent for the operating system. Each module has four diagnostic LEDs, which indicate the status of the transmission standard in addition to the power. For better visibility the LEDs of the RJ45 sockets are redundantly implemented on the lower diagnostic LEDs.

The CX2550-0179 and CX2550-0279 modules supplement the CX2000 series by the function of the CU8800 and CU8801 USB extension for Industrial PCs and enable the direct connection of Beckhoff Control Panels with USB Extended interface. The CX2550-0179 system module is suitable for the connection of the Beckhoff CP69xx and CP79xx Control Panel series with USB Extended 1.1 connection. The CX2550-0279 system module is suitable for the connection of the Beckhoff CP29xx and CP39xx Control Panel series with USB Extended 2.0 connection.

Technical data	CX2550-0179	CX2550-0279
Interfaces	1 x USB Extended 1.1	1 x USB Extended 2.0
Type of connection	RJ45 socket	
Properties	transmission of USB 1.1 up to max. 50 m via Cat. 5E cable	transmission of USB 2.0 up to max. 50 m via Cat. 5E cable
Diagnostics LED	1 x power, 1 x speed, 1 x +15 V, 1 x suspend	1 x power, 1 x host, 1 x activity, 1 x link
Power supply	via system bus (through CX2100-0xxx power supply modules)	
Dimensions (W x H x D)	24 mm x 99 mm x 54.5 mm	
Weight	approx. 190 g	
Operating/storage temperature	-25…+60 °C/-40…+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals	CE, UL	
Further information	www.beckhoff.com/CX2550-0179	www.beckhoff.com/CX2550-0279



PROFIBUS master

CANopen master

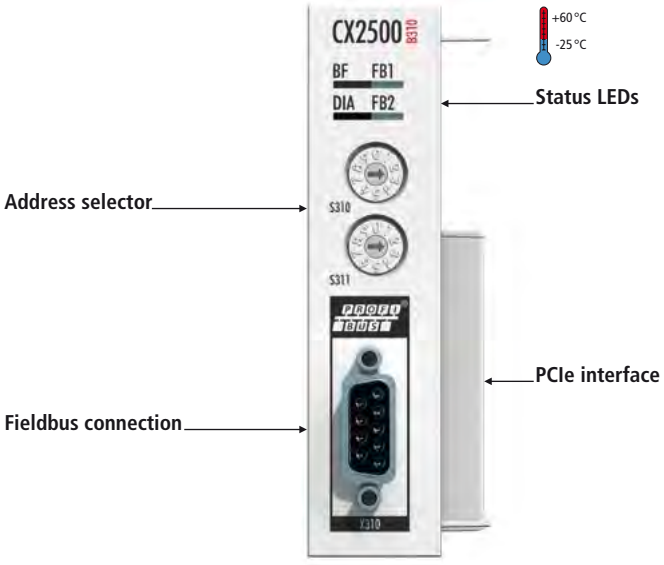
CX2500-Mxxx | Master fieldbus modules for CX2000

The CX2500-Mxxx fieldbus master modules are left-sided attachments for the CX2000 Embedded PC series. The use of CX2000 systems with fieldbus master modules enables the segment-like construction of control structures in extensive plants and machines using further fieldbus components (Bus Couplers, Bus Terminal Controllers, Drive Technology, etc.).

The CX2500-M310 fieldbus master module assumes the function of a PROFIBUS master, while the CX2500-M510 is a CANopen master. Each of these modules occupies a PCI Express lane, so that a total of four modules can be connected in any desired combination to the left side of a CX2000 group. Compared with the Beckhoff PCIe Fieldbus Cards, the technical data of the fieldbus master modules are almost identical, but with single channels.

The parallel operation of several identical or different masters is possible, e.g. two PROFIBUS masters or a PROFIBUS master and a CANopen master. In the case of mixed operation of master and slave connections, CX systems act as intelligent gateways between different fieldbuses: data are received, processed and fed into other fieldbuses. Master or slave connections network several CX systems with one another strictly deterministically via the fieldbus level. CX fieldbus modules can be retrofitted/exchanged by adding them to existing CX systems. The scanning and recognising of the modules, the parameterisation, the configuration of the connected I/O components and the online diagnosis of the process/fieldbus status take place in the TwinCAT System Manager.

Technical data	CX2500-M310	CX2500-M510
Fieldbus	PROFIBUS DP, DP-V1; DP-V2 (MC) in preparation	CANopen
Data transfer rates	9.6 kbaud…12 Mbaud	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbaud
Bus interface	1 x D-sub socket, 9-pin	
Bus device	max. 125 slaves with up to 244 bytes input, output, parameter, configuration or diagnostic data per slave	max. 127 slaves
Interface to the CPU	PCI Express	
Max. power loss	2.8 W	
Dimensions (W x H x D)	24 mm x 99 mm x 54.5 mm	
Weight	approx. 180 g	
Operating/storage temperature	-25…+60 °C/-40…+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals	CE, UL	
Further information	www.beckhoff.com/CX2500-M310	www.beckhoff.com/CX2500-M510



PROFIBUS slave

CANopen slave

CX2500-Bxxx | Slave fieldbus modules for CX2000

The CX2500-Bxxx fieldbus slave modules are left-sided attachments for the CX2000 Embedded PC series. The use of CX2000 systems with fieldbus slave modules enables the use of a CX system as a subordinate local controller for the construction of complex or modular systems. External process data are received from the master and processed, or data from its own process peripherals are returned to the master controller directly or processed.

The CX2500-B310 fieldbus slave module assumes the function of a PROFIBUS slave, while the CX2500-B510 is a CANopen slave. Each of these modules occupies a PCI Express lane, so that a total of four of these modules can be connected in any desired combination to the left side of a CX2000 group. The fieldbus slave modules are single-channel modules. The CX2500-B310 fieldbus slave module for PROFIBUS can present itself to the master as a multiple (max. quadruple) "virtual" slave station, resulting in a four-fold increase in the quantity of exchanged process data.

The parallel operation of several identical or different slaves is possible, e.g. two PROFIBUS slaves or a PROFIBUS slave and a CANopen slave. In the case of mixed operation of master and slave connections, CX systems act as intelligent gateways between different fieldbuses: data are received, processed and fed into other fieldbuses.

Master or slave connections network several CX systems with one another strictly deterministically via the fieldbus level. CX fieldbus modules can be retrofitted/exchanged by adding them to existing CX systems. The scanning and recognising of the modules, the parameterisation, the configuration of the connected I/O components and the online diagnosis of the process/fieldbus status take place in the TwinCAT System Manager.

Technical data	CX2500-B310	CX2500-B510
Fieldbus	PROFIBUS DP, DP-V1	CANopen
Data transfer rates	9.6 kbaud…12 Mbaud	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbaud
Bus interface	1 x D-sub socket, 9-pin	
Bus device	max. 125 slaves	max. 127 slaves
Interface to the CPU	PCI Express	
Max. number of bytes	max. 244 byte input/244 byte output	max. 1536 byte input/1536 byte output
Max. power loss	2.8 W	
Dimensions (W x H x D)	24 mm x 99 mm x 54.5 mm	
Weight	approx. 180 g	
Operating/storage temperature	-25…+60 °C/-40…+85 °C	
Relative humidity	95 %, no condensation	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protection class	IP 20	
Approvals	CE, UL	
Further information	www.beckhoff.com/CX2500-B310	www.beckhoff.com/CX2500-B510

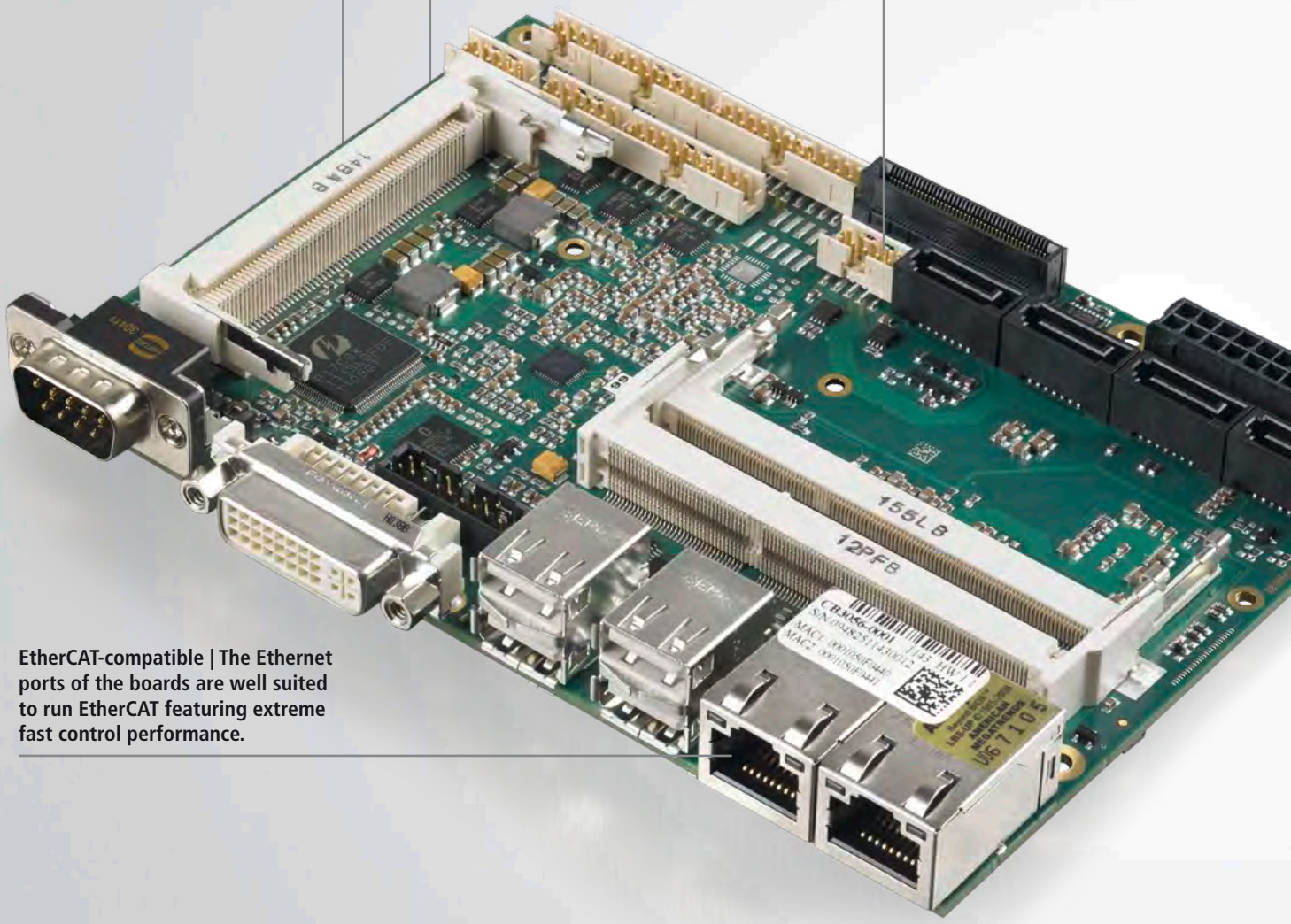
Industrial Motherboards

▶ www.beckhoff.com/Motherboards

Simple cooling adaptation | The layout of the boards is optimised for simple and efficient cooling.

Operating system support | Beckhoff supports all Microsoft operating systems like Windows NT, 2000, XP, XP Embedded, Windows 7, 10 and CE.

Auxiliary on-board interfaces | On-board touch screen controller, I²C, SMB, and GPIO reduce the overall bill of material for a device.



EtherCAT-compatible | The Ethernet ports of the boards are well suited to run EtherCAT featuring extreme fast control performance.

Motherboard series ATX

Motherboard series 3½-inch

Compact motherboard

Motherboards with Intel® x86 and ARM architecture

Beckhoff has expanded the "Industrial Motherboards" line of business into an independent product segment, with in-house board development, design and production. In addition, the own motherboard and BIOS development initiatives enable Beckhoff to respond more quickly to new technologies in the PC market and to customer-specific requirements.

Flexible PC BIOS software

BIOS source code access for Phoenix and AMI BIOS makes it possible to adapt to special board functions or introduce specific customer requirements. BIOS functionality very much depends on the field of usage for a motherboard: commercial applications typically require a balance between power dissipation and program load, the industrial usage often requires full CPU availability at any time. For example, settings for speed stepping and thermal monitoring need to be adapted in the BIOS to reflect the different usage modes.

Standard form factors

Typical form factors such as 3½-inch and ATX are supported. The 3½-inch form factor is characterised by its compact dimensions and simple cooling adaptation. No specially adapted cables are required for fast commissioning. In general, Beckhoff provides all form factors with one chipset. This allows the construction of a family with architecture-identical devices.

Long-term availability

Boards are made available for a minimum of five years, based on the general market availability of the components. All components are selected according to the longevity of supply. CPUs and chipsets, for example, are selected only if they are part of the embedded product line of the manufacturer.

Manufacturing quality

Since Beckhoff is using many of the motherboard products in their own PCs, quality is the number one goal. The focus is robustness and reliability; only high quality electronic components are used. All boards must pass a visual, electrical and functional inspection. The manufacturing date and serial number are clearly marked on the boards.

Customer-specific adaptation and integration services

Board and BIOS can be adapted to meet the needs of a customized device. Furthermore, Beckhoff is experienced in designing and producing complete embedded units, including the housing, display, various other electrical and mechanical interfaces, operating systems and application software.

Beckhoff Motherboards – Hightech from Westphalia, Germany

The complete engineering and design cycle as well as manufacturing of the boards takes place in Westphalia, Germany, at two locations: in Münster and at the Beckhoff headquarters in Verl. This local geographical context ensures short turnaround cycles between engineering, production and quality control. It also ensures that reaction time on customer feedback is the shortest possible.

Product overview Industrial Motherboards

	ATX		3½-inch
	CB1061	CB1064	CB3060
General data			
CPU	Intel® Core™ i3/i5/i7, 4th generation	Intel® Pentium®/Celeron®/ Core™ i3/i5/i7, 6th/7th generation	Intel® Core™ i3/i5/i7, 4th generation
Socket	LGA1150	LGA1151	FCBGA 1364
Chipset	Intel® Q87	Intel® Q170	Intel® QM87
Further information	www.beckhoff.com/CB1061	www.beckhoff.com/CB1064	www.beckhoff.com/CB3060
Memory			
Type	SODIMM204–1.35 V/DDR3L	SODIMM260–1.2 V/DDR4	SODIMM204–1.35 V/DDR3L
Slots	4	4	2
Max. memory	32 GB	64 GB	16 GB
Max. speed	1600 MHz	2133 MHz	1600 MHz
Graphic			
HDMI resolution	2560 x 1600 @ 60 Hz; 4096 x 2304 @ 24 Hz	2560 x 1600 @ 60 Hz; 4096 x 2160 @ 24 Hz	2560 x 1600 @ 60 Hz; 4096 x 2304 @ 24 Hz
DP resolution	3840 x 2160	4096 x 2304 @ 60 Hz	3840 x 2160
DVI resolution	1920 x 1200	1920 x 1200 @ 60 Hz	1920 x 1200
LAN			
LAN1 controller	Intel® Q87/i218 Phy	Intel® Q170/i219 Phy	Intel® Q87/i218 Phy
LAN1	10/100/1000 MB/s	10/100/1000 MB/s	10/100/1000 MB/s
LAN2 controller	Intel® i210	Intel® i210	Intel® i210
LAN2	10/100/1000 MB/s	10/100/1000 MB/s	10/100/1000 MB/s
LAN3 controller	–	–	–
LAN3	–	–	–
LAN4 controller	–	–	–
LAN4	–	–	–
Internal interfaces			
PCI32	3 x	2 x (3.0)	–
Mini PCI slot	–	–	1 x
PCIe (manufacturer dependency)	–	–	4 x PCIe x1(2.0) or 1 x PCIe x4(2.0), adapter cards required
PCIe x16	1 x (3.0)	1 x (3.0)	–
PCIe x4	1 x (2.0)	2 x (3.0)	–
PCIe x1	2 x (2.0)	2 x (3.0)	–
SATA (total)	6 x	6 x	4 x
SATA (6 GB/s)	6 x	6 x	2 x
SATA (3 GB/s)	–	–	2 x
SATA RAID	0/1/5/10	0/1/5/10	0/1/5/10
USB 3.0	2 x	–	–
USB 2.0	8 x	8 x	6 x
Serial interface	3 x RS232	3 x RS232	3 x RS232
External interfaces			
PS/2 keyboard/mouse	yes/yes	yes/yes	–
USB 3.0	2 x	4 x	2 x
USB 2.0	2 x	–	2 x
LAN	2 x	2 x	2 x
DVI-I	1 x	–	1 x
DVI-D	1 x	2 x	–
DisplayPort	1 x	1 x	–
Serial interface	1 x RS232	1 x RS232	1 x RS232
Audio	Line in/out & Mic	Line in/out & Mic	–

Compact motherboard			
CB3063	**CB3064**	**CB6263**	**CB6464**
Intel® Atom™ E38xx, System on a Chip (SoC)	Intel® Pentium®/Celeron®/ Core™ i3/i5/i7, 6th/7th generation	Intel® Atom™ E38xx, System on a Chip (SoC)	Intel® Pentium®/Celeron®/ Core™ i3/i5/i7, 6th/7th generation
–	LGA1151	–	LGA1151
Intel® Atom™ E38xx	Intel® Q170	Intel® Atom™ E38xx	Intel® Q170, Intel® H110
www.beckhoff.com/CB3063	www.beckhoff.com/CB3064	www.beckhoff.com/CB6263	www.beckhoff.com/CB6464
SODIMM204–1.35 V/DDR3L	SODIMM260–1.2 V/DDR4	on-board 1.35 V/DDR3L	SODIMM260–1.2 V/DDR4
1	2	–	2
8 GB	32 GB	4 GB	32 GB
1333 MHz	2133 MHz	1333 MHz	2133 MHz
1920 x 1080 @ 60 Hz	3840 x 2160 @ 60 Hz; 4096 x 2160 @ 24 Hz	1920 x 1080 @ 60 Hz	3840 x 2160 @ 60 Hz; 4096 x 2160 @ 24 Hz
2560 x 1600 @ 60 Hz	3840 x 2160 @ 60 Hz	2560 x 1600 @ 60 Hz	3840 x 2160 @ 60 Hz
1920 x 1200 @ 60 Hz	1920 x 1200 @ 60 Hz	1920 x 1200 @ 60 Hz	1920 x 1200 @ 60 Hz
Intel® i210	Intel® Q170/i210 Phy	Intel® i210	Intel® i219 Phy
10/100/1000 MB/s	10/100/1000 MB/s	10/100/1000 MB/s	10/100/1000 MB/s
Intel® i210	Intel® i219	Intel® i210	Intel® Q170/H110/i210 Phy
10/100/1000 MB/s	10/100/1000 MB/s	10/100/1000 MB/s	10/100/1000 MB/s
–	–	–	Intel® Q170/H110/i210 Phy
–	–	–	10/100/1000 MB/s
–	–	–	Intel® Q170/H110/i210 Phy
–	–	–	10/100/1000 MB/s
–	–	–	–
–	–	–	–
1 x PCIe x1(2.0), adapter cards required	4 x PCIe x1(2.0) or 1 x PCIe x4(2.0), adapter cards required	2 x PCIe x1(2.0), adapter cards required	2 x PCIe x1 at M.2 (depending on chipset configuration)
–	–	–	–
–	–	–	1 x via BaseCon*
–	–	–	max. 8 x (3.0) via BaseCon*
2 x	4 x	2 x (1 x M.2, 1 x BaseCon)	6 x*
–	4 x	–	2 x at M.2, 4 x via BaseCon*
2 x	–	2 x	–
–	0/1/5/10	–	0/1/5/10
1 x	–	–	2 x internally at M.2, 4 x via BaseCon*
4 x	6 x	3 x (1 x M.2, 2 x BaseCon)	2 x internally at M.2, 4 x via BaseCon*
1 x RS232	1 x RS232	–	–
–	–	–	–
–	4 x	1 x	4 x
4 x	–	–	–
2 x	2 x	2 x	4 x
1 x	–	–	–
–	1 x	–	–
–	–	1 x	2 x
–	1 x RS232	–	–
–	–	–	–

*(depending on chipset configuration), adapter cards necessary