

### Highlights

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

# Infrastructure Components

PC Fieldbus Cards, Switches, Media Converters

► [www.beckhoff.com/Infrastructure-components](http://www.beckhoff.com/Infrastructure-components)

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630	Mini PCI cards

100 Mbit/s	
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## 618 EtherCAT components

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SERCOS II	
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PROFINET IRT Device	
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# Product overview Infrastructure Components

Ethernet components			
	1 Gbit/s		10/100 Mbit/s
Switches	<b>CU2208</b> 616	<b>CU2008</b> 614	
	8 x RJ45, IP 20	8 x RJ45, IP 20	
		<b>CU2608</b> 615	
		8 x M12 (D-coded), IP 67	
		<b>CU2016</b> 614	
		16 x RJ45, IP 20	
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Port multiplier	<b>CU2508</b> 617		
	1 x RJ45 (+ 8 x RJ45: 100 Mbit/s)		
PCI	<b>FC9024-0000</b> 630	<b>FC9004-0000</b> 631	
	4 x RJ45	4 x RJ45	
	<b>FC9022-0000</b> 630	<b>FC9002-0000</b> 631	
	2 x RJ45	2 x RJ45	
	<b>FC9011-0000</b> 630	<b>FC9001-0010</b> 631	
	1 x RJ45	1 x RJ45	
Mini PCI	<b>FC9151-0000</b> 630	<b>FC9051-0000</b> 631	
	1 x RJ45	1 x RJ45	

EtherCAT components			
	IP 20		IP 67
Junctions	<b>CU1123</b> 618		
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Media converters	<b>CU1521-0000</b> 620	<b>EP9521-0020</b> 621	
	multimode, IP 20	multimode, IP 67	
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Slave (PCI)	<b>FC1100</b> 622		
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PC Fieldbus Cards							
	PCI				Mini PCI		
<b>LIGHTBUS</b>	<b>FC2001-0000</b> 623	<b>FC2002-0000</b> 623					
	1-channel	2-channel					
<b>PROFI<sup>®</sup> BUS</b>	<b>FC3101-0000</b> 624	<b>FC3101-0002</b> 624	<b>FC3121</b> 625	<b>FC3151-0000</b> 624	<b>FC3151-0002</b> 624		
	1-channel	1-channel, 32 kbyte NOVRAM	1-channel, PCIe	1-channel	1-channel, 128 kbyte NOVRAM		
	<b>FC3102-0000</b> 624	<b>FC3102-0002</b> 624	<b>FC3122</b> 625				
	2-channel	2-channel, 32 kbyte NOVRAM	2-channel, PCIe				
<b>CANopen</b>	<b>FC5101-0000</b> 626	<b>FC5101-0002</b> 626	<b>FC5121</b> 627	<b>FC5151-0000</b> 626	<b>FC5151-0002</b> 626		
	1-channel	1-channel, 32 kbyte NOVRAM	1-channel, PCIe	1-channel	1-channel, 128 kbyte NOVRAM		
	<b>FC5102-0000</b> 626	<b>FC5102-0002</b> 626	<b>FC5122</b> 627				
	2-channel	2-channel, 32 kbyte NOVRAM	2-channel, PCIe				
<b>DeviceNet</b>	<b>FC5201-0000</b> 628	<b>FC5201-0002</b> 628		<b>FC5251-0000</b> 628	<b>FC5251-0002</b> 628		
	1-channel	1-channel, 32 kbyte NOVRAM		1-channel	1-channel, 128 kbyte NOVRAM		
	<b>FC5202-0000</b> 628	<b>FC5202-0002</b> 628					
	2-channel	2-channel, 32 kbyte NOVRAM					
<b>sercos</b> the automation bus	<b>FC7501-0000</b> 629	<b>FC7502-0000</b> 629		<b>FC7551-0000</b> 629	<b>FC7551-0002</b> 629		
	1-channel	2-channel		1-channel	1-channel, 128 kbyte NOVRAM		
<b>PROFI<sup>®</sup> NET</b>	<b>FC9321-0010</b> 632	<b>FC9361-0010</b> 632					
	1-channel, IRT device, PCIe	1-channel, IRT device, PCIe, compact					



## Infrastructure Components

### PCI/PCIe Fieldbus Cards

Beckhoff rounds off its range of fieldbus components with the PCI-based PC Fieldbus Cards for Lightbus, PROFIBUS, CANopen, DeviceNet, SERCOS, Ethernet and the PCI Express v1.1 cards for PROFIBUS, CANopen and Ethernet. The cards were specifically developed for fast controllers and real-time tasks such as drive position control. To enable universal application, the interface cards are fitted with either one or two fieldbus channels. The Ethernet cards offer a maximum of four channels. Features:

- fast data exchange through short cycle times (e.g. EtherCAT: down to 12.5  $\mu$ s)
- process data communication can either be free running, synchronised, synchronised with a delay, or equidistant
- powerful parameter and diagnostics interfaces
- freely configurable bus management for every device

### Mini PCI Fieldbus Cards

The Mini PCI cards for PROFIBUS, CANopen, DeviceNet, SERCOS and Ethernet complement the PC fieldbus card range. Just like the standard PCI cards from Beckhoff, the interfaces are specifically optimised for fast controllers with compact size and real-time tasks. The bus interface is not implemented on the fieldbus card, but separately in the respective Industrial PC housing (device-specific).

### Switches

The Ethernet switches in industrial design forward incoming Ethernet frames to the target ports and prevent collisions in full duplex mode. They can be used universally in automation and office networks. User-friendly installation via integrated DIN rail adapter.

### Infrastructure Components

The real-time Ethernet port multiplier allows the connection of eight independent Ethernet networks.

The EtherCAT junction serves as 8-way network access junction for configuring star topologies.

The EtherCAT media converters (optical fibre to copper and vice versa) meet the requirements for a highly deterministic EtherCAT network. They are useful in applications where EtherCAT is to be transmitted over long distances or where increased electromagnetic interference is to be expected. The EtherCAT media converters can also be used for other Industrial Ethernet protocols.



## CU20xx | Ethernet Switch, IP 20

The Beckhoff Ethernet Switches offer five (CU2005), eight (CU2008) or 16 (CU2016) RJ45 Ethernet ports. Switches relay incoming Ethernet frames to the destination ports. In full duplex mode, they prevent collisions. They can be used universally in automation and office networks. User-friendly

installation via integrated DIN rail adapter.

The switches meet the special requirements of real-time-capable Industrial Ethernet solutions through several outstanding features:

- compact design in full metal housing

- half or full duplex, with automatic baud rate detection
- 10/100 Mbits/s Ethernet
- cross-over detection: automatic detection and correction of crossover and straight-through Ethernet cables

- clear, quick diagnosis, two LEDs for each Ethernet port
- fast DIN rail mounting
- industrial design

Technical data	CU2005	CU2008	CU2016
Bus system	all Ethernet (IEEE 802.3)-based protocols, store and forward switching mode, unmanaged		
Number of Ethernet ports	5	8	16
Ethernet interface	10BASE-T/100BASE-TX Ethernet with 5 x RJ45	10BASE-T/100BASE-TX Ethernet with 8 x RJ45	10BASE-T/100BASE-TX Ethernet with 16 x RJ45
Cable length	up to 100 m twisted pair		
Data transfer rates	IEEE 802.3u auto-negotiation, half or full duplex, automatic settings	10/100 Mbit/s, IEEE 802.3u auto-negotiation, half or full duplex at 10 and 100 Mbit/s possible, automatic settings	10/100 Mbit/s, IEEE 802.3u auto-negotiation, half or full duplex at 10 and 100 Mbit/s possible, automatic settings
Hardware diagnosis	2 LEDs per channel (activity, link)	2 LEDs per channel (activity, link, 10/100 Mbit)	2 LEDs per channel (activity, link, 10/100 Mbit)
Power supply	24 (18...30) V DC, 3-pin connection (+, -, PE)	24 (18...30) V DC, 100 mA, 3-pin connection (+, -, PE)	24 (18...30) V DC, 150 mA, 3-pin connection (+, -, PE)
Weight	approx. 260 g	320 g	400 g
Dimensions (W x H x D)	approx. 73 mm x 100 mm x 30 mm	approx. 85 mm x 100 mm x 30 mm	approx. 146 mm x 100 mm x 30 mm
Operating/storage temperature	0...+55 °C/-25...+85 °C		
Protect. class/installation pos.	IP 20/variable		
Further information	<a href="http://www.beckhoff.com/CU2005">www.beckhoff.com/CU2005</a>	<a href="http://www.beckhoff.com/CU2008">www.beckhoff.com/CU2008</a>	<a href="http://www.beckhoff.com/CU2016">www.beckhoff.com/CU2016</a>



## CU2608 | 8-port Ethernet Switch, IP 67

The CU2608 Ethernet Switch offers eight D-coded M12 Ethernet ports. Switches relay incoming Ethernet frames to the destination ports. In full duplex mode, they prevent collisions. They can be used universally in automation and office networks. Mounting can easily be carried out by the user with two central M4 fixings or alternatively via two offset M3 holes.

The CU2608 meets the special requirements of real-time-capable Industrial Ethernet solutions through several outstanding features:

- compact design in IP 67 plastic housing
- 8 D-coded M12 sockets
- 10/100 Mbit/s, half or full duplex, with automatic baud rate detection
- cross-over detection: automatic detection and correction of crossover and straight-through Ethernet cables
- clear, quick diagnosis, 1 LED for each Ethernet port
- easy on-site installation

Technical data	CU2608
Bus system	all Ethernet (IEEE 802.3)-based protocols, store and forward switching mode, unmanaged
Number of Ethernet ports	8
Ethernet interface	10BASE-T/100BASE-TX Ethernet with 8 x M12 socket, D-coded, 4-pin
Cable length	up to 100 m twisted pair
Data transfer rates	10/100 Mbit/s, IEEE 802.3u auto-negotiation, half or full duplex at 10 and 100 Mbit/s possible, automatic settings
Hardware diagnosis	1 LED per channel (activity, link)
Power supply	24 V DC (-15 %/+20 %), feed/downstream connection: M8, 4-pin
Weight	approx. 300 g
Dimensions (W x H x D)	60 mm x 126 mm x 26.5 mm
Operating/storage temperature	-30...+70 °C/-40...+85 °C
Protect. class/installation pos.	IP 65/66/67 (conforms to EN 60529)/variable
Further information	<a href="http://www.beckhoff.com/CU2608">www.beckhoff.com/CU2608</a>



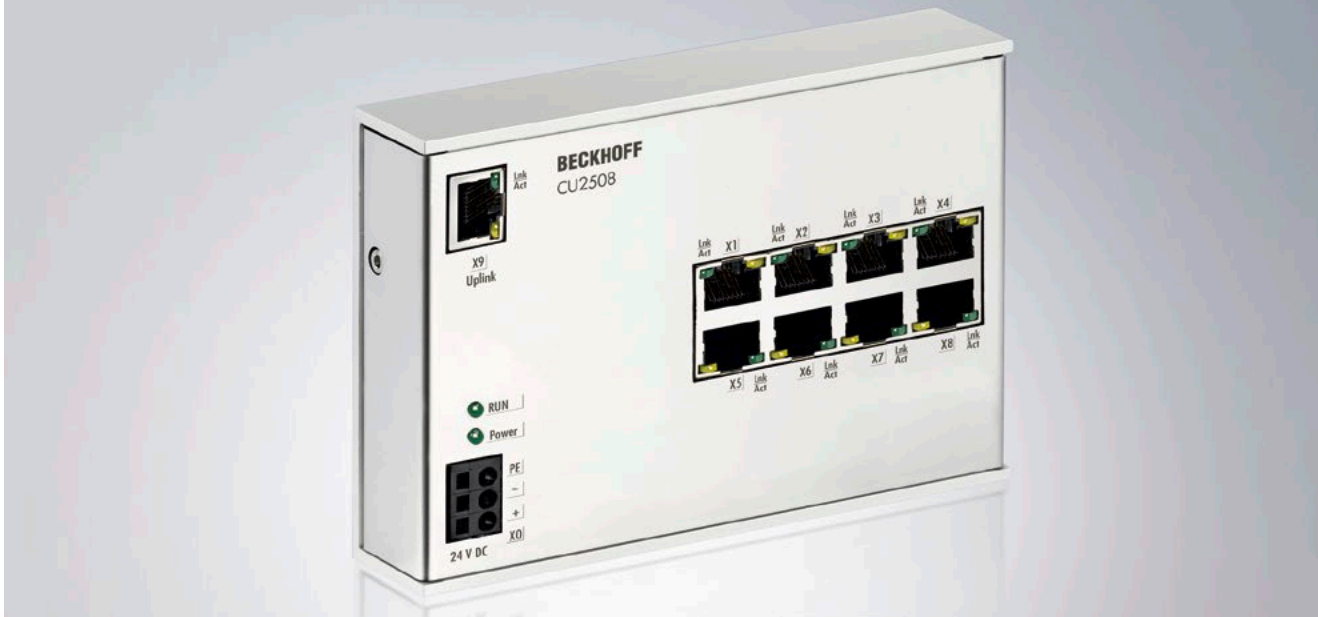
## CU2208 | 8-port Gbit Ethernet Switch

The Beckhoff Ethernet Switch offers eight RJ45 Gbit Ethernet ports. Switches relay incoming Ethernet frames to the destination ports. In full duplex mode, they prevent collisions. They can be used universally in automation and office networks. User-friendly installation via integrated DIN rail adapter.

The switches meet the special requirements of real-time-capable Industrial Ethernet solutions through several outstanding features:

- compact design in full metal housing
- half or full duplex, with automatic baud rate detection
- 10/100/1000 Mbits/s Ethernet
- cross-over detection: automatic detection and correction of crossover and straight-through Ethernet cables
- clear, quick diagnosis, two LEDs for each Ethernet port
- fast DIN rail mounting
- industrial design

Technical data	CU2208
Bus system	all Ethernet (IEEE 802.3)-based protocols, store and forward switching mode, unmanaged
Number of Ethernet ports	8
Ethernet interface	10BASE-T/100BASE-TX/1000BASE-T Ethernet
Cable length	up to 100 m twisted pair
Data transfer rates	IEEE 802.3u auto-negotiation, half or full duplex, automatic settings
Hardware diagnosis	2 LEDs per channel (activity, link)
Power supply	24 (18...30) V DC, 3-pin connection (+, -, PE)
Weight	430 g
Dimensions (W x H x D)	approx. 122 mm x 100 mm x 30 mm
Operating/storage temperature	0...+55 °C/-25...+85 °C
Protect. class/installation pos.	IP 20/variable
Further information	<a href="http://www.beckhoff.com/CU2208">www.beckhoff.com/CU2208</a>

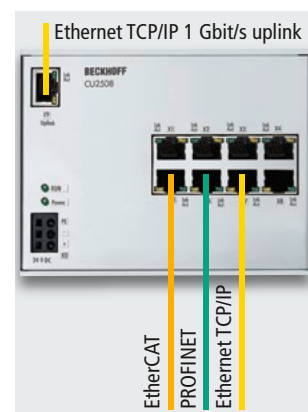


## CU2508 | Real-time Ethernet port multiplier

The real-time Ethernet port multiplier allows the connection of eight independent Ethernet networks. The CU2508 is connected to the PC via a gigabit uplink. The PC offers high-performance data transfer to the multiplier, which allocates the data to the relevant 100BASE-TX port based on an analysis of a frame prefix and sends them time-controlled with  $\mu$ s precision. Received frames are also allocated a prefix including a timestamp and sent

to the PC. With the support of a driver, users have eight independent ports with full real-time characteristics available. The CU2508 is used in applications in which several Ethernet ports are required that need to be realised outside the PC. TwinCAT supports the CU2508 and makes further network ports at the PC unnecessary. For extremely high demands, an EtherCAT installation can, for example, be distributed

or expanded to up to eight lines in order to multiply the performance. The distributed clocks of the EtherCAT lines are synchronised. An EtherCAT cable redundancy with simultaneous usage of distributed clocks can also be realised using two ports of the CU2508.



Technical data	CU2508
Protocol	Ethernet TCP/IP; real-time protocols: EtherCAT, PROFINET and others (depending on driver)
Number of Ethernet ports	8 x 100 Mbit/s and 1 x 1 Gbit/s (uplink)
Ethernet interface	RJ45
Cable length	up to 100 m twisted pair
Data transfer rates	100BASE-TX and 1 Gbit/s
Hardware diagnosis	LEDs
Power supply	24 (18...30) V DC, 100 mA, 3-pin connection (+, -, PE)
Dimensions (W x H x D)	approx. 146 mm x 100 mm x 30 mm
Operating/storage temperature	0...+55 °C/-25...+85 °C
Protect. class/installation pos.	IP 20/variable
Further information	<a href="http://www.beckhoff.com/CU2508">www.beckhoff.com/CU2508</a>



## CU1123, CU1124 | EtherCAT junctions, IP 20



Line, tree or star – EtherCAT supports almost any topology. The 3-port CU1123 EtherCAT junction and the 4-port CU1124 EtherCAT junction provide compact solutions to cascade an EtherCAT network. Where junctions with several ports need to be implemented outside of the EtherCAT Terminal system, the DIN rail-mountable EtherCAT CU1123 and CU1124 junctions can be used instead of the EK1122 EtherCAT Coupler and

the 8-port CU1128 EtherCAT junction. Port 1 is the input port for the EtherCAT network; ports 2, 3, and 4 can be used to connect additional EK1100 Couplers or EtherCAT Box modules. The EtherCAT branches are connected via RJ45 ports featuring link and activity status indicators.

In connection with TwinCAT or other suitable EtherCAT masters, the EtherCAT CU1123 and CU1124 junctions permit

the connection or disconnection of EtherCAT strands while the network is in operation (Hot Connect). The devices cannot be used as a standard Ethernet switch.

Technical data	CU1123	CU1124
Task within EtherCAT system	coupling of EtherCAT junctions	
Data transfer medium	Ethernet/EtherCAT cable (min. Cat. 5), shielded	
Bus interface	3 x RJ45	4 x RJ45
Distance between stations	max. 100 m (100BASE-TX)	
Protocol	EtherCAT	
Delay	approx. 1 µs per port	
Data transfer rates	100 Mbit/s	
Configuration	not required	
Power supply	24 V (-15 %/+20 %), 3-pin connection (+, -, PE)	
Operating/storage temperature	0...+55 °C/-25...+85 °C	
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protect. class/installation pos.	IP 20/variable	
Approvals	CE	
Further information	<a href="http://www.beckhoff.com/CU1123">www.beckhoff.com/CU1123</a>	<a href="http://www.beckhoff.com/CU1124">www.beckhoff.com/CU1124</a>



## CU1128, EP9128 | EtherCAT junctions



Line, tree or star: EtherCAT supports almost any topology. If a star topology requires several branches at a particular point, the 8-way CU1128 EtherCAT junction can be used instead of several EK1122

devices. Port 1 is the input port for the network. Further EK1100 or EtherCAT Box modules can be connected at ports 2 to 8. The EtherCAT junctions are connected via RJ45 sockets with direct display of link and activity status.

In conjunction with TwinCAT or other suitable EtherCAT masters the CU1128 also supports coupling and uncoupling of EtherCAT strands during operation (Hot Connect). The device

cannot be used as a standard Ethernet switch.

Analogous to the infrastructure components with IP 20 protection, the EP9128-0021 8-way EtherCAT junction offers the possibility to construct the branches of the topology with the smallest possible number of components in the IP 67 world as well. The EtherCAT network is connected to the input port of the EP9128-0021 and can be extended at ports 2 to 8.

EtherCAT topologies can be arranged even more flexibly with the multiple junctions with IP 67 protection, since connection to the IP 20 world is also possible via the ports. The EtherCAT junctions are connected via shielded M8 sockets with direct display of link and activity status. Suitable accessories (cables and connectors) are available.

Technical data	CU1128	EP9128-0021
Task within EtherCAT system	coupling of EtherCAT junctions	
Data transfer medium	Ethernet/EtherCAT cable (min. Cat. 5), shielded	
Bus interface	8 x RJ45	8 x M8, shielded, screw type
Distance between stations	max. 100 m (100BASE-TX)	
Protocol	EtherCAT	
Delay	approx. 1 µs per port	
Data transfer rates	100 Mbit/s	
Configuration	not required	
Power supply	24 (18...30) V DC, 3-pin connection (+, -, PE)	24 V DC (-15 %/+20 %)
Current consumption 24 V DC	typ. 185 mA	approx. 150 mA
Dimensions (W x H x D)	122 mm x 100 mm x 38 mm	60 mm x 126 mm x 26.5 mm
Operating/storage temperature	0...+55 °C/-25...+85 °C	-25...+60 °C/-40...+85 °C
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27	
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4	
Protect. class/installation pos.	IP 20/variable	IP 65/66/67 (conforms to EN 60529)/variable
Approvals	CE, UL	
Further information	<a href="http://www.beckhoff.com/CU1128">www.beckhoff.com/CU1128</a>	<a href="http://www.beckhoff.com/EP9128">www.beckhoff.com/EP9128</a>



## CU15xx | EtherCAT media converters, optical fibre/copper

The EtherCAT-capable CU1521, CU1521-0010 and CU1561 for Industrial Fast Ethernet/ 100 Mbit/s serve as media converters from optical fibre to copper and vice versa. The CU1521 is suitable for multimode, the CU1521-0010 for singlemode optical fibre

and therefore significantly longer transmission links. The CU1561 is suitable for POF (plastic optical fibre) cables, which are particularly easy to install in the field.

The media converters always operate bidirectionally and collision-free with constant delay. They can be diagnosed as

a separate EtherCAT devices. In this way, unlike standard media converters, they enable fast link control and the safe closing of the EtherCAT strand even in the event of a fault. Since the transfer direction (copper to optical fibre | optical fibre to copper) is relevant

for the bus, the device can be configured via a switch. Via this switch "Link Loss Forwarding" for normal Ethernet operation can also be selected. The CU15xx are useful in applications where higher EMC loads on the bus line are to be expected.

Technical data	CU1521-0000	CU1521-0010	CU1561
Task within EtherCAT system	media transition from RJ45 copper physics to multimode fibre optic and back	media transition from RJ45 copper physics to singlemode fibre optic and back	media transition from RJ45 copper physics to POF and back
Data transfer medium	multimode glass fibre 50/125 µm (MM); Ethernet/EtherCAT cable (min. Cat. 5), shielded	singlemode glass fibre 9/125 µm (SM); Ethernet/EtherCAT cable (min. Cat. 5), shielded	plastic optic fibre 980/1000 µm (POF); Ethernet/EtherCAT cable (min. Cat. 5), shielded
Bus interface	1 x SC Duplex; 1 x RJ45		
Distance between stations	max. 2000 m (100BASE-FX); max. 100 m (100BASE-TX)	max. 20,000 m (100BASE-FX); max. 100 m (100BASE-TX)	max. 50 m (POF); max. 100 m (100BASE-TX)
Protocol	EtherCAT		
Delay	approx. 1 µs		
Data transfer rates	100 Mbit/s		
Configuration	per rotary switch		
Power supply	24 (18...30) V DC, 3-pin connection (+, -, PE)		
Current consumption 24 V DC	approx. 100 mA		
Dimensions (W x H x D)	34 mm x 98 mm x 77 mm		
Weight	approx. 120 g		
Operating/storage temperature	-25...+60 °C/-40...+85 °C	0...+55 °C/-25...+85 °C	0...+55 °C/-25...+85 °C
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27		
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4		
Protect. class/installation pos.	IP 20/variable		
Approvals	CE, UL		
Further information	<a href="http://www.beckhoff.com/CU1521">www.beckhoff.com/CU1521</a>	<a href="http://www.beckhoff.com/CU1521">www.beckhoff.com/CU1521</a>	<a href="http://www.beckhoff.com/CU1561">www.beckhoff.com/CU1561</a>



## EP9521 | EtherCAT media converter, optical fibre/copper (multimode), IP 67

The EtherCAT/Industrial Ethernet module EP9521 for Industrial Fast Ethernet/100 Mbit/s serves as media converter from optical fibre to copper and vice versa. The media converter is suitable for multimode fibre-optic cables and is used for direct transfer between the two media.

The media converter operates bidirectionally and collision-free with constant delay. It can be diagnosed as a separate EtherCAT device. In this way, unlike standard media converters, it enables fast link control and the safe closing of the EtherCAT strand even

in the event of a fault. Since the transfer direction (copper to optical fibre | optical fibre to copper) is relevant for the bus, the device can be configured via a switch. Via this switch "Link Loss Forwarding" for normal Ethernet operation can also be selected.

The EP9521 is useful in applications where EtherCAT transfers over large distances are required or where higher EMC loads on the bus line are to be expected.

Technical data	EP9521-0020
Number of channels	1
Task within EtherCAT system	media transition from M8 copper physics to multimode fibre optic and back
Data transfer medium	multimode glass fibre 50/125 µm; Ethernet/EtherCAT cable (min. Cat. 5), shielded
Bus interface	1 x LC Duplex; 2 x M8, shielded, screw type
Distance between stations	max. 2000 m (100BASE-FX); max. 100 m (100BASE-TX)
Protocol	EtherCAT/Industrial Fast Ethernet
Delay	approx. 1 µs
Data transfer rates	100 Mbit/s
Configuration	per rotary switch
Power supply	24 V DC (-15 %/+20 %)
Current consumption 24 V DC	approx. 150 mA
Dimensions (W x H x D)	85 mm x 126 mm x 26.5 mm
Weight	approx. 250 g
Operating/storage temperature	-25...+60 °C/-40...+85 °C
Protect. class/installation pos.	IP 65/66/67 (conforms to EN 60529)/variable
Approvals	CE, UL
Further information	<a href="http://www.beckhoff.com/EP9521">www.beckhoff.com/EP9521</a>



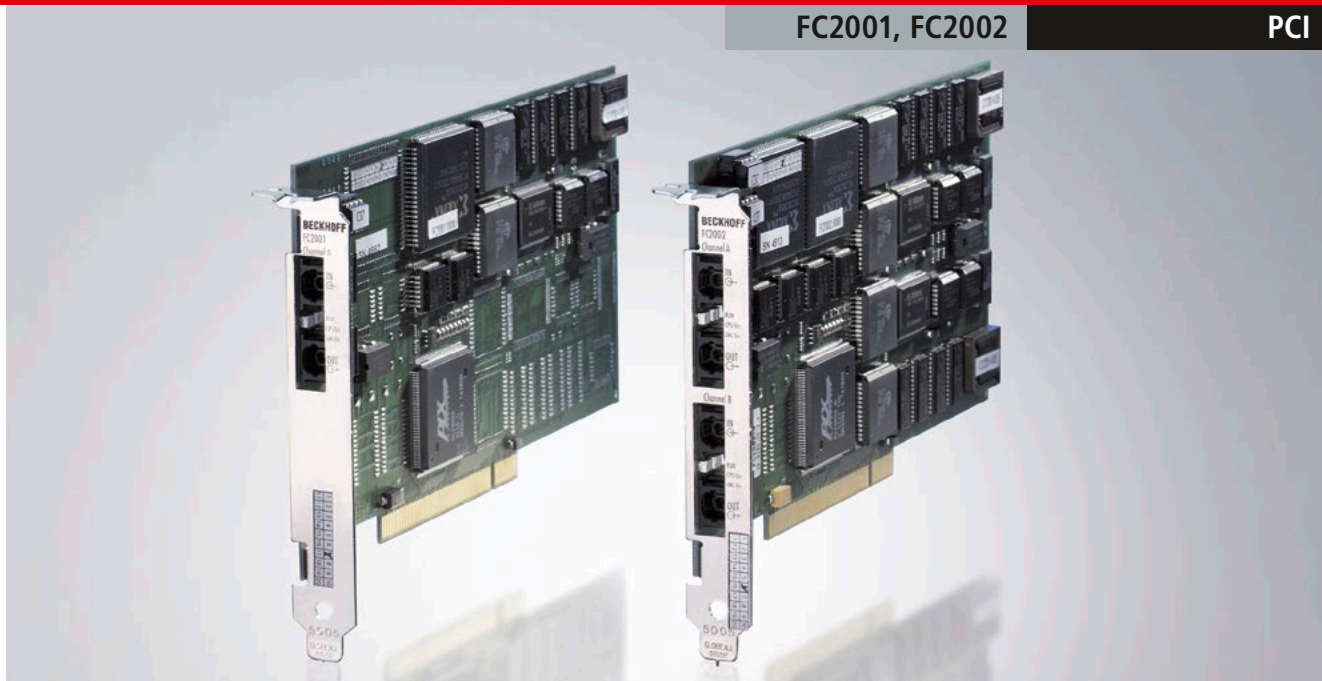
## FC1100, FC1121 | PCI, PCIe EtherCAT slave card

**EtherCAT**

The FC1100 PCI EtherCAT card and the FC1121 PCIe (PCI Express) EtherCAT card can be used to integrate a PC as a slave in an EtherCAT network. The cards

have an EtherCAT channel with two ports (IN/OUT). They can therefore also be used for the development of EtherCAT slave software on the PC.

Technical data	FC1100	FC1121
Fieldbus	EtherCAT (direct mode)	
EtherCAT plug	2 x RJ45, EtherCAT IN/OUT	
Data transfer rates	100 Mbit/s	
Interface to the PC	PCI 32 bit	PCIe (PCI Express)
EtherCAT Slave Controller	ET1100	
RAM	8 kbyte	
SYNC manager	8	4
FMMUs	8	3
Cable length	up to 100 m	
Hardware diagnosis	2 LEDs per channel (activity, link)	
Dimensions	approx. 65 mm x 125 mm	approx. 100 mm x 130 mm
Operating temperature	0...+55 °C	
Driver	TwinCAT driver for EtherCAT	
Further information	<a href="http://www.beckhoff.com/FC1100">www.beckhoff.com/FC1100</a>	<a href="http://www.beckhoff.com/FC1121">www.beckhoff.com/FC1121</a>



## FC2001, FC2002 | Lightbus PCI interface cards

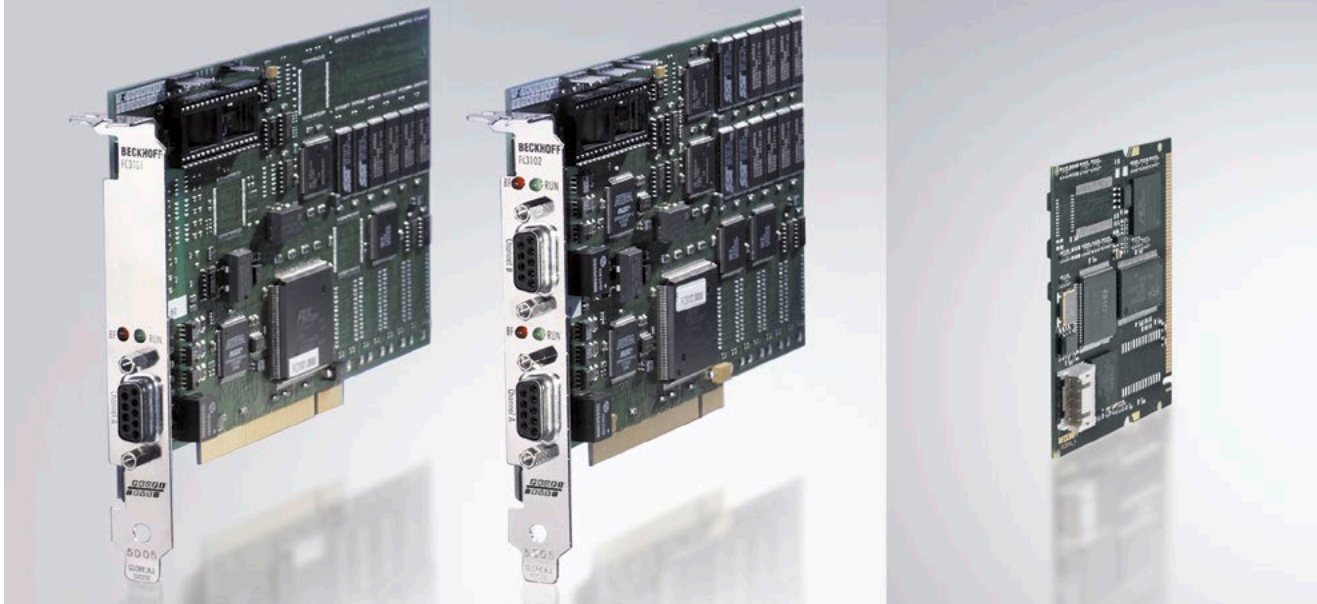
### LIGHTBUS

The PCI Fieldbus Cards from Beckhoff are characterised by outstanding features. They are tailor-made for TwinCAT, the software solution for PC-compatible control technology. The power of TwinCAT comes into its own with this interface generation:

- Cycle times up to 100 µs are possible.
- Process data communication can either be free running or synchronised.
- It is possible to select two parallel fieldbus channels on one card.
- powerful parameter and diagnostics interfaces (ADS)

TwinCAT I/O provides configuration tools and drivers for different Windows versions for programs in any desired high-level language (DLLs) and for Visual Basic applications (ActiveX). Applications with OPC interface can access the cards via an OPC server.

Technical data	FC2001-0000	FC2002-0000
Fieldbus	Lightbus	
Type	PCI	
Number of fieldbus channels	1	2
Data transfer rates	2.5 Mbaud, 32 bit of process data in 25 µs	
Interface to the PC	plug-and-play PCI 32 bit with 4 kbyte DPRAM for 8 communication channels, data, control and status register	
Bus interface	2 x standard fibre optic connector Z1000 (plastic fibre), Z1010 (HCS fibre)	4 x standard fibre optic connector Z1000 (plastic fibre), Z1010 (HCS fibre)
Communication	8 priority controlled logical communication channels	
Bus device	max. 254 nodes with a max. of 65,280 I/O points per fieldbus connection	
Interrupt	initiation of 2 PC hardware interrupts is possible	
Hardware diagnosis	3 LEDs per channel	
NOVRAM	–	
Dimensions	approx. 106 mm x 187 mm	
Operating temperature	0...+55 °C	
Driver	only compatible with TwinCAT 2	
Further information	<a href="http://www.beckhoff.com/FC2001">www.beckhoff.com/FC2001</a>	<a href="http://www.beckhoff.com/FC2002">www.beckhoff.com/FC2002</a>



## FC3101, FC3102 | PCI PROFIBUS

### FC3151 | Mini PCI PROFIBUS



PROFIBUS DP, DP-V1 and DP-V2 (MC): the FC3101, FC3102 and FC3151 PROFIBUS PCI Fieldbus Cards can master the PROFIBUS protocol with all its features. Thanks to the PROFIBUS chip developed in-house, the cards

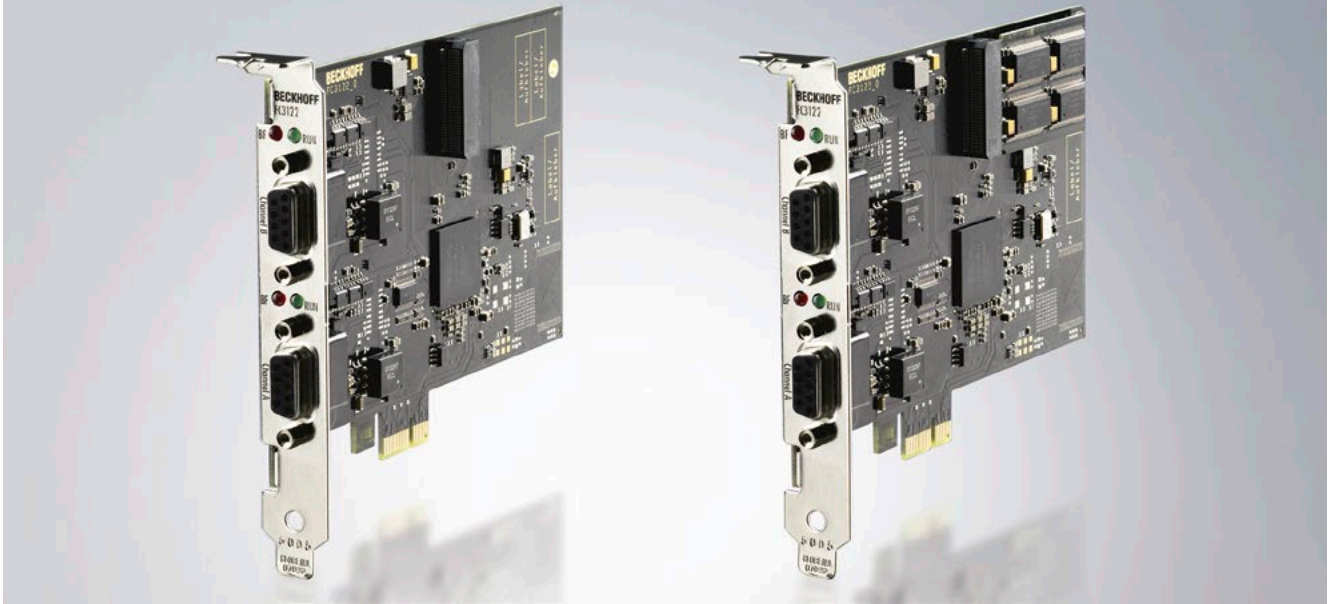
are equipped with the latest version of the PROFIBUS technology.

The FC3151 Mini PCI card brings fieldbus functionalities to the Industrial PC in a compact construction. The bus interface is not implemented on the fieldbus

card, but separately in the respective housing (device-specific).

The FC3151 is only available for Beckhoff Industrial PCs with Mini PCI option.

Technical data	FC3102-0000	FC3102-0002	FC3101-0000	FC3101-0002	FC3151-0000	FC3151-0002
Fieldbus	PROFIBUS DP (standard), PROFIBUS DP-V1 (CI. 1+2: acyclic services, alarms), DP-V2, PROFIBUS MC (equidistant)					
Type	PCI	PCI	PCI	PCI	Mini PCI	Mini PCI
Number of fieldbus channels	2	2	1	1	1	1
Data transfer rates	9.6 kbaud...12 Mbaud					
Interface to the PC	plug-and-play PCI 32 bit with 4 kbyte DPRAM per channel		plug-and-play PCI 32 bit with 4 kbyte DPRAM per channel		Mini PCI 32 bit with 4 kbyte DPRAM per channel	
Bus interface	2 x D-sub socket, 9-pin, galvanically decoupled		1 x D-sub socket, 9-pin, galvanically decoupled		device-specific in the respective IPC housing	
Communication	master and slave functionality (also mixed)					
Bus device	per channel: max. 125 slaves with up to 244 bytes input, output, parameter, configuration or diagnostic data per slave					
Cycle time	differing DP cycle times per slave are possible using the CDL concept					
Hardware diagnosis	2 LEDs per channel	2 LEDs per channel	2 LEDs per channel	2 LEDs per channel	device-specific in the respective IPC housing	
Bit width in the process image	per channel total max.: 3 kbyte input and output data					
NOVRAM	–	32 kbytes	–	32 kbytes	–	128 kbytes
Dimensions	approx. 106 mm x 175 mm		approx. 106 mm x 175 mm		59.75 mm x 50.95 mm (type III A)	
Operating temperature	0...+55 °C					
Driver	TwinCAT I/O and higher levels					
Further information	www.beckhoff.com/FC3102		www.beckhoff.com/FC3101		www.beckhoff.com/FC3151	



## FC3121, FC3122 | PCIe PROFIBUS



PROFIBUS DP and DP-V1: the PROFIBUS PCIe (PCI Express) Fieldbus Cards from Beckhoff can master the following PROFIBUS features:

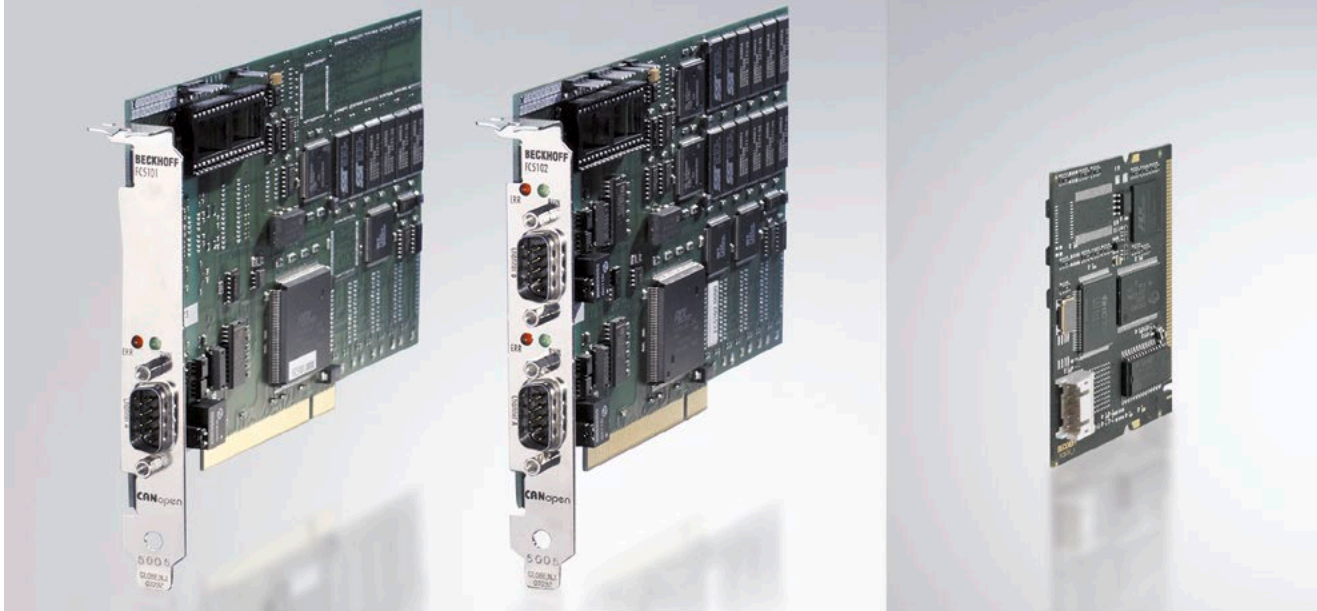
- master, slave and PROFIBUS monitor up to 12 Mbit/s
- powerful parameter and diagnostics interfaces
- the error management for each bus user is freely configurable

- It is possible to read the bus configuration and automatically assign the "GSE" files.

In TwinCAT, all functions are conveniently available. Other applications also benefit from the diverse features: general drivers for different Windows versions and convenient configuration tools are included in the TwinCAT I/O software package.

High-level language programs use the DLL, Visual Basic applications the ActiveX interface. Applications with OPC interface can access process data and parameters via an OPC server.

Technical data	FC3121	FC3122
Fieldbus	PROFIBUS DP (standard), PROFIBUS DP-V1	
Type	PCI Express	
Number of fieldbus channels	1	2
Data transfer rates	9.6 kbaud...12 Mbaud	
Bus interface	1 x D-sub socket, 9-pin, galvanically decoupled	2 x D-sub socket, 9-pin, galvanically decoupled
Communication	master and slave functionality	
Bus device	per channel: max. 125 slaves with up to 244 bytes input, output, parameter, configuration or diagnostic data per slave	
Bit width in the process image	total max.: 30.5 kbyte input and output data	
Dimensions	approx. 100 mm x 130 mm	
Operating temperature	0...+55 °C	
Driver	TwinCAT 2.11 R3 and higher	
Further information	<a href="http://www.beckhoff.com/FC3121">www.beckhoff.com/FC3121</a>	<a href="http://www.beckhoff.com/FC3122">www.beckhoff.com/FC3122</a>



## FC5101, FC5102 | PCI CANopen FC5151 | Mini PCI CANopen

### CANopen

The FC510x PC plug-in cards link the PC to a CANopen network. They optionally act as network master or slave. In addition, general CAN messages can be sent or received – without having to bother with CAN

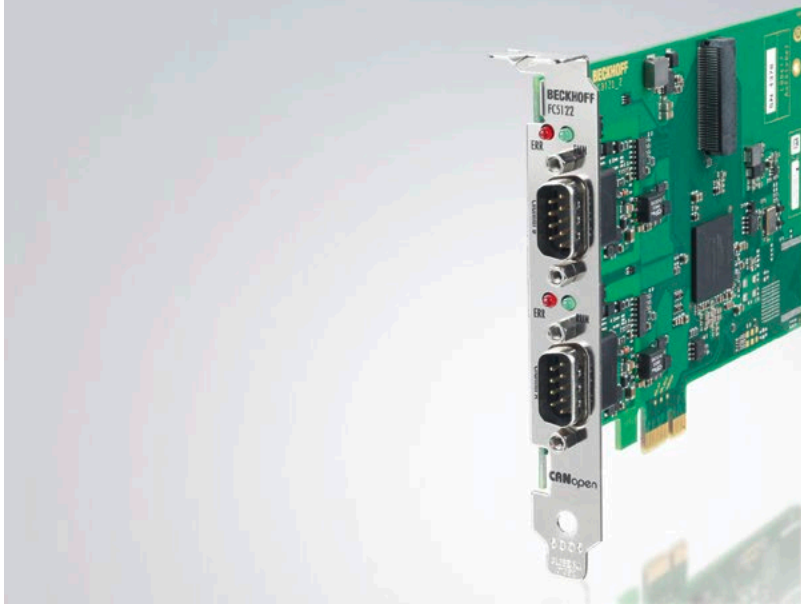
frames in the application program. The cards provide a powerful implementation of the protocol.

The FC5151 Mini PCI card brings fieldbus functionalities to the Industrial PC in a compact

construction. The bus interface is not implemented on the fieldbus card, but separately in the respective housing (device-specific).

The FC5151 is only available for Beckhoff Industrial PCs with Mini PCI option.

Technical data	FC5102-0000	FC5102-0002	FC5101-0000	FC5101-0002	FC5151-0000	FC5151-0002
Fieldbus	CANopen					
Type	PCI	PCI	PCI	PCI	Mini PCI	Mini PCI
Technology	master and slave					
Number of fieldbus channels	2	2	1	1	1	1
Data transfer rates	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbaud					
Interface to the PC	plug-and-play PCI 32 bit with 4 kbyte DPRAM per channel		plug-and-play PCI 32 bit with 4 kbyte DPRAM per channel		Mini PCI 32 bit with 4 kbyte DPRAM per channel	
Bus interface	D-sub connector, 9-pin according to CANopen specification, galvanically decoupled		D-sub connector, 9-pin according to CANopen specification, galvanically decoupled		device-specific in the respective IPC housing	
Communication	CANopen network master and CANopen manager, optionally CANopen slave					
Bus device	per channel: max. 127 slaves					
Termination resistor	switchable	switchable	switchable	switchable	externally, e.g. with ZS1051-3000	
Hardware diagnosis	2 LEDs per channel	2 LEDs per channel	2 LEDs per channel	2 LEDs per channel	device-specific in the respective IPC housing	
Bit width in the process image	per channel total max.: 3 kbyte input and output data					
NOVRAM	– 32 kbytes		– 32 kbytes		– 128 kbytes	
Dimensions	approx. 106 mm x 175 mm		approx. 106 mm x 175 mm		59.75 mm x 50.95 mm (type III A)	
Operating temperature	0...+55 °C					
Driver	TwinCAT I/O and higher levels					
Further information	www.beckhoff.com/FC5102		www.beckhoff.com/FC5101		www.beckhoff.com/FC5151	



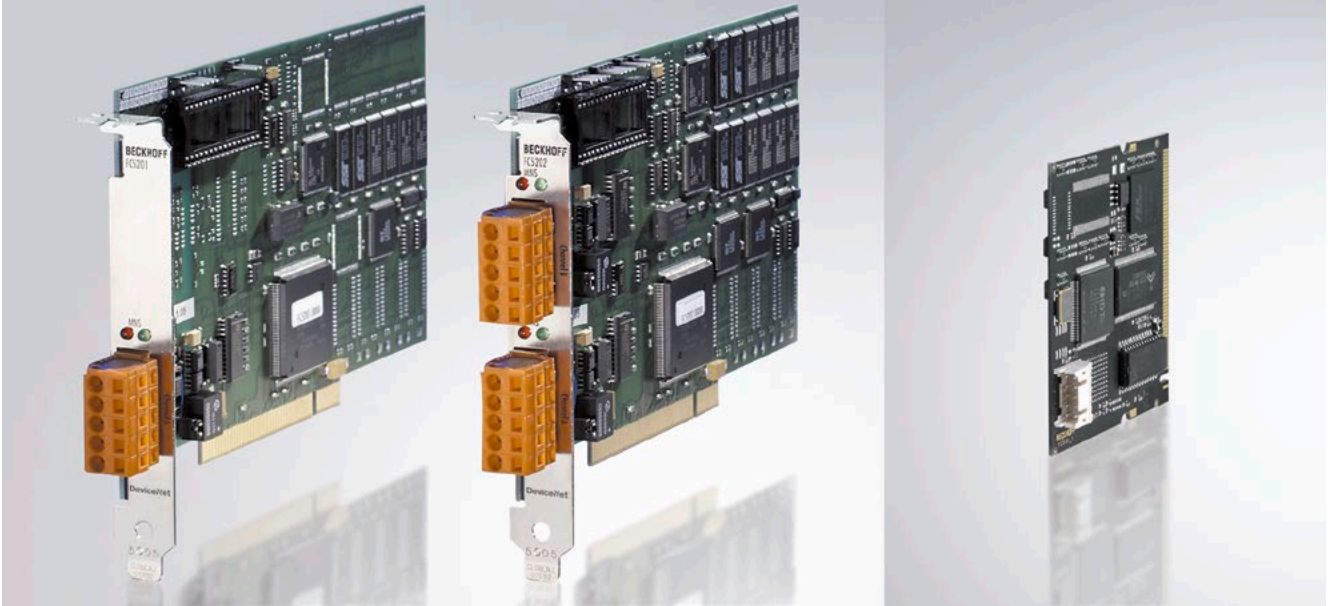
## FC5121, FC5122 | PCIe CANopen

### CANopen

The FC512x PC plug-in cards link the PC (PCI Express) to a CANopen network. They optionally act as network master or slave. In addition, general CAN messages can be sent or received – without having to bother with CAN frames in the application program. The cards provide a powerful implementation of the protocol, offering many desirable features:

- All CANopen PDO communication types are supported: event driven, time driven (using an event timer), synchronous, polling.
  - individual monitoring of the process data objects
  - synchronisation with the PC controller's task cycle
  - SDO parameter communication at start-up and runtime
  - emergency message handling
  - Guarding and Heartbeat
  - boot-up according to DS 302
  - powerful parameter and diagnostics interfaces
  - The error management for each bus user is freely configurable.
  - It is possible to read the bus configuration and the node parameters.
  - online bus load display
- In TwinCAT, all functions are conveniently available.

Technical data	FC5121	FC5122
Fieldbus	CANopen	
Type	PCI Express	
Number of fieldbus channels	1	2
Data transfer rates	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbaud	
Bus interface	1 x D-sub socket, 9-pin, galvanically decoupled	2 x D-sub socket, 9-pin, galvanically decoupled
Communication	CANopen network master and CANopen manager	
Bus device	per channel: max. 127 slaves	
Termination resistor	switchable	
Bit width in the process image	total max.: 4 kbyte input and output data	
Dimensions	approx. 100 mm x 130 mm	
Operating temperature	0...+55 °C	
Driver	TwinCAT 2.11 R3 and higher	
Further information	<a href="http://www.beckhoff.com/FC5121">www.beckhoff.com/FC5121</a>	<a href="http://www.beckhoff.com/FC5122">www.beckhoff.com/FC5122</a>



## FC5201, FC5202 | PCI DeviceNet FC5251 | Mini PCI DeviceNet

### DeviceNet™

The FC520x PC plug-in cards link the PC to a DeviceNet network. They can act there as master or as slave modules. The PCI bus interface ensures both high transmission rates to the PC and fully automatic configuration of the cards in the PC hardware.

The DeviceNet cards provide a powerful implementation of the protocol.

The FC5251 Mini PCI card brings fieldbus functionalities to the Industrial PC in a compact construction. The bus interface is not implemented on the fieldbus

card, but separately in the respective housing (device-specific).

The FC5251 is only available for Beckhoff Industrial PCs with Mini PCI option.

Technical data	FC5202-0000	FC5202-0002	FC5201-0000	FC5201-0002	FC5251-0000	FC5251-0002
Fieldbus	DeviceNet					
Type	PCI	PCI	PCI	PCI	Mini PCI	Mini PCI
Technology	master and slave					
Number of fieldbus channels	2	2	1	1	1	1
Data transfer rates	125, 250, 500 kbaud					
Interface to the PC	plug-and-play PCI 32 bit with 4 kbyte DPRAM per channel		plug-and-play PCI 32 bit with 4 kbyte DPRAM per channel		Mini PCI 32 bit with 4 kbyte DPRAM per channel	
Bus interface	open style connector, 5-pin, according to DeviceNet specification, galvanically decoupled (Connector is supplied.)		open style connector, 5-pin, according to DeviceNet specification, galvanically decoupled (Connector is supplied.)		device-specific in the respective IPC housing	
Communication	DeviceNet network master (scanner), optionally DeviceNet slave					
Bus device	per channel: max. 63 slaves					
Termination resistor	switchable	switchable	switchable	switchable	externally, e.g. with ZS1052-3000	
Hardware diagnosis	2 LEDs per channel	2 LEDs per channel	2 LEDs per channel	2 LEDs per channel	device-specific in the respective IPC housing	
Bit width in the process image	per channel total max.: 3 kbyte input and output data					
NOVRAM	–	32 kbytes	–	32 kbytes	–	128 kbytes
Dimensions	approx. 106 mm x 175 mm		approx. 106 mm x 175 mm		59.75 mm x 50.95 mm (type III A)	
Operating temperature	0...+55 °C					
Driver	TwinCAT I/O and higher levels					
Further information	www.beckhoff.com/FC5202		www.beckhoff.com/FC5201		www.beckhoff.com/FC5251	



## FC7501, FC7502 | PCI SERCOS II

### FC7551 | Mini PCI SERCOS II

**sercos**  
the automation bus

The SERCOS II PCI Fieldbus Cards from Beckhoff allow direct access to the SERCON816-ASIC. The driver for these passive cards is incorporated into the TwinCAT software and allows optimum access to the SERCOS interface.

There are no artificial limitations with regard to the number of bus devices and I/O data per device.

The FC7551 Mini PCI card brings fieldbus functionalities to the Industrial PC in a compact construction. The bus interface is

not implemented on the fieldbus card, but separately in the respective housing (device-specific).

The FC7551 is only available for Beckhoff Industrial PCs with Mini PCI option.

Technical data	FC7502-0000	FC7501-0000	FC7551-0000	FC7551-0002
Fieldbus	SERCOS II			
Type	PCI	PCI	Mini PCI	Mini PCI
Technology	master			
Number of fieldbus channels	2	1	1	1
Data transfer rates	2, 4, 8, 16 Mbaud			
Interface to the PC	plug-and-play PCI 32 bit, direct access to DPRAM and SERCON816 register		Mini PCI 32 bit with 4 kbyte DPRAM per channel	
Bus interface	4 x connector FSMA according to IEC 874-2	2 x connector FSMA according to IEC 874-2	device-specific in the respective IPC housing	
Synchronisation	synchronisation of several cards via ribbon cable		–	–
Communication	SERCON816 chip			
Bus device	≤ 254			
Cycle time	all cycle times supported by SERCOS interface (down to 62.5 µs)			
Hardware diagnosis	1 LED per channel	1 LED per channel	device-specific in the respective IPC housing	
NOVRAM	–	–	–	128 kbytes
Dimensions	approx. 95 mm x 120 mm	approx. 95 mm x 120 mm	59.75 mm x 50.95 mm (type III A)	
Operating temperature	0...+55 °C			
Driver	TwinCAT I/O and higher levels			
Further information	<a href="http://www.beckhoff.com/FC7502">www.beckhoff.com/FC7502</a>	<a href="http://www.beckhoff.com/FC7501">www.beckhoff.com/FC7501</a>	<a href="http://www.beckhoff.com/FC7551">www.beckhoff.com/FC7551</a>	<a href="http://www.beckhoff.com/FC7551">www.beckhoff.com/FC7551</a>



Ethernet TCP/IP

EtherCAT®

EtherNet/IP™

PROFINET®

## FC9xxx | PCI, Mini PCI, PCIe Ethernet

### 1 Gbit/s Ethernet

The Ethernet network cards can be used in office and automation networks and offer the following benefits:

- available in PCI, PCIe and Mini PCI
- plug-and-play interface
- 10/100/1000 Mbit/s, full duplex
- automatic transmission rate setting according to IEEE 802.3u for each channel

- maximum performance through hardware-integrated checksum creation and verification
- The hardware side supports Quality of Service (QoS) through prioritised multiple queues.

The cards (or individual channels) can also be operated with TwinCAT drivers – and therefore in real-time. The bus interface

of the Mini PCI card is not implemented on the fieldbus card, but separately in the respective housing (device-specific).

The FC9151 is only available for Beckhoff Industrial PCs with Mini PCI option.

Technical data	FC9011-0000	FC9022-0000	FC9024-0000	FC9151-0000
Fieldbus	all Ethernet (IEEE 802.3) based protocols			
Type	PCI	PCI Express	PCI Express	Mini PCI
Number of Ethernet channels	1	2	4	1
Data transfer rates	10/100/1000 Mbit/s, IEEE 802.3ab auto-negotiation, full duplex at 10, 100 and 1000 Mbit/s			
Interface to the PC	plug-and-play PCI 32 bit	PCI Express x1	PCI Express 2.1 x1 (5.0 GT/s)	Mini PCI
Ethernet interface	10BASE-T/100BASE-TX/1000BASE-TX Ethernet			
Ethernet plug	1 x RJ45	2 x RJ45	4 x RJ45	1 x RJ45
Cable length	up to 100 m			
Standard drivers	standard drivers or Beckhoff driver for different Windows versions (available from Beckhoff website)			
Real-time drivers	TwinCAT drivers for EtherCAT/real-time Ethernet. Drivers can be selected separately for each channel.			
Hardware diagnosis	2 LEDs per channel (activity, link)			
NOVRAM	–			
Dimensions	approx. 51 mm x 120 mm	approx. 62 mm x 100 mm	approx. 98 mm x 98 mm	59.75 mm x 44.60 mm
Operating temperature	0...+55 °C			
Further information	<a href="http://www.beckhoff.com/FC9011">www.beckhoff.com/FC9011</a>	<a href="http://www.beckhoff.com/FC9022">www.beckhoff.com/FC9022</a>	<a href="http://www.beckhoff.com/FC9024">www.beckhoff.com/FC9024</a>	<a href="http://www.beckhoff.com/FC9151">www.beckhoff.com/FC9151</a>



Ethernet TCP/IP

EtherCAT®

EtherNet/IP™

PROFI  
NET®

## FC9xxx | PCI, Mini PCI Ethernet

### 100 Mbit/s Ethernet

The Ethernet network cards can be used in office and automation networks and offer the following benefits:

- available in PCI and Mini PCI
- plug-and-play interface
- 10/100 Mbit/s, full duplex
- automatic transmission rate setting according to IEEE 802.3u for each channel
- maximum performance through hardware-integrated

checksum creation and verification

- The hardware side supports Quality of Service (QoS) through prioritised multiple queues.

The cards (or individual channels) can also be operated with TwinCAT drivers – and therefore in real-time. The bus interface of the Mini PCI card is not implemented on the fieldbus card,

but separately in the respective housing (device-specific).

The FC9051 is only available for Beckhoff Industrial PCs with Mini PCI option.

Technical data	FC9001-0010	FC9002-0000	FC9004-0000	FC9051-0000
Fieldbus	all Ethernet (IEEE 802.3) based protocols			
Type	PCI	PCI	PCI	Mini PCI
Number of Ethernet channels	1	2	4	1
Data transfer rates	10/100 Mbit/s, IEEE 802.3u auto-negotiation, full duplex at 10 and 100 Mbit/s			
Interface to the PC	plug-and-play PCI 32 bit	plug-and-play PCI 32 bit	plug-and-play PCI 32 bit	Mini PCI
Ethernet interface	10BASE-T/100BASE-TX Ethernet			
Ethernet plug	1 x RJ45	2 x RJ45	4 x RJ45	1 x RJ45
Cable length	up to 100 m			
Standard drivers	standard drivers or Beckhoff driver for different Windows versions (available from Beckhoff website)			
Real-time drivers	TwinCAT drivers for EtherCAT/real-time Ethernet. Drivers can be selected separately for each channel.			
Hardware diagnosis	2 LEDs per channel (activity, link)			
NOVRAM	–			
Dimensions	approx. 51 mm x 120 mm	approx. 95 mm x 125 mm	approx. 95 mm x 125 mm	59.75 mm x 44.60 mm
Operating temperature	0...+55 °C			
Further information	<a href="http://www.beckhoff.com/FC9001">www.beckhoff.com/FC9001</a>	<a href="http://www.beckhoff.com/FC9002">www.beckhoff.com/FC9002</a>	<a href="http://www.beckhoff.com/FC9004">www.beckhoff.com/FC9004</a>	<a href="http://www.beckhoff.com/FC9051">www.beckhoff.com/FC9051</a>



## FC9321, FC9361 | PCIe PROFINET IRT device



The FC9321 and FC9361 fieldbus cards are PROFINET device cards that can be used in both RT and IRT networks. The FC9321 is a PCIe card that can be plugged into

standard PCIe slots. The FC9361 is designed for Beckhoff IPCs with a compact design.

Both cards are equipped with a switch that allows the configuration of linear topol-

ogies. In PROFINET IRT networks the card can be used with up to 250  $\mu$ s, in RT mode with up to 1 ms.

Technical data	i FC9321-0010	i FC9361-0010
Fieldbus	PROFINET RT/IRT device	
Type	PCIe	Compact PCIe for Beckhoff IPCs
Technology	slave	
Number of fieldbus channels	1	
Data transfer rates	100 Mbit/s	
Interface to the PC	PCIe (PCI Express)	
Bus interface	2 x RJ45 (switched)	
Communication	device functionality (slave)	
Hardware diagnosis	2 LEDs per channel	
Operating temperature	0...+55 °C	
Driver	TwinCAT 3.1 Build 4022 and higher levels	
Further information	<a href="http://www.beckhoff.com/FC9321">www.beckhoff.com/FC9321</a>	<a href="http://www.beckhoff.com/FC9361">www.beckhoff.com/FC9361</a>

**i** For availability status see Beckhoff website at: [www.beckhoff.com](http://www.beckhoff.com)

