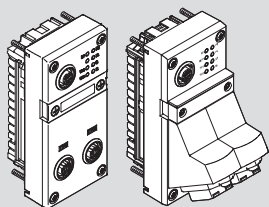


CPX(-M)-FB33/34/35/43/44/45

Bus node



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Brief instruction

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Translation of the original instructions

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1 About this document

1.1 Applicable documents

All available documents for the product → www.festo.com/sp.

Document	Contents
CPX system description CPX-SYS-...	Detailed information on the CPX terminal
Brief instructions for bus node	Essential information on the product
Operating instructions for bus node	Detailed information on the product

Tab. 1: Applicable documents

2 Safety

2.1 Safety Instructions

- Only use the product in original status without unauthorised modifications.
- Only use the product if it is in perfect technical condition.
- Observe labelling on the product.
- Store the product in a cool, dry, UV-protected and corrosion-protected environment. Ensure that storage times are kept to a minimum.
- Before working on the product, switch off the power supply and secure it against being switched on again.
- This product can generate high frequency malfunctions, which may make it necessary to implement interference suppression measures in residential areas.
- Comply with the handling specifications for electrostatically sensitive devices.

2.2 Intended use

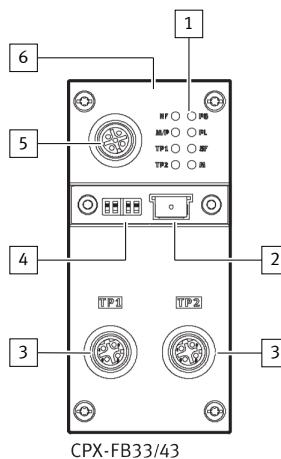
The bus node is intended for operation as a station (IO Device) in the Industrial Ethernet system PROFINET IO.

When the additional Message Queuing Telemetry Transport (MQTT) function is activated, the bus node can be used as a gateway between Industrial Ethernet networks and an on-premise MQTT broker.

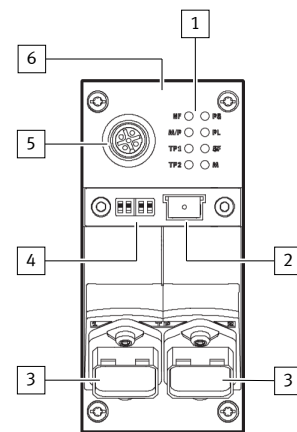
The product may only be used in combination with the CPX Terminal in an industrial environment.

3 Structure

3.1 Product design



CPX-FB33/43



CPX-M-FB34/44
CPX-M-FB35/45

Fig. 1: Connection and display elements

- | | |
|------------------------------------|---------------------|
| 1 LED displays | 4 DIL switches |
| 2 Memory card, only for FB33/34/35 | 5 Service interface |
| 3 Network connection | 6 Product labelling |

3.2 Product variants

The following software and hardware revisions are a prerequisite for using the functions:

Function	Bus bus node revision number	
	Software	Hardware
Priority start-up (Fast Start-up)	from Rev 12	from Rev 11
Identification & Maintenance (I&M)	from Rev 14	from Rev 1
PROFenergy	from Rev 20	from Rev 1
Media Redundancy Protocol (MRP)	from Rev 20	from Rev 1
Media Redundancy for Planned Duplication (MRPD)	from Rev 50	from Rev 45
S2 system redundancy	from Rev 50	from Rev 45
Isochronous real time (IRT)	from Rev 21	from Rev 1
Message Queuing Telemetry Transport (MQTT)	from Rev 53	from Rev 45

Tab. 2: Required revision numbers for using the functions

i
The bus nodes CPX(-M)-FB33/34/35 do not support MQTT.

i
The revision numbers of the hardware and software for the bus node can be checked with the control software, the Festo Maintenance Tool (FMT) or the Festo Field Device Tool (FFT).

3.3 LED displays

LED	Network status LEDs	LED	CPX-specific LEDs
	NF Network Failure, red		PS Power System, green
	M/P Maintenance/PROFenergy, green or yellow		PL Power Load, green
	TP1 Link/Traffic 1, green		SF System Failure, red
	TP2 Link/Traffic 2, green		M Modify, yellow

Tab. 3: LEDs on the bus node

3.4 Control elements

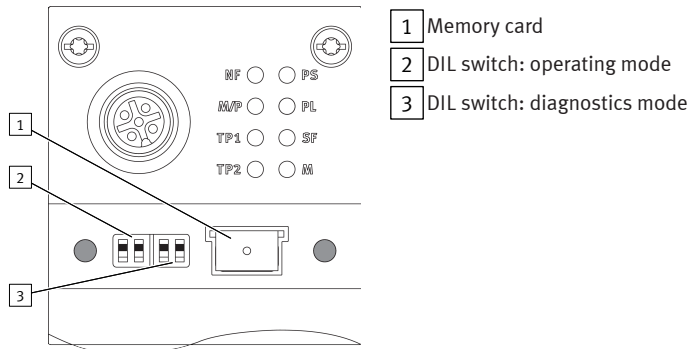


Fig. 2: Control elements for PROFINET

DIL switches

A bus node must be operated as a master in the CPX terminal. The "Remote I/O" operating mode must be set on this bus node. The "Remote Controller" operating mode must be set on all other bus nodes.

The [2] DIL switch is used to set the operating mode :

DIL switch [2]	Description
	Factory setting: 1: OFF 2: OFF Remote I/O operating mode All functions of the CPX terminal are controlled by the PROFINET I/O controller.
	1: ON 2: OFF Remote controller operating mode A CPX-CEC-xx takes over the I/O open-loop control. Requirement: CPX Terminal with CEC.

Tab. 4: Setting the operating mode

The diagnostics mode or the data field size is set with the [3] DIL switch depending on the operating mode:

DIL switch [3]	Description	Remote I/O	Remote controller
	Factory setting: 1: OFF 2: OFF Diagnostics switched off.		Data field size: 8 bytes I/8 bytes O
	1: OFF 2: ON Status bits switched on.		Data field size: 16 bytes I/16 bytes O
	1: ON 2: OFF I/O diagnostics interface switched on.		Data field size: 32 bytes I/32 bytes O
	1: ON 2: ON Position is reserved.		Position is reserved.

Tab. 5: Setting the diagnostics mode



Reserved DIL switches are blocked for future functions and must not be used.



The setting of the DIL switches for operating mode and diagnostics mode must match the settings in the open-loop control.

Memory card



The bus nodes CPX-(M)-FB43/44/45 do not support memory cards.

The memory card serves as a carrier for configuration data, such as the fieldbus device name. This makes it easy to replace a bus node. Detailed information on use → Bus node operating instructions.

NOTICE

Malfunction or Damage to the Memory Card.

Inserting or removing the memory card while the power supply is switched on can result in malfunctions of or damage to the memory card.

- Disconnect the power supply before you insert or remove the memory card.

The various bus node revisions are only compatible with the corresponding memory card:

Memory card	Bus bus node revision number
CPX-SK	from Rev 07
CPX-SK-2	from Rev 12
CPX-SK-3	from Rev 30

Tab. 6: Compatibility of the memory cards depending on the bus node revision

3.5 Connecting elements

Pin allocation of the network interface of the bus node CPX-FB33/43

Bushing	Pin	Signal	Explanation
	1	TD+	Transmitted data (Transmit Data) +
	2	RD+	Received data (Receive Data) +
	3	TD-	Transmitted data -
	4	RD-	Received data -
Housing		Shield/FE	Shielding/functional earth

Tab. 7: Network interface of the bus node CPX-FB33/43

Pin allocation of the network interface of the bus node CPX-M-FB34/44

Bushing	Pin	Signal	Explanation
	1	TD+	Transmitted data (Transmit Data) +
	2	TD-	Transmitted data -
	3	RD+	Received data (Receive Data) +
	4	n.c.	not connected
	5	n.c.	not connected
	6	RD-	Received data -
	7	n.c.	not connected
	8	n.c.	not connected
Housing		Shield/FE	Shielding/functional earth

Tab. 8: Network interface of the bus node CPX-M-FB34/44

Pin allocation of the network interface of the bus node CPX-M-FB35/45

Bushing	Pin	Signal	Explanation
	1	TX	Transmitted data
	2	RX	Received data

Tab. 9: Network interface of the bus node CPX-M-FB35/45

Overview of connections and plug

Bus node	Connection technology	Network connectors
CPX-FB33/43	2 x M12, D-coded, female, 4-pin, in accordance with IEC 61076-2	NECU-MS-D12G4-C2-ET
CPX-M-FB34/44	2 x RJ45, push-pull, Cu, AIDA, in accordance with IEC 60603, IEC 61076-3	FBS-RJ45-PP-GS
CPX-M-FB35/45	2 x SCRJ, push-pull, 650 nm, AIDA, in accordance with IEC 61754-24	FBS-SCRJ-PP-GS

Tab. 10: Connection technology and network connectors



In the following table, the cable lengths were used in accordance with the specifications for PROFINET networks.

Network connectors	Cable specification
NECU-MS-D12G4-C2-ET	Ethernet cable, shielded, Cat 5/5e, 6 ... 8 mm, 0.14 ... 0.75 mm ² ; max. 100 m PROFINET end-to-end link; 22 AWG
FBS-RJ45-PP-GS	Ethernet cable, shielded, Cat 5/Cat 5e, 5 ... 8 mm, 0.13 ... 0.36 mm ² ± ca. 26 ... 22 AWG; max. 100 m PROFINET end-to-end link; 22 AWG
FBS-SCRJ-PP-GS	POF fibre-optic cable, 980/1000 µm, 6.5 ... 9.5 mm; max. 50 m PROFINET end-to-end link; ≤ 12.5 dB

Tab. 11: Cable specification for network connectors

Service interface

An operator unit such as CPX-MMI-1 can be connected to the service interface. Alternatively, the service interface can be connected to a PC via the USB adapter NEFC-M12G5-0.3-U1G5 so that the "Festo Maintenance Tool" software (FMT) can be used.

4 Assembly

The bus node is mounted in an interlinking block of the CPX terminal.

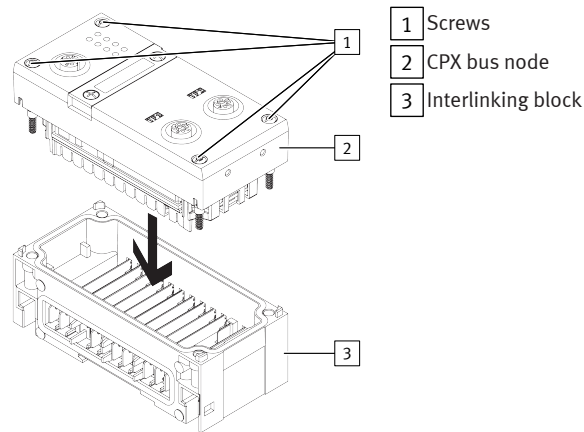


Fig. 3: Mounting the bus node in an interlinking block

- Before working on the product, switch off the power supply and secure it against being switched on again.
- CPX-M-FB35/45 only permissible on metal linking.

Disassembly

1. Unscrew screws.
2. Carefully lift the bus node.

Assembly

1. Check seal and sealing surfaces and insert the bus node.
2. Screws must be placed so that the self-tapping threads are used. Tighten the screws by hand cross-wise.
Tightening torque: 0.9 ... 1.1 Nm.



Use suitable screws for the interlinking block.

- Plastic interlinking block: thread-grooving self-tapping screws.
- Metal interlinking block: screws with metric thread.

5 Commissioning

NOTICE

Malfunction due to incorrect switch-on sequence.

- First switch on the operating voltage supply of all network stations and then the operating power supply of the open-loop control.



CPX- M-FB34: cyclical process data exchange can freeze in exceptional cases in applications with increased electrostatic load.

This results in an entry in the diagnostic memory with error number FN150.

- Restart to ensure normal operation.
- Reduce electrostatic charges in the vicinity of the product or use a CPX Terminal with metal interlinking.

6 Technical data

6.1 General

Characteristics	CPX-FB33	CPX-M-FB34	CPX-M-FB35
Module code in the CPX Terminal			
– Remote I/O	215	216	217
– Remote Controller	164	165	166
Module identification			
– Remote I/O	FB33-RIO PROFINET remote I/O	FB34-RIO PROFINET RJ45 remote I/O	FB35-RIO PROFINET LWL remote I/O
– Remote Controller	FB33-RC PROFINET I/O bus node	FB34-RC PROFINET RJ45 bus node	FB35-RC PROFINET LWL bus node
Power supply			
Operating voltage/load voltage	→ CPX system description (CPX-SYS-...)		
Internal current consumption of the internal electronics at a nominal operating voltage of 24 V DC, from operating voltage supply for electronics/sensors, U _{EL/SEN}	Typ. 85 mA	Typ. 85 mA	Typ. 155 mA
Separation of the PROFINET interfaces to U _{EL/SEN}	Electrically isolated by transformer up to 1500 V	Electrically isolated by transformer up to 1500 V	Electrically isolated by fibre-optic cable
Mains buffering time	10 ms	10 ms	10 ms

Tab. 12: Special characteristics of CPX-(M)-FB33/34/35

Characteristics	CPX-FB43	CPX-M-FB44	CPX-M-FB45
Module code in the CPX Terminal			
– Remote I/O	215	216	217
– Remote Controller	164	165	166
– Sub-module code	32	32	32
Module identification			
– Remote I/O	FB43-RIO PROFINET remote I/O	FB44-RIO PROFINET RJ45 remote I/O	FB45-RIO PROFINET LWL remote I/O
– Remote Controller	FB43-RC PROFINET I/O bus node	FB44-RC PROFINET RJ45 bus node	FB45-RC PROFINET LWL bus node
Power supply			
Operating voltage/load voltage	→ CPX system description (CPX-SYS-...)		
Internal current consumption of the internal electronics at a nominal operating voltage of 24 V DC, from operating voltage supply for electronics/sensors, U _{EL/SEN}	Typ. 75 mA	Typ. 75 mA	Typ. 150 mA
Separation of the PROFINET interfaces to U _{EL/SEN}	Electrically isolated by transformer up to 1500 V	Electrically isolated by transformer up to 1500 V	Electrically isolated by fibre-optic cable
Mains buffering time	10 ms	10 ms	10 ms
Accuracy in voltage measurement of the operating or load voltage	≤ 5%	≤ 5%	≤ 5%

Tab. 13: Special characteristics of CPX-(M)-FB43/44/45

6.2 Network

Characteristics	CPX-FB33/43	CPX-M-FB34/44	CPX-M-FB35/45
Transmission rate	100 Mbit/s	100 Mbit/s	100 Mbit/s
Wavelength	–	–	650 nm, suitable for POF fibre-optic cable
Network connections	2 x M12 bushings, D-coded, 4-pin	2 x RJ45 bushings, push-pull, AIDA-conforming	2 x SCRJ bushings, push-pull, AIDA-conforming
Crossover detection	Auto MDI	Auto MDI	–
Max. addressing volume of outputs/inputs, operating mode-independent	64 bytes I, 64 bytes O	64 bytes I, 64 bytes O	64 bytes I, 64 bytes O

Tab. 14: Special network characteristics CPX-(M)-FB33/34/35/43/44/45