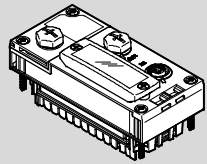


# CPX bus node EtherCAT CPX-FB38



**FESTO**

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Brief description

8024372  
1301a  
[8024376]

Original: de

CPX bus node EtherCAT CPX-FB38 ..... English

## 1 User instructions

The bus node CPX-FB38 for CPX terminals is intended exclusively for use as a participant (I/O device or "Box") in an EtherCAT network.

The specified limits for technical data must be adhered to. You can find detailed information in the bus node description P.BE-CPX-FB38-... and in the CPX system description P.BE-CPX-SYS-...



### Note

- EtherCAT® and TORX® are registered trademarks of the respective trademark owners in certain countries.



### Warning

- Switch off the power supply before assembling or disassembling modules or plugging plug connectors together or separating them (danger of operative malfunctions or damage).
- Only use voltage sources which guarantee reliable electrical isolation of the operating voltage in accordance with IEC/EN 60204-1. Observe also the general requirements for PELV power circuits in accordance with IEC/EN 60204-1.
- Connect an earth conductor of sufficient cable cross section to the connection of the CPX terminal marked with the earth symbol.



### Note

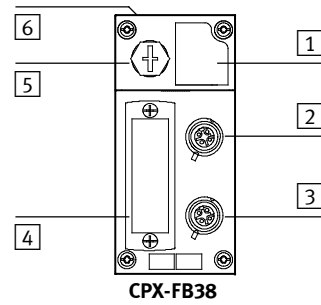
- The CPX bus node contains electrostatically sensitive devices. Therefore, do not touch any components. Observe the handling specifications for electrostatically sensitive devices.



### Note

- Only commission a CPX terminal which has been completely mounted and connected.

## 2 Connection and display components



- |  |  |
|--|--|
| 1) EtherCAT-specific network status LEDs and CPX-specific LEDs | 5) Service interface for the Handheld (V.24)     |
| 2) Network connection 2 (output "Out2") <sup>1)</sup>          | 6) Name plate                                    |
| 3) Network connection 1 (input "In1") <sup>1)</sup>            | 1) Connector socket: M12, D-coded, female, 4-pin |
| 4) Cover for DIL switches                                      |  |

Fig. 1

EtherCAT network status LEDs		CPX-specific LEDs <sup>3)</sup>	
Run	Operating status (green) <sup>1)</sup>	PS	Power system (green)
Error	EtherCAT error (red) <sup>1)</sup>	PM	Power load (green)
L/A2	Connection status (link/activity) Out2/In1 (green) <sup>2)</sup>	SF	System failure (red) <sup>4)</sup>
L/A1		M	Modify (yellow) <sup>5)</sup>

1) Detailed information: → bus node description P.BE-CPX-FB38-...  
 2) Network connection or data traffic at Out2 or In1  
 3) Detailed information: → CPX system description P.BE-CPX-SYS-...  
 4) Flashes in case of error, diagnostics using error no. (see P.BE-CPX-SYS-...)  
 5) Parameterisation revised or "Force" active

Fig. 2

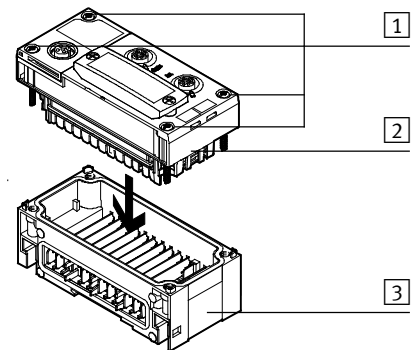
### Normal operating status:

The Run, PS and PL LEDs light up green; the LEDs L/A1 and L/A2 light up or flash green (if the connection is used); the LEDs Error and SF do not light up. The M LED lights or flashes only if parameterisation is changed or "Force" is active.

## 3 Installation instructions

### 3.1 Mounting/Dismounting

When built-in, the bus node is located in an interlinking block of the CPX terminal.



- |  |  |
|--|--|
| 1) TORX T10 screws; tightening torque 0.9 ... 1.1 Nm | 2) CPX bus node                          |
|  | 3) Interlinking block with contact rails |

Fig. 3



### Warning

Switch off the power supply before assembling or disassembling bus nodes (danger of operative malfunction or damage).

### Dismantling:

- Unscrew screws and carefully lift off the bus node.

### Mounting:

1. Check seal and seal surfaces.
2. Carefully insert connection block into the interlinking block and press it in.
3. Screws must be set so that the self-cutting threads can be used. Tighten the screws by hand in diagonally opposite sequence. Tightening torque: 0.9 ... 1.1 Nm

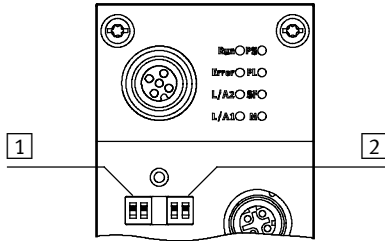


### Note

Always use the correct screws for the interlocking block, which depend on whether the block is made of metal or plastic:

- **Plastic** interlinking block: thread-cutting screws
- **Metal** interlinking block: screws with metric thread

### 3.2 Setting the DIL switches



- 1 DIL switch 1: bus node operating mode
- 2 DIL switch 2: remote I/O operating mode only: diagnostics mode

Fig. 4

#### Setting the operating mode with DIL switch 1

You can set the operating mode of the bus node with switch element 1.1 of DIL switch 1:

DIL switch 1	Settings	Function
	DIL 1.1: OFF DIL 1.2: OFF (factory setting)	<b>Remote I/O operating mode</b> All functions of the CPX terminal are controlled directly by the EtherCAT-I/O controller or a higher-level PLC.
	DIL 1.1: ON DIL 1.2: OFF	<b>Remote controller</b> A CPX-FEC or CPX-CEC integrated into the terminal controls all functions

Fig. 5

#### Only in remote I/O operating mode – setting the diagnostics mode with DIL switch 2

The function of this DIL switch is dependent on the set operating mode of the CPX terminal:

The diagnostics mode is set in the Remote I/O operating mode.

DIL switch 2	Settings	Remote I/O	Remote controller
	DIL 2.1: OFF DIL 2.2: OFF (factory setting)	I/O diagnostics interface and status bits <b>switched off</b>	Reserved
	DIL 2.1: OFF DIL 2.2: ON	<b>Status bits</b> are switched on	Reserved
	DIL 2.1: ON DIL 2.2: OFF	<b>I/O diagnostics interface</b> is switched on	Reserved
	DIL 2.1: ON DIL 2.2: ON	Reserved	Reserved

Fig. 6

### 3.3 Pin allocation and specification of the network interface

Socket	Pin	Signal	Explanation
<b>M12, D-coded</b>			
	1	TD+	Transmitted data (Transmit Data) +
	2	RD+	Received data (Receive Data) +
	3	TD-	Transmitted data –
	4	RD-	Received data –
	Housing	FE	Shield/functional earth (Shield/functional earth, FE)

Fig. 7

Connection technology	Plug
2 x M12 socket, D-coded, female, 4-pin, corresponding to IEC 61076-2-101, SPEED-CON®-compatible	Plug from Festo, type NECU-M-S-D12G4-C2-ET, for EtherCat lines with cable diameters of 6...8 mm

Fig. 8

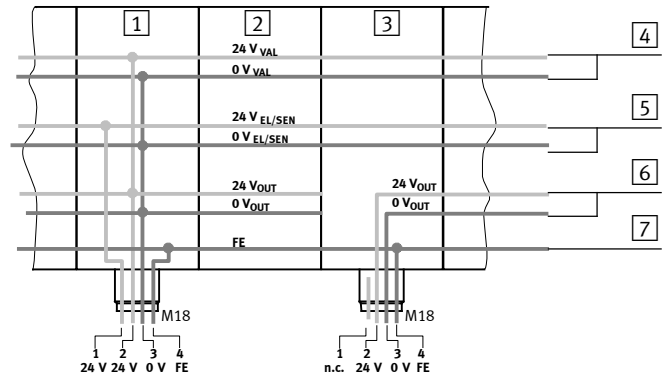
### Cable specification

- Cable type: Screened industrial Ethernet line (at least category Cat 5)
- Cable length: Max. 100 m between network participants (corresponding to specifications for Ethernet networks, ISO/IEC 11801 and ANSI/TIA/EIA-568-B)
- Wire cross section for max. line length: 22 AWG (for 100 m link length, based on ISO/IEC 11801)

Fig. 9

### 3.4 Power supply of the CPX terminal

The operating and load voltage supplies for the CPX terminal are fed in via interlinking blocks. The interlinking blocks carry the operating and load voltage over contact rails to the adjacent modules.



- 1 Interlinking block with system supply, e.g. type CPX-GE-EV-S
- 2 Interlinking block **without** supply, e.g. type CPX-GE-EV
- 3 Interlinking block with additional power supply, e.g. type CPX-GE-EV-Z
- 4 Load voltage for valves
- 5 Operating voltage for electronics and sensors
- 6 Load voltage for digital outputs
- 7 Functional earth (FE), with earth terminal connected to the end plate, and also with the housing if metallic design

Fig. 10

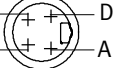
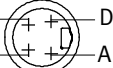
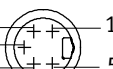
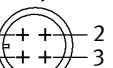
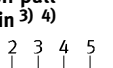
Plug	Interlinking block with		
	System supply CPX-(M-)GE-EV-S...	Additional power supply CPX-(M-)GE-EV-Z...	Valve supply CPX-GE-EV-V...
<b>7/8" 4-pin 1)</b> 	D: 0 V <sub>EL/SEN</sub> / 0 V <sub>VAL</sub> / 0 V <sub>VOUT</sub> C: FE B: 24 V <sub>VAL</sub> / 24 V <sub>VOUT</sub> A: 24 V <sub>EL/SEN</sub>	D: 0 V <sub>VOUT</sub> C: FE B: 24 V <sub>VOUT</sub> A: not connected	D: 0 V <sub>VAL</sub> C: FE B: 24 V <sub>VAL</sub> A: not connected
<b>7/8" 4-pin 2)</b> 	D: 0 V <sub>VAL</sub> / 0 V <sub>VOUT</sub> C: FE B: 24 V <sub>VAL</sub> / 24 V <sub>VOUT</sub> A: 24 V <sub>EL/SEN</sub>	–	–
<b>7/8" 5-pin</b> 	1: 0 V <sub>VAL</sub> / 0 V <sub>VOUT</sub> 2: 0 V <sub>EL/SEN</sub> 3: FE 4: 24 V <sub>EL/SEN</sub> 5: 24 V <sub>VAL</sub> / 24 V <sub>VOUT</sub>	1: 0 V <sub>VOUT</sub> 2: not connected 3: FE 4: not connected 5: 24 V <sub>VOUT</sub>	–
<b>M18 4-pin 1)</b> 	1: 24 V <sub>EL/SEN</sub> 2: 24 V <sub>VAL</sub> / 24 V <sub>VOUT</sub> 3: 0 V <sub>EL/SEN</sub> / 0 V <sub>VAL</sub> / 0 V <sub>VOUT</sub> 4: FE	1: not connected 2: 24 V <sub>VOUT</sub> 3: 0 V <sub>VOUT</sub> 4: FE	1: not connected 2: 24 V <sub>VAL</sub> 3: 0 V <sub>VAL</sub> 4: FE
<b>Push-pull 5-pin 3) 4)</b> 	1: 24 V <sub>EL/SEN</sub> 2: 0 V <sub>EL/SEN</sub> 3: 24 V <sub>VAL</sub> / 24 V <sub>VOUT</sub> 4: 0 V <sub>VAL</sub> / 0 V <sub>VOUT</sub> 5: FE	1: not connected 2: not connected 3: 24 V <sub>VOUT</sub> 4: 0 V <sub>VOUT</sub> 5: FE	–
24 V <sub>EL/SEN</sub> , 0 V <sub>EL/SEN</sub> : 24 V <sub>VOUT</sub> , 0 V <sub>VOUT</sub> : 24 V <sub>VAL</sub> , 0 V <sub>VAL</sub> : FE:	Operating voltage electronics/sensors Load voltage outputs Load voltage valves Functional earth		
A, B, C, D:	<b>Note:</b> coupling (plug socket NECU-G78G4-C2) is marked with "1, 2, 3, 4". Allocation: D=1, C=2, B=3, A=4. Other couplings can deviate from this.		
1) Only for plastic interlinking blocks 2) Only at CPX-M-GE-EV-S-7/8-CIP-4POL 3) Only for metal interlinking blocks	4) CPX-M-GE-EV-S-PP-5POL can be used alternatively for power supply to the following equipment (→ P.BE-CPX-SYS-...).		

Fig. 11


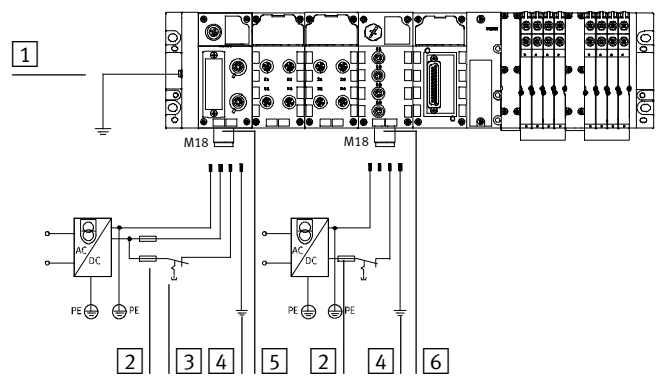
Plug	End plate with system power supply, type CPX-EPL-EV-S <sup>1)</sup>
<b>Pin header, 7-pin</b> 1 2 3 4 5 6 7 	1: 0 V <sub>VAL</sub> 2: 24 V <sub>VAL</sub> 3: 0 V <sub>OUT</sub> 4: 24 V <sub>OUT</sub> 5: 0 V <sub>EL/SEN</sub> 6: 24 V <sub>EL/SEN</sub> 7: FE
24 V <sub>EL/SEN</sub> , 0 V <sub>EL/SEN</sub> : 24 V <sub>VOUT</sub> , 0 V <sub>VOUT</sub> : 24 V <sub>VAL</sub> , 0 V <sub>VAL</sub> : FE:	Operating voltage electronics/sensors Load voltage outputs Load voltage valves Functional earth
1) Only for CPX terminals with plastic interlinking blocks	

Fig. 12

### Example of connection

The following diagram shows as an example the connection for a system power supply and an additional power supply (each with M18 plugs) for electric outputs.



- 1) Potential equalisation
- 2) External fuses
- 3) The load voltage for the valves/outputs can be switched off separately
- 4) Earth connection on pin 4 (M18 plug), designed for 16 A
- 5) Connection of the system power supply type CPX-GE-EV-S (M18)
- 6) Connection of the additional supply for electric outputs type CPX-GE-EV-Z (M18)

Fig. 13

### 3.5 Start-up behaviour of the CPX terminal

If the Modify LED M lights up or flashes permanently after the system start, "System start with saved parametrisation and saved CPX expansion" is set or "Force" is active.

### 3.6 Note on module replacement



#### Caution

For CPX terminals with a continuously shining or flashing M-LED, the parameterisation is not automatically created by the higher-level system when the CPX terminal is replaced during servicing. In this case, verify which settings are required before replacement, and restore these settings after replacement.

### 3.7 Parameterisation



#### Note

The CPX terminal and the related bus node can be parameterised by means of the Festo Handheld (CPX-MMI) or Festo Maintenance Tool (CPX-FMT).

Through EtherCAT, 20 I/O modules can be parameterised. For each module, 64 bytes are available over CoE.



Further information on parameterisation, module replacement and start-up behaviour of the CPX terminal can be found in the bus node description P.BE-CPX-FB38-...

Information on EtherCAT can be obtained in the Internet: EtherCAT Technology Group → <http://www.ethercat.org>

## 4 Technical data

Type	CPX-FB38
<b>General technical data</b>	See CPX system description P.BE-CPX-SYS-...
<b>Protection class through housing</b> in accordance with IEC/EN 60529, completely mounted, plug connector inserted or provided with cover cap	IP65/IP67
<b>Protection against electric shock</b> Protection against direct and indirect contact in accordance with IEC/EN 60204-1	By means of PELV power circuit
<b>Bus node intrinsic current consumption</b> from operating voltage supply for electronics/sensors (U <sub>EL/SEN</sub> )	Max. 80 mA at 24 V (internal electronics)
<b>Separation</b> EtherCAT interfaces for U <sub>EL/SEN</sub>	Galvanically isolated
<b>Module code (CPX-specific)</b> – Remote I/O – Remote Controller	220 169
<b>Network-specific characteristics</b> – Fieldbus protocol  – Transmission rate – Cross-over detection – EtherCAT input/output size	EtherCAT, based on the Ethernet protocol IEEE 802.3, optimised for process data, real-time capable  100 MBit/s Auto-MDI 64 bytes/64 bytes, independent of operating mode

Fig. 14