

Instructions | Operating

8108871  
2019-04a  
[8108873]

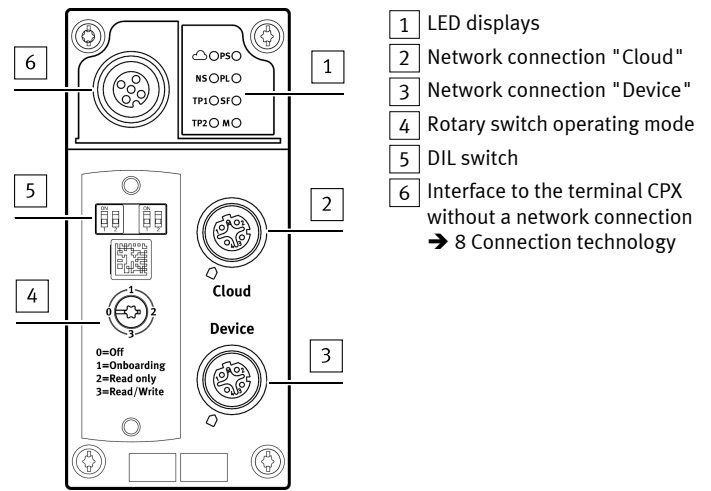


Fig. 1 Connection and display components

**3.1 Network connections**

For connection to the Internet and the local industrial Ethernet network or direct connection to the field devices, there are two industrial Ethernet interfaces on the module, the network connections "Cloud" and "Device". Both connections have Auto-Negotiation und Crossover detection (factory setting).

Connection <sup>1)</sup>	Pin	Cloud <sup>2)</sup>		Device <sup>2)</sup>	
		Signal <sup>3)</sup>	Explanation	Signal	Explanation
	1	TD+	Transmitted data +	RD+	Received data +
	2	RD+	Received data +	TD+	Transmitted data +
	3	TD-	Transmitted data -	RD-	Received data -
	4	RD-	Received data -	TD-	Transmitted data -
	Housing, shielding connected <sup>4)</sup>	FE, Shield	Functional earth <sup>5)</sup>	FE, Shield	Functional earth <sup>5)</sup>

- 1) socket, M12, D-coded, 4-pin, SPEEDCON-compatible
- 2) Pin activation with deactivated crossover detection
- 3) TD = Transmit Data, RD = Receive Data, FE = Functional Earth
- 4) via RC link to functional earth
- 5) equipotential bonding → System description of the terminal CPX (CPX-SYS)

Tab. 1 Network connections

**3.1.1 Fieldbus protocol and field devices**

Via the network connection "Device", field devices can be directly connected with an industrial Ethernet connection to the Gateway, e. g. bus node or controllers (controller, PLC) with protocols such as, for example, PROFINET, EtherNet/IP or OPC UA.

Information on the supported field devices and controllers → Festo AppWorld, [www.festo.com/appworld](http://www.festo.com/appworld).

**3.1.2 Network security**

**NOTICE!**

**Unauthorised access to the device can cause damage or malfunctions.** When connecting the device to a network, protect the network from unauthorised access.

Measures to protect the network include:

- Firewall
- Intrusion Prevention System (IPS)
- Network segmentation
- Virtual LAN (VLAN)
- Virtual Private Network (VPN)
- Security at physical access level (Port Security)

An access password only protects against unintentional modification. For additional information → Guidelines and standards for security in information technology, e. g. IEC 62443, ISO/IEC 27001.

When connecting the gateway, configure the firewall setting for the network connection "Cloud" as follows:

- Outgoing connections: release for port 443 (HTTPS)
- Incoming connections: no port release

For further information on the required measures in terms of network security, enter → [www.festo.com/sp](http://www.festo.com/sp): "CPX-IOT", filter according to Application Note .

Translation of the original instructions

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**1 Intended use**

The module described in this document is intended for use in the industrial sector as a gateway between industrial Ethernet networks and cloud applications, such as, for example, Festo Dashboard applications.

The module is intended for installation in machines or automation-technology systems and may only be used only as follows:

- In perfect technical condition
- In its original condition, without unauthorised modifications, except for the adaptations described in this document
- Within the limits of the product defined by the technical data.

Outside of industrial environments, e.g. in commercial and mixed-residential areas, it may be necessary to take measures to suppress interference.

Information on commissioning and operating the gateway, e. g. to activate the network connections "Cloud" and "Device" and to integrate them into the cloud ("Onboarding"):

- 6.3 Rotary switch operating mode
- Festo App World, [www.festo.com/appworld](http://www.festo.com/appworld)
- Festo Dashboards, [dashboards.festo.com](http://dashboards.festo.com)

Information on the terminal CPX:

- System description of the terminal CPX (CPX-SYS), [www.festo.com/pk](http://www.festo.com/pk)

All available documents for the product → [www.festo.com/pk](http://www.festo.com/pk).

**Note on licencing**

This product uses open-source software, which is subject to "GNU General Public License", Version 2 and "GNU Lesser General Public License", Version 2.1, among others.

The licence conditions of the GPL, LGPL and the other open-source licences can be viewed via the integrated web server of the product:

- Connect the gateway via the network connection "Device" with a PC or Notebook.
- Calling up the web server:  
→ [http://IP-Adresse\\_des\\_Netzwerkanschlusses\\_\"Device\"/cgi-bin/system-about](http://IP-Adresse_des_Netzwerkanschlusses_\).

**2 Safety**

- Before assembly or installation work:  
Switch off the power supply and secure it against being switched on again.
- For the electrical power supply, use PELV circuits in accordance with IEC 60204-1/EN 60204-1.
- Observe the handling specifications for electrostatically sensitive devices.
- Seal unused connections with cover caps to achieve the required degree of protection.
- Use connection hardware with the required degree of protection.
- Observe specifications in the system description of the terminal CPX (CPX-SYS).
- Commission only a completely mounted and wired module.

### 3.2 LED displays

Network-specific LED displays		Gateway-specific LED displays	
Cloud (blue)	Network status "Cloud"	PS (green) <sup>1)</sup>	Status of operating voltage - supply (Power System)
NS (red/green)	Network status "Device" <sup>2)</sup>	PL	Reserved
TP1 (green)	Connection status "Cloud" ("Link/Traffic")	SF (red) <sup>1)</sup>	System error (System Failure)
TP2 (green)	Connection status "Device" ("Link/Traffic") <sup>2)</sup>	M (yellow)	Module status "Onboarding"

1) General information on the LEDs PS and SF → System description of the terminal CPX (CPX-SYS)

2) Module positioning: LEDs PS, PL and NS flash at the same rate.





Tab. 2 LED displays

#### Normal operating status

Behaviour of the LED displays in a normal operating status:






- PS and NS illuminated green
- Cloud illuminated blue
- TP1 and/or TP2 illuminated or flashing green
- PL, SF and M are not illuminated

#### 3.2.1 Network status "Cloud"

LED status	Meaning	Error handling
 Illuminated blue	Normal operating status: Network connection to the cloud ("Link") created	-
 Flashes blue 1x	Creation or new creation of a connection to the cloud	-
 Flashes blue 2x	Network error	- Check the configuration, e. g. DHCP address assignment, static IP address
 Off	No connection to the cloud	- Check network connection






Tab. 3 Network status "Cloud" (LED with cloud symbol)

#### 3.2.2 Network status "Device" (Network Status)

LED status	Meaning	Error handling
 Illuminated green	Normal operating status: The gateway is connected with field devices ("Devices").	-
 Flashes green	No connection to field devices ("Devices"): The gateway is online and has an IP address, but is not yet connected with field devices.	- Check configuration - Check module status - Restart module ("Reboot") - Repeat "Onboarding"
 Illuminated red	Communication with the field devices ("Devices") has failed: Non-permitted network configuration, e. g. already used IP address.	- Check configuration, e. g. DHCP address assignment, static IP address
 Flashes red	Communication with field devices has failed: Network connection disturbed, z. B. connecting cable interrupted.	- Check device connection
 Off	The gateway is offline.	- Check network connection




Tab. 4 Network status "Device" (Network Status, LED NS)

### 3.2.3 Module status "Onboarding"

LED status	Meaning	Error handling
 Off	Normal operating status: Onboarding completed. The gateway has been successfully integrated into the cloud application. The gateway is in the operating mode "Off", "Read only" or "Read/Write" → 6.3 Rotary switch operating mode.	-
 Flashes yellow 1x	Gateway Onboarding active: The gateway is in operating mode "Onboarding". The gateway is integrated into the cloud application.	-
 Flashes yellow 2x	The gateway is in operating mode "Onboarding". The gateway has been successfully integrated into the cloud application.	- Select operating mode "Read only" or "Read/Write" → 6.3 Rotary switch operating mode
 Flashes yellow 3x	Devices Onboarding active. The gateway performs a network scan: supported devices ("Devices") are integrated into the cloud application. The gateway is in operating mode "Read/Write".	-
 Illuminated yellow	The gateway is not yet integrated into the cloud application. The gateway is in the operating mode "Off", "Read only" or "Read/Write" → 6.3 Rotary switch operating mode.	- Perform Onboarding

Tab. 5 Module status "Onboarding" (LED M)




#### 3.2.4 Connection status "Cloud"

LED status	Meaning	Error handling
 Illuminated green	Normal operating status: Network connection to the cloud established	-
 Flashes green	Data traffic ("Traffic") <sup>1)</sup>	-
 Off	No network connection	- Check network connection

1) Flashing frequency is dependent on the traffic.

Tab. 6 Connection status "Cloud" (Link/Traffic, LED TP1)




#### 3.2.5 Connection status "Device"

LED status	Meaning	Error handling
 Illuminated green	Normal operating status: Network connection ("Link") to the field devices ("Devices") established	-
 Flashes green	Data traffic ("Traffic") <sup>1)</sup>	-
 Off	No network connection	- Check network connection

1) Flashing frequency is dependent on the traffic.

Tab. 7 Connection status "Device" ("Link/Traffic", LED TP2)









### 3.2.6 Status of operating voltage supply (Power System)

LED status	Meaning	Error handling <sup>1)</sup>
 Illuminated green	Normal operating status: Operating voltage applied.	–
 Flashes green	Undervoltage: Operating voltage outside the tolerance range.	– Rectify undervoltage.
 Off	Operating voltage is not present	– Check operating voltage supply

<sup>1)</sup> General information on LED PS → System description of terminal CPX (CPX-SYS)

Tab. 8 Status of operating voltage supply (Power System, LED PS)

### 3.2.7 System error (System Failure)

LED (red)	Process <sup>1)</sup>	Meaning	Error handling <sup>2)</sup>
 Off		Normal operating status: No error.	–
 Flashes red 1x		Simple error / information (error class 1) <sup>3)</sup>	– Error handling → Festo App World, www.festo.com/appworld.
 Flashes red 2x		Error (error class 2) <sup>4)</sup>	
 Flashes red 3x		Serious error, internal error, e. g. hardware error (error class 3) <sup>5)</sup>	

<sup>1)</sup> The LED SF flashes if an error occurs and is dependent on the error class.

<sup>2)</sup> General information on LED SF → System description of the terminal CPX (CPX-SYS)

<sup>3)</sup> Error class 1 (minor error): 1x flash, pause

<sup>4)</sup> Error class 2 (error): 2x flashes, pause

<sup>5)</sup> Error class 3 (serious error): 3x flashes, pause

Tab. 9 System error (System Failure, LED SF)

### 4 Assembly and disassembly

The module must be inserted into an interlinking block for the terminal CPX

→ [www.festo.com/catalogue](http://www.festo.com/catalogue):

– Version 1:

Gateway in an interlinking block with system supply, e. g. CPX-GE-EV-S-..., between two end plates

– Version 2:

Gateway in an interlinking block without supply, between two end plates with system supply, e. g. CPX-EPL-EV-S-...

**i**

Information on power supply → 5 Power supply.

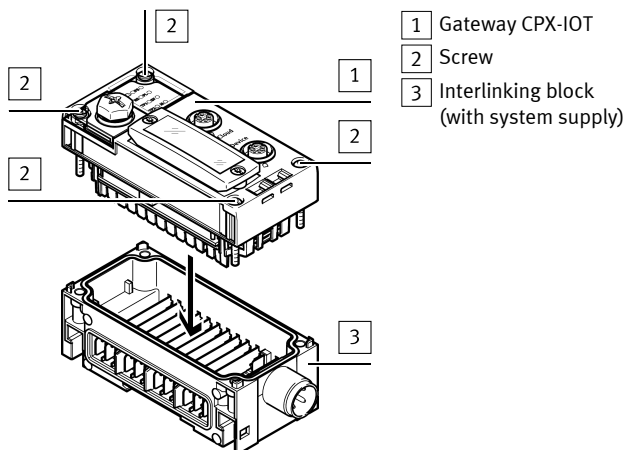


Fig. 2 Assembly and disassembly

### 4.1 Assembly

**NOTICE!**

#### Material damage due to incorrect mounting.

Select screws that are suitable for the material of the interlinking block:

- Polymer: thread-grooving screws
- Metal: screws with metric thread

**i**

When ordering an individual module, all the screws required are enclosed.

1. Switch off the power supply and secure it against being switched on again.
2. Check seal and seal surfaces. Replace damaged parts.
3. Push the module carefully and without tilting into the interlinking block up to the stop.
4. Turn the screws into the existing thread.
5. Tighten the screws in diagonally opposite sequence.  
Tightening torque: 1 Nm ± 10 %.

#### 4.2 Disassembly

1. Switch off the power supply and secure it against being switched on again.
2. Unscrew the screws.
3. Pull the module without tilting out of the interlinking block.

### 5 Power supply

The operating and load voltage supply is fed in via interlinking blocks or end plates with system supply.

**i**

Information on power supply:

→ System description of the terminal CPX (CPX-SYS)

→ Pin allocation power supply connection (CPX-PIN-BEL)

**WARNING!**

#### Risk of injury due to electric shock.

- For the electric power supply, use PELV circuits that guarantee a reliable electric disconnection from the mains network.
- Observe IEC 60204-1/EN 60204-1.
- Connect all circuits for the operating and load voltage supply.

### 6 Switching elements

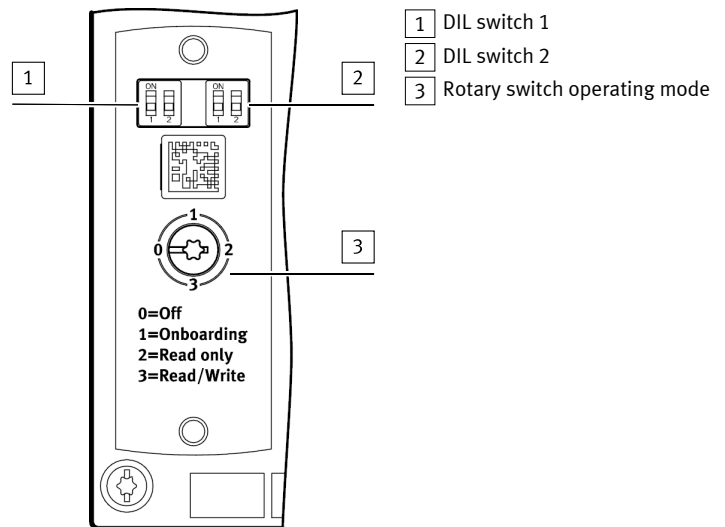






Fig. 3 Switching elements

#### 6.1 DIL switch 1

Switching position	Function
 DIL 1.1: Off (factory setting)	Reserved
 DIL 1.1: On	Reserved

Tab. 10 DIL switch 1.1

Switching position	Function
 DIL 1.2: Off (factory setting)	Reserved
 DIL 1.2: On	Reserved

Tab. 11 DIL switch 1.2

## 6.2 DIL switch 2

Switching position	Function
DIL 2.1: Off (factory setting)	Reserved
DIL 2.1: On	→ 10 Reset to factory setting ("Factory Reset")

Tab. 12 DIL switch 2.1

Switching position	Function
DIL 2.2: Off (factory setting)	Reserved
DIL 2.2: On	→ 10 Reset to factory setting ("Factory Reset")

Tab. 13 DIL switch 2.2

## 6.3 Rotary switch operating mode

Switching position	Operating mode/function
0: Off	<ul style="list-style-type: none"> <li>Network connection "Cloud" deactivated (switch-off of interface)</li> <li>No communication with the cloud</li> </ul>
1: Onboarding	<ul style="list-style-type: none"> <li>Network connection "Cloud" activated</li> <li>Gateway for integration into the cloud ("Onboarding") ready</li> </ul>
2: Read only	<ul style="list-style-type: none"> <li>Gateway sends process data of the configured field devices to the cloud</li> <li>Manual adding of field devices enabled</li> <li>Automatic adding of field devices via the Auto-Scan function blocked</li> <li>Removal of field devices and removal of the gateway from the cloud ("Offboarding") blocked</li> <li>Receipt of data, e. g. parameters, from the cloud disabled</li> <li>Parameters of connected devices cannot be changed</li> </ul>
3: Read/Write	<ul style="list-style-type: none"> <li>Gateway sends process data of the configured field devices to the cloud</li> <li>Manual adding of field devices enabled</li> <li>Automatic adding of field devices via the Auto-Scan function enabled</li> <li>Removal of field devices and removal of the gateway from the cloud ("Offboarding") enabled</li> <li>Receipt of data, e. g. parameters, from the cloud enabled</li> <li>Parameters of connected devices can be changed</li> </ul>

Tab. 14 Rotary switch operating mode

## 7 Ensuring the degree of protection

### NOTICE!

### Short circuit as a result of ingress of liquids or foreign matter.

Malfunction or damage to the electronics.

- Use connection devices (connecting cables, plugs, adapters) with the required degree of protection.
- Use cover caps to seal unused connections.
- Mount the DIL switch cover:
  - Check the seal.
  - Place cover and press it on.
  - Tighten screws.
 Tightening torque: maximum 0.4 Nm.

## 8 Connection technology

Using the M12 socket [6] (→ Fig.1), a terminal CPX can be directly connected with the gateway without a network connection, i. e. without an industrial Ethernet connection.

Connection	Connecting hardware	Cover cap
Network connection "Cloud" <sup>1)</sup>	Plug NECU-M-S-D12G4-C2-ET	ISK-M12
Network connection "Device" <sup>1)</sup>		
Interface to terminal CPX without a network connection <sup>2)</sup>	Connecting cable NEBC-M12G5-S-1,5-N-M12G5	

1) socket, M12, D-coded, 4-pin, SPEEDCON-compatible

2) socket, M12, A-coded, 5-pin

Tab. 15 Connection technology

## 9 Parameterisation

The gateway can be parameterised via the FestoField Device Tool (FFT). Alternatively, the integrated web server of the gateway can be used via the network connection "Device" for the parameterisation, e. g. for setting the IP addresses of the network connections:

Connect the gateway via the network connection "Device" with a PC or Notebook. Calling up the web server:

→ [http://IP-Adresse\\_des\\_Netzwerkanschlusses\\_\"Device\"](http://IP-Adresse_des_Netzwerkanschlusses_\) (see IP configuration (factory settings) → 13 Technical data)

Logging in:

→ User name: admin

→ Password (factory setting): CPX-IoT Product Key on the type plate, e.g. 3S7PMM2M93V

## 10 Reset to factory setting ("Factory Reset")

- Set rotary switch to "Off".
- Switch off the power supply.
- Set DIL switch 2.1 and 2.2 to "On".
- Switch on the power supply.
  - LED M flashes quickly for a few seconds.
    - Do not switch off the power supply
    - Do not actuate the DIL switch
- If the LED M has stopped flashing:
  - Set DIL switch 2.1 and 2.2 to "Off".
    - The gateway has returned to the factory setting.

## 11 Firmware update

A firmware update is possible via the Festo Field Device Tool (FFT)

→ [www.festo.com/sp](http://www.festo.com/sp).

## 12 Module replacement

After replacing a gateway, integration into the cloud („Onboarding“) must be carried out again → Festo App World, [www.festo.com/appworld](http://www.festo.com/appworld).

## 13 Technical data

Property	Specification/value
General technical data	→ System description of the terminal CPX (CPX-SYS)
Power supply	
Operating power supply $U_{EL/SEN}$	[V DC] 24 ± 25 %
Intrinsic current consumption at nominal operating voltage 24 V from operating voltage supply $U_{EL/SEN}$	[mA] Typically 80 (internal electronics)
Mains buffering time	[ms] 10
Separation of network interface from operating voltage supply $U_{EL/SEN}$	Galvanic
Protection against electric shock <sup>1)</sup>	Through the use of PELV circuits
Degree of protection by housing <sup>2)3)</sup> , With power supply connection	
– Via interlinking block	IP65/IP67
– Via end plate	IP20
Connection technology	
Network connections	2 × sockets, M12, D-coded, 4-pin, SPEEDCON-compatible
Interface to terminal CPX without a network connection	1 × socket, M12, A-coded, 5-pin
Network-specific characteristics	
IP configuration (factory settings)	Cloud DHCP Device IP address: 192.168.0.1 Subnet mask: 255.255.255.0
Encryption of data transmission to the Cloud	HTTPS
Transmission technology	Industrial Ethernet, Switched Fast Ethernet
Specification	IEEE 802.3u (100Base-TX)
Transmission rate	[Mbit/s] 10/100 (full duplex/half duplex)
Crossover detection	Auto-MDI/MDI-X
Number of devices (network connection "Device")	Maximum 10 <sup>4)</sup>
Cable specification	
Cable type	Ethernet twisted pair cable, shielded (Shielded Twisted Pair, STP)
Transmission class (Link Class)	Category Cat 5
Cable diameter <sup>5)</sup>	[mm] 6 ... 8
Wire cross section <sup>6)</sup>	[mm <sup>2</sup> ] 0.14 ... 0.75
Cable length	[m] Maximum 100

1) protection against direct and indirect contact in accordance with IEC 60204-1/EN 60204-1

2) Degree of protection in accordance with IEC 60529, module completely assembled, plug connector in the plugged-in status or provided with cover cap

3) Connected products may only fulfil a lower degree of protection.

4) More devices can be operated depending on the application.

5) when using the plug NECU-M-S-D12G4-C2-ET

6) 22 AWG required for max. connection length between network participants (end-to-end link)

Tab. 16 Technical data

## 14 Specified standards

Version	
IEC 60529:2001-02	IEEE 802.3:2014-00

Tab. 17 Specified standards