

CPX-E
Automation system

FESTO
Festo SE & Co. KG
Ruiter Straße 82
73734 Esslingen
Germany
+49 711 347-0
www.festo.com
8192618

Operating instruction

8192618
2023-09b
[8192620]

Translation of the original instructions

© 2023 all rights reserved to Festo SE & Co. KG

IO-Link is a registered trademark of its respective trademark holder in certain countries.

1 About this document

This document describes the use of the above-mentioned product family.
Certain aspects of use are described in other documents and must be observed
→ 1.1 Applicable documents.

1.1 Applicable documents

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

Table with 2 columns: Document, Content. Rows include Automation system CPX-E Manual and Operating instructions and manuals for the CPX-E modules.

Tab. 1: Applicable documents

1.2 Product version

This document refers to the automation system CPX-E with CPX-E modules.
The product version can be identified from the product labelling or with the help of appropriate software from Festo.

Software suitable for determining the product version is available from Festo in the Support Portal → www.festo.com/sp.
Information on using the software can be found in the integrated Help function.

1.3 Product labelling

The CPX-E modules are labelled on the left side. The product labelling is described in the documentation supplied with the product.

1.4 Specified standards

Table with 2 columns: Version, Content. Rows list standards such as DIN 46228-1:1992-08, DIN 46228-4:1990-09, EN 60068-2-27:2010-02, EN 60529:2013-10, EN 60715:2001-09, and IEC 60204-1:2014-10.

Tab. 2: Standards specified in the document

1.5 UL certification

In combination with the UL inspection mark on the product, the information in this section must also be observed in order to comply with the certification conditions of Underwriters Laboratories Inc. (UL) for USA and Canada.

Table with 2 columns: UL certification information, Content. Rows include Product category code (NRAQ/NRAQ7), File number (E239998), Considered standards (UL 61010-1, UL 61010-2-201, CSA-C22.2 No. 61010-1-12, etc.), and UL mark (UL LISTED).

Tab. 3: UL certification information

- Technical data and environmental conditions may be subject to change in order to comply with Underwriters Laboratories Inc. (UL) certification requirements for the USA and Canada.
Note deviations → Technical data.
- The unit shall be supplied by a power source which fulfils the requirements on a limited-energy circuit in accordance to IEC/EN/UL/CSA 61010-1 or on a Limited Power Source (LPS) in accordance to IEC/EN/UL/CSA 60950-1 or IEC/EN/UL/CSA 62368-1 or a Class 2 circuit in accordance to NEC or CEC.

Unauthorised access to the device can cause damage or malfunctions.
When connecting the device to a network:
Protect the network against 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)

For additional information → Guidelines and standards for security in information technology, e. g. IEC 62443, ISO/IEC 27001.

An access password only protects against unintentional modification.

NOTICE

Modules with Ethernet interfaces should only be operated in networks if all connected network components are supplied by PELV circuits or integrated circuits with equivalent protection.

2 Safety

2.1 Safety instructions

- Take into consideration the legal regulations for the installation location.
- Use the product only within the defined values → 13 Technical data.
- Observe the identifications on the product.
- Observe further applicable documents.
- Store the product in a cool, dry environment protected from UV and corrosion.
Keep storage times short.
- Before working on the product: switch off the power supply and secure it against being switched on again.
- Comply with the handling specifications for electrostatically sensitive devices.

2.2 Intended use

The product described in this document is intended only for use within a protected range in the vicinity of a machine and/or automated system.
Use the product only as follows:
- Use only in an industrial environment. Outside industrial environments, e.g. in commercial and residential/mixed-use areas, it may be necessary to take measures to suppress radio interference.
- Use only in combination with modules and components that are approved for the applicable product variant → www.festo.com/catalogue.
- Only use the product if it is in perfect technical condition.
- Only use the product in its original condition without unauthorised modifications. Only the conversions or modifications described in this and the further applicable documents are permitted.

2.3 Training of qualified personnel

Work on the product should only be conducted by qualified personnel. The qualified personnel must be familiar with installation of electrical control systems.

3 Additional information

- Contact the regional Festo contact if you have technical problems → www.festo.com.
- Accessories and spare parts → www.festo.com/catalogue.

Firmware, software or configuration files → www.festo.com/sp.

Table with 2 columns: More information, Content. Rows include Device description files and Documentation for the higher-order controller and the additional devices in the network.

Tab. 4: More information

4 Product overview

4.1 Function

The Automation system CPX-E is a modular system for the connection of electrical peripherals. The individual modules in an Automation system CPX-E are used, for example, to detect sensor signals and to control actuators. Using a bus

module or controller, the Automation system CPX-E can be connected to a higher-order controller through a network or operated autonomously. Various interfaces and functions are available for diagnostics.

4.2 Structure

4.2.1 Product design

4.2.1.1 Automation system CPX-E

The automation system CPX-E consists of a bus module or controller on the left side and at least one I/O module for signal processing. The modules are connected by linkage elements. The contacts of both external linkage elements are protected by end supports.

2 end supports are included with each bus module or controller.

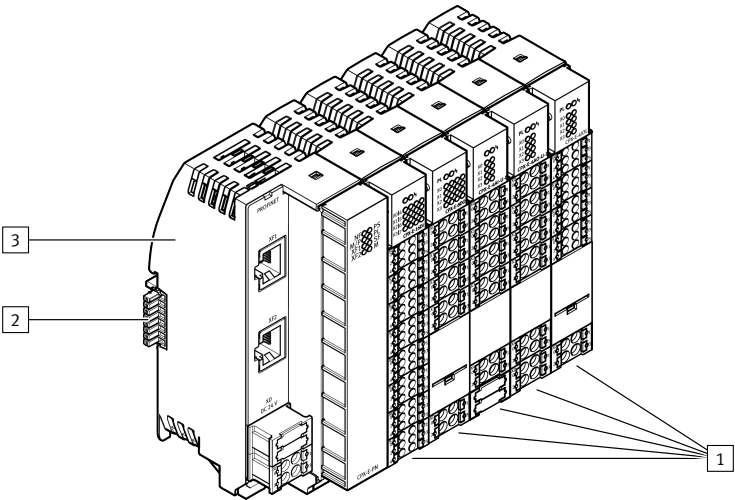


Fig. 1: Structure of the automation system CPX-E (example)

1 Input and output modules      3 Bus module, here CPX-E-PN

2 Linkage element

4.2.1.2 CPX-E modules

The CPX-E modules are designed in such a way that it is possible to replace individual components without dismantling the automation system CPX-E. Terminal strips can be removed from the module by disengaging the interlock. An individual module can be removed from the system by disengaging the module interlock. The linkage element remains on the H-rail.

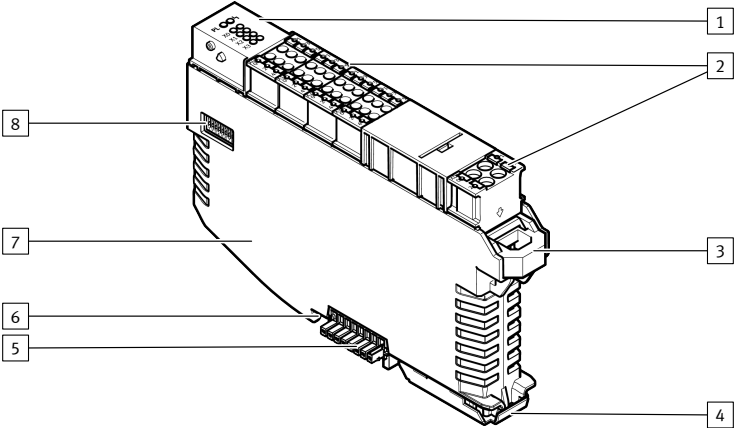


Fig. 2: Module design (example)

1 LED indicators      5 Linkage element

2 Terminal strips      6 Functional earth contact FE

3 Terminal strip interlock      7 Housing

4 Module interlock      8 DIL switch (module-dependent)

4.2.2 Display components

The CPX-E modules have LED indicators specific to the module or to the network and system:

- LED indicators specific to the module and network are described in the documentation for the that module.
- The overview of the system-specific LED indicators is shown in the following table → Tab. 5 System-specific LED indicators.
- The response of the system-specific LED indicators is described in:
  - → 11 Diagnostics and fault clearance
  - "Automation system CPX-E manual" → 1.1 Applicable documents

System-specific LED indicators

| LED                                                                                          | Meaning        |                                                                                                            |
|----------------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------------------------------|
|  PS (green) | Power System   | Monitoring of the operating voltage supply $U_{EL/SEN}$                                                    |
|  PL (green) | Power Load     | Monitoring of the logic and load voltage supply $U_{OUT}$                                                  |
|  SF (red)   | System Failure | System errors <sup>1)</sup>                                                                                |
|  M (yellow) | Modify         | Force mode active or system start with saved parameterisation and saved system configuration has been set. |

1) Display of 3 error classes by different flashing responses

Tab. 5: System-specific LED indicators

Detailed information on the error classes can be found in the "Automation system CPX-E manual" → 1.1 Applicable documents.

4.2.3 Control elements

The CPX-E module has interlocks for engaging and disengaging the module, connector plugs and connected conductors.

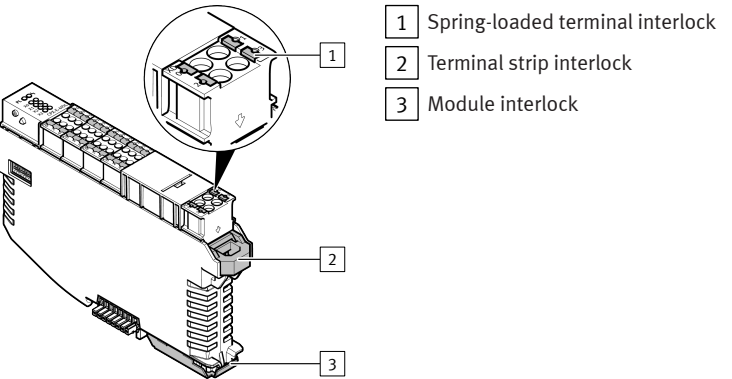


Fig. 3: Control elements

4.2.4 Connecting elements

4.2.4.1 Connecting the automation system CPX-E

The individual modules of the automation system CPX-E are connected to each other by means of the linking elements. The contact to the linking element is established when the modules are hung into the H-rail → 6 Mounting. If a module is removed, the connection to the other modules is interrupted.

4.2.4.2 Connecting the peripherals

For the connection of peripheral equipment, the modules have plug connectors with spring-loaded terminals → 7 Installation.

5 Functional example

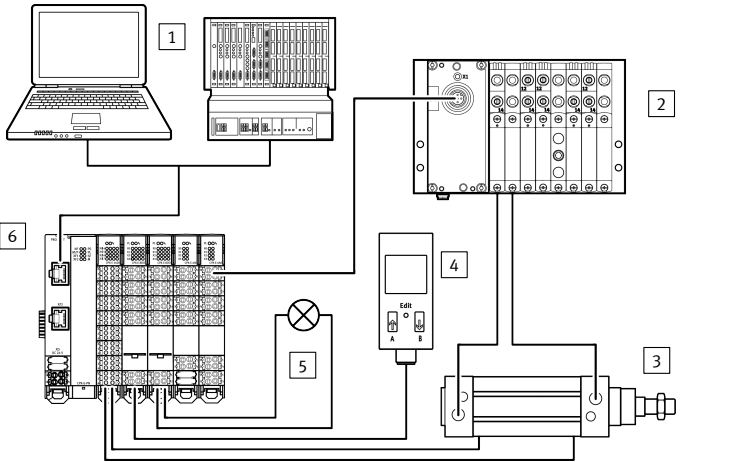


Fig. 4: Functional example

1 Higher-order controller      4 Flow sensor

2 Valve terminal VTUG      5 Indicator light

3 Standards-based cylinder with proximity switches for position sensing      6 Automation system CPX-E with bus module and I/O modules

6 Mounting

6.1 H-rail mounting

The modules are mounted on an H-rail 35 mm × 7.5 mm in accordance with EN 60715.



When selecting screws for H-rail mounting, a distance of 3 mm between the H-rail and the linkage elements must be maintained.  
The distance between the retaining screws for mounting the H-rail must not exceed a maximum of 50 mm.

6.2 Mounting clearances

To ensure sufficient ventilation of the modules, maintain the following minimum clearances when mounting the automation system CPX-E.

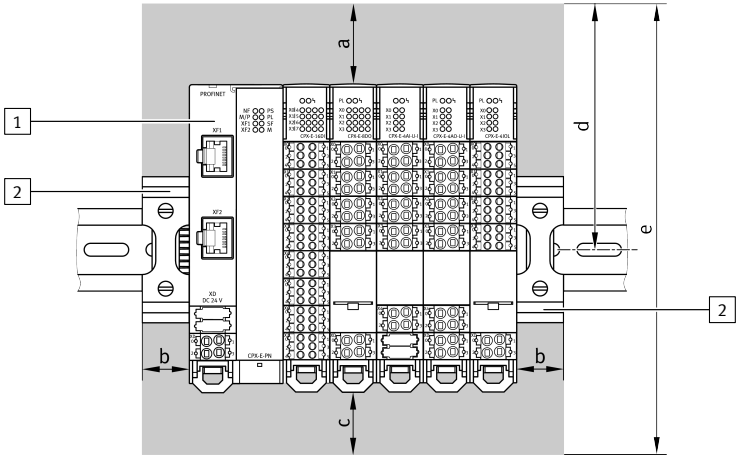


Fig. 5: Mounting clearances

- 1 Automation system CPX-E      2 End support

| Dimension         |      | a  | b  | c  | d   | e   |
|-------------------|------|----|----|----|-----|-----|
| Minimum clearance | [mm] | 40 | 20 | 30 | 106 | 195 |

Tab. 6: Minimum clearances

6.3 Fitting linkage element

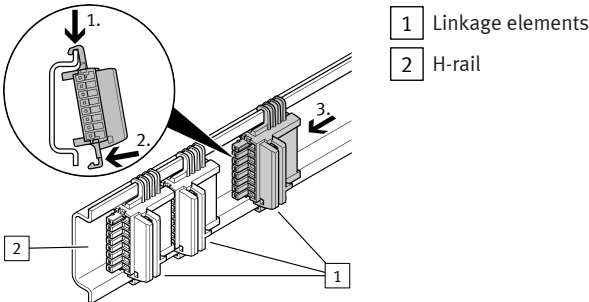


Fig. 6: Fitting linkage element

- Place the linkage element in the correct position on the H-rail.
- Clip the linkage element onto the H-rail.
- Push the linkage elements towards one another until they latch together.

6.4 Modules

6.4.1 Fitting and locking the module

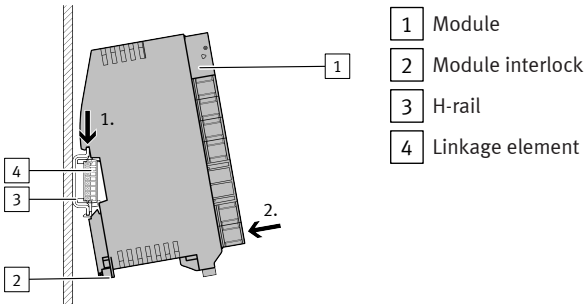


Fig. 7: Fitting module

- Place the module above the linkage element(s) on the H-rail:
  - Two linkage elements are required per module for bus modules.
  - Four linkage elements are required per controller for controllers.
- Press the module onto the H-rail until the module interlock locks into place.

6.4.2 Disengaging and removing the module

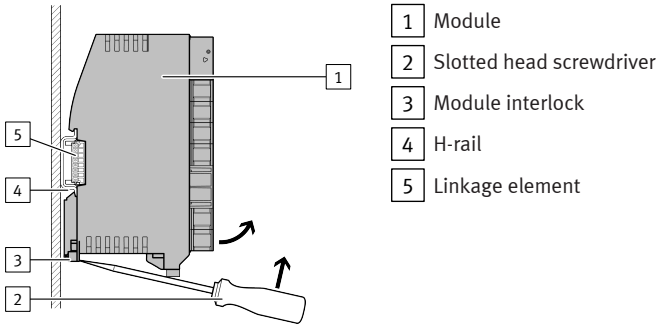


Fig. 8: Disengaging module

- Disengage the module interlock (e.g. with a slotted head screwdriver).
- Tilt the module upward and remove it from the H-rail.

7 Installation

NOTICE

Malfunction due to electromagnetic interference.

- Connect shielding to the functional earth connection FE.
- Connect the H-rail to the earth potential with low impedance.

7.1 Power supply concept

The Automation system CPX-E uses separate voltages to supply the electronics and sensors ( $U_{EL/SEN}$ ) and to supply outputs ( $U_{OUT}$ ). The equivalent voltage potentials (+24 V DC and 0 V DC) are connected to each other in the terminal strips. This enables the applicable voltage to be transferred from one module to the next.

WARNING

Risk of injury due to uncontrolled movements of the connected actuators.

A feedback loop through the sensor or actuator supply to the modules can supply the automation system CPX-E and lead to unwanted functions.

- Keep the range of movement of the connected actuators unobstructed.

Operating power supply  $U_{EL/SEN}$

The operating voltage supply  $U_{EL/SEN}$  to supply the electronics and sensors is fed in at the bus module or controller and distributed internally to the entire Automation system CPX-E.

| Connection [XD1], [XD2] <sup>1)</sup> | Signal                                         |
|---------------------------------------|------------------------------------------------|
| 0                                     | +24 V DC operating voltage supply $U_{EL/SEN}$ |
| 1                                     |                                                |
| 2                                     | 0 V DC operating voltage supply $U_{EL/SEN}$   |
| 3                                     |                                                |

1) Connections XDx.0 and XDx.1 and also XDx.2 and XDx.3 are each connected to each other in the terminal strip.

Tab. 7: Connection [XD1], [XD2]



To comply with the certification requirements of Underwriters Laboratories Inc. (UL) for the USA and Canada, within the scope of UL/CSA, depending on the current consumption, the parallel connection of the operating voltage supply to [XD1] and [XD2] is required → 13.3 Technical data for UL certification.

Load voltage supply  $U_{OUT}$

The load voltage supply  $U_{OUT}$  to supply the outputs is fed directly to the module separately for every module with outputs. In the following example with the output module CPX-E-8DO this is the output module CPX-E-4AO-U1 and the IO-Link master module CPX-E-4IOL.

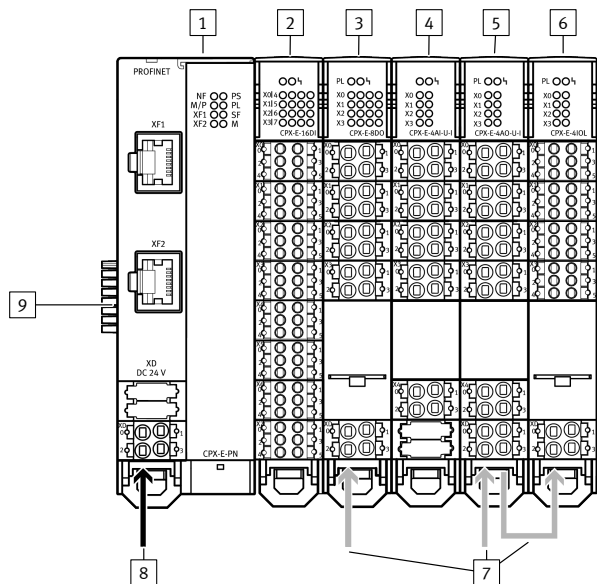


Fig. 9: Power supply concept

- |                               |                                       |
|-------------------------------|---------------------------------------|
| 1 Bus module CPX-E-PN         | 6 IO-Link master module CPX-E-4IOL    |
| 2 Input module CPX-E-16DI     | 7 Load voltage supply $U_{OUT}$       |
| 3 Output module CPX-E-8DO     | 8 Operating power supply $U_{EL/SEN}$ |
| 4 Input module CPX-E-4AI-U-I  | 9 Linkage element                     |
| 5 Output module CPX-E-4AO-U-I |                                       |



The operating voltage supply  $U_{EL/SEN}$  and load voltage supply  $U_{OUT}$  are routed separately from each other within the automation system CPX-E. If this separation is not required for the respective use case, both voltages can also be supplied from a common voltage source. In this case, it must be possible to disconnect the load voltage supply separately.

## 7.2 Connecting cables

### 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.

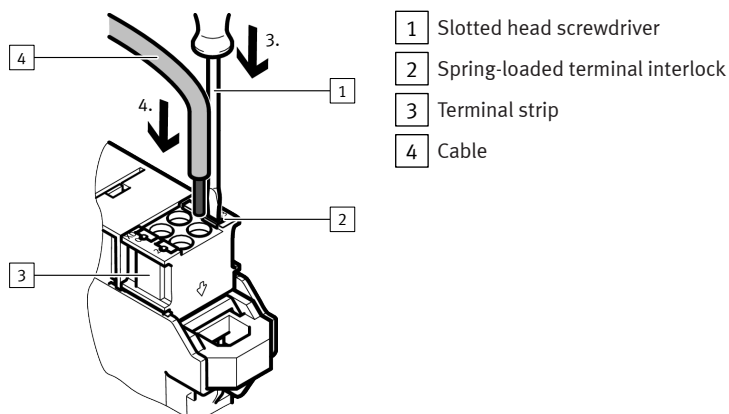


Fig. 10: Connecting cables

- Make sure the module and the cable are de-energised.
- Strip the end of the line and fit wire ferrules if required.
- Disengage the spring-loaded terminal interlock (e.g. with a slotted head screwdriver).
- Insert the end of the cable into the terminal strip as far as the stop.
- Engage the spring-loaded terminal interlock.

## 7.3 Disconnecting cables

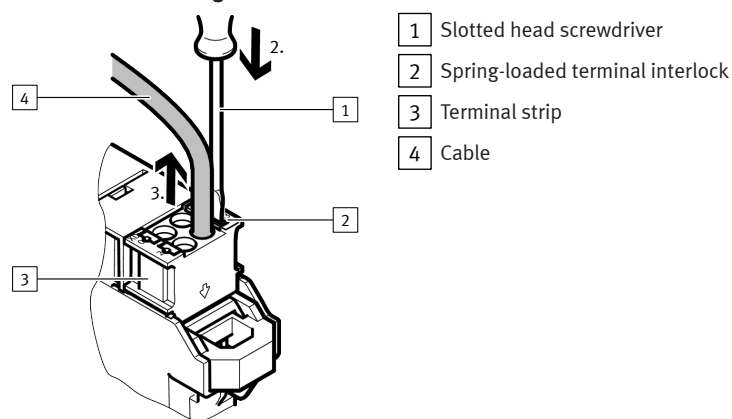


Fig. 11: Disconnecting cables

- Make sure the module and the cable are de-energised.
- Disengage the spring-loaded terminal interlock (e.g. with a slotted head screwdriver).
- Pull the cable out of the terminal strip.

## 8 Commissioning

The response of the automation system CPX-E during commissioning is largely determined by the parameterisation of the bus module.

- Observe information on parameterisation in the manual of the bus module → 1.1 Applicable documents.

### WARNING

#### Risk of injury due to uncontrolled movements of the connected actuators.

The automation system CPX-E starts even if the parameterisation process is incomplete.

- Keep the range of movement of the connected actuators unobstructed.
- Check the parameterisation and address allocation of the inputs and outputs (e.g. using Force mode).

In order to avoid connection and addressing errors, commissioning must be step by step as follows:

- Check assembly and connections → 8.1 Checking assembly and electrical connections.
- Apply settings → 8.2 Applying settings to the bus module or controller.
- Test function → 8.3 Functional test (without higher-order controller).
- Perform commissioning → 8.4 Commissioning in network (with higher-order controller).
- Carry out parameterisation → 8.5 Parameterisation.

### NOTICE

#### Addressing errors caused by changing address ranges during operation.

- Do not connect the bus module/controller to the network until after the functional test.

### 8.1 Checking assembly and electrical connections

- Check the assembly of the automation system CPX-E:
  - Make sure the linkage elements are clipped onto the H-rail and latched together.
  - Check that all module interlocks are latched onto the H-rail.
  - Check that all connector plug interlocks are locked in place.
- Check electrical installation of the automation system CPX-E:
  - Check the functional earth connections.
  - Check that connected cables are seated firmly.
  - Check the feed of the power supplies.
  - Check the allocation of the sensors and actuators to the modules.

### 8.2 Applying settings to the bus module or controller

Settings are applied to the bus module or controller independently of the module using rotary and/or DIL switches.



The functions and factor settings of the rotary and DIL switches (if present on the module) are described in the respective documentation accompanying the product.

- Apply the desired settings to the bus module or controller if they deviate from the factory setting.

### 8.3 Functional test (without higher-order controller)

- Switch on power supplies ( $U_{EL/SEN}$ ,  $U_{OUT}$ ).
- Check behaviour of the automation system CPX-E:
  - LED indicators
  - Connected actuators

8.4 Commissioning in network (with higher-order controller)

NOTICE

**Malfunction due to switching on the higher-order controller and automation system CPX-E in the incorrect order.**

- Switch on the higher-order controller and automation system CPX-E according to the preset order of the network used.

Information on commissioning can be found in the operating instructions for the specific bus module → 1.1 Applicable documents.

8.5 Parameterisation

Parameterisation enables the response of the automation system CPX-E or of individual modules and channels to be adapted to the specific application. Parameterisation can be performed with suitable Festo software or by the higher-order controller. The parameters are preset at the factory.

The parameterisation options depend on the installed bus module or controller: → Manual for the specific bus module / controller. A list and description of the general parameters can be found in the “Automation system CPX-E manual” → 1.1 Applicable documents.

8.5.1 Parameterisation using Festo software

Suitable software for parameterisation is available in the Festo Support Portal → www.festo.com/sp. Information on using the software can be found in the integrated Help function.

8.5.2 Parameterisation using the higher-order controller

Information on parameterisation using the higher-order controller can be found in the manual for the specific bus module or controller.

8.5.3 Start behaviour of the automation system CPX-E

The “System start” system parameter fundamentally influences the start behaviour of the automation system CPX-E.

- “Standard parameters” setting (presetting):  
The automation system CPX-E starts with the factory setting. The desired parameterisation can be established by the higher-order controller.
- “Stored parameters” setting:  
The automation system CPX-E starts with the parameters saved in the bus module. The setting is signalled by the “Modify” [M] LED indicator → 4.2.2 Display components being lit.

If the “Modify” [M] LED indicator is lit, the parameterisation of the automation system CPX-E is not restored by the higher-order controller after a replacement.

- Before replacement, note the required parameters and restore them after replacement.

9 Operation

The response of the automation system CPX-E in case of an error involving the following malfunctions depends on the parameterisation of the higher-order controller and the setting of the “fail-safe” system parameter:

- Telegram failure
- Network interruption

The electrical outputs are switched off (factory setting), switched on or retain their status depending on the parameterisation.

Detailed information on the “fail safe” system parameter can be found in the “Automation system CPX-E manual” → 1.1 Applicable documents.

10 Service

NOTICE

**Accumulation of heat due to reduced air supply to electronics.**

- Keep the ventilation slots free and regularly remove contamination.

11 Diagnostics and fault clearance

11.1 Diagnostics options

Various options are available for error diagnostics, depending on the parameterisation and network protocol used:

- Internal system diagnostics
- LED indicators on the product

11.2 Internal system diagnostics

The internal system diagnostics is described in the “Automation system CPX-E manual” → 1.1 Applicable documents.

11.3 LED indicators

Various LED indicators are available on every module for visualisation of status and errors. A distinction is made here between system-specific LED indicators and those specific to the module or network.

The system-specific LED indicators are described in this document. The LED indicators specific to the module or network are described in the documentation for the respective module.

| Power system [PS] – operating voltage supply U <sub>EL</sub> /SEN                            |     |                                                    |                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------|-----|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LED (green)                                                                                  |     | Meaning                                            | Remedy                                                                                                                                                                                         |
| <br>on      | ON  | Power supply present, no error                     | –                                                                                                                                                                                              |
|                                                                                              | OFF |                                                    |                                                                                                                                                                                                |
| <br>flashes | ON  | Power supply present but outside tolerance range   | Rectify undervoltage.                                                                                                                                                                          |
|                                                                                              | OFF | Linkage on the bus module is missing or incomplete | Check linkage.                                                                                                                                                                                 |
| <br>off     | ON  | internal fuse of the power supply has tripped      | Correct short circuit or overload. Depending on the parameterisation, the power supply is then switched on again automatically (factory setting) or it must be switched off and then on again. |
|                                                                                              | OFF | Power supply not present                           | Check connection of the power supply.                                                                                                                                                          |

Tab. 8: Power system [PS] – operating voltage supply

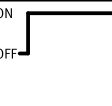
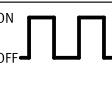
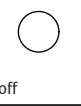
| Power load [PL] – load voltage supply U <sub>OUT</sub>                                         |     |                                                  |                                       |
|------------------------------------------------------------------------------------------------|-----|--------------------------------------------------|---------------------------------------|
| LED (green)                                                                                    |     | Meaning                                          | Remedy                                |
| <br>on      | ON  | Power supply present, no error                   | –                                     |
|                                                                                                | OFF |                                                  |                                       |
| <br>flashes | ON  | Power supply present but outside tolerance range | Rectify undervoltage.                 |
|                                                                                                | OFF | Power supply not present                         | Check connection of the power supply. |
| <br>off     | ON  | Power supply not present                         | Check connection of the power supply. |
|                                                                                                | OFF |                                                  |                                       |

Tab. 9: Power load [PL] – load voltage supply

| System failure [SF] – system error                                                             |     |                                         |                                  |
|------------------------------------------------------------------------------------------------|-----|-----------------------------------------|----------------------------------|
| LED (red) <sup>1)</sup>                                                                        |     | Meaning                                 | Remedy                           |
| <br>flashes | ON  | minor error/information (Error class 1) | → Manual Automation system CPX-E |
|                                                                                                | OFF | Error (Error class 2)                   |                                  |
|                                                                                                | ON  | serious error (Error class 3)           |                                  |
| <br>off     | ON  | no error                                | –                                |
|                                                                                                | OFF |                                         |                                  |

1) The LED “System Failure” [SF] indicator flashes depending on the error class.

Tab. 10: System failure [SF] – system error

| Modify [M] – parameterisation modified or force active                                      |                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LED (yellow)                                                                                |                                                                                                | Meaning                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <br>on      | <br>ON<br>OFF | System start set with saved parameterisation and saved configuration; parameters and configuration are saved to non-volatile memory; external parameterisation is blocked. <sup>1)</sup> Caution when replacing systems with saved parameterisation. Parameterisation in these systems is not automatically initiated by the higher-order controller on replacement. – Before replacement, note required settings and restore them after replacement, if required. |
| <br>flashes | <br>ON<br>OFF | The force function is enabled. <sup>1)</sup>                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <br>off     | <br>ON<br>OFF | System start set with default parameterisation (factory setting) and current configuration; external parameterisation is possible (presetting).                                                                                                                                                                                                                                                                                                                    |

1) The indication of the force function (LED flashing) has priority over indication of the setting for the system start with the saved parameterisation and saved configuration (LED steady).

Tab. 11: Modify [M] – parameterisation modified or force active

## 12 Modification

### 12.1 Replacing the module

#### NOTICE

**When a bus module, controller or complete system is replaced, different parameterisation will result in deviating behaviour.**

- Before replacement, check which settings are required and restore them after the replacement.

#### 12.1.1 Removing terminal strips

If a module is exchanged in the course of modification or repair, the conductors can be left in the terminal strips and the terminal strips removed from the module.

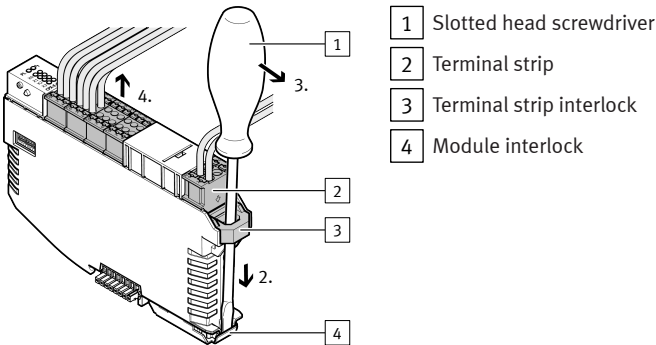


Fig. 12: Removing terminal strips

- Ensure that the module is de-energised.
- Insert the slotted head screwdriver through the recess of the terminal strip interlock and into the module interlock.
- Pull the slotted head screwdriver in the direction of the arrow to disengage the connector plugs.
- Remove terminal strips.

After the terminal strips are disengaged, they remain held in position. Push the terminal strips that are not removed back in as far as the stop.

#### 12.1.2 Disengaging module

➔ 6.4.2 Disengaging and removing the module

#### 12.1.3 Fitting module

➔ 6.4.1 Fitting and locking the module

#### 12.1.4 Inserting terminal strips

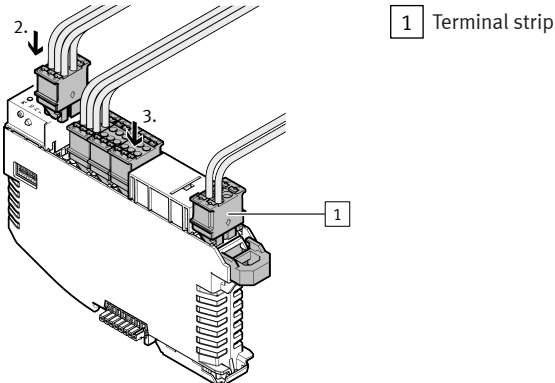


Fig. 13: Inserting terminal strips

- Ensure that the module is de-energised.

- Place the terminal strips in the appropriate positions on the module.
- Push the terminal strips in as far as the stop.

To prevent connection faults, the terminal strips for the power supply and for the signals have matching coding.

### 12.2 Replacing linkage element

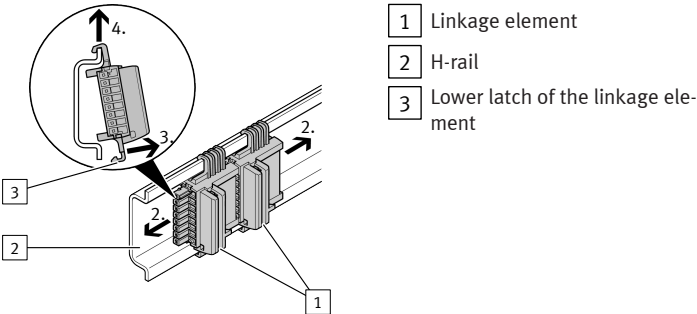


Fig. 14: Replacing linkage element

- Disengage and remove the module ➔ 6.4.2 Disengaging and removing the module.
- Disconnect the linkage elements by pulling them apart.
- Release the lower latch of the linkage element from the H-rail.
- Remove the linkage element from the H-rail.
- Fit the new linkage element ➔ 6.3 Fitting linkage element.

## 13 Technical data

### 13.1 Technical data, general

| General technical data                                                                                            | CPX-E                                                     |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Certificates, declaration of conformity                                                                           | ➔ <a href="http://www.festo.com/sp">www.festo.com/sp</a>  |
| Mounting position                                                                                                 | Vertical/horizontal                                       |
| Ambient temperature with vertical mounting position [°C]                                                          | –5 ... +60                                                |
| Ambient temperature with horizontal mounting position [°C]                                                        | –5 ... +50                                                |
| Storage temperature [°C]                                                                                          | –20 ... +70                                               |
| Humidity (non-condensing) [%]                                                                                     | 0 ... 95                                                  |
| Max. permissible setup altitude above sea level [m]                                                               | 2000                                                      |
| Degree of protection in accordance with EN 60529                                                                  | IP20<br>The degree of protection is not UL-tested.        |
| Protection against electric shock (Protection against direct and indirect contact in accordance with IEC 60204-1) | By the use of PELV circuits (Protected extra-low voltage) |
| Certification                                                                                                     | RCM Mark                                                  |
| Pollution degree                                                                                                  | 2                                                         |
| Vibration and shock resistance in accordance with EN 60068 ➔ Tab. 13 Type of severity level (SL)                  |                                                           |
| Vibration (part 2-6)                                                                                              | H-rail SL1                                                |
| Shock (part 2-27)                                                                                                 | H-rail SL1                                                |
| Continuous shock (part 2-27)                                                                                      | H-rail SL1                                                |
| Automation system CPX-E                                                                                           |                                                           |
| Address volume of the inputs/outputs [Byte]                                                                       | 64/64 (maximum)                                           |
| Max. number of modules per Automation system CPX-E, including the bus module or controller                        | 11                                                        |

Tab. 12: General technical data

| Type of severity level (SL) |             |                     |     |                      |       |
|-----------------------------|-------------|---------------------|-----|----------------------|-------|
| Vibration load              |             |                     |     |                      |       |
| Frequency range [Hz]        |             | Acceleration [m/s²] |     | Deflection [mm]      |       |
| SL1                         | SL2         | SL1                 | SG2 | SL1                  | SL2   |
| 2 ... 8                     | 2 ... 8     | –                   | –   | ±3.5                 | ±3.5  |
| 8 ... 27                    | 8 ... 27    | 10                  | 10  | –                    | –     |
| 27 ... 58                   | 27 ... 60   | –                   | –   | ±0.15                | ±0.35 |
| 58 ... 160                  | 60 ... 160  | 20                  | 50  | –                    | –     |
| 160 ... 200                 | 160 ... 200 | 10                  | 10  | –                    | –     |
| Shock load                  |             |                     |     |                      |       |
| Acceleration [m/s²]         |             | Duration [ms]       |     | Shocks per direction |       |
| SL1                         | SL2         | SL1                 | SL2 | SL1                  | SL2   |
| ±150                        | ±300        | 11                  | 11  | 5                    | 5     |
| Continuous shock load       |             |                     |     |                      |       |
| Acceleration [m/s²]         |             | Duration [ms]       |     | Shocks per direction |       |
| ±150                        |             | 6                   |     | 1000                 |       |

Tab. 13: Type of severity level (SL)

13.2 Technical data, electrical

| Power supply                               |        |                                |
|--------------------------------------------|--------|--------------------------------|
| Operating power supply U <sub>EL/SEN</sub> |        |                                |
| Nominal operating voltage                  | [V DC] | 24 ± 25%                       |
| Trigger level, undervoltage detection      | [V DC] | 17.5                           |
| Max. current rating of terminal strip      | [A]    | 8 <sup>1)</sup>                |
| Mains buffering time                       | [ms]   | module-dependent <sup>2)</sup> |
| Load voltage supply U <sub>OUT</sub>       |        |                                |
| Nominal operating voltage                  | [V DC] | 24 ± 25% <sup>3)</sup>         |
| Trigger level, undervoltage detection      | [V DC] | Module-dependent <sup>2)</sup> |
| Max. current rating of terminal strip      | [A]    | 8                              |

- 1) Non-conforming operating conditions UL → Documentation of modules  
2) → Documentation of the modules  
3) The tolerance indication is a deviation with some modules.

Tab. 14: Power supply

| Connection data for the terminal strips                         |       | 4-pin        | 6-pin        |
|-----------------------------------------------------------------|-------|--------------|--------------|
| Conductor cross section                                         |       |              |              |
| Solid                                                           | [mm²] | 0.14 ... 1.5 |              |
| Flexible                                                        | [mm²] | 0.14 ... 2.5 | 0.14 ... 1.5 |
| Conductor cross section with wire ferrule                       |       |              |              |
| Without plastic sleeve                                          | [mm²] | 0.14 ... 1.5 |              |
| With plastic sleeve                                             | [mm²] | 0.14 ... 1.5 | 0.14 ... 1.0 |
| Length of the wire ferrule without plastic sleeve <sup>1)</sup> |       |              |              |
| Conductor cross section<br>0.14 ... 1.0 mm²                     | [mm]  | 8 ... 10     |              |
| Conductor cross section<br>1.5 mm²                              | [mm]  | 8 ... 10     | 10           |
| Length of the wire ferrule with plastic sleeve <sup>2)</sup>    |       |              |              |
| Conductor cross section<br>0.14 ... 0.34 mm²                    | [mm]  | 8 ... 10     |              |
| Conductor cross section<br>0.5 ... 1.0 mm²                      | [mm]  | 8 ... 10     | 10           |

- 1) in accordance with DIN 46228-1  
2) in accordance with DIN 46228-4

Tab. 15: Connection data for the terminal strips

13.3 Technical data for UL certification

| Electrical data and ambient conditions UL |                                                    |
|-------------------------------------------|----------------------------------------------------|
| Pollution degree                          | 3                                                  |
| Installation site                         | for indoor use only                                |
| Maximum installation height               | 2000 m                                             |
| Protection against mechanical influences  | Install the product in housing or control cabinet. |

Tab. 16: Electrical data and ambient conditions UL

| Maximum current rating of operating voltage supply U <sub>EL/SEN</sub> UL |     |             |
|---------------------------------------------------------------------------|-----|-------------|
| Supply via [XD1] connection                                               | [A] | ≤ 4         |
| Supply via both [XD1] and [XD2] connections                               | [A] | > 4 ... 8 A |

Tab. 17: Maximum current rating UL