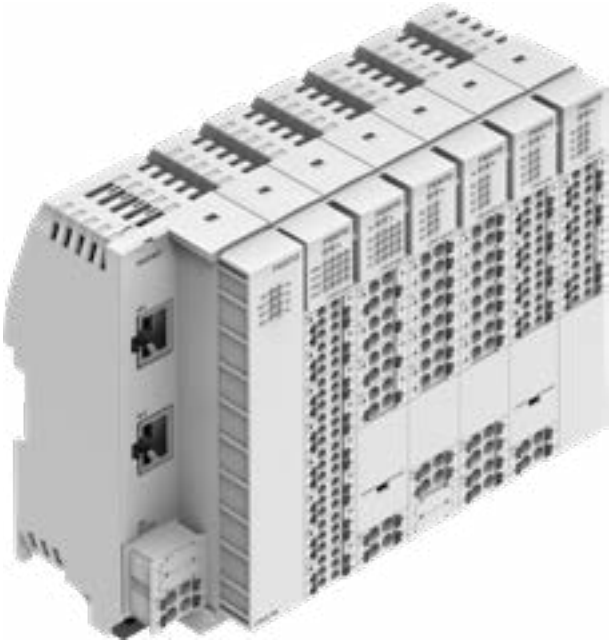
# Automation system CPX-E

# Key features



**Key features**

The automation system CPX-E is a high-performance control and automation system focusing primarily on motion control functions for handling technology. It comprises individual function modules that allow a very flexible system structure.
Depending on the combination, the automation system CPE-X can be configured and used purely as a remote I/O system or as a control system. The following modules are available:

- Controller
- Bus modules
- Input/output modules
- Counter modules
- IO-Link master modules

The controllers for the automation system CPX-E are powerful and have comprehensive PLC functions. They have an integrated EtherCAT master for communication with other products such as motor controllers.
There is support for SoftMotion, depending on the variant. SoftMotion is a powerful software library for simple and complex motion control applications.
All controllers have an integrated bus interface; an additional bus module for connection to higher-order controllers is not required.

- Standardised CODESYS programming interface
- Reduced development work through seamless data management
- Extended software functions for seamless integration and simplified control of electric drives
- Standardised, integrated platform combining servo technology and stepper motor technology, enabling mixed operation of the two technologies without problems in the application

Scalable motion control functions:

- Simple movements
- Multi-axis movements (cam discs)
- Contour applications
- Robotics

Handling technology using Festo kinematics (planar surface gantry, linear gantry, Cartesian three-dimensional gantries)

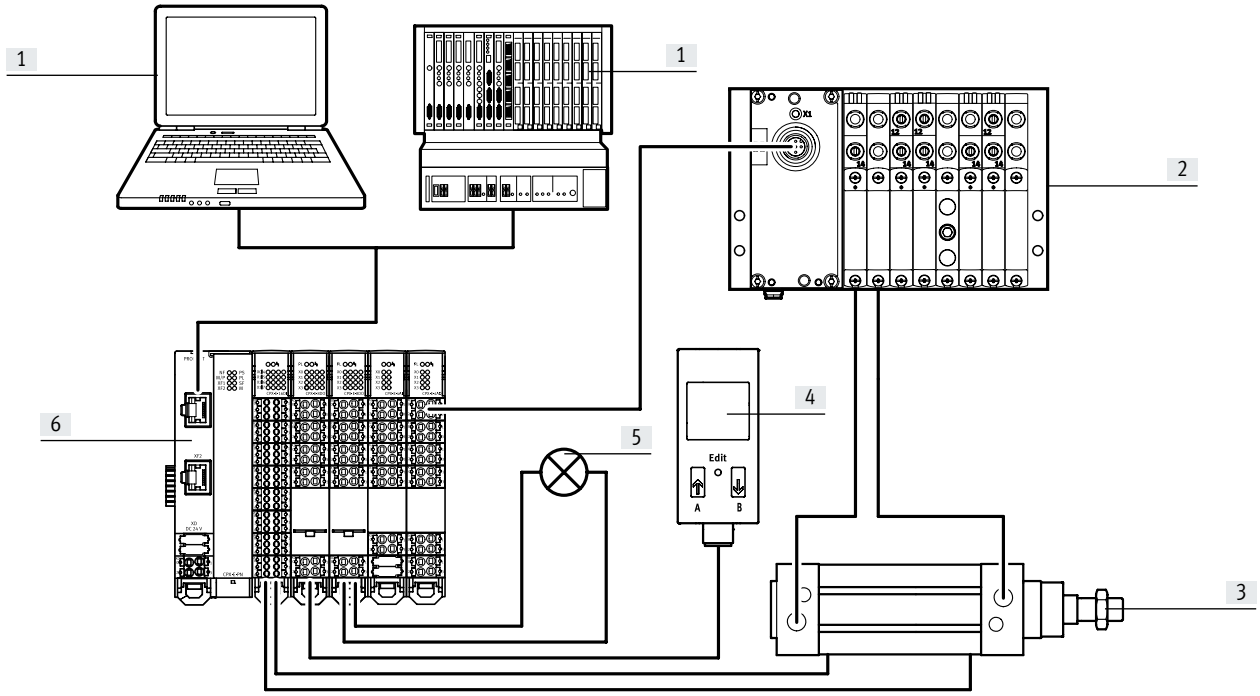
- Parts handling
- Assembly systems
- Palletising
- Gluing, dispensing

Complete automation of machines:

- Packaging machinery
- Palletising systems
- Assembly machines
- Handling systems

# Key features

## Overview




[1] Higher-order controller
[2] Valve terminal with I-Port interface/device with IO-Link interface
[3] Cylinder with sensors for position sensing
[4] Flow sensor
[5] Visual indicator
[6] Automation system CPX-E

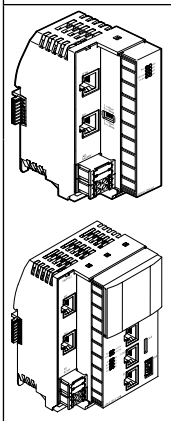
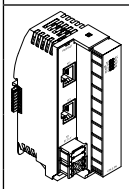
## Ordering data – Product options

Configurable product
This product and all its product options can be ordered using the configurator.

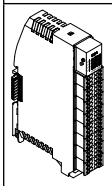
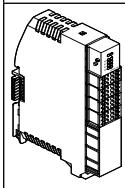
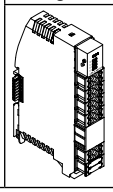
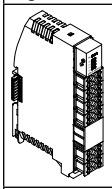
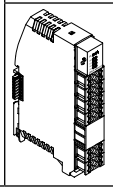
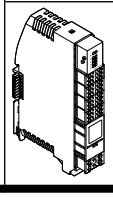
The configurator can be found at
➔ **www.festo.com/catalogue/...**
Enter the part number or the type.

| Part no. | Type |
|---|---|
| 5237644 | CPX-E |

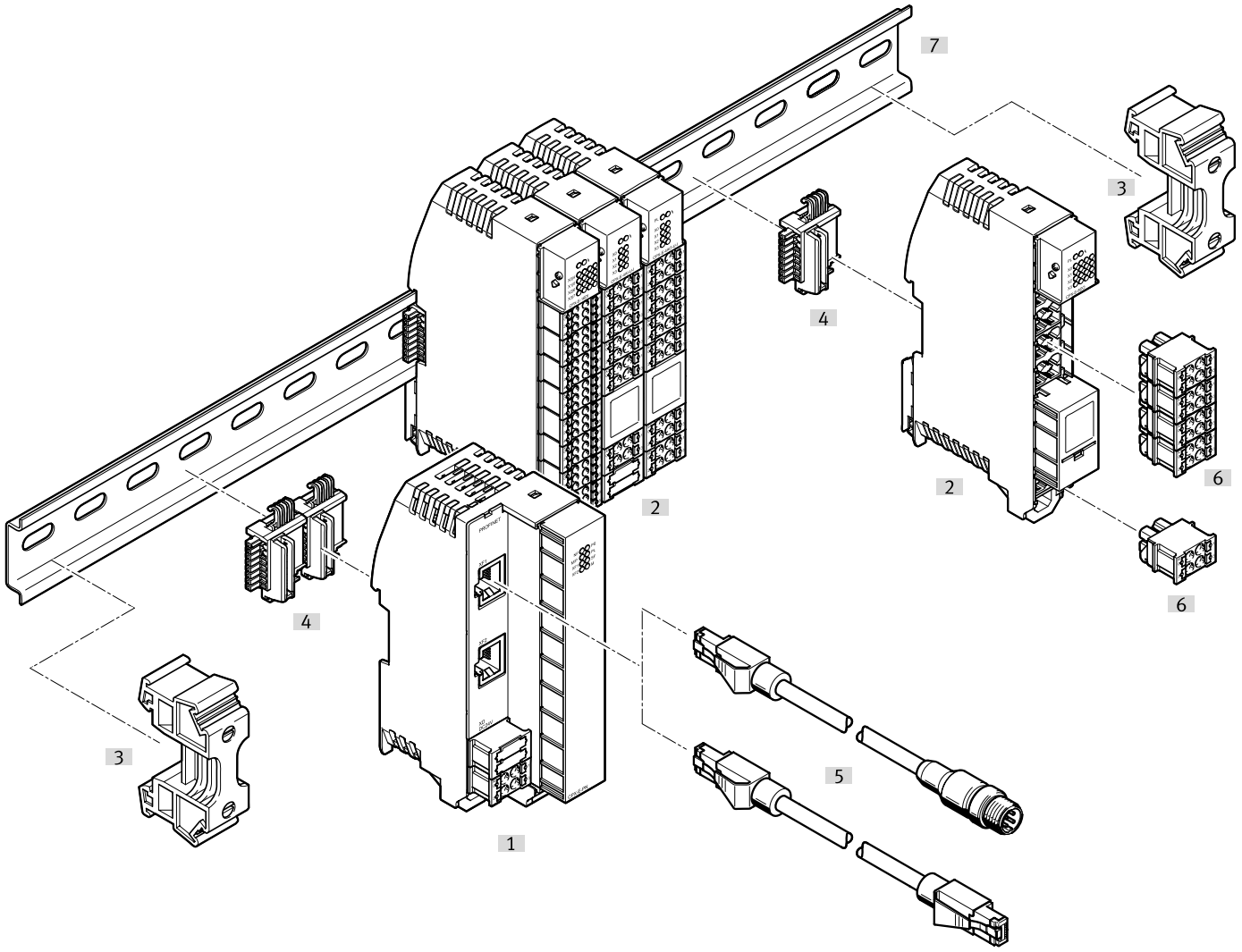
# Product range overview

| Function | Design | | Type | | → Page |
|---|---|---|---|---|---|
| **Controllers and bus modules** | **Controller** | | | | |
| |  | CODESYS V3 | CPX-E-CEC-C1 | • EtherCAT master<br>• Stand-alone controller<br>• Ethernet interface (EasyIP, Modbus TCP, TCP/IP, OPC-UA)<br>• CODESYS | 12 |
| | | | CPX-E-CEC-C1-PN | • EtherCAT master<br>• Communication via PROFINET IRT (Slave), EasyIP, Modbus TCP or TCP/IP<br>• Ethernet interface (EasyIP, Modbus TCP, TCP/IP, OPC-UA)<br>• CODESYS | 17 |
| | | | CPX-E-CEC-C1-EP | • EtherCAT master<br>• Communication via EtherNet/IP (Slave), EasyIP, Modbus TCP or TCP/IP<br>• Ethernet interface (EasyIP, Modbus TCP, TCP/IP, OPC-UA)<br>• CODESYS | 25 |
| | | CODESYS V3 with SoftMotion | CPX-E-CEC-M1 | • EtherCAT master<br>• Stand-alone controller<br>• Ethernet interface (EasyIP, Modbus TCP, TCP/IP, OPC-UA)<br>• CODESYS<br>• SoftMotion functionality | 12 |
| | | | CPX-E-CEC-M1-PN | • EtherCAT master<br>• Communication via PROFINET IRT (Slave), EasyIP, Modbus TCP or TCP/IP<br>• Ethernet interface (EasyIP, Modbus TCP, TCP/IP, OPC-UA)<br>• CODESYS<br>• SoftMotion functionality | 17 |
| | | | CPX-E-CEC-M1-EP | • EtherCAT master<br>• Communication via EtherNet/IP (Slave), EasyIP, Modbus TCP or TCP/IP<br>• Ethernet interface (EasyIP, Modbus TCP, TCP/IP, OPC-UA)<br>• CODESYS<br>• SoftMotion functionality | 25 |
| | **Bus module** | | | | |
| |  | PROFINET | CPX-E-PN | • Actuation via PROFINET<br>• Ethernet interface | 33 |
| | | EtherCAT | CPX-E-EC | • Actuation via EtherCAT<br>• Ethernet interface | 37 |
| | | EtherNet/IP | CPX-E-EP | • Actuation via EtherNet/IP<br>• Ethernet interface | 41 |
| | | PROFIBUS | CPX-E-PB | • Activation via PROFIBUS<br>• Sub-D interface | 45 |

# Product range overview

| Function | Design | | Type | | → Page |
|---|---|---|---|---|---|
| **Input module** | **Digital** | | | | |
| |  | 16 inputs | CPX-E-16DI | • LED display<br>• PNP (positive switching)<br>• 2- and 3-wire sensors to IEC 61131-2 | 49 |
| |  | 1 counter input | CPX-E-1CI | • LED display<br>• Incremental encoder with two phase-offset signals and optional signal 0<br>• Pulse generator with or without direction signal<br>• Differential encoder input with 5 V DC operating voltage<br>• Single encoder input (single ended) with 5 V DC or 24 V DC operating voltage | 52 |
| | **Analogue** | | | | |
| |  | 4 inputs | CPX-E-4AI-U-I | • LED display<br>• Measured variable: current or voltage, can be set<br>• Analogue input can be set up to 10 V/up to 20 mA | 59 |
| **Output module** | **Digital** | | | | |
| |  | 8 outputs | CPX-E-8DO | • LED display<br>• PNP (positive switching)<br>• Characteristic curve outputs to IEC 61131-2, type 0.5 | 56 |
| | **Analogue** | | | | |
| |  | 4 outputs | CPX-E-4AO-U-I | • LED display<br>• Measured variable: current or voltage, can be set<br>• Analogue input can be set up to 10 V/up to 20 mA | 63 |
| **Master module** | **IO-Link** | | | | |
| |  | 4 ports | CPX-E-4IOL | • LED display<br>• Protocol version Master V 1.1 | 67 |

# Peripherals overview




| | | Type | Description | → Page/ Internet |
|---|---|---|---|---|
| [1] | Controller/bus module | CPX-E-CEC<br>CPX-E-PN<br>CPX-E-EC<br>CPX-E-EP<br>CPX-E-PB | Connection of the CPX-E to a higher-order controller | 12<br>33<br>37<br>41<br>45 |
| [2] | Input/output module<br>Counter module<br>IO-Link master module | CPX-E-16DI<br>CPX-E-1CI<br>CPX-E-8DO<br>CPX-E-4AI-U-I<br>CPX-E-4AO-U-I<br>CPX-E-4IOL | Digital and analogue input and output modules | 49<br>52<br>56<br>59<br>63<br>67 |
| [3] | Retaining bracket | CAFM-X3-HC | Prevents the CPX-E from slipping on the H-rail | – |
| [4] | Electrical manifold module | VAEA-X3-L | Electrical connection between the individual modules of the CPX-E | – |
| [5] | Connecting cable | NEBC | For connection to the higher-order controller | – |
| [6] | Terminal strip | NEKC | Blocks with spring-loaded terminals for connecting sensors and actuators | – |
| [7] | DIN mounting rail | NRH-35-2000 | H-rail to EN 60715 | nrh |

# Key features – Mounting

**Mounting**

The automation system CPX-E can only be mounted on an H-rail.
Modules can easily be removed, replaced or added at a later date.

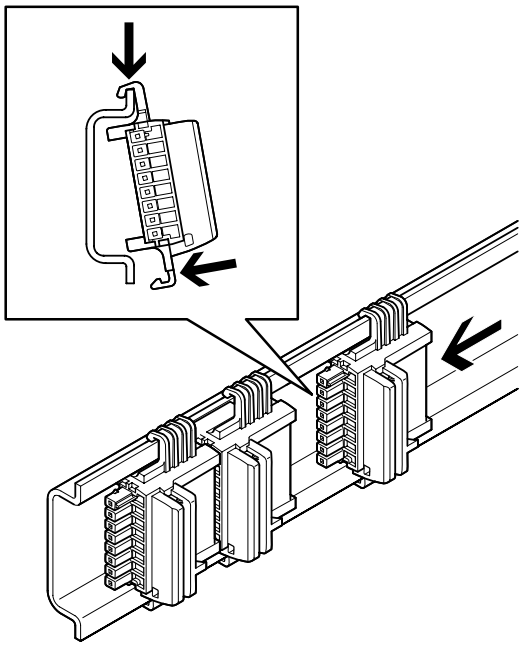
The following mounting clearances are recommended to allow sufficient ventilation of the automation system CPX-E:

- At the top: 4 cm
- At the side: 2 cm
- At the bottom: 3 cm

**Note**

Assembly must only take place in a de-energised state.

Mounting – Electrical manifold module



The electrical manifold modules are clipped into the H-rail. They can be moved along the H-rail.
The electrical manifold modules connect the individual modules of the automation system CPX-E to one another.
They are used for:

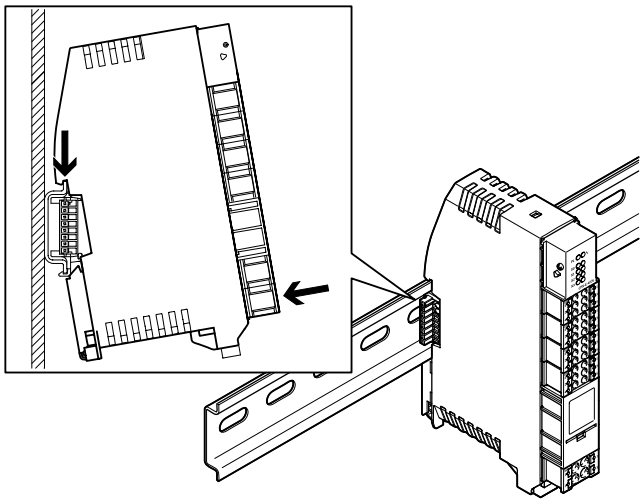
- Data transmission
- Power supply to the module
- Power supply to connected sensors

Output modules have a separate power infeed from which the consumers connected to the module are supplied.

The modules require different numbers of electrical manifold modules (included in the scope of delivery of the module):

- One electrical manifold module per input module
- One electrical manifold module per counter module
- One electrical manifold module per output module
- One electrical manifold module per IO-Link master module
- Two electrical manifold modules per bus module
- Two electrical manifold modules per stand-alone controller
- Four electrical manifold modules per PROFINET controller
- Four electrical manifold modules per EtherNet/IP controller

Assembly – Modules



The module is attached to the H-rail or the electrical manifold module and latched in place.
For removal, a screwdriver is required to undo the fastening clamp.
The automation system CPX-E is prevented from slipping off the H-rail by laterally attaching retainers (included in the scope of delivery).

If a module is to be replaced, the associated electrical manifold module remains on the H-rail.
If a module is missing, this interrupts the connection of the bus module/controller to the downstream input/output modules or IO-Link master modules.

# Key features – Mounting

## Electrical connections

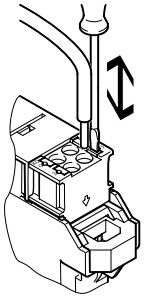
All the electrical connections of the automation system CPX-E are designed as terminal strips with spring-loaded terminals.

Modules can easily be removed, replaced or added at a later date.

**Note**

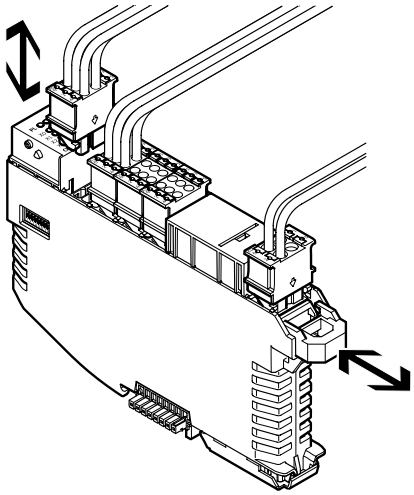
Assembly must only take place in a de-energised state.

### Mounting – Single wire



The electrical connection for the inputs and outputs, as well as the power supply, is provided via terminal strips for single strands.

### Mounting – Terminal strip



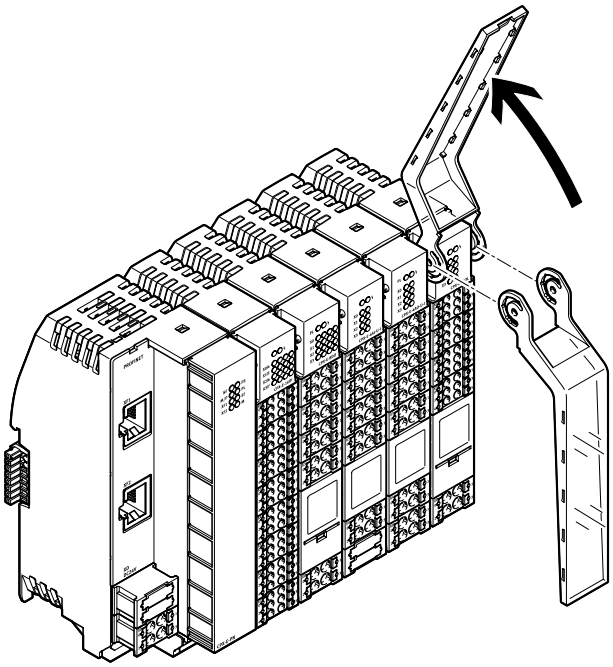
The terminal strips mounted on a module are held in position by a central locking mechanism.
To remove individual terminal strips, the locking mechanism is released using a screwdriver:

- Simple changeover of connected sensors or actuators
- Fast and visible disconnection and reconnection of the power supply
- Simple changeover of an entire CPX-E module, wiring is retained

The terminal strips have a partially coded plug pattern:

- Terminal strips with the same number of pins can be interchanged
- Terminal strips for power supply connections only fit on power supply connections

### Labelling

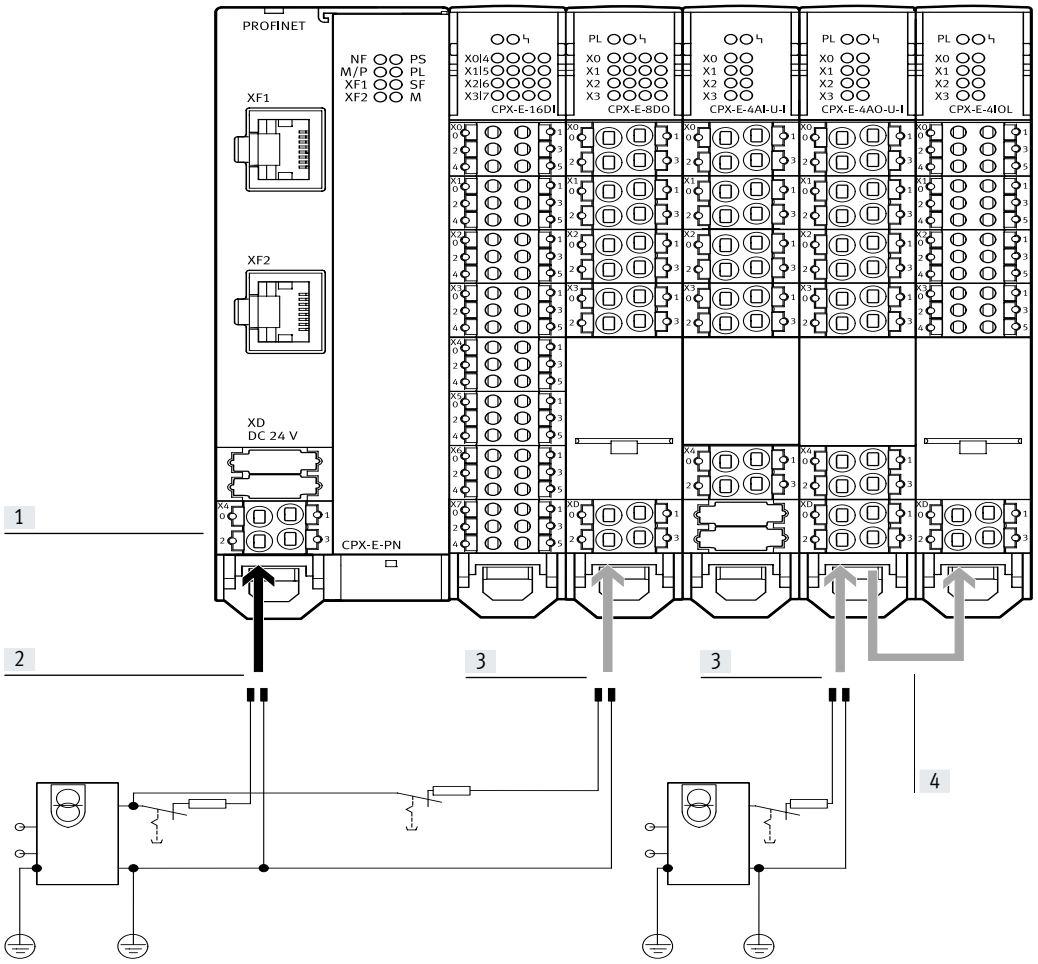


A hinged identification holder is available for the input and output modules and IO-Link master modules.

A matching label strip is inserted into the identification holder for labelling.

# Key features – Power supply

**Power supply concept**




[1] The power supply is provided via a terminal strip with spring-loaded terminals on the module

[2] The power supply for the modules themselves and the connected sensors is provided centrally on the bus module/controller.

[3] The power supply for connected actuators is provided via a terminal strip with spring-loaded terminals on the respective output module/IO-Link master module

[4] The power supply for actuators can be looped through from output module to output module/IO-Link master module

Electrical manifold modules represent the backbone of the automation system CPX-E with all supply cables. They provide the power supply for the modules used on them as well as their bus connections.

For segmentation into voltage zones, the power supply for the outputs is fed in separately at the output module. This creates electrically isolated, all-pin disconnectable potential groups/voltage segments.

# Key features – Diagnostics

**System performance**

## Diagnostics

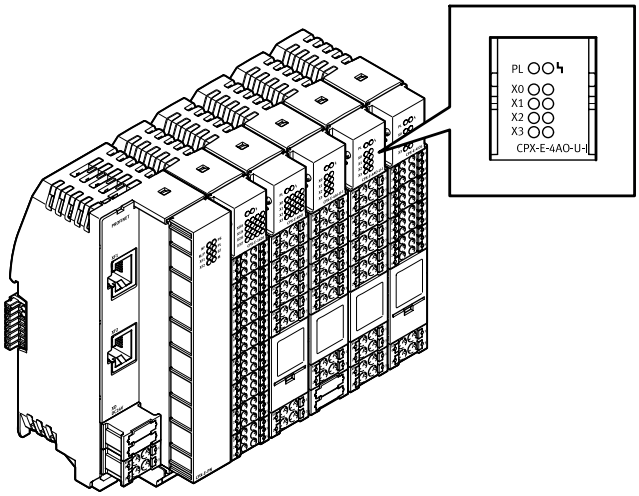
Detailed diagnostic functions are needed in order to quickly locate the causes of errors in the electrical installation and therefore reduce downtimes in production plants.
A basic distinction is made between on-the-spot diagnostics using LEDs or an operator unit and diagnostics using a bus interface.

The automation system CPX-E supports on-the-spot diagnostics via a row of LEDs. This is separate from the connection area and therefore provides good visual access to status and diagnostic information.
The parameters for maximum storage time and recording method for diagnostic messages can be set.

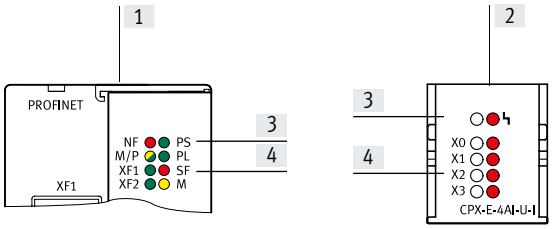
Module and channel-specific diagnostics are supported, for example:
- Undervoltage detection
- Short circuit detection
- Open load detection
- Storage of the 40 most recently occurring errors

Diagnostic messages can be read out via the bus interface in the higher-order controller and visualised for the central recording and evaluation of error causes. This is done using the individual fieldbus-specific channels.
There is also the option of access via the integrated web server (remote maintenance via PC/web applications).

## Displays




Each module has a row of LEDs for indicating the operating status of the module and of the connected sensors or actuators.




[1] LED indicators on the bus module/controller
[2] LED indicators on the input/output module, IO-Link master module
[3] System-specific LED indicator (e.g. power supply)
[4] Communication-specific LED indicator (e.g. status of network connection, switching status of sensor)

## Parameterisation

Changes to the application are often required during commissioning. The parameterisable characteristics of the CPX-E modules mean that functions can be very easily changed using the configuration software.

It is therefore possible, for example, to reduce the input debounce time for an input module – normally 3 ms – to 0.1 ms on a "fast" input module for faster processes.

Depending on the modules used, parameterisation is performed via the following interfaces:
- Ethernet
- Fieldbus

The following settings are affected by the parameterisation:
- Behaviour in the event of communication errors
- Behaviour on being switched back on
- Debounce times and signal extension
- Force settings (defining the signal status)
- Operating mode of the diagnostic memory

# Key features – Addressing

## Addressing

The various CPX-E modules occupy a different number of addresses within the CPX-E system. The maximum address space for bus modules depends on the performance of the fieldbus systems.

Maximum system configuration:
- 1 bus module or controller
- 10 input/output/counter modules and IO-Link master modules

The maximum system configuration can be limited in individual cases by exceeding the address space.

Addresses are allocated automatically in ascending order from left to right, as viewed from the bus module/ controller.

**Note**

Please refer to the detailed description of the configuration/addressing rules in the technical data for CPX-E bus modules.

**Overview – Address space for CPX-E bus modules and controller**

| | Protocol | Max. total | | Max. digital | | Max. analogue | |
|---|---|---|---|---|---|---|---|
| | | Inputs | Outputs | Inputs | Outputs | Inputs | Outputs |
| CPX-E-CEC-C1 | CODESYS V3 | 512 bits | 512 bits | 160 DI | 80 DO | 32 AI | 32 AO |
| CPX-E-CEC-M1 | CODESYS V3 with SoftMotion | 512 bits | 512 bits | 160 DI | 80 DO | 32 AI | 32 AO |
| CPX-E-CEC-C1-PN | CODESYS V3 | 4096 bits | 4096 bits | 1280 DI | 360 DO | 256 AI | 256 AO |
| CPX-E-CEC-M1-PN | CODESYS V3 with SoftMotion | 4096 bits | 4096 bits | 1280 DI | 360 DO | 256 AI | 256 AO |
| CPX-E-CEC-C1-EP | CODESYS V3 | 4096 bits | 4096 bits | 1280 DI | 360 DO | 256 AI | 256 AO |
| CPX-E-CEC-M1-EP | CODESYS V3 with SoftMotion | 4096 bits | 4096 bits | 1280 DI | 360 DO | 256 AI | 256 AO |
| CPX-E-PN | PROFINET | 512 bits | 512 bits | 160 DI | 80 DO | 32 AI | 32 AO |
| CPX-E-EC | EtherCAT | 512 bits | 512 bits | 160 DI | 80 DO | 32 AI | 32 AO |
| CPX-E-EP | EtherNet/IP | 512 bits | 512 bits | 160 DI | 80 DO | 32 AI | 32 AO |
| CPX-E-PB | PROFIBUS | 512 bits | 512 bits | 160 DI | 80 DO | 32 AI | 32 AO |

DI = Digital inputs (1 bit)
DO = Digital outputs (1 bit)
AO = Analogue outputs (16 bits)
AO = Analogue outputs (16 bits)
AI = Analogue inputs (16 bits)

**Note**

The bandwidth of the bus modules can be restricted by the choice of module and the maximum number of modules.

**Overview – Allocated addresses for CPX-E modules**

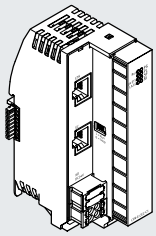
| | | Inputs [bit] | Outputs [bit] |
|---|---|---|---|
| CPX-E-16DI | Digital input module, 16 inputs | 16 | – |
| CPX-E-1CI | Digital counter module, 1 counter input | 96 | 16 |
| CPX-E-8DO | Digital output module, 8 outputs | – | 8 |
| CPX-E-4AI-U-I | Analogue input module, 4 inputs | 64 | – |
| CPX-E-4AO-U-I | Analogue output module, 4 outputs | – | 64 |
| CPX-E-4IOL | IO-Link master module, 4 ports | 64 ... 256 | 64 ... 256 |

**Example of CPX-E-PN (PROFINET)**

| | Inputs [bit] | Outputs [bit] | Remarks |
|---|---|---|---|
| 3x CPX-E-16DI | 48 | – | • The maximum number of modules is achieved with 10 CPX-E input/output modules<br>• The available address space (512 bits) is not fully used up<br>• No additional modules can be configured |
| 1x CPX-E-8DO | – | 8 | |
| 6x CPX-E-4AI-U-I | 384 | – | |
| Allocated address space | 432 | 8 | |

# Data sheet – Stand-alone controller

Controller for operating the automation system CPX-E as an autonomous unit
Programming and process visualisation take place via CODESYS.
The controller includes the power supply for the modules of the automation system and the connected sensors.



## Application

### Ethernet connection

The controller can be accessed directly via two Ethernet interfaces.

There is also the option of connecting via Modbus/TCP or standard Ethernet (TCP/IP).

The interfaces support crossover detection, which means that there is a choice of using patch cables or crossover cables.

### Motion controller

The controller has an integrated EtherCAT master. EtherCAT is used for communication with other products:
- Motor controllers (CMMP, CMMT)
- Electrical terminal (CPX)
- Valve terminals with I-Port interface via the installation system CTEL (bus node CTEU-EC)

The SoftMotion extension makes it possible to control/execute coordinated multi-axis movements.

### Additional functions

- Web server for read access to the most important parameter and diagnostic functions
- FTP server for data exchange
- Real-time clock, can be set and read using CODESYS
- Internal temperature sensor

# Data sheet – Stand-alone controller

| General technical data | | |
|---|---|---|
| CPU data | | Dual core 650 MHz |
| | | 128 MB RAM |
| Programming software | | CODESYS provided by Festo |
| Program memory | | 12 MB, user program |
| Buffering time real-time clock | | 3 weeks |
| Processing time | | Approx. 200 µs/1 k instruction |
| Flags | | 120 kB remanent data |
| | | CODESYS variable concept |
| Function blocks | | Read CPX module diagnostics |
| | | CPX diagnostic status |
| | | Copy CPX diagnostic trace |
| | | And others |
| IP address setting | | DHCP |
| | | Via CODESYS |
| Control elements | | DIL switch for RUN/STOP |
| Configuration support | | CODESYS V3 |
| Maximum number of modules | | 10 |
| System parameters | | Diagnostic memory |
| | | Fail-safe response |
| | | System start |
| Module parameters | | Channel alarms bundling |
| | | Undervoltage diagnostics |
| | | Channel alarms for undervoltage |
| | | Process value representation, analogue modules |
| Diagnostics via LED | | Force mode |
| | | Network status engineering port 1 |
| | | Network status EtherCAT |
| | | Run |
| | | Power supply, electronics/sensors |
| | | Power supply load |
| | | System error |
| **Address capacity of internal bus inputs/outputs** | | |
| Max. address capacity of outputs | [byte] | 64 |
| Max. address capacity of inputs | [byte] | 64 |

| Technical data – Interfaces | | |
|---|---|---|
| **Fieldbus interface** | | |
| Protocol | | EtherCAT |
| | | EtherCAT master |
| | | EtherCAT CoE |
| | | EtherCAT EoE |
| | | EtherCAT FoE |
| Function | | Bus connection outgoing |
| Transmission rate | [Mbps] | 100 |
| Type | | Ethernet |
| Connection type | | Socket |
| Connection technology | | RJ45 |
| Number of pins/wires | | 8 |
| Galvanic isolation | | Yes |
| **Ethernet interface** | | |
| Protocol | | EasyIP |
| | | Modbus TCP |
| | | TCP/IP |
| | | OPC UA |
| Function | | Diagnostics |
| Transmission rate | [Mbps] | 10 |
| | [Mbps] | 100 |
| Connection type | | Socket |
| Connection technology | | RJ45 |
| Number of pins/wires | | 8 |

# Data sheet – Stand-alone controller

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Power failure buffering | [ms] | 20 |
| Max. power supply | [A] | 8 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | Typically 65 |
| Protection against direct and indirect contact | | PELV |
| Reverse polarity protection | | 24 V sensor supply against 0 V sensor supply |
| Note on reverse polarity protection | | Self-protection |
| | | |
| **Electrical connection, power supply** | | |
| Function | | Electronics and sensors |
| Connection type | | Terminal strip |
| Note on connection type | | › 4 A and UL 2x terminal strip for power supply |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [mm²] | 0.2 … 1.5 |
| Note on conductor cross section | | 0.2 … 2.5 mm² for flexible conductor without wire end sleeve |

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 145 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 42.2 x 76.5 x 125.8 |

| Materials | |
|---|---|
| Housing | PA |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

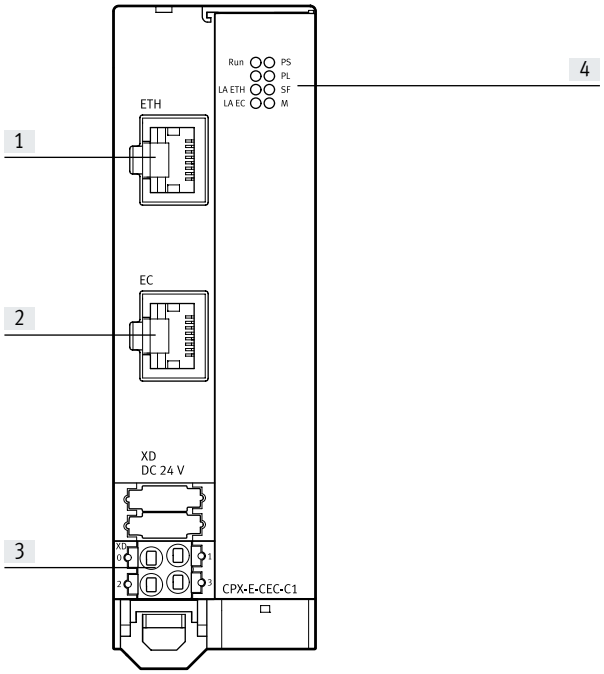
| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 … +50 |
| Note on ambient temperature | [°C] | –5 … +60 for vertical installation |
| Storage temperature | [°C] | –20 … +70 |
| Corrosion resistance class CRC[1] | | 0 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

1) Additional information: www.festo.com/x/topic/kbk
2) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.
3) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

# Data sheet – Stand-alone controller

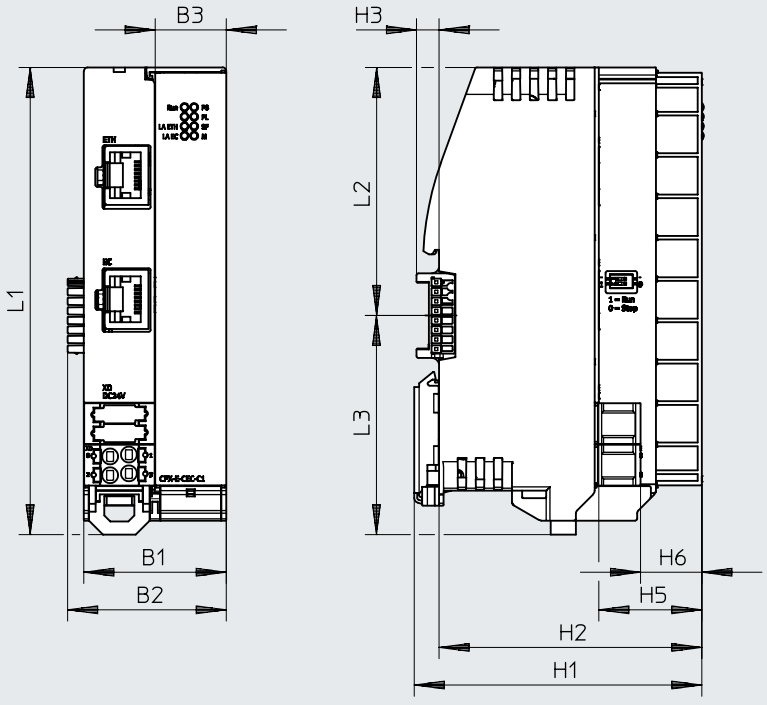
## Connection and display components




[1] Ethernet network connection
[2] EtherCAT master network connection
[3] Terminal strip for operating voltage supply
[4] LED indicators

## Dimensions

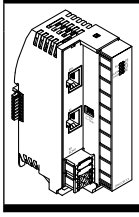
Download CAD data ➔ www.festo.com



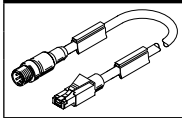
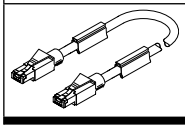

| | B1 | B2 | B3 | H1 | H2 | H3 | H4 | H5 | H6 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CPX-E-CEC-C1 | 37.8 | 42.2 | 18.9 | 76.5 | 69.9 | 6 | – | 27.4 | 16.3 | 124.3 | 66 | 58.3 |
| CPX-E-CEC-M1 | | | | | | | | | | | | |

# Data sheet – Stand-alone controller

**Ordering data**

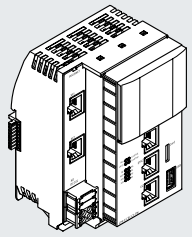
| | Bus connection | Additional functions | Part no. | Type |
|---|---|---|---|---|
|  | Stand-alone controller | CODESYS V3 | **5226780** | **CPX-E-CEC-C1** |
| | | CODESYS V3 with SoftMotion | **5266781** | **CPX-E-CEC-M1** |

**Ordering data – Accessories**

| | | | Cable length [m] | Part no. | Type |
|---|---|---|---|---|---|
|  | Straight plug, M12x1, 4-pin, D-coded | Straight plug, RJ45, 8-pin | 1 | **8040451** | **NEBC-D12G4-ES-1-S-R3G4-ET** |
| | | | 3 | **8040452** | **NEBC-D12G4-ES-3-S-R3G4-ET** |
| | | | 5 | **8040453** | **NEBC-D12G4-ES-5-S-R3G4-ET** |
| | | | 10 | **8040454** | **NEBC-D12G4-ES-10-S-R3G4-ET** |
|  | Straight plug, RJ45, 8-pin | Straight plug, RJ45, 8-pin | 1 | **8040455** | **NEBC-R3G4-ES-1-S-R3G4-ET** |

# Data sheet – PROFINET controller

Controller for operating the automation system CPX-E on PROFINET or as an autonomous unit
Programming and process visualisation take place via CODESYS.
The controller includes the power supply for the modules of the automation system and the connected sensors.



## Application

### Bus connection

The bus connection is provided via RJ45 sockets which meet Ethernet requirements.
Communication with a higher-order controller takes place via PROFINET.
There is also the option of connecting via Modbus/TCP or standard Ethernet (TCP/IP).
The controller can be accessed directly via two Ethernet interfaces. The integrated switch supports star and line topology and enables the network to be divided into segments.
The controller can be operated both as a higher-order device (master) and as a subordinate device (slave) using the communication protocol Modbus/TCP.
The interfaces support crossover detection, which means that there is a choice of using patch cables or crossover cables.

### Motion controller

The controller has an integrated EtherCAT master.
EtherCAT is used for communication with other products:

- Motor controllers (CMMP, CMMT)
- Electrical terminal (CPX)
- Valve terminals with I-Port interface via the installation system CTEL (bus node CTEU-EC)

The SoftMotion extension makes it possible to control/execute coordinated multi-axis movements.

### Data storage

An SD card slot and a USB interface are provided for reading out and storing data.
The maximum memory size for compatible media is 32 GB in FAT format with a partition.
There is no provision to permanently record data on the external media during operation.
Only USB storage media with a current consumption of less than 0.5 A may be used.

### Additional functions

- Web server for read access to the most important parameter and diagnostic functions
- FTP server for data exchange
- Real-time clock, can be set and read using CODESYS
- Internal temperature sensor

# Data sheet – PROFINET controller

| General technical data | | |
|---|---|---|
| CPU data | | Dual core 766 MHz |
| | | 512 MB RAM |
| Storage medium | | Micro SD card up to 32 GB |
| | | USB memory stick up to 32 GB |
| Programming software | | CODESYS provided by Festo |
| Program memory | | 100 MB, user program |
| Buffering time real-time clock | | 3 weeks |
| Processing time | | Approx. 200 µs/1 k instruction |
| Flags | | 120 kB remanent data |
| | | CODESYS variable concept |
| Function blocks | | Read CPX module diagnostics |
| | | CPX diagnostic status |
| | | Copy CPX diagnostic trace |
| | | And others |
| IP address setting | | DHCP |
| | | Via CODESYS |
| | | Optional: via operator unit CDSB |
| Control elements | | DIL switch for RUN/STOP |
| | | Optional operator unit CDSB |
| Configuration support | | Operator unit CDSB |
| | | CODESYS V3 |
| | | GSDML file |
| Maximum number of modules | | 10 |
| System parameters | | Diagnostic memory |
| | | Fail-safe response |
| | | System start |
| Module parameters | | Channel alarms bundling |
| | | Undervoltage diagnostics |
| | | Channel alarms for undervoltage |
| | | Process value representation, analogue modules |
| Diagnostics via LED | | Force mode |
| | | Network errors |
| | | Network status engineering port 1 |
| | | Network status engineering port 2 |
| | | Network status EtherCAT |
| | | Network status port 1 |
| | | Network status port 2 |
| | | Run |
| | | Power supply, electronics/sensors |
| | | Power supply load |
| | | System error |
| | | Maintenance required |
| | | |
| **Address capacity of internal bus inputs/outputs** | | |
| Max. address capacity of outputs | [byte] | 64 |
| Max. address capacity of inputs | [byte] | 64 |

# Data sheet – PROFINET controller

| Technical data – Interfaces | | |
|---|---|---|
| **Fieldbus interface 1** | | |
| Protocol | | PROFINET IO |
| | | PROFINET RT |
| | | PROFINET Shared device |
| | | PROFINET I&M0 .. 3 |
| | | MRP, MRPD (ring redundancy) |
| | | LLDP |
| | | SNMP |
| Function | | Bus connection incoming/outgoing |
| Transmission rate | [Mbps] | 100 |
| Type | | Ethernet |
| Connection type | | 2 x socket |
| Connection technology | | RJ45 |
| Number of pins/wires | | 8 |
| Galvanic isolation | | Yes |
| Max. address capacity of outputs | [byte] | 512 |
| Max. address capacity of inputs | [byte] | 512 |
| **Fieldbus interface 2** | | |
| Protocol | | EtherCAT |
| | | EtherCAT master |
| | | CoE |
| | | EoE |
| | | FoE |
| Function | | Bus connection incoming/outgoing |
| Transmission rate | [Mbps] | 100 |
| Type | | Ethernet |
| Connection type | | Socket |
| Connection technology | | RJ45 |
| Number of pins/wires | | 8 |
| Galvanic isolation | | Yes |
| **Ethernet interface** | | |
| Protocol | | EasyIP |
| | | Modbus TCP |
| | | TCP/IP |
| | | OPC UA |
| Function | | Switch |
| | | Diagnostics |
| Transmission rate | [Mbps] | 10 |
| | [Mbps] | 100 |
| Connection type | | 2 x socket |
| Connection technology | | RJ45 |
| Number of pins/wires | | 8 |
| **USB interface** | | |
| USB interface | | USB 2.0 |

# Data sheet – PROFINET controller

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC | [V DC] | 24 |
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Power failure buffering | [ms] | 20 |
| Max. power supply | [A] | 8 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | Typically 150 |
| Protection against direct and indirect contact | | PELV |
| Reverse polarity protection | | 24 V sensor supply against 0 V sensor supply |
| Note on reverse polarity protection | | Self-protection |
| **Electrical connection, power supply** | | |
| Function | | Electronics and sensors |
| Connection type | | Terminal strip |
| Note on connection type | | › 4 A and UL 2x terminal strip for power supply |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [mm²] | 0.2 … 1.5 |
| Note on conductor cross section | | 0.2 … 2.5 mm² for flexible conductor without wire end sleeve |

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 288 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 75.9 x 82.5 x 124.3 |

| Materials | |
|---|---|
| Housing | PA |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 … +50 |
| Note on ambient temperature | [°C] | –5 … +60 for vertical installation |
| Storage temperature | [°C] | –20 … +70 |
| Corrosion resistance class CRC[1] | | 0 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

1) Additional information: www.festo.com/x/topic/kbk

2) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

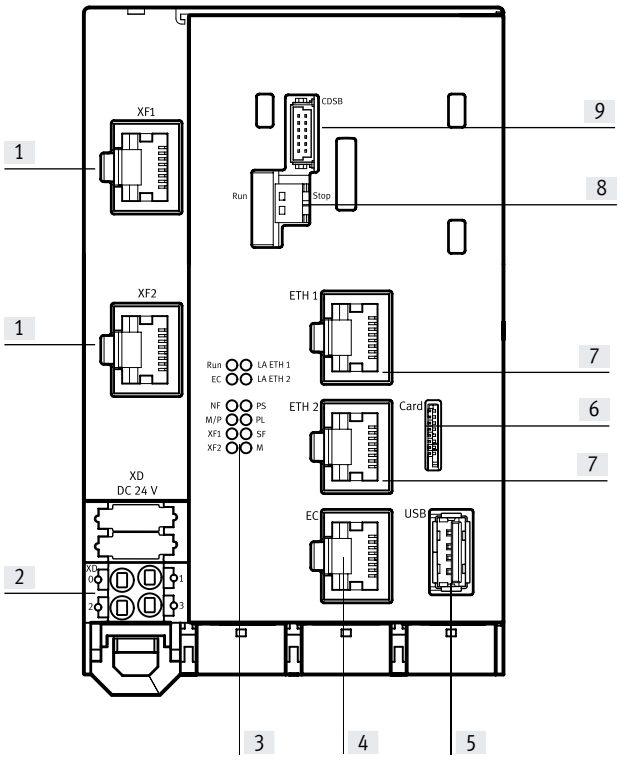
3) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

# Data sheet – PROFINET controller

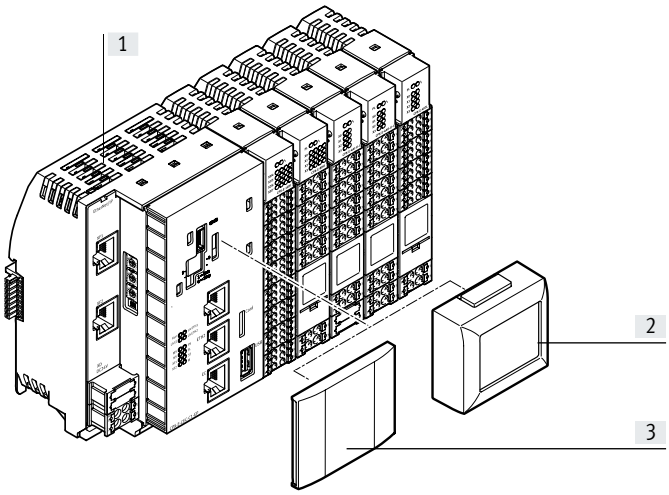
## Connection and display components

CPX-E-CEC-...




[1] Network connections 1 and 2, PROFINET IO
[2] Terminal strip for operating voltage supply
[3] LED indicators
[4] EtherCAT master network connection
[5] USB interface
[6] Slot for micro SD memory card
[7] Network connections 1 and 2, Ethernet
[8] DIL switch for holding and starting projects in CODESYS
[9] Slot for operator unit CDSB

Display and operator unit CDSB-A1




The operator unit CDSB-A1 from Festo is a plug-in display and operating panel for the automation system CPX-E. The integrated colour TFT display with touchscreen can be used both for operation and for simple diagnostics of the connected basic unit. User-friendliness is enhanced through fault diagnostics with plain-text error messages.

- Display of full-text messages (errors, warnings, data)
- Easy data backup of parameters and firmware in the unit (e.g. for series commissioning or device replacement)
- 1.77" colour TFT display
- 3 GB user memory

[1] CPX-E-CEC
[2] Operator unit CDSB-A1
[3] Cover (included in the scope of delivery of the CPX-E-CEC)

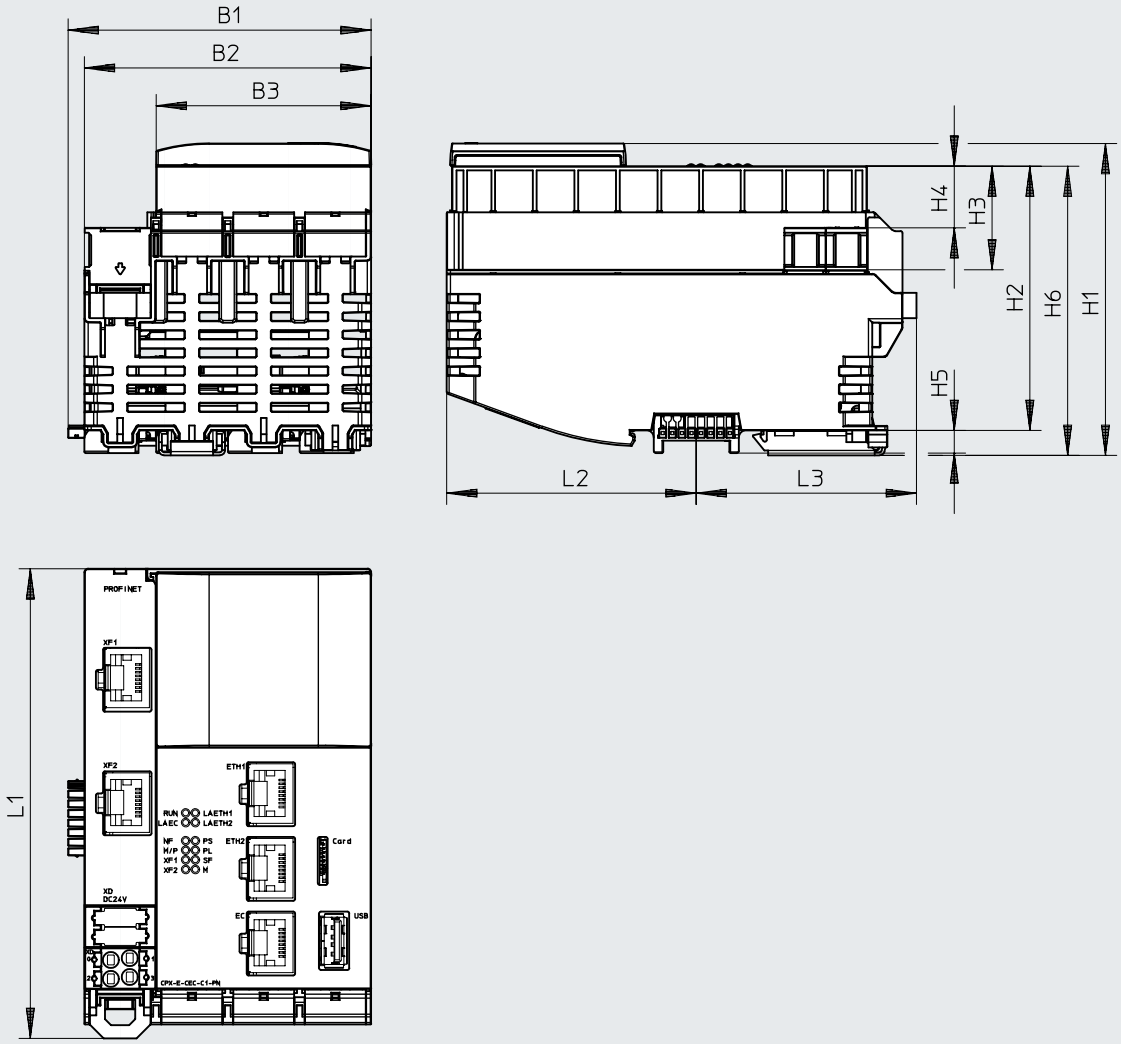
# Data sheet – PROFINET controller

**Software**

| Software licences | Licences | Minimum requirement |
|---|---|---|
| The "Motion & Robotics" software enables simple configuration and programming of the automation system CPX-E in conjunction with Festo handling systems.<br><br>Functions:<br>• Support for Festo linear gantries YXCL and EXCT<br>• Support for Festo linear gantries YXCF, EXCH and EXCM<br>• Support for Festo 3-dimensional gantries YXCR<br>• Simple configuration of the kinematics/drives in CODESYS<br>• Web visualisation for easy operation and commissioning<br>• Any required positioning thanks to free programming<br>• Easy-to-understand textual macro programming language<br>• Storage of motion programs in a project structure.<br>• Teach-in programming via graphic dialogue at the handheld terminal<br>• Motion path smoothing with full axis dynamics<br>• Integrated limiters for programmed dynamic values with simultaneous path accuracy<br>• Simple switching points along the contour for switching actions, for example gripper control<br>• Interface between the integrated PLC and FTL programming | 2 software licenses are being offered which can be purchased from the Festo App World:<br><br>PTP licence<br>• Point-to-point interpolation<br>• Actuation of simple kinematic systems<br>• Graphic visualisation for handheld operator unit CDSA-D3-RV<br>• Teach-in function<br>• For simple applications such as pick & place, loading/unloading<br><br>CP licence<br>• Cartesian linear and circular interpolation<br>• Interpolation of orientation<br>• Contour applications<br>• Graphic visualisation for handheld operator unit CDSA-D3-RV<br>• Teach-in function | • CPX-E with revision 8 or higher<br>• For CPX-E-CEC-M1-PN<br>• CODESYS SP 15 P3<br>• SoftMotion version 4.6.3.0<br>• The licences are purchased once and then are then always available |

# Data sheet – PROFINET controller

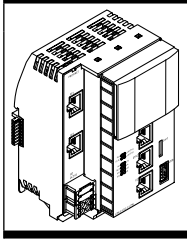
**Dimensions** Download CAD data ➔ www.festo.com



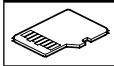
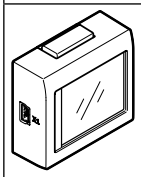
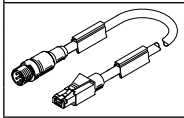
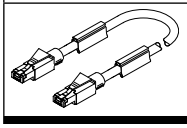

| | B1 | B2 | B3 | H1 | H2 | H3 | H4 | H5 | H6 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CPX-E-CEC-...PN | 80.2 | 75.9 | 56.9 | 82.5 | 69.9 | 27.4 | 16.3 | 6 | 76.5 | 124.3 | 66 | 58.3 |

# Data sheet – PROFINET controller

**Ordering data**

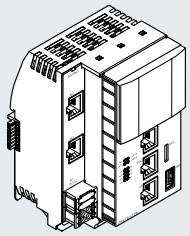
| | Bus connection | Additional functions | Part no. | Type |
|---|---|---|---|---|
|  | PROFINET IO | CODESYS V3 | **4252741** | **CPX-E-CEC-C1-PN** |
| | | CODESYS V3 with SoftMotion | **4252743** | **CPX-E-CEC-M1-PN** |

**Ordering data – Accessories**

| | | | Cable length [m] | Part no. | Type |
|---|---|---|---|---|---|
|  | Memory card | 32 GB | – | **8094425** | **CAMC-M-MS-G32-G2** |
|  | Display and operator unit | • Colour touchscreen<br>• Diagnostic function<br>• Update function for CPX-E-CEC (in plugged-in state) | – | **8070984** | **CDSB-A1** |
|  | • Software licence for controlling a Festo handling system<br>• For CPX-E-CEC-M1-PN | Point-to-point interpolation | – | **8129269** | **GSAR-C1-L1** |
| | | Cartesian interpolation | – | **8129270** | **GSAR-C1-L2** |
|  | Straight plug, M12x1, 4-pin, D-coded | Straight plug, RJ45, 8-pin | 1 | **8040451** | **NEBC-D12G4-ES-1-S-R3G4-ET** |
| | | | 3 | **8040452** | **NEBC-D12G4-ES-3-S-R3G4-ET** |
| | | | 5 | **8040453** | **NEBC-D12G4-ES-5-S-R3G4-ET** |
| | | | 10 | **8040454** | **NEBC-D12G4-ES-10-S-R3G4-ET** |
|  | Straight plug, RJ45, 8-pin | Straight plug, RJ45, 8-pin | 1 | **8040455** | **NEBC-R3G4-ES-1-S-R3G4-ET** |

# Data sheet – EtherNet/IP controller

Controller for operating the automation system CPX-E on EtherNet/IP or as an autonomous unit
Programming and process visualisation take place via CODESYS.
The controller includes the power supply for the modules of the automation system and the connected sensors.



## Application

### Bus connection

The bus connection is provided via RJ45 sockets which meet Ethernet requirements.
Communication with a higher-order controller takes place via EtherNet/IP.
There is also the option of connecting via Modbus/TCP or standard Ethernet (TCP/IP).
The controller can be accessed directly via two Ethernet interfaces. The integrated switch supports star and line topology and enables the network to be divided into segments.
The controller can be operated both as a higher-order device (master) and as a subordinate device (slave) using the communication protocol Modbus/TCP.
The interfaces support crossover detection, which means that there is a choice of using patch cables or crossover cables

### Motion controller

The controller has an integrated EtherCAT master.
EtherCAT is used for communication with other products:

- Motor controllers (CMMP, CMMT)
- Electrical terminal (CPX)
- Valve terminals with I-Port interface via the installation system CTEL (bus node CTEU-EC)

The SoftMotion extension makes it possible to control/execute coordinated multi-axis movements.

### Data storage

An SD card slot and a USB interface are provided for reading out and storing data.
The maximum memory size for compatible media is 32 GB in FAT format with a partition.
There is no provision to permanently record data on the external media during operation.
Only USB storage media with a current consumption of less than 0.5 A may be used.

### Additional functions

- Web server for read access to the most important parameter and diagnostic functions
- FTP server for data exchange
- Real-time clock, can be set and read using CODESYS
- Internal temperature sensor

# Data sheet – EtherNet/IP controller

| **General technical data** | | |
|---|---|---|
| CPU data | | Dual core 766 MHz |
| | | 512 MB RAM |
| Storage medium | | Micro SD card up to 32 GB |
| | | USB memory stick up to 32 GB |
| Programming software | | CODESYS provided by Festo |
| Program memory | | 100 MB, user program |
| Buffering time real-time clock | | 3 weeks |
| Processing time | | Approx. 200 µs/1 k instruction |
| Flags | | 120 kB remanent data |
| | | CODESYS variable concept |
| Function blocks | | Read CPX module diagnostics |
| | | CPX diagnostic status |
| | | Copy CPX diagnostic trace |
| | | And others |
| IP address setting | | DHCP |
| | | Via CODESYS |
| | | Optional: via operator unit CDSB |
| Control elements | | DIL switch for RUN/STOP |
| | | Optional operator unit CDSB |
| | | Rotary switch for address setting |
| Configuration support | | Operator unit CDSB |
| | | CODESYS V3 |
| Maximum number of modules | | 10 |
| System parameters | | Diagnostic memory |
| | | Fail-safe response |
| | | System start |
| Module parameters | | Channel alarms bundling |
| | | Undervoltage diagnostics |
| | | Channel alarms for undervoltage |
| | | Process value representation, analogue modules |
| Diagnostics via LED | | Module status |
| | | Network status |
| | | Network status engineering port 1 |
| | | Network status engineering port 2 |
| | | Network status port 1 |
| | | Network status port 2 |
| | | Network status EtherCAT |
| | | Run |
| | | Power supply, electronics/sensors |
| | | Power supply load |
| | | |
| **Address capacity of internal bus inputs/outputs** | | |
| Max. address capacity of outputs | [byte] | 64 |
| Max. address capacity of inputs | [byte] | 64 |

# Data sheet – EtherNet/IP controller

| Technical data – Interfaces | | |
|---|---|---|
| **Fieldbus interface 1** | | |
| Protocol | | EtherNet/IP |
| | | EtherNet/IP QoS |
| | | EtherNet/IP quickconnect |
| | | ACD (address conflict detection) |
| | | DLR (device level ring) |
| | | SNMP |
| Function | | Bus connection incoming/outgoing |
| Transmission rate | [Mbps] | 100 |
| Type | | Ethernet |
| Connection type | | 2 x socket |
| Connection technology | | RJ45 |
| Number of pins/wires | | 8 |
| Galvanic isolation | | Yes |
| Max. address capacity of outputs | [byte] | 512 |
| Max. address capacity of inputs | [byte] | 512 |
| | | |
| **Fieldbus interface 2** | | |
| Protocol | | EtherCAT |
| | | CoE |
| | | EoE |
| | | FoE |
| Function | | Bus connection incoming/outgoing |
| Transmission rate | [Mbps] | 100 |
| Type | | Ethernet |
| Connection type | | Socket |
| Connection technology | | RJ45 |
| Number of pins/wires | | 8 |
| Galvanic isolation | | Yes |
| | | |
| **Ethernet interface** | | |
| Protocol | | EasyIP |
| | | Modbus TCP |
| | | TCP/IP |
| | | OPC UA |
| Function | | Switch |
| | | Diagnostics |
| Transmission rate | [Mbps] | 10 |
| | [Mbps] | 100 |
| Connection type | | 2 x socket |
| Connection technology | | RJ45 |
| Number of pins/wires | | 8 |
| | | |
| **USB interface** | | |
| USB interface | | USB 2.0 |

# Data sheet – EtherNet/IP controller

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC | [V DC] | 24 |
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Power failure buffering | [ms] | 20 |
| Max. power supply | [A] | 8 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | Typically 150 |
| Protection against direct and indirect contact | | PELV |
| Electrical isolation between channel and internal bus | | Yes |
| Reverse polarity protection | | 24 V sensor supply against 0 V sensor supply |
| Note on reverse polarity protection | | Self-protection |
| | | |
| **Electrical connection, power supply** | | |
| Function | | Electronics and sensors |
| Connection type | | Terminal strip |
| Note on connection type | | › 4 A and UL 2x terminal strip for power supply |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [mm²] | 0.2 … 1.5 |
| Note on conductor cross section | | 0.2 … 2.5 mm² for flexible conductor without wire end sleeve |

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 288 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 75.9 x 82.5 x 124.3 |

| Materials | |
|---|---|
| Housing | PA |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 … +50 |
| Note on ambient temperature | [°C] | –5 … +60 for vertical installation |
| Storage temperature | [°C] | –20 … +70 |
| Corrosion resistance class CRC[1] | | 0 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

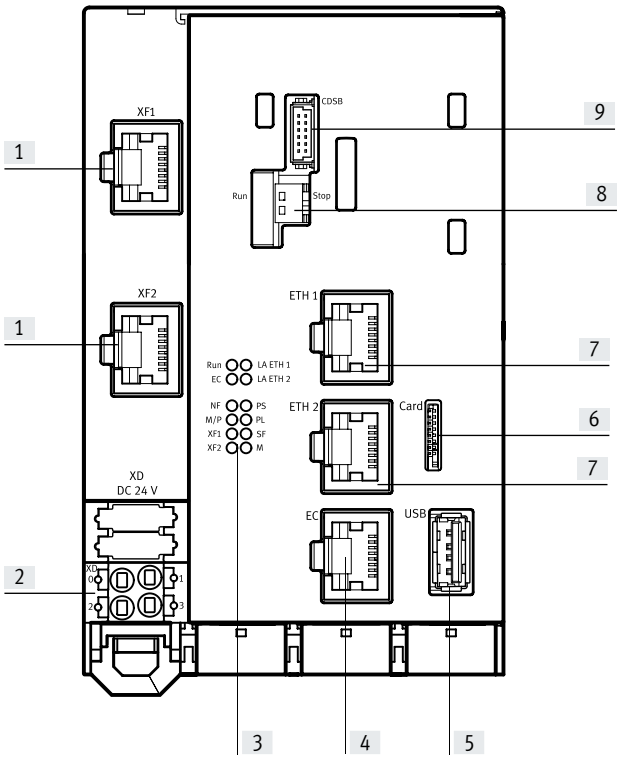
1) Additional information: www.festo.com/x/topic/kbk
2) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.
3) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

# Data sheet – EtherNet/IP controller

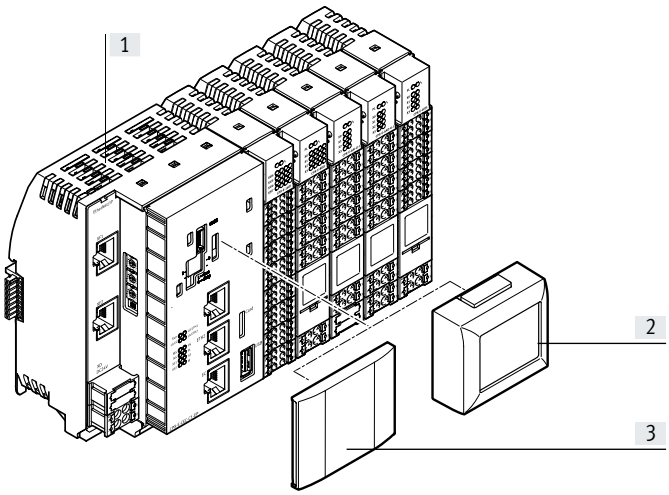
## Connection and display components

CPX-E-CEC-...




[1] Network connections 1 and 2, EtherNet/IP
[2] Terminal strip for operating voltage supply
[3] LED indicators
[4] EtherCAT master network connection
[5] USB interface
[6] Slot for micro SD memory card
[7] Network connections 1 and 2, Ethernet
[8] DIL switch for holding and starting projects in CODESYS
[9] Slot for operator unit CDSB

Display and operator unit CDSB-A1




The operator unit CDSB-A1 from Festo is a plug-in display and operator unit for the automation system CPX-E.
The integrated colour TFT display with touchscreen can be used both for operation and for simple diagnostics of the connected basic unit. User-friendliness is enhanced through fault diagnostics with plain-text error messages.

[1] CPX-E-CEC
[2] Operator unit CDSB-A1
[3] Cover (included in the scope of delivery of the CPX-E-CEC)

- Display of full-text messages (errors, warnings, data)
- Easy data backup of parameters and firmware in the unit (e.g. for series commissioning or device replacement)
- 1.77" colour TFT display
- 3 GB user memory

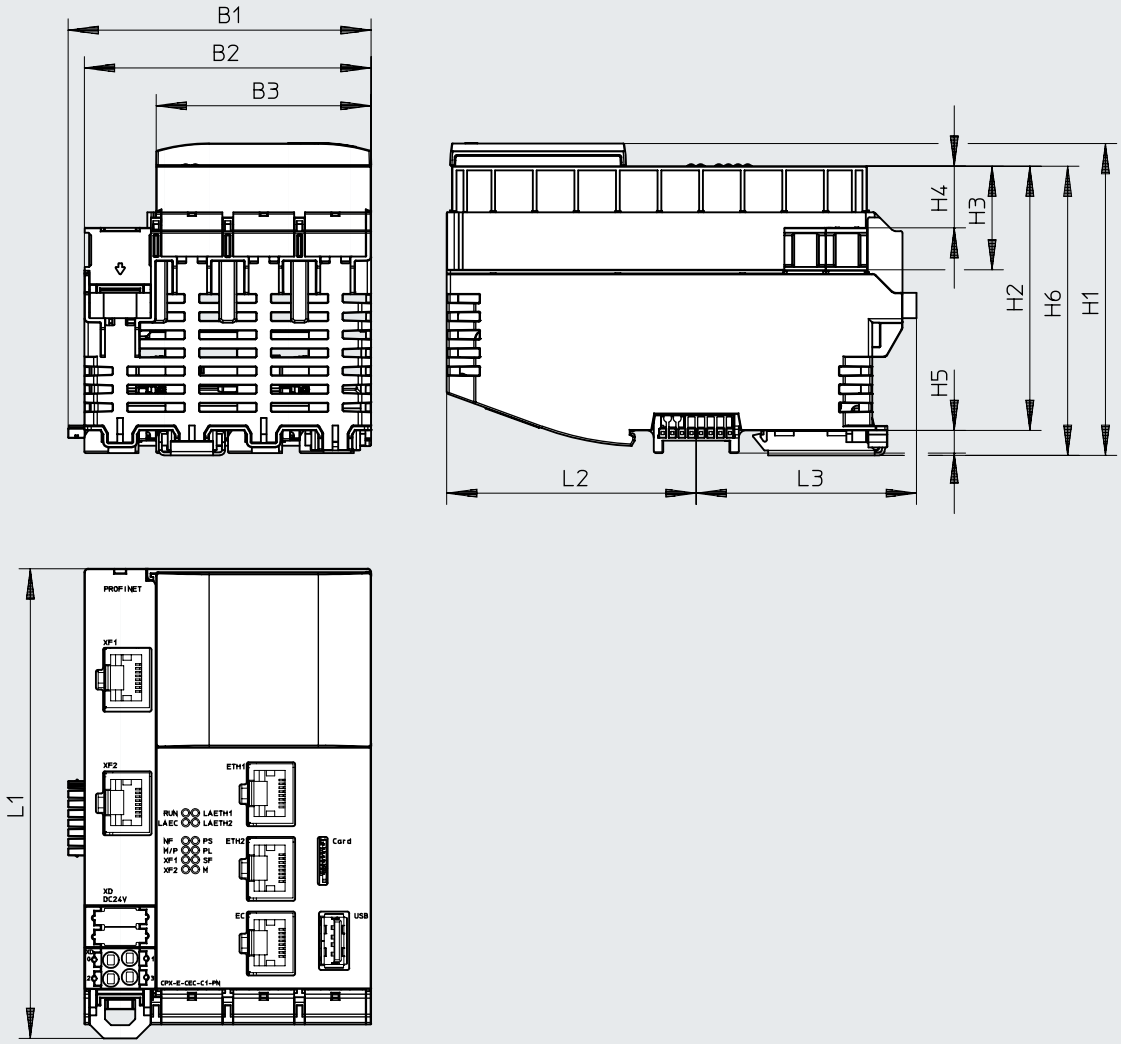
# Datasheet – EtherNet/IP control

**Software**

| Software licences | Licences | Minimum requirement |
|---|---|---|
| The "Motion & Robotics" software simplifies the configuration and programming of the automation system CPX-E in conjunction with Festo handling systems.<br><br>Functions:<br>• Support for linear gantries YXCL and EXCT from Festo<br>• Support for planar surface gantries YXCF, EXCH and EXCM from Festo<br>• Support for three-dimensional gantries YXCR from Festo<br>• Easy configuration of the kinematics/drives in CODESYS<br>• Web visualisation for easy operation and commissioning<br>• Any required positioning thanks to free programming<br>• Easy-to-understand textual macro programming language<br>• Storage of motion programs in a project structure.<br>• Teach-in programming via graphic dialogue at the hand-held terminal<br>• Motion path smoothing with full axis dynamics<br>• Integrated limiters for programmed dynamic values with simultaneous path accuracy<br>• Simple switching points along the contour for switching actions, for example gripper control<br>• Interface between the integrated PLC and FTL programming | 2 software licences are being offered which can be purchased from the Festo App World:<br><br>PTP licence<br>• Point-to-point interpolation<br>• Actuation of simple kinematic systems<br>• Graphic visualisation for handheld operator unit CDSA-D3-RV<br>• Teach-in function<br>• For simple applications such as pick & place, loading/unloading<br><br>CP licence<br>• Cartesian linear and circular interpolation<br>• Interpolation of orientation<br>• Contour applications<br>• Graphic visualisation for handheld operator unit CDSA-D3-RV<br>• Teach-in function | • CPX-E with revision 8 or higher<br>• For CPX-E-CEC-M1-EP<br>• CODESYS SP 15 P3<br>• SoftMotion version 4.6.3.0<br>• The licences are purchased once and are then always available |

# Data sheet – EtherNet/IP controller

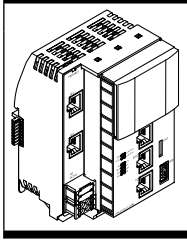
**Dimensions** Download CAD data ➔ www.festo.com



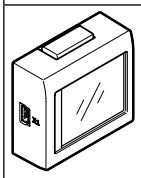
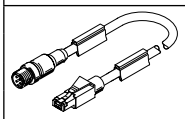
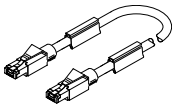

| | B1 | B2 | B3 | H1 | H2 | H3 | H4 | H5 | H6 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CPX-E-CEC-...EP | 80.2 | 75.9 | 56.9 | 82.5 | 69.9 | 27.4 | 16.3 | 6 | 76.5 | 124.3 | 66 | 58.3 |

# Data sheet – EtherNet/IP controller

**Ordering data**

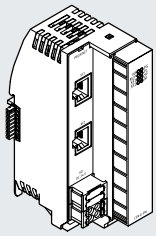
| | Bus connection | Additional functions | Part no. | Type |
|---|---|---|---|---|
|  | EtherNet/IP | CODESYS V3 | **4252742** | **CPX-E-CEC-C1-EP** |
| | | CODESYS V3 with SoftMotion | **4252744** | **CPX-E-CEC-M1-EP** |

**Ordering data – Accessories**

| | | | Cable length [m] | Part no. | Type |
|---|---|---|---|---|---|
|  | Memory card | 32 GB | – | **8094425** | **CAMC-M-MS-G32-G2** |
|  | Display and operator unit | • Colour touchscreen<br>• Diagnostic function<br>• Update function for CPX-E-CEC (in plugged-in state) | – | **8070984** | **CDSB-A1** |
|  | Straight plug, M12x1, 4-pin, D-coded | Straight plug, RJ45, 8-pin | 1 | **8040451** | **NEBC-D12G4-ES-1-S-R3G4-ET** |
| | | | 3 | **8040452** | **NEBC-D12G4-ES-3-S-R3G4-ET** |
| | | | 5 | **8040453** | **NEBC-D12G4-ES-5-S-R3G4-ET** |
| | | | 10 | **8040454** | **NEBC-D12G4-ES-10-S-R3G4-ET** |
|  | Straight plug, RJ45, 8-pin | Straight plug, RJ45, 8-pin | 1 | **8040455** | **NEBC-R3G4-ES-1-S-R3G4-ET** |

# Data sheet – PROFINET bus module

Bus module for operating the automation system CPX-E on PROFINET. Data is transmitted on the basis of Industrial Ethernet.
The bus module includes the power supply for the modules of the automation system and the connected sensors.



## Application

### Bus connection

The bus connection is provided via RJ45 sockets which meet Ethernet requirements.
Communication with a higher-order controller takes place via PROFINET with real-time protocol (real time RT or isochronous real time IRT).
The integrated switch supports star and line topology and enables the network to be divided into segments.

### Additional functions

- The bus module supports PROFIenergy for reducing the energy requirement through selective switching off of consumers when they are not required
- The bus module has crossover detection, which means that there is the option of using patch cables or crossover cables

### Device description file

The bus module is configured using a device description file (GSDML file) which includes all the necessary information for parameterisation.

### Web server

The integrated web server enables read access to the most important parameter and diagnostic functions.

| General technical data | | |
|---|---|---|
| **Fieldbus interface** | | |
| Protocol | | PROFINET IRT |
| | | PROFINET IRT |
| Function | | Bus connection incoming/outgoing |
| Transmission rate | [Mbps] | 100 |
| Type | | Ethernet |
| Connection type | | 2 x socket |
| Connection technology | | RJ45 |
| Number of pins/wires | | 8 |
| Galvanic isolation | | Yes |
| Max. address volume for outputs | [byte] | 64 |
| Max. address capacity inputs | [byte] | 64 |
| | | |
| **Address capacity of internal bus inputs/outputs** | | |
| Max. address capacity of outputs | [byte] | 64 |
| Note on outputs | | 62 bytes with I/O diagnostic interface |
| | | 64 bytes with status bits |
| | | 64 bytes without diagnostics |
| Max. address capacity of inputs | [byte] | 64 |
| Note on inputs | | 62 bytes with I/O diagnostic interface |
| | | 62 bytes with status bits |
| | | 64 bytes without diagnostics |

# Data sheet – PROFINET bus module

| General data | |
|---|---|
| Configuration support | GSDML file |
| Maximum number of modules | 10 |
| Additional functions | LLDP |
| | MRP |
| | MRPD |
| | PROFINET FSU |
| | PROFINET I&MO..3, 1..3 retentive memory possible |
| | PROFINET Shared device |
| | S2 system redundancy |
| | SNMP |
| System parameters | Diagnostic memory |
| | Fail-safe response |
| | Force mode |
| | System start |
| Module parameters | Channel alarms bundling |
| | Undervoltage diagnostics |
| | Channel alarms for undervoltage |
| | Process value representation, analogue modules |
| Diagnostics via LED | Force mode |
| | Network errors |
| | Network status connection 1 |
| | Network status connection 2 |
| | Power supply, electronics/sensors |
| | Power supply load |
| | System error |
| | Maintenance required |
| Diagnostics via the bus | Parameterisation error |
| | Lower limit value not observed |
| | Upper limit value not observed |
| | Wire break |
| | Short circuit |
| | PROFIsafe addresses different |
| | Undervoltage |
| | Excessive temperature |

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Power failure buffering | [ms] | 20 |
| Max. power supply | [A] | 8 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | Typically 75 |
| Reverse polarity protection | | 24 V sensor supply against 0 V sensor supply |
| Protection against direct and indirect contact | | PELV |
| | | |
| **Electrical connection, power supply** | | |
| Function | | Electronics and sensors |
| Connection type | | Terminal strip |
| Note on connection type | | › 4 A and UL 2x terminal strip for power supply |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [$mm^2$] | 0.2 … 1.5 |
| Note on conductor cross section | [$mm^2$] | 0.2 … 2.5 for flexible wire without wire end sleeve |

| Technical data – Mechanical components | | |
|---|---|---|
| Mounting position | | Vertical |
| | | Horizontal |
| Type of mounting | | With H-rail |
| Product weight | [g] | 145 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 42.2 x 76.5 x 125.8 |

# Data sheet – PROFINET bus module

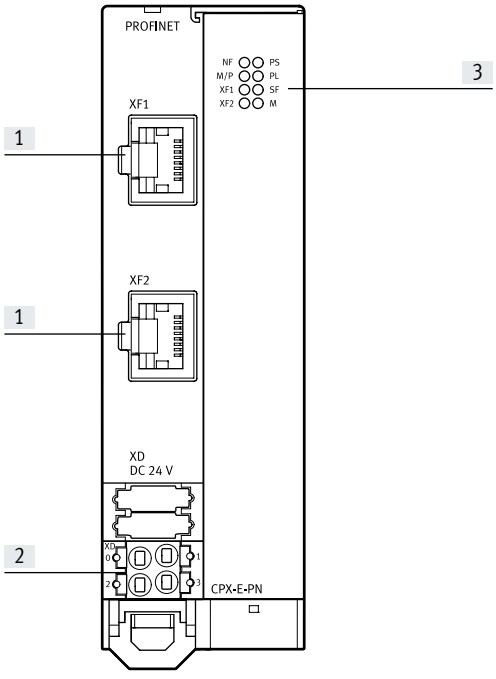
| Materials | |
|---|---|
| Housing | PA |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 ... +50 |
| Note on ambient temperature | | –5 ... +60°C for vertical installation |
| Storage temperature | [°C] | –20 ... +70 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

1) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.
2) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

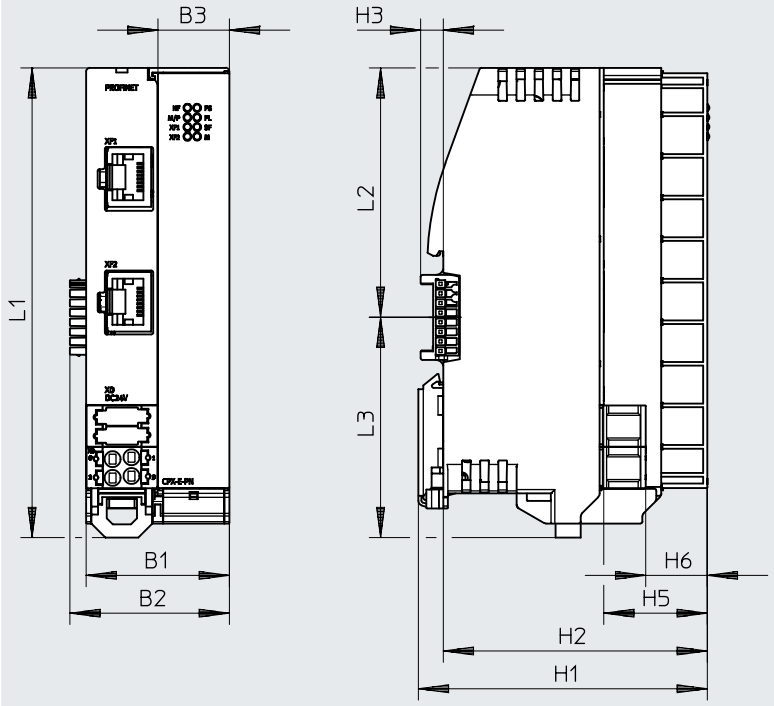
## Connection and display components




[1] Network connections 1 and 2, PROFINET
[2] Terminal strip for operating voltage supply
[3] LED indicators

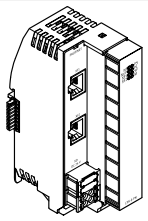
# Data sheet – PROFINET bus module

**Dimensions** Download CAD data ➔ www.festo.com

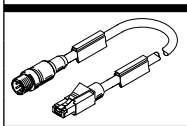
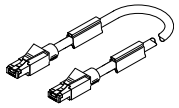



| | B1 | B2 | B3 | H1 | H2 | H3 | H5 | H6 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CPX-E-PN | 37.8 | 42.2 | 18.9 | 76.5 | 69.9 | 6 | 27.4 | 16.3 | 124.3 | 66 | 58.3 |

**Ordering data**

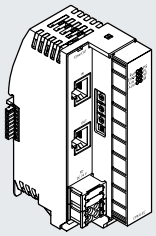
| | | Part no. | Type |
|---|---|---|---|
|  | PROFINET bus module | **4080497** | **CPX-E-PN** |

**Ordering data – Accessories**

| | Electrical connection 1 | Electrical connection 2 | Cable length [m] | Part no. | Type |
|---|---|---|---|---|---|
|  | Straight plug, M12x1, 4-pin, D-coded | Straight plug, RJ45, 8-pin | 1 | **8040451** | **NEBC-D12G4-ES-1-S-R3G4-ET** |
| | | | 3 | **8040452** | **NEBC-D12G4-ES-3-S-R3G4-ET** |
| | | | 5 | **8040453** | **NEBC-D12G4-ES-5-S-R3G4-ET** |
| | | | 10 | **8040454** | **NEBC-D12G4-ES-10-S-R3G4-ET** |
|  | Straight plug, RJ45, 8-pin | Straight plug, RJ45, 8-pin | 1 | **8040455** | **NEBC-R3G4-ES-1-S-R3G4-ET** |

# Data sheet – EtherCAT bus module

Bus module for operating the automation system CPX-E on EtherCAT. Data is transmitted on the basis of Industrial Ethernet.
The bus module includes the power supply for the modules of the automation system and the connected sensors.



**Application**

| Bus connection | Additional functions | Device description file | Web server |
|---|---|---|---|
| The bus connection is provided via RJ45 sockets which meet Ethernet requirements.<br>All kinds of topologies are supported.<br>Manual setting of the EtherCAT address using a rotary coding switch enables the bus to be coupled and decoupled during operation (hot connect). | • The product supports the "distributed clocks" function for the precise synchronisation of participants in an EtherCAT network<br>• The bus module has crossover detection, which means that there is the option of using patch cables or crossover cables | The bus module is configured using a device description file (ESI file) which includes all the necessary information for parameterisation. | The integrated web server enables read access to the most important parameter and diagnostic functions. |

| **General technical data** | | |
|---|---|---|
| **Fieldbus interface** | | |
| Protocol | | EtherCAT |
| Function | | Bus connection incoming/outgoing |
| Transmission rate | [Mbps] | 100 |
| Note on transmission rate | | 100 Mb, switched Fast Ethernet |
| Type | | EtherCAT |
| Connection type | | 2 x socket |
| Connection technology | | RJ45 |
| Number of pins/wires | | 8 |
| Galvanic isolation | | Yes |
| Max. address volume for outputs | [byte] | 64 |
| Max. address capacity inputs | [byte] | 64 |
| | | |
| **Address capacity of internal bus inputs/outputs** | | |
| Max. address capacity of outputs | [byte] | 64 |
| Note on outputs | | 62 bytes with I/O diagnostic interface |
| | | 64 bytes with status bits |
| | | 64 bytes without diagnostics |
| Max. address capacity of inputs | [byte] | 64 |
| Note on inputs | | 62 bytes with I/O diagnostic interface |
| | | 63 bytes with status bits |
| | | 64 bytes without diagnostics |

# Data sheet – EtherCAT bus module

| General technical data | |
|---|---|
| Configuration support | ESI file |
| Maximum number of modules | 10 |
| System parameters | Diagnostic memory |
| | Fail-safe response |
| | Force mode |
| | System start |
| Module parameters | Channel alarms bundling |
| | Undervoltage diagnostics |
| | Channel alarms for undervoltage |
| Diagnostics via LED | Connection status |
| | EtherCAT error |
| | EtherCAT RUN |
| | Power supply, electronics/sensors |
| | Power supply load |
| | System error |
| | Maintenance required |
| Diagnostics via the bus | Parameterisation error |
| | Lower limit value not observed |
| | Upper limit value not observed |
| | Wire break |
| | Short circuit |
| | Undervoltage |
| | Excessive temperature |

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Power failure buffering | [ms] | 20 |
| Max. power supply | [A] | 8 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | Typically 64 |
| Protection against direct and indirect contact | | PELV |
| Reverse polarity protection | | 24 V sensor supply against 0 V sensor supply |
| Note on reverse polarity protection | | Self-protection |
| **Electrical connection, power supply** | | |
| Function | | Electronics and sensors |
| Connection type | | Terminal strip |
| Note on connection type | | › 4 A and UL 2x terminal strip for power supply |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [$mm^2$] | 0.2 ... 1.5 |
| Note on conductor cross section | [$mm^2$] | 0.2 ... 2.5 for flexible wire without wire end sleeve |

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 145 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 42.2 x 76.5 x 125.8 |

| Materials | |
|---|---|
| Housing | PA |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

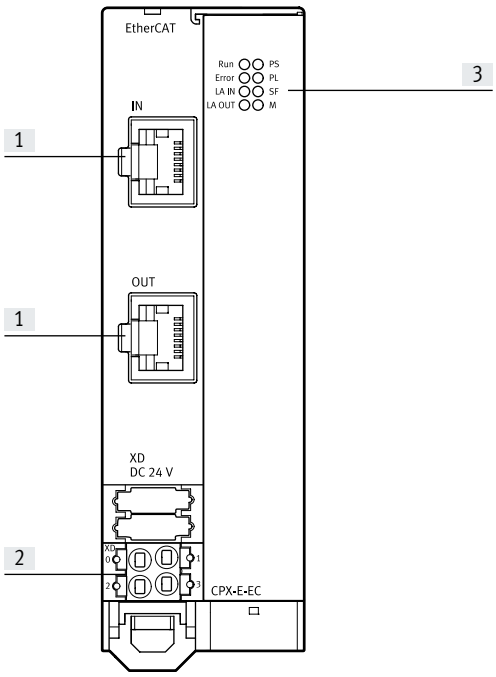
# Data sheet – EtherCAT bus module

| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 ... +50 |
| Note on ambient temperature | | –5 ... +60 °C for vertical installation |
| Storage temperature | [°C] | –20 ... +70 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

1) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.
2) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

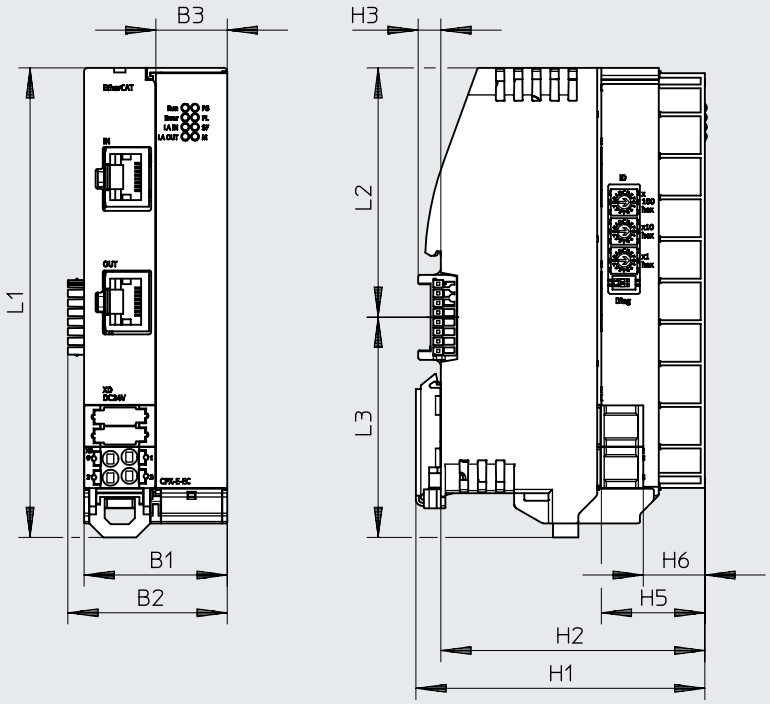
## Connection and display components




[1] Network connections 1 and 2, EtherCAT
[2] Terminal strip for operating voltage supply
[3] LED indicators

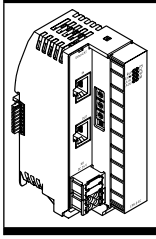
# Data sheet – EtherCAT bus module

**Dimensions** Download CAD data ➔ www.festo.com

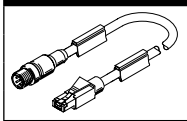
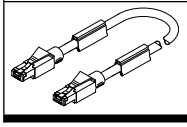



| | B1 | B2 | B3 | H1 | H2 | H3 | H5 | H6 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CPX-E-EC | 37.8 | 42.2 | 18.9 | 76.5 | 69.9 | 6 | 27.4 | 16.3 | 124.3 | 66 | 58.3 |

**Ordering data**

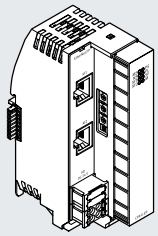
| | | Part no. | Type |
|---|---|---|---|
|  | EtherCAT bus module | **4080498** | **CPX-E-EC** |

**Ordering data – Accessories**

| | Electrical connection 1 | Electrical connection 2 | Cable length [m] | Part no. | Type |
|---|---|---|---|---|---|
|  | Straight plug, M12x1, 4-pin, D-coded | Straight plug, RJ45, 8-pin | 1 | **8040451** | **NEBC-D12G4-ES-1-S-R3G4-ET** |
| | | | 3 | **8040452** | **NEBC-D12G4-ES-3-S-R3G4-ET** |
| | | | 5 | **8040453** | **NEBC-D12G4-ES-5-S-R3G4-ET** |
| | | | 10 | **8040454** | **NEBC-D12G4-ES-10-S-R3G4-ET** |
|  | Straight plug, RJ45, 8-pin | Straight plug, RJ45, 8-pin | 1 | **8040455** | **NEBC-R3G4-ES-1-S-R3G4-ET** |

# Data sheet – EtherNet/IP bus module

Bus module for operating the automation system CPX-E in an Ethernet network using the protocols EtherNet/IP or Modbus/TCP. Data is transmitted on the basis of Industrial Ethernet.
The bus module includes the power supply for the modules of the automation system and the connected sensors.



## Application

### Bus connection

The bus connection is provided via RJ45 sockets which meet Ethernet requirements.
The integrated switch supports star and line topology and enables the network to be divided into segments.

### Additional functions

- The bus module has quick-start capability (quick connect).
- The bus module has crossover detection, which means that there is the option of using patch cables or crossover cables

### Device description file

The bus module is configured using a device description file (EDS file) which includes all the necessary information for parameterisation.

### Web server

The integrated web server enables read access to the most important parameter and diagnostic functions.

| General technical data | | |
|---|---|---|
| **Fieldbus interface** | | |
| | | EtherNet/IP |
| | | Modbus/TCP |
| Protocol | | EtherNet/IP |
| | | EtherNet/IP QoS |
| | | EtherNet/IP quickconnect |
| | | ACD (address conflict detection) |
| | | DLR (device level ring) |
| | | SNMP |
| | | Modbus/TCP |
| Function | | Bus connection incoming/outgoing |
| Transmission rate | [Mbps] | 100 |
| Note on transmission rate | | 100 Mb, switched Fast Ethernet |
| Type | | Ethernet |
| Connection type | | 2 x socket |
| Connection technology | | RJ45 |
| Number of pins/wires | | 8 |
| Galvanic isolation | | Yes |
| Max. address volume for outputs | [byte] | 64 |
| Max. address capacity inputs | [byte] | 64 |
| | | |
| **Address capacity of internal bus inputs/outputs** | | |
| Max. address capacity of outputs | [byte] | 64 |
| Note on outputs | | 62 bytes with I/O diagnostic interface |
| | | 64 bytes with status bits |
| | | 64 bytes without diagnostics |
| Max. address capacity of inputs | [byte] | 64 |
| Note on inputs | | 62 bytes with I/O diagnostic interface |
| | | 63 bytes with status bits |
| | | 64 bytes without diagnostics |

# Data sheet – EtherNet/IP bus module

| General data | |
|---|---|
| Configuration support | EDS file |
| Maximum number of modules | 10 |
| System parameters | Diagnostic memory |
| | Fail-safe response |
| | Force mode |
| | Idle response |
| | System start |
| Module parameters | Channel alarms bundling |
| | Undervoltage diagnostics |
| | Channel alarms for undervoltage |
| Diagnostics via LED | Network status |
| | Module status |
| | Connection status |
| | Power supply, electronics/sensors |
| | Power supply load |
| | System error |
| | Maintenance required |
| Diagnostics via the bus | Parameterisation error |
| | Lower limit value not observed |
| | Upper limit value not observed |
| | Wire break |
| | Short circuit |
| | Undervoltage |
| | Excessive temperature |

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Power failure buffering | [ms] | 20 |
| Max. power supply | [A] | 8 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | Typically 65 |
| Protection against direct and indirect contact | | PELV |
| Reverse polarity protection | | 24 V sensor supply against 0 V sensor supply |
| Note on reverse polarity protection | | Self-protection |
| | | |
| **Electrical connection, power supply** | | |
| Function | | Electronics and sensors |
| Connection type | | Terminal strip |
| Note on connection type | | › 4 A and UL 2x terminal strip for power supply |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [$mm^2$] | 0.2 ... 1.5 |
| Note on conductor cross section | [$mm^2$] | 0.2 ... 2.5 for flexible wire without wire end sleeve |

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 145 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 42.2 x 76.5 x 125.8 |

| Materials | |
|---|---|
| Housing | PA |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

# Data sheet – EtherNet/IP bus module

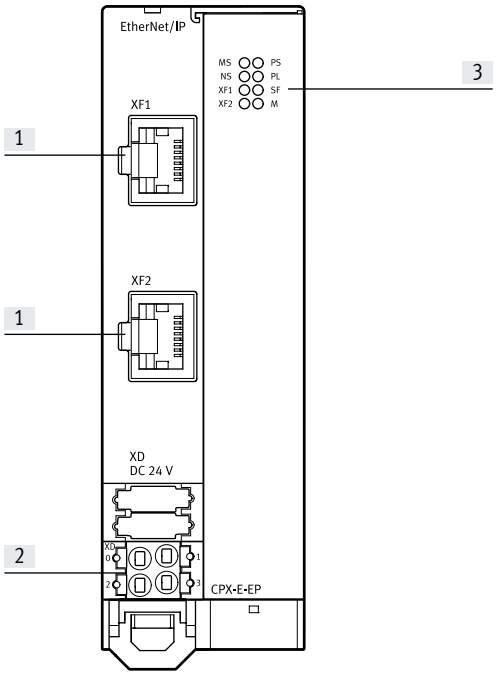
| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 ... +50 |
| Note on ambient temperature | | –5 ... +60°C for vertical installation |
| Storage temperature | [°C] | –20 ... +70 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

1) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

2) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

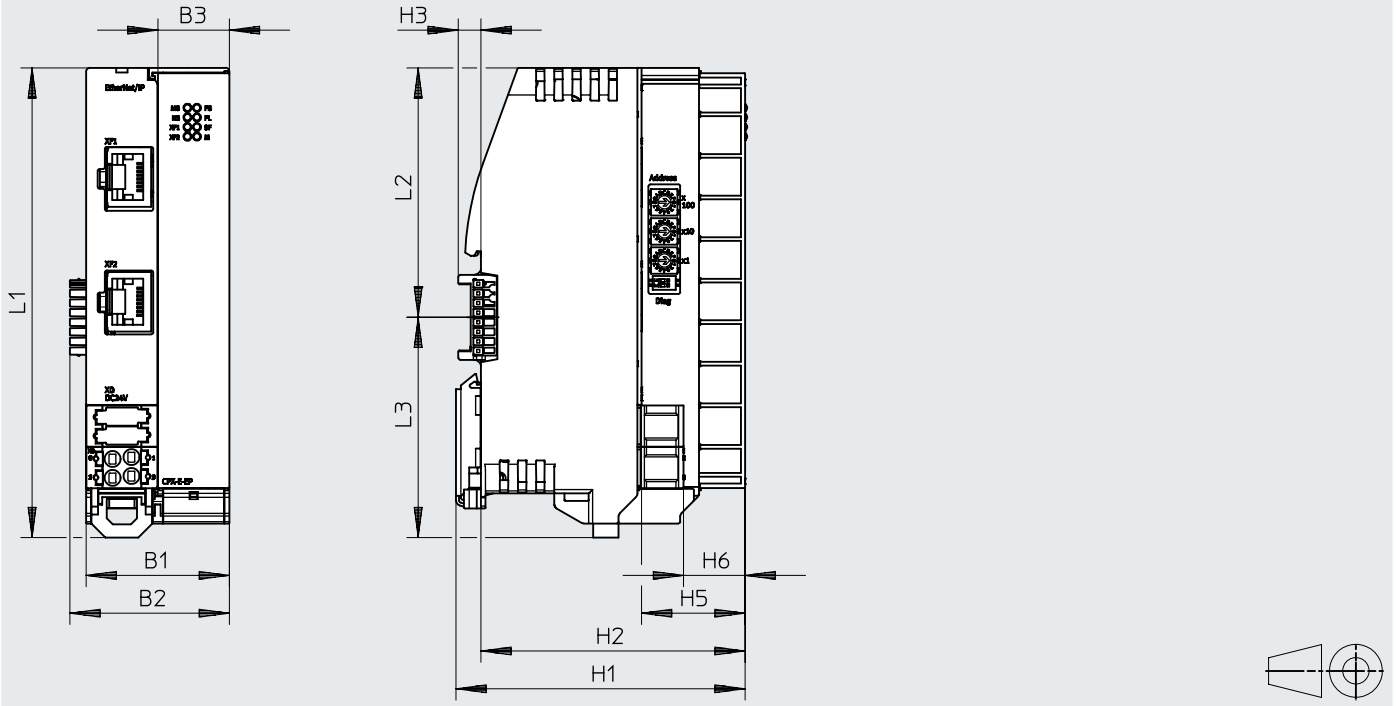
## Connection and display components




[1] Network connections 1 and 2, EtherNet/IP
[2] Terminal strip for operating voltage supply
[3] LED indicators

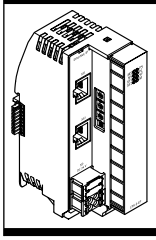
# Data sheet – EtherNet/IP bus module

**Dimensions** Download CAD data ➔ www.festo.com

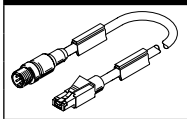
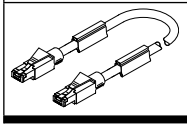



| | B1 | B2 | B3 | H1 | H2 | H3 | H5 | H6 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CPX-E-EP | 37.8 | 42.2 | 18.9 | 76.5 | 69.9 | 6 | 27.4 | 16.3 | 124.3 | 66 | 58.3 |

**Ordering data**

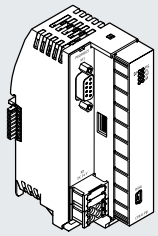
| | | Part no. | Type |
|---|---|---|---|
|  | EtherNet/IP bus module | **4080499** | **CPX-E-EP** |

**Ordering data – Accessories**

| | Electrical connection 1 | Electrical connection 2 | Cable length [m] | Part no. | Type |
|---|---|---|---|---|---|
|  | Straight plug, M12x1, 4-pin, D-coded | Straight plug, RJ45, 8-pin | 1 | **8040451** | **NEBC-D12G4-ES-1-S-R3G4-ET** |
| | | | 3 | **8040452** | **NEBC-D12G4-ES-3-S-R3G4-ET** |
| | | | 5 | **8040453** | **NEBC-D12G4-ES-5-S-R3G4-ET** |
| | | | 10 | **8040454** | **NEBC-D12G4-ES-10-S-R3G4-ET** |
|  | Straight plug, RJ45, 8-pin | Straight plug, RJ45, 8-pin | 1 | **8040455** | **NEBC-R3G4-ES-1-S-R3G4-ET** |

# Data sheet – PROFIBUS bus module

Bus module for operating the automation system CPX-E on PROFIBUS. Data transmission takes place using an RS485 interface.
The bus module includes the power supply for the modules of the automation system and the connected sensors.



## Application

### Bus connection

The bus connection is provided via an RS485 interface; the use of an optical adapter makes it possible to transmit data through a fibre-optic cable.
The bus module can be combined with up to 31 other participants in a network.

### Additional functions

The bus module has a mini-USB interface via which system data can be read and the bus module can be parameterised.

### Parameterisation

The parameterisation data can be sent from the higher-order controller to the bus module via the network.

**General technical data**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Fieldbus interface** | | | | | | |
| Protocol | | PROFIBUS DP | | | | |
| Function | | Bus connection incoming/outgoing | | | | |
| Transmission rate | [kbps] | 9.6 | 19.2 | 93.75 | 187.5 | 500 |
| | [Mbps] | 1.5 | 3 | 6 | 12 | |
| Type | | PROFIBUS | | | | |
| Connection type | | Socket | | | | |
| Connection technology | | Sub-D | | | | |
| Number of pins/wires | | 9 | | | | |
| Note on fieldbus interface | | Optional connection technology with accessories: plug/socket M12x1 B-coded, 5-pin, degree of protection IP65 | | | | |
| Galvanic isolation | | Yes | | | | |
| Max. address volume for outputs | [byte] | 64 | | | | |
| Max. address capacity inputs | [byte] | 64 | | | | |
| **Service interface** | | | | | | |
| Function | | Diagnostics and parameterisation | | | | |
| Connection type | | Socket | | | | |
| Connection technology | | USB 2.0 type B mini | | | | |
| Number of pins/wires | | 5 | | | | |
| **Address capacity of internal bus inputs/outputs** | | | | | | |
| Max. address volume for outputs | [byte] | 64 | | | | |
| Note on outputs | | 62 bytes with I/O diagnostic interface | | | | |
| | | 64 bytes with status bits | | | | |
| | | 64 bytes without diagnostics | | | | |
| Max. address capacity inputs | [byte] | 64 | | | | |
| Note on inputs | | 62 bytes with I/O diagnostic interface | | | | |
| | | 63 bytes with status bits | | | | |
| | | 64 bytes without diagnostics | | | | |

# Data sheet – PROFIBUS bus module

| General data | |
|---|---|
| Conforms to standard | NAMUR NE 21 |
| Control elements | DIL switch |
| Configuration support | GSD file |
| Maximum number of modules | 10 |
| System parameters | Diagnostic memory |
| | Fail-safe response |
| | Force mode |
| | System start |
| Module parameters | Undervoltage diagnostics |
| | Process value representation, analogue modules |
| | |
| Diagnostics via LED | Bus error |
| | Force mode |
| | Power supply, electronics/sensors |
| | Power supply load |
| | System error |
| Diagnostics via the bus | Parameterisation error |
| | Overflow buffer |
| | Transmission error |
| | Requested function not supported |
| | Not ready for data exchange |
| | Lower limit value not observed |
| | Upper limit value not observed |
| | Wire break |
| | Short circuit |
| | Undervoltage |
| | Watchdog/I/O status |

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Power failure buffering | [ms] | 20 |
| Max. power supply | [A] | 8 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | Typically 75 |
| Protection against direct and indirect contact | | PELV |
| Reverse polarity protection | | 24 V sensor supply against 0 V sensor supply |
| Note on reverse polarity protection | | Self-protection |
| | | |
| **Electrical connection, power supply** | | |
| Function | | Electronics and sensors |
| Connection type | | Terminal strip |
| Note on connection type | | › 4 A and UL 2x terminal strip for power supply |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [$mm^2$] | 0.2 ... 1.5 |
| Note on conductor cross section | [$mm^2$] | 0.2 ... 2.5 for flexible wire without wire end sleeve |

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 145 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 42.2 x 76.5 x 125.8 |

| Materials | |
|---|---|
| Housing | PA |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

# Data sheet – PROFIBUS bus module

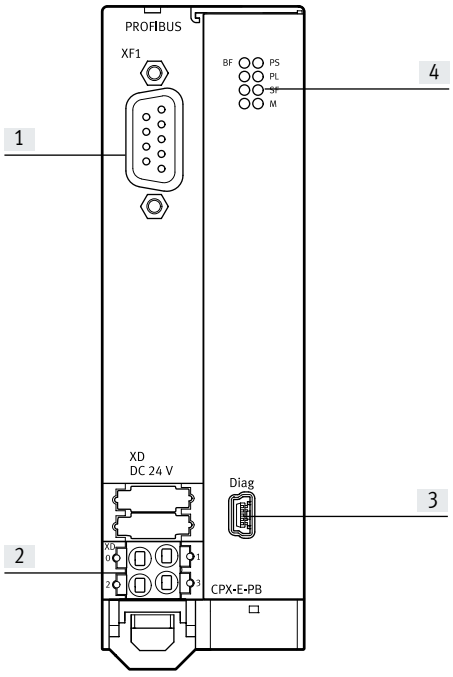
| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 ... +50 |
| Note on ambient temperature | | –5 ... +60°C for vertical installation |
| Storage temperature | [°C] | –20 ... +70 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

1) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

2) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

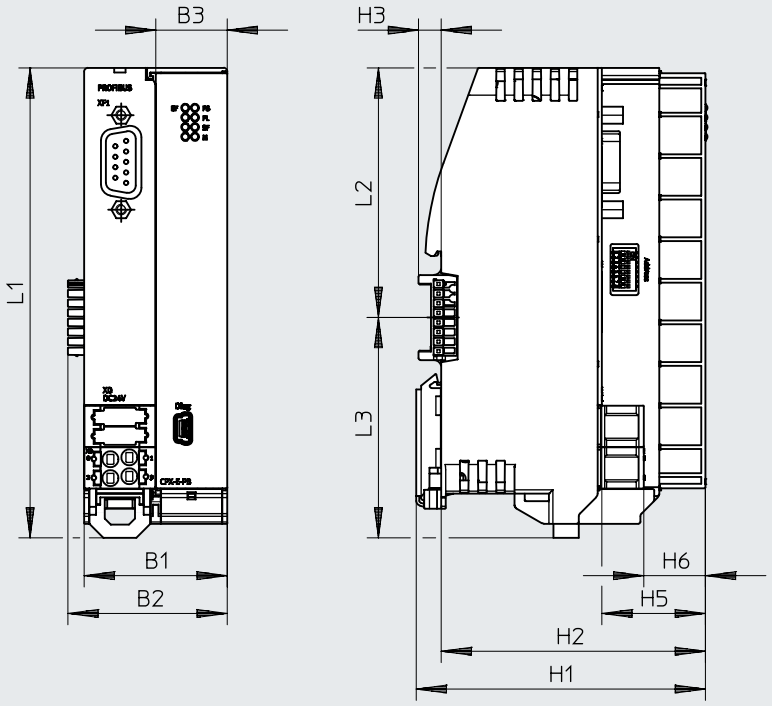
## Connection and display components




[1] Network connection, PROFIBUS
[2] Terminal strip for operating voltage supply
[3] USB interface, mini USB
[4] LED indicators

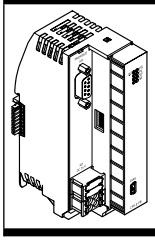
# Data sheet – PROFIBUS bus module

**Dimensions** Download CAD data ➔ www.festo.com

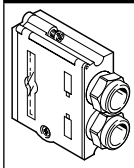
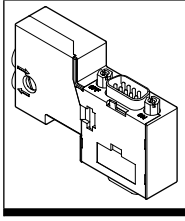



| | B1 | B2 | B3 | H1 | H2 | H3 | H5 | H6 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CPX-E-PB | 37.8 | 42.2 | 18.9 | 76.5 | 69.9 | 6 | 27.4 | 16.3 | 124.3 | 66 | 58.3 |

**Ordering data**

| | | Part no. | Type |
|---|---|---|---|
|  | PROFIBUS bus module | **4080496** | **CPX-E-PB** |

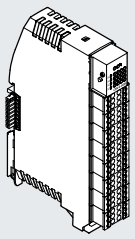
**Ordering data – Accessories**

| | | Part no. | Type |
|---|---|---|---|
|  | Sub-D plug, straight | **532216** | **FBS-SUB-9-GS-DP-B** |
|  | Sub-D plug, straight, with terminating resistor and programming interface | **574589** | **NECU-S1W9-C2-APB** |

# Data sheet – Digital input modules

**Function**
Digital input modules make it easier to connect proximity switches or other 24 V DC sensors (inductive, capacitive, etc.).

**Area of application**
- Input modules for 24 V DC sensor signals
- Terminal strip
- Display of the input statuses for each input signal via an assigned LED
- Operating voltage supply 24 V DC for all connected sensors
- Diagnostic LED for short circuit/ overload of sensor supply



| General technical data | | | | | |
|---|---|---|---|---|---|
| Number of inputs | | 16 | | | |
| Max. address capacity of inputs | [byte] | 2 | | | |
| Input characteristics | | To IEC 61131-2, type 3 | | | |
| Switching logic at inputs | | PNP (positive switching) | | | |
| | | 2- and 3-wire sensors to IEC 61131-2 | | | |
| Fuse protection (short circuit) | | Internal electronic fuse per module | | | |
| Maximum cable length | | 30 m inputs | | | |
| Electrical isolation between channel and internal bus | | No | | | |
| Electrical isolation between channels | | No | | | |
| Switching level | Signal 0 | ≤5 V | | | |
| | Signal 1 | ≥11 V | | | |
| Input debounce time | [ms] | 0.1 | 3 | 10 | 20 |
| Reverse polarity protection | | 24 V sensor supply against 0 V sensor supply | | | |
| Note on reverse polarity protection | | Self-protection | | | |

| General data | |
|---|---|
| Module parameters | Diagnostics of sensor supply short circuit |
| | Behaviour after short circuit/overload |
| | Input debounce time |
| | Signal extension time |
| Channel parameters | Signal extension |
| Diagnostics via LED | Errors per module |
| | Status per channel |
| Diagnostics via the bus | Short circuit/overload in sensor supply |

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | 15 |
| Max. residual current of inputs per module | [A] | 1.8 |
| **Electrical connection, input** | | |
| Function | | Digital input |
| Connection type | | 8x terminal strip |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 6 |
| Conductor cross section | [mm²] | 0.2 ... 1.5 |
| Note on conductor cross section | [mm²] | 0.2 ... 2.5 for flexible wire without wire end sleeve |

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 102 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 18.9 x 76.6 x 124.3 |

# Data sheet – Digital input modules

| Materials | |
|---|---|
| Housing | PA |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

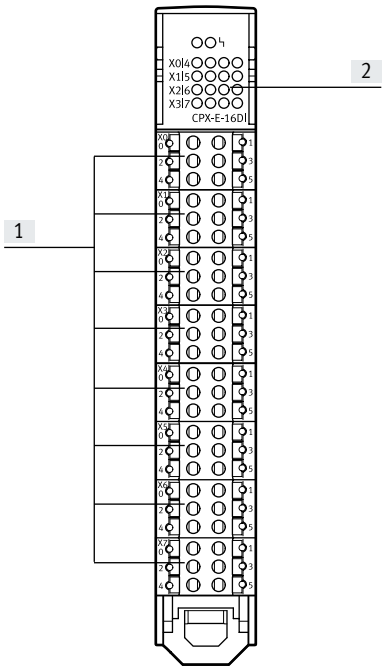
| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 ... +50 |
| Note on ambient temperature | | –5 ... +60°C for vertical installation |
| Storage temperature | [°C] | –20 ... +70 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

1) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

2) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

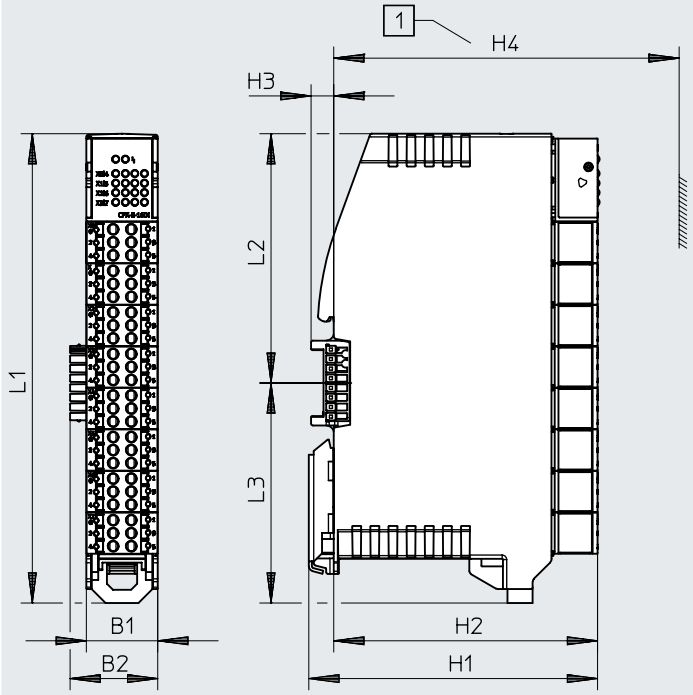
## Connection and display components




[1] Digital inputs, 8 terminal strips with 2 inputs each
[2] LED indicators

# Data sheet – Digital input modules

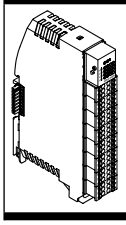
**Dimensions** Download CAD data ➔ www.festo.com



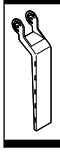

[1] Height with identification holder

| | B1 | B2 | H1 | H2 | H3 | H4 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|
| CPX-E-16DI | 18.9 | 23.2 | 76.5 | 69.9 | 6 | 91.5 | 124.3 | 66 | 58.3 |

**Ordering data**

| | | Part no. | Type |
|---|---|---|---|
|  | Digital input module with 16 inputs | **4080492** | **CPX-E-16DI** |

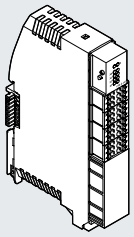
**Ordering data – Accessories**

| | | Part no. | Type |
|---|---|---|---|
|  | Identification holder, 5 pieces | **4080500** | **CAFC-X3-C** |

# Data sheet – Digital counter modules

**Function**
Digital counter modules support the connection of encoders for detecting pulses.

**Area of application**
- Incremental encoder with two phase-offset signals and optional signal 0
- Pulse generator with or without direction signal
- Differential encoder input with 5 V DC operating voltage
- Single encoder input (single ended) with 5 V DC or 24 V DC operating voltage
- Operating voltage supply for all connected encoders/sensors
- Diagnostics LED



| General technical data | | | | |
|---|---|---|---|---|
| Number of inputs | | 4 | | |
| Max. address capacity of inputs | [byte] | 12 | | |
| Input characteristics | | To IEC 61131-2, type 3 | | |
| Switching logic at inputs | | PNP (positive switching) | | |
| | | 2- and 3-wire sensors to IEC 61131-2 | | |
| Max. address capacity of outputs | [byte] | 2 | | |
| Fuse protection (short circuit) | | Internal electronic fuse per module | | |
| Electrical isolation between channel and internal bus | | No | | |
| Electrical isolation between channels | | No | | |
| Switching level | Signal 0 | ≤5 V | | |
| | Signal 1 | ≥11 V | | |
| Input debounce time | [ms] | 0.02 | 0.1 | 3 |
| Reverse polarity protection | | 24 V sensor supply against 0 V sensor supply | | |
| Note on reverse polarity protection | | Self-protection | | |

| General data | |
|---|---|
| Module parameters | Signal type/encoder type |
| | Signal evaluation |
| | Monitoring of cable break |
| | Monitoring of tracking error |
| | Monitoring of zero pulse |
| | Pulse/zero pulse |
| | Latch signal |
| | Latch event |
| | Latch response |
| | Upper count limit |
| | Lower count limit |
| | Load value |
| | Debounce time for digital inputs |
| | Integration time for speed measurement |
| | Internal revision ID |
| Behaviour after end of overload of the sensor supply | Automatic return |
| Channel parameters | Signal extension |

# Data sheet – Digital counter modules

| General data | |
|---|---|
| Diagnostics via LED | Errors per module |
| | Status per channel |
| | Encoder supply error |
| | Encoder error |
| | Encoder normal operation |
| | Encoder supply normal operation |
| Diagnostics via the bus | Short circuit/overload in sensor supply |
| | Measuring system error |
| | Parameter error |
| | Monitoring wire break |
| | Monitoring of zero pulse |
| | Monitoring of tracking error |

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | Typically 15 |
| Max. residual current of inputs per module | [A] | 1.8 |
| Power failure buffering | [ms] | 10 |
| | | |
| **Electrical connection input 1** | | |
| Function | | Digital input |
| Connection type | | 2x terminal strip |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 6 |
| Conductor cross section | [mm²] | 0.2 ... 1.5 |
| Note on conductor cross section | [mm²] | 0.2 ... 2.5 for flexible wire without wire end sleeve |
| | | |
| **Electrical connection input 2** | | |
| Function | | Counting input |
| Connection type | | Terminal strip |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 6 |
| Conductor cross section | [mm²] | 0.2 ... 1.5 |
| Note on conductor cross section | [mm²] | 0.2 ... 2.5 for flexible wire without wire end sleeve |
| | | |
| **Power supply** | | |
| Function | | Encoder supply |
| Connection type | | Terminal strip |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 6 |
| Conductor cross section | [mm²] | 0.2 ... 1.5 |
| Note on conductor cross section | [mm²] | 0.2 ... 2.5 for flexible wire without wire end sleeve |

# Data sheet – Digital counter modules

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 88 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 18.9 x 76.6 x 124.3 |

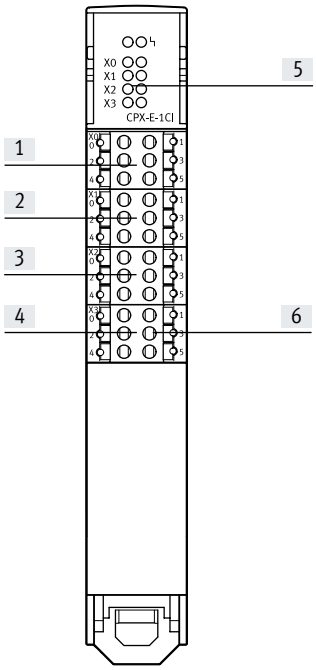
| Materials | |
|---|---|
| Housing | PA |
| Screws | Galvanised steel |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 ... +50 |
| Note on ambient temperature | | –5 ... +60°C for vertical installation |
| Storage temperature | [°C] | –20 ... +70 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

1) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.
2) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

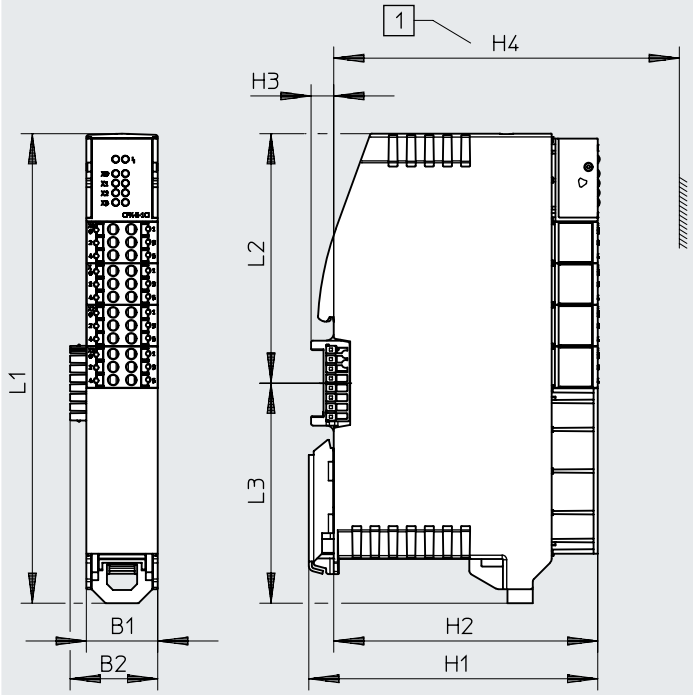
## Connection and display components




[1] Transmit count/block count transmission control inputs
[2] Set counter/block counter control inputs
[3] Counter input, 1 terminal strip
[4] 24 V DC supply voltage for encoder
[5] LED indicators
[6] 5 V DC supply voltage for encoder

# Data sheet – Digital counter modules

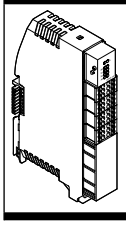
**Dimensions** Download CAD data ➔ www.festo.com



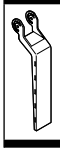

[1] Height with identification holder

| | B1 | B2 | H1 | H2 | H3 | H4 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|
| CPX-E-1CI | 18.9 | 23.2 | 76.5 | 69.9 | 6 | 91.5 | 124.3 | 66 | 58.3 |

**Ordering data**

| | | Part no. | Type |
|---|---|---|---|
|  | Digital counter module with 1 input | **4827505** | **CPX-E-1CI** |

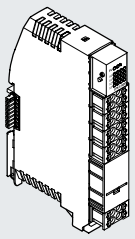
**Ordering data – Accessories**

| | | Part no. | Type |
|---|---|---|---|
|  | Identification holder, 5 pieces | **4080500** | **CAFC-X3-C** |

# Data sheet – Digital output modules

**Function**
Digital output modules make it possible to connect electrical consumers in accordance with IEC 1131-2 type 0.5 (valves, contactors or display components) with an operating voltage of 24 V DC.

**Area of application**
- Output modules for 24 V DC operating voltage
- Terminal strip
- Electronic fuse protection against short circuit or overload with automatic resetting
- Error display via LED
- Slow response; possible short-term increase in current requirement



| General technical data | | |
|---|---|---|
| Number of outputs | | 8 |
| Max. address capacity of outputs | [byte] | 1 |
| Characteristic curve outputs | | To IEC 61131-2, type 0.5 |
| Switching logic at outputs | | PNP (positive switching) |
| Fuse protection (short circuit) | | Internal electronic fuse per channel |
| Maximum cable length | | 30 m inputs |
| Electrical isolation between channel and internal bus | | Yes |
| Electrical isolation between channels | | No |
| Reverse polarity protection | | 24 V sensor supply against 0 V sensor supply |
| Note on reverse polarity protection | | Self-protection |

| General data | |
|---|---|
| Module parameters | Diagnostics of short circuit at output |
| | Behaviour after short circuit/overload |
| | Diagnostics for undervoltage in load supply |
| Behaviour after end of overload of the outputs | No automatic return (default) |
| | Parameterisable (module by module) |
| Channel parameters | Force channel x |
| Diagnostics via LED | Errors per module |
| | Error per channel |
| | Status per channel |
| Diagnostics via the bus | Short circuit/overload at output |
| | Undervoltage in load supply |
| | Module error |

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC load | [V DC] | 24 |
| Permissible voltage fluctuations, load | [%] | ±25 |
| Intrinsic current consumption at nominal operating voltage, load | [mA] | 34 |
| Max. residual current outputs per module | [A] | 4 |
| Protection against direct and indirect contact | | PELV |
| **Electrical connection, output** | | |
| Function | | Digital output |
| Connection type | | 4x terminal strip |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [mm²] | 0.2 ... 1.5 |
| Note on conductor cross section | [mm²] | 0.2 ... 2.5 for flexible wire without wire end sleeve |
| **Power supply** | | |
| Connection type | | Terminal strip |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [mm²] | 0.2 ... 1.5 |
| Note on conductor cross section | [mm²] | 0.2 ... 2.5 for flexible wire without wire end sleeve |

# Data sheet – Digital output modules

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 93 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 18.9 x 76.6 x 124.3 |

| Materials | |
|---|---|
| Housing | PA |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

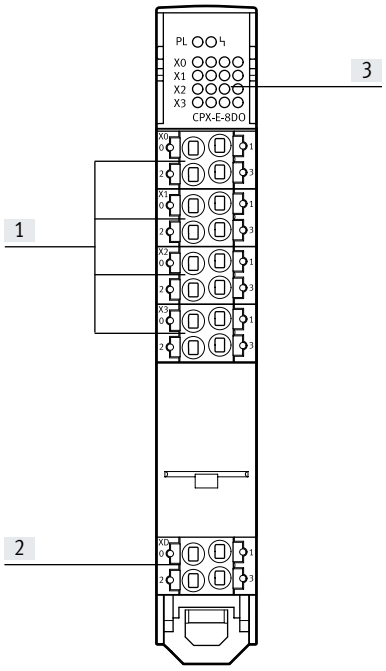
| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 ... +50 |
| Note on ambient temperature | | –5 ... +60°C for vertical installation |
| Storage temperature | [°C] | –20 ... +70 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

1) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

2) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

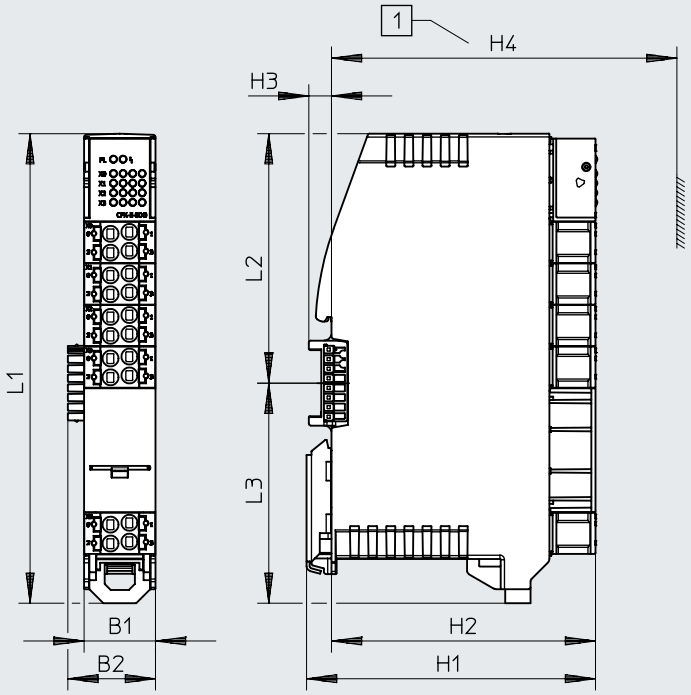
## Connection and display components




[1] Digital outputs, 4 terminal strips with 2 outputs each
[2] Terminal strip for operating voltage supply
[3] LED indicators

# Data sheet – Digital output modules

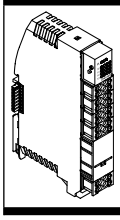
**Dimensions** Download CAD data ➔ www.festo.com



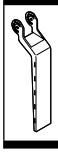

[1] Height with identification holder

| | B1 | B2 | H1 | H2 | H3 | H4 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|
| CPX-E-8DO | 18.9 | 23.2 | 76.5 | 69.9 | 6 | 91.5 | 124.3 | 66 | 58.3 |

**Ordering data**

| | | Part no. | Type |
|---|---|---|---|
|  | Digital output module with 8 outputs | **4080491** | **CPX-E-8DO** |

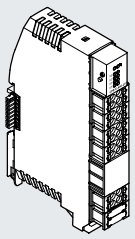
**Ordering data – Accessories**

| | | Part no. | Type |
|---|---|---|---|
|  | Identification holder, 5 pieces | **4080500** | **CAFC-X3-C** |

# Data sheet – Analogue input modules

**Function**
Analogue input modules make it possible to detect analogue input signals such as current or voltage.

**Area of application**
- Measurement ranges, limit values, measured value smoothing and diagnostic behaviour can be set
- Terminal strip
- Electronic fuse protection against short circuit or overload with automatic resetting
- Error display via LED
- Slow response; possible short-term increase in current requirement



**General technical data**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Number of inputs | | 4 | | | | | | |
| Max. address capacity of inputs | [byte] | 8 | | | | | | |
| Measured variable | | Voltage | | | | Current | | |
| Signal range | [V] | –10 ... +10 | –5 ... +5 | 0 ... +10 | +1 ... +5 | – | – | – |
| | [mA] | – | – | – | – | –20 ... +20 | 0 ... +20 | +4 ... +20 |
| Repetition accuracy | [%] | ±0.1 at 25°C | | | | | | |
| Data format | | 15 bits + prefix | | | | | | |
| | | Linear scaling | | | | | | |
| Basic fault limit | [%] | ±0.2 at 25°C | | | | | | |
| Operating error limit related to the ambient temperature range | [%] | ±0.3 | | | | | | |
| Fuse protection (short circuit) | | Internal electronic fuse per module | | | | | | |
| Maximum cable length | | 30 m inputs; shielded | | | | | | |
| Electrical isolation between channel and internal bus | | Yes | | | | | | |
| Electrical isolation between channels | | No | | | | | | |
| Internal cycle time | [µs] | ≤ 500 | | | | | | |
| Reverse polarity protection | | 24 V sensor supply against 0 V sensor supply | | | | | | |
| Note on reverse polarity protection | | Self-protection | | | | | | |

**General data**

| | |
|---|---|
| Module parameters | Diagnostics of sensor supply short circuit |
| | Parameterisation error diagnostics |
| | Diagnostics of overload at analogue inputs |
| | Behaviour after short circuit/overload |
| | Behaviour after overload on analogue inputs |
| | Data format analogue inputs |
| | Hysteresis limit monitoring |
| | Deactivate sensor supply |
| Behaviour after end of overload of the outputs | No automatic return (default) |
| | Parameterisable (module by module) |
| Channel parameters | Signal range per channel |
| | Diagnostics for lower limit |
| | Diagnostics for upper limit |
| | Wire break diagnostics |
| | Underflow/overflow diagnostics |
| | Parameter error diagnostics |
| | Smoothing factor |
| | Lower/upper limits |
| Diagnostics via LED | Errors per module |
| | Error per channel |
| Diagnostics via the bus | Short circuit/overload in sensor supply |
| | Parameterisation error |
| | Parameter error |
| | Overload at analogue inputs |
| | Upper/lower limit value exceeded |
| | Wire break |
| | Underflow/overflow |

# Data sheet – Analogue input modules

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Power failure buffering | [ms] | 10 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | 70 |
| Max. residual current of inputs per module | [A] | 1.4 |
| **Electrical connection, input** | | |
| Function | | Analogue input |
| Connection type | | 4x terminal strip |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [mm²] | 0.2 … 1.5 |
| Note on conductor cross section | [mm²] | 0.2 … 2.5 for flexible wire without wire end sleeve |

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 96 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 18.9 x 76.6 x 124.3 |

| Materials | |
|---|---|
| Housing | PA |
| Screws | Galvanised steel |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 … +50 |
| Note on ambient temperature | | –5 … +60°C for vertical installation |
| Storage temperature | [°C] | –20 … +70 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

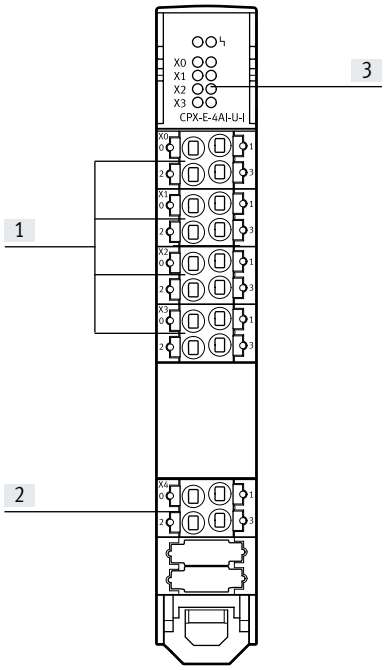
1) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

2) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

# Data sheet – Analogue input modules

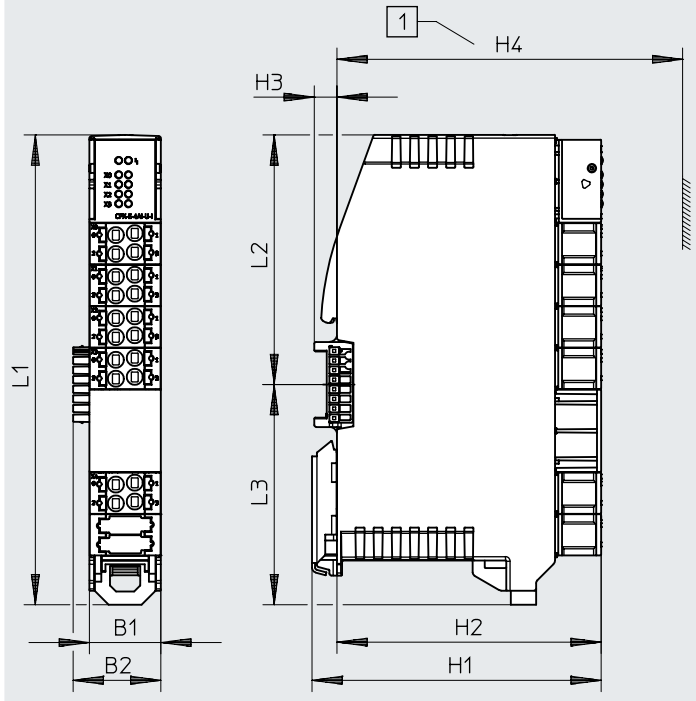
## Connection and display components




[1] Analogue inputs, 4 terminal strips each with one input
[2] Terminal strip for operating voltage supply
[3] 4 connections for functional earth (FE)

## Dimensions

Download CAD data ➔ www.festo.com

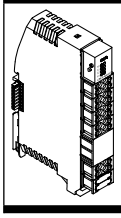



[1] Height with identification holder

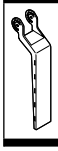
| | B1 | B2 | H1 | H2 | H3 | H4 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|
| CPX-E-4AI-U-I | 18.9 | 23.2 | 76.5 | 69.9 | 6 | 91.5 | 124.3 | 66 | 58.3 |

# Data sheet – Analogue input modules

**Ordering data**

| | | Part no. | Type |
|---|---|---|---|
|  | Analogue input module with 4 inputs | **4080493** | **CPX-E-4AI-U-I** |

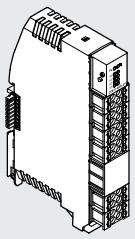
**Ordering data – Accessories**

| | | Part no. | Type |
|---|---|---|---|
|  | Identification holder, 5 pieces | **4080500** | **CAFC-X3-C** |

# Data sheet – Analogue output modules

**Function**
The module converts the value specified by the controller (15-bit value with prefix) and transfers it to a connected actuator as an analogue current or voltage value.

**Area of application**
- Output signal (current/voltage) can be set
- Terminal strip
- Electronic fuse protection against short circuit or overload with automatic resetting
- Error display via LED
- Slow response; possible short-term increase in current requirement



| **General technical data** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Number of outputs | | 4 | | | | | |
| Max. address capacity of outputs | [byte] | 8 | | | | | |
| Measured variable | | Voltage | | | Current | | |
| Signal range | [V] | –10 ... +10 | –5 ... +5 | 0 ... +10 | – | – | – |
| | [mA] | – | – | – | –20 ... +20 | 0 ... +20 | +4 ... +20 |
| Repetition accuracy | [%] | ±0.05 at 25°C | | | | | |
| Data format | | 15 bits + prefix | | | | | |
| | | Linear scaling | | | | | |
| Basic fault limit | [%] | ±0.1 at 25°C | | | | | |
| Operating error limit related to the ambient temperature range | [%] | ±0.3 | | | | | |
| Fuse protection (short circuit) | | Internal electronic fuse per module | | | | | |
| Maximum cable length | | 30 m outputs; shielded | | | | | |
| Electrical isolation between channel and internal bus | | Yes | | | | | |
| Electrical isolation between channels | | No | | | | | |
| Reverse polarity protection | | 24 V actuator supply against 0 V sensor supply | | | | | |
| | | 24 V load against 0 V load | | | | | |
| | | 24 V sensor supply against 0 V sensor supply | | | | | |
| Note on reverse polarity protection | | Self-protection | | | | | |

| **General data** | |
|---|---|
| Module parameters | Short circuit diagnostics for actuator supply |
| | Parameterisation error diagnostics |
| | Diagnostics for undervoltage in load supply |
| | Behaviour after short circuit/overload in actuator supply |
| | Behaviour after short circuit/overload at analogue output |
| | Data format for analogue outputs |
| | Deactivate actuator supply |
| Behaviour after end of overload of the outputs | No automatic return (default) |
| | Parameterisable (module by module) |
| Channel parameters | Signal range per channel |
| | Enable overload/short circuit diagnostics |
| | Enable wire break/idling diagnostics |
| | Release for parameterisation error diagnostics |
| | Force channel x |
| Diagnostics via LED | Errors per module |
| | Error per channel |
| Diagnostics via the bus | Short circuit/overload in actuator supply |
| | Parameterisation error |
| | Nominal range exceeded |
| | Nominal range not reached |
| | Short circuit/overload at analogue output |
| | Undervoltage in load supply |
| | General error |

# Data sheet – Analogue output modules

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Nominal operating voltage DC load | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Permissible voltage fluctuations, load | [%] | ±25 |
| Power failure buffering | [ms] | 10 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | 60 |
| Intrinsic current consumption at nominal operating voltage, load | [mA] | 15 |
| Max. residual current outputs per module | [A] | 2 |
| Protection against direct and indirect contact | | PELV |
| **Electrical connection, output** | | |
| Function | | Analogue output |
| Connection type | | 4x terminal strip |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [mm²] | 0.2 … 1.5 |
| Note on conductor cross section | [mm²] | 0.2 … 2.5 for flexible wire without wire end sleeve |
| **Power supply** | | |
| Connection type | | Terminal strip |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [mm²] | 0.2 … 1.5 |
| Note on conductor cross section | [mm²] | 0.2 … 2.5 for flexible wire without wire end sleeve |

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 96 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 18.9 x 76.6 x 124.3 |

| Materials | |
|---|---|
| Housing | PA |
| Screws | Galvanised steel |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 … +50 |
| Note on ambient temperature | | –5 … +60 °C for vertical installation |
| Storage temperature | [°C] | –20 … +70 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

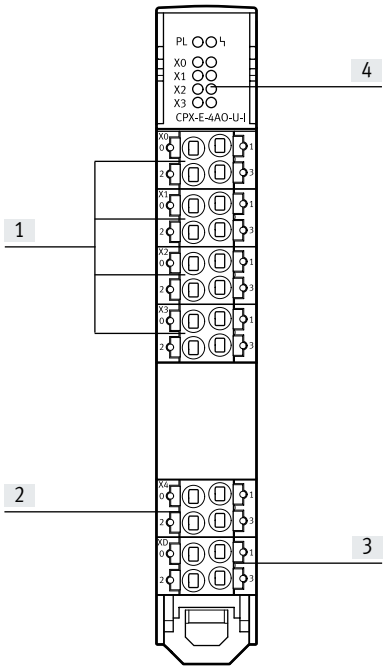
1) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

2) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

# Data sheet – Analogue output modules

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

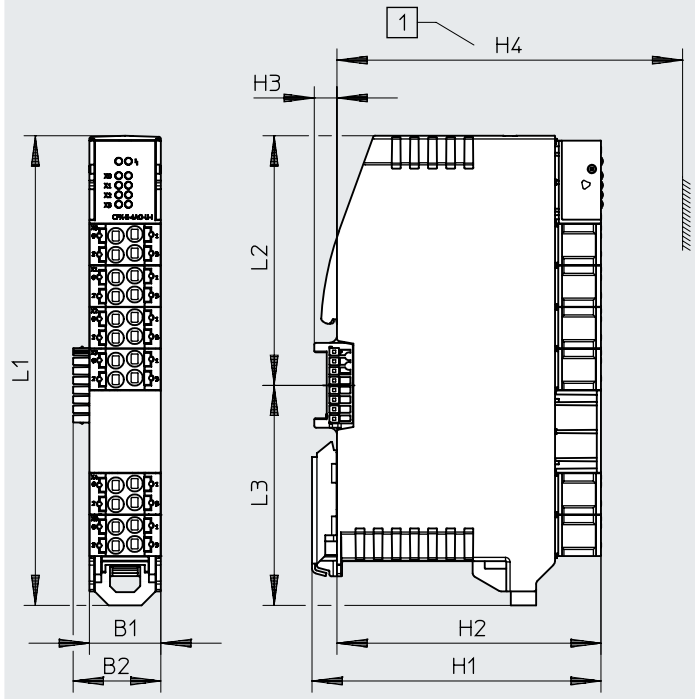
## Connection and display components




[1] Analogue outputs, 4 terminal strips each with one output
[2] 4 connections for functional earth (FE)
[3] Terminal strip for operating voltage supply
[4] LED indicators

## Dimensions

Download CAD data ➔ www.festo.com

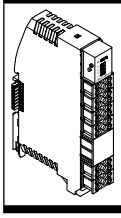



[1] Height with identification holder

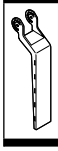
| | B1 | B2 | H1 | H2 | H3 | H4 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|
| CPX-E-4AO-U-I | 18.9 | 23.2 | 76.5 | 69.9 | 6 | 91.5 | 124.3 | 66 | 58.3 |

# Data sheet – Analogue output modules

**Ordering data**

| | | Part no. | Type |
|---|---|---|---|
|  | Analogue output module with 4 outputs | **4080494** | **CPX-E-4AO-U-I** |

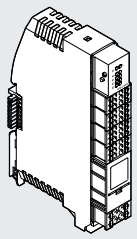
**Ordering data – Accessories**

| | | Part no. | Type |
|---|---|---|---|
|  | Identification holder, 5 pieces | **4080500** | **CAFC-X3-C** |

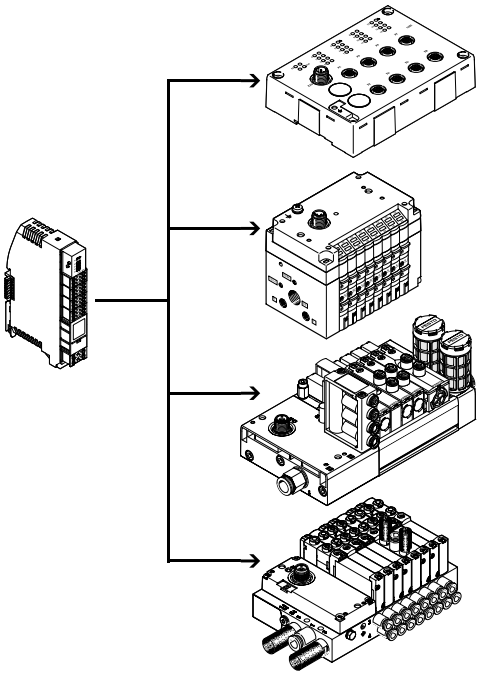
# Data sheet – IO-Link master modules

**Function**
The IO-Link master module establishes the connection to modules that have an IO-Link interface (device). The I/O data from the connected devices is transmitted to the connected CPX-E bus module and thus to the higher-order controller via fieldbus.

**Area of application**
- Address space can be set
- Terminal strip
- Electronic fuse protection against short circuit or overload with automatic resetting
- Error display via LED
- Slow response; possible short-term increase in current requirement



## Application – Example configuration



The IO-Link master module provides 4 external IO-Link interfaces.
As well as transmitting the communication data, the IO-Link interfaces also transmit the power supply to the connected sensors and the load supply to the valves (or outputs). Both circuits are supplied separately with 24 V, using a separate reference potential. The load voltage supply is fed directly into the module.

The address space provided by the IO-Link master module to the IO-Link interfaces (ports) is set using DIL switches.
It can be set from 2 ... 32 bytes per port. Since the address space for the module is limited to a total of 32 bytes, there is the following gradation:
- For 2, 4 or 8 bytes per port, all 4 ports are active
- For 16 bytes per port, 2 ports are active
- For 32 bytes per port, just 1 port is active

The behaviour of the master module is defined using parameters.

| General technical data | | | |
|---|---|---|---|
| Protocol | | | IO-Link |
| IO-Link | No. of ports | | 4 |
| | Port class | | B |
| | Communication mode | | SIO, COM1 (4.8 kBaud), COM2 (38.4 kBaud), COM3 (230.4 kBaud) |
| | | | Configurable via software |
| | Communication | | C/Q green LED |
| | Minimum cycle time | | Depending on minimally supported cycle time of connected IO-Link device |
| | Protocol version | | Master V 1.1 |
| | Process data width IN | [byte] | 8 ... 32, parameterisable |
| | Process data width OUT | [byte] | 8 ... 32, parameterisable |
| Number of outputs | | | 8 |
| Max. address capacity of outputs | | [Byte] | 1 |
| Characteristic curve of outputs | | | To IEC 61131-2, type 0.5 |
| Switching logic at outputs | | | PNP (positive switching) |
| Fuse protection (short circuit) | | | Internal electronic fuse per channel |
| | | | Internal electronic fuse per module |
| Electrical isolation between channel and internal bus | | | No |
| Electrical isolation between channels | | | No |
| Reverse polarity protection | | | 24 V sensor supply against 0 V sensor supply |
| | | | 24 V load against 0 V load |
| Note on reverse polarity protection | | | Self-protection |

# Data sheet – IO-Link master modules

| General data | |
|---|---|
| Module parameters | Short circuit diagnostics for actuator supply |
| | Behaviour after short circuit/overload |
| | Deactivate sensor supply |
| Behaviour after end of overload of the outputs | No automatic return |
| Channel parameters | Deactivate actuator supply |
| | Device error code |
| | Channel mode |
| | Channel status |
| | Force channel x |
| Diagnostics via LED | Errors per module |
| | Status per channel |
| Diagnostics via the bus | Short circuit |
| | Parameter error |
| | Wire break |
| | Module error |
| | Device missing/failed |
| | Underflow/overflow |
| | Undervoltage |
| | General error |

| Technical data – Electrics | | |
|---|---|---|
| Nominal operating voltage DC for electronics/sensors | [V DC] | 24 |
| Nominal operating voltage DC load | [V DC] | 24 |
| Permissible voltage fluctuations for electronics/sensors | [%] | ±25 |
| Permissible voltage fluctuations, load | [%] | ±25 |
| Intrinsic current consumption at nominal operating voltage for electronics/sensors | [mA] | 50 |
| Intrinsic current consumption at nominal operating voltage, load | [mA] | 15 |
| Max. residual current outputs per module | [A] | 4 |
| Protection against direct and indirect contact | | PELV |
| | | |
| **Electrical connection, IO-Link** | | |
| Connection type | | 4x terminal strip |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 6 |
| Conductor cross section | [mm²] | 0.2 … 1.5 |
| Note on conductor cross section | [mm²] | 0.2 … 2.5 for flexible wire without wire end sleeve |
| | | |
| **Power supply** | | |
| Connection type | | Terminal strip |
| Connection technology | | Spring-loaded terminal |
| Number of pins/wires | | 4 |
| Conductor cross section | [mm²] | 0.2 … 1.5 |
| Note on conductor cross section | [mm²] | 0.2 … 2.5 for flexible wire without wire end sleeve |

| Technical data – Mechanical components | | |
|---|---|---|
| Type of mounting | | With H-rail |
| Mounting position | | Vertical; horizontal |
| Product weight | [g] | 96 |
| Grid dimension | [mm] | 18.9 |
| Dimensions W x L x H | [mm] | 18.9 x 76.6 x 124.3 |

| Materials | |
|---|---|
| Housing | PA |
| Note on materials | RoHS-compliant |
| PWIS conformity | VDMA24364 zone III |

# Data sheet – IO-Link master modules

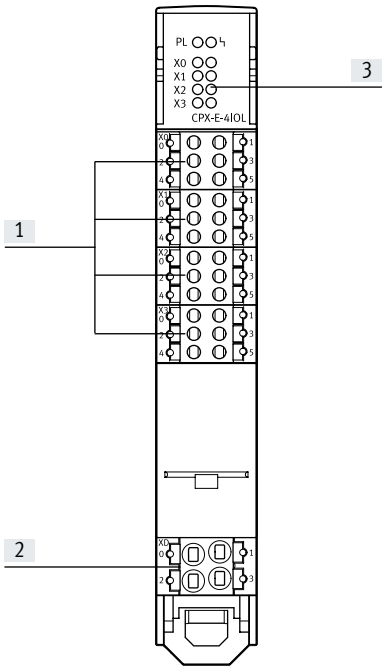
| Operating and environmental conditions | | |
|---|---|---|
| Ambient temperature | [°C] | –5 ... +60 |
| Note on ambient temperature | | –5 ... +60 °C for vertival mounting |
| Storage temperature | [°C] | –20 ... +70 |
| Relative humidity | [%] | 95 |
| | | Non-condensing |
| CE marking (see declaration of conformity)[2] | | To EU EMC Directive[1] |
| | | To EU RoHS Directive |
| UKCA marking (see declaration of conformity)[2] | | To UK instructions for EMC |
| | | To UK RoHS instructions |
| KC mark | | KC EMC |
| Certification | | RCM |
| | | c UL us-Listed (OL) |
| Certificate issuing authority | | UL E239998 |
| Degree of protection | | IP20 |

1) For information about the area of use, see the EC declaration of conformity at: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

2) Additional information: www.festo.com/catalogue/CPX-E ➔ Support/Downloads.

| Safety characteristics | |
|---|---|
| Shock resistance | Shock test with severity level 1 to FN 942017-5 and EN 60068-2-27 |
| Vibration resistance | Transport application test with severity level 1 to FN 942017-4 and EN 60068-2-6 |

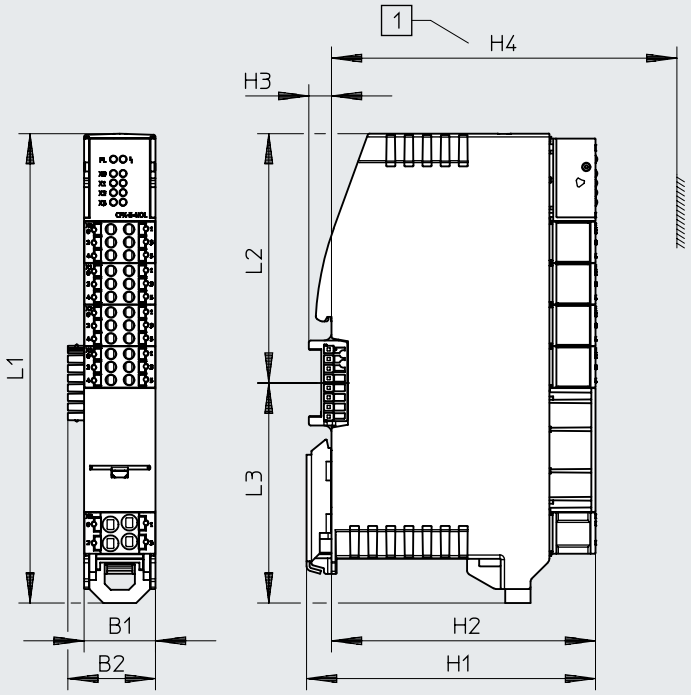
## Connection and display components




[1] IO-Link ports, 4 terminal strips each with one port
[2] Terminal strip for operating voltage supply, load voltage
[3] LED indicators

# Data sheet – IO-Link master modules

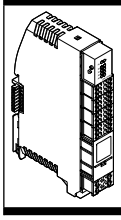
**Dimensions** Download CAD data ➔ www.festo.com



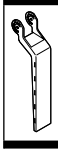

[1] Height with identification holder

| | B1 | B2 | H1 | H2 | H3 | H4 | L1 | L2 | L3 |
|---|---|---|---|---|---|---|---|---|---|
| CPX-E-4IOL | 18.9 | 23.2 | 76.5 | 69.9 | 6 | 91.5 | 124.3 | 66 | 58.3 |

**Ordering data**

| | | Part no. | Type |
|---|---|---|---|
|  | IO-Link master module with 4 ports | **4080495** | **CPX-E-4IOL** |

**Ordering data – Accessories**

| | | Part no. | Type |
|---|---|---|---|
|  | Identification holder, 5 pieces | **4080500** | **CAFC-X3-C** |

# Ordering data – Modular product system

**Ordering table**

| | | Condi-tions | Code | | Enter code |
|---|---|---|---|---|---|
| Module no. | **5237644** | | | | |
| Product type | System CPX-E | [1] | **60E** | | 60E |
| Electrical control | PROFIBUS bus module | [1] | **-PB** | | |
| | PROFINET bus module | [1] | **-PN** | | |
| | EtherNet/IP bus module | [1] | **-EP** | | |
| | EtherCAT bus module | [1] | **-EC** | | |
| | Controller CODESYS V3, PROFINET | [1] | **-CPN** | | |
| | Controller CODESYS V3 with SoftMotion, PROFINET | [1] | **-MPN** | | |
| | Controller CODESYS V3, EtherNet/IP | [1] | **-CEP** | | |
| | Controller CODESYS V3 with SoftMotion, EtherNet/IP | [1] | **-MEP** | | |
| | Controller CODESYS V3 | [1] | **-CB** | | |
| | Controller CODESYS V3 with SoftMotion | [1] | **-MB** | | |
| Input/output modules | Digital input module with 16 inputs | [1] | **M** | | |
| | Digital output module with 8 outputs | [1] | **L** | | |
| | Analogue input module with 4 inputs (current/voltage) | [1] | **NI** | | |
| | Analogue output module with 4 outputs (current/voltage) | [1] | **NO** | | |
| | IO-Link master module | [1] | **T51** | | |
| | Counter module | [1] | **T53** | | |
| Module configuration for IO-Link master module | DIL1 ... 8: OFF (64 bit consumption) 4 active ports,16-bit I/O per port | | **OO** | | |
| | DIL 1: ON (128 bit consumption) 4 active ports, 32-bit I/O per port | | **IO** | | |
| | DIL 2: ON (256 bit consumption) 4 active ports, 64-bit I/O per port | | **OI** | | |
| | DIL 1: ON, DIL 2: ON, DIL4: ON (256 bit consumption) 2 active ports, 128-bit I/O per port | | **II** | | |
| | DIL 3: ON, DIL 5: ON (256 bit consumption) 1 active port, 256-bit I/O per port | | **III** | | |
| Accessories | Module cover including label strips | | **+MH** | | |
| | 32 GB memory card | | **+SK** | | |
| | Display and operating unit | | **+AB** | | |

1) A maximum of one bus module or one controller and 10 input/output modules can be included.