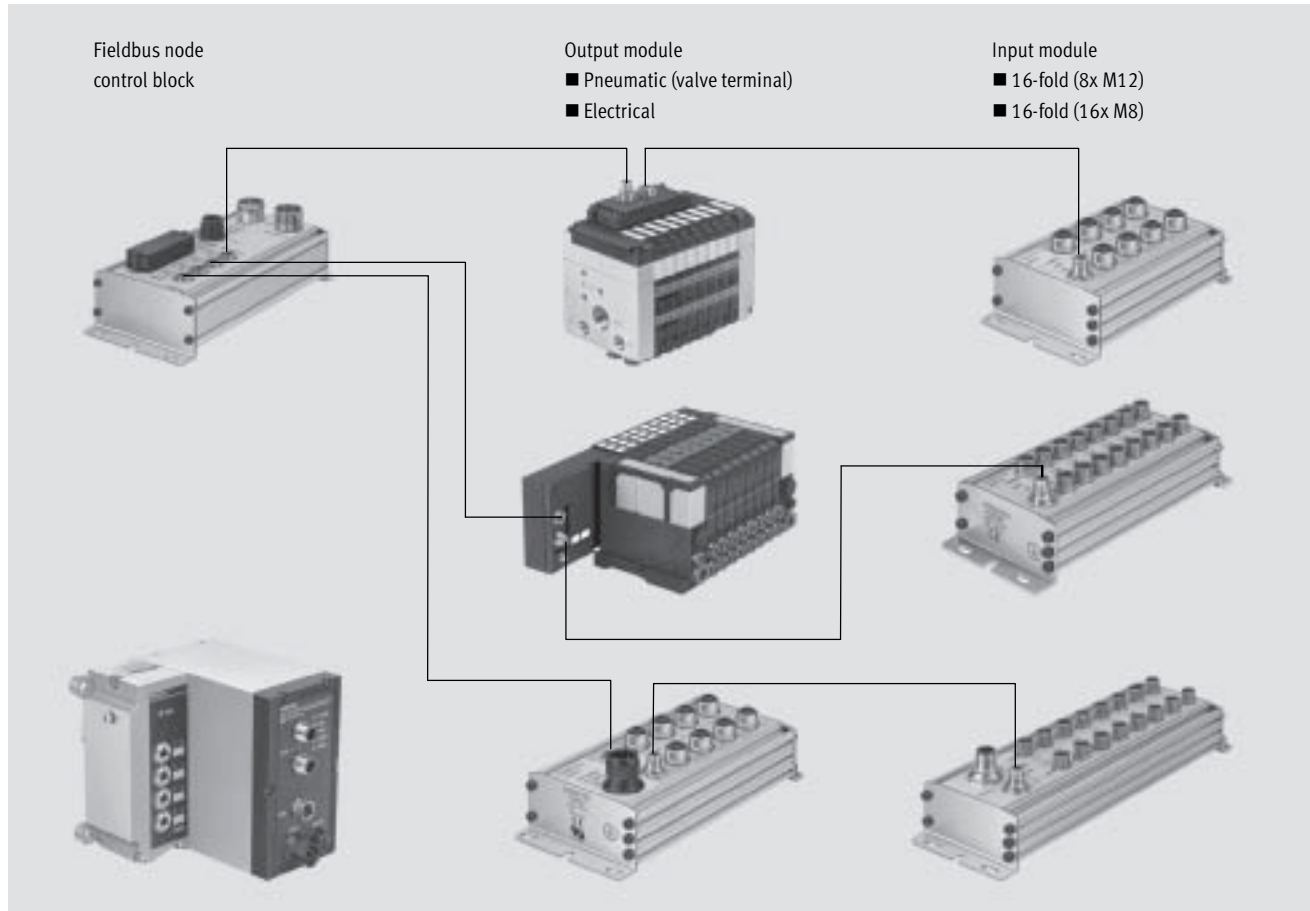




- Decentralised installation system for short cycle times
- Central fieldbus connection for optimum cost-effectiveness
- Open to a wide range of fieldbus protocols
- Diagnosis via LEDs and fieldbus
- Max. 64 inputs and 64 outputs can be connected (incl. solenoid coils)
- Power supply and bus connection via the same line
- Programmable with integrated controller

# Electrical installation system, for CPV/CPA

Key features



### Innovative

- Complete concept for decentralised machine and system structure
- Decentralised pneumatics and sensors for fast processes
- Central electrics for fieldbus and common power supply
- Flexible configuration of the individual CP strings
- Selectable valve terminal sizes for optimum pneumatic control loop systems

### Robust

- Fieldbus node in metal housing
- Electrical accessories to IP65
- Proven valve terminals CPV (compact) and CPA (modular sub-bases)
- Electrical input and output modules in metal housing
- Sturdy connection technology M12, alternatively M8

### Flexible

- Four CP strings up to 10 m permit optimum decentralisation
- 16 inputs and 16 outputs/valves per string
- Valves available:
  - Compact CPV10/14/18 with flow rates of 400, 800, 1600 l/min
  - Modular CPA 10/14 with flow rates of 350, 650 l/min
- Input modules with 16 inputs with or without auxiliary power supply
- Universal electrical outputs
- IP20 module with 16 inputs for control cabinet installation

### Reliable

- Sturdy modules and accessories
- Ready to install system including CP cables
- Polarity-safe and short circuit proof connections
- Valves with separate load voltage supply
- All modules equipped with local diagnosis and status LEDs
- Diagnosis of each CP string via fieldbus
- Intelligent system (teach-in button) "learns" current configuration
- Easy replacement of modules at any time

# Electrical installation system, for CPV/CPA

Key features

## CP installation system

The CP installation system is capable of meeting two completely different requirements and resolves the conflict between extensive decentralised modularisation and electrical installation.

High-speed machines require short cycle times and short pneumatic tubing. The valves must be mounted close to the cylinders. The CP installation system was developed to meet these requirements without having to wire each valve individually.

The system integrates the modular valve terminals CPV, the sub-base valve terminal CPA and various input/output modules in a single installation concept.

All CP valve terminals and CP modules are connected using a ready to install CP cable, and are attached to the CP fieldbus node. One CP valve terminal and one CP input module make up an installation string that ends at the CP fieldbus node. The installation system supports a maximum of 4 installation strings, which can be connected to the fieldbus node.

Each string can be extended up to a maximum length of 10 metres.

The CP fieldbus node is the central connection point for the fieldbus and for the valve actuation and sensor power supply. It is here that the relevant bus parameters are set by means of switches and the standard fieldbus connector is attached. The power supply for the sensors connected to the input modules is separate from the load voltage of the valves.

The CP string is used to exchange the input and output states of the connected modules with the CP fieldbus node and supply power separately to the valves and input module.

The CP valve terminals and CP input modules do not need any other electrical connection apart from the CP cable, nor do they require any module-specific settings. This minimises the installation space required for the electrical connections to the modules and valves.

## Node types:

Fieldbus/control block  
CP-03



CP fieldbus node  
CP-E



# Electrical installation system, for CPV/CPA

Peripherals overview

FESTO

## Fieldbus systems, programmable controllers



**FESTO**

**MOELLER** 

**ABB**

**SIEMENS**

*DeviceNet*

 **Allen-Bradley**



### Fieldbus variations:

Of the more than 20 different fieldbus systems (protocols) available on the market, some have emerged as the most important variants. Festo supports these by means of various fieldbus nodes (FBxx) on its valve terminals. Fieldbus systems require a powerful, central PLC and a master interface adapted to that particular fieldbus.

Fieldbus systems are generally used when several devices with many inputs/outputs, complex functions or high communication levels must be controlled. In this case, the advantages of simple cabling, easy diagnosis and maintenance outweigh the extra outlay for a fieldbus master interface and the necessary know-how.

### Festo fieldbus:

A fieldbus developed by Festo with simple prompting, supported by the control systems in the FPC, SF and IPC series (Festo FB5). A maximum of 98 bus stations can be connected to the Festo fieldbus. The bus can operate with 4 different baud rates. 31.25; 62.5; 187.75 and 375 kbps.

### Interbus:

An open fieldbus standard, originally developed by Phoenix Contact and now in worldwide use. Important installation accessories such as bus plugs must be obtained from Phoenix or its partners (Festo FB6).

### DeviceNet:

An open fieldbus system based on CAN technology originally developed for the automotive sector. DeviceNet was originally developed by Rockwell (Allen Bradley) and is now an open standard (Festo FB11).

### Profibus DP:

An open fieldbus standard, originally developed by Siemens and in worldwide use (Festo FB13 for 12 MBd).

### ABB CS31:

The fieldbus from ABB connects a maximum of 63 fieldbus stations to the fieldbus master. The data is transferred at a constant baud rate of 187.5 kbps. The protocol is suitable for use in all areas of automation technology (Festo FB5).

### Moeller SUCONET K:

A maximum of 98 bus stations can be connected to the SUCONET K fieldbus. The bus operates with a baud rate of 187.5 or 375 kbps, depending on the design, bus length, etc. The bus interface is based on RS 485 with a master/slave structure (Festo FB5).

# Electrical installation system, for CPV/CPA

Peripherals overview

## Control blocks

Controllers integrated in the Festo valve terminals permit the construction of stand-alone control units to IP65 – without control cabinets.

Using the slave operation mode, these valve terminals can be used for intelligent pre-processing and are therefore ideal modules for designing decentralised intelligence.

In the master operation mode, terminal groups can be designed with many options and functions, which can autonomously control a medium sized machine/system.

## Control block variants

### Integrated Festo PLC

A high performance miniature controller from Festo has been integrated into the SF3 valve terminal node. This provides stand-alone control of up to 128 inputs and 128 outputs.



With the Festo fieldbus, additional I/O and expanded functions can be installed and controlled. The control block SF3 can be operated as required as a stand-alone operation, a fieldbus slave or master (with up to 31 fieldbus slaves and up to 1048 inputs and outputs).

### Integrated Allen Bradley PLC – SLC embedded

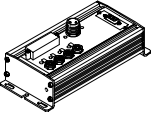

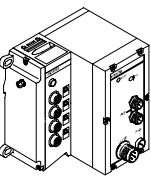
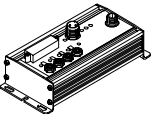
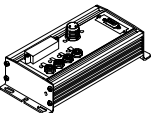
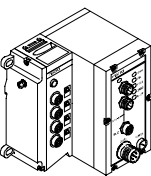
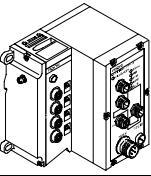
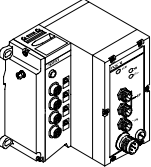
A powerful SLC5/02 mini controller from Allen Bradley, integrated in the valve terminal node SB/SF60.



This provides stand-alone control of up to 128 inputs and 128 outputs. With the DeviceNet scanner of the SF60, additional I/O and expanded functions can be installed and controlled. The control block SF60 can be operated as required as a stand-alone operation, a DeviceNet slave or master (with up to 31 slaves).

# Electrical installation system, for CPV/CPA

Peripherals overview

| Fieldbus/control block                                                              |           |                                                             |                |             |                                          |            |
|-------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------|----------------|-------------|------------------------------------------|------------|
| View                                                                                | Node type | Fieldbus protocol                                           | No. of strings | No. of I/Os | Plug type, bus connection                | → Page     |
|    | FB5       | Festo<br>ABB CS31<br>Moeller SUCONET K                      | 4              | 64/64       | Sub-D                                    | 4 / 4.6-11 |
|    | FB6       | Interbus                                                    |                |             | 1x round socket M23<br>1x round plug M23 | 4 / 4.6-15 |
|    | FB8       | Allen Bradley (1771 RIO)                                    |                |             | 2x round socket M12,<br>4-pin            | 4 / 4.6-19 |
|   | FB11      | DeviceNet                                                   |                |             | 1x round socket M12,<br>5-pin            | 4 / 4.6-23 |
|  | FB13      | Profibus DP (12 MBd)                                        |                |             | Sub-D or<br>2x M12 Reversekey            | 4 / 4.6-27 |
|  | SB6       | Allen Bradley control block, SLC<br>embedded                |                |             | 2x round socket M12,<br>5-pin            | 4 / 4.6-31 |
|  | SF6       | Allen Bradley control block, SLC<br>embedded with DeviceNet |                |             | 3x round socket M12,<br>5-pin            | 4 / 4.6-36 |
|  | SF3       | Festo control block with<br>fieldbus connection             |                |             | 3x round socket M12,<br>4-pin            | 4 / 4.6-40 |

# Electrical installation system, for CPV/CPA

Key features – Power supply

## Operating voltage and load current supply

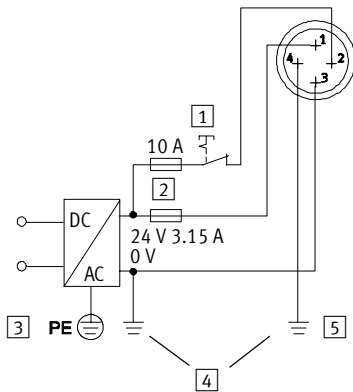
The following functions are made available to the connected modules through the CP cable:

- Connection for data exchange
- Operating voltage for internal electronics
- Sensor supply voltage for the input modules

Every module in the CP installation system is protected separately against overload with electronic fuses. Input modules without additional power supply provide a maximum

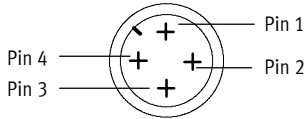
sensor supply of 500 mA, while input modules with additional power supply provide up to 2 A residual current for the connected sensors.

## Example of circuit



- 1 Operating voltage (externally fused)
- 2 External fuses
- 3 Protective earth
- 4 Potential equalisation
- 5 Earth connection on pin 4, rated for 12 A

## Pin allocation for fieldbus node power supply



- Pin 1 24 V supply for electronics and inputs
- Pin 2 24 V load supply for valves
- Pin 3 0 V
- Pin 4 Earth terminal

# Electrical installation system, for CPV/CPA

Key features – CP converter



## Connection of valve terminal and input modules via CP converter

### Central power supply

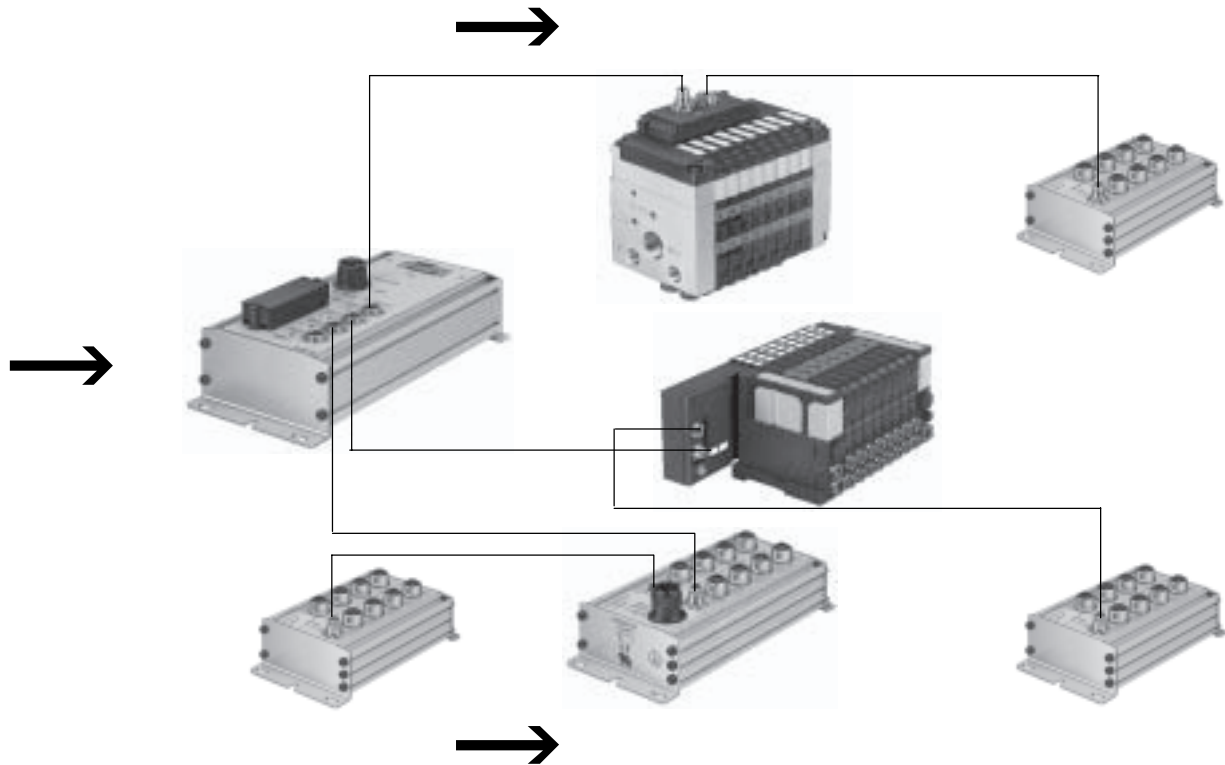
- Operating voltage for the modules
- Sensor supply for the input modules
- Load voltage for valves

### Central at the CP converter:

Distribution of the power supply to the individual valve terminals and modules of the CP installation system.  
Transmission of I/O and diagnostic data.

### Distributed to each I/O module:

- Electronic fuses to provide overload protection
- Voltage failure detection
- Monitoring of the load voltage level of the valves for secure operation





# Electrical installation system, for CPV/CPA

Key features – Diagnosis



## Diagnosis – Fieldbus node

Comprehensive diagnosis available for every CP string.

Diagnostic information can either be detected with the LEDs or read out and evaluated for a specific fieldbus using the PLC program.

### Diagnosis using LEDs

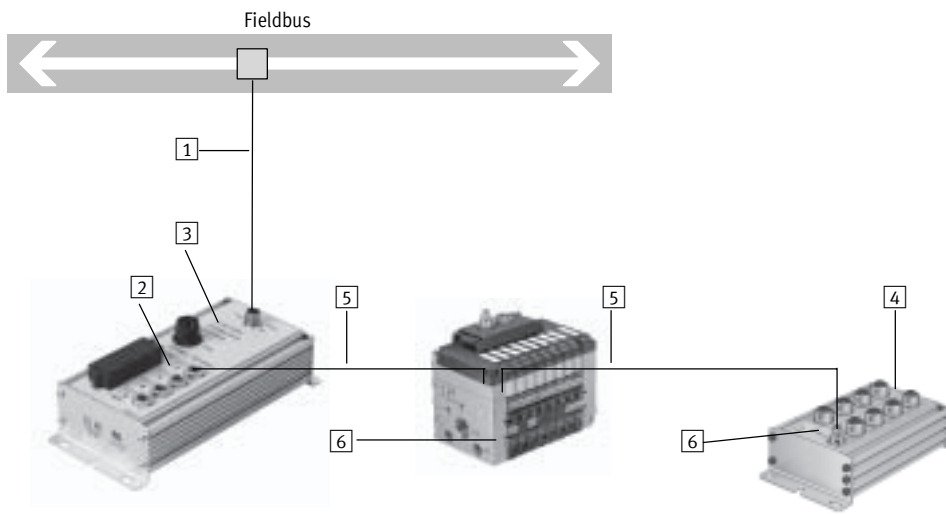
- Error in bus communication
- POWER, power supply display for internal electronics
- POWER V, load voltage display for valves
- 0 ... 3, CP string allocation changed or interrupted

There are also bus-specific LED displays.

### Diagnosis using PLC program, for example:

- Configuration errors
- Bus errors
- Operating voltage failure
- Falling below voltage tolerance (valves)
- Short circuit in sensor voltage supply

- Operating voltage failure on the output modules
- Short circuit/overload on the output modules
- Connection to one or more CP modules interrupted (valve terminal, input/output modules)



- 1 Diagnosis using fieldbus
- 2 String diagnosis using LED on fieldbus node
- 3 Bus-specific LED
- 4 Diagnosis using LED on CP module
- 5 Diagnosis using CP string
- 6 Status display on CP module

# Electrical installation system, for CPV/CPA

Key features – I/O modules



## I/O modules



16-fold input module, 8 x M12  
CP-E16-M12x2-5POL  
CP-E16N- M12x2

PNP/NPN input modules with integrated sensor voltage supply via CP connection to IP65



16-fold input module, 16 x M8  
CP-E16-M8  
CP-E16N-M8

PNP/NPN input modules with integrated sensor voltage supply via CP connection to IP65



16-fold input module, 16 x M8  
CP-E16-M8-Z

PNP/NPN input module with external sensor voltage supply to protection class IP65



16-fold input module, terminals  
CP-E16-KL-IP20-Z

PNP/NPN input module with external sensor voltage supply to protection class IP20



8-fold output module, 8 x M12  
CP-A08-M12-5POL  
CP-A08N-M12

PNP/NPN output modules with external load voltage supply to protection class IP65

# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB05-E

FESTO

FESTO

MOELLER 

ABB

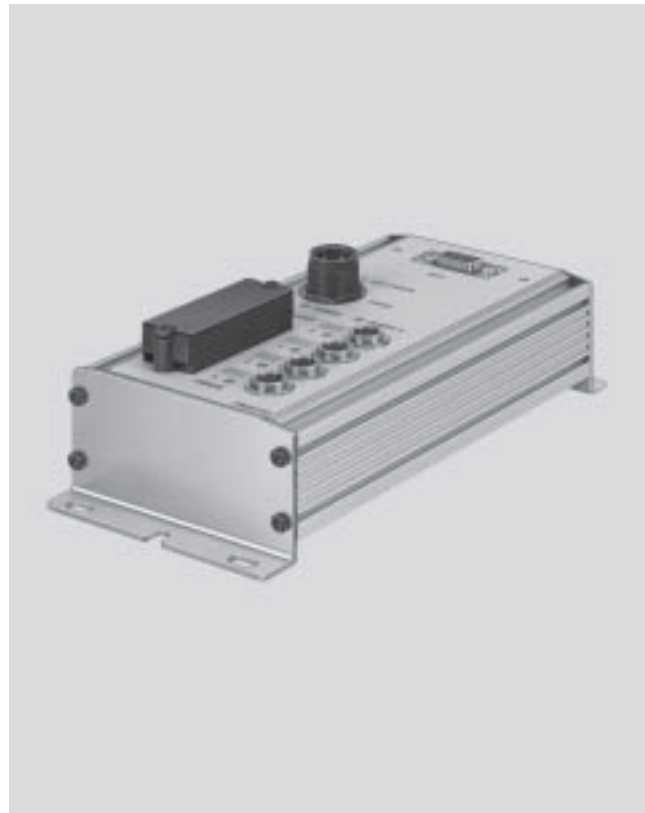
This fieldbus node handles communication between the decentralised CP installation system and a higher-order master. The fieldbus node is a slave station on the fieldbus and represents the I/O data and diagnostic information of the connected CP modules on the network.

For the electrical peripherals, this module provides the separate electrical system supply for

- the electronics modules and sensor supply, and
- the load current of the valves.

The FB5 fieldbus node supports three different company-specific fieldbus protocols, based on a floating RS485 connection. The required protocol is selected by means of switch settings.

- Festo fieldbus
- ABB CS31
- Moeller SUCONET K



Fieldbus systems/electrical peripherals  
CP installation system

4.6

## Application

### Bus connection

The bus connection on the FB5 is established by means of a 9-pin Sub-D plug. In the case of operation on the fieldbus, the incoming control signals from the node via the fieldbus are permanently forwarded to the

connected CP modules. The CP modules ensure that the programmed output signals are present or switch the relevant valves.

 Note

Alternatively the bus connection can be established via a 2x M12 adapter plug (B-coded).

## Implementation

The FB5 supports the digital input and output modules and the solenoid coils. It can service a total of

64 digital outputs, of which max. 4x 16 can include solenoid coils, and 64 digital inputs.

 Note

Please observe the general guidelines on I/O addressing when assigning the outputs.

# Electrical installation system, for CPV/CPA

FESTO

Technical data – Fieldbus node CP-FB05-E

| General technical data                                    |                                                |                                                                                                                                                                                                   |
|-----------------------------------------------------------|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type                                                      |                                                | CP-FB05-E                                                                                                                                                                                         |
| Part No.                                                  |                                                | 18 238                                                                                                                                                                                            |
| Baud rates                                                | Festo fieldbus                                 | Set using HW switch<br><ul style="list-style-type: none"> <li>■ 31.25 kbps</li> <li>■ 62.50 kbps</li> <li>■ 187.50 kbps</li> <li>■ 375 kbps</li> </ul>                                            |
|                                                           | ABB CS31                                       | 187.50 kbps                                                                                                                                                                                       |
|                                                           | Moeller SUCONET K                              | Baud rate set automatically<br><ul style="list-style-type: none"> <li>■ 187.50 kbps</li> <li>■ 375 kbps</li> </ul>                                                                                |
| Addressing range                                          | Festo fieldbus                                 | 1 ... 98                                                                                                                                                                                          |
|                                                           | ABB CS31                                       | 0 ... 60                                                                                                                                                                                          |
|                                                           | Moeller SUCONET K                              | 1 ... 98                                                                                                                                                                                          |
| Type of communication                                     | Festo fieldbus                                 | Cyclic polling                                                                                                                                                                                    |
|                                                           | ABB CS31                                       | I16, O16 or I/O16                                                                                                                                                                                 |
|                                                           | Moeller SUCONET K                              | Up to 32 I/O: SIS-K-06/07<br>Up to 64 I/O: SIS-K-10/10                                                                                                                                            |
| Max. no. of solenoid coils                                |                                                | 64                                                                                                                                                                                                |
| Max. no. of outputs incl. solenoid coils                  |                                                | 64                                                                                                                                                                                                |
| Max. no. of inputs                                        |                                                | 64                                                                                                                                                                                                |
| LED diagnostic displays                                   | Power                                          | Power supply display for internal electronics                                                                                                                                                     |
|                                                           | Power V                                        | Power supply display for valves                                                                                                                                                                   |
|                                                           | 0...3                                          | CP string LED                                                                                                                                                                                     |
|                                                           | Bus                                            | Bus error status                                                                                                                                                                                  |
| Device-specific diagnostics transmitted to the controller |                                                | <ul style="list-style-type: none"> <li>■ Short circuit/overload, outputs</li> <li>■ Undervoltage of valves</li> <li>■ Undervoltage of outputs</li> <li>■ Undervoltage of sensor supply</li> </ul> |
| Operating voltage                                         | Nominal value                                  | 24 V DC polarity-safe                                                                                                                                                                             |
|                                                           | Permissible range                              | 20.4 ... 26.4 V                                                                                                                                                                                   |
|                                                           | Power failure buffering                        | 20 ms                                                                                                                                                                                             |
| Current consumption pin 1                                 | Fieldbus node                                  | 250 mA                                                                                                                                                                                            |
|                                                           | CP modules                                     | 560 mA (internal electronics) + total current consumption of inputs                                                                                                                               |
| Current limiting                                          | Electronics of fieldbus node and CP connection | Max. 1.25 A, short circuit proof                                                                                                                                                                  |
| Load voltage pin 2                                        | Solenoid valves                                | Total of all valves switched simultaneously, see technical data on CP valves<br>→ 4 / 2.1-2 and 4 / 2.1-80 Compact Performance valve terminals CPV and CPA                                        |
| Current limiting                                          | Supply for solenoid valves                     | Max. 2.5 A, fused                                                                                                                                                                                 |
| Certification                                             |                                                | CE                                                                                                                                                                                                |
| Protection class to EN 60 529                             |                                                | IP65                                                                                                                                                                                              |
| Temperature range                                         | Operation                                      | -5 ... +50 °C                                                                                                                                                                                     |
|                                                           | Storage                                        | -20 ... +70 °C                                                                                                                                                                                    |
| Materials                                                 | Housing                                        | Die-cast aluminium                                                                                                                                                                                |
| Dimensions (LxWxD)                                        |                                                | 196.4 x 88 x 61.5 mm                                                                                                                                                                              |
| Weight                                                    |                                                | 925 g                                                                                                                                                                                             |

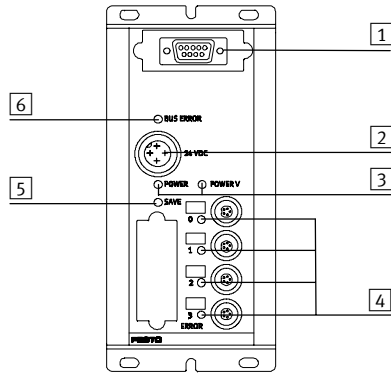
# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB05-E



## Connection and display components

The following connection and display components can be found on the bus node cover:




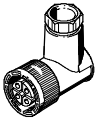
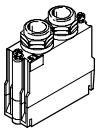

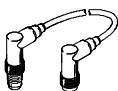
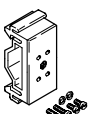
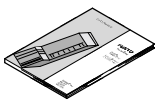

- 1 Plug for fieldbus cable
- 2 Operating voltage connection for CP and valves
- 3 Operating voltage LEDs
- 4 String LEDs
- 5 Save key
- 6 Bus-specific LED

| Pin allocation for fieldbus interface (plug view) |         |                         |                                          |          |                                     |                                     |
|---------------------------------------------------|---------|-------------------------|------------------------------------------|----------|-------------------------------------|-------------------------------------|
| Plug view                                         | Pin     | Festo Sub-D plug (IP65) | Manufacturer-specific signal designation |          |                                     |                                     |
|                                                   |         |                         | Festo fieldbus interface                 | ABB CS31 | Moeller SUCONET K                   |                                     |
|                                                   |         |                         |                                          |          | Sub-D, 9-pin                        | DIN (round), 5-pin                  |
|                                                   | 1       |                         |                                          |          |                                     |                                     |
|                                                   | 2       |                         |                                          |          |                                     |                                     |
|                                                   | 3       | B                       | S+                                       | Bus1     | 3 (T <sub>A</sub> /R <sub>A</sub> ) | 4 (T <sub>A</sub> /R <sub>A</sub> ) |
|                                                   | 4       |                         |                                          |          |                                     |                                     |
|                                                   | 5       |                         |                                          |          |                                     |                                     |
|                                                   | 6       |                         |                                          |          |                                     |                                     |
|                                                   | 7       |                         |                                          |          |                                     |                                     |
|                                                   | 8       | A                       | S-                                       | Bus2     | 7 (T <sub>B</sub> /R <sub>B</sub> ) | 1 (T <sub>B</sub> /R <sub>B</sub> ) |
|                                                   | 9       |                         |                                          |          |                                     |                                     |
|                                                   | Housing |                         | Cable clip                               | Screen   | Screen                              | 4 (screen)                          |

# Electrical installation system, for CPV/CPA

FESTO

Accessories – Fieldbus node CP-FB05-E

| Ordering data                                                                       |                                        |                              |                     |          |
|-------------------------------------------------------------------------------------|----------------------------------------|------------------------------|---------------------|----------|
| Designation                                                                         |                                        |                              | Type                | Part No. |
| <b>Power supply</b>                                                                 |                                        |                              |                     |          |
|    | Power supply socket, straight          | for 1.5 mm <sup>2</sup>      | NTSD-GD-9           | 18 493   |
|                                                                                     |                                        | for 2.5 mm <sup>2</sup>      | NTSD-GD-13,5        | 18 526   |
|    | Power supply socket, angled            | for 1.5 mm <sup>2</sup>      | NTSD-WD-9           | 18 527   |
|                                                                                     |                                        | for 2.5 mm <sup>2</sup>      | NTSD-WD-11          | 533 119  |
| <b>Fieldbus connection</b>                                                          |                                        |                              |                     |          |
|    | Fieldbus socket, Sub-D connection      |                              | FBS-Sub-9-GS-DP-B   | 532 216  |
|    | M12 adapter                            |                              | FBA-2-M12-5POL-RK   | 533 118  |
| <b>Valve terminal connection</b>                                                    |                                        |                              |                     |          |
|  | Connecting cable WS-WD                 | 0.5 m                        | KVI-CP-1-WS-WD-0,5  | 178 564  |
|                                                                                     |                                        | 2 m                          | KVI-CP-1-WS-WD-2    | 163 139  |
|                                                                                     |                                        | 5 m                          | KVI-CP-1-WS-WD-5    | 163 138  |
|                                                                                     | Connecting cable GS-WD                 | 5 m                          | KVI-CP-1-GS-WD-5    | 163 137  |
|                                                                                     |                                        | 8 m                          | KVI-CP-1-GS-WD-8    | 163 136  |
|                                                                                     | Connecting cable GS-GD                 | 2 m, for chain link trunking | KVI-CP-2-GS-GD-2    | 170 234  |
|                                                                                     |                                        | 5 m, for chain link trunking | KVI-CP-2-GS-GD-5    | 170 235  |
|                                                                                     |                                        | 8 m, for chain link trunking | KVI-CP-2-GS-GD-8    | 165 616  |
| <b>Mounting</b>                                                                     |                                        |                              |                     |          |
|  | Mounting, for H-rail                   |                              | CP-TS-HS35          | 170 169  |
| <b>User documentation</b>                                                           |                                        |                              |                     |          |
|  | User documentation – Bus node CP-FB5-E | German                       | P.BE-CP-FB5-E-DE    | 165 105  |
|                                                                                     |                                        | English                      | P.BE-CP-FB5-E-EN    | 165 205  |
|                                                                                     |                                        | French                       | P.BE-CP-FB5-E-FR    | 165 135  |
|                                                                                     |                                        | Italian                      | P.BE-CP-FB5-E-IT    | 165 165  |
| <b>Software</b>                                                                     |                                        |                              |                     |          |
|  | CD-ROM                                 | Valve terminals              | P.CD-VALVE-T        | 183 350  |
|                                                                                     |                                        | Utilities                    | P.CD-VI-UTILITIES-2 | 533 500  |

# Electrical installation system, for CPV/CPA

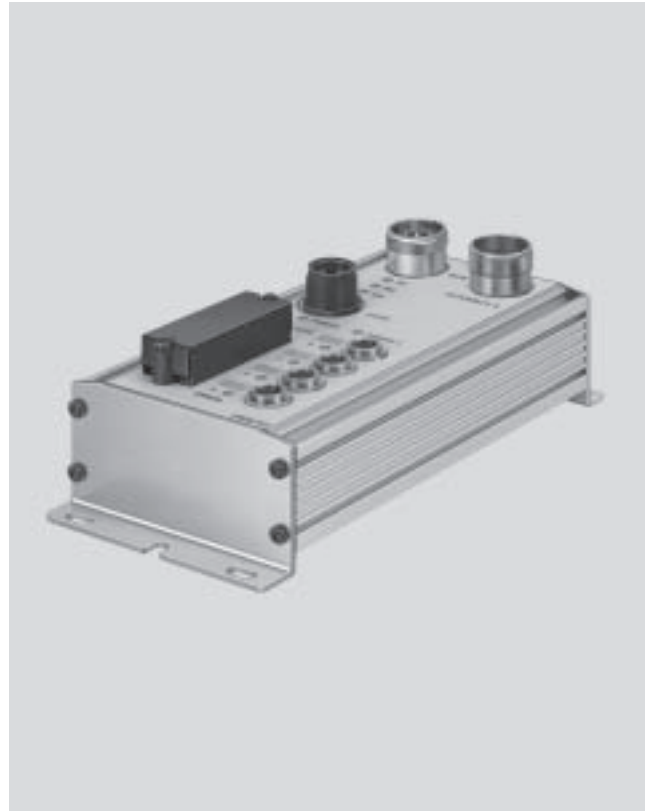
Technical data – Fieldbus node CP-FB06-E



This fieldbus node handles communication between the decentralised CP installation system and a higher-order master. The fieldbus node is a slave station on the fieldbus and represents the I/O data and diagnostic information of the connected CP modules on the network.

For the electrical peripherals, this module provides the separate electrical system supply for

- the electronics modules and sensor supply, and
- the load current of the valves.



## Application

### Bus connection

The bus connection is established via two 9-pin M23 connections with a typical Interbus pin allocation. The plug and socket are labelled with Remote IN and Remote OUT in

accordance with the definition for the Interbus remote bus. Both bus cables are always routed to the fieldbus node and looped through in accordance with the ring structure of the Interbus.

The CP fieldbus node receives the data from the higher-order controller and forwards it to the connected CP valve terminals or electrical output modules. The signal status of the

inputs is requested from the input modules and forwarded to the CP fieldbus nodes.

### Implementation

The FB6 supports the digital input and output modules and the solenoid coils. It can service a total of

64 digital outputs, of which max. 64 can include solenoid coils, and 64 digital inputs.



Note

Please observe the general guidelines regarding addressing when assigning outputs.

# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB06-E

| General technical data                                                                           |                                                                                                                                                                                                   |                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type                                                                                             | CP-FB06-E                                                                                                                                                                                         |                                                                                                                                                            |
| Part No.                                                                                         | 18 225                                                                                                                                                                                            |                                                                                                                                                            |
| Baud rates                                                                                       | 500 kbps                                                                                                                                                                                          |                                                                                                                                                            |
| ID code                                                                                          | 3                                                                                                                                                                                                 |                                                                                                                                                            |
| No. of process data bits                                                                         | 16, 32, 48 or 64 depending on expansion                                                                                                                                                           |                                                                                                                                                            |
| PCP channel                                                                                      | No                                                                                                                                                                                                |                                                                                                                                                            |
| Configuration support                                                                            | Icon file for CMD software<br>Station description file with CMD software                                                                                                                          |                                                                                                                                                            |
| Max. no. of solenoid coils                                                                       | 64                                                                                                                                                                                                |                                                                                                                                                            |
| Max. no. of outputs incl. solenoid coils                                                         | 64                                                                                                                                                                                                |                                                                                                                                                            |
| Max. no. of inputs                                                                               | 64                                                                                                                                                                                                |                                                                                                                                                            |
| LED diagnostic displays                                                                          | Power                                                                                                                                                                                             | Power supply indicator for internal electronics                                                                                                            |
|                                                                                                  | Power V                                                                                                                                                                                           | Power supply indicator for valves                                                                                                                          |
|                                                                                                  | 0...3                                                                                                                                                                                             | CP string LED                                                                                                                                              |
|                                                                                                  | RC                                                                                                                                                                                                | Remotebus check                                                                                                                                            |
|                                                                                                  | BA                                                                                                                                                                                                | Bus active                                                                                                                                                 |
|                                                                                                  | RD                                                                                                                                                                                                | Remotebus disable                                                                                                                                          |
| Device-specific diagnostics transmitted to the controller as common message (peripherals errors) | <ul style="list-style-type: none"> <li>■ Short circuit/overload, outputs</li> <li>■ Undervoltage of valves</li> <li>■ Undervoltage of outputs</li> <li>■ Undervoltage of sensor supply</li> </ul> |                                                                                                                                                            |
| Additional functions                                                                             | Test routine for checking the valves and outputs without bus communication                                                                                                                        |                                                                                                                                                            |
| Operating voltage                                                                                | Nominal value                                                                                                                                                                                     | 24 V DC polarity-safe                                                                                                                                      |
|                                                                                                  | Permissible range                                                                                                                                                                                 | 20.4 ... 26.4 V                                                                                                                                            |
|                                                                                                  | Power failure buffering                                                                                                                                                                           | 20 ms                                                                                                                                                      |
| Current consumption pin 1                                                                        | Fieldbus node                                                                                                                                                                                     | 250 mA                                                                                                                                                     |
|                                                                                                  | CP modules                                                                                                                                                                                        | 560 mA (internal electronics) + total current consumption of inputs                                                                                        |
| Current limiting                                                                                 | Electronics of fieldbus node and CP connection                                                                                                                                                    | Max. 1.25 A, short circuit proof                                                                                                                           |
| Load voltage pin 2                                                                               | Solenoid valves                                                                                                                                                                                   | Total of all valves switched simultaneously, see technical data on CP valves<br>➔ 4 / 2.1-2 and 4 / 2.1-80 Compact Performance valve terminals CPV and CPA |
| Current limiting                                                                                 | Supply for solenoid valves                                                                                                                                                                        | Max. 2.5 A, fused                                                                                                                                          |
| Protection class to EN 60 529                                                                    | IP65                                                                                                                                                                                              |                                                                                                                                                            |
| Temperature range                                                                                | Operation                                                                                                                                                                                         | -5 ... +50 °C                                                                                                                                              |
|                                                                                                  | Storage                                                                                                                                                                                           | -20 ... +70 °C                                                                                                                                             |
| Materials                                                                                        | Housing                                                                                                                                                                                           | Die-cast aluminium                                                                                                                                         |
| Dimensions (LxWxD)                                                                               | 196.4 x 88 x 61.5 mm                                                                                                                                                                              |                                                                                                                                                            |
| Weight                                                                                           | 915 g                                                                                                                                                                                             |                                                                                                                                                            |

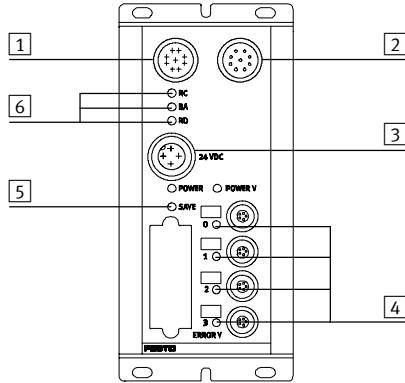


# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB06-E

## Connection and display components

The following connection and display components can be found on the bus node cover:



- 1 Remote bus incoming
- 2 Remote bus outgoing
- 3 Voltage supply connection
- 4 String LEDs
- 5 Save key
- 6 Interbus-specific LEDs

## Pin allocation for the INTERBUS interface, non-floating installation remote bus


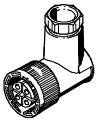
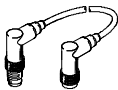
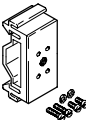

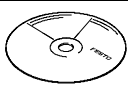
| Terminal allocation | Pin No. <sup>1)</sup> | Signal    | Designation                                     |
|---------------------|-----------------------|-----------|-------------------------------------------------|
| <b>Incoming</b>     |                       |           |                                                 |
| Plug view<br>       | 1                     | DO        | Data out                                        |
|                     | 2                     | /DO       | Data out inverse                                |
|                     | 3                     | DI        | Data in                                         |
|                     | 4                     | /DI       | Data in inverse                                 |
|                     | 5                     | Ground    | Reference conductor                             |
|                     | 6                     | FE        | Functional earthing for installation remote bus |
|                     | 7                     | +24 V     | Installation remote bus supply                  |
|                     | 8                     | +0 V      | Installation remote bus supply                  |
|                     | Sleeve                | Screen    | Screening                                       |
| <b>Outgoing</b>     |                       |           |                                                 |
| Socket view<br>     | 1                     | DO        | Data out                                        |
|                     | 2                     | /DO       | Data out inverse                                |
|                     | 3                     | DI        | Data in                                         |
|                     | 4                     | /DI       | Data in inverse                                 |
|                     | 5                     | Ground    | Reference conductor                             |
|                     | 6                     | FE        | Functional earthing for installation remote bus |
|                     | 7                     | +24 V     | Installation remote bus supply                  |
|                     | 8                     | +0 V      | Installation remote bus supply                  |
|                     | 9                     | RBST      | Establish bridge to pin 5                       |
| Sleeve              | Screen                | Screening |                                                 |

1) Pins not listed here must not be connected.

# Electrical installation system, for CPV/CPA

FESTO

Accessories – Fieldbus node CP-FB06-E

| Ordering data                                                                       |                                         |                              |                     |          |
|-------------------------------------------------------------------------------------|-----------------------------------------|------------------------------|---------------------|----------|
| Designation                                                                         |                                         |                              | Type                | Part No. |
| <b>Power supply</b>                                                                 |                                         |                              |                     |          |
|    | Power supply socket, straight           | for 1.5 mm <sup>2</sup>      | NTSD-GD-9           | 18 493   |
|                                                                                     |                                         | for 2.5 mm <sup>2</sup>      | NTSD-GD-13,5        | 18 526   |
|    | Power supply socket, angled             | for 1.5 mm <sup>2</sup>      | NTSD-WD-9           | 18 527   |
|                                                                                     |                                         | for 2.5 mm <sup>2</sup>      | NTSD-WD-11          | 533 119  |
| <b>Valve terminal connection</b>                                                    |                                         |                              |                     |          |
|    | Connecting cable WS-WD                  | 0.5 m                        | KVI-CP-1-WS-WD-0,5  | 178 564  |
|                                                                                     |                                         | 2 m                          | KVI-CP-1-WS-WD-2    | 163 139  |
|                                                                                     |                                         | 5 m                          | KVI-CP-1-WS-WD-5    | 163 138  |
|                                                                                     | Connecting cable GS-WD                  | 5 m                          | KVI-CP-1-GS-WD-5    | 163 137  |
|                                                                                     |                                         | 8 m                          | KVI-CP-1-GS-WD-8    | 163 136  |
|                                                                                     | Connecting cable GS-GD                  | 2 m, for chain link trunking | KVI-CP-2-GS-GD-2    | 170 234  |
|                                                                                     |                                         | 5 m, for chain link trunking | KVI-CP-2-GS-GD-5    | 170 235  |
|                                                                                     |                                         | 8 m, for chain link trunking | KVI-CP-2-GS-GD-8    | 165 616  |
| <b>Mounting</b>                                                                     |                                         |                              |                     |          |
|  | Mounting, for H-rail                    |                              | CP-TS-HS35          | 170 169  |
| <b>User documentation</b>                                                           |                                         |                              |                     |          |
|  | User documentation – Bus node CP-FB06-E | German                       | P.BE-CP-FB6-E-DE    | 165 106  |
|                                                                                     |                                         | English                      | P.BE-CP-FB6-E-EN    | 165 206  |
|                                                                                     |                                         | French                       | P.BE-CP-FB6-E-FR    | 165 136  |
|                                                                                     |                                         | Italian                      | P.BE-CP-FB6-E-IT    | 165 166  |
|                                                                                     |                                         | Spanish                      | P.BE-CP-FB6-E-ES    | 165 236  |
|                                                                                     |                                         | Swedish                      | P.BE-CP-FB6-E-SV    | 165 266  |
| <b>Software</b>                                                                     |                                         |                              |                     |          |
|  | CD-ROM                                  | Valve terminals              | P.CD-VALVE-T        | 183 350  |
|                                                                                     |                                         | Utilities                    | P.CD-VI-UTILITIES-2 | 533 500  |

# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB08-03

FESTO



This fieldbus node handles communication between the decentralised CP installation system and a higher-order master. The fieldbus node is a slave station on the fieldbus and represents the I/O data and diagnostic information of the connected CP modules on the network.

For the electrical peripherals, this module provides the separate electrical system supply for

- the electronics modules and sensor supply, and
- the load current of the valves.

CP outputs are supplied on a decentralised basis.  
 The FB8 fieldbus node supports the 1771 Remote I/O fieldbus from Allen-Bradley/Rockwell Automation.

- 1771 Remote I/O



## Application

**Bus connection**

The FB8 node has 2 M12 plugs with 4 connections for connecting to the Remote interface. The two plugs are connected internally, so that either a branch line installation can be performed with one cable, or 2 cables can be routed to the node, connected to the two plugs and looped through.

## Implementation

The FB8 supports the digital input and output modules and the solenoid coils. It can service a total of 64 digital outputs, of which max. 64 can include solenoid coils, and 64 digital inputs. No other type 03 modules (I/Os) or valves can be connected.

**Note**  
 Please observe the general guidelines on I/O addressing when assigning the outputs.

# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB08-03

**FESTO**

| General technical data                   |                                                                                                                                                            |                                                                               |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Type                                     | CP-FB08-03                                                                                                                                                 |                                                                               |
| Part No.                                 | 18 240                                                                                                                                                     |                                                                               |
| Combination with analogue modules        | No                                                                                                                                                         |                                                                               |
| Combination with AS-interface master     | No                                                                                                                                                         |                                                                               |
| Baud rates                               | Set using HW switch<br><ul style="list-style-type: none"> <li>■ 57.6 kbps</li> <li>■ 115.2 kbps</li> <li>■ 230.4 kbps</li> </ul>                           |                                                                               |
| Addressing range                         | The maximum rack number and I/O group depends on the controller connected.<br>With PLC-3 up to rack no. 30 group 4/5.                                      |                                                                               |
| Emulated product                         | Remote Rack<br>Quarter rack or half rack                                                                                                                   |                                                                               |
| Configuration support                    | Automatic configuration as a quarter or half rack                                                                                                          |                                                                               |
| Max. no. of solenoid coils               | 64                                                                                                                                                         |                                                                               |
| Max. no. of outputs incl. solenoid coils | 64                                                                                                                                                         |                                                                               |
| Max. no. of inputs                       | 64                                                                                                                                                         |                                                                               |
| LED diagnostic indicators                | Power                                                                                                                                                      | Operating status                                                              |
|                                          | Bus                                                                                                                                                        | Error status                                                                  |
|                                          | 0...3                                                                                                                                                      | CP string LED                                                                 |
| Operating voltage pin 1                  | Nominal value                                                                                                                                              | 24 V DC polarity-safe                                                         |
|                                          | Permissible range                                                                                                                                          | 18 ... 30 V                                                                   |
|                                          | Power failure buffering                                                                                                                                    | 20 ms                                                                         |
| Current consumption pin 1                | Fieldbus node                                                                                                                                              | 200 mA                                                                        |
|                                          | CP module                                                                                                                                                  | 560 mA (internal electronics) + total current consumption of inputs, internal |
| Load voltage pin 2                       | Nominal value                                                                                                                                              | 24 V DC                                                                       |
|                                          | Valves                                                                                                                                                     | 20.4 ... 26.4 V                                                               |
| Current consumption pin 2                | Total of all valves switched simultaneously, see technical data on CP valves<br>➔ 4 / 2.1-2 and 4 / 2.1-80 Compact Performance valve terminals CPV and CPA |                                                                               |
| Protection class to EN 60 529            | IP65                                                                                                                                                       |                                                                               |
| Temperature range                        | Operation                                                                                                                                                  | -5 ... +50 °C                                                                 |
|                                          | Storage                                                                                                                                                    | -20 ... +70 °C                                                                |
| Materials                                | Housing                                                                                                                                                    | Die-cast aluminium                                                            |
|                                          | Cover                                                                                                                                                      | Polyamide                                                                     |
| Dimensions <sup>1)</sup> (LxWxD)         | 162 x 118.7 x 132 mm                                                                                                                                       |                                                                               |
| Grid dimension                           | 72 mm                                                                                                                                                      |                                                                               |
| Weight                                   | 1550 g                                                                                                                                                     |                                                                               |

1) Consisting of bus node, CP interface as well as left and right end plate

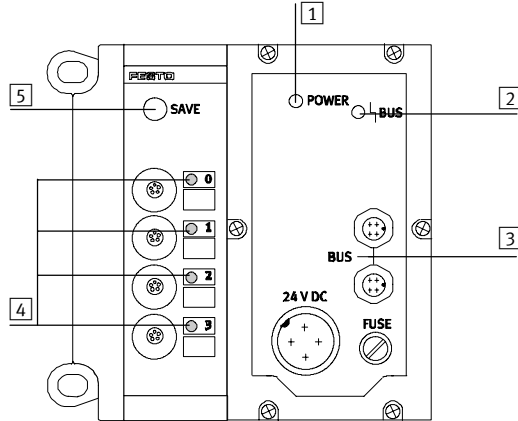
# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB08-03



## Connection and display components

The following connection and display components can be found on the bus node cover:



- 1 Red LED for operating voltage
- 2 Green LED for error on bus
- 3 RIO interface
- 4 String LEDs
- 5 Save key

## Pin allocation for RIO interface


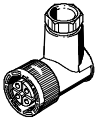


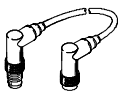
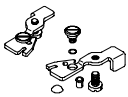
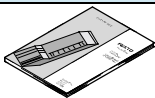
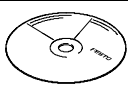
Terminal allocation

| Terminal allocation | Pin No.  | Signal          |
|---------------------|----------|-----------------|
|                     | 1 Plug 1 | 1 S+/Bus2       |
|                     |          | 2 n.c.          |
|                     |          | 3 S-/Bus2       |
|                     |          | 4 Screen/shield |
|                     | 2 Plug 2 | 1 S+/Bus1       |
|                     |          | 2 n.c.          |
|                     |          | 3 S-/Bus21      |
|                     |          | 4 Screen/shield |
| 3 Internal network  |          |                 |
| 4 Housing/node      |          |                 |

# Electrical installation system, for CPV/CPA

Accessories – Fieldbus node CP-FB08-03

**FESTO**

| Ordering data                                                                       |                                          |                              |                     |          |
|-------------------------------------------------------------------------------------|------------------------------------------|------------------------------|---------------------|----------|
| Designation                                                                         |                                          |                              | Type                | Part No. |
| <b>Power supply</b>                                                                 |                                          |                              |                     |          |
|    | Power supply socket, straight            | for 1.5 mm <sup>2</sup>      | NTSD-GD-9           | 18 493   |
|                                                                                     |                                          | for 2.5 mm <sup>2</sup>      | NTSD-GD-13,5        | 18 526   |
|    | Power supply socket, angled              | for 1.5 mm <sup>2</sup>      | NTSD-WD-9           | 18 527   |
|                                                                                     |                                          | for 2.5 mm <sup>2</sup>      | NTSD-WD-11          | 533 119  |
| <b>Fieldbus connection</b>                                                          |                                          |                              |                     |          |
|    | Bus connection, straight                 | PG7                          | FBSD-GD-7           | 18 497   |
|                                                                                     |                                          | PG9                          | FBSD-GD-9           | 18 495   |
|                                                                                     |                                          | PG13.5                       | FBSD-GD-13,5        | 18 496   |
|    | Bus connection, angled                   | PG7                          | FBSD-WD-7           | 18 524   |
|                                                                                     |                                          | PG9                          | FBSD-WD-9           | 18 525   |
| <b>Valve terminal connection</b>                                                    |                                          |                              |                     |          |
|  | Connecting cable WS-WD                   | 0.5 m                        | KVI-CP-1-WS-WD-0,5  | 178 564  |
|                                                                                     |                                          | 2 m                          | KVI-CP-1-WS-WD-2    | 163 139  |
|                                                                                     |                                          | 5 m                          | KVI-CP-1-WS-WD-5    | 163 138  |
|                                                                                     | Connecting cable GS-WD                   | 5 m                          | KVI-CP-1-GS-WD-5    | 163 137  |
|                                                                                     |                                          | 8 m                          | KVI-CP-1-GS-WD-8    | 163 136  |
|                                                                                     | Connecting cable GS-GD                   | 2 m, for chain link trunking | KVI-CP-2-GS-GD-2    | 170 234  |
|                                                                                     |                                          | 5 m, for chain link trunking | KVI-CP-2-GS-GD-5    | 170 235  |
|                                                                                     |                                          | 8 m, for chain link trunking | KVI-CP-2-GS-GD-8    | 165 616  |
| <b>Mounting</b>                                                                     |                                          |                              |                     |          |
|  | Mounting, for H-rail                     |                              | IBGH-03-4,0         | 18 649   |
| <b>User documentation</b>                                                           |                                          |                              |                     |          |
|  | User documentation – Bus node CP-FB08-03 | German                       | P.BE-CP-FB08-03-DE  | 165 108  |
|                                                                                     |                                          | English                      | P.BE-CP-FB08-03-EN  | 165 208  |
|                                                                                     |                                          | French                       | P.BE-CP-FB08-03-FR  | 165 138  |
|                                                                                     |                                          | Italian                      | P.BE-CP-FB08-03-IT  | 165 168  |
|                                                                                     |                                          | Spanish                      | P.BE-CP-FB08-03-ES  | 165 238  |
|                                                                                     |                                          | Swedish                      | P.BE-CP-FB08-03-SV  | 165 268  |
| <b>Software</b>                                                                     |                                          |                              |                     |          |
|  | CD-ROM                                   | Valve terminals              | P.CD-VALVE-T        | 183 350  |
|                                                                                     |                                          | Utilities                    | P.CD-VI-UTILITIES-2 | 533 500  |

# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB11-E

## DeviceNet

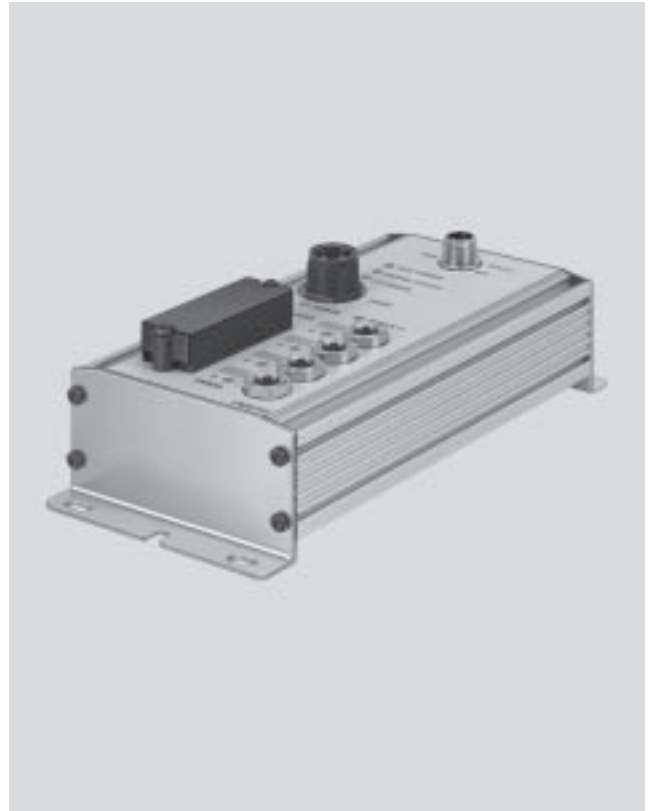
This fieldbus node handles communication between the decentralised CP installation system and a higher-order master. The fieldbus node is a slave station on the fieldbus and represents the I/O data and diagnostic information of the connected CP modules on the network.

For the electrical peripherals, this module provides the separate electrical system supply for

- the electronics modules and sensor supply, and
- the load current of the valves.

The FB11 fieldbus node supports the CAN-based fieldbus protocol DeviceNet.

- DeviceNet



### Application

#### Bus connection

The DeviceNet connection is established via a 5-pin M12 plug with pins that corresponds to the specific mini connector. A DeviceNet installation with a higher degree of protection is typically laid using main

and branch lines that are connected via T-pieces. Various manufacturers such as Turck, Lumberg and Rockwell offer finished cables and terminating resistors. The terminating resistors are attached to

the two outermost T-pieces. This installation technique keeps the bus closed while a bus station is being removed. Provides detailed diagnosis, information about status bits for the master controller.

### Implementation

The FB11 supports the digital input and output modules.

It can service a total of 64 digital inputs and 64 digital outputs, of which max. 64 can include solenoid coils.



Note

Please observe the general guidelines on I/O addressing when assigning the outputs.

# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB11-E



| General technical data                    |                                                                                                                                                                                                                                           |                                                                                                                                                            |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type                                      | CP-FB11-E                                                                                                                                                                                                                                 |                                                                                                                                                            |
| Part No.                                  | 18 227                                                                                                                                                                                                                                    |                                                                                                                                                            |
| Baud rates                                | Set using HW switch<br><ul style="list-style-type: none"> <li>■ 125 kbps</li> <li>■ 250 kbps</li> <li>■ 500 kbps</li> </ul>                                                                                                               |                                                                                                                                                            |
| Addressing range                          | Set using 2 rotary switches<br>0 ... 63                                                                                                                                                                                                   |                                                                                                                                                            |
| Product type                              | Communication converter (12 dec.)                                                                                                                                                                                                         |                                                                                                                                                            |
| Product code                              | 2282 hex./35050 dec.                                                                                                                                                                                                                      |                                                                                                                                                            |
| Type of communication                     | Polling/Cos/Bit Strobe                                                                                                                                                                                                                    |                                                                                                                                                            |
| Configuration support                     | EDS file and graphics symbol                                                                                                                                                                                                              |                                                                                                                                                            |
| Max. no. of solenoid coils                | 64                                                                                                                                                                                                                                        |                                                                                                                                                            |
| Max. no. of outputs and solenoid coils    | 64                                                                                                                                                                                                                                        |                                                                                                                                                            |
| Max. no. of inputs                        | 64                                                                                                                                                                                                                                        |                                                                                                                                                            |
| LED diagnostic displays                   | Bus/Power                                                                                                                                                                                                                                 | Operating voltage of bus                                                                                                                                   |
|                                           | Module status                                                                                                                                                                                                                             | Operating status                                                                                                                                           |
|                                           | I/O Error                                                                                                                                                                                                                                 | Internal error                                                                                                                                             |
| Device-specific diagnostics via DeviceNet | <ul style="list-style-type: none"> <li>■ Short circuit/overload, outputs</li> <li>■ Undervoltage of valves</li> <li>■ Undervoltage of outputs</li> <li>■ Undervoltage of sensor supply</li> <li>■ Interrupt point on CP string</li> </ul> |                                                                                                                                                            |
| Operating voltage                         | Nominal value                                                                                                                                                                                                                             | 24 V DC polarity-safe                                                                                                                                      |
|                                           | Permissible range                                                                                                                                                                                                                         | 20.4 ... 26.4 V                                                                                                                                            |
|                                           | Power failure buffering                                                                                                                                                                                                                   | 20 ms                                                                                                                                                      |
| Current consumption pin 1                 | Fieldbus node                                                                                                                                                                                                                             | 250 mA                                                                                                                                                     |
|                                           | CP module                                                                                                                                                                                                                                 | 560 mA (internal electronics) + total current consumption of inputs, internal                                                                              |
| Current limiting                          | Electronics of fieldbus node and CP connection                                                                                                                                                                                            | Max. 1.25 A, short circuit proof                                                                                                                           |
| Current consumption pin 2                 | Solenoid valves                                                                                                                                                                                                                           | Total of all valves switched simultaneously, see technical data on CP valves<br>→ 4 / 2.1-2 and 4 / 2.1-80 Compact Performance valve terminals CPV and CPA |
| Protection class to EN 60 529             | IP65                                                                                                                                                                                                                                      |                                                                                                                                                            |
| Temperature range                         | Operation                                                                                                                                                                                                                                 | -5 ... +50 °C                                                                                                                                              |
|                                           | Storage/transport                                                                                                                                                                                                                         | -20 ... +70 °C                                                                                                                                             |
| Materials                                 | Housing                                                                                                                                                                                                                                   | Die-cast aluminium                                                                                                                                         |
| Dimensions (HxWxD)                        | 196.4 x 88 x 61.5 mm                                                                                                                                                                                                                      |                                                                                                                                                            |
| Grid dimension                            | 72 mm                                                                                                                                                                                                                                     |                                                                                                                                                            |
| Weight                                    | 950 g                                                                                                                                                                                                                                     |                                                                                                                                                            |

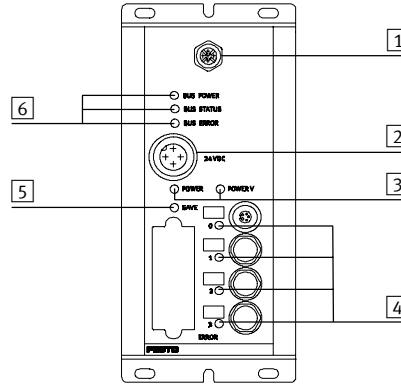


# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB11-E

## Connection and display components

The following connection and display components can be found on the bus node cover:



- 1** Plug for fieldbus cable
- 2** Operating voltage connection for CP and valves
- 3** Operating voltage LEDs
- 4** String LEDs
- 5** Save key
- 6** Bus status LEDs

## Pin allocation for fieldbus interface


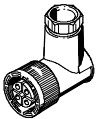

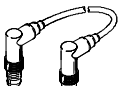
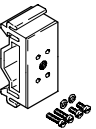
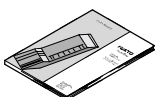

Terminal allocation

| Terminal allocation                                          | Pin No.       | Signal      |
|--------------------------------------------------------------|---------------|-------------|
|                                                              | <b>1</b> Plug | 1 Screen    |
|                                                              |               | 2 +24 V bus |
|                                                              |               | 3 GND Bus   |
|                                                              |               | 4 Data+     |
|                                                              |               | 5 Data-     |
| <b>2</b> Housing of the fieldbus connection module PE        |               |             |
| <b>3</b> Internal screening connection in the valve terminal |               |             |

# Electrical installation system, for CPV/CPA

FESTO

Accessories – Fieldbus node CP-FB11-E

| Ordering data                                                                       |                                         |                              |                     |          |
|-------------------------------------------------------------------------------------|-----------------------------------------|------------------------------|---------------------|----------|
| Designation                                                                         |                                         |                              | Type                | Part No. |
| <b>Power supply</b>                                                                 |                                         |                              |                     |          |
|    | Power supply socket, straight           | for 1.5 mm <sup>2</sup>      | NTSD-GD-9           | 18 493   |
|                                                                                     |                                         | for 2.5 mm <sup>2</sup>      | NTSD-GD-13,5        | 18 526   |
|    | Power supply socket, angled             | for 1.5 mm <sup>2</sup>      | NTSD-WD-9           | 18 527   |
|                                                                                     |                                         | for 2.5 mm <sup>2</sup>      | NTSD-WD-11          | 533 119  |
| <b>Fieldbus connection</b>                                                          |                                         |                              |                     |          |
|    | Bus connection, straight, PG9, 5-pin    |                              | FBSD-GD-9-5POL      | 18 324   |
| <b>Valve terminal connection</b>                                                    |                                         |                              |                     |          |
|    | Connecting cable WS-WD                  | 0.5 m                        | KVI-CP-1-WS-WD-0,5  | 178 564  |
|                                                                                     |                                         | 2 m                          | KVI-CP-1-WS-WD-2    | 163 139  |
|                                                                                     |                                         | 5 m                          | KVI-CP-1-WS-WD-5    | 163 138  |
|                                                                                     | Connecting cable GS-WD                  | 5 m                          | KVI-CP-1-GS-WD-5    | 163 137  |
|                                                                                     |                                         | 8 m                          | KVI-CP-1-GS-WD-8    | 163 136  |
|                                                                                     | Connecting cable GS-GD                  | 2 m, for chain link trunking | KVI-CP-2-GS-GD-2    | 170 234  |
|                                                                                     |                                         | 5 m, for chain link trunking | KVI-CP-2-GS-GD-5    | 170 235  |
|                                                                                     |                                         | 8 m, for chain link trunking | KVI-CP-2-GS-GD-8    | 165 616  |
| <b>Mounting</b>                                                                     |                                         |                              |                     |          |
|  | Mounting, for H-rail                    |                              | CP-TS-HS35          | 170 169  |
| <b>User documentation</b>                                                           |                                         |                              |                     |          |
|  | User documentation – Bus node CP-FB11-E | German                       | P.BE-CP-FB11-E-DE   | 165 111  |
|                                                                                     |                                         | English                      | P.BE-CP-FB11-E-EN   | 165 211  |
|                                                                                     |                                         | French                       | P.BE-CP-FB11-E-FR   | 165 141  |
|                                                                                     |                                         | Italian                      | P.BE-CP-FB11-E-IT   | 165 171  |
|                                                                                     |                                         | Spanish                      | P.BE-CP-FB11-E-ES   | 165 241  |
|                                                                                     |                                         | Swedish                      | P.BE-CP-FB11-E-SV   | 165 271  |
| <b>Software</b>                                                                     |                                         |                              |                     |          |
|  | CD-ROM                                  | Valve terminals              | P.CD-VALVE-T        | 183 350  |
|                                                                                     |                                         | Utilities                    | P.CD-VI-UTILITIES-2 | 533 500  |

# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB13-E

FESTO



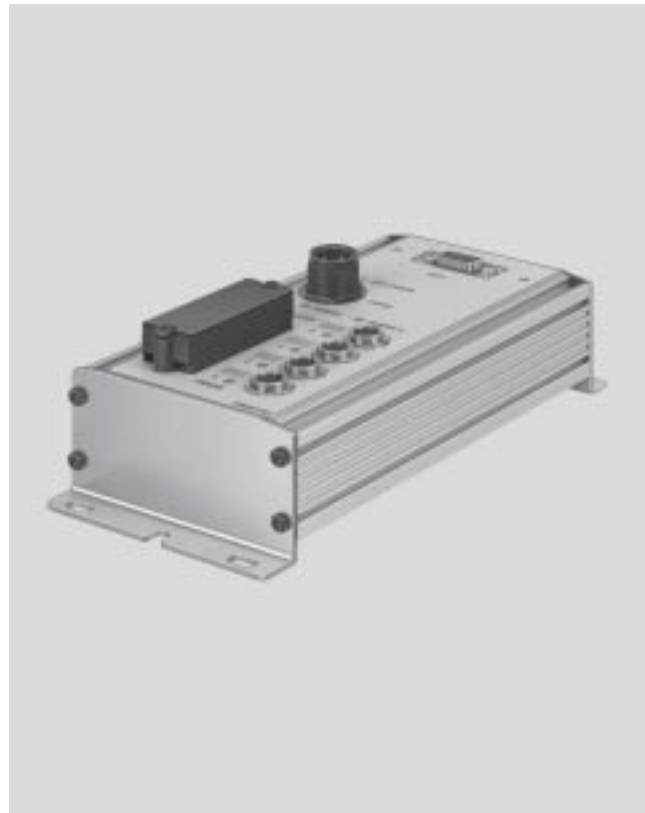
This fieldbus node handles communication between the decentralised CP installation system and a higher-order master via Profibus DP. The fieldbus node is a slave station on the fieldbus and represents the I/O data and diagnostic information of the connected CP modules on the network.

For the electrical peripherals, this module provides the separate electrical system supply for

- the electronics modules and sensor supply, and
- the load current of the valves.

The status of the voltage supplies and the bus communication is indicated via the LEDs Power, Power Valves, String Error and Bus Error.

- Profibus DP



Fieldbus systems/electrical peripherals  
CP installation system

4.6

## Application

### Bus connection

The bus connection is established via a 9-pin Sub-D socket with a typical Profibus allocation (to EN 50 170). The bus connector plug (with protection class IP65 from Festo or IP20

from other manufacturers) facilitates the connection of an incoming and an outgoing bus cable. An active bus terminal can be connected using the integrated DIL switch. The Sub-D

interface is designed for the control of network components via a fibre optic cable connection and provides detailed diagnostic information for master detection.



Note

Alternatively the bus connection can be established via a 2x M12 adapter plug (B-coded).

## Implementation

The FB13 supports digital input and output modules and solenoid coils. 64 digital outputs in total, of which max. 64 solenoid coils. Max. 64 digital inputs for recording sensor signals.



Note

When assigning the electrical modules, please observe the configuration guidelines for valve terminals in relation to address allocation and the number of occupied module positions.

# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB13-E



| General technical data                      |                                                                                                                                                                                                                                            |                                                                                                                                                            |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type                                        | CP-FB13-E                                                                                                                                                                                                                                  |                                                                                                                                                            |
| Part No.                                    | 174 337                                                                                                                                                                                                                                    |                                                                                                                                                            |
| Baud rates                                  | Automatic detection<br>9.6 kBaud ... 12 MBaud                                                                                                                                                                                              |                                                                                                                                                            |
| Addressing range                            | Set using 2 DIL switches<br>1 ... 125                                                                                                                                                                                                      |                                                                                                                                                            |
| Product family                              | 4: Valves                                                                                                                                                                                                                                  |                                                                                                                                                            |
| Ident. number                               | 0xFB13                                                                                                                                                                                                                                     |                                                                                                                                                            |
| Type of communication                       | Cyclic communication                                                                                                                                                                                                                       |                                                                                                                                                            |
| Configuration support                       | GSD file and bitmaps                                                                                                                                                                                                                       |                                                                                                                                                            |
| Max. no. of solenoid coils                  | 64                                                                                                                                                                                                                                         |                                                                                                                                                            |
| Max. no. of outputs and solenoid coils      | 64                                                                                                                                                                                                                                         |                                                                                                                                                            |
| Max. no. of inputs                          | 64                                                                                                                                                                                                                                         |                                                                                                                                                            |
| LED diagnostic displays                     | Power                                                                                                                                                                                                                                      | Operating voltage of electronics                                                                                                                           |
|                                             | Power V                                                                                                                                                                                                                                    | Operating voltage of valves and outputs                                                                                                                    |
|                                             | Bus Error                                                                                                                                                                                                                                  | Communication error                                                                                                                                        |
|                                             | 0...3                                                                                                                                                                                                                                      | CP string                                                                                                                                                  |
| Device-specific diagnostics via Profibus DP | <ul style="list-style-type: none"> <li>■ Short circuit/overload, outputs</li> <li>■ Undervoltage of valves</li> <li>■ Undervoltage of outputs</li> <li>■ Undervoltage of sensor supply</li> <li>■ Interrupt points on CP string</li> </ul> |                                                                                                                                                            |
| Additional functions                        | <ul style="list-style-type: none"> <li>■ Test routine for checking the valves and outputs without bus communication</li> </ul>                                                                                                             |                                                                                                                                                            |
| Operating voltage                           | Nominal value                                                                                                                                                                                                                              | 24 V DC polarity-safe                                                                                                                                      |
|                                             | Permissible range                                                                                                                                                                                                                          | 20.4 ... 26.4 V                                                                                                                                            |
|                                             | Power failure buffering                                                                                                                                                                                                                    | 20 ms                                                                                                                                                      |
| Current consumption pin 1                   | Fieldbus node                                                                                                                                                                                                                              | 250 mA                                                                                                                                                     |
|                                             | CP module                                                                                                                                                                                                                                  | 560 mA (internal electronics) + total current consumption of inputs, internal                                                                              |
| Current limiting                            | Electronics of fieldbus node and CP connection                                                                                                                                                                                             | Max. 1.25 A, short circuit proof                                                                                                                           |
| Current consumption pin 2                   | Solenoid valves                                                                                                                                                                                                                            | Total of all valves switched simultaneously, see technical data on CP valves<br>➔ 4 / 2.1-2 and 4 / 2.1-80 Compact Performance valve terminals CPV and CPA |
| Current limiting                            | Supply for solenoid valves                                                                                                                                                                                                                 | Max. 2.5 A, fused                                                                                                                                          |
| Protection class to EN 60 529               | IP65                                                                                                                                                                                                                                       |                                                                                                                                                            |
| Temperature range                           | Operation                                                                                                                                                                                                                                  | -5 ... +50 °C                                                                                                                                              |
|                                             | Storage/transport                                                                                                                                                                                                                          | -20 ... +70 °C                                                                                                                                             |
| Materials                                   | Housing                                                                                                                                                                                                                                    | Die-cast aluminium                                                                                                                                         |
| Dimensions (LxWxD)                          | 196.4 x 88 x 61.5 mm                                                                                                                                                                                                                       |                                                                                                                                                            |
| Grid dimension                              | 72 mm                                                                                                                                                                                                                                      |                                                                                                                                                            |
| Weight                                      | 925 g                                                                                                                                                                                                                                      |                                                                                                                                                            |

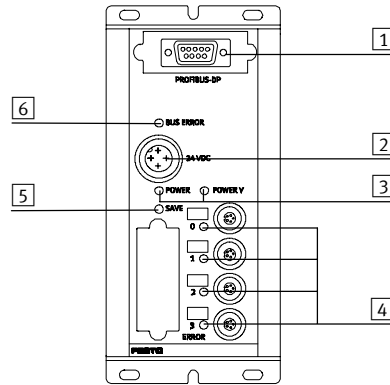
# Electrical installation system, for CPV/CPA

Technical data – Fieldbus node CP-FB13-E


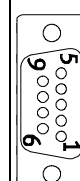

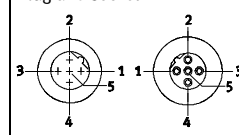


## Connection and display components

The following connection and display components can be found on the bus node cover:



- 1 Plug for fieldbus cable
- 2 Operating voltage connection for CP and valves
- 3 Operating voltage LEDs
- 4 String LEDs
- 5 Save key
- 6 Bus-specific LED


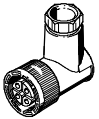
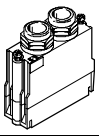

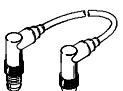

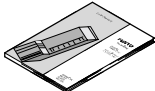
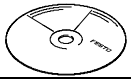
| Pin allocation for Profibus DP interface                                            |                                                                                                        |         |                      |                                |                                |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------|----------------------|--------------------------------|--------------------------------|
|                                                                                     | Terminal allocation                                                                                    | Pin No. | Signal               | Designation                    |                                |
| <b>Plug Sub-D</b>                                                                   |                                                                                                        |         |                      |                                |                                |
|   | Socket side view<br> | 1       | n.c.                 | Not connected                  |                                |
|                                                                                     |                                                                                                        | 2       | n.c.                 | Not connected                  |                                |
|                                                                                     |                                                                                                        | 3       | RxD/TxD-P            | Received/transmitted data P    |                                |
|                                                                                     |                                                                                                        | 4       | CNTR-P <sup>1)</sup> | Repeater control signal        |                                |
|                                                                                     |                                                                                                        | 5       | DGND                 | Data reference potential (M5V) |                                |
|                                                                                     |                                                                                                        | 6       | VP                   | Supply voltage (P5V)           |                                |
|                                                                                     |                                                                                                        | 7       | n.c.                 | Not connected                  |                                |
|                                                                                     |                                                                                                        | 8       | RxD/TxD-N            | Received/transmitted data N    |                                |
|                                                                                     |                                                                                                        | 9       | n.c.                 | Not connected                  |                                |
|                                                                                     |                                                                                                        | Housing | Screen               | Connection to housing          |                                |
| <b>Bus connection M12 adapter plug (B-coded)</b>                                    |                                                                                                        |         |                      |                                |                                |
|  | Plug and socket<br> | Plug    | 1                    | n.c.                           | Not connected                  |
|                                                                                     |                                                                                                        |         | 2                    | RxD/TxD-N                      | Received/transmitted data N    |
|                                                                                     |                                                                                                        |         | 3                    | n.c.                           | Not connected                  |
|                                                                                     |                                                                                                        |         | 4                    | RxD/TxD-P                      | Received/transmitted data P    |
|                                                                                     |                                                                                                        |         | 5 and M12            | Screen                         | Connection to FE               |
|                                                                                     |                                                                                                        | Socket  | 1                    | VP                             | Supply voltage (P5V)           |
|                                                                                     |                                                                                                        |         | 2                    | RxD/TxD-N                      | Received/transmitted data N    |
|                                                                                     |                                                                                                        |         | 3                    | DGND                           | Data reference potential (M5V) |
|                                                                                     |                                                                                                        |         | 4                    | RxD/TxD-P                      | Received/transmitted data P    |
|                                                                                     |                                                                                                        |         | 5 and M12            | Screen                         | Connection to FE               |

1) The repeater control signal CNTR-P is realised as a TTL signal.

# Electrical installation system, for CPV/CPA

Accessories – Fieldbus node CP-FB13-E

**FESTO**

| Ordering data                                                                       |                                                              |                              |                     |          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------|------------------------------|---------------------|----------|
| Designation                                                                         |                                                              |                              | Type                | Part No. |
| <b>Power supply</b>                                                                 |                                                              |                              |                     |          |
|    | Power supply socket, straight                                | for 1.5 mm <sup>2</sup>      | NTSD-GD-9           | 18 493   |
|                                                                                     |                                                              | for 2.5 mm <sup>2</sup>      | NTSD-GD-13,5        | 18 526   |
|    | Power supply socket, angled                                  | for 1.5 mm <sup>2</sup>      | NTSD-WD-9           | 18 527   |
|                                                                                     |                                                              | for 2.5 mm <sup>2</sup>      | NTSD-WD-11          | 533 119  |
| <b>Fieldbus connection</b>                                                          |                                                              |                              |                     |          |
|    | Plug Sub-D, for Profibus DP                                  |                              | FBS-SUB-9-GS-DP-B   | 532 216  |
|    | Bus connection 2x M12 adapter plug (B-coded) for Profibus DP |                              | FBA-2-M12-5POL-RK   | 533 118  |
| <b>Valve terminal connection</b>                                                    |                                                              |                              |                     |          |
|  | Connecting cable WS-WD                                       | 0.5 m                        | KVI-CP-1-WS-WD-0,5  | 178 564  |
|                                                                                     |                                                              | 2 m                          | KVI-CP-1-WS-WD-2    | 163 139  |
|                                                                                     |                                                              | 5 m                          | KVI-CP-1-WS-WD-5    | 163 138  |
|                                                                                     | Connecting cable GS-WD                                       | 5 m                          | KVI-CP-1-GS-WD-5    | 163 137  |
|                                                                                     |                                                              | 8 m                          | KVI-CP-1-GS-WD-8    | 163 136  |
|                                                                                     | Connecting cable GS-GD                                       | 2 m, for chain link trunking | KVI-CP-2-GS-GD-2    | 170 234  |
|                                                                                     |                                                              | 5 m, for chain link trunking | KVI-CP-2-GS-GD-5    | 170 235  |
|                                                                                     |                                                              | 8 m, for chain link trunking | KVI-CP-2-GS-GD-8    | 165 616  |
| <b>Mounting</b>                                                                     |                                                              |                              |                     |          |
|  | Mounting, for H-rail                                         |                              | CP-TS-HS35          | 170 169  |
| <b>User documentation</b>                                                           |                                                              |                              |                     |          |
|  | User documentation – Bus node CP-FB13-E                      | German                       | P.BE-CP-FB13-E-DE   | 165 113  |
|                                                                                     |                                                              | English                      | P.BE-CP-FB13-E-EN   | 165 213  |
|                                                                                     |                                                              | French                       | P.BE-CP-FB13-E-FR   | 165 143  |
|                                                                                     |                                                              | Italian                      | P.BE-CP-FB13-E-IT   | 165 173  |
|                                                                                     |                                                              | Swedish                      | P.BE-CP-FB13-E-SV   | 165 273  |
| <b>Software</b>                                                                     |                                                              |                              |                     |          |
|  | CD-ROM                                                       | Valve terminals              | P.CD-VALVE-T        | 183 350  |
|                                                                                     |                                                              | Utilities                    | P.CD-VI-UTILITIES-2 | 533 500  |

## Electrical installation system, for CPV/CPA

Technical data – Control block CP-SB60-03

FESTO



The control block ISB60-03 is an Allen Bradley SLC500 controller, integrated in a sturdy aluminium housing protected to IP65.



### Application

All plugs and electrical connections are designed for direct mounting on the machine (provided that the requirements of IP65 are adhered to). The SLC5/02 processor technology licensed by Rockwell Automation provides computing power which is tailored to the requirements of a fully expanded valve terminal or a CP system. The controller is programmed

using Allen Bradley's standard RSLogix500 programming software. The online connection to the PC is established using the pre-assembled programming cable. The control block SB60 is a highly compact solution; a stand-alone controller for CP valves and CP I/O modules connected via the CP installation system.

The combination of tried and tested technology in the form of pneumatic valves from Festo and controller technology from Allen Bradley produces the most compact function unit for controlling pneumatically driven movements. The elimination of internal wiring to the controller reduces the number of connection points required, thereby shortening the installation time and eliminating sources of potential errors.

The performance of the controller technology was selected and specially customised to meet the requirements of a valve terminal. Extensive diagnostic information stored in the controller's M1 file provides information on the status of all components mounted on the valve terminal as well as the sensors and actuators connected to it. MIDI/MAXI/ISO valves can, like the electrical I/O modules from the range of electrical peripherals type 03/04, be expanded or combined.

# Electrical installation system, for CPV/CPA

Technical data – Control block CP-SB60-03

FESTO

| General technical data                   |                                                                                                                                                                                                                                                                                                                   |                                                                     |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Type                                     | CP-SB60-03                                                                                                                                                                                                                                                                                                        |                                                                     |
| Part No.                                 | 175 412                                                                                                                                                                                                                                                                                                           |                                                                     |
| Processor type                           | SLC5/02                                                                                                                                                                                                                                                                                                           |                                                                     |
| Processor speed                          | 4.8 ms/K                                                                                                                                                                                                                                                                                                          |                                                                     |
| Memory capacity                          | Data words                                                                                                                                                                                                                                                                                                        | 16 K                                                                |
|                                          | Program memory                                                                                                                                                                                                                                                                                                    | 4 K                                                                 |
| No. of programs                          | Main program                                                                                                                                                                                                                                                                                                      | 1                                                                   |
|                                          | Max. subprograms                                                                                                                                                                                                                                                                                                  | 156                                                                 |
| Decentralised outputs via CP interface   | 4 strings, each with 16 outputs                                                                                                                                                                                                                                                                                   |                                                                     |
| Decentralised inputs via CP interface    | 4 strings, each with 16 inputs                                                                                                                                                                                                                                                                                    |                                                                     |
| CPV/CPA valve terminals via CP interface | 4 CPV/CPA valve terminals with max. 16 solenoid coils per terminal                                                                                                                                                                                                                                                |                                                                     |
| LED diagnostic displays                  | Identical to those for SLC5/02 processor                                                                                                                                                                                                                                                                          |                                                                     |
| Device-specific diagnostics              | <ul style="list-style-type: none"> <li>■ Short circuit, electrical output</li> <li>■ Undervoltage of valves</li> <li>■ Undervoltage of electrical outputs</li> <li>■ Undervoltage of sensor supply</li> <li>■ Enhanced CP string diagnostics</li> <li>■ Monitoring of the valve terminal configuration</li> </ul> |                                                                     |
| Operating voltage pin 1                  | Nominal value                                                                                                                                                                                                                                                                                                     | 24 V DC polarity-safe                                               |
|                                          | Permissible range                                                                                                                                                                                                                                                                                                 | 18 ... 30 V                                                         |
|                                          | Power failure buffering                                                                                                                                                                                                                                                                                           | 20 ms                                                               |
| Current consumption pin 1                | Control block                                                                                                                                                                                                                                                                                                     | 200 mA                                                              |
|                                          | CP modules                                                                                                                                                                                                                                                                                                        | 560 mA (internal electronics) + total current consumption of inputs |
| Load voltage pin 2                       | Nominal value                                                                                                                                                                                                                                                                                                     | 24 V DC                                                             |
|                                          | Valves                                                                                                                                                                                                                                                                                                            | 20.4 ... 26.4 V                                                     |
| Current consumption pin 2                | Total of all valves switched simultaneously, see technical data on CP valves<br>➔ 4 / 2.1-2 and 4 / 2.1-80 Compact Performance valve terminals CPV and CPA                                                                                                                                                        |                                                                     |
| Current consumption                      | 200 mA + total current consumption of inputs, internal                                                                                                                                                                                                                                                            |                                                                     |
| Protection class to EN 60 529            | IP65                                                                                                                                                                                                                                                                                                              |                                                                     |
| Temperature range                        | Operation                                                                                                                                                                                                                                                                                                         | -5 ... +50 °C                                                       |
|                                          | Storage                                                                                                                                                                                                                                                                                                           | -20 ... +70 °C                                                      |
| Materials                                | Housing                                                                                                                                                                                                                                                                                                           | Die-cast aluminium                                                  |
|                                          | Cover                                                                                                                                                                                                                                                                                                             | Polyamide                                                           |
| Dimensions <sup>1)</sup> (LxWxD)         | 162 x 148.7 x 132 mm                                                                                                                                                                                                                                                                                              |                                                                     |
| Grid dimension                           | 72 mm                                                                                                                                                                                                                                                                                                             |                                                                     |
| Weight                                   | 1750 g                                                                                                                                                                                                                                                                                                            |                                                                     |

1) Dimensions consisting of control block, CP interface as well as left and right end plate

## Integrated DH-485 coupling

The network DH-485 is an integral element of the control block. This network allows different control blocks and the Allen Bradley controllers to exchange data in a peer-to-peer arrangement. Pre-assembled

connecting cables for the connection of all current HMI control units such as Panel View, DTAM Micro and DTAM Plus to the control block are available as accessories.

The network DH-485 together with the necessary DH-485 link coupler are generally integrated in the control block. The consistent integration of all necessary components in the housing of the control block means that the

network DH-485 can be expanded to include a valve terminal in the field whilst maintaining protection class IP65.



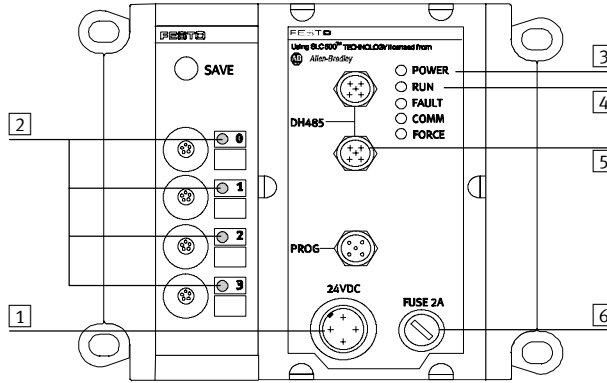
# Electrical installation system, for CPV/CPA

Technical data – Control block CP-SB60-03



## Connection and display components

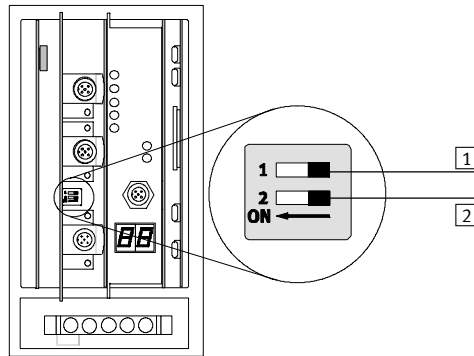
The following connection and display components can be found on the control block cover:



- 1 Operating voltage connection
- 2 String LEDs
- 3 Red LED / POWER
- 4 Green LED / RUN
- 5 Plug for DH-485
- 6 Fuse for operating voltage of inputs

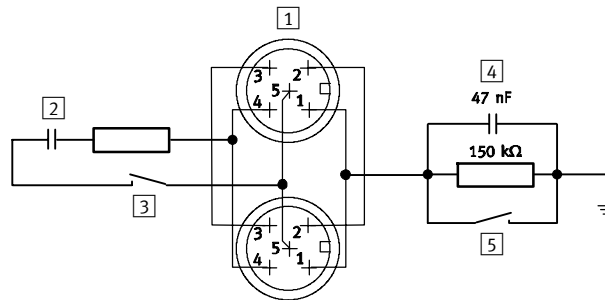
## DIP switch settings

The control block is equipped with DIP switches for activating the DH-485 bus terminal.



- 1 On: Bus terminal activated  
Off (condition upon delivery): Bus terminal not activated
- 2 On: Earthing of the DH-485 screen activated  
Off (condition upon delivery): DH-485 screen not activated

Positioning of the DIP switches for the bus terminal and earth on the DH-485



- 1 Connection of the DH-485 to the control block
- 2 DH-485 bus terminal
- 3 DIP switch 1
- 4 DH-485 earth
- 5 DIP switch 2

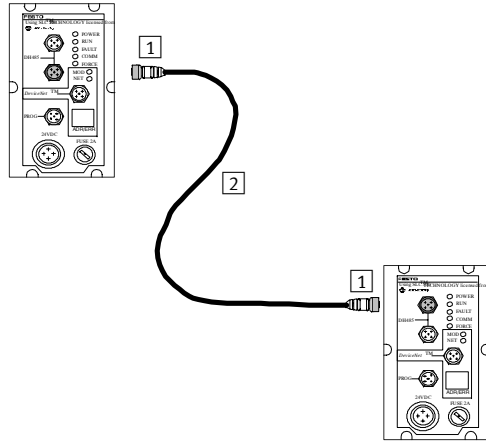
# Electrical installation system, for CPV/CPA

Technical data – Control block CP-SB60-03



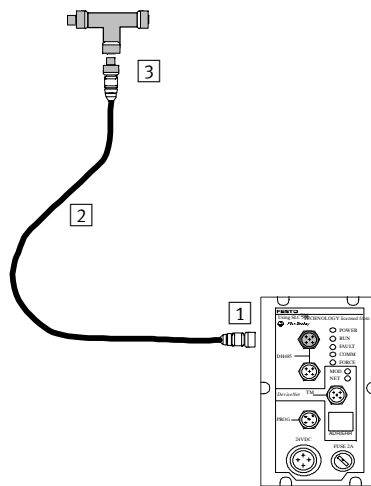
## Connection examples

Cable for DH-485 is looped through



- 1 Connection socket, straight, 5-pin
- 2 Belden cable

Cable for T-adapter


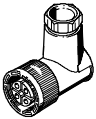




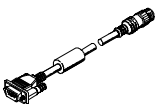
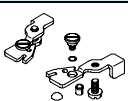
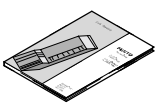
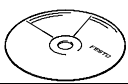


- 1 Connection socket, straight, 5-pin
- 2 Belden cable
- 3 Straight plug, 5-pin for T-adapter

# Electrical installation system, for CPV/CPA

Accessories – Control block CP-SB60-03

**FESTO**

| Ordering data                                                                       |                                         |                         |                     |          |
|-------------------------------------------------------------------------------------|-----------------------------------------|-------------------------|---------------------|----------|
| Designation                                                                         |                                         |                         | Type                | Part No. |
| <b>Power supply</b>                                                                 |                                         |                         |                     |          |
|    | Power supply socket, straight           | for 1.5 mm <sup>2</sup> | NTSD-GD-9           | 18 493   |
|                                                                                     |                                         | for 2.5 mm <sup>2</sup> | NTSD-GD-13,5        | 18 526   |
|    | Power supply socket, angled             | for 1.5 mm <sup>2</sup> | NTSD-WD-9           | 18 527   |
|                                                                                     |                                         | for 2.5 mm <sup>2</sup> | NTSD-WD-11          | 533 119  |
| <b>Fieldbus connection</b>                                                          |                                         |                         |                     |          |
|    | Plug socket, straight, 5-pin            |                         | FBSD-GD-9-5POL      | 18 324   |
|    | Plug, straight, 5-pin for T-adapter     |                         | FBS-M12-5GS-PG9     | 175 380  |
|    | T-adapter for DH-485                    |                         | FB-TA-M12-5POL      | 171 175  |
| <b>Diagnostic/data connection</b>                                                   |                                         |                         |                     |          |
|  | Programming cable                       | 3 m                     | KDI-SB60-3,0-M12    | 171 173  |
|                                                                                     |                                         | 6 m                     | KDI-SB60-6,0-M12    | 175 686  |
|                                                                                     |                                         | 10 m                    | KDI-SB60-10,0-M12   | 171 174  |
|  | Cable for DTAM Micro                    | 3 m                     | KDTAM-SB60-3-M12    | 188 979  |
|                                                                                     |                                         | 6 m                     | KDTAM-SB60-6-M12    | 188 980  |
|                                                                                     |                                         | 10 m                    | KDTAM-SB60-10-M12   | 188 981  |
| <b>Mounting</b>                                                                     |                                         |                         |                     |          |
|  | Mounting, for H-rail                    |                         | IBGH-03-4,0         | 18 649   |
| <b>User documentation</b>                                                           |                                         |                         |                     |          |
|  | User documentation – Control block SB60 | German                  | P.BE-VISB60-03-DE   | 184 572  |
|                                                                                     |                                         | English                 | P.BE-VISB60-03-EN   | 184 573  |
|                                                                                     |                                         | Spanish                 | P.BE-VISB60-03-ES   | 184 575  |
| <b>Software</b>                                                                     |                                         |                         |                     |          |
|  | CD-ROM                                  | Valve terminals         | P.CD-VALVE-T        | 183 350  |
|                                                                                     |                                         | Utilities               | P.CD-VI-UTILITIES-2 | 533 500  |

## Electrical installation system, for CPV/CPA

Technical data – Control block CP-SF60-03-DN

FESTO

DeviceNet



The SF60 control block is an Allen Bradley SLC500 controller with an additional DeviceNet link enclosed in a sturdy aluminium housing protected to IP65.



### Application

In addition to the SLC5/02 processor, the SF60 control block is also equipped with an integrated type 1747-SDN DeviceNet scanner.

SLC5/02 processor technology and the 1747-SDN scanner technology licensed by Rockwell Automation provide computing and networking power, which is tailored to the requirements of a fully expanded

valve terminal or CP system with networked system synchronisation. The controller is programmed and configured using standard Allen Bradley software. The program is created using RSLogix500 and the DeviceNet configured using RSNetwork for DeviceNet. The online connection to the PC is established using the pre-assembled programming cable.

The control block SF60 is a highly compact solution; a stand-alone controller for CP valves and CP I/O modules connected via the CP installation system. The DeviceNet scanner can be used to network and synchronise stand-alone function units.

The mode of operation and functional scope of the control block SF60 is identical to that of the control block SB60. The SF60 also has an integrated DeviceNet scanner 1747-SDN. MIDI/MAXI/ISO valves can, like the electrical I/O modules from the range of electrical peripherals type 03/04, be expanded or combined.

# Electrical installation system, for CPV/CPA

Technical data – Control block CP-SF60-03-DN

| General technical data           |                                                                                                                                                                                                                         |                                                                     |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Type                             | CP-SF60-03-DN                                                                                                                                                                                                           |                                                                     |
| Part No.                         | 175 413                                                                                                                                                                                                                 |                                                                     |
| Addressing range                 | 0 ... 63                                                                                                                                                                                                                |                                                                     |
| Product type                     | Communication converter (12 dec.)                                                                                                                                                                                       |                                                                     |
| Product code                     | SF60 scanner 1747-SDN (19 dec.)                                                                                                                                                                                         |                                                                     |
| Type of communication            | <ul style="list-style-type: none"> <li>■ Polled I/O</li> <li>■ Change of state/cyclic</li> <li>■ Strobed I/O</li> <li>■ Explicit messaging</li> </ul>                                                                   |                                                                     |
| Data storage area for DeviceNet  | Input data                                                                                                                                                                                                              | 32 bytes, plus M1 file                                              |
|                                  | Output data                                                                                                                                                                                                             | 32 bytes, plus M0 file                                              |
| Mode of operation on DeviceNet   | <ul style="list-style-type: none"> <li>■ DeviceNet master</li> <li>■ Intelligent DeviceNet slave with exchange of data with the master</li> <li>■ Intelligent slave with assigned slave station on DeviceNet</li> </ul> |                                                                     |
| Diagnostic displays              | LEDs and 7 segment display identical to those of 1747-SDN                                                                                                                                                               |                                                                     |
| Operating voltage pin 1          | Nominal value                                                                                                                                                                                                           | 24 V DC polarity-safe                                               |
|                                  | Permissible range                                                                                                                                                                                                       | 18 ... 30 V                                                         |
|                                  | Power failure buffering                                                                                                                                                                                                 | 20 ms                                                               |
| Current consumption pin 1        | Control block                                                                                                                                                                                                           | 200 mA                                                              |
|                                  | CP modules                                                                                                                                                                                                              | 560 mA (internal electronics) + total current consumption of inputs |
| Load voltage pin 2               | Nominal value                                                                                                                                                                                                           | 24 V DC                                                             |
|                                  | Valves                                                                                                                                                                                                                  | 20.4 ... 26.4 V                                                     |
| Current consumption pin 2        | Total of all valves switched simultaneously, see technical data on CP valves<br>→ 4 / 2.1-2 and 4 / 2.1-80 Compact Performance valve terminals CPV and CPA                                                              |                                                                     |
| Protection class to EN 60 529    | IP65                                                                                                                                                                                                                    |                                                                     |
| Temperature range                | Operation                                                                                                                                                                                                               | -5 ... +50 °C                                                       |
|                                  | Storage                                                                                                                                                                                                                 | -20 ... +70 °C                                                      |
| Materials                        | Housing                                                                                                                                                                                                                 | Die-cast aluminium                                                  |
|                                  | Cover                                                                                                                                                                                                                   | Polyamide                                                           |
| Dimensions <sup>1)</sup> (LxWxD) | 162 x 148.7 x 132 mm                                                                                                                                                                                                    |                                                                     |
| Grid dimension                   | 72 mm                                                                                                                                                                                                                   |                                                                     |
| Weight                           | 1800 g                                                                                                                                                                                                                  |                                                                     |

1) Dimensions consisting of control block, CP interface as well as left and right end plate

## Network connection

DeviceNet is a rapid communication medium that is required for interlocking logic in decentralised automation units and for stand-alone manufacturing cells, commissioned separately and coupled via DeviceNet.

The DeviceNet scanner facilitates the connection of supplementary devices from manufacturers that are needed to realise the full functional scope of the control program of the control block – a quick and easy way of expanding functions.

Through the integration of the DeviceNet scanner 1747-SDN, in addition to the controller capabilities of the SLC500, the control block offers the greatest possible degree of flexibility in terms of installation on the DeviceNet.

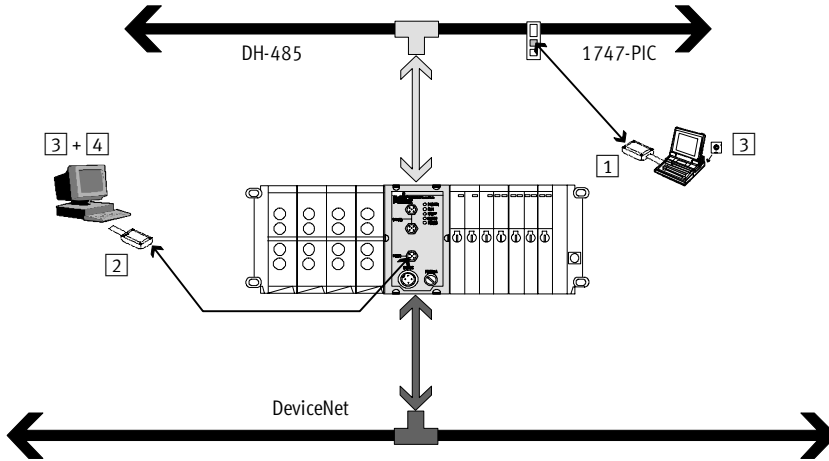
- Can be used as a master in a network with subordinate slave stations
- Can be used as an intelligent slave station, with execution synchronisation with a higher-order master
- Can be used as an intelligent slave station with its own assigned slave devices for the expansion of functions

# Electrical installation system, for CPV/CPA

Technical data – Control block CP-SF60-03-DN



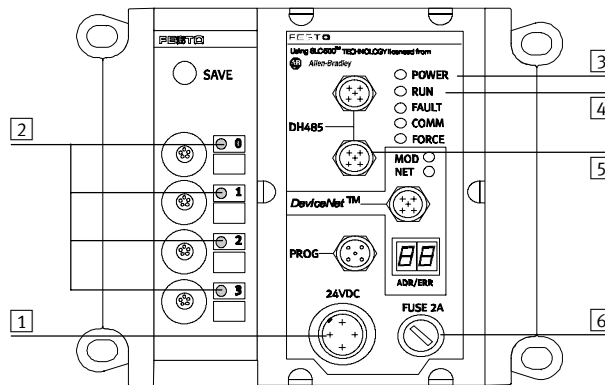
## System overview – DeviceNet



- 1 Interface converter 1747-PIC
- 2 Communication adapter 1770-KFD or 1784-PCD
- 3 Programming software RSNetWorx or RSLogix500
- 4 DeviceNetManager software version 3.004 or above

## Connection and display components

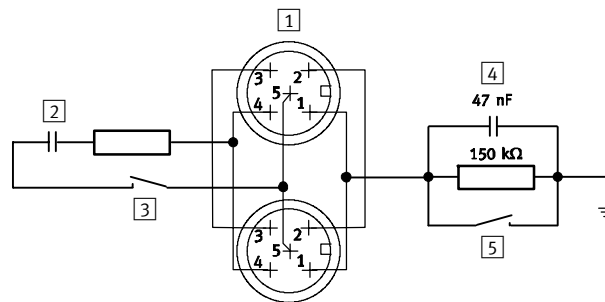
The following connection and display components can be found on the control block cover:



- 1 Operating voltage connection
- 2 String LEDs
- 3 Red LED / POWER
- 4 Green LED / RUN
- 5 Plug for DH-485
- 6 Fuse for operating voltage of inputs

## DIP switch settings

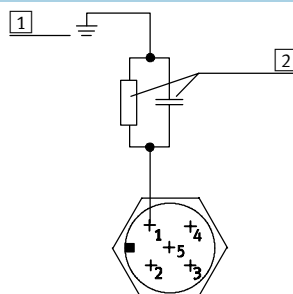
Positioning of the DIP switches for the bus terminal and earth on the DH-485



- 1 Connection of the DH-485 to the control block
- 2 DH-485 bus terminal
- 3 DIP switch 1
- 4 DH-485 earth
- 5 DIP switch 2

## Pin allocation

Fieldbus interface


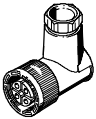




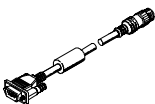
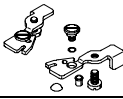

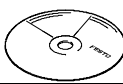


- 1 Screen/shield
- 2 Internal network

# Electrical installation system, for CPV/CPA

Accessories – Control block CP-SF60-03-DN

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| Ordering data                                                                       |                                                  |                         |                     |          |
|-------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------|---------------------|----------|
| Designation                                                                         |                                                  |                         | Type                | Part No. |
| <b>Power supply</b>                                                                 |                                                  |                         |                     |          |
|    | Power supply socket, straight                    | for 1.5 mm <sup>2</sup> | NTSD-GD-9           | 18 493   |
|                                                                                     |                                                  | for 2.5 mm <sup>2</sup> | NTSD-GD-13,5        | 18 526   |
|    | Power supply socket, angled                      | for 1.5 mm <sup>2</sup> | NTSD-WD-9           | 18 527   |
|                                                                                     |                                                  | for 2.5 mm <sup>2</sup> | NTSD-WD-11          | 533 119  |
| <b>Fieldbus connection</b>                                                          |                                                  |                         |                     |          |
|    | Plug socket, straight, 5-pin                     |                         | FBSD-GD-9-5POL      | 18 324   |
|    | Plug, straight, 5-pin for T-adaptor              |                         | FBS-M12-5GS-PG9     | 175 380  |
|    | T-adaptor for DH-485                             |                         | FB-TA-M12-5POL      | 171 175  |
| <b>Diagnostic/data connection</b>                                                   |                                                  |                         |                     |          |
|  | Programming cable                                | 3 m                     | KDI-SB60-3,0-M12    | 171 173  |
|                                                                                     |                                                  | 6 m                     | KDI-SB60-6,0-M12    | 175 686  |
|                                                                                     |                                                  | 10 m                    | KDI-SB60-10,0-M12   | 171 174  |
|  | Cable for DTAM Micro                             | 3 m                     | KDTAM-SB60-3-M12    | 188 979  |
|                                                                                     |                                                  | 6 m                     | KDTAM-SB60-6-M12    | 188 980  |
|                                                                                     |                                                  | 10 m                    | KDTAM-SB60-10-M12   | 188 981  |
| <b>Mounting</b>                                                                     |                                                  |                         |                     |          |
|  | Mounting, for H-rail                             |                         | IBGH-03-4,0         | 18 649   |
| <b>User documentation</b>                                                           |                                                  |                         |                     |          |
|  | User documentation – Control block CP-SF60-03-DN | German                  | P.BE-VISB60-03-DE   | 184 572  |
|                                                                                     |                                                  | English                 | P.BE-VISB60-03-EN   | 184 573  |
|                                                                                     |                                                  | Spanish                 | P.BE-VISB60-03-ES   | 184 575  |
| <b>Software</b>                                                                     |                                                  |                         |                     |          |
|  | CD-ROM                                           | Valve terminals         | P.CD-VALVE-T        | 183 350  |
|                                                                                     |                                                  | Utilities               | P.CD-VI-UTILITIES-2 | 533 500  |

# Electrical installation system, for CPV/CPA

Technical data – Control block CP-SF3-03

FESTO

FESTO

A powerful mini controller from Festo has been integrated in the ISF3-03 control block and built into a robust aluminium housing with the protection class IP65. This permits stand-alone control of up to 128 local inputs and outputs. A further 1048 inputs and outputs can be controlled via the integrated fieldbus.



## Application

All plugs and electrical connections are designed for direct mounting on the machine outside of the control cabinet (provided that the requirements of IP65 are adhered to). With the Festo fieldbus, additional I/Os and expanded functions can be installed and controlled. The control block SF3 can be operated as required in stand-alone mode, as a fieldbus slave or fieldbus master with up to 31 fieldbus slaves.

This controller is programmed via an RS232 programming interface using the software FST200. Alternatively, a display and control unit can be directly connected on-site. The control block ISF3-03 is a highly compact solution; a stand-alone controller for CP valves and CP I/O modules connected via the CP installation system.

The elimination of internal wiring to the controller reduces the number of connection points required, thereby shortening the installation time and eliminating sources of potential errors. The performance of the controller technology was selected and specially customised to meet the requirements of a valve terminal. Extensive

diagnostic data provides information on the status of all components mounted on the valve terminal as well as the sensors and actuators connected to it. MIDI/MAXI/ISO valves can, like the electrical I/O modules from the range of electrical peripherals type 03/04, be expanded or combined.



# Electrical installation system, for CPV/CPA

Technical data – Control block CP-SF3-03



## Operating modes

### Stand-alone

Valve terminal with control block SF3 for controlling a stand-alone machine. Can be used to autonomously control small stand-alone machines or system components. Finally, it can be used to realise stand-alone subsystems with a discrete function as part of a larger system.

### Master

Control block SF3 with a fieldbus extension for controlling systems. The control block SF3 with integrated fieldbus interface facilitates the connection of local inputs and outputs as well as further fieldbus stations. It can also be used to

process automation tasks requiring a large number of electrical sensors and actuators. Finally, it can be used to realise stand-alone subsystems with a discrete function as part of a larger system.

## General technical data

|                                              |                                                                                         |                                                           |                                                           |                                             |
|----------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------|
| Type                                         | <b>CP-SF3-03</b>                                                                        |                                                           |                                                           |                                             |
| Part No.                                     | <b>18 247</b>                                                                           |                                                           |                                                           |                                             |
| Programming device interface                 | 4-pin round plug for PC/ABG/serial coupling (V24/RS232)                                 |                                                           |                                                           |                                             |
| RAM and EEPROM program memory                | 128 kByte for program, modules, text modules and drivers<br>(4-20 Byte = 1 instruction) |                                                           |                                                           |                                             |
| Processing time for 1024 binary instructions | approx. 1 ms                                                                            |                                                           |                                                           |                                             |
| Flags                                        | F0.0 to F31.15 = 512, all remanent                                                      |                                                           |                                                           |                                             |
|                                              | No. of time flags                                                                       | T0 to T31 = 32 (timer preselection remanent)              |                                                           |                                             |
|                                              | Time range                                                                              | 0.01 s to 655.35 s                                        |                                                           |                                             |
|                                              | No. of counting flags                                                                   | Z0 to Z31, all remanent                                   |                                                           |                                             |
| Counting range                               | 0 to 65535                                                                              |                                                           |                                                           |                                             |
| Register                                     | R0 to R127, R0 to R99 remanent                                                          |                                                           |                                                           |                                             |
| Special FU                                   | Function units 0 to 4096                                                                |                                                           |                                                           |                                             |
| Arithmetic functions                         | +, -, *, :                                                                              |                                                           |                                                           |                                             |
| Inputs                                       | digital                                                                                 | 128                                                       |                                                           |                                             |
|                                              | analogue                                                                                | 36                                                        |                                                           |                                             |
| Outputs                                      | digital                                                                                 | 128                                                       |                                                           |                                             |
|                                              | analogue                                                                                | 12                                                        |                                                           |                                             |
| Programmable inputs/<br>outputs              | CP                                                                                      | 64 digital inputs/64 digital outputs incl. solenoid coils |                                                           |                                             |
|                                              | Fieldbus                                                                                | 1048 I/O (per station, max. 128 I and 128 O)              |                                                           |                                             |
| Permissible modules                          | Overview                                                                                |                                                           |                                                           |                                             |
|                                              | Programs                                                                                | P 0 ... P 15 (user programs)                              |                                                           |                                             |
|                                              | Program modules                                                                         | BAP 0 ... 15 (user programmable)                          |                                                           |                                             |
|                                              | Functional modules                                                                      | BAF 0 ... 99                                              |                                                           |                                             |
|                                              | BAF-Nr.                                                                                 | Application                                               |                                                           |                                             |
|                                              | 0                                                                                       | Control block                                             | Deletion of internal operands                             |                                             |
|                                              | 1                                                                                       |                                                           | Location of short circuits                                |                                             |
|                                              | 2                                                                                       |                                                           | Indirect set/reset of local outputs                       |                                             |
|                                              | 3                                                                                       |                                                           | Indirect access to FU0 to FU4095                          |                                             |
|                                              | 4                                                                                       |                                                           | Measurement of program runtime                            |                                             |
|                                              | 5                                                                                       |                                                           | Reading of remanent data words                            |                                             |
|                                              | 6                                                                                       |                                                           | Writing of remanent data words                            |                                             |
|                                              | 10                                                                                      |                                                           | Assigning operation parameters/reading of counters/timers |                                             |
|                                              | 11                                                                                      |                                                           | Interrupt-controlled enable/disable of counters/timers    |                                             |
|                                              | 21                                                                                      |                                                           | CP interface                                              | Reading/writing of data CP auxiliary module |
|                                              | 23                                                                                      |                                                           |                                                           | Reset of all outputs accessible via CP      |
|                                              | 25                                                                                      | Diagnosis of CP valve terminal, input and output modules  |                                                           |                                             |
|                                              | 27                                                                                      | Assigning operation parameters for CP errors              |                                                           |                                             |
|                                              | 28                                                                                      | Recording of CP configuration                             |                                                           |                                             |

# Electrical installation system, for CPV/CPA



Technical data – Control block CP-SF3-03

| General technical data |                         |                  |                                                                                   |
|------------------------|-------------------------|------------------|-----------------------------------------------------------------------------------|
| Type                   |                         | CP-SF3-03        |                                                                                   |
| Part No.               |                         | 18 247           |                                                                                   |
|                        | Functional modules      |                  |                                                                                   |
|                        | BAF-Nr.                 | Application      |                                                                                   |
|                        | 31                      | AS-interface     | Reading of AS-interface slave parameters                                          |
|                        | 32                      | master/          | Writing of AS-interface slave parameters                                          |
|                        | 33                      | AS-interface bus | Reset of all outputs accessible via AS-interface bus                              |
|                        | 35                      | system           | Diagnosis of all AS-interface slaves                                              |
|                        | 37                      |                  | Assigning operation parameters for control block for AS-interface errors          |
|                        | 38                      |                  | Reconfiguration of the AS-interface bus                                           |
|                        | 40                      | Fieldbus         | Requesting the fieldbus configuration                                             |
|                        | 41                      |                  | Master/slave mode: Reading the parameters of a fieldbus station                   |
|                        | 42                      |                  | Master/slave mode: Writing the parameters of a fieldbus station                   |
|                        | 43                      |                  | Reset of all outputs accessible via fieldbus                                      |
|                        | 44                      |                  | Fieldbus station status request                                                   |
|                        | 47                      |                  | Assigning operation parameters for fieldbus errors                                |
|                        | 48                      |                  | Recording of actual configuration                                                 |
|                        | 49                      |                  | Comparison of actual list with reference list                                     |
|                        | 50                      |                  | Reading of fieldbus station information                                           |
|                        | 51                      |                  | Fieldbus station reset                                                            |
|                        | 60                      | Analogue         | Loading of analogue values                                                        |
|                        | 61                      | modules          | Output of analogue values                                                         |
|                        | 63                      |                  | Diagnosis of analogue module                                                      |
|                        | 90                      | Control block    | Execution of assembler programs (functional modules)                              |
|                        | 91                      |                  |                                                                                   |
|                        | 92                      |                  |                                                                                   |
|                        | 93                      |                  |                                                                                   |
|                        | 94                      |                  |                                                                                   |
|                        | 95                      |                  |                                                                                   |
|                        | 96                      |                  |                                                                                   |
|                        | 97                      |                  |                                                                                   |
|                        | 98                      |                  |                                                                                   |
|                        | 99                      |                  |                                                                                   |
| Programming software   |                         |                  | FESTO FST 200                                                                     |
| Communication          | Point to point coupling |                  | Yes                                                                               |
|                        | Bus system              |                  | Festo fieldbus (master or slave), RS485                                           |
| Diagnosis              |                         |                  | Comprehensive diagnosis, evaluation using FST 200 or via inputs into user program |

# Electrical installation system, for CPV/CPA

Technical data – Control block CP-SF3-03

| General technical data                             |                         |                                                                                                                                                            |
|----------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type                                               |                         | <b>CP-SF3-03</b>                                                                                                                                           |
| Part No.                                           |                         | <b>18 247</b>                                                                                                                                              |
| Fieldbus interface                                 |                         | 2x 4-pin round plug (RS485)                                                                                                                                |
| Protocol                                           |                         | Festo fieldbus                                                                                                                                             |
| Cable length (dependent on baud rate)              |                         | Two wire cable, max. 500 ... 4000 m                                                                                                                        |
| Bus address SF master                              |                         | Permanent (master/slave mode set via FST 200)                                                                                                              |
| Bus address SF slave                               |                         | Set via FST 200 (1 ... 31)                                                                                                                                 |
| Bus terminal                                       |                         | Set via FST 200                                                                                                                                            |
| Communication SF slave                             |                         | Max. 12 byte inputs and 12 byte outputs                                                                                                                    |
| Bus station as master                              |                         | Control block CP-SF3-03<br>1 master<br>Max. 31 slaves: Festo valve terminals and digital modules                                                           |
| Bus station as slave                               |                         | Control block CP-SF3-03                                                                                                                                    |
| Data exchange (cyclic)                             |                         | Max. 12 byte inputs and 12 byte outputs,<br>via fieldbus I/O with Festo fieldbus master (e.g. SF3, FPC405, ...)                                            |
| Data exchange (acyclic)                            |                         | Parameter field, max. 256 words                                                                                                                            |
| Parameter/configuration software for SF3 as master |                         | Using a fieldbus configurator integrated in the FST 200                                                                                                    |
| Diagnosis                                          |                         | Comprehensive diagnosis, evaluation using FST 200 or via inputs into user program                                                                          |
| Operating voltage                                  | Nominal value           | 24 V DC polarity-safe                                                                                                                                      |
|                                                    | Permissible range       | 18 ... 30 V                                                                                                                                                |
|                                                    | Power failure buffering | 20 ms                                                                                                                                                      |
| Current consumption pin 1                          | Control block           | 200 mA                                                                                                                                                     |
|                                                    | CP modules              | 560 mA (internal electronics) + total current consumption of inputs                                                                                        |
| Current consumption pin 2                          |                         | Total of all valves switched simultaneously, see technical data on CP valves<br>➔ 4 / 2.1-2 and 4 / 2.1-80 Compact Performance valve terminals CPV and CPA |
| Protection class to EN 60 529                      |                         | IP65                                                                                                                                                       |
| Temperature range                                  | Operation               | -5 ... +50 °C                                                                                                                                              |
|                                                    | Storage                 | -20 ... +70 °C                                                                                                                                             |
| Material                                           | Housing                 | Die-cast aluminium                                                                                                                                         |
|                                                    | Cover                   | Polyamide                                                                                                                                                  |
| Dimensions (HxWxD)                                 |                         | 162 x 118.7 x 132 mm                                                                                                                                       |
| Weight                                             |                         | 1550 g                                                                                                                                                     |

# Electrical installation system, for CPV/CPA

Technical data – Control block CP-SF3-03




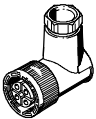

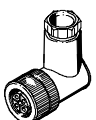


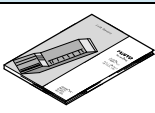

| Pin allocation for fieldbus interface |         |                  |
|---------------------------------------|---------|------------------|
| Terminal allocation                   | Pin No. | Signal           |
|                                       | 1       | Plug 1           |
|                                       | 1       | S+               |
|                                       | 2       | n.c.             |
|                                       | 3       | S-               |
|                                       | 4       | Screen/shield    |
|                                       | 2       | Plug 2           |
|                                       | 1       | S+               |
|                                       | 2       | n.c.             |
|                                       | 3       | S-               |
|                                       | 4       | Screen/shield    |
|                                       | 3       | Internal network |
|                                       | 4       | Housing/node     |

| Pin allocation for diagnostic interface |         |        |
|-----------------------------------------|---------|--------|
| Terminal allocation                     | Pin No. | Signal |
|                                         | 1       | RxD    |
|                                         | 2       | TxD    |
|                                         | 3       | GND    |
|                                         | 4       | Screen |

# Electrical installation system, for CPV/CPA

Accessories – Control block CP-SF3-03

**FESTO**

| Ordering data                                                                       |                                                 |                         |                        |          |
|-------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------|------------------------|----------|
| Designation                                                                         |                                                 |                         | Type                   | Part No. |
| <b>Power supply</b>                                                                 |                                                 |                         |                        |          |
|    | Power supply socket, straight                   | for 1.5 mm <sup>2</sup> | NTSD-GD-9              | 18 493   |
|                                                                                     |                                                 | for 2.5 mm <sup>2</sup> | NTSD-GD-13,5           | 18 526   |
|    | Power supply socket, angled                     | for 1.5 mm <sup>2</sup> | NTSD-WD-9              | 18 527   |
|                                                                                     |                                                 | for 2.5 mm <sup>2</sup> | NTSD-WD-11             | 533 119  |
| <b>Fieldbus connection</b>                                                          |                                                 |                         |                        |          |
|    | Bus connection, straight                        | PG7                     | FBSD-GD-7              | 18 497   |
|                                                                                     |                                                 | PG9                     | FBSD-GD-9              | 18 495   |
|                                                                                     |                                                 | PG13.5                  | FBSD-GD-13,5           | 18 496   |
|    | Bus connection, angled                          | PG7                     | FBSD-WD-7              | 18 524   |
|                                                                                     |                                                 | PG9                     | FBSD-WD-9              | 18 525   |
|                                                                                     | T-adapter for fieldbus                          |                         | FB-TA                  | 18 498   |
| <b>Diagnostic/data connection</b>                                                   |                                                 |                         |                        |          |
|  | Programming cable                               |                         | KDI-SB202-BU9          | 150 268  |
| <b>Mounting</b>                                                                     |                                                 |                         |                        |          |
|  | Mounting, for H-rail                            |                         | IBGH-03-4,0            | 18 649   |
| <b>User documentation</b>                                                           |                                                 |                         |                        |          |
|  | User documentation – Control block ISF3-03      | German                  | P.BE-VISF3-03-DE       | 165 481  |
|                                                                                     |                                                 | English                 | P.BE-VISF3-03-EN       | 165 486  |
|                                                                                     |                                                 | French                  | P.BE-VISF3-03-FR       | 165 491  |
|                                                                                     |                                                 | Italian                 | P.BE-VISF3-03-IT       | 165 446  |
|                                                                                     |                                                 | Spanish                 | P.BE-VISF3-03-ES       | 165 496  |
| <b>Software</b>                                                                     |                                                 |                         |                        |          |
|  | Programming software FST200 with manual for SF3 | German                  | P.BE-FTS200-AWL/KOP-DE | 165 484  |
|                                                                                     |                                                 | English                 | P.BE-FTS200-AWL/KOP-EN | 165 489  |
|                                                                                     | CD-ROM                                          | Valve terminals         | P.CD-VALVE-T           | 183 350  |
|                                                                                     |                                                 | Utilities               | P.CD-VI-UTILITIES-2    | 533 500  |

# Electrical installation system, for CPV/CPA

CPV Direct

FESTO

The CPV Direct product range is the most compact way of connecting valves to the fieldbus. The fieldbus node is integrated in the electrical activation part of the CPV valve terminal, in the CPV “cap”, and therefore takes up only a minimal amount of space.



## Application

CPV Direct is a system for the compact connection of a CPV valve terminal for valve sizes 10, 14 and 18, with a maximum of 8 valve slices, on the basis of 9 different fieldbus standards. The most important fieldbus types including Profibus, Interbus, DeviceNet and CANopen are supported. The CP string extension option allows the functions and components of the CP installation system to be used.

### The CPV Direct system:

- Extremely compact and space-saving design
- Low-cost solution for the connection of a small number of valves to the fieldbus
- Direct front-end integration with a high degree of protection (IP65)

The CPV valve terminal is available in three sizes

- CPV10
- CPV14
- CPV18
- Max. 16 valves on 8 valve slices

### Note

The range of functions and combination options of CPV valves are described in detail in

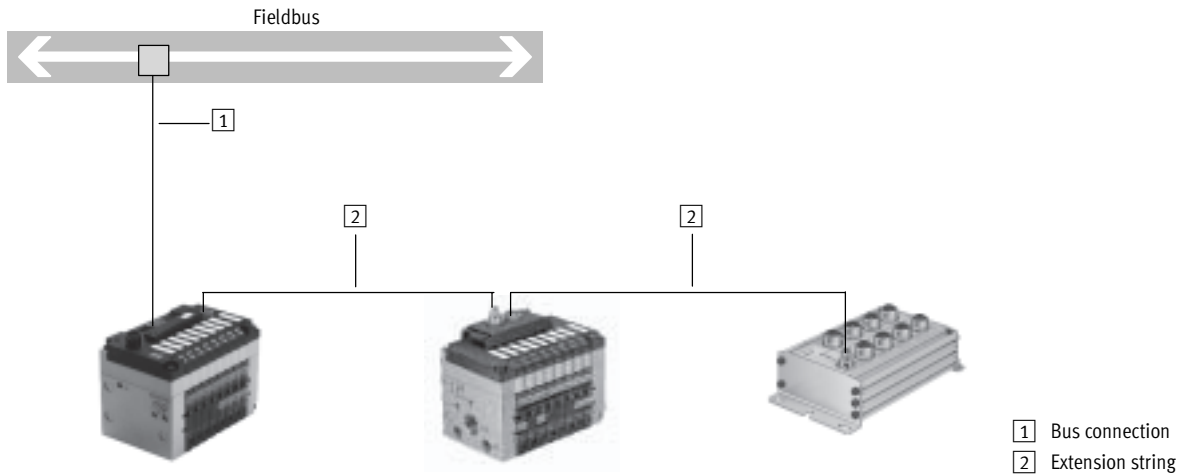
- ➔ 4 / 2.1-2 Valve terminal CPV
- ➔ 4 / 4.7-2 CPV Direct

# Electrical installation system, for CPV/CPA

CPV Direct

FESTO

## Peripherals overview – CPV Direct



## Switch module



The bus parameters and the device configuration of CPV Direct are set using the removable switch module. The integrated DIL switches are also easy to set and control, even if the mounting position is difficult to access.

## CP string extension

The optional string extension allows an additional valve terminal and I/O modules to be connected to the CPV Direct fieldbus node. A CP string of the CP installation system is integrated in the fieldbus node as an extension. Different input and output modules as

well as CPV and CPA valve terminals can be connected.

The max. length of the CP string extends to 10 metres, whereby the extension modules can be mounted directly on-site. All of the required electrical signals are transmitted via

the CP cable, which means that no further installation is needed on the extension module.

The CP string interface offers:

- 16 input signals
- 16 output signals for output modules 24 V DC or solenoid coils

- Logic and sensor supply for the input modules
- Load voltage supply for the valve terminals
- Logic supply for the output module

# Electrical installation system, for CPV/CPA

CPV Direct

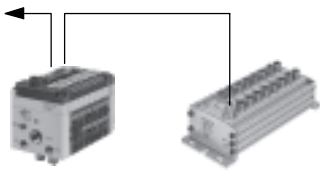
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## Connection options



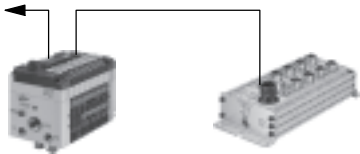
CPV Direct with fieldbus node.

- 8 valve slices
- 16 solenoid coils
- 16 valves (3/2-way valves)



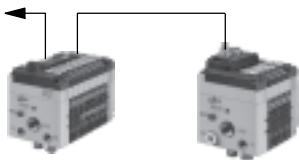
CPV Direct with input module 24 V DC for detecting the cylinder end positions.

- 8 valve slices
- 16 inputs M8, M12 or spring-loaded terminals each with sensor supply



CPV Direct with output module 24 V DC for the activation of individual valves and general actuators.

- 8 valve slices
- 8 outputs (M12 connection)



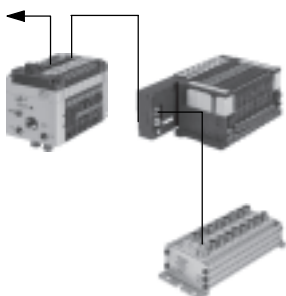
CPV Direct with additional CPV valve terminal as an extension, for variable adaptation.

- 8 valve slices in CPV Direct
- Additional 4, 6 or 8 valve slices<sup>1)</sup> in CPV valve terminal or up to 16 CPA valve slices<sup>1)</sup>.



CPV Direct with additional CPV valve terminal as an extension and input module 24 V DC.

- 8 valve slices in CPV Direct
- CPV valve terminal with 4, 6 or 8 valve slices<sup>1)</sup>
- 16 inputs M8, M12 or spring-loaded terminals



CPV Direct with additional CPA valve terminal as an extension and input module 24 V DC.

- 8 valve slices in CPV Direct
- CPA valve terminal with 2 ... 8 valve slices
- 16 inputs M8, M12 or spring-loaded terminals

1) max. 16 solenoid coils



# Electrical installation system, for CPV/CPA

Technical data – Input modules

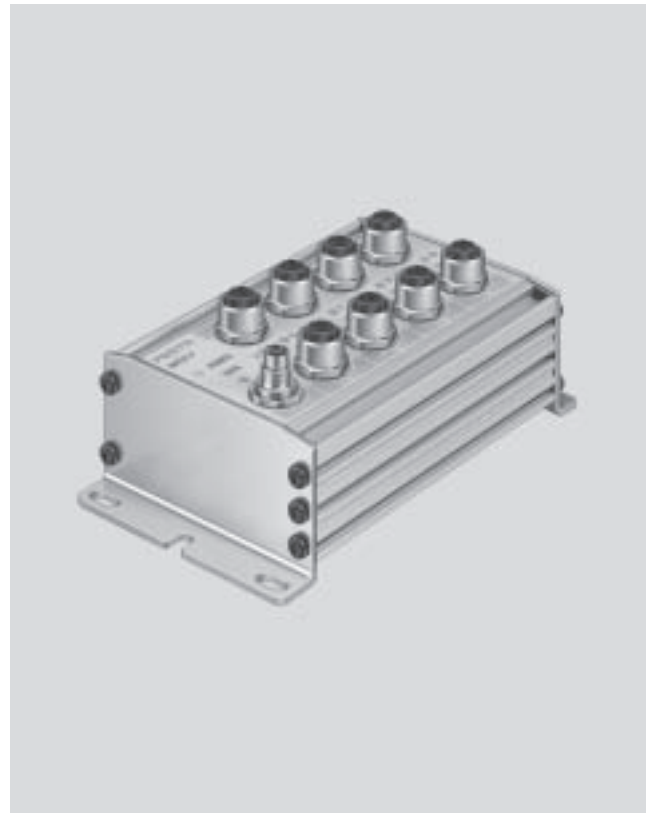
## Function

Digital input modules facilitate the connection of proximity sensors or other 24 V DC sensors (inductive, capacitive, etc.).

M12 plugs with double allocation are separated using a DUO plug or DUO cable.

## Applications

- Input modules for 24 V DC sensor signals
- M8 and M12 plugs, single allocation connection technology with 16 connections, double allocation connection technology with 8 connections
- M12 plug, 5-pin
- The input statuses are indicated for each input signal on an assigned LED
- 24 V DC supply provided for all connected sensors
- Diagnostic LED for short circuit/ undervoltage of sensor supply
- Diagnostic LED for short circuit/ interruption of external sensor supply with CP-E-16-M8-Z.



| General technical data                                      |                                                              |                                  |                                         |
|-------------------------------------------------------------|--------------------------------------------------------------|----------------------------------|-----------------------------------------|
| Type                                                        | CP-E16-M8<br>positive switching                              | CP-E16N-M8<br>negative switching | CP-E16-M12x2-5POL<br>positive switching |
| Part No.                                                    | 18 205                                                       | 18 243                           | 175 561                                 |
| No. of inputs                                               | 16                                                           |                                  |                                         |
| Allocation of inputs                                        | Single allocation                                            |                                  | Double allocation                       |
| Sensor connection type                                      | 16x M8, 3-pin                                                |                                  | 8x M12, 5-pin                           |
| Power supply 24 V DC                                        | Coming from bus node                                         |                                  |                                         |
| Intrinsic current consumption, electronics                  | 40 mA                                                        | 90 mA                            |                                         |
| Input current at 24 V DC (from sensor)                      | Typical 8 mA                                                 |                                  | Typical 6 mA                            |
| Fuse protection for sensors and electronic module           | Internal electronic short circuit protection                 |                                  |                                         |
| Max. current consumption of sensor supply, residual current | Max. 0.5 A                                                   |                                  |                                         |
| Supply voltage of sensors                                   | 24 V DC $\pm$ 25%                                            |                                  |                                         |
| Protection against polarity reversal                        | For logic and sensor voltage                                 |                                  |                                         |
| Electrical isolation                                        | None                                                         |                                  |                                         |
| Switching level                                             | Signal 0                                                     | $\leq$ 5 V                       | $\geq$ -11 V                            |
|                                                             | Signal 1                                                     | $\geq$ 11 V                      | $\leq$ -5 V                             |
| Input delay                                                 | Typical 5 ms                                                 |                                  | Typical 3 ms                            |
| Switching logic                                             | PNP                                                          | NPN                              | PNP                                     |
| Input characteristic curve                                  | To IEC 1131-2                                                |                                  |                                         |
| Connection to bus node                                      | Via pre-fabricated cables                                    |                                  |                                         |
| Protection class to EN 60 529                               | IP65 (when fully plugged-in or fitted with protective cover) |                                  |                                         |
| Temperature range                                           | Operation                                                    | -5 ... +50 °C                    |                                         |
|                                                             | Storage                                                      | -20 ... +70 °C                   |                                         |
| Material                                                    | Die-cast aluminium                                           |                                  |                                         |
| Dimensions                                                  | 148.9 x 66 x 47.9 mm                                         |                                  | 140.9 x 78 x 55.2 mm                    |
| Weight                                                      | 400 g                                                        |                                  | 500 g                                   |

# Electrical installation system, for CPV/CPA

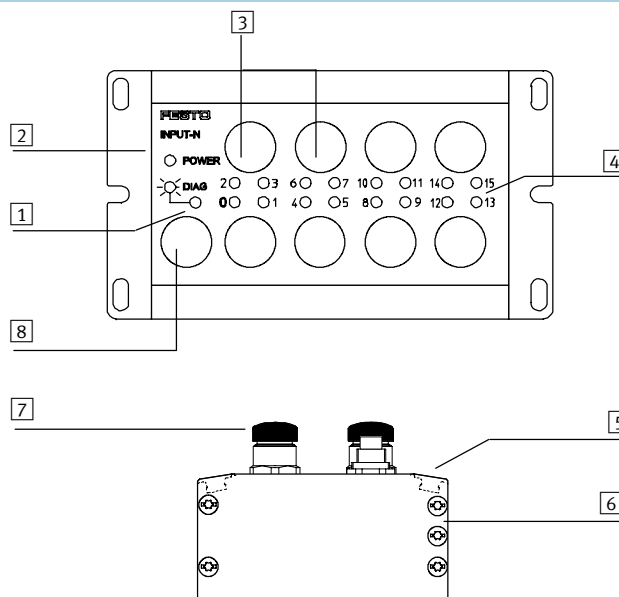
Technical data – Input modules



| General technical data                                      |                                                              |                |                                                               |               |                                                        |               |
|-------------------------------------------------------------|--------------------------------------------------------------|----------------|---------------------------------------------------------------|---------------|--------------------------------------------------------|---------------|
| Type                                                        | CP-E16N-M12x2<br>negative switching                          |                | CP-E16-M8-Z<br>positive and negative<br>switching             |               | CP-E16-KL-IP20-Z<br>positive and negative<br>switching |               |
| Part No.                                                    | 18 244                                                       |                | 189 670                                                       |               | 197 983                                                |               |
| No. of inputs                                               | 16                                                           |                |                                                               |               | 2x 8                                                   |               |
| Allocation of inputs                                        | Double allocation                                            |                | Single allocation                                             |               |                                                        |               |
| Sensor connection type                                      | 8x M12, 4-pin                                                |                | 16x M8, 3-pin                                                 |               | Screw terminal or tension-<br>spring sockets           |               |
| Power supply 24 V DC                                        | Coming from bus node                                         |                | Coming from bus node, connection for additional sensor supply |               |                                                        |               |
| Intrinsic current consumption, electronics                  | 90 mA                                                        |                | 40 mA                                                         |               | 90 mA                                                  |               |
| Input current at 24 V DC (from sensor)                      | Typical 8 mA                                                 |                |                                                               |               |                                                        |               |
| Fuse protection for sensors and electronic module           | Internal electronic short<br>circuit protection              |                | Electronic short circuit protection per group                 |               |                                                        |               |
| Max. current consumption of sensor supply, residual current | Max. 0.5 A                                                   |                | Max. 1 A per 8-fold input group                               |               |                                                        |               |
| Supply voltage of sensors                                   | 24 V DC $\pm 25\%$                                           |                |                                                               |               |                                                        |               |
| Protection against polarity reversal                        | For logic and sensor voltage                                 |                |                                                               |               |                                                        |               |
| Electrical isolation                                        | None                                                         |                |                                                               |               | Yes                                                    |               |
| Switching level                                             |                                                              |                | PNP                                                           | NPN           | PNP                                                    | NPN           |
|                                                             | Signal 0                                                     | $\geq 11$ V    | $\leq 6$ V                                                    | $\geq -8.6$ V | $\leq 6$ V                                             | $\geq -8.6$ V |
|                                                             | Signal 1                                                     | $\leq 5$ V     | $\geq 8.6$ V                                                  | $\leq -6$ V   | $\geq 8.6$ V                                           | $\leq -6$ V   |
| Input delay                                                 | Typical 5 ms                                                 |                | Typical 3 ms                                                  |               |                                                        |               |
| Switching logic                                             | NPN                                                          |                | PNP/NPN                                                       |               | PNP/NPN                                                |               |
| Input characteristic curve                                  | To IEC 1131-2                                                |                |                                                               |               |                                                        |               |
| Connection to bus node                                      | Via pre-fabricated cables                                    |                |                                                               |               |                                                        |               |
| Protection class to EN 60 529                               | IP65 (when fully plugged-in or fitted with protective cover) |                |                                                               |               |                                                        |               |
| Temperature range                                           | Operation                                                    | -5 ... +50 °C  |                                                               |               |                                                        |               |
|                                                             | Storage                                                      | -20 ... +70 °C |                                                               |               |                                                        |               |
| Material                                                    | Die-cast aluminium                                           |                |                                                               |               |                                                        |               |
| Dimensions                                                  | 140.9 x 78 x 55.2 mm                                         |                | 216.9 x 66 x 50.6 mm                                          |               | 175 x 66 x 53.2 mm                                     |               |
| Weight                                                      | 500 g                                                        |                | 420 g                                                         |               | 320 g                                                  |               |

## Connection and display components

The following connection and display components can be found on the cover of the input modules:



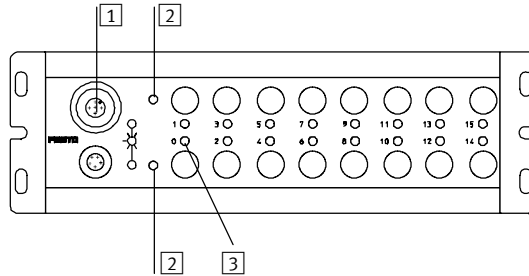
- 1 Status LED (green)
- 2 Identification of input type:  
-INPUT-P for PNP inputs  
-INPUT-N for NPN inputs
- 3 Sensor connections
- 4 Green LED for status display  
(one LED per input)
- 5 Slot for inscription labels  
(ISB 6x10)
- 6 Earth terminal
- 7 Protective cover
- 8 CP connection

# Electrical installation system, for CPV/CPA

Technical data – Input modules

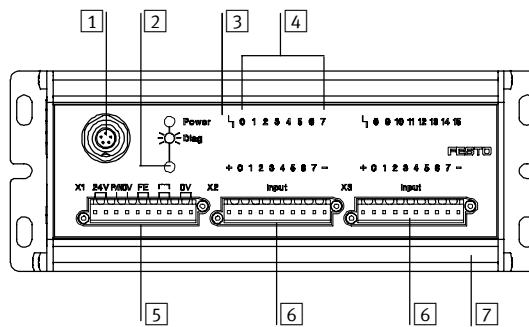
## Connection and display components

The illustration shows the additional display and connection elements of the input module CP-E16-M8-Z



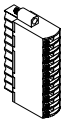
- 1 Connection for sensor supply
- 2 Red LED for short circuit display or sensor voltage failure (one LED per input group)
- 3 Green LED for status display (one LED per input)

The illustration shows the display and connection elements of the input module CP-E16-KL-IP20-Z



- 1 CP connection
- 2 Status LED (green)
- 3 Red LED for short circuit/overload display (one LED per input group)
- 4 Green LED for status display (one LED per input)
- 5 Connection for sensor supply
- 6 Sensor connections (8 inputs per input group)
- 7 Slot for inscription labels (ISB 6x10)

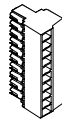
Tension-spring socket, 1-row



Tension-spring socket, 3-row



Screw terminal socket, 1-row



# Electrical installation system, for CPV/CPA

Technical data – Input modules



| Pin allocation for external sensor supply |        | Pin No. | Signal         |
|-------------------------------------------|--------|---------|----------------|
| Terminal allocation                       |        |         |                |
|                                           | 1 Plug | 1       | 24 V DC ±25%   |
|                                           |        | 2       | PNP/NPN        |
|                                           |        | 3       | 0 V            |
|                                           |        | 4       | Free (n.c.)    |
|                                           |        | 5       | Earth terminal |
| 2 PNP operation (pin 2 and 3 bridged)     |        |         |                |
| 3 NPN operation (pin 2 and 1 bridged)     |        |         |                |
|                                           | 1 Plug | 1       | 24 V DC ±25%   |
|                                           |        | 2       | PNP/NPN        |
|                                           |        | 3       | 0 V            |
|                                           |        | 4       | Free (n.c.)    |
|                                           |        | 5       | Earth terminal |

- - Note

External sensor supply for CP-E16-M8-Z. Specified for PNP or NPN operation (type CP-E16-M8-Z only). The input module provides PNP or NPN inputs. The setting for PNP or NPN operation is made by installing a bridge in the socket of the sensor supply connection.

Fieldbus systems/electrical peripherals  
CP installation system

## 4.6

# Electrical installation system, for CPV/CPA

Technical data – Input modules

| Pin allocation for sensor connections |                        |        |      |                |
|---------------------------------------|------------------------|--------|------|----------------|
| Terminal allocation                   | Pin No.                | Signal |      |                |
| <b>CP-E16-M12x2-5Pol</b>              |                        |        |      |                |
|                                       | 1                      | Plug   | 1    | 24 V           |
|                                       |                        |        | 2    | lx+3           |
|                                       |                        |        | 3    | 0 V            |
|                                       |                        |        | 4    | lx+2           |
|                                       |                        |        | 5    | Earth terminal |
|                                       | 2                      | Plug   | 1    | 24 V           |
|                                       |                        |        | 2    | lx+1           |
|                                       |                        |        | 3    | 0 V            |
|                                       |                        |        | 4    | lx             |
|                                       |                        |        | 5    | Earth terminal |
| <b>CP-E16...-M8 and CP-E16-M8-Z</b>   |                        |        |      |                |
|                                       | 1                      | Plug   | 1    | 24 V           |
|                                       |                        |        | 3    | 0 V            |
|                                       |                        |        | 4    | lx+1           |
|                                       | 2                      | Plug   | 1    | 24 V           |
|                                       |                        |        | 3    | 0 V            |
|                                       |                        |        | 4    | lx             |
|                                       | <b>CP-E16...-M12x2</b> |        |      |                |
|                                       |                        | 1      | Plug | 1              |
|                                       |                        |        | 2    | lx+3           |
|                                       |                        |        | 3    | 0 V            |
|                                       |                        |        | 4    | lx+2           |
| 2                                     |                        | Plug   | 1    | 24 V           |
|                                       |                        |        | 2    | lx+1           |
|                                       |                        |        | 3    | 0 V            |
|                                       |                        |        | 4    | lx             |

\* lx = Input x

# Electrical installation system, for CPV/CPA

Technical data – Input modules



| Pin allocation for power supply and operation mode                                                                                                                                                 |                 |                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------|
| Terminal allocation                                                                                                                                                                                | Pin No.         | Signal                              |
| CP-E16-KL-IP20-Z                                                                                                                                                                                   |                 |                                     |
|                                                                                                                                                                                                    | 1               | Internal connection                 |
|                                                                                                                                                                                                    | 2               | Plug X1                             |
|                                                                                                                                                                                                    | 1               | 24 V DC ±25%                        |
|                                                                                                                                                                                                    | 2               | Bridged with 1                      |
|                                                                                                                                                                                                    | 3               | PNP/NPN                             |
|                                                                                                                                                                                                    | 4               | 0 V                                 |
|                                                                                                                                                                                                    | 5               | FE                                  |
|                                                                                                                                                                                                    | 6               | FE                                  |
|                                                                                                                                                                                                    | 7               | Not in use but bridged with 8       |
|                                                                                                                                                                                                    | 8               | Not in use but bridged with 7       |
| 9                                                                                                                                                                                                  | Bridged with 10 |                                     |
| 10                                                                                                                                                                                                 | 0 V             |                                     |
|                                                                                                                                                                                                    | 3               | PNP operation (pin 3 and 4 bridged) |
|                                                                                                                                                                                                    | 4               | NPN operation (pin 3 and 2 bridged) |
| A separate load supply for the valves/outputs can be looped through via pin 7 and 8.<br>The relevant potential can be passed on to the next module via the other internal bridges (24 V, FE, 0 V). |                 |                                     |

- Note

The input module type CP-E16-KL-IP20-Z provides PNP or NPN inputs. The setting for PNP or NPN operation is made by installing an external bridge on the sensor supply connection.

# Electrical installation system, for CPV/CPA

Technical data – Input modules



| Pin allocation for sensor supply |           |        |         |
|----------------------------------|-----------|--------|---------|
| Terminal allocation              | Pin No.   | Signal |         |
| CP-E16-KL-IP20-Z                 |           |        |         |
|                                  | 1 Plug X2 | +      | 24 V DC |
|                                  |           | 0      | I 0     |
|                                  |           | 1      | I 1     |
|                                  |           | 2      | I 2     |
|                                  |           | 3      | I 3     |
|                                  |           | 4      | I 4     |
|                                  |           | 5      | I 5     |
|                                  |           | 6      | I 6     |
|                                  |           | 7      | I 7     |
|                                  |           | -      | 0 V DC  |
|                                  | 2 Plug X3 | +      | 24 V DC |
|                                  |           | 0      | I 8     |
|                                  |           | 1      | I 9     |
|                                  |           | 2      | I 10    |
|                                  |           | 3      | I 11    |
|                                  |           | 4      | I 12    |
|                                  | 5         | I 13   |         |
|                                  | 6         | I 13   |         |
|                                  | 7         | I 15   |         |
|                                  | -         | 0 V DC |         |

Note  
 8 sensors can be connected to each of the connections X2 and X3. The voltage supplied externally via pin 1/2 and pin 9/10 of the plug X1 is supplied to the + and – terminals of X2 and X3 for supplying the sensors.

# Electrical installation system, for CPV/CPA

Technical data – Input modules



| Ordering data                                       |                                                                                                       |                               |                          |          |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------|----------|
| Designation                                         |                                                                                                       |                               | Type                     | Part No. |
| <b>Power supply</b>                                 |                                                                                                       |                               |                          |          |
|                                                     | Plug, tension-spring socket screw-in (4 pieces)                                                       | 1-row, 10-pin                 | PS1-SAC10-10POL          | 197 159  |
|                                                     | Plug, screw terminal socket plug-in (4 pieces)                                                        | 1-row, 10-pin                 | PS1-ZC13-10POL-SCHRAUBKL | 160 800  |
|                                                     | Power supply socket, straight, M12                                                                    |                               | FBSD-GD-9-5POL           | 18 324   |
| <b>Sensor plug</b>                                  |                                                                                                       |                               |                          |          |
|                                                     | Plug, straight socket, M12                                                                            | 5-pin, PG7                    | SEA-M12-5GS-PG7          | 175 487  |
|                                                     |                                                                                                       | 4-pin, PG7                    | SEA-GS-7                 | 18 666   |
|                                                     |                                                                                                       | 4-pin, 2.5 mm <sup>2</sup> OD | SEA-4GS-7-2,5            | 192 008  |
|                                                     | Plug, straight, M8                                                                                    | 3-pin, solderable             | SEA-GS-M8                | 18 696   |
|                                                     |                                                                                                       | 3-pin, screw-in               | SEA-3GS-M8-S             | 192 009  |
|                                                     | Plug for 2 sensor cables, M12, PG11                                                                   | 4-pin                         | SEA-GS-11-DUO            | 18 779   |
|                                                     |                                                                                                       | 5-pin                         | SEA-5GS-11-DUO           | 192 010  |
| <b>Connection sets for power supply and sensors</b> |                                                                                                       |                               |                          |          |
|                                                     | Connection set, standard tension-spring socket, screw-in, consisting of<br>■ PS1 SAC30<br>■ PS1 SAC31 | 3/1-row                       | SEA-KL-SAC10/30          | 526 256  |
|                                                     | Plug, tension-spring socket plug-in (4 pieces)                                                        | 1-row, 10-pin                 | PS1-ZC13Z-10POL-ZUGFEDER | 183 733  |
|                                                     | Plug, screw terminal socket plug-in (4 pieces)                                                        | 1-row, 10-pin                 | PS1-ZC13-10POL-SCHRAUBKL | 160 800  |
|                                                     | Plug, tension-spring socket screw-in                                                                  | 3-row, 30-pin                 | PS1 SAC30                | 197 161  |
|                                                     | Plug, tension-spring socket screw-in, with LED                                                        | 3-row, 30-pin                 | PS1 SAC31                | 197 162  |
| <b>Mounting</b>                                     |                                                                                                       |                               |                          |          |
|                                                     | Mounting, for H-rail                                                                                  |                               | CP-TS-HS35               | 170 169  |
| <b>User documentation</b>                           |                                                                                                       |                               |                          |          |
|                                                     | User documentation for input/output modules                                                           | German                        | P.BE.-CPEA-DE            | 165 125  |
|                                                     |                                                                                                       | English                       | P.BE.-CPEA-EN            | 165 225  |
|                                                     |                                                                                                       | French                        | P.BE.-CPEA-FR            | 165 127  |
|                                                     |                                                                                                       | Italian                       | P.BE.-CPEA-IT            | 165 157  |
|                                                     |                                                                                                       | Spanish                       | P.BE.-CPEA-ES            | 165 227  |
|                                                     |                                                                                                       | Swedish                       | P.BE.-CPEA-SV            | 165 257  |
| <b>Software</b>                                     |                                                                                                       |                               |                          |          |
|                                                     | CD-ROM                                                                                                | Valve terminals               | P.CD-VALVE-T             | 183 350  |
|                                                     |                                                                                                       | Utilities                     | P.CD-VI-UTILITIES-2      | 533 500  |




# Electrical installation system, for CPV/CPA

Technical data – Output modules

### Function

The electrical outputs control actuators such as individual valves, lamps, signal equipment and many more.

 Note  
Optimum control for valves with M12 central plug.

### Applications

- Output module with 8 outputs 24 V DC
- M12 connection technology, with 4- or 5-pin sockets
- LED display of the switching status per channel
- Short circuit and overload detection
- Malfunction display by means of green LED



| General technical data                     |                                                              |                                   |
|--------------------------------------------|--------------------------------------------------------------|-----------------------------------|
| Type                                       | CP-A08-M12-5POL<br>positive switching                        | CP-A08N-M12<br>negative switching |
| Part No.                                   | 175 640                                                      | 18 234                            |
| No. of outputs                             | 8                                                            |                                   |
| Allocation of outputs                      | Single allocation                                            |                                   |
| Output connection type                     | 8x M12, 5-pin                                                | 8x M12, 4-pin                     |
| Load voltage connection                    | M18, 4-pin                                                   |                                   |
| Bus connection                             | 2 plugs M9, 5-pin, via prefabricated cables                  |                                   |
| Max. output current per channel            | 0.5 A                                                        |                                   |
| Operating voltage                          | 24 V DC ±25%                                                 |                                   |
| Load voltage connection                    | 24 V DC ±25%, reverse polarity protection                    |                                   |
| Fuse protection for power output           | Electronic fuse per output 0.5 A                             |                                   |
| Intrinsic current consumption, electronics | Max. 90 mA                                                   |                                   |
| Overload/short circuit protection          | Per channel                                                  |                                   |
| Switching logic                            | PNP to IEC 1131-2                                            | NPN to IEC 1131-2                 |
| Protection class to EN 60 529              | IP65 (when fully plugged-in or fitted with protective cover) |                                   |
| Temperature range                          | Operation                                                    | -5 ... +50 °C                     |
|                                            | Storage                                                      | -20 ... +70 °C                    |
| Material                                   | Die-cast aluminium                                           |                                   |
| Dimensions (LxWxD)                         | 172.9 x 78 x 57.1 mm                                         |                                   |
| Weight                                     | 500 g                                                        |                                   |

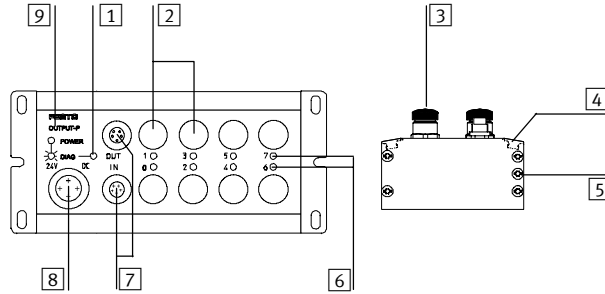
# Electrical installation system, for CPV/CPA

Technical data – Output modules



## Connection and display components

The following connection and display components can be found on the cover of the output modules:



- 1 Status LED (green)
- 2 Connections for actuators
- 3 Protective cover
- 4 Slot for inscription labels (ISB 6x10)
- 5 Earth terminal
- 6 Yellow LED for status display (one LED per output)
- 7 CP connection
- 8 Load voltage connection
- 9 Identifier for output type:
  - OUTPUT-P for PNP outputs
  - OUTPUT-N for NPN outputs

## Pin allocation for load voltage connection

| Terminal allocation | Pin No. | Signal         |
|---------------------|---------|----------------|
|                     | 1       | Free (n.c.)    |
|                     | 2       | 24 V DC ±25%   |
|                     | 3       | 0 V            |
|                     | 4       | Earth terminal |

# Electrical installation system, for CPV/CPA

Technical data – Output modules




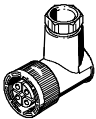


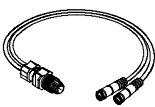

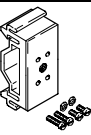
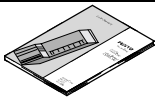
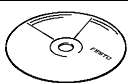
| Pin allocation for outputs                                                                                            |                                        |                |                       |  |
|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------|-----------------------|--|
| Terminal allocation                                                                                                   | Pin No.                                | Signal         |                       |  |
| <b>CP-A08-M12-5Pol (PNP outputs)</b>                                                                                  |                                        |                |                       |  |
|                                                                                                                       | <b>1</b> Plug                          | 1              | Free (n.c.)           |  |
|                                                                                                                       |                                        | 2              | Free (n.c.)           |  |
|                                                                                                                       |                                        | 3              | 0 V                   |  |
|                                                                                                                       |                                        | 4              | Ox+1                  |  |
|                                                                                                                       |                                        | 5              | Earth terminal        |  |
|                                                                                                                       | <b>2</b> Internal connection in module |                |                       |  |
|                                                                                                                       | <b>3</b> Plug (locations 0, 2, 4, 6)   | 1              | Free (n.c.)           |  |
|                                                                                                                       |                                        | 2              | Ox                    |  |
|                                                                                                                       |                                        | 3              | 0 V                   |  |
|                                                                                                                       |                                        | 4              | Ox+1                  |  |
|                                                                                                                       | 5                                      | Earth terminal |                       |  |
| Two outputs can be connected to output sockets 0, 2, 4 and 6 of the CP output module by means of internal connection. |                                        |                |                       |  |
| <b>CP-A08N-M12 (NPN outputs)</b>                                                                                      |                                        |                |                       |  |
|                                                                                                                       | <b>1</b> Plug                          | 1              | 24 V DC <sup>1)</sup> |  |
|                                                                                                                       |                                        | 2              | Earth terminal        |  |
|                                                                                                                       |                                        | 3              | Free (n.c.)           |  |
|                                                                                                                       |                                        | 4              | Ox+1                  |  |
|                                                                                                                       | <b>2</b> Plug                          | 1              | 24 V DC <sup>1)</sup> |  |
|                                                                                                                       |                                        | 2              | Earth terminal        |  |
|                                                                                                                       |                                        | 3              | Free (n.c.)           |  |
|                                                                                                                       |                                        | 4              | Ox                    |  |

1) Consuming devices/load must be supplied via this 24 V connection  
 Ox = Output x

# Electrical installation system, for CPV/CPA

Technical data – Output modules

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| Ordering data                                                                       |                                                             |                               |                     |          |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------|---------------------|----------|
| Designation                                                                         |                                                             |                               | Type                | Part No. |
| <b>Power supply</b>                                                                 |                                                             |                               |                     |          |
|    | Power supply socket, straight                               | for 1.5 mm <sup>2</sup>       | NTSD-GD-9           | 18 493   |
|                                                                                     |                                                             | for 2.5 mm <sup>2</sup>       | NTSD-GD-13,5        | 18 526   |
|    | Power supply socket, angled                                 | for 1.5 mm <sup>2</sup>       | NTSD-WD-9           | 18 527   |
|                                                                                     |                                                             | for 2.5 mm <sup>2</sup>       | NTSD-WD-11          | 533 119  |
| <b>Sensor plug</b>                                                                  |                                                             |                               |                     |          |
|    | Plug, straight socket, M12                                  | 5-pin, PG7                    | SEA-M12-5GS-PG7     | 175 487  |
|                                                                                     |                                                             | 4-pin, PG7                    | SEA-GS-7            | 18 666   |
|                                                                                     |                                                             | 4-pin, 2.5 mm <sup>2</sup> OD | SEA-4GS-7-2,5       | 192 008  |
|    | Plug for 2 sensor cables, M12, PG11                         | 4-pin                         | SEA-GS-11-DUO       | 18 779   |
|                                                                                     |                                                             | 5-pin                         | SEA-5GS-11-DUO      | 192 010  |
| <b>Cable</b>                                                                        |                                                             |                               |                     |          |
|   | DUO cable                                                   | 2x straight socket            | KM12-DUO-M8-GDGD    | 18 685   |
|                                                                                     |                                                             | 2x straight/angled socket     | KM12-DUO-M8-GDWD    | 18 688   |
|                                                                                     |                                                             | 2x angled socket              | KM12-DUO-M8-WDWD    | 18 687   |
|  | Connecting cable, M12, 4-pin, straight plug-straight socket | 2.5 m                         | KM12-M12-GSGD-2,5   | 18 684   |
|                                                                                     |                                                             | 5.0 m                         | KM12-M12-GSGD-5     | 18 686   |
| <b>Mounting</b>                                                                     |                                                             |                               |                     |          |
|  | Mounting, for H-rail                                        |                               | CP-TS-HS35          | 170 169  |
| <b>User documentation</b>                                                           |                                                             |                               |                     |          |
|  | User documentation for input/output modules                 | German                        | P.BE.-CPEA-DE       | 165 125  |
|                                                                                     |                                                             | English                       | P.BE.-CPEA-EN       | 165 225  |
|                                                                                     |                                                             | French                        | P.BE.-CPEA-FR       | 165 127  |
|                                                                                     |                                                             | Italian                       | P.BE.-CPEA-IT       | 165 157  |
|                                                                                     |                                                             | Spanish                       | P.BE.-CPEA-ES       | 165 227  |
|                                                                                     |                                                             | Swedish                       | P.BE.-CPEA-SV       | 165 257  |
| <b>Software</b>                                                                     |                                                             |                               |                     |          |
|  | CD-ROM                                                      | Valve terminals               | P.CD-VALVE-T        | 183 350  |
|                                                                                     |                                                             | Utilities                     | P.CD-VI-UTILITIES-2 | 533 500  |

# Electrical installation system, for CPV/CPA

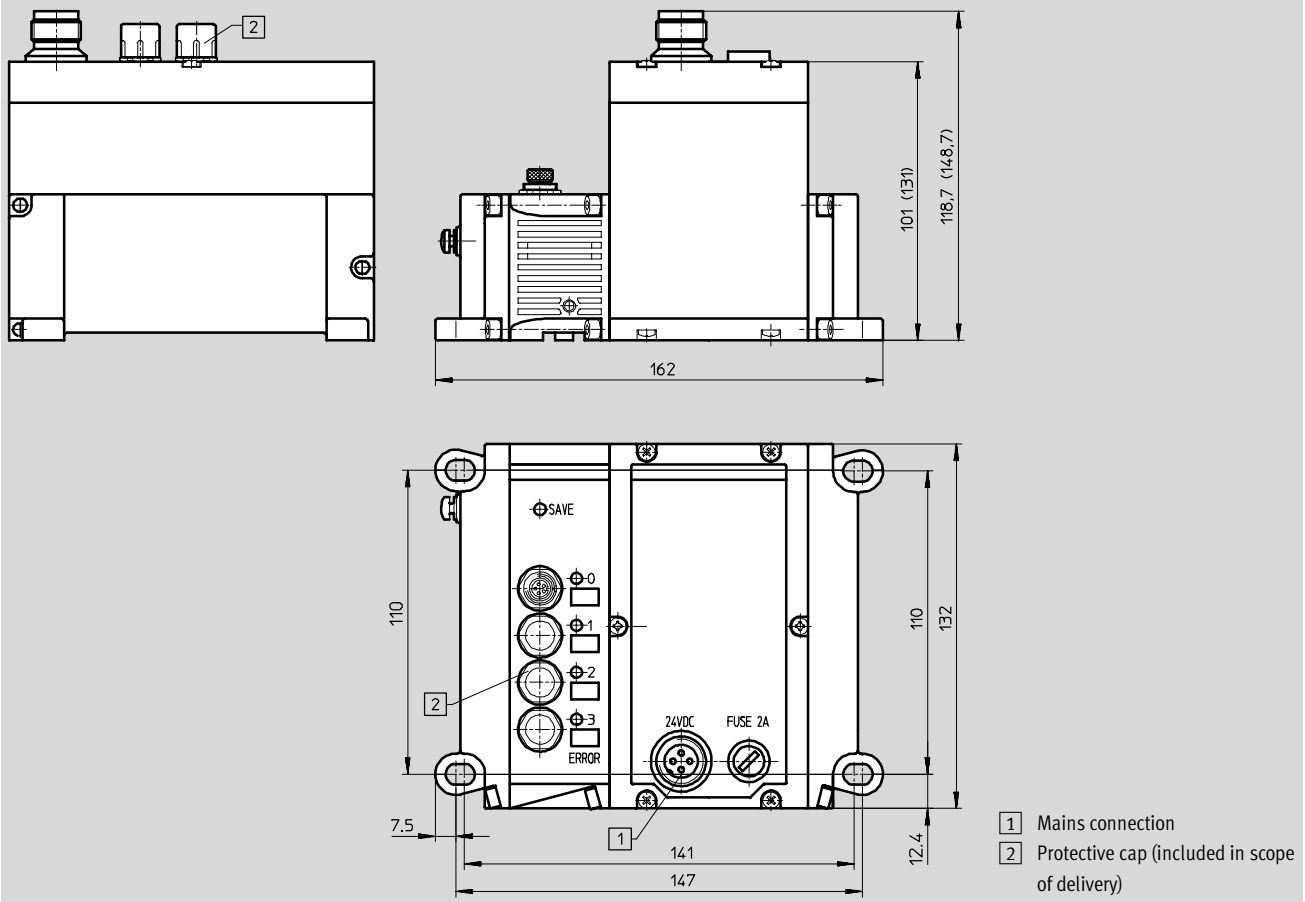
Technical data



## Dimensions

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Fieldbus node/control block



- - Note

The dimensions are valid for:

- Fieldbus node CP-FB08-03
- Integrated Festo controller CP-SF3-03
- Integrated Allen Bradley controller CP-SB/SF60-03 (dimensions in brackets)

# Electrical installation system, for CPV/CPA

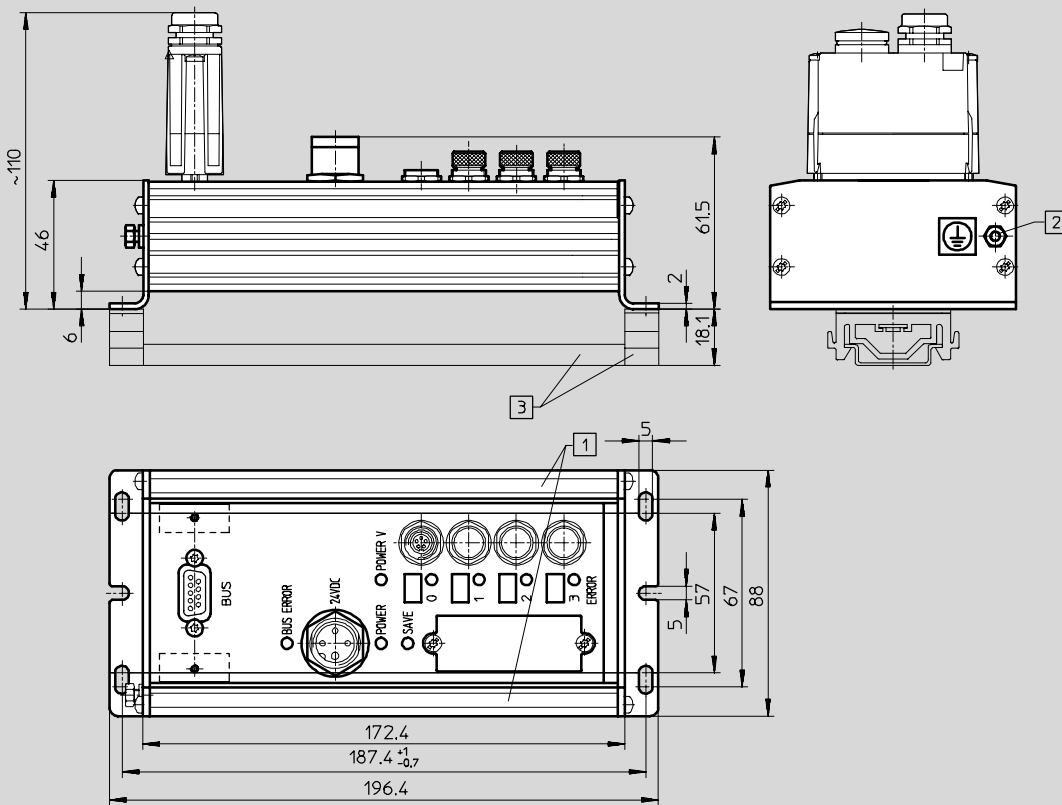
Technical data

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## Dimensions

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Fieldbus node



- 1 Inscription label slots
- 2 Earthing screw
- 3 H-rail with support base

- - Note

The dimensions are valid for the fieldbus node types:

- CP-FB05-E
  - CP-FB06-E
  - CP-FB11-E
  - CP-FB13-E
- Different height ~110 (incl. fieldbus plug) for
- CP-FB06-E with M23
  - CP-FB11-E with M12
  - CP-FB13-E with 2x M12

# Electrical installation system, for CPV/CPA

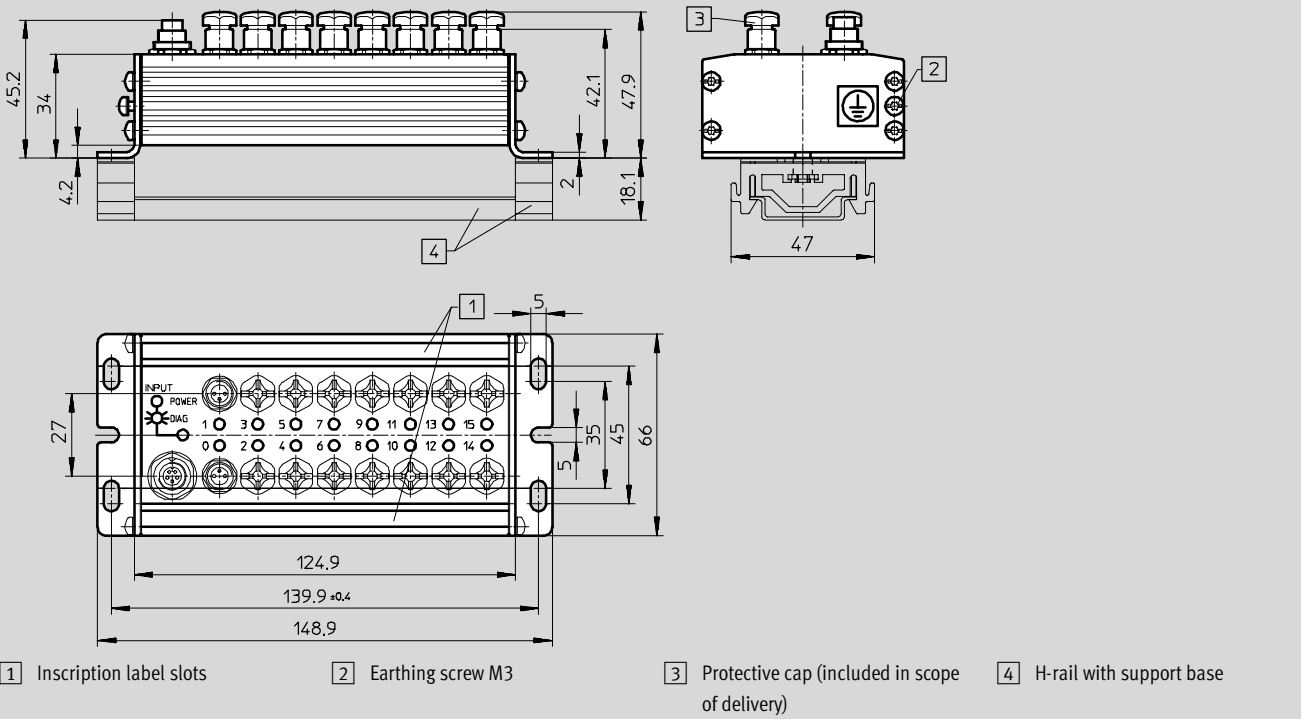
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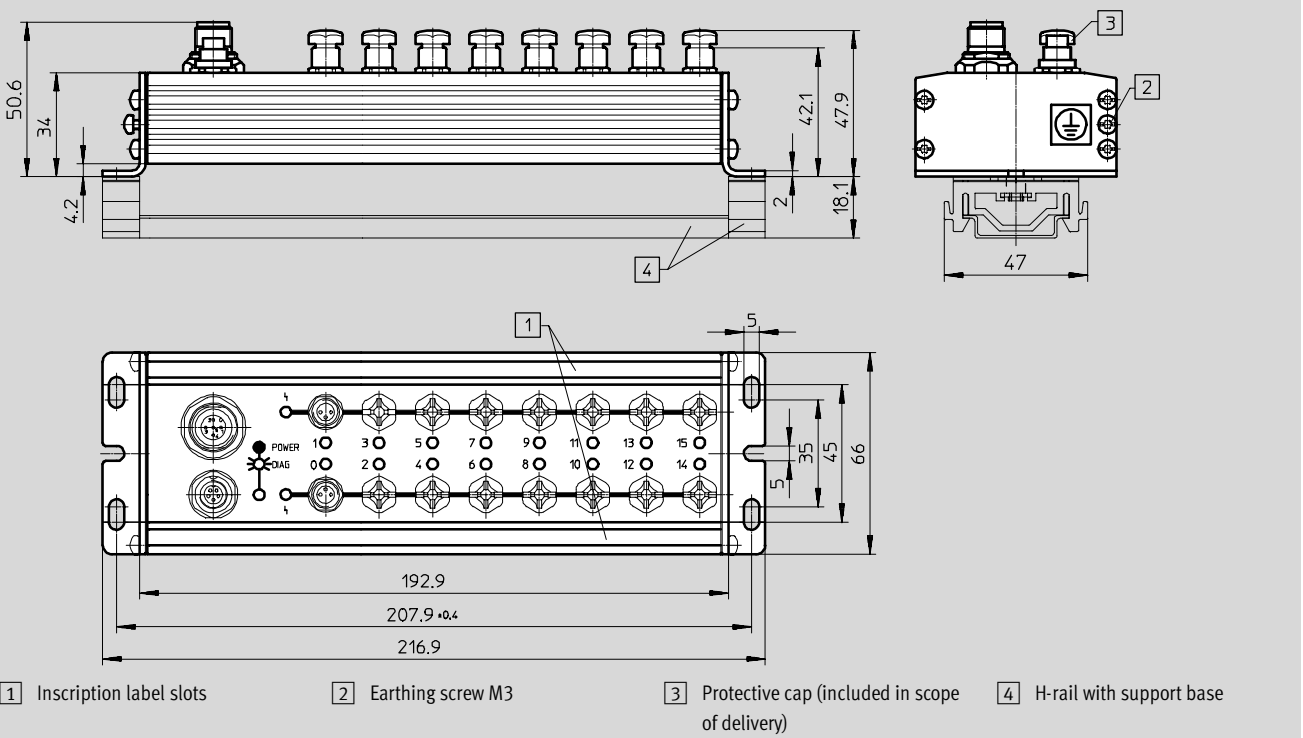
## Dimensions – 16-fold input modules

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

### CP-E16-M8



### CP-E16-M8-Z



Fieldbus systems/electrical peripherals  
CP installation system  
4.6

# Electrical installation system, for CPV/CPA

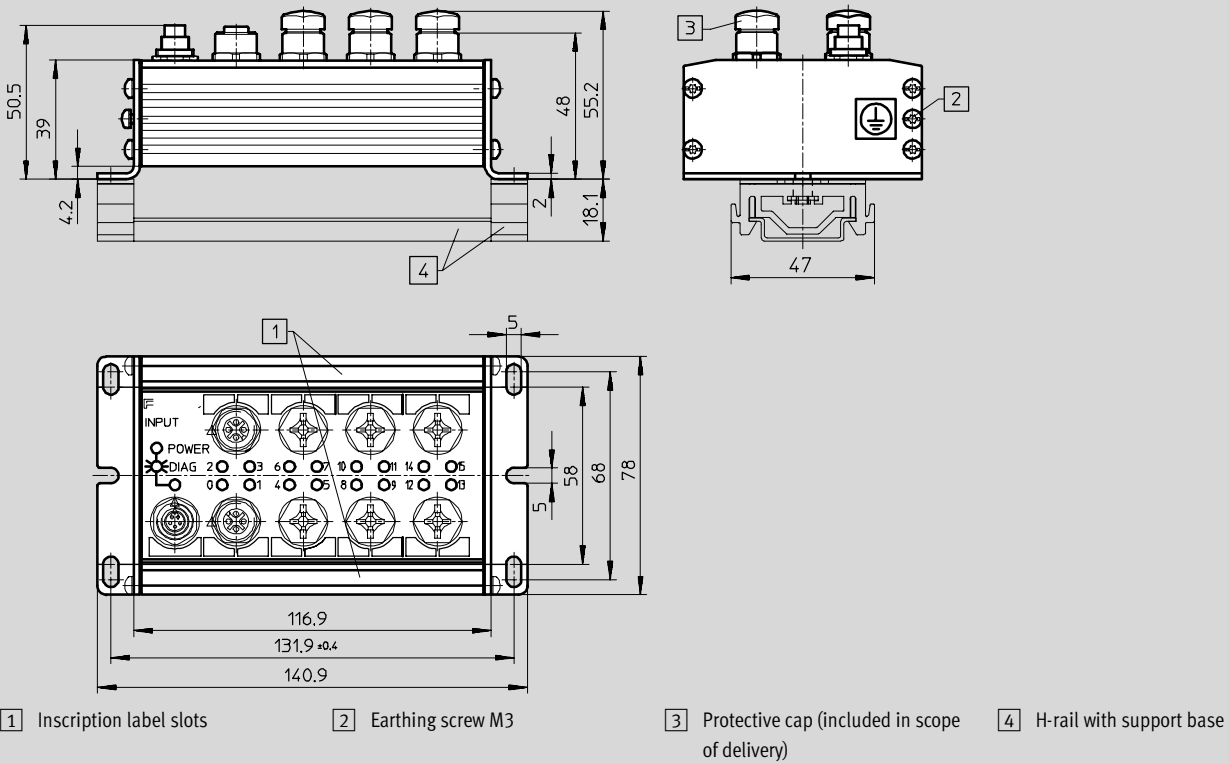
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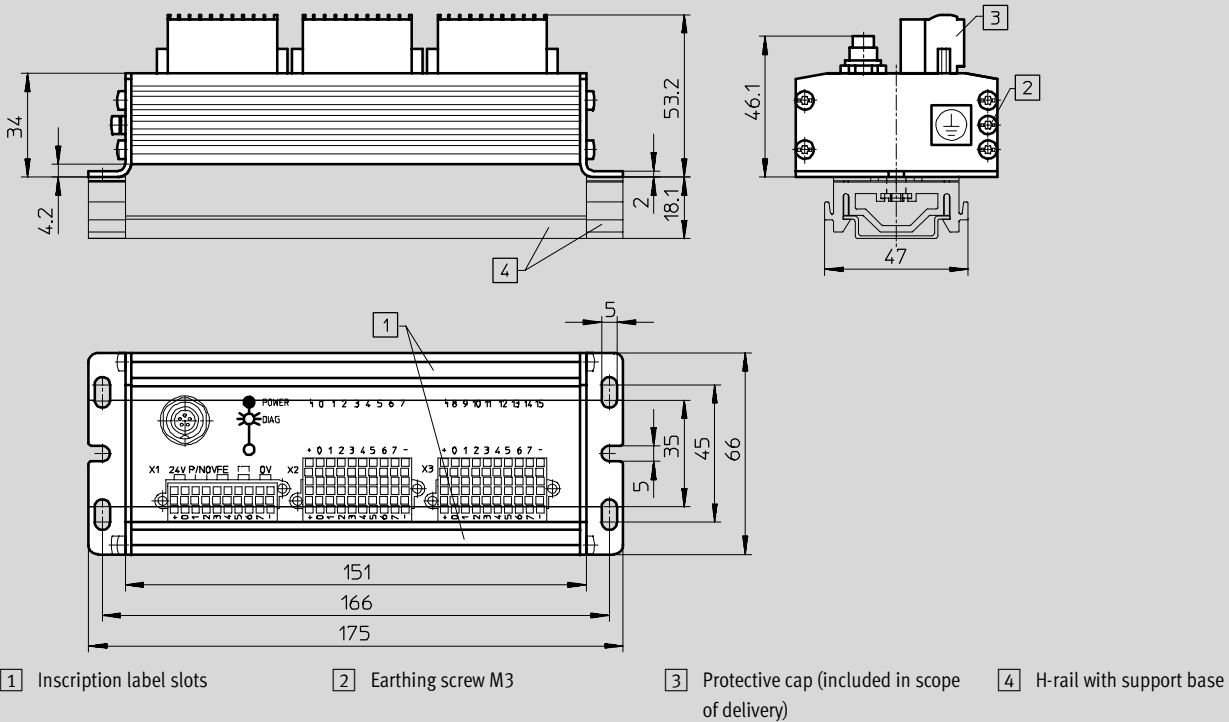
## Dimensions – 16-fold input modules

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

CP-E16-M12x2-5POL/CP-E16N-M12x2



## CP-E16-KL-IP20-Z





# Electrical installation system, for CPV/CPA

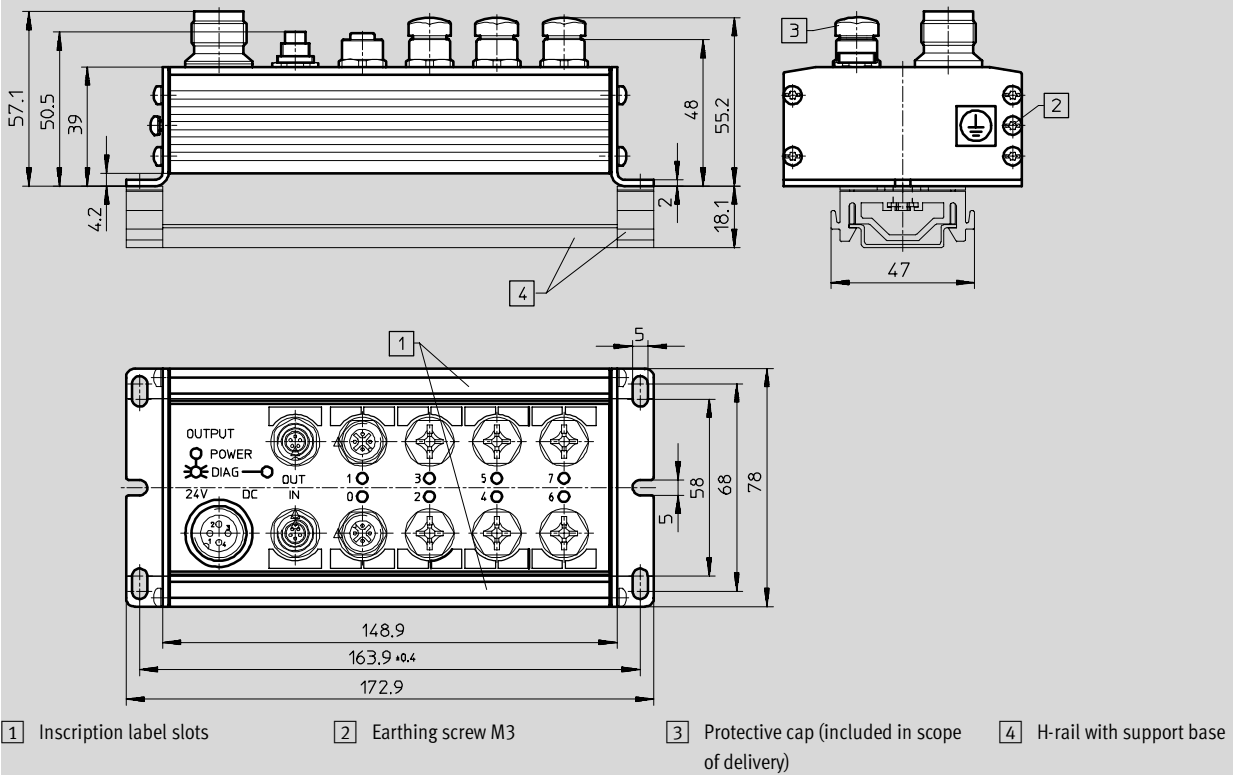
Technical data



## Dimensions – 8-fold output module

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

CP-A08-M12-5/CP-A08N-M12

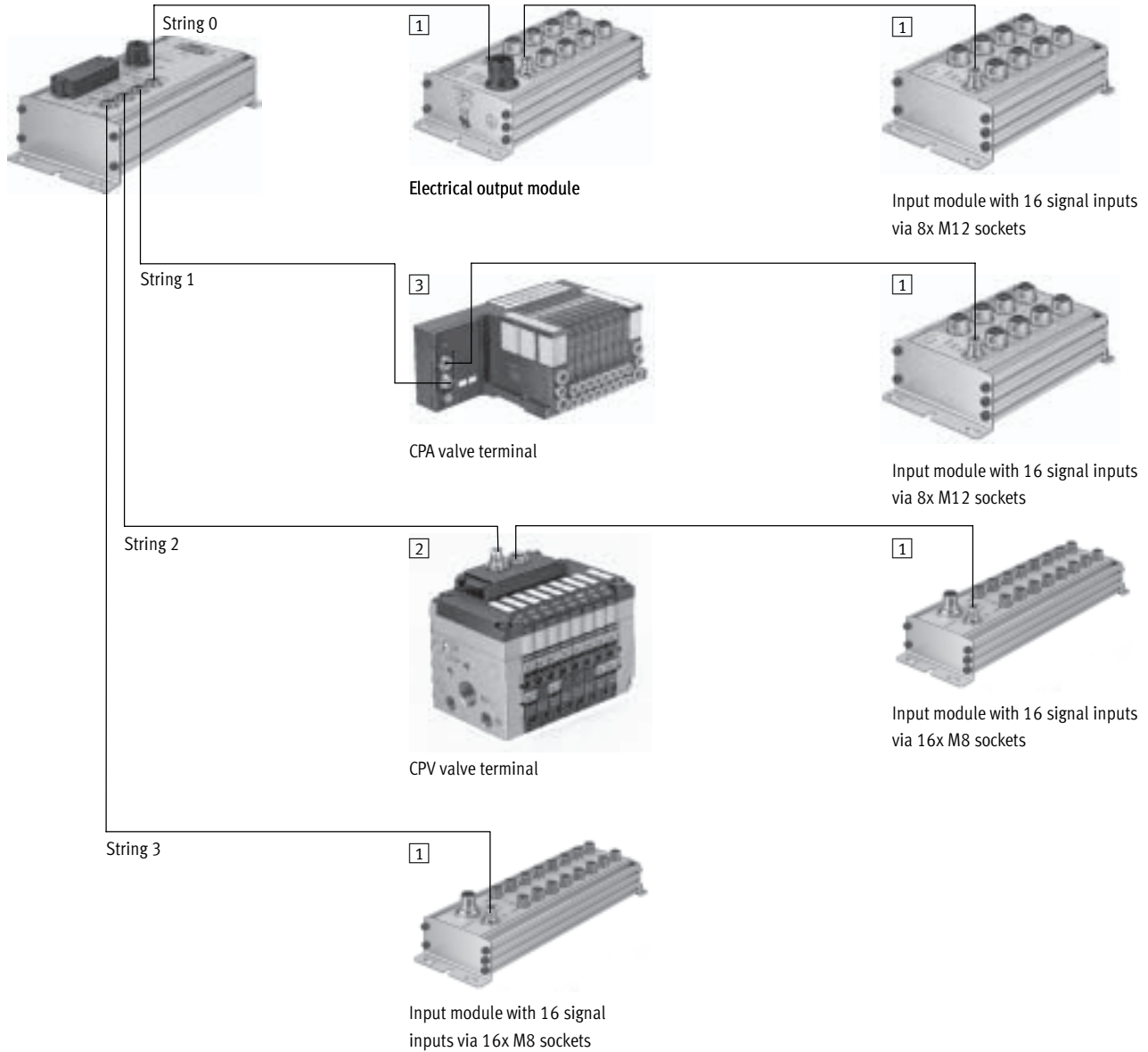


# Electrical installation system, for CPV/CPA

Order processing information



## Fieldbus node/control block



The CP electrical installation system is ordered via the catalogue using various order forms or with the valve terminal configurator using various module configurations.

- 1 The electrical CP modules, the CP cable and the required accessories are ordered via the ordering procedure for the CP installation system → 4 / 4.6-68. The CPV and CPA valve terminals are entered as placeholders on these pages; these modules are configured separately.
- 2 CPV valve terminals for operation within the CP installation system, CPV10/18-VI-FB-.... These are ordered via the ordering procedure for the CPV valve terminal → 4 / 2.1-57
- 3 CPA valve terminals for operation within the CP installation system, CPA10/14-IFB-CP-.... These are ordered via the ordering procedure for the CPA valve terminal → 4 / 2.1-110

# Electrical installation system, for CPV/CPA

Order processing information

FESTO

## Configuration guidelines

- Up to 64 inputs and 64 outputs can be connected to each node in up to 4 strings.
- Up to 16 inputs and 16 outputs can be included in each string.
- Each string may include one module with outputs (electrical or pneumatic) and one module with inputs.
- Ascending consecutive numbers should be assigned to the strings, i.e. starting with string 0, followed by string 1 ... etc. without omitting any numbers.
- Valve terminals and output modules have one plug each for valve terminal input connection and valve terminal output connection.
- Input modules have only one plug for valve terminal input connection.
- Starting at the node, a valve terminal (or an output module) is connected first, followed by an input module.
- An input module can also be connected directly to the node. However, only the input module can be included in the string in this case.
- The modules are connected to one another and to the fieldbus node with prefabricated cables.
- Cable length for any given string may not exceed 10 m.
- Cables are available with lengths of 0.5 m, 2 m, 5 m and 8 m  
→ 4 / 4.6-69

# Electrical installation system, for CPV/CPA

Ordering data – Modular products



**M** Mandatory data →

|                         |                                        |                                            |
|-------------------------|----------------------------------------|--------------------------------------------|
| <b>Module No.</b>       | <b>Valve terminal, electrical part</b> | <b>Fieldbus node/control block</b>         |
| 18 270                  | ECP                                    | D1, FB5, FB6, FB8, F11, F13, SF3, SB6, SF6 |
| <b>Ordering example</b> |                                        |                                            |
| <b>18 270</b>           | <b>ECP</b>                             | <b>- F13</b>                               |
| 1                       | 2                                      | 3                                          |

**Ordering table**

|          |                                          |                                                        | Condi-<br>tions | Code        | Enter<br>code |
|----------|------------------------------------------|--------------------------------------------------------|-----------------|-------------|---------------|
| <b>M</b> | <b>1</b> Module No.                      | <b>18 270</b>                                          |                 |             |               |
|          | <b>2</b> Valve terminal, electrical part | Electrical installation system for type 10/12, CPA/CPV |                 | <b>ECP</b>  | ECP           |
|          | <b>3</b> Fieldbus node and control block | Place holder for valve terminals with Direct Link      | <b>1</b>        | <b>-D1</b>  |               |
|          |                                          | Festo fieldbus, ABB (CS31), Moeller, Suconet K         |                 | <b>-FB5</b> |               |
|          |                                          | INTERBUS                                               |                 | <b>-FB6</b> |               |
|          |                                          | Allen Bradley (1771 RIO)                               |                 | <b>-FB8</b> |               |
|          |                                          | DeviceNet                                              |                 | <b>-F11</b> |               |
|          |                                          | PROFIBUS DP, 12 MBd                                    |                 | <b>-F13</b> |               |
|          |                                          | Control block SF3 (with Festo fieldbus)                |                 | <b>-SF3</b> |               |
|          |                                          | Control block SB60                                     |                 | <b>-SB6</b> |               |
|          |                                          | Control block SF60 (with DeviceNet)                    |                 | <b>-SF6</b> |               |

**1** **D1** Only 1 string may be occupied.

Fieldbus systems/electrical peripherals  
CP installation system

## 4.6

Transfer order code

|               |            |   |   |
|---------------|------------|---|---|
| <b>18 270</b> | <b>ECP</b> | - |   |
| 1             | 2          |   | 3 |

# Electrical installation system, for CPV/CPA

Ordering data – Modular products



| M Mandatory data                                                                                                                                                                                                                  | O Options |          |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|----------|
| String 1                                                                                                                                                                                                                          | String 2  | String 3 | String 4 |
| <b>4 First connecting cable:</b> Q, R, S, K, L, U, V, W<br><b>5 Input module, output module:</b> E, M, F, A, I, J, C, N, P<br><b>6 Second connecting cable:</b> Q, R, S, K, L, U, V, W<br><b>7 Input module:</b> E, M, F, I, J, N |           |          |          |
| - Q I , K E , L A ,                                                                                                                                                                                                               |           |          |          |
| 4 + 5 + 6 + 7                                                                                                                                                                                                                     |           |          |          |

| Ordering table |                         |                                                               |                 |      |               |
|----------------|-------------------------|---------------------------------------------------------------|-----------------|------|---------------|
| Module No.     |                         | 18 270                                                        | Condi-<br>tions | Code | Enter<br>code |
| ↓              | String 1 ... 4          |                                                               | 2               | -    | -             |
| M 4            | First connecting cable  | Terminal connection cable WS-WD, 0.5 m                        | 3               | Q    |               |
|                |                         | Terminal connection cable WS-WD, 2 m                          | 3               | R    |               |
|                |                         | Terminal connection cable WS-WD, 5 m                          | 3               | S    |               |
|                |                         | Terminal connection cable GS-WD, 5 m                          | 3               | K    |               |
|                |                         | Terminal connection cable GS-WD, 8 m                          | 3               | L    |               |
|                |                         | Terminal connection cable GS-GD, 2 m, for chain link trunking | 3               | U    |               |
|                |                         | Terminal connection cable GS-GD, 5 m, for chain link trunking | 3               | V    |               |
|                |                         | Terminal connection cable GS-GD, 8 m, for chain link trunking | 3               | W    |               |
| 5              | Input/output module     | 16-fold input module, 16xM8 (PNP)                             |                 | E    |               |
|                |                         | 16-fold input module, 16xM8 (PNP), Z                          |                 | M    |               |
|                |                         | 16-fold input module, 8xM12 (PNP) 5-pin                       |                 | F    |               |
|                |                         | 8-fold output module, 8xM12 (PNP) 5-pin                       |                 | A    |               |
|                |                         | 16-fold input module, 16xM8 (NPN)                             |                 | I    |               |
|                |                         | 16-fold input module, 8xM12 (NPN)                             |                 | J    |               |
|                |                         | 8-fold output module, 8xM12 (NPN)                             |                 | C    |               |
|                |                         | 16-fold input module, IP20, terminals, Z                      |                 | N    |               |
|                |                         | Place holder for valve terminal CPV, CPA                      |                 | P    |               |
| 6              | Second connecting cable | Terminal connection cable WS-WD, 0.5 m                        | 3               | Q    |               |
|                |                         | Terminal connection cable WS-WD, 2 m                          | 3               | R    |               |
|                |                         | Terminal connection cable WS-WD, 5 m                          | 3 4             | S    |               |
|                |                         | Terminal connection cable GS-WD, 5 m                          | 3 4             | K    |               |
|                |                         | Terminal connection cable GS-WD, 8 m                          | 3 4             | L    |               |
|                |                         | Terminal connection cable GS-GD, 2 m, for chain link trunking | 3               | U    |               |
|                |                         | Terminal connection cable GS-GD, 5 m, for chain link trunking | 3 4             | V    |               |
|                |                         | Terminal connection cable GS-GD, 8 m, for chain link trunking | 3 4             | W    |               |
| 7              | Input module            | 16-fold input module, 16xM8 (PNP)                             | 5               | E    |               |
|                |                         | 16-fold input module, 16xM8 (PNP), Z                          | 5               | M    |               |
|                |                         | 16-fold input module, 8xM12 (PNP) 5-pin                       | 5               | F    |               |
|                |                         | 16-fold input module, 16xM8 (NPN)                             | 5               | I    |               |
|                |                         | 16-fold input module, 8xM12 (NPN)                             | 5               | J    |               |
|                |                         | 16-fold input module, IP20, terminals, Z                      | 5               | N    |               |

2 String 1 ... 4 The strings must be continuously occupied; min. string 1.

3 Q, R, S, K, L, U, V, W

An input module/output module must always be selected to follow the connecting cable.

4 S, K, L, V, W Max. total length per string: 10 m.

5 E, M, F, I, J, N Only 1 input module may be selected per string.

### Transfer order code

- \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_  
4 + 5 + 6 + 7

# Electrical installation system, for CPV/CPA

Ordering data – Modular products



## Options

| Accessories | Power supply socket | Fieldbus connection socket/plug | Fieldbus connection | Cable socket | Sensor plug                  | DUO plug   | H-rail mounting set | Connection set | User documentation |
|-------------|---------------------|---------------------------------|---------------------|--------------|------------------------------|------------|---------------------|----------------|--------------------|
| ZCP         | ...M, ...N, ...I    | Z, T, U, F, G, V                | ...OF               | ...D         | ...S, ...W, ...P, ...R, ...C | ...X, ...K | ...H                | ...Y           | B                  |
| ZCP         | -                   | V                               |                     |              |                              |            | 10H                 |                |                    |

8

## Ordering table

| Module No. |                                                  | 18 270                                                                    | Condi-<br>tions | Code | Enter<br>code |
|------------|--------------------------------------------------|---------------------------------------------------------------------------|-----------------|------|---------------|
| 0 8        | Accessories                                      | Accessories for electrical installation system for type 10/12 CPV/CPA     |                 | ZCP- | ZCP-          |
|            | Power supply socket                              | straight, for 1.5 mm <sup>2</sup>                                         | 1 ... 99        | 6    | ...M          |
|            |                                                  | straight, for 2.5 mm <sup>2</sup>                                         | 1 ... 99        | 6    | ...N          |
|            |                                                  | angled, for 1.5 mm <sup>2</sup>                                           | 1 ... 99        | 6    | ...I          |
|            | Fieldbus connection socket/plug                  | 2 cable sockets, straight, Pg7                                            |                 | 7    | Z             |
|            |                                                  | 2 cable sockets, straight, Pg9                                            |                 | 7    | T             |
|            |                                                  | 2 cable sockets, straight, Pg13.5                                         |                 | 7    | U             |
|            |                                                  | 2 cable sockets, angled, Pg7                                              |                 | 7    | F             |
|            |                                                  | 2 cable sockets, angled, Pg9                                              |                 | 7    | G             |
|            |                                                  | 1 Sub-D fieldbus plug for Profibus DP                                     |                 | 8 9  | V             |
|            | Fieldbus connection 2xM12 ReverseKey Profibus DP | 1 ... 99                                                                  |                 | 8 10 | ...OF         |
|            | Cable socket                                     | straight, Pg9, 5-pin                                                      | 1 ... 99        | 11   | ...D          |
|            | Sensor plug                                      | straight, M12, Pg7                                                        | 1 ... 99        | 12   | ...S          |
|            |                                                  | 4-pin, M12, for 2.5 mm cable OD                                           | 1 ... 99        | 12   | ...W          |
|            |                                                  | M12, Pg7, 5-pin                                                           | 1 ... 99        | 12   | ...P          |
|            |                                                  | straight, M8, solderable                                                  | 1 ... 99        | 13   | ...R          |
|            |                                                  | straight, M8, screw-in                                                    | 1 ... 99        | 13   | ...C          |
|            | DUO plug                                         | M12 (2 cable outlets)                                                     | 1 ... 99        | 14   | ...X          |
|            |                                                  | M12 for 2 cables, 5-pin                                                   | 1 ... 99        | 14   | ...K          |
|            | H-rail mounting set for modules                  | 1 ... 99                                                                  |                 |      | ...H          |
|            | Connection set complete CP for CP-E16-KL-IP20-Z  | 1 ... 99                                                                  |                 | 15   | ...Y          |
|            | User documentation                               | Express waiver - no user documentation to be included (already available) |                 | 6    | B             |

6 M, N, I, B Not with fieldbus node and control block D1.

7 Z, T, U, F, G Only with fieldbus node and control block FB8, SF3, D1.

8 V, OF Only with fieldbus node and control block FB5, F13, D1.

9 V Not with accessory OF.

10 OF Not with accessory V.

11 D Only with fieldbus node and control block F11, SF6 or with input module M.

12 S, W, P Only with input module F or with output module A.

13 R, C Only with input module E, M, I.

14 X, K Only with input module F, J or output module A, C.

15 Y Only with input module N.

## Transfer order code

|     |   |  |  |  |  |  |  |  |  |
|-----|---|--|--|--|--|--|--|--|--|
| ZCP | - |  |  |  |  |  |  |  |  |
|-----|---|--|--|--|--|--|--|--|--|

8

# Electrical installation system, for CPV/CPA

FESTO

Accessories

| Accessories for bus nodes/control blocks – Product range overview |                    |     |     |     |     |     |      |      |     |
|-------------------------------------------------------------------|--------------------|-----|-----|-----|-----|-----|------|------|-----|
| Designation                                                       | Type               | FB5 | FB6 | FB8 | F11 | F13 | SB60 | SF60 | SF3 |
| <b>Fieldbus connection</b>                                        |                    |     |     |     |     |     |      |      |     |
| Bus connection, straight, PG7                                     | FBSD-GD-7          | -   | -   | ■   | -   | -   | -    | -    | ■   |
| Bus connection, straight, PG9                                     | FBSD-GD-9          | -   | -   | ■   | -   | -   | -    | -    | ■   |
| Bus connection, straight, PG9, 5-pin                              | FBSD-GD-9-5POL     | -   | -   | -   | ■   | -   | ■    | ■    | -   |
| Bus connection, straight, PG13.5                                  | FBSD-GD-13,5       | -   | -   | ■   | -   | -   | -    | -    | ■   |
| Bus connection, angled, PG7                                       | FBSD-WD-7          | -   | -   | ■   | -   | -   | -    | -    | ■   |
| Bus connection, angled, PG9                                       | FBSD-WD-9          | -   | -   | ■   | -   | -   | -    | -    | ■   |
| Plug, Sub-D                                                       | FBS-SUB-9-GS-9     | ■   | -   | -   | -   | ■   | -    | -    | -   |
| Plug, Sub-D                                                       | FBS-SUB-9-GS-DP-B  | ■   | -   | -   | -   | ■   | -    | -    | -   |
| Bus connection, 2x M12 adapter plug (B-coded)                     | FBA-2-M12-5POL-RK  | ■   | -   | -   | -   | ■   | -    | -    | -   |
| Plug, straight, 5-pin for T-adapter                               | FBS-M12-5GS-PG9    | -   | -   | -   | -   | -   | ■    | ■    | -   |
| T-adapter for DH-485                                              | FB-TA-M12-5POL     | -   | -   | -   | -   | -   | ■    | ■    | -   |
| T-adapter for fieldbus                                            | FB-TA              | -   | -   | -   | -   | -   | -    | -    | ■   |
| <b>Power supply</b>                                               |                    |     |     |     |     |     |      |      |     |
| Power supply socket, straight, for 1.5 mm <sup>2</sup>            | NTSD-GD-9          | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| Power supply socket, straight, for 2.5 mm <sup>2</sup>            | NTSD-GD-13,5       | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| Power supply socket, angled, for 1.5 mm <sup>2</sup>              | NTSD-WD-9          | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| Power supply socket, angled, for 2.5 mm <sup>2</sup>              | NTSD-WD-11         | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| <b>Diagnostic/data connection</b>                                 |                    |     |     |     |     |     |      |      |     |
| Programming cable, 3 m                                            | KDI-SB60-3,0-M12   | -   | -   | -   | -   | -   | ■    | ■    | -   |
| Programming cable, 6 m                                            | KDI-SB60-6,0-M12   | -   | -   | -   | -   | -   | ■    | ■    | -   |
| Programming cable, 10 m                                           | KDI-SB60-10,0-M12  | -   | -   | -   | -   | -   | ■    | ■    | -   |
| Programming cable                                                 | KDI-SB202-BU9      | -   | -   | -   | -   | -   | -    | -    | ■   |
| Cable for DTAM Micro, 3 m                                         | KDTAM-SB60-3-M12   | -   | -   | -   | -   | -   | ■    | ■    | -   |
| Cable for DTAM Micro, 6 m                                         | KDTAM-SB60-6-M12   | -   | -   | -   | -   | -   | ■    | ■    | -   |
| Cable for DTAM Micro, 10 m                                        | KDTAM-SB60-10-M12  | -   | -   | -   | -   | -   | ■    | ■    | -   |
| <b>Valve terminal connection</b>                                  |                    |     |     |     |     |     |      |      |     |
| Connecting cable WS-WD, 0.5 m                                     | KVI-CP-1-WS-WD-0,5 | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| Connecting cable WS-WD, 2 m                                       | KVI-CP-1-WS-WD-2   | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| Connecting cable WS-WD, 5 m                                       | KVI-CP-1-WS-WD-5   | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| Connecting cable GS-WD, 5 m                                       | KVI-CP-1-GS-WD-5   | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| Connecting cable GS-WD, 8 m                                       | KVI-CP-1-GS-WD-8   | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| Connecting cable GS-GD, 2 m, for chain link trunking              | KVI-CP-2-GS-GD-2   | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| Connecting cable GS-GD, 5 m, for chain link trunking              | KVI-CP-2-GS-GD-5   | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| Connecting cable GS-GD, 8 m, for chain link trunking              | KVI-CP-2-GS-GD-8   | ■   | ■   | ■   | ■   | ■   | ■    | ■    | ■   |
| <b>Mounting</b>                                                   |                    |     |     |     |     |     |      |      |     |
| Mounting, for H-rail                                              | CP-TS-HS35         | ■   | ■   | -   | ■   | ■   | -    | -    | -   |
|                                                                   | IBGH-03-4,0        | -   | -   | ■   | -   | -   | ■    | ■    | ■   |

Fieldbus systems/electrical peripherals  
CP installation system

4.6

# Electrical installation system, for CPV/CPA

FESTO

Accessories

| Accessories for I/O modules – Product range overview      |                          |                                    |                      |
|-----------------------------------------------------------|--------------------------|------------------------------------|----------------------|
| Designation                                               | Type                     | 16-fold input module <sup>1)</sup> | 8-fold output module |
| <b>Power supply</b>                                       |                          |                                    |                      |
| Power supply socket, straight, for 1.5 mm <sup>2</sup>    | NTSD-GD-9                | –                                  | ■                    |
| Power supply socket, straight, for 2.5 mm <sup>2</sup>    | NTSD-GD-13,5             | –                                  | ■                    |
| Power supply socket, angled, for 1.5 mm <sup>2</sup>      | NTSD-WD-9                | –                                  | ■                    |
| Power supply socket, angled, for 2.5 mm <sup>2</sup>      | NTSD-WD-11               | –                                  | ■                    |
| Power supply socket, straight                             | FBSD-GD-9-5POL           | ■                                  | –                    |
| Plug                                                      | PS1-SAC10-10POL          | ■                                  | –                    |
| Plug, screw terminal socket                               | PS1-ZC13-10POL-SCHRAUBKL | ■                                  | –                    |
| <b>Plugs and sockets</b>                                  |                          |                                    |                      |
| Plug, straight socket, M12, 4-pin, PG7                    | SEA-GS-7                 | ■                                  | ■                    |
| Plug, straight socket, M12, 4-pin, 2.5 mm <sup>2</sup> OD | SEA-4GS-7-2,5            | ■                                  | ■                    |
| Plug, straight socket, M12, 5-pin, PG7                    | SEA-M12-5GS-PG7          | ■                                  | ■                    |
| Plug, straight, M8, 3-pin, solderable                     | SEA-GS-M8                | ■                                  | –                    |
| Plug, straight, M8, 3-pin, screw-in                       | SEA-3GS-M8-S             | ■                                  | –                    |
| Plug for 2 sensor cables, M12, PG11, 4-pin                | SEA-GS-11-DUO            | ■                                  | ■                    |
| Plug for 2 sensor cables, M12, PG11, 5-pin                | SEA-5GS-11-DUO           | ■                                  | ■                    |
| <b>Cables</b>                                             |                          |                                    |                      |
| DUO cable, 2x straight socket                             | KM12-DUO-M8-GDGD         | ■                                  | ■                    |
| DUO cable, 2x straight/angled socket                      | KM12-DUO-M8-GDWD         | ■                                  | ■                    |
| DUO cable, 2x angled socket                               | KM12-DUO-M8-WDWD         | ■                                  | ■                    |
| Connecting cable, M12-M12, 4-pin, 2.5 m                   | KM12-M12-GSGD-2,5        | ■                                  | ■                    |
| Connecting cable, M12-M12, 4-pin, 5 m                     | KM12-M12-GSGD-5          | ■                                  | ■                    |
| <b>Connection sets for power supply and sensors</b>       |                          |                                    |                      |
| Connection set, standard tension-spring socket, 3/1-row   | SEA-KL-SAC10/30          | ■                                  | –                    |
| Plug, tension-spring socket, 1-row                        | PS1-ZC13Z-10POL-ZUGFEDER | ■                                  | –                    |
| Plug, screw terminal socket, 1-row, 10-pin                | PS1-ZC13-10POL-SCHRAUBKL | ■                                  | –                    |
| <b>Mounting</b>                                           |                          |                                    |                      |
| Mounting, for H-rail                                      | CP-TS-HS35               | ■                                  | ■                    |

1 Only with modules with additional power supply



# Electrical installation system, for CPV/CPA

Accessories

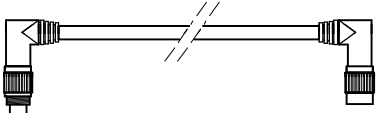
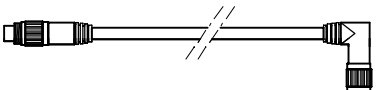
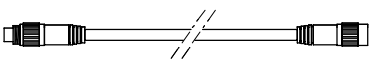
FESTO

## Connecting cable

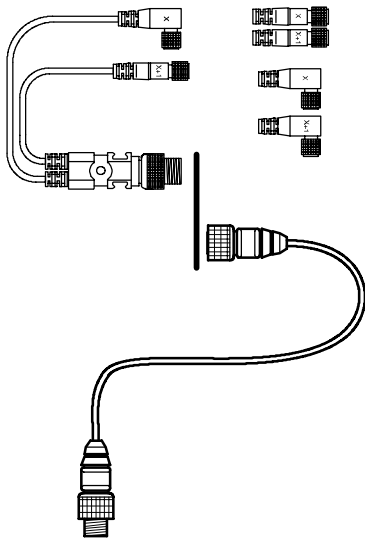
The modules are connected to one another and to the fieldbus node or control block with prefabricated cables. Two types of cable are available:

- Standard cable with polyurethane casing
  - Suitable for chain link trunking
- Cable length for any given string may not exceed 10 m.

## Ordering data

| Designation                                                                        | Type                         | Part No.           |         |
|------------------------------------------------------------------------------------|------------------------------|--------------------|---------|
| <b>Connecting cable between angled plug and angled socket</b>                      |                              |                    |         |
|   | 0.5 m                        | KVI-CP-1-WS-WD-0,5 | 178 564 |
|                                                                                    | 2 m                          | KVI-CP-1-WS-WD-2   | 163 139 |
|                                                                                    | 5 m                          | KVI-CP-1-WS-WD-5   | 163 138 |
| <b>Connecting cable between straight plug and angled socket</b>                    |                              |                    |         |
|   | 5 m                          | KVI-CP-1-GS-WD-5   | 163 137 |
|                                                                                    | 8 m                          | KVI-CP-1-GS-WD-8   | 163 136 |
| <b>Connecting cable between straight plug and straight socket</b>                  |                              |                    |         |
|  | 2 m, for chain link trunking | KVI-CP-2-GS-GD-2   | 170 234 |
|                                                                                    | 5 m, for chain link trunking | KVI-CP-2-GS-GD-5   | 170 235 |
|                                                                                    | 8 m, for chain link trunking | KVI-CP-2-GS-GD-8   | 165 616 |

## DUO cable

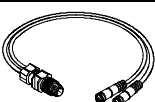


Two inputs are always connected to one plug with 16-fold input modules with M12 connection. With the 8-fold output modules with M12 connection two outputs can optionally be connected to one socket. 2 sensors/ outputs can be connected to a single plug with DUO cables. The DUO cables are 500 mm long.

Great distances can be covered with the extension cables. Connections can be established inside the cable duct as well.

DUO cables are not ordered as part of the ident. code, but rather separately with the indicated part numbers.


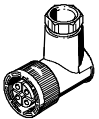








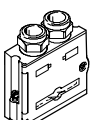


## Ordering data

| Designation                                                                         | Type                      | Part No.         |        |
|-------------------------------------------------------------------------------------|---------------------------|------------------|--------|
| <b>Cables</b>                                                                       |                           |                  |        |
|  | 2x straight socket        | KM12-DUO-M8-GDGD | 18 685 |
|                                                                                     | 2x straight/angled socket | KM12-DUO-M8-GDWD | 18 688 |
|                                                                                     | 2x angled socket          | KM12-DUO-M8-WDWD | 18 687 |

# Electrical installation system, for CPV/CPA

Accessories

**FESTO**

| Ordering data                                                                       |                                                              |                         |                          |          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------|--------------------------|----------|
| Designation                                                                         |                                                              |                         | Type                     | Part No. |
| <b>Power supply</b>                                                                 |                                                              |                         |                          |          |
|    | Power supply socket, straight                                | for 1.5 mm <sup>2</sup> | NTSD-GD-9                | 18 493   |
|                                                                                     |                                                              | for 2.5 mm <sup>2</sup> | NTSD-GD-13,5             | 18 526   |
|    | Power supply socket, angled                                  | for 1.5 mm <sup>2</sup> | NTSD-WD-9                | 18 527   |
|                                                                                     |                                                              | for 2.5 mm <sup>2</sup> | NTSD-WD-11               | 533 119  |
|    | Power supply socket, straight, M12                           |                         | FBSD-GD-9-5POL           | 18 324   |
|    | Plug, tension-spring socket screw-in (4 pieces)              | 1-row, 10-pin           | PS1-SAC10-10POL          | 197 159  |
|    | Plug, screw terminal socket plug-in (4 pieces)               | 1-row, 10-pin           | PS1-ZC13-10POL-SCHRAUBKL | 160 800  |
| <b>Fieldbus connection</b>                                                          |                                                              |                         |                          |          |
|  | Bus connection, straight                                     | PG7                     | FBSD-GD-7                | 18 497   |
|                                                                                     |                                                              | PG9                     | FBSD-GD-9                | 18 495   |
|                                                                                     |                                                              | PG13.5                  | FBSD-GD-13,5             | 18 496   |
|  | Bus connection, angled                                       | PG7                     | FBSD-WD-7                | 18 524   |
|  | Bus connection, straight, PG9, 5-pin                         |                         | FBSD-GD-9-5POL           | 18 324   |
|  | Plug, straight, 5-pin for T-adapter                          |                         | FBS-M12-5GS-PG9          | 175 380  |
|  | T-adapter for DH-485                                         |                         | FB-TA-M12-5POL           | 171 175  |
|                                                                                     | T-adapter for fieldbus                                       |                         | FB-TA                    | 18 498   |
|  | Plug Sub-D, for Profibus DP                                  |                         | FBS-SUB-9-GS-DP-B        | 532 216  |
|  | Bus connection 2x M12 adapter plug (B-coded) for Profibus DP |                         | FBA-2-M12-5POL-RK        | 533 118  |
| <b>Cables</b>                                                                       |                                                              |                         |                          |          |
|  | Connecting cable, M12, 4-pin, straight plug-straight socket  | 2.5 m                   | KM12-M12-GSGD-2,5        | 18 684   |
|                                                                                     |                                                              | 5.0 m                   | KM12-M12-GSGD-5          | 18 686   |
|                                                                                     | Connecting cable, M8, straight plug-straight socket          | 0.5 m                   | KM8-M8-GSGD-0,5          | 175 488  |
|                                                                                     |                                                              | 1.0 m                   | KM8-M8-GSGD-1            | 175 489  |
|                                                                                     |                                                              | 2.5 m                   | KM8-M8-GSGD-2,5          | 165 610  |
|                                                                                     |                                                              | 5.0 m                   | KM8-M8-GSGD-5            | 165 611  |




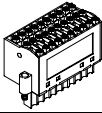


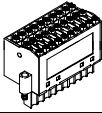

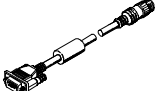
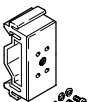
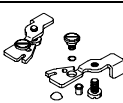


Fieldbus systems/electrical peripherals  
CP installation system

4.6

# Electrical installation system, for CPV/CPA

Accessories


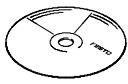
FESTO

| Ordering data                                                                       |                                                                                                       |                               |                          |          |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------|----------|
| Designation                                                                         |                                                                                                       |                               | Type                     | Part No. |
| <b>Sensor plug</b>                                                                  |                                                                                                       |                               |                          |          |
|    | Plug, straight socket, M12                                                                            | 5-pin, PG7                    | SEA-M12-5GS-PG7          | 175 487  |
|                                                                                     |                                                                                                       | 4-pin, PG7                    | SEA-GS-7                 | 18 666   |
|                                                                                     |                                                                                                       | 4-pin, 2.5 mm <sup>2</sup> OD | SEA-4GS-7-2,5            | 192 008  |
|    | Plug, straight, M8                                                                                    | 3-pin, solderable             | SEA-GS-M8                | 18 696   |
|                                                                                     |                                                                                                       | 3-pin, screw-in               | SEA-3GS-M8-S             | 192 009  |
|    | Plug for 2 sensor cables, M12, PG11                                                                   | 4-pin                         | SEA-GS-11-DUO            | 18 779   |
|                                                                                     |                                                                                                       | 5-pin                         | SEA-5GS-11-DUO           | 192 010  |
| <b>Connection sets for mains connection and sensors</b>                             |                                                                                                       |                               |                          |          |
|    | Connection set, standard tension-spring socket, screw-in, consisting of<br>■ PS1 SAC30<br>■ PS1 SAC31 | 3/1-row                       | SEA-KL-SAC10/30          | 526 256  |
|    | Plug, tension-spring socket plug-in (4 pieces)                                                        | 1-row                         | PS1-ZC13Z-10POL-ZUGFEDER | 183 733  |
|   | Plug, screw terminal socket plug-in (4 pieces)                                                        | 1-row, 10-pin                 | PS1-ZC13-10POL-SCHRAUBKL | 160 800  |
|  | Plug, tension-spring socket screw-in                                                                  | 3-row, 30-pin                 | PS1 SAC30                | 197 161  |
|                                                                                     | Plug, tension-spring socket screw-in, with LED                                                        | 3-row, 30-pin                 | PS1 SAC31                | 197 162  |
| <b>Diagnostic/data connection</b>                                                   |                                                                                                       |                               |                          |          |
|  | Programming cable                                                                                     | 3 m                           | KDI-SB60-3,0-M12         | 171 173  |
|                                                                                     |                                                                                                       | 6 m                           | KDI-SB60-6,0-M12         | 175 686  |
|                                                                                     |                                                                                                       | 10 m                          | KDI-SB60-10,0-M12        | 171 174  |
|                                                                                     | Programming cable                                                                                     |                               | KDI-SB202-BU9            | 150 268  |
|  | Cable for DTAM Micro                                                                                  | 3 m                           | KDTAM-SB60-3-M12         | 188 979  |
|                                                                                     |                                                                                                       | 6 m                           | KDTAM-SB60-6-M12         | 188 980  |
|                                                                                     |                                                                                                       | 10 m                          | KDTAM-SB60-10-M12        | 188 981  |
| <b>Mounting</b>                                                                     |                                                                                                       |                               |                          |          |
|  | Mounting, for H-rail                                                                                  |                               | CP-TS-HS35               | 170 169  |
|  | Mounting, for H-rail                                                                                  |                               | IBGH-03-4,0              | 18 649   |
| <b>Inscription labels</b>                                                           |                                                                                                       |                               |                          |          |
|  | Inscription labels, 6x10 in frames (64 pieces)                                                        |                               | IBS-6x10                 | 18 576   |
|  | Inscription labels, 9x20 in frames (20 pieces)                                                        |                               | IBS-9x20                 | 18 182   |

# Electrical installation system, for CPV/CPA

Accessories

**FESTO**

| Ordering data                                                                       |                                                 |                   |                        |          |
|-------------------------------------------------------------------------------------|-------------------------------------------------|-------------------|------------------------|----------|
| Designation                                                                         |                                                 |                   | Type                   | Part No. |
| <b>User documentation</b>                                                           |                                                 |                   |                        |          |
|    | Bus node CP-FB05-E                              | German            | P.BE-CP-FB5-E-DE       | 165 105  |
|                                                                                     |                                                 | English           | P.BE-CP-FB5-E-EN       | 165 205  |
|                                                                                     |                                                 | French            | P.BE-CP-FB5-E-FR       | 165 135  |
|                                                                                     |                                                 | Italian           | P.BE-CP-FB5-E-IT       | 165 165  |
|                                                                                     | Bus node CP-FB06-E                              | German            | P.BE-CP-FB6-E-DE       | 165 106  |
|                                                                                     |                                                 | English           | P.BE-CP-FB6-E-EN       | 165 206  |
|                                                                                     |                                                 | French            | P.BE-CP-FB6-E-FR       | 165 136  |
|                                                                                     |                                                 | Italian           | P.BE-CP-FB6-E-IT       | 165 166  |
|                                                                                     |                                                 | Spanish           | P.BE-CP-FB6-E-ES       | 165 236  |
|                                                                                     |                                                 | Swedish           | P.BE-CP-FB6-E-SV       | 165 266  |
|                                                                                     | Bus node CP-FB08-03                             | German            | P.BE-CP-FB08-03-DE     | 165 108  |
|                                                                                     |                                                 | English           | P.BE-CP-FB08-03-EN     | 165 208  |
|                                                                                     |                                                 | French            | P.BE-CP-FB08-03-FR     | 165 138  |
|                                                                                     |                                                 | Italian           | P.BE-CP-FB08-03-IT     | 165 168  |
|                                                                                     |                                                 | Spanish           | P.BE-CP-FB08-03-ES     | 165 238  |
|                                                                                     |                                                 | Swedish           | P.BE-CP-FB08-03-SV     | 165 268  |
|                                                                                     | Bus node CP-FB11-E                              | German            | P.BE-CP-FB11-E-DE      | 165 111  |
|                                                                                     |                                                 | English           | P.BE-CP-FB11-E-EN      | 165 211  |
|                                                                                     |                                                 | French            | P.BE-CP-FB11-E-FR      | 165 141  |
|                                                                                     |                                                 | Italian           | P.BE-CP-FB11-E-IT      | 165 171  |
|                                                                                     |                                                 | Spanish           | P.BE-CP-FB11-E-ES      | 165 241  |
|                                                                                     |                                                 | Swedish           | P.BE-CP-FB11-E-SV      | 165 271  |
|                                                                                     | Bus node CP-FB13-E                              | German            | P.BE-CP-FB13-E-DE      | 165 113  |
|                                                                                     |                                                 | English           | P.BE-CP-FB13-E-EN      | 165 213  |
|                                                                                     |                                                 | French            | P.BE-CP-FB13-E-FR      | 165 143  |
|                                                                                     |                                                 | Italian           | P.BE-CP-FB13-E-IT      | 165 173  |
|                                                                                     |                                                 | Spanish           | P.BE-CP-FB13-E-ES      | 165 243  |
|                                                                                     |                                                 | Swedish           | P.BE-CP-FB13-E-SV      | 165 273  |
| Control block SF3                                                                   | German                                          | P.BE-VISF3-03-DE  | 165 481                |          |
|                                                                                     | English                                         | P.BE-VISF3-03-EN  | 165 486                |          |
|                                                                                     | French                                          | P.BE-VISF3-03-FR  | 165 491                |          |
|                                                                                     | Italian                                         | P.BE-VISF3-03-IT  | 165 446                |          |
|                                                                                     | Spanish                                         | P.BE-VISF3-03-ES  | 165 496                |          |
| Control block SB/SF6                                                                | German                                          | P.BE-VISB60-03-DE | 184 572                |          |
|                                                                                     | English                                         | P.BE-VISB60-03-EN | 184 573                |          |
|                                                                                     | Spanish                                         | P.BE-VISB60-03-ES | 184 575                |          |
| Input/output modules                                                                | German                                          | P.BE.-CPEA-DE     | 165 125                |          |
|                                                                                     | English                                         | P.BE.-CPEA-EN     | 165 225                |          |
|                                                                                     | French                                          | P.BE.-CPEA-FR     | 165 127                |          |
|                                                                                     | Italian                                         | P.BE.-CPEA-IT     | 165 157                |          |
|                                                                                     | Spanish                                         | P.BE.-CPEA-ES     | 165 227                |          |
|                                                                                     | Swedish                                         | P.BE.-CPEA-SV     | 165 257                |          |
| System description                                                                  | German                                          | P.BE-CPSYS-DE     | 165 126                |          |
|                                                                                     | English                                         | P.BE-CPSYS-EN     | 165 226                |          |
|                                                                                     | French                                          | P.BE-CPSYS-FR     | 165 128                |          |
|                                                                                     | Italian                                         | P.BE-CPSYS-IT     | 165 158                |          |
|                                                                                     | Spanish                                         | P.BE-CPSYS-ES     | 165 228                |          |
|                                                                                     | Swedish                                         | P.BE-CPSYS-SV     | 165 258                |          |
| <b>Software</b>                                                                     |                                                 |                   |                        |          |
|  | Programming software FST200 with manual for SF3 | German            | P.BE-FTS200-AWL/KOP-DE | 165 484  |
|                                                                                     |                                                 | English           | P.BE-FTS200-AWL/KOP-EN | 165 489  |
|                                                                                     | CD-ROM                                          | Valve terminals   | P.CD-VALVE-T           | 183 350  |
|                                                                                     |                                                 | Utilities         | P.CD-VI-UTILITIES-2    | 533 500  |