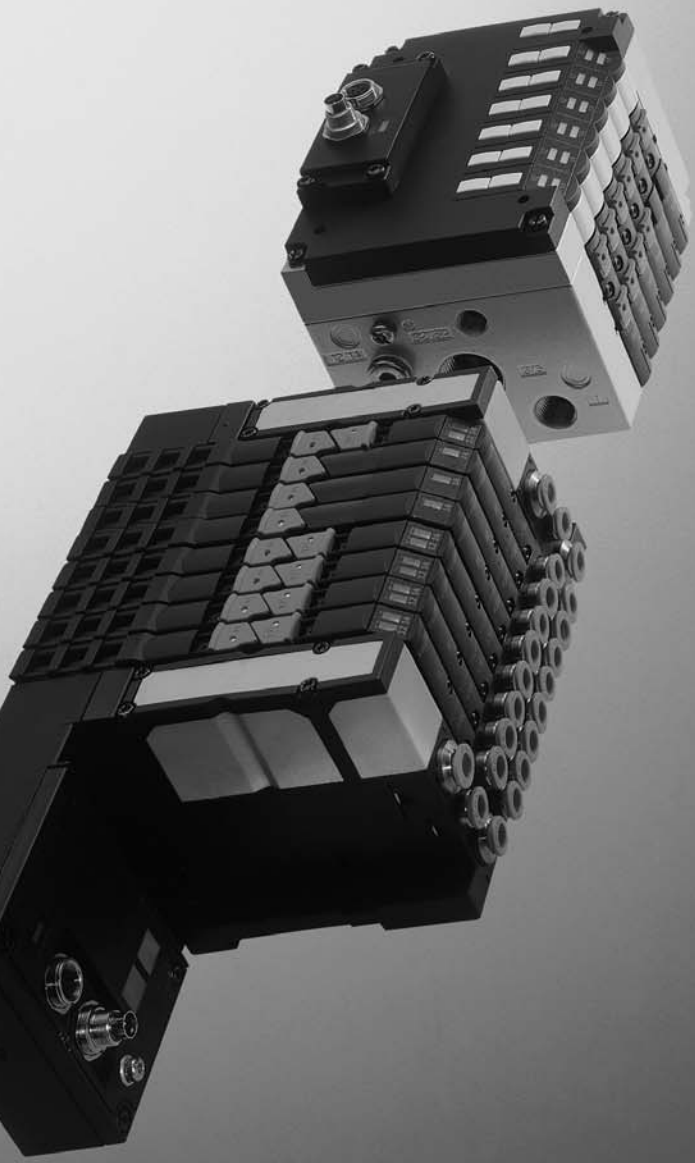
Compact performance

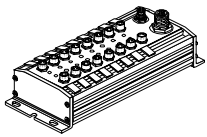


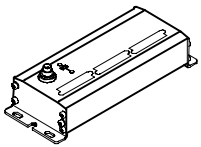
FESTO

Electronics manual

CP modules

Input module type CP-E16...-M...-...
Input module type CP-E16-KL-IP20-Z
Output module type CP-A08...-M12-...





Manual
165 225
en 0802e
[730 690]

Original ..... de

Edition ..... en 0802e

Designation ..... P.BE-CPEA-EN

Order-no. 165 225

Internet: http://www.festo.com
E-Mail: service_international@festo.com

Contents

Designated use

The CP modules described in this manual are intended exclusively for use on a CP string, an axis interface string or a CP branch line in conjunction with a CP field bus node, the Smart Positioning Controller type SPC200 or the Powerbox type CP-FB-TBOX-SUBD9. CP modules and CP cables are only to be used as follows:

– in accordance with designated use

– in its/their original state

– without any modifications by the user

– in faultless technical condition.

When used together with commercially available components, such as sensors and actuators, the specified limits for pressures, temperatures, electrical data, torques etc. must be observed. National and local safety regulations must also be observed. All CP modules comply with protection class III.

Warning

- Use only PELV **circuits** as per IEC/DIN EN 60204-1 (Protective Extra-Low Voltage, PELV) for the electrical supply. Consider also the general requirements for PELV circuits in accordance with IEC/DIN EN 60204-1.
- Use power **supplies** which guarantee reliable electrical isolation of the operating voltage as per IEC/DIN EN 60204-1.

Target group

This manual is directed exclusively at technicians trained in control and automation technology.

Service

Please consult your local Festo repair service if you have any technical problems.

Important user instructions

Danger categories

This manual contains instructions on the possible dangers which may occur if the product is not used correctly. These instructions are marked (Warning, Caution, etc), printed on a shaded background and marked additionally with a pictogram. A distinction is made between the following danger warnings:

Warning
This means that failure to observe this instruction may result in serious personal injury or damage to property.

Caution
This means that failure to observe this instruction may result in personal injury or damage to property.

Please note
This means that failure to observe this instruction may result in damage to property.

The following pictogram marks passages in the text which describe activities with electrostatically sensitive components.

Electrostatically sensitive components may be damaged if they are not handled correctly.

Marking special information

The following pictograms mark passages in the text containing special information.

Pictograms

Information:
Recommendations, tips and references to other sources of information.

Accessories:
Information on necessary or sensible accessories for the Festo product.

Environment:
Information on environment-friendly use of Festo products.

Text markings

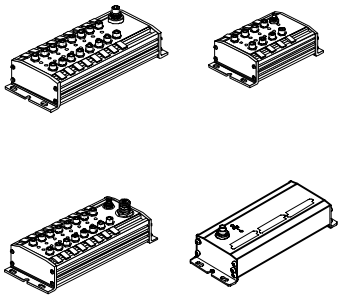
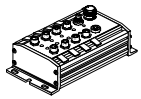
- The bullet indicates activities which may be carried out in any order.

1. Figures denote activities which must be carried out in the numerical order specified.

– Hyphens indicate general activities.

Notes on the use of this manual

CP I/O modules are available in the designs PNP (positive-switching) and NPN (negative-switching). The positive-switching modules with M12 connectors are available in 4-pin and 5-pin designs. The 5-pin design offers an earthing connection. This manual contains general basic information on the method of operation, and on fitting, installing and commissioning CP systems.

This manual refers to:	
	Input modules PNP: – CP-E16-M8 – CP-E16-M12x2 – CP-E16-M12x2-5POL NPN: – CP-E16N-M8 – CP-E16N-M12x2 PNP or NPN: – CP-E16-M8-Z – CP-E16-KL-IP20-Z
	Output modules PNP: – CP-A08-M12 – CP-A08-M12-5POL NPN: – CP-A08N-M12

Information on further modules, as well as basic information which must be observed in conjunction with the higher-order system, can be found in the manuals for the relevant systems.

Manuals on the CP system				**Periph-erals**
Manual	"CP system, installation and commissioning" type P.BE-CPSYS-...			
Contents	General basic information on the method of operation, fitting, installation and commissioning of CP systems.			
Manual	"CP field bus node, programming and diagnosis" type P.BE-CP-FB... or P.BE-VIFB...-10...	"CPV valve terminal, pneumatics" or "CPA valve terminal, pneumatics" type P.BE-CPV-... or P.BE-CPA-...	"CP modules, electronics" type P.BE-CPEA-...	
Contents	Special information on commissioning, programming and diagnosing related to the node used.	Information on fitting, installing and commissioning CPA or CPV valve terminals	Information on fitting, installing and commissioning CP I/O modules	

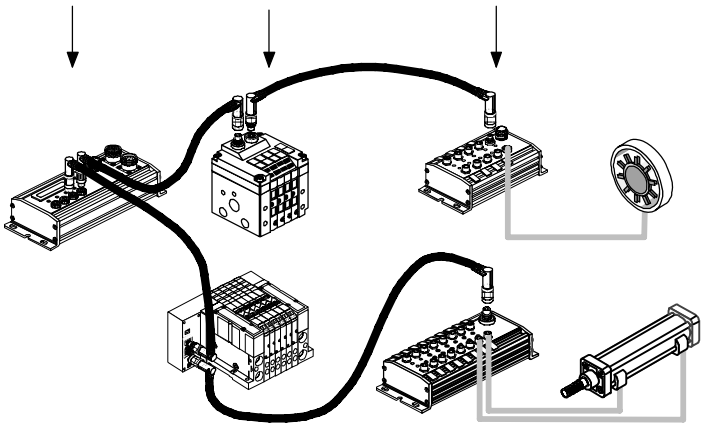


Fig. 0/1: Manuals on the CP system

Manuals on the SPC200 Smart Positioning Controller			**Peripherals**
Manuals	SPC200 Smart Positioning Controller, User manual type P.BE-SPC200-...	Manual WinPISA type P.SW-WIN-PISA-...	Manuals on: – proportional directional control valves – service unit – position measuring system – cylinder or linear drives
Contents	Installation, commissioning and diagnosis with SPC200; standard components and modules	Functions of the WinPISA software package	
Description	CPV valve terminal pneumatics type P.BE-CPV-...	CP modules electronics type P.BE-CPEA-...	
Contents	Information on the CPV valve terminals	Information on the CP I/O modules	

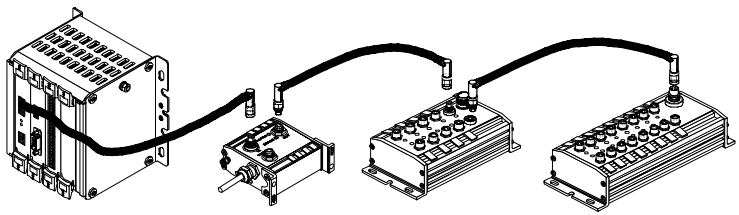


Fig. 0/2: Manuals on the SPC200

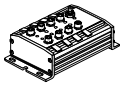
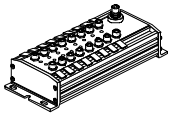
Input modules type CP-E16...-M...-...

Chapter 1

Contents

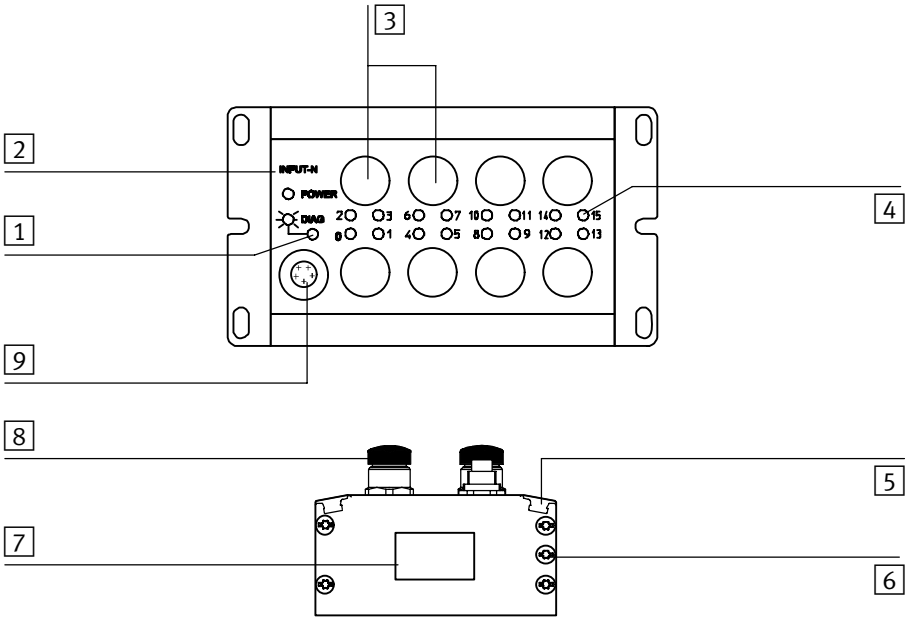
1.1 Function of input modules type CP-E16...-M...-...

CP input modules provide digital inputs for connecting sensors and enable e.g. cylinder positions to be scanned. A distinction is made between the following types:

Type	Explanation
CP-E16-M12x2-...  CP-E16N-M12x2	Provides 16 PNP inputs; sensor connections via 8 sockets with M12 thread Provides 16 NPN inputs; sensor connections via 8 sockets with M12 thread
CP-E16-M8  CP-E16N-M8	Provides 16 PNP inputs; sensor connections via 16 sockets with M8 thread Provides 16 NPN inputs; sensor connections via 16 sockets with M8 thread
CP-E16-M8-Z 	Provides 16 PNP or 16 NPN inputs and has its own connection for supplying the sensor voltage

1.1.1 Display and connecting elements

The diagram below shows, as an example, the display and connecting elements on the input module type CP-E16...-M12x2.



1 Status LED (green)

2 Identification for input type:
- INPUT-P for PNP inputs
- INPUT-N for NPN inputs

3 Sensor connections

4 Yellow LED for status display (one LED per input)

5 Groove for identification signs (IBS 6x10)

6 Earth/ground connection

7 Type plate

8 Protective cap

9 CP connection

Fig. 1/1: Display and connecting elements

The diagram below shows the additional display and operating elements on the input module type CP-E16-M8-Z.

[1] Connection for the power supply to the sensors

[2] Red LED for displaying short circuits or failure of the sensor voltage (one LED per input group)

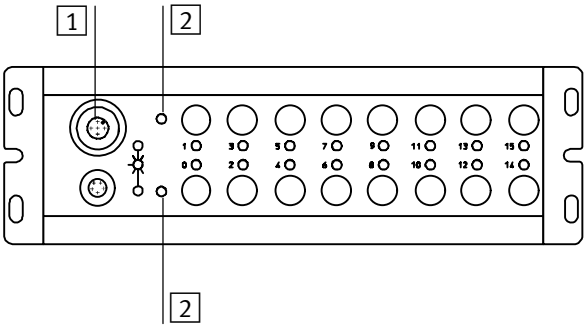


Fig. 1/2: Additional elements of type CP-E16-M8-Z

1.2 Fitting

Input modules are intended for fitting onto a wall or a hat rail. If you are fitting the module onto a wall, you will require the following space:

Type	Mounting area
CP-E16...-M8	approx. 150 x 66 mm
CP-E16-M8-Z	approx. 217 x 66 mm
CP-E16...-M12x2-...	approx. 141 x 78 mm

Fitting onto a wall

The diagram below shows the dimensions for the four threaded holes of M4 screw size.

1 Input module, type CP-E16...-M12x2-...

2 Input module, type CP-E16...-M8

3 Input module, type CP-E16-M8-Z

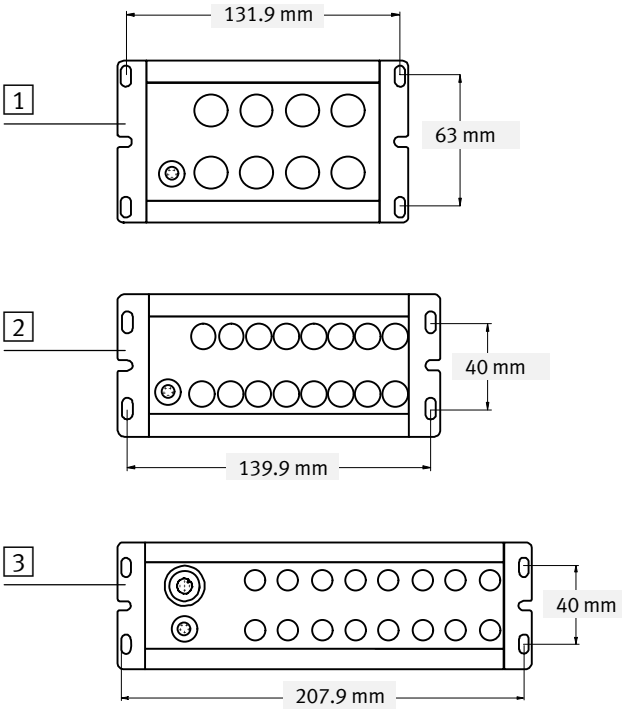


Fig. 1/3: Mounting dimensions for CP-E16...-M...-...

In order to fit the module onto a hat rail, you will require fastening kit CP-TS-HS35. This kit consists of 2 fastenings, 2 M4x12 screws and two washers.

Fitting onto a hat rail

Proceed as follows when fitting the modules onto a hat rail:

1. Make sure that the mounting surface can support the weight of the node.
2. Fit a hat rail (support rail as per EN 50022 - 35x15; width 35 mm, height 15 mm).
3. Fasten the hat rail to the fastening surface at intervals of at least every 100 mm.
4. Let both fastenings on the hat rail snap into place (see Fig. 1/4).
5. Fasten the housing to the fastening with the screws supplied, as shown in the diagram below.
6. Tighten the screws. The fastening and the housing will then be clamped firmly on the hat rail.

1 Fastening
2 Housing
3 M4x12 screw
4 Washer
5 Hat rail

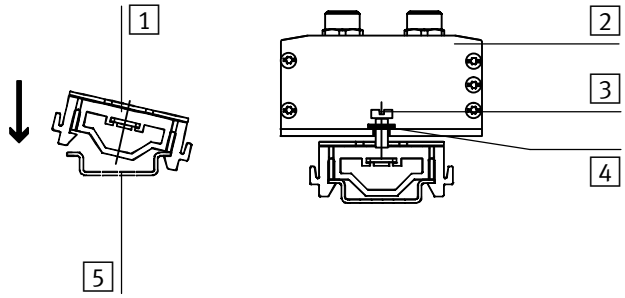


Fig. 1/4: Fitting onto a hat rail

Proceed with dismantling as follows:

1. Loosen the screws.
2. Remove the housing.
3. Lift the fastening out of the hat rail with a screwdriver.

1 Screwdriver
2 Fastening

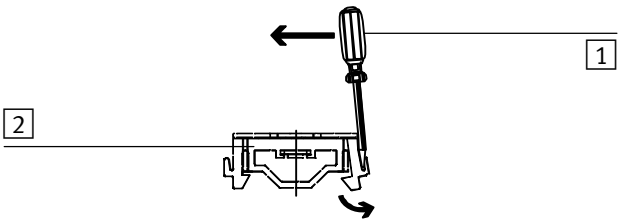


Fig. 1/5: Dismantling the fastening

1.3 Installation

Warning
Before carrying out installation and maintenance work, switch off the following:

– the operating and load voltages on the higher-order system (e.g. CP field bus node)
– if necessary, the separate supply voltages.

You can thereby avoid:

– unexpected movements of the connected actuators
– non-defined switching states of the electronic components.

Warning
Connect the earth connection on the side of the housing (see Fig. 1/1) with low impedance (short cable with large cross-sectional area) to the earth potential.

In this way you can avoid faults due to electromagnetic influences and ensure electromagnetic compatibility in accordance with EMC guidelines.

1.3.1 Determining PNP or NPN operation (only with type CP-E16-M8-Z)

Input module type CP-E16-M8-Z provides PNP or NPN inputs. You can determine either PNP or NPN operation by installing a bridge in the socket of the sensor supply connection. The following views show the rear of the socket.

[1] Pin assignment
- 1: + 24 V DC ± 25 %
- 2: PNP/NPN
- 3. 0 V
- 4: not connected
- 5: earth/ground connection

[2] PNP operation (pins 2 and 3 bridged)

[3] NPN operation (pins 2 and 1 bridged)

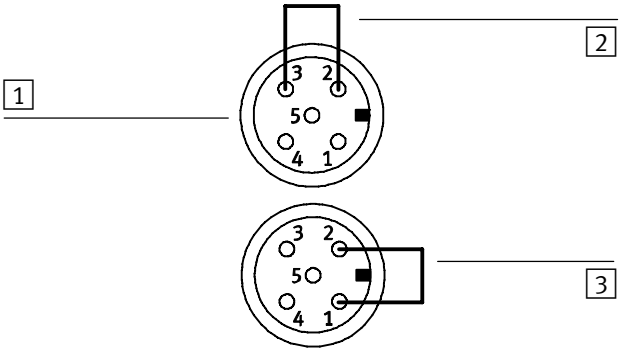


Fig. 1/6: Determining PNP or NPN operation (only with type CP-E16-M8-Z)

1.3.2 Connecting the separate power supply for the sensors (only with type CP-E16-M8-Z)

Warning

- Use only PELV **circuits** as per IEC/DIN EN 60204-1 (Protective Extra-Low Voltage, PELV) for the electrical supply. Consider also the general requirements for PELV circuits in accordance with IEC/DIN EN 60204-1.
- Use power **supplies** which guarantee reliable electrical isolation of the operating voltage as per IEC/DIN EN 60204-1.

By the use of PELV circuits, protection against electric shock (protection against direct and indirect contact) is guaranteed in accordance with IEC/EN 60204-1 (Electrical equipment for machines, General requirements).

The CP input module must be earthed to ensure that it functions correctly (e.g. EMC).

The connected sensors are supplied with + 24 V DC via the connection for the sensor supply. The module enables sensors with high current consumption to be connected (max. 125 mA per sensor).

The following diagram shows the pin assignment of the connection as well as an example of a connection for PNP operation (bridge between pins 2 and 3). See “Determining PNP or NPN operation”, section 1.3.1.

1 Pin assignment
- 1: + 24 V DC ± 25 %
- 2: PNP/NPN
- 3. 0 V
- 4: not connected
- 5: earth/ground connection

2 The sensor voltage can be switched off separately; the operating voltage is supplied via the CP connection

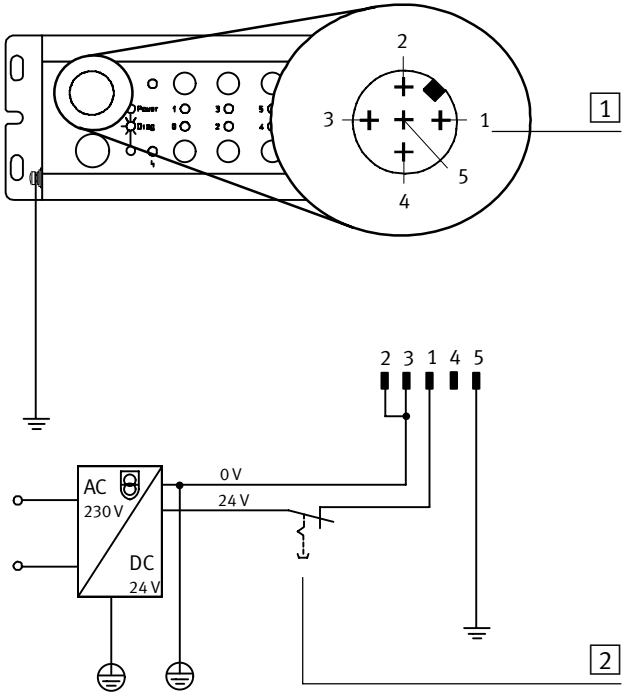


Fig. 1/7: Pin assignment and connection example of the sensor supply (PNP operation)

Potential equalization

The CP module has two earthing connections for potential equalization:

– on the connection for the sensor voltage supply (pin 5).

– on the housing (earthing connection see Fig. 1/7).

Please note

- Always connect the earth potential to pin 5 of the sensor supply voltage.
- Connect the earth connection on the left-hand side of the housing with low impedance (short cable with large cross-sectional area) to the earth potential.
- With low-impedance connections you can ensure that the housing of the module and the earth connection at pin 5 have the same potential and that there are no equalizing currents.

In this way you can avoid faults due to electromagnetic influences and ensure electromagnetic compatibility in accordance with EMC guidelines.

1.3.3 Connecting the sensors

Caution
If you are using input module type CP-E16-M8-Z, make sure that pin 2 of the sensor supply connection is bridged in accordance with the operating method of your system (either PNP or NPN operation, see section 1.3.1).

Use the following cables or plugs for connecting the sensors:

Type	Plugs	Cable
CP-E16...-M12x2	SEA-GS-7 (PG7) SEA-WS-7 (PG7)	KM12-DUO-...
CP-E16-M12x2-5POL	Use plugs with union nuts with M12x1 thread.	
CP-E16...-M8 and CP-E16-M8-Z	Use plugs with union nuts with M8x1 thread (outer diameter max. 12 mm).	KM8-M8-GSGD-...

Fasten the plugs with the aid of the union nut in order to prevent unintentional loosening, e.g. due to shock. Seal the unused sensor connections with the protective caps supplied. Only in this way can you comply with protection class IP 65.

Pin assignment (PNP and NPN inputs)

The diagrams below show, as an example, the pin assignment of the sensor connections of the various CP input modules.

Pin assignment

[1] 1: 24 V
4: Ex+1
3. 0 V

[2] 1: 24 V
4: Ex
3. 0 V

Ex = Input x

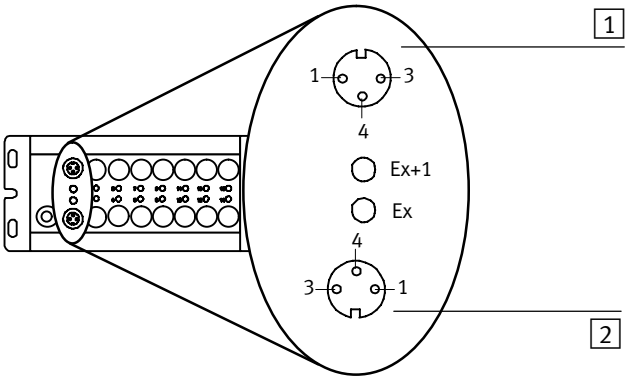


Fig. 1/8: Pin assignment of type CP-E16...-M8 and CP-E16-M8-Z

Pin assignment

[1] 1: 24 V
2: Ex+1
3. 0 V
4: Ex + 2

[2] 1: 24 V
2: Ex+1
3. 0 V
4: Ex

Ex = Input x

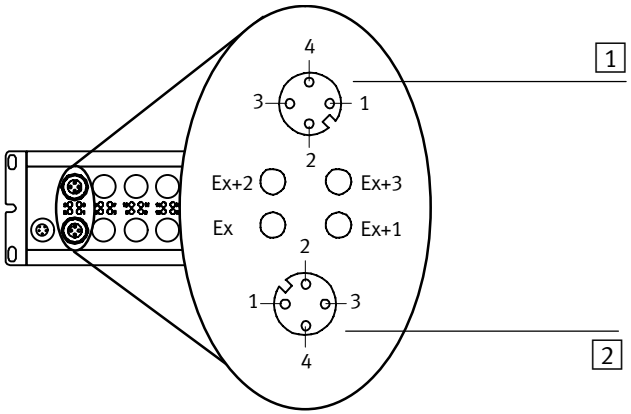


Fig. 1/9: Pin assignment of type CP-E16...-M12x2

Pin assignment

[1] 1: 24 V
2: Ex+3
3. 0 V
4: Ex+2
5: earth/ground connection

[2] 1: 24 V
2: Ex+1
3. 0 V
4: Ex
5: earth/ground connection

Ex = Input x

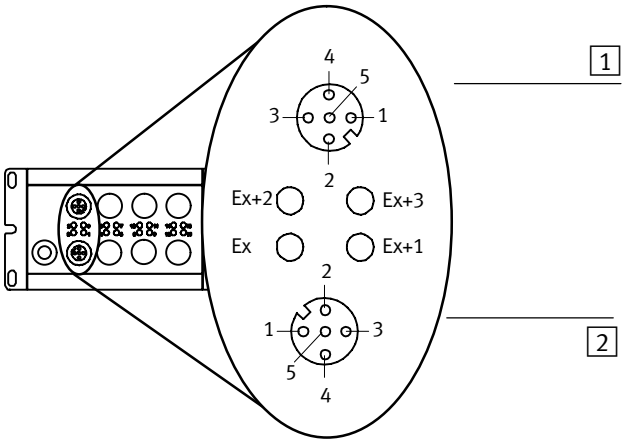
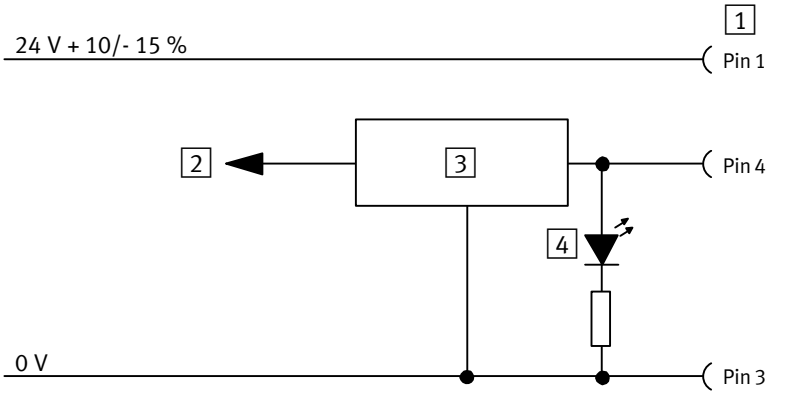


Fig. 1/10: Pin assignment of type CP-E16-M12x2-5POL

Internal structure of CP-E16-M8 (PNP inputs) and CP-E16-M8-Z with PNP operation



1 Pin assignment
1: 24 V + 10/- 15 %
4: Ex
3. 0 V

2 PLC/IPC Ex (e.g. via field bus)

3 Logic identifier Ex

4 Green LED Ex

Ex = Input x

Fig. 1/11: Internal structure

Circuitry examples of CP-E16-M8 (PNP inputs) and CP-E16-M8-Z with PNP operation

1 Pin assignment
3. 24 V
4: Ex
3. 0 V

2 Three-wire sensor (positive-switching)

3 Two-wire sensor (positive-switching)

4 Contact

Ex = Input x

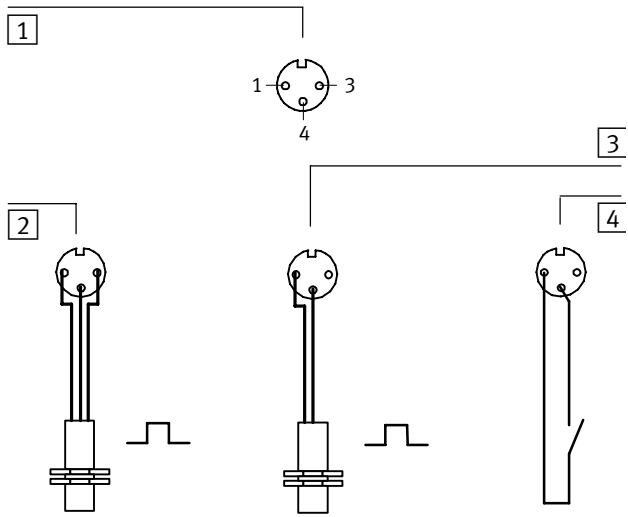
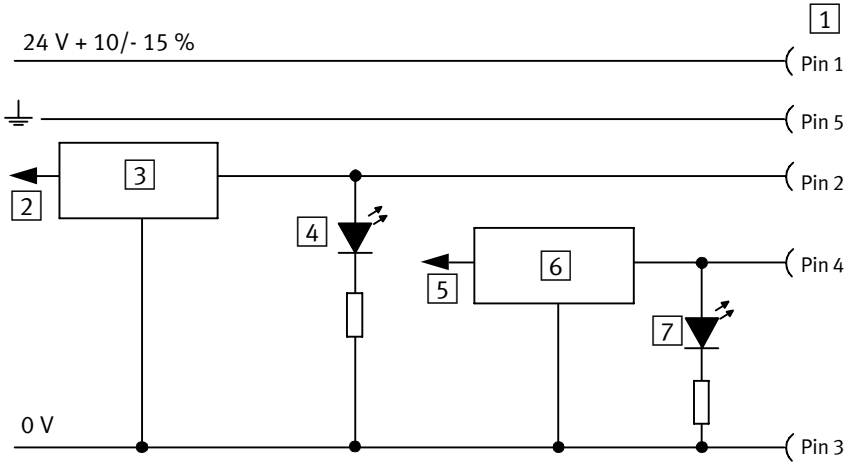


Fig. 1/12: Circuitry examples

Internal structure of CP-E16-M12x2-... (PNP inputs)



1 Pin assignment
- 1: + 24 V + 10/- 15 %
- 2: Ex+1
- 3. 0 V
- 4: Ex
- 5: Earth connection only with type CP-E16-M12x2-5POL

2 PLC/IPC Ex+1 (e.g. via field bus)

3 Logic identifier Ex+1

4 Green LED Ex+1

5 PLC/IPC Ex (e.g. via field bus)

6 Logic identifier Ex

7 Green LED Ex

Ex = Input x

Fig. 1/13: Internal structure

Circuitry examples of CP-E16-M12x2... (PNP inputs)

1 Pin assignment
3. 24 V
2: Ex +1
3. 0 V
4: Ex
5: *)

2 Sensor 2 (Ex+1) positive switching

3 2-way distributor (T-piece)

4 Sensor 1 (Ex) positive switching

*) Only with type CP-16-M12x2-5POL earth/ground connection

Ex = Input x

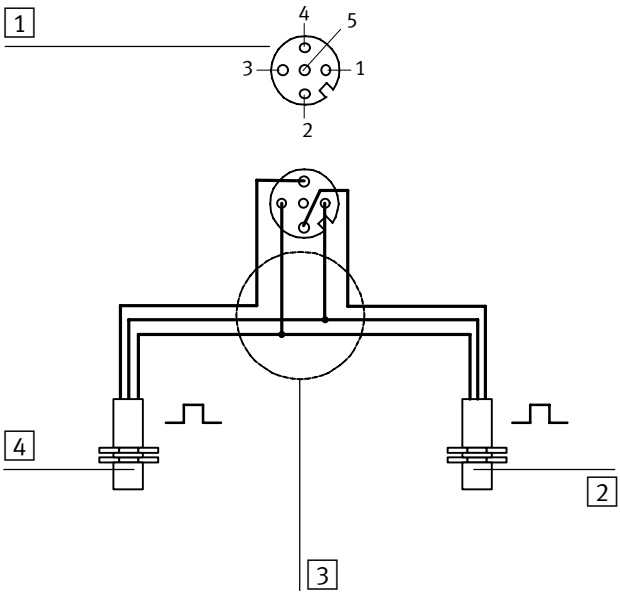
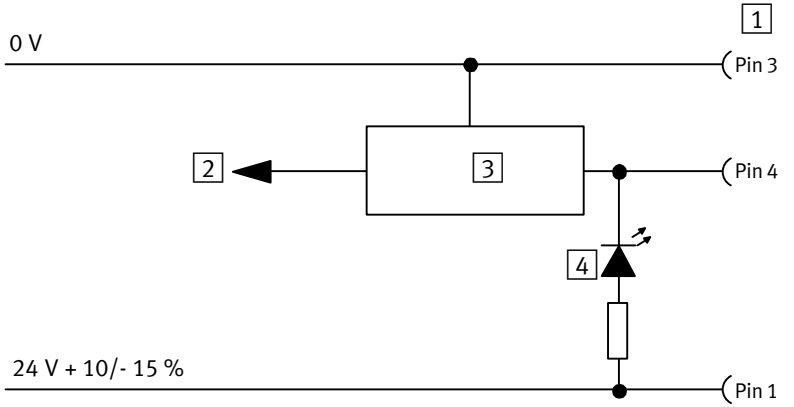


Fig. 1/14: Circuitry examples

Internal structure of CP-E16N-M8 (NPN inputs) and CP-E16-M8-Z with NPN operation



1 Pin assignment
1: 24 V + 10/- 15 %
4: Ex
3. 0 V

2 PLC/IPC Ex (e.g. via field bus)

3 Logic identifier Ex

4 Green LED Ex

Ex = Input x

Fig. 1/15: Internal structure

Circuitry examples of CP-E16N-M8 (NPN inputs) and CP-E16-M8-Z with NPN operation

1 Pin assignment
3. 24 V
4: Ex
3. 0 V

2 Three-wire sensor (negative-switching)

3 Two-wire sensor (negative-switching)

4 Contact

Ex = Input x

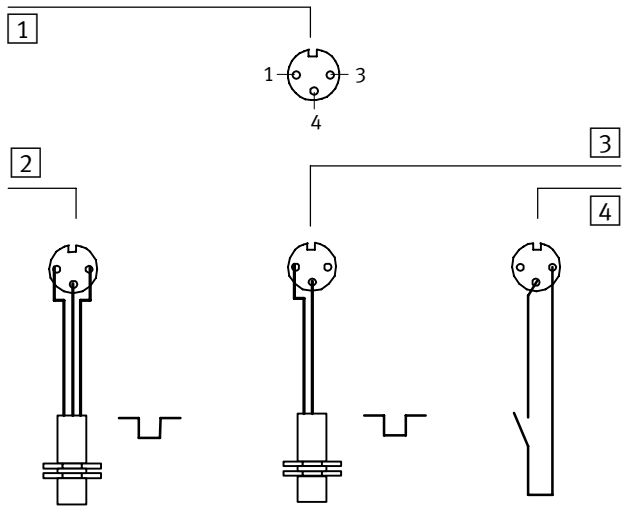
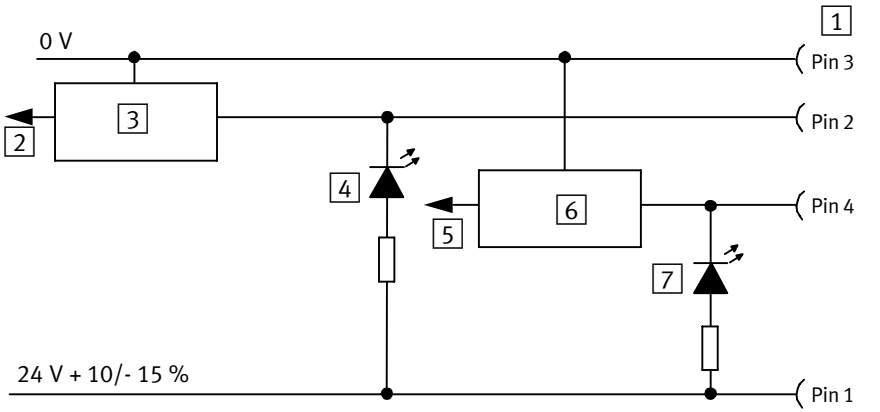


Fig. 1/16: Circuitry examples

Internal structure of CP-E16N-M12x2 (NPN inputs)



1 Pin assignment
1: + 24 V + 10/- 15 %
2: Ex+1
3. 0 V
4: Ex

2 PLC/IPC Ex+1 (e.g. via field bus)

Ex = Input x

3 Logic identifier Ex+1

4 Green LED Ex+1

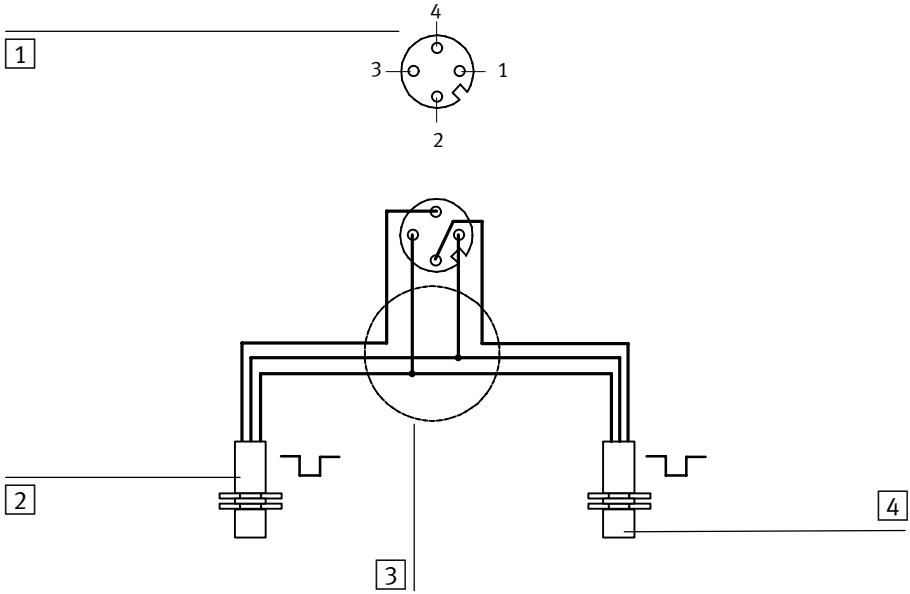
5 PLC/IPC Ex (via field bus)

6 Logic identifier Ex

7 Green LED Ex

Fig. 1/17: Internal structure

Circuitry examples of CP-E16N-M12x2 (NPN inputs)



1 Pin assignment
1. 24 V
2: Ex+1
3. 0 V
4: Ex

Ex = Input x

2 Sensor 2 (Ex+1) (negative logic)

3 2-way distributor (T-piece, e.g. Festo Duo cable; only 4-pin)

4 Sensor 1 (Ex) (negative logic)

Fig. 1/18: Circuitry examples

1.3.4 Connecting the input module

Caution
Please observe the maximum permitted string lengths. You can thereby avoid errors in data exchange between the input module and the higher-order system (e.g. field bus node).

Use only the following original cables for connecting the modules:

For connection to:	max. permitted string length	Cable type
Field bus node with CP connection	10 m	– KVI-CP-1-... or – KVI-CP-2-... (suitable for drag chain)
Axis interface type SPC-AIF-...	See manual for the SPC200 type P.BE-SPC200-...	
Powerbox type CP-FB-TBOX-...	See manual for the higher-order system	

The following functions are provided for the module via the CP cable:

– Operating voltage for the internal electronics

– Connection for data exchange

– in the case of input modules without connection for supplying the sensors:
Operating voltage for the connected sensors.

Input modules should be connected to one of the following:

– to the CP connection of the higher-order system (field bus node or axis interface or Powerbox)

– to the CP connection of a CP output module

– to the CP connection of a valve terminal.

Further information can be found in the relevant system manual.

1.4 Instructions on commissioning

Warning
Please be careful if the string assignment is modified at a later stage.
After saving the string assignment/hardware configuration, check the address assignments of your higher-order system before starting user programs.

You can thereby avoid:

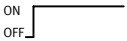
– addressing errors with unintentionally incorrectly fitted CP modules.

When the string assignment on CP field bus nodes has been modified (CP modules added or removed), you must save the new string assignment by pressing the SAVE button on the node. Proceed here as described in the manual “CP system, installation and commissioning”.

When the string assignment has been modified on the SPC200, the new hardware configuration must also be saved. Proceed here as described in the manual for the SPC200 or in the WinPISA manual.

Status LED

The operating status of the input module is indicated by the status LED on the CP connection (see table below).

Status LED	Sequence	Operating status	Error treatment
 LED lights up		Operating voltage applied	None
 LED is out		– Operating voltage not applied or no connection to the higher-order system or In conjunction with the CP node: – incorrect string assignment ascertained during operation In conjunction with the SPC200: – see user manual for the SPC200	• Check the CP cable and the operating voltage connection on the higher-order system or • correct string assignment • see user manual type P.BE-SPC200
 LED flashes		– Test phase when power supply has been switched on or – short circuit in sensor supply [3] or With type CP-E16-M8-Z: – undervoltage in sensor supply (< 17 V) or In conjunction with the CP node: – incorrect string assignment when operating voltage is switched on In conjunction with the SPC200: – see user manual for the SPC200	• None or • eliminate short circuit and, if applicable, delete error [1] or • eliminate undervoltage • check string assignment [2] • see user manual type P.BE-SPC200

[1] With type CP-E16-M8-Z the error will be deleted automatically With other modules the error will be deleted when the input module is disconnected from the string or when the power supply is switched on again on the higher-order system.

[2] When the string assignment on CP field bus nodes has been modified (CP modules added or removed), you must save the new string assignment by pressing the SAVE button on the node (see Manual for the “CP system, installation und commissioning”).

[3] With type CP-E16-M8-Z the short circuit LED on the relevant input group will light up.

Short circuit in the sensor supply on input module type CP-E16-M8-Z

If there is a short circuit, the input module will switch off the power supply for the relevant input group and pass the error on to the higher-order system. The short circuit LED of the relevant input group lights up.

1 Input group 1 (upper row)

2 Input group 2 (lower row)

3 Red LED for displaying short circuits or failure of the sensor voltage (one LED per input group)

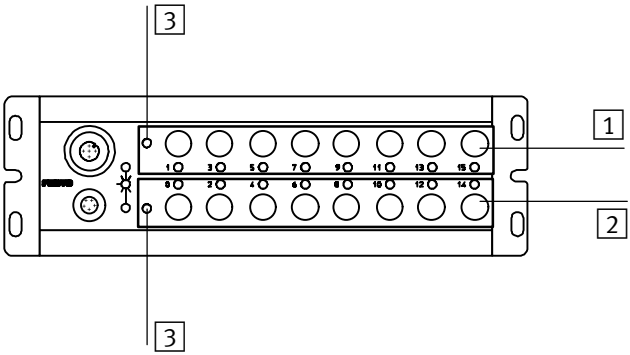


Fig. 1/19: Short circuit displays with type CP-E16-M8-Z

The status LEDs of the relevant input group are switched off and the relevant inputs supply a 0-signal. The other input group remains ready to operate. When the short circuit is eliminated, the error will be deleted automatically.

Short circuit in the sensor supply on input modules without sensor supply connection

If there is a short circuit, the input module will switch off the power supply for the sensors self-holding and pass the error on to the higher-order system. The status LEDs will be switched off and the inputs of the module supply a 0-signal. When the short circuit has been eliminated, delete this error as follows:

In conjunction with the CP node:

- Disconnect the input module briefly from the string or
- switch the operating voltage off and then on again.

In conjunction with the SPC200:

- For procedure see user manual type P.BE-SPC200

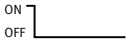
Replacing CP modules

If a fault occurs on a CP module during operation, you can replace the module during operation by another module of the same type.

Please note
Please note here the instructions in the manual for the higher-order system (e.g. CP system, CP field bus node, SPC200).

Status display

There are one or two green LEDs next to the sensor connections. These indicate the status of the signal at the relevant output. The LEDs indicate the following:

Status LED	Sequence	Status
 LED lights up		logical 1 (signal present)
 LED is out		logical 0 (no signal)
 LED flashes		Only in the start-up phase when: – there is a 1-signal and – there is a string assignment error

Please note
in conjunction with the CP field bus node:
If there is a string assignment error during the start-up phase, the CP node will switch the power supply for the input module, and thereby also for the connected sensors, cyclically on and off. In this case, therefore, the status LEDs and the LEDs of the connected sensors will flash, providing there is a signal (logical 1).

1.5 Technical specifications

General technical specifications	Type CP-E16...-...
Temperature range: – Operation – Storage/transport	 - 5 °C ... + 50 °C - 20 °C ... + 70 °C
Relative humidity	95 % non-condensing
Protection class as per EN 60529; plug connector inserted or provided with protective cap	IP65
Protection against electric shock as per EN 60204-1 / IEC 204	(protection against direct and indirect contact) by connection to a PELV power unit (Protected Extra Low Voltage)
Electromagnetic compatibility – Interference emitted – Immunity against interference	 Tested as per EN 55011, limit class B Tested as per EN 50082-2
Vibration and shock – Vibration – Shock	 Tested as per DIN/IEC 68/EN 60068 part 2-6; severity class 2 Tested as per DIN/IEC 68/EN 60068 part 2-27; severity class 2

Special technical data	**Type CP-E16-M8-Z; positive switching (PNP) – or negative switching (NPN) operation**
Digital inputs – Design	16 inputs as per IEC 1131-2 type 2 inputs 24 V DC, positive or negative switching
– Logic level, positive switching ON OFF – Logic level negative switching ON OFF	PNP (reference 0 V): ≥ 8.6 V ≤ 6 V PNP (reference 24 V): ≤ 6 V ≥ 8.6 V
– Current consumption (at 24 V) (input current from sensor to input)	At “logical 1” typ. 8 mA
– Response delay (at 24 V)	Typ. 3 ms
Sensor supply V_D 24 V ± 25 %	Max. 1 A per input group (electronic short-circuit protection per group)
Electrical isolation	None
Internal current consumption of electronics	< 40 mA

Special technical data	**Positive-switching input modules (PNP) without separate sensor supply connection**	
	Type CP-E16-M8 and type CP-E16-M12x2	**Type CP-E16-M12x2-5POL**
Digital inputs – Design	16 inputs as per IEC 1131-2 Type 2 inputs 24 V DC positive-switching	16 inputs as per IEC 1131-2 Type 2 inputs 24 V DC negative-switching
– Logic level ON OFF	 > 11 V < 5 V	 ≥ 8.6 V ≤ 6 V
– Current consumption (at 24 V) (input current from sensor to input)	At “logical 1” typ. 8 mA	At ”logical 1” typ. 6 mA
– Response delay (at 24 V)	Typ. 5 ms	Typ. 3 ms
Sensor supply V_D 24 V ± 25 %	Max. 0.5 A (electronic short-circuit protection)	
Electrical isolation	None	
Internal current consumption of electronics	< 40 mA	Max. 90 mA

Special technical data	**Negative-switching input modules (NPN)** **Type CP-E16N-M8 and type CP-E16N-M12x2**
Digital inputs – Design	16 inputs as per IEC 1131-2 type 2 inputs 24 V DC negative-switching
– Logic level ON OFF	 $< V_D$ - 11 V $> V_D$ - 5 V
– Current consumption (at 24 V) (input current from sensor to input)	At “logical 0” typ. 8 mA
– Response delay (at 24 V)	Typ. 5 ms
Sensor supply V_D 24 V ± 25 %	Max. 0.5 A (electronic short-circuit protection)
Electrical isolation	None
Internal current consumption of electronics	Max. 90 mA

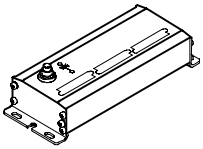
Input module type CP-E16-KL-IP20-Z

Chapter 2

Contents

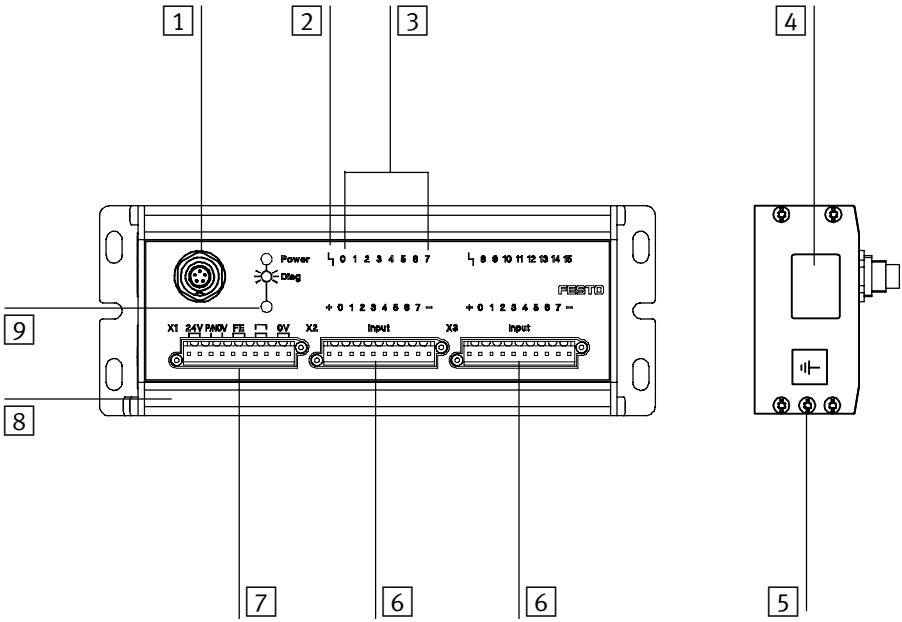
2.1 Method of operation of input module CP-E16-KL-IP20-Z

CP input modules provide digital inputs for connecting sensors and enable e.g. cylinder positions to be scanned.

Type	Explanation
CP-E16-KL-IP20-Z 	Input module type CP-E16-KL-IP20-Z provides 16 PNP or 16 NPN inputs and has its own connection for the power supply to the sensors. It has three 10-pin optional connecting sockets in screw or tension spring design and is therefore particularly suited for fitting into a control cabinet (IP20).

2.1.1 Display and connecting elements

The diagram below shows the display and operating elements on input module type CP-E16-KL-IP20-Z.



4 CP connection

5 Red LED for short circuit/overload display (one LED per input module)

6 Green LED for status display (one LED per input)

7 Type plate

8 Earth/ground connection

9 Sensor connections (8 inputs per input module)

1 Connection for sensor power supply

1 1 Groove for identification signs (IBS 6x10)

1 2 Status LED (green)

Fig. 2/1: Display and connecting elements

2.2 Fitting

The input module is intended for fitting onto a wall or a hat rail. If you are fitting the module onto a wall, you will require the following space:

Type	Mounting surface
CP-E16-KL-IP20-Z	Approx. 175 x 66 mm

Fitting onto a wall

The diagram below shows the dimensions for the four threaded holes of M4 screw size. You should fasten the module with at least 3 screws.

1 Input module, type CP-E16-KL-IP20-Z

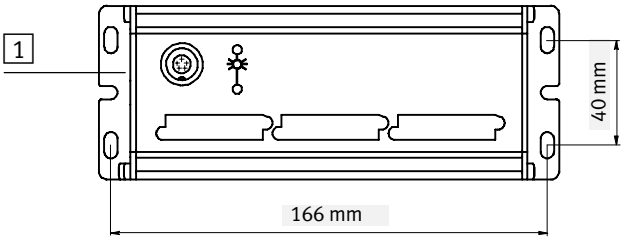


Fig. 2/2: Mounting dimensions for CP-E16...-M...-...

Hat rail fitting

You will require the following accessories for fitting the module onto a hat rail:

In order to fit the module onto a hat rail, you will require fastening kit CP-TS-HS35. This kit consists of 2 fastenings, 2 M4x12 screws and two washers.

Proceed as follows when fitting the modules onto a hat rail:

1. Make sure that the mounting surface can support the weight of the module.
2. Fit a hat rail (support rail as per EN 50022 - 35x15; width 35 mm, height 15 mm).
3. Fasten the hat rail to the fastening surface at intervals of at least every 100 mm.
4. Let both fastenings snap into place on the hat rail (see Fig. 1/4).
5. Fasten the housing to the fastening with the screws supplied, as shown in the diagram below.
6. Tighten the screws. The fastening and the housing will then be clamped firmly on the hat rail.

1 Fastening
2 Housing
3 M4x12 screw
4 Washer
5 Hat rail

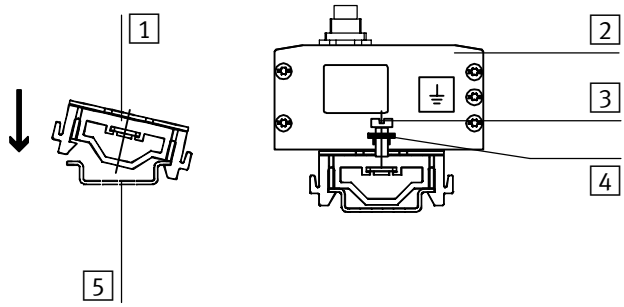


Fig. 2/3: Fitting onto a hat rail

Proceed with dismantling as follows:

1. Loosen the screws.
2. Remove the housing.
3. Lift the fastening out of the hat rail with a screwdriver.

1 Screwdriver
2 Fastening

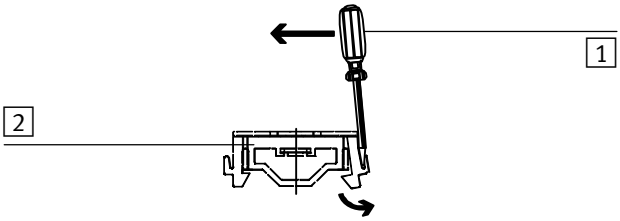


Fig. 2/4: Dismantling the fastening

2.3 Installation

Warning
Undesired movement of the connected actuators and non-defined switching states of the electronics can cause injury to human beings or damage to property.

Before carrying out installation and maintenance work, switch off the following:

– the operating and load voltages on the higher-order system (e. g. CP field bus node)
– separate power supplies.

Warning
Incorrect or missing earthing can cause interference due to electromagnetic influences.

Connect the earth connection on the side of the housing (see Fig. 1/1) with low impedance (short cable with large cross-sectional area) to the earth potential.

You can then guarantee electromagentic compatibility in accordance with the EMC guidelines.

Caution
Only connection X1 is used for the power supply to the sensors. Do not connect **any** external supply to terminals + and – of X2 and X3. Otherwise the input module may be damaged.

2.3.1 Determining PNP or NPN operation

Input module type CP-E16-KL-IP20-Z provides PNP or NPN inputs. You can determine either PNP or NPN operation by installing an external bridge in the sensor supply connection.

[1] Internal connection

[2] Pin assignment

1: + 24 V *)
2: Bridged with 1
3: PNP/NPN
4: 0 V
5: FE
6: FE
7: Not assigned, but bridged with 8
8: Not assigned, but bridged with 7
9: Bridged with 10
10: 0 V
*) Sensor supply for the inputs + 24 V DC ± 25 %

[3] PNP operation (pins 3 and 4 bridged)

[4] NPN operation (pins 3 and 2 bridged)

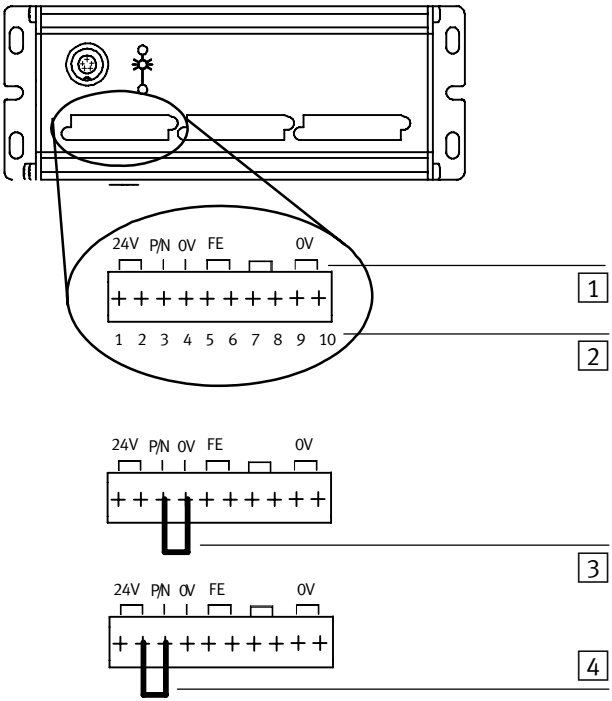


Fig. 2/5: Determining PNP or NPN operation

Internal bridges

A separate load supply for the valves/outputs can be looped through via pins 7 and 8. By means of the other internal bridges (24 V, FE, 0 V), the relevant potential can be passed on to the next CP module.

2.3.2 Connecting the separate power supply for the sensors

Warning

- Use only PELV **circuits** as per IEC/DIN EN 60204-1 (Protective Extra-Low Voltage, PELV) for the electrical supply. Consider also the general requirements for PELV circuits in accordance with IEC/DIN EN 60204-1.
- Use power **supplies** which guarantee reliable electrical isolation of the operating voltage as per IEC/DIN EN 60204-1.

By the use of PELV circuits, protection against electric shock (protection against direct and indirect contact) is guaranteed in accordance with IEC/EN 60204-1 (Electrical equipment for machines, General requirements).

The CP input module must be earthed to ensure that it functions correctly (e.g. EMC).

The sensors are supplied with + 24 V DC via the connection for the sensor supply. The module enables sensors with high current consumption to be connected (max. 1 A per input module).

The following diagram shows the pin assignment of the connection as well as an example of a connection for PNP operation (bridge between pins 3 and 4). See also “Determining PNP or NPN operation”, section 1.3.1.

1 Pin assignment

1: + 24 V *)
2: Bridged with 1
3: PNP/NPN
4: 0 V
5: FE
6: FE
7: Bridged with 8
8: Bridged with 7
9: Bridged with 10
10: 0 V
*) Sensor supply for the inputs + 24 V DC ± 25 %

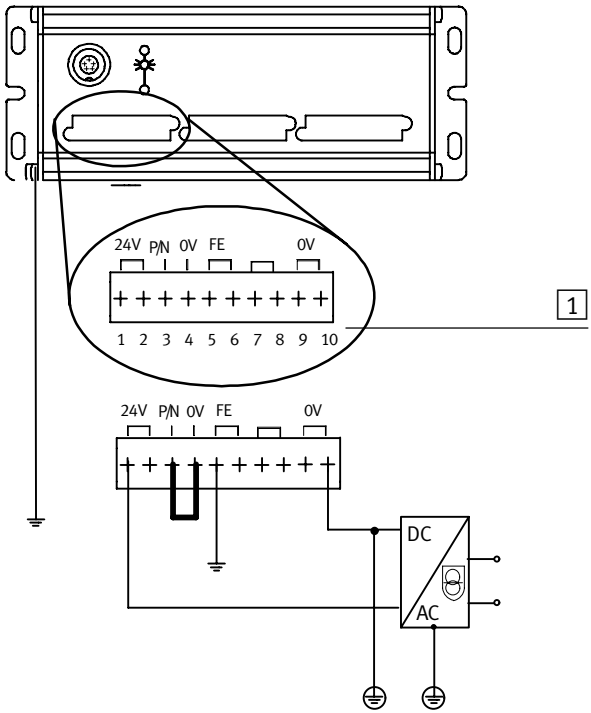


Fig. 2/6: Pin assignment and connection example of the sensor supply (PNP operation)

Potential equalization

The CP module has two earthing connections for potential equalization:

– on the connection for the sensor voltage supply (pin 5 or 6)

– on the housing (earthing connection see Fig. 1/7).

Please note

- Always connect the earth potential to pin 5 or 6 of the sensor supply voltage.
- Connect the earth connection (FE) on the left-hand side of the housing with low impedance (short cable with large cross-sectional area) to the earth potential.
- With low-impedance connections you can ensure that the housing of the module and the earth connection at pin 5 or 6 have the same potential and that there are no equalizing currents.

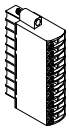
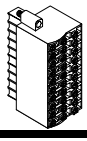
In this way you can avoid faults due to electromagnetic influences and ensure electromagnetic compatibility in accordance with EMC guidelines.

2.3.3 Connecting the sensors

Caution
Long signal cables reduce the immunity to interference. Do not exceed the maximum permitted signal cable length of 30 m.

Caution
Make sure that pin 3 of the sensor supply connection is bridged in accordance with the operating mode of your system (PNP or NPN operation, see section 1.3.1).

Recommendation: Use the connector sockets from connecter set type SEA-KL-SAC10/30.

Sockets in the connector set type SEA-KL-SAC10/30	Number	Connection cross-sectional area	Recommended for connection
Tension spring socket, 1-row 	1	See leaflet with product	X1
Tension spring socket, 3-rows 	2	See leaflet with product	X2, X3

Two rows of the three-row connector socket are intended as distributor boards for the sensor supply. These rows are each connected internally (see Fig. 2/9).

- Fasten these sockets with the aid of the fitted screws. The maximum tightening torque is 0.2 Nm.

Instructions on wiring the connector sockets from connecter set type SEA-KL-SAC10/30

Solid wires and wires with core end sleeves can easily be inserted into the desired tension spring terminal. In order to insert flexible wires, you must use a tool (e.g. a screwdriver) to press down the coloured push button assigned to the tension spring terminal.

1 Tension spring socket from connector set type SEA-KL-SAC10/30

2 Cables

3 Screwdriver

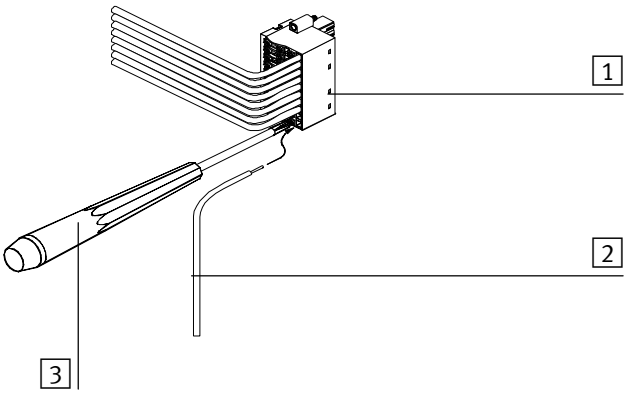
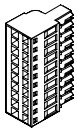
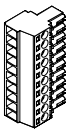


Fig. 2/7: Wiring the connector sockets

The following connector sets contain further possible connector sockets.

Further possible connector sets	Number	Connector cross section	Possible for connection
Type PSI ZC13-Z (tension spring sockets, 1-row) 	4	See leaflet with product	X1, X2, X3
Type PSI ZC13-S (screw-terminal sockets, 1-row) 	4	See leaflet with product	X1, X2, X3

2.3.4 Pin assignment (PNP and NPN inputs)

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

Caution
Do not connect **any** external supply to terminals + and – of X2 and X3. Otherwise the input module may be damaged.

Pin assignment

1 Plug X2
- +: 24 V DC
- 0: I0
- 1: I1
- 2: I2
- 3: I3
- 4: I4
- 5: I5
- 6: I6
- 7: I7
- -: 0 V DC

2 Plug X3
- +: 24 V DC
- 0: I8
- 1: I9
- 2: I10
- 3: I11
- 4: I12
- 5: I13
- 6: I14
- 7: I15
- -: 0 V DC

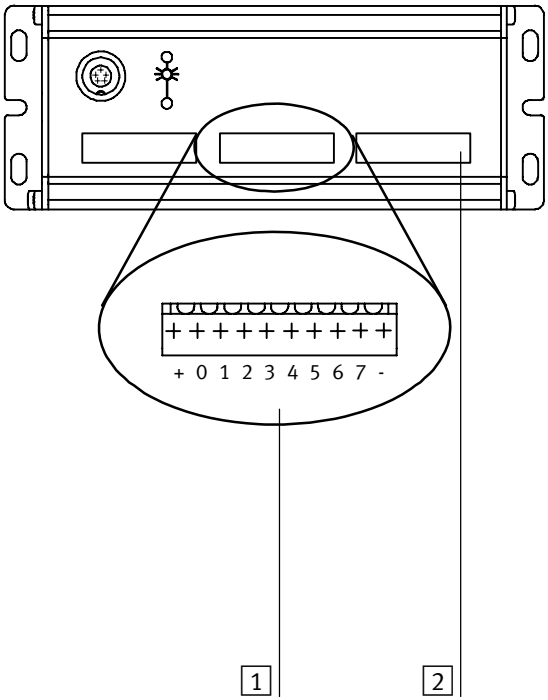


Fig. 2/8: Pin assignment of plugs X2 and X3

2.3.5 Circuitry examples of PNP inputs

Three-row connector socket from connector set type SEA-KL-SAC10/30

Two rows of the three-row connector socket are intended as distributor boards for the sensor supply. These rows are each connected internally. The upper row (blue push buttons) is intended for the 0 V distributor, the centre row (red push buttons) is intended for the 24 V distributor. The relevant voltage must be supplied with the aid of an external bridge from terminals + and – (lower row).

[1] External bridge for potential distribution (24 V)

[2] External bridge for potential distribution (0 V)

[3] Pin assignment
+: 24 V
0...7: Ix + n
-: 0 V

[4] Contact

[5] Two-wire sensor (positive-switching)

[6] Three-wire sensor (positive-switching)

Ix = Input x

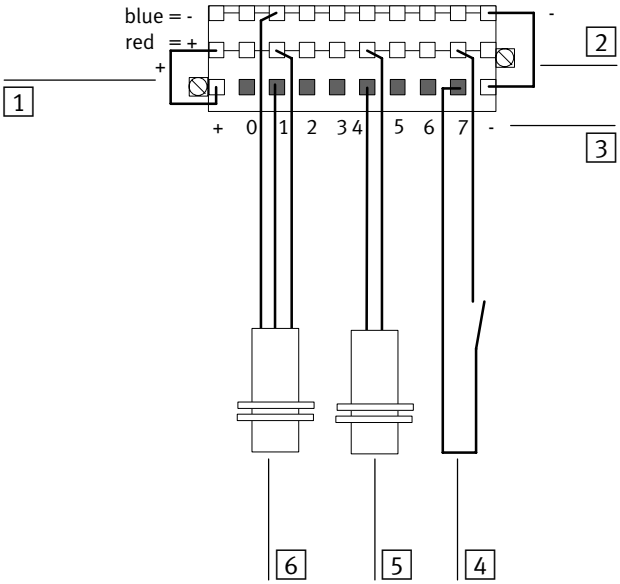


Fig. 2/9: PNP inputs (3-row connector socket set SEA-KL-SAC10/30)

Single-row connector socket

1 External potential distribution (24 V)

2 Pin assignment
+: 24 V
0...7: Ix + n
-: 0 V

3 External potential distribution (0 V)

4 Contact

5 Two-wire sensor (positive-switching)

6 Three-wire sensor (positive-switching)

Ix = Input x

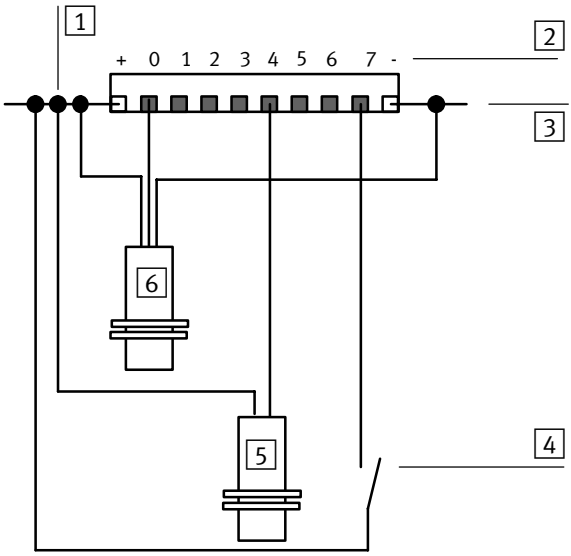
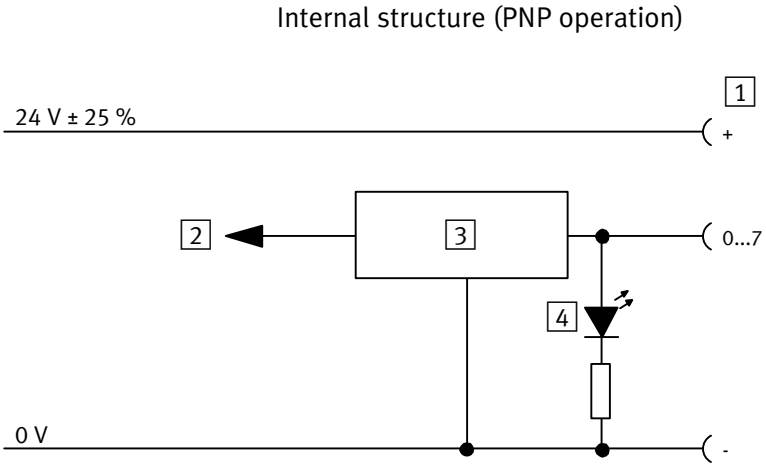


Fig. 2/10: PNP inputs (1 row, connector socket)



1 Pin assignment
+: 24 V ± 25 %
0...7: Ix + n
-: 0 V

2 PLC/IPC Ix (e.g. via field bus)

3 Logic recognition Ix + n

4 Green LED Ix + n

Ix = Input x

Fig. 2/11: Internal structure (PNP operation)

2.3.6 Circuitry examples of NPN inputs

Three-row connector socket from connector set type SEA-KL-SAC10/30

Two rows of the three-row connector socket are intended as distributor boards for the sensor supply. These rows are each connected internally. The upper row (blue push buttons) is intended for the 0 V distributor, the centre row (red push buttons) is intended for the 24 V distributor. The relevant voltage must be supplied with the aid of an external bridge from terminals + and – (lower row).

[1] External bridge for potential distribution (24 V)

[2] External bridge for potential distribution (0 V)

[3] Pin assignment
+: 24 V
0...7: Ix + n
-: 0 V

[4] Contact

[5] Two-wire sensor (negative-switching)

[6] Three-wire sensor (negative-switching)

Ix = Input x

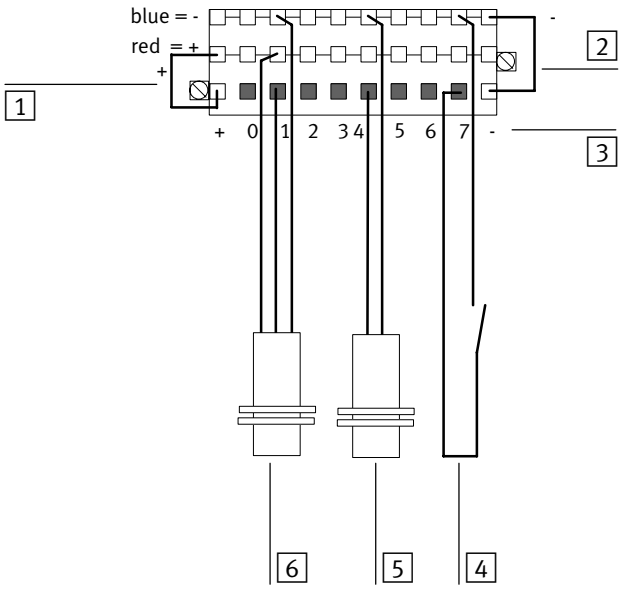


Fig. 2/12: NPN inputs (3-row connector socket set SEA-KL-SAC10/30)

Single-row connector socket

1 Pin assignment
+: 24 V
0...7: Ix + n
-: 0 V

2 External potential distribution (0 V)

3 Three-wire sensor (negative-switching)

4 Two-wire sensor (negative-switching)

5 Contact

6 External potential distribution (24 V)

Ix = Input x

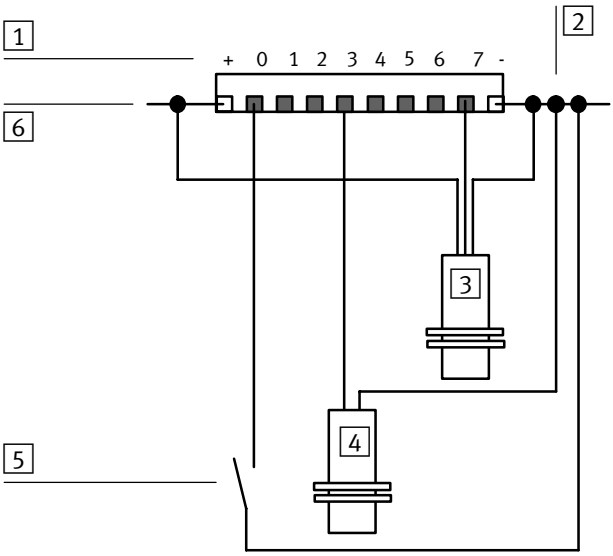
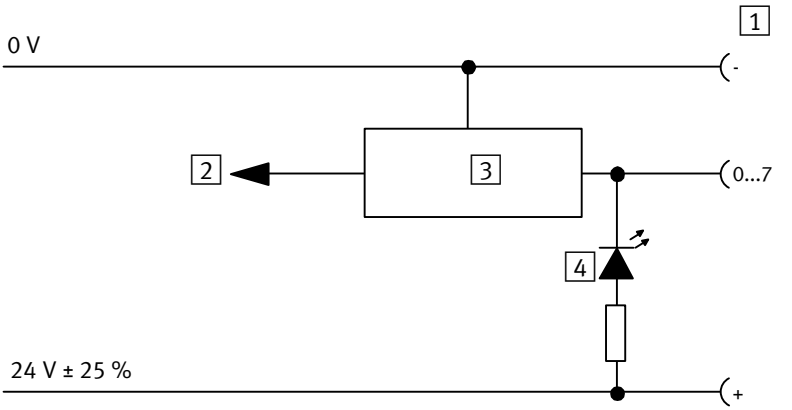


Fig. 2/13: NPN inputs (1 row, connector socket)

Internal structure (PNP operation)



1 Pin assignment
+: 24 V ± 25 %
0...7: Ix + n
- : 0 V

2 PLC/IPC Ix (e.g. via field bus)

3 Logic recognition Ix + n

4 Green LED Ix + n

Ix = Input x

Fig. 2/14: Internal structure (NPN operation)

2.3.7 Connecting the input module

Caution
Please observe the maximum permitted string lengths. You can thereby avoid errors in data exchange between the input module and the higher-order system (e.g. field bus node).

Use only the following original cables for connecting the modules:

For connection to:	Max. permitted string length	Cable type
Field bus node with CP connection or CPV valve terminal with direct connection	10 m	– KVI-CP-1-... or – KVI-CP-2-... (suitable for drag chain)
Axis interface type SPC-AIF-...	See manual for the SPC200 type P.BE-SPC200-...	
Powerbox type CP-FB-TBOX-...	See manual for the higher-order system	

The following functions are provided for the module via the CP cable:

– Operating voltage for the internal electronics

– Connection for data exchange

Input modules should be connected to one of the following:

– to the CP connection of the higher-order system (field bus node or axis interface or Powerbox)

– to the CP connection of a CP output module

– to the CP connection of a valve terminal.

Further information can be found in the relevant system manual.

2.4 Instructions on commissioning

Warning
Please be careful if the string assignment is modified at a later stage. After saving the string assignment/hardware configuration, check the address assignments of your higher-order system before starting user programs.

You can thereby avoid:

– addressing errors with unintentionally incorrectly fitted CP modules.

If, in the case of CP field bus nodes and CP valve terminals with direct connection, the string assignment is modified (CP modules added or removed), the new string assignment must be saved or configured.

Depending on the design of the node or CP valve terminal, this is accomplished as follows:

– press the SAVE button or

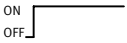
– configure with the DIL switch.

Proceed here as described in the manual “CP system, installation and commissioning” or in the manual for your “CP valve terminal with direct connection”.

When the string assignment has been modified on the SPC200, the new hardware configuration must also be saved. Proceed here as described in the manual for the SPC200 or in the WinPISA manual.

Status LED

The operating status of the input module is indicated by the status LED on the CP connection (see table below).

Status LED	Sequence	Operating status	Error treatment
 LED lights up		Operating voltage applied	None
LED is out		– Operating voltage not applied or no connection to the higher-order system or In conjunction with the CP node: – Incorrect string assignment ascertained during operation In conjunction with the SPC200: – See user manual for the SPC200	• Check the CP cable and the operating voltage connection on the higher-order system or • Correct string assignment • See user manual type P.BE-SPC200
 LED flashes		– Test phase when power supply has been switched on or – Short circuit in sensor supply [2] or – Undervoltage in sensor supply (< 17 V) or In conjunction with the CP node: – Incorrect string assignment when operating voltage is switched on In conjunction with the SPC200: – See user manual for the SPC200	• None or • Eliminate short circuit or • Eliminate undervoltage • Check string assignment [1] • See user manual type P.BE-SPC200

[1] When the string assignment has been modified (CP modules added or removed), the new string assignment must be saved or configured (see manual “CP system, installation and commissioning” or “CP valve terminal with direct connection”).

[2] The short circuit LED of the relevant input module lights up.

Short circuit in sensor supply

If there is a short circuit, the input module will switch off the power supply for the relevant input module and pass the error on to the higher-order system. The short circuit LED of the relevant input module lights up.

1 Red LED for short circuit/overload display (one LED per input module)

2 Input module (plug X3)

3 Input module 1 (plug X2)

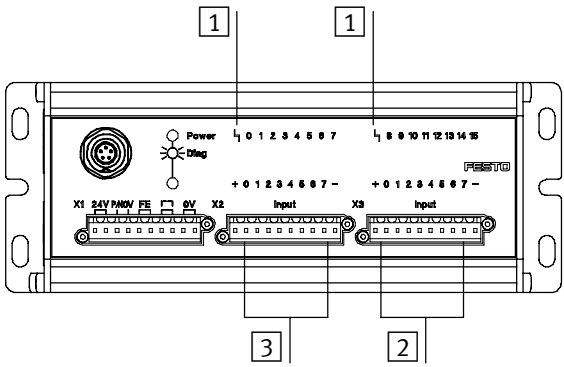


Fig. 2/15: Short circuit displays

Reaction with PNP operation (positive logic)

All status LEDs of the relevant input module are switched off. The status LEDs of the non-affected input module continue to show the status. However, the inputs are no longer processed in respect of software. For all 16 inputs, the module supplies a 0-signal to the higher-order system. When the short circuit is eliminated, the error will be deleted automatically.

Reaction with NPN operation (negative logic)

All status LEDs of the relevant input module are switched on. The status LEDs of the non-affected input module continue to show the status. However, the inputs are no longer processed in respect of software. For all 16 inputs, the module supplies a 0-signal to the higher-order system. When the short circuit is eliminated, the error will be deleted automatically.

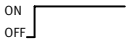
Replacing CP modules

If a fault occurs on a CP module during operation, you can replace the module during operation by another module of the same type.

Please note
Please note here the instructions in the manual for the higher-order system (e.g. CP system, CP field bus node, SPC200).

Status display

There are green LEDs above the sensor connections. These indicate the status of the signal at the relevant input. The LEDs indicate the following:

Status LED	Sequence	Status
 LED lights up		Logical 1 (signal present)
 LED is out		Logical 0 (no signal)

2.5 Technical specifications

Technical specifications	Type CP-E16-...-...
Temperature range: – Operation – Storage/transport	 - 5 °C ... + 50 °C - 20 °C ... + 70 °C
Relative humidity	95 %non-condensing
Protection against electric shock as per EN 60204-1 / IEC 204	(Protection against direct and indirect contact) by connection to a PELV power unit (Protected Extra Low Voltage)
Electromagnetic compatibility – Interference emitted – Immunity against interference	 Tested as per EN 55011, limit class B Tested as per EN 61000-6-2 1)
Vibration and shock – Vibration – Shock	 Tested as per DIN/IEC 68/EN 60068 part 2-6; Severity class 2 Tested as per DIN/IEC 68/EN 60068 part 2-27; Severity class 2
1) The maximum permitted signal cable length is 30 m.	

Special technical data	**Type CP-E16-KL-IP20-Z; positive switching (PNP) – or negative switching (NPN) operation**
Protection class as per DIN 60529	IP20
Digital inputs – Design	16 inputs as per IEC 1131-2 type 2 inputs 24 V DC, positive or negative switching
– Logical level, positive switching ON OFF – Logical level, negative switching ON OFF	PNP (reference 0 V): ≥ 8.6 V ≤ 6 V NPN (reference 24 V): ≤ 6 V ≥ 8.6 V
– Current consumption (at 24 V) (input current from sensor to input)	at “logical 1” typ. 8 mA
– Response delay (at 24 V)	typ. 3 ms
Sensor supply V_D 24 V ± 25 %	Max. 1 A per input group (electronic short-circuit protection per group)
Electrical isolation of the power supply for the sensors/inputs from the power supply for the electronics and the CP bus	Yes
Internal current consumption of electronics	< 40 mA

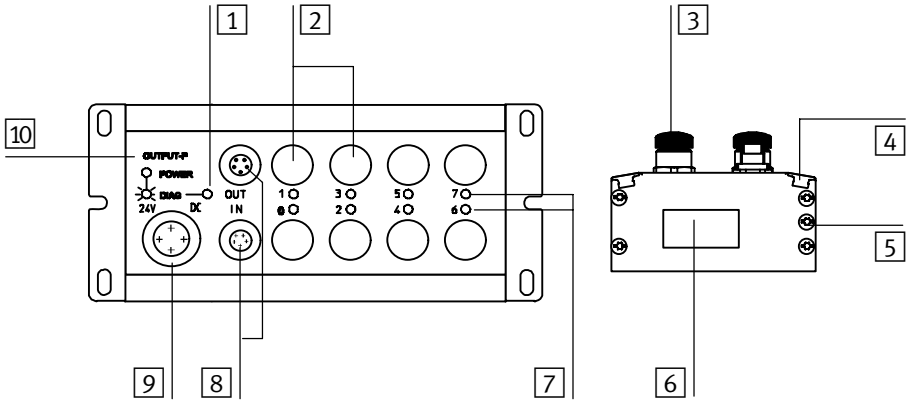
Output modules type CP-A08...-M12-...

Chapter 3

Contents

3.1 Summary

Output module CP-A08...-M12-... provides 8 universally usable digital outputs for controlling low-current consuming devices (bulbs, further valves etc.). The diagram below shows the display and connecting elements on the output module.



1 Status LED (green)

2 Connections for actuators

3 Protective cap

4 Groove for identification signs (IBS 6x10)

5 Earth/ground connection

6 Type plate

7 Yellow LED for status display (one LED per output)

8 CP connection

9 Load voltage connection

10 Identifier for output type
OUTPUT-P for PNP outputs
OUTPUT-N for NPN outputs

Fig. 3/1: Display and connecting elements

3.2 Fitting

The output module is intended for fitting onto a wall and a hat rail. It requires a mounting area of approx. 173 x 78 mm.

Fitting onto a wall

The diagram below shows the dimensions for the four threaded holes of M4 screw size.

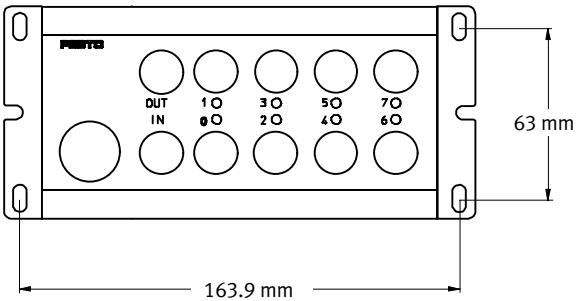


Fig. 3/2: Fitting dimensions for output module CP-A08...-M12-...

Fitting onto a hat rail

The procedure for fitting onto a hat rail is the same as with the input modules type CP-E16...-M... (see section 1.2).

3.3 Installation

Warning
Before carrying out installation and maintenance work, switch off the following:

- the load voltage on the relevant output module.

Also switch off the following when carrying out installation work:

- the operating voltage supply for the higher-order system
- the load voltage supply for all the output modules

You can thereby avoid:

– unexpected movements of the connected actuators

– non-defined switching states of the electronic components.

Warning
Connect the earth connection on the side of the housing (see fig. 2/1) with low impedance (short cable with large cross-sectional area) to the earth potential.

In this way you can avoid faults due to electromagnetic influences and ensure electromagnetic compatibility in accordance with EMC guidelines.

3.3.1 Connecting the actuators

Use plugs with union nuts with M12 thread for connecting the actuators. Fasten the plugs with the aid of the union nut in order to prevent unintentional loosening, e.g. due to shock.

Seal the unused connections with the protective caps supplied. Only in this way can you comply with protection class IP65.

Pin assignment of the actuator connections on the CP-A08-M12-... (PNP outputs)

[1] Pin assignment
- 1: n.c.
- 2: n.c.
- 3. 0 V
- 4: Ax+1

[2] Pin assignment
- 1: n.c.
- 2: n.c.
- 3. 0 V
- 4: Ax

n.c. = not connected (not connected)
Ax = Output x

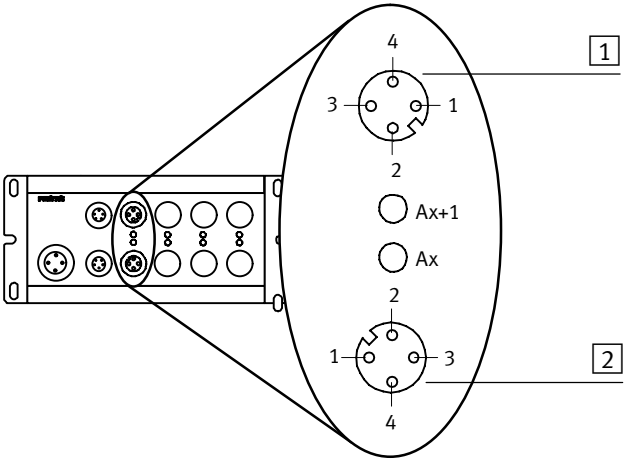


Fig. 3/3: Pin assignment of output module CP-A08...-M12-...

By means of internal connections, two outputs can be connected on each of the output sockets 0, 2, 4 and 6 on the CP output module type CP-A08-M12-5POL.

1 Pin assignment
- 1: n.c.
- 2: n.c.
- 3. 0 V
- 4: Ax+1
- 5: earth/ground connection

2 Internal connection in the module

3 Pin assignment
- 1: n.c.
- 2: Ax+1
- 3. 0 V
- 4: Ax
- 5: earth/ground connection

n.c. = not connected (not connected)
Ax = Output x

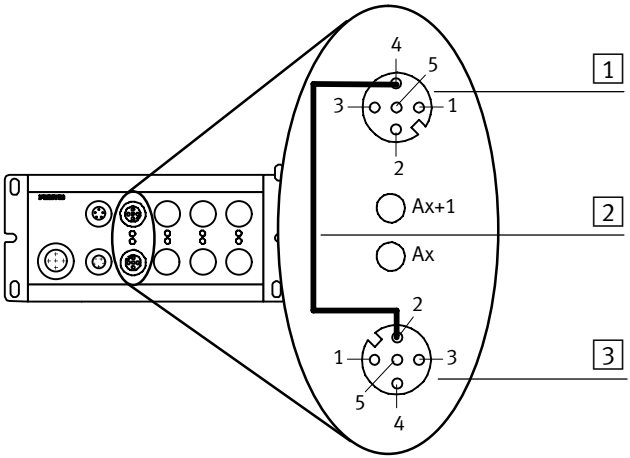
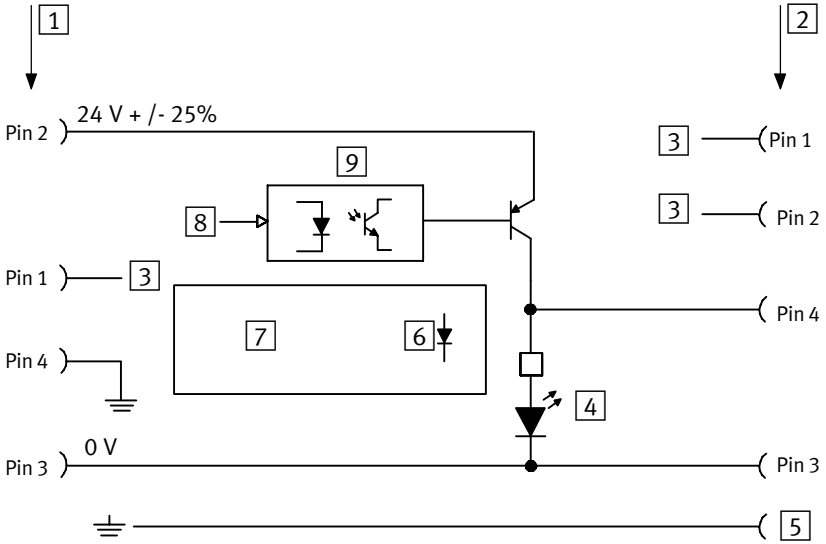


Fig. 3/4: Pin assignment of output module CP-A08-M12-5POL

Internal structure of CP-A08...-M12-... (PNP outputs)



1 Load voltage connection

2 Actuator connection

3 On type CP-A08...-M12-...
n.c. = not connected on type CP-A08-M12-5POL
– connections 0, 2, 4, 6: Ax+1
– connections 1, 3, 5, 7:
n.c. = not connected

4 Yellow LED

5 Pin 5 on type CP-A08-M12-5POL
earth/ground connection

6 Green LED

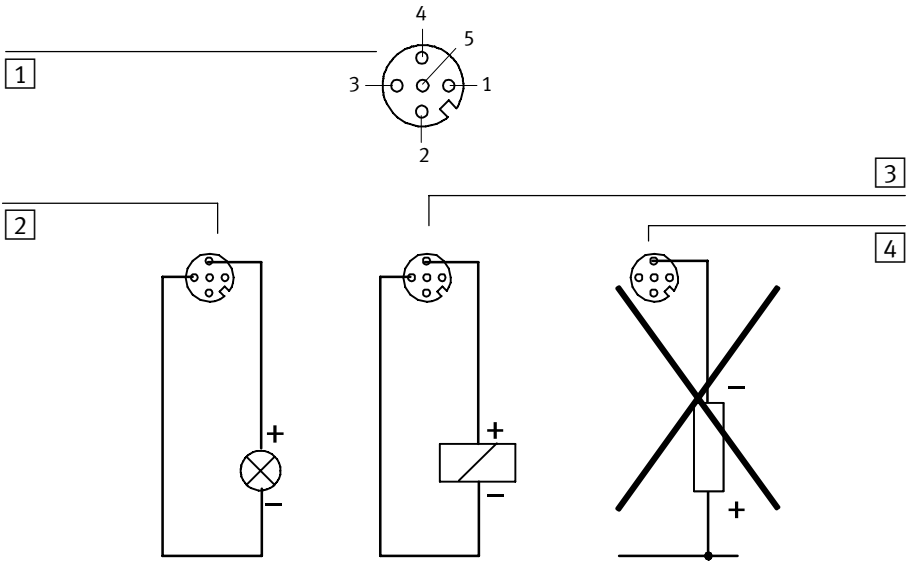
7 Diagnosis
– short circuit/overload
– load voltage failure

8 PLC/IPC Ax (e.g. via field bus)

9 Electrical isolation

Fig. 3/5: Internal structure of output module CP-A08...-M12-...

Internal structure of CP-A08...-M12-... (PNP outputs)



1 Pin assignment
- 1: n.c.
- 2: *)
- 3. 0 V
- 4: Ax+1
- 5: only with type CP-A08-M12-5POL earth/ground connection

*) On type CP-A08...-M12-...
n.c. = not connected on type CP-A08-M12-5POL
- connections 0, 2, 4, 6: Ax+1
- connections 1, 3, 5, 7: n.c. = not connected

2 Example 1:

3 Example 2:

4 Not permitted

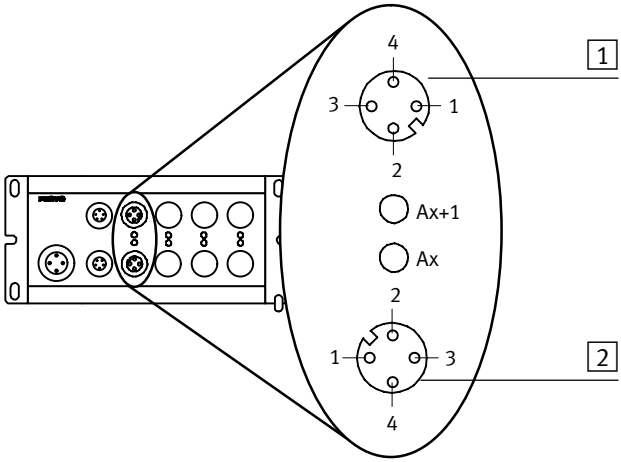
Ax = Output x
n.c.= not connected

Fig. 3/6: Examples of circuitry for output module CP-A08...-M12-...

Pin assignment of the actuator connections on the CP-A08N-M12-... (NPN outputs)

1 Pin assignment
- 1: 24 V[1)]
- 2: earth/ground connection
- 3: n.c.
- 4: Ax+1

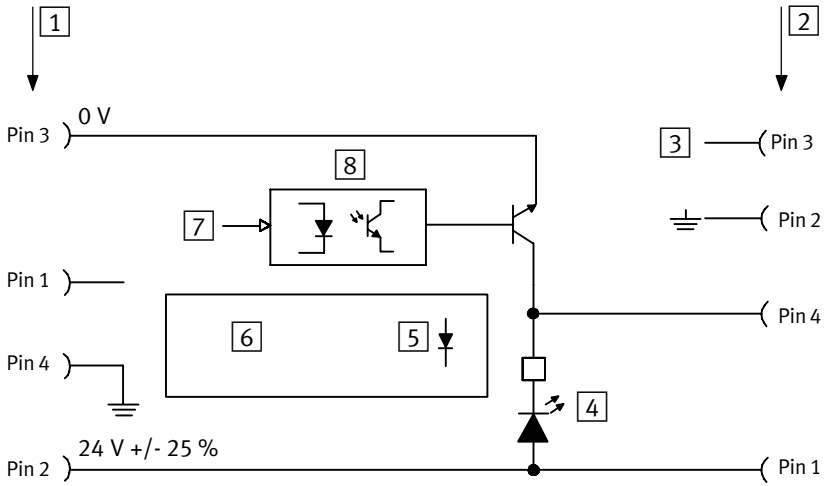
2 Pin assignment
- 1: 24 V[1)]
- 2: earth/ground connection
- 3: n.c.
- 4: Ax



[1)] Current consumer/load must be supplied via this 24 V connection
n.c. = not connected
Ax = output x

Fig. 3/7: Pin assignment of output module CP-A08N-M12-...

Internal structure of CP-A08N-M12 (NPN outputs)



1 Load voltage connection

2 Actuator connection

3 n.c. = not connected

4 Yellow LED

5 Green LED

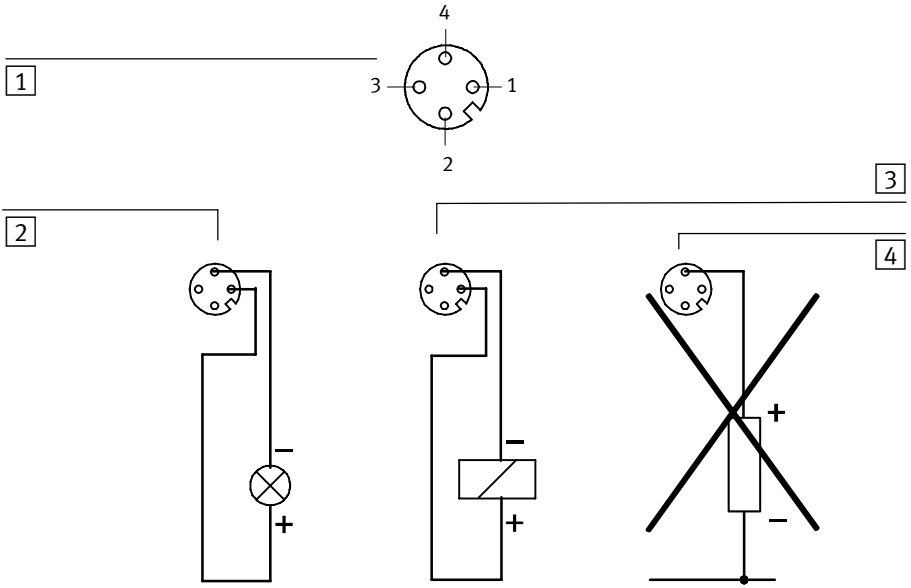
6 Diagnosis
- short circuit/overload
- load voltage failure

7 PLC/IPC Ax (e.g. via field bus)

8 Electrical isolation

Fig. 3/8: Internal structure of output module CP-A08N-M12

Circuitry example of CP-A08N-M12 (NPN outputs)



1 Pin assignment
1: 24 V[1)]
2: earth/ground connection
3: n.c.
4: Ax+1

2 Example 1:

3 Example 2:

4 not permitted

1) Current consumer/load must be supplied via this 24 V connection

n.c. = not connected
Ax = Output x

Fig. 3/9: Examples of circuitry of output module CP-A08N-M12

3.3.2 Connecting the output module

Warning
Please observe the maximum string lengths. You can thereby avoid errors in data exchange between the output module and the higher-order system (e.g. field bus nodes).

Use only the following original cables for connecting the modules:

For connection to:	max. permitted string length	Cable type
Field bus node with CP connection	10 m	– KVI-CP-1-... or – KVI-CP-2-... (suitable for drag chain)
Axis interface type SPC-AIF-...	See manual for the SPC200 type P.BE-SPC200-...	
Powerbox type CP-FB-TBOX-...	See manual for the higher-order system	

Communication and the necessary operating voltage for the internal electronics of the module are carried out via the CP cable.

The output module is connected directly to the CP connection of the higher-order system (field bus node, axis interface or Powerbox). Detailed information can be found in the relevant system manual.

3.3.3 Connecting the load voltage

Warning
Use only power units which guarantee reliable isolation of the operating voltages as per IEC 742/EN 60742/VDE 0551 with at least 4 kV isolation resistance (Protected Extra Low Voltage PELV).

Switch power packs are permitted, providing they guarantee reliable isolation in accordance with EN 60950 / VDE 0805.

By the use of PELV power units, protection against electric shock (protection against direct and indirect contact) is guaranteed with the SPC10 in accordance with EN 60204-1/ IEC 204. Safety transformers with the adjacent symbol must be used for supplying PELV networks. The CP output module must be earthed to ensure that it functions correctly (e.g. EMC).

The connected actuators are supplied with + 24 V DC via the load voltage connection on the output module. Use a cable for the operating voltage with sufficient cross-sectional area.

The diagram below shows the pin assignment of the load voltage connection on the output module with an example.

[1] Pin assignment
- 1: n.c.
- 2: 24 V DC ± 25 %
- 3. 0 V
- 4: earth/ground connection

[2] The load voltage can be switched off separately; the operating voltage is supplied via the CP connection.

n.c. = not connected (not connected)

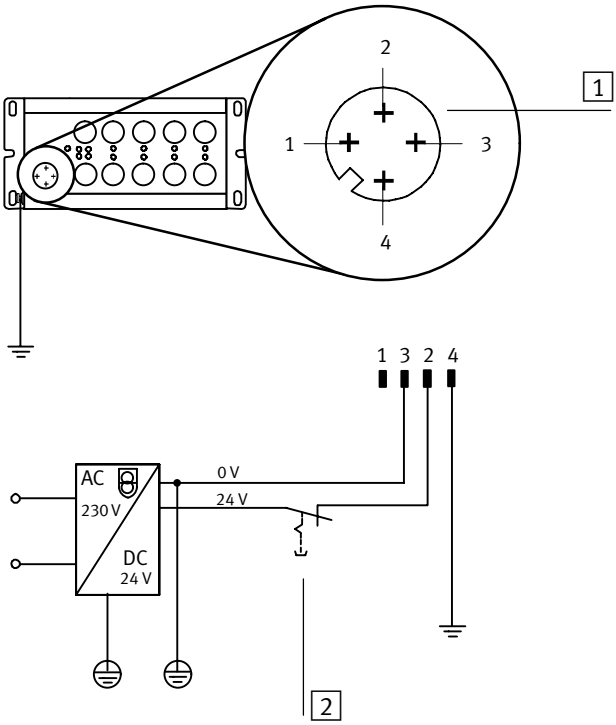


Fig. 3/10: Pin assignment and example of the load voltage connection

Potential equalization

The CP module has two earthing connections for potential equalization:

– at the load voltage connection (pin 4)

– on the housing (earthing connection see Fig. 3/10).

Please note
- Always connect the earth potential to pin 4 of the load voltage connection.
- Connect the earth connection on the left-hand side of the housing with low impedance (short cable with large cross-sectional area) to the earth potential.
- With low-impedance connections you can ensure that the housing of the output module and the earth connection at pin 4 have the same potential and that there are no equalizing currents.

In this way you can avoid faults due to electromagnetic influences and ensure electromagnetic compatibility in accordance with EMC guidelines.

Please note
Check within the framework of your EMERGENCY STOP circuit, to ascertain the measures necessary for putting your machine/system into a safe state in the event of an EMERGENCY STOP (e.g. switching of the operating voltage for the valves and output modules, switching off the compressed air).

3.4 Instructions on commissioning

Warning
Please be careful if the string assignment is modified at a later stage.

After saving the string assignment/hardware configuration, check the address assignments of your higher-order system before starting user programs.

You can thereby avoid:

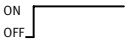
– addressing errors with unintentionally incorrectly fitted CP modules.

When the string assignment on CP field bus nodes has been modified (CP modules added or removed), you must save the new string assignment by pressing the SAVE button on the node. Proceed here as described in the manual “CP system, installation and commissioning”.

When the string assignment has been modified on the SPC200, the new hardware configuration must also be saved. Proceed here as described in the manual for the SPC200 or in the WinPISA manual.

Status LED

The operating status of the output module is indicated by the status LED on the CP connection (see table below).

Status LED	Sequence	Operating status	Error treatment
 LED lights up		Operating voltage applied	None
 LED is out		– Operating voltage not applied or no connection to node or In conjunction with the CP node: – incorrect string assignment ascertained during operation In conjunction with the SPC200: – see user manual for the SPC200	• Check CP cable and operating voltage connection on node (pin 1) or • correct string assignment • see user manual for the SPC200
 LED flashes fast		– Test phase when power supply has been switched on or – short circuit/overload on at least one output module or In conjunction with the CP node: – incorrect string assignment when operating voltage is switched on In conjunction with the SPC200: – see user manual for the SPC200	• None or • eliminate short circuit/overload and reset output [1] or • check string assignment [2] • see user manual for the SPC200
 LED flashes slowly		Load voltage failure	Restore load voltage

[1] In the event of a short circuit/overload all the outputs on the module will be switched off automatically. The fault must be eliminated when the outputs are reset. (e.g. by user program).

[2] When the string assignment has been modified (CP modules added or removed), you must save the new string assignment by pressing the SAVE button on the node.

Short circuit/overload

In the event of a short circuit/overload, the output module will switch off all 8 outputs self-holding and pass the error on to the CP node or the SPC200. When the short circuit has been eliminated, delete this error as follows:

- Reset all 8 outputs (e.g. by user program)

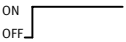
Replacing CP modules

If a fault occurs on a CP module during operation, you can replace the module during operation by another module of the same type.

Please note
Please note here the instructions in the manual for the higher-order system (e.g. CP system, CP field bus node, SPC200).

Status display

There are two yellow LEDs next to the connections for the actuators. These indicate the status of the signal at the relevant output. The meanings are as follows:

Status LED	Sequence	Status
 LED lights up		Output supplies a 1-signal
 LED is out		Output supplies a 0-signal

3.5 Technical specifications

General technical specifications	Type CP-A...-M12 and CP-A...-M12-...
Temperature range: – Operation – Storage/transport	 - 5 °C ... + 50 °C - 20 °C ... + 70 °C
Relative humidity	95 % non-condensing
Protection class as per EN 60529; plug connector inserted or provided with protective cap	IP65
Protection against electric shock as per EN 60204-1 / IEC 204	By connection to a PELV power unit (Protected Extra Low Voltage)
Electromagnetic compatibility – Interference emitted – Immunity against interference	 Tested as per EN 55011, limit class B Tested as per EN 50082-2
Vibration and shock – Vibration – Shock	 Tested as per DIN/IEC 68/EN 60068 part 2-6; severity class 2 Tested as per DIN/IEC 68/EN 60068 part 2-27; severity class 2
Load voltage connection – Rated value (protected against incorrect polarity) – Tolerance – Residual ripple – Insulation resistance – Internal current consumption of electronics	Electrically isolated load voltage supply via additional M18 plug connector 24 V ± 25 % 4 Vpp (within tolerance) 500 V < 40 mA

Special technical data (PNP outputs)	**Positive-switching output module**
	Type CP-A08-M12 and type CP-A08-M12-5POL
Digital outputs – Design	8 outputs as per IEC 1131-2; 24 V DC, positive-switching
– Maximum load per digital output	0.5 A
– Electronic fuse (short circuit, overload) Trigger current Response time	Min. 750 mA Max. 1.5 ms

Special technical data (NPN outputs)	**Negative-switching output modules**
	Type CP-A08N-M12
Digital outputs – Design	8 outputs as per IEC 1131-2; 24 V DC, negative-switching
– Maximum load per digital output	0.5 A
– Electronic fuse (short circuit, overload) Trigger current Response time	Typical 1 A Max. 1.5 ms

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Appendix A

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