

Compact performance

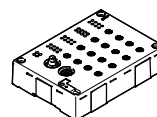
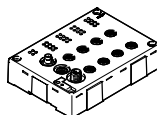
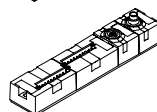
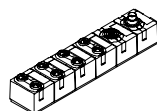


FESTO

Description Manual

CPI-CL modules:
- CP-E08-M12-CL
- CP-E08-M8-CL
- CP-E16-KL-CL
- CP-A04-M12-CL

CPI-EL modules
- CP-E32-M8-EL
- CP-E16-M8-EL
- CP-E16-M12-EL
- CP-A08-M12-EL-Z



Description

539 300
en 0711a
[726 334]

Contents and general safety instructions

Original German text
Edition en 0711a
Designation P.BE-CPEA-CL-EN
Order -no. 539 300

© (Festo SE & Co. KG, D-73726 Esslingen, Federal Republic of Germany, 2007)
Internet: <http://www.festo.com>
E-mail: service_international@festo.com

The copying, distribution and utilization of this document as well as the communication of its contents to others without expressed authorization is prohibited. Violations give rise to compensation. All rights are reserved, in particular the right to carry out patent, utility model or ornamental design registration.

Contents

Intended use	VI
Selecting the power unit	VII
Target group	VII
Service	VII
Important user instructions	VIII
Notes on the use of this manual	X
 1. System overview CPI/CP system	 1-1
1.1 Setting up CPI systems	1-3
1.1.1 Method of operation of the CPI/CP system	1-5
1.1.2 Rules for extending the CPI system	1-8
1.1.3 Use of the I/O modules	1-11
1.1.4 Basic rules for addressing	1-13
 2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL	 2-1
2.1 Function of the input modules CP-E08-M...-CL and CP-E16-KL-CL	2-3
2.1.1 Display and connecting elements	2-4
2.2 Mounting	2-7
2.3 Installation	2-8
2.3.1 Connecting sensors	2-9
2.3.2 Connect the input module to the CP string	2-12
2.4 Diagnosis	2-14
2.4.1 Diagnosis via LEDs	2-14
2.4.2 Diagnosis via the field bus	2-17
 3. Output module type CP-A04-M12-CL	 3-1
3.1 Function of output module type CP-A04-M12-CL	3-3
3.1.1 Display and connecting elements	3-4
3.2 Mounting	3-5
3.3 Installation	3-6
3.3.1 Connecting the actuators	3-7
3.3.2 Connect the output module to the CP string	3-8

3.4	Diagnostics	3-10
3.4.1	Diagnostics via LEDs	3-10
3.4.2	Diagnostics via the fieldbus	3-13
4.	Input modules type CP-E16-M...-EL and CP-E32-M8-EL	4-1
4.1	Function of the input modules CP-E16-M...-EL and CP-E32-M8-EL	4-3
4.1.1	Display and connecting elements	4-4
4.2	Mounting	4-7
4.3	Labelling of inscription label holder	4-9
4.4	Installation	4-10
4.4.1	Connecting sensors	4-11
4.4.2	Connect the input module to the CP string	4-14
4.5	Diagnostics	4-16
4.5.1	Diagnostics via LEDs	4-16
4.5.2	Diagnostics using fieldbus	4-20
5.	Output module type CP-A08-M12-EL-Z	5-1
5.1	Function of the output module type CP-A08-M12-EL-Z	5-3
5.1.1	Display and connecting elements	5-4
5.2	Mounting	5-5
5.3	Labelling of inscription label holder	5-7
5.4	Installation	5-8
5.4.1	Connect external load supply	5-9
5.4.2	Connecting the actuators	5-10
5.4.3	Connect the output module to the CP string	5-11
5.5	Diagnostics	5-13
5.5.1	Diagnostics via LEDs	5-13
5.5.2	Diagnostics using fieldbus	5-16
A.	Technical appendix	A-1
A.1	Technical specifications	A-3
A.1.1	General technical data	A-3
A.1.2	Technical specifications of the CL input modules	A-4
A.1.3	Technical specifications of the CL output modules	A-6

	A.1.4	Technical specifications of the EL input modules	A-7
	A.1.5	Technical specifications of the EL output modules	A-9
A.2		Internal structure of the inputs	A-10
	A.2.1	Internal structure type CP-E32-M8-EL	A-10
	A.2.2	Internal structure type CP-E08-M12-CL and CP-E16-M12-EL	A-11
	A.2.3	Internal structure type CP-E08-M8-CL and CP-E16-M8-EL	A-12
	A.2.4	Internal structure type CP-E16-KL-CL	A-13
A.3		Internal structure of the outputs	A-14
	A.3.1	Internal structure type CP-A04-M12-CL and CP-A08-M12-EL-Z ...	A-14
A.4		Examples of circuitry	A-15
	A.4.1	Circuitry examples for inputs	A-15
	A.4.2	Circuitry examples for outputs	A-20
A.5		General information on parameterisation	A-22
	A.5.1	Input debounce time (only with CP-EL modules)	A-22
	A.5.2	Signal extension (only with CP-EL modules)	A-24
A.6		Accessories	A-27
	A.6.1	General accessories	A-27
	A.6.2	Accessories for modules with M12 connection	A-27
	A.6.3	Accessories for modules with M8 connection	A-28
	A.6.4	Connector sets for input module type CP-E16-KL-CL	A-29
B.		Index	B-1

Intended use

The CPI modules described in this manual are intended exclusively for use on a CP string on a CPI/CP master (e.g.: CPX-CP interface, CP fieldbus node, CPV Direct).

The CPI/CP modules may only be used as follows:

- as specified in industrial applications
- without any modifications by the user. Only the conversions or modifications described in the documentation supplied with the product are permitted.
- In perfect technical condition.

If used together with additional commercially available components, such as sensors and actuators, the specified limits for pressures, temperatures, electrical data, torques etc. must be observed.

Please comply with national and local safety laws and regulations.

Selecting the power unit



Warning

- In order to provide the electric power supply, use only PELV **circuits** as per IEC/DIN EN 60204-1 (Protective Extra-Low Voltage, PELV). Take into account also the general requirements for PELV circuits as per IEC/DIN EN 60204-1.
- Use only **power packs** which guarantee reliable electrical isolation of the operating voltage as per IEC/DIN EN 60204-1.

By the use of PELV power units, protection against electric shock (protection against direct and indirect contact) is guaranteed in accordance with IEC/DIN EN 60204-1 (electrical equipment of machines, general requirements).

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 can 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

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



Caution

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



Note

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



The following pictogram marks passages in the text which describe activities using electrostatically sensitive devices.

Electrostatically sensitive devices: Incorrect handling can result in damage to components.

Identifying special information

The following pictograms mark passages in the text which contain special information.

Pictograms



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



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



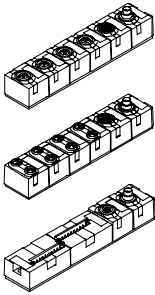
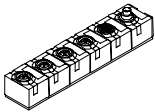
Environment:
Information on the environment-friendly use of Festo products.

Text designations

- The bullet indicates activities which may be carried out in any order.
- 1. Numbers denote activities which must be carried out in the sequence specified.
- Hyphens indicate general activities.

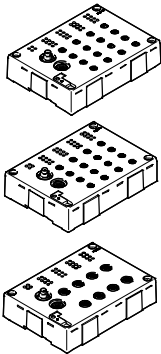
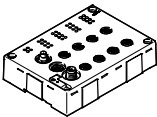
Notes on the use of this manual

This manual contains information on fitting, installing and commissioning the following CPI modules as well as a description of their method of operation:

This manual refers to:	
	Input modules PNP: – CP-E08-M12-CL: 8 digital inputs, 4 M12 sockets, 5-pin – CP-E08-M8-CL: 8 digital inputs, 8 M8 sockets, 3-pin – CP-E16-KL-CL: 16 digital inputs, 2 series plugs, 10-pin
	Output modules PNP: – CP-A04-M12-CL 4 digital outputs, 4 M12 sockets, 5-pin

Tab. 0/1: CP I/O modules type CP-...-CL

Input module type CP-E16-KL-CL offers 2 series plugs for screw terminal sockets or tension spring sockets (see section A.6.4).

This manual refers to:	
	Input modules PNP: – CP-E32-M8-EL: 32 digital inputs, 16 M8 sockets, 4-pin – CP-E16-M8-EL: 16 digital inputs, 16 M8 sockets, 3-pin – CP-E16-M12-EL: 16 digital inputs, 8 M12 sockets, 5-pin
	Output modules PNP: – CP-A08-M12-EL-Z 8 digital outputs, 8 M12 sockets, 5-pin

Tab. 0/2: CP I/O modules type CP-...-EL

Basic information, which must be observed in conjunction with the CPI/CP master, can be found in the manuals for the relevant CPI/CP master and in the CPI system description for type CPX-CP-... .

Type	Title		Description
CPI system, Description electronics	“CP system” Type P.BE-CPX-CP-...		General basic information on fitting, installing and commissioning CPI systems and on their method of operation.
Modules with CP connection, description of electronics	“CPV Direct” Type P.BE-CP-DI...		Instructions on fitting, installing, commissioning and diagnosing the relevant CPV valve terminal with direct connection.
	“CP fieldbus node” Type P.BE-CPX-FB.../ CP-4-FB-...		Instructions on fitting, installing, commissioning and diagnosing the relevant fieldbus node.
	“CDVI ...” Type P.BE-CDVI-DN-...		Instructions on fitting, installing, commissioning and diagnosing the relevant CDVI with fieldbus direct connection “DeviceNet.”
	“CPA-SC / CPV-SC ...” Type P.BE-CPASC-CPVSC-...		Instructions on fitting, installing, commissioning and diagnosing the CPV-SC or CPA-SC valve terminal with fieldbus direct connection for PROFI-BUS DP or DeviceNet.
CP modules, description of electronics	“CP modules” Type P.BE-CPEA-...		Information on fitting, installing and commissioning CP I/O modules.
Valve terminals, Pneumatics manual	“Valve terminals with CPV pneumatics” Type P.BE-CPV-...		Information on fitting, installing and commissioning CPV valve terminals (type 10).
	“Valve terminals with MPA pneumatics” Type P.BE-MPA-...		Information on fitting, installing and commissioning MPA valve terminals (type 32), (type 33).
	“Valve terminals with CPA pneumatics” Type P.BE-CPA-...		Information on fitting, installing and commissioning CPA valve terminals (type 12).

Tab. 0/3: Manuals on the CPI/CP system

The following product-specific terms and abbreviations are used in this manual:

Term/abbreviation	Meaning
A	Digital output
CP cable	Special cable for connecting the various CPI/CP modules in a CP string. Colour: black, type KVI-CP1-... and type KVI-CP2-...
CP functions	Supports the CP protocol without extended functions
CP module/valve terminal	Common term for modules without extended functions which can be incorporated in a CPI/CP system.
CP string	CPI or CP modules which are connected by CPI/CP cable and which are connected to the CPX-CP interface. For reasons of simplicity, only the term “CP string” is used, even if it has CPI functionality.
CP system	Complete electrical installation system consisting of a CP master with one or more CP strings. The system consists of CP modules (without extended functions).
CPI cable	Special cable for connecting the various CPI/CP modules in a CP string. Colour: white, type KVI-CP3-...
CPI connection	Socket or plug on the CPI modules which allows the modules to be connected using the CPI or CP cable.
CPI fieldbus interface	Term for a CPI capable interface with fieldbus connection (e.g. combination of CPX fieldbus node and CPX-CP interface (CPI fieldbus module) or CPV with CPI string extension (CPV Direct))
CPI fieldbus module	Defined combination of a CPX fieldbus node and a CPX-CP interface. Connects a CPI system with a fieldbus.
CPI functions	Supports the CPI protocol with extended functions
CPI module/valve terminal	Common term for modules with extended functions which can be incorporated in a CPI/CP system.
CPI system	Also: “CPI installation system” Complete electrical installation system consisting of a CP master with one or more CP strings. The system consists of CPI/CP modules with and without extended functions. The system need not consist exclusively of CPI modules.
E	Digital input
Input module	Input module

Term/abbreviation	Meaning
I/Os	Digital inputs and outputs
I/O modules	Collective term for the modules which provide digital inputs and outputs (e.g., CPX I/O modules, CPI input modules and CPI output modules).
Output module	Output module
String allocation	Type and order of the CPI/CP modules connected to one or more CP strings.

Tab. 0/4: Specific terms and abbreviations

System overview CPI/CP system

Chapter 1

Contents

1. **System overview CPI/CP system** **1-1**

1.1 Setting up CPI systems 1-3

 1.1.1 Method of operation of the CPI/CP system 1-5

 1.1.2 Rules for extending the CPI system 1-8

 1.1.3 Use of the I/O modules 1-11

 1.1.4 Basic rules for addressing 1-13

1. System overview CPI/CP system

The CPI/CP system consists of individual modules which are connected to each other by means of CP cables. In this way it is possible to decentralize the arrangement of the CP system. The compact CP valve terminals can be mounted very close to the cylinders to be controlled. This enables short compressed air tubing to be used.

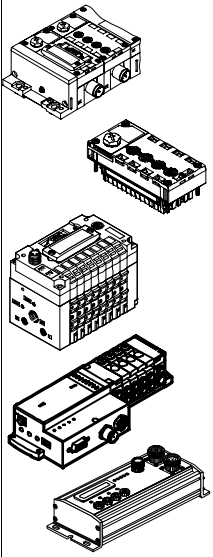
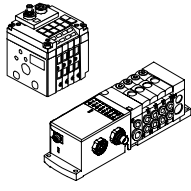
System losses can be minimized if short compressed air tubing is used and the times required for pressurising and exhausting the tubing can be reduced.

This enables smaller valves with sufficient flow to be used, thereby helping to reduce costs.

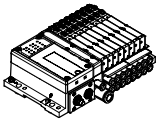
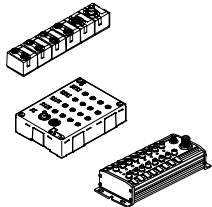
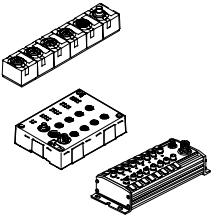
1. System overview CPI/CP system

1.1.1 Method of operation of the CPI/CP system

CPI/CP systems are composed of the following modules:

Modules	Function
CPI/CP master 	Special CP fieldbus nodes and CP modules are available for the various fieldbuses. – These provide the connection to certain fieldbuses. – These offer connections for up to four strings to which I/O modules and CP valve terminals are connected. – They transmit control signals to the connected modules and monitor their functioning.
CPV/CPV-SC valve terminals with CPI connection 	– These provide different valve functions via valve plates for controlling pneumatic actuators. – Relay plates, pressure zone separation plates and blanking plates can also be fitted.

1. System overview CPI/CP system

Modules	Function
MPA valve terminal with CPI connection 	– These provide different valve functions via valves for controlling pneumatic actuators.
Input modules (type CL, EL, RL) 	– These provide inputs for connecting sensors and enable e.g. cylinder positions to be scanned.
Output modules (type CL, EL, RL) 	– These provide universal electric outputs for controlling low-current consuming devices (further valves, bulbs etc.).

Tab. 1/1: Overview of the CPI modules

1. System overview CPI/CP system

Depending on their design, CPI/CP masters control the transfer of data to the different control systems via the various fieldbuses.

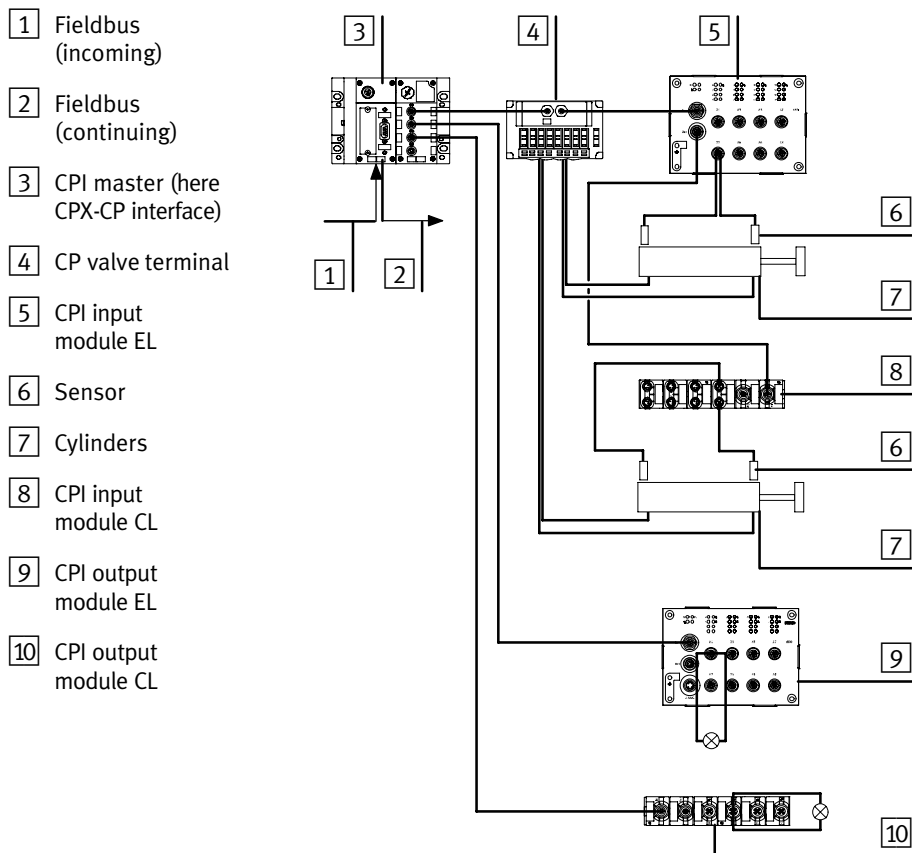


Fig. 1/2: Method of operation of the CP system

1. System overview CPI/CP system

1.1.2 Rules for extending the CPI system

The CPI system supports a different number of modules per CP string, depending on the type of CP master and on the CPI/CP modules connected.

The CPV Direct is a CPI master.

Modules can be placed in two different groups:

- CPI modules (with extended functions)
- CP modules (without extended functions)

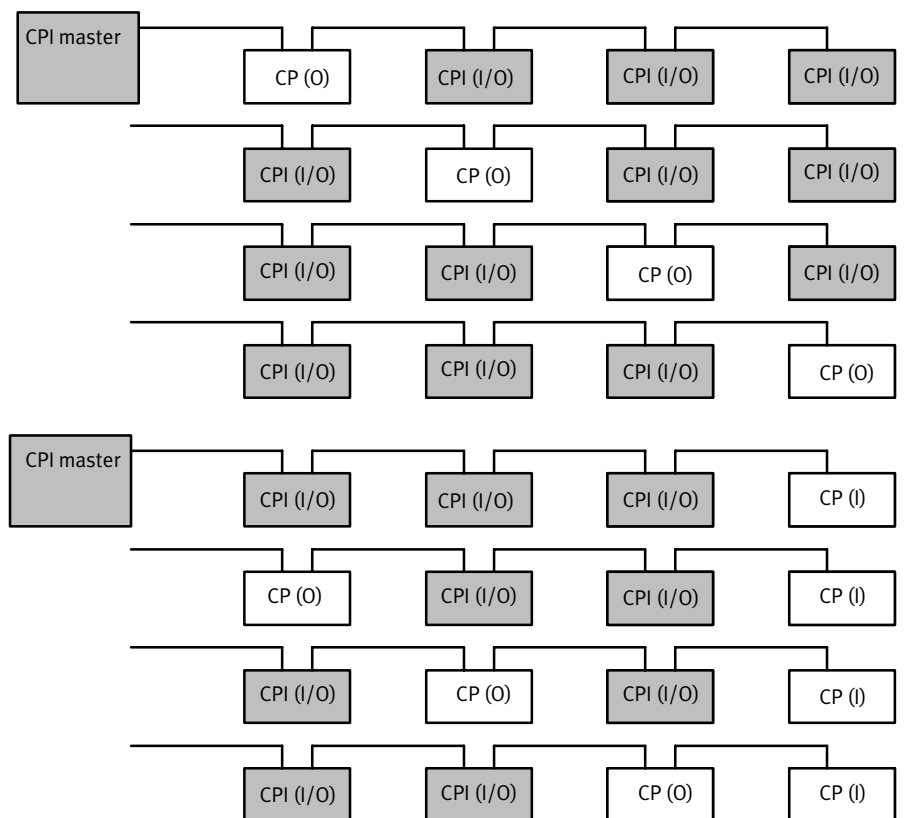
	Rules and properties
CPI system	– Max. 4 modules on the CP string – Max. 32 inputs and 32 outputs (per CP string) – The sequence of the modules within the CP string is optional
CPI master	A mixture of CPI/CP modules is possible on CPI masters: – Only one CP input module is possible at the end of a string – Only one CP valve terminal ²⁾ or one CP output module ²⁾ is possible per CP string – “Unused” locations on the CP string can be “filled” with CPI modules ¹⁾
CPI modules	Modules always have an incoming and continuing interface on all CPI modules (input modules, output modules) and valve terminals with CPI connection
¹⁾ with extended functions ²⁾ without extended functions	

Tab. 1/2: Rules for extending the CPI system



Note
Irrespective of the type of CPI/CP modules, not more than 32 inputs and 32 outputs may be connected (sum of all modules on a CP string).
This means that a CP string can be extended by maximum 2 CP valve terminals with CPI ability, as CP valve terminals always occupy 16 output addresses.

1. System overview CPI/CP system



grey: CPI (with extended functions)
 CP (I): CP input module
 CP (O): CP output module or CP valve terminal
 CPI (I/O): CPI input or output module (with extended functions) or CP valve terminal with CPI ability
 (for valve terminal: max. 2 possible)

Rules:

CP: The rules for the CP master remain valid.

CPI: **Max. 32 inputs and 32 outputs per string**, max. 4 modules per string

Max. 1 CP output module or 1 CP valve terminal

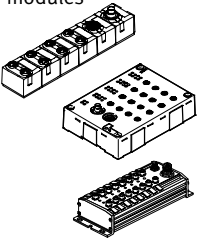
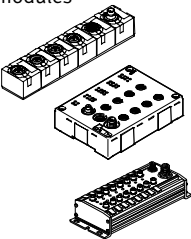
Max. 1 CP input module always at the end of the string

Max. 2 valve terminals with CPI functions per string

Fig. 1/3: Expansion of a CPI/CP system

1. System overview CPI/CP system

The following list of CPI/CP modules shows in each case their functions as well as the maximum possible number of inputs or outputs on each CPI/CP module.

CPI/CP modules			Assigned I/Os			
Type	Type	Module supports extended functions	on CP masters with extended functions		on CP masters without extended functions	
			E	A	E	A
 CPI/CP input modules	CP-E08-M8-CL	Yes	8 E	–	16 E	–
	CP-E08-M12-CL	Yes	8 E	–	16 E	–
	CP-E16-KL-CL	Yes	16 E	–	16 E	–
	CP-E16-M12-EL	Yes	16 E	–	16 E	–
	CP-E16-M8-EL	Yes	16 E	–	16 E	–
	CP-E32-M8-EL	Yes	32 E	–	– 1)	– 1)
	CP-E16-M8	No	16 E	–	16 E	–
	CP-E16N-M8	No	16 E	–	16 E	–
	CP-E16-M8-Z	No	16 E	–	16 E	–
	CP-E16-M12x2-5POL	No	16 E	–	16 E	–
	CP-E16N-M12x2	No	16 E	–	16 E	–
	CP-E16-KL-IP20-Z	No	16 E	–	16 E	–
 CPI/CP output modules	CP-A04-M12-CL	Yes	–	8 A	–	16 A
	CP-A08-M12-EL-Z	Yes	–	8 A	–	16 A
	CP-A08-M12-5POL	No	–	16 A	–	16 A
	CP-A08N-M12	No	–	16 A	–	16 A
1) No function on CP master						

Tab. 1/3: Assigned I/Os of the CPI/CP modules

1. System overview CPI/CP system

1.1.3 Use of the I/O modules

CPI/CP I/O modules can be used in conjunction with various CPI/CP masters. These are e.g.:

- CPX terminal with CPX-CP interface
- CP fieldbus node
- CPV Direct
- CPV-SC-DN / CPA-SC-DN
- CPV-SC-DP / CPA-SC-DP
- CDVI-DN

The CPI/CP masters are distinguished by the different number of CP strings made available, by the functions, the maximum number of inputs and outputs to be processed and the number of CPI/CP modules per string.

1. System overview CPI/CP system

CPI/CP master type	Number of strings	Functionality	Max. number of inputs/outputs per string	Max. number of modules per string
CPX with CP interface	4	CP	16 I + 16 O	2
	4	CPI (advanced) ¹⁾	32 I + 32 O	4
CP fieldbus node	4	CP	16 I + 16 O	2
CPV Direct	1	CP	16 I + 16 O	2
	1	CPI (advanced) ¹⁾	32 I + 32 O ¹⁾	4 ¹⁾
CPV-SC-DP / CPA-SC-DP	1	CP	16 I + 16 O	2
	1	CPI (advanced) ¹⁾	32 I + 32 O ¹⁾	4 ¹⁾
CPV-SC-DN / CPA-SC-DN	1	CP	16 I + 16 O	2
	1	CPI (advanced) ¹⁾	32 I + 32 O ¹⁾	4 ¹⁾
CDVI-DN	1	CP	16 I + 16 O	2
1) Supporting the extended functions with CPV-DI02, CPV-CS02, CPV-DI02, CS02, DN3, CO3.				

Tab. 1/4: Overview, CPI/CP master

The compact CPI/CP I/O modules (type CP-...-CL and -EL) described in this manual support the extended functions of the CPI system. Combinations with other CPI/CP modules are possible, but limit the number of CPI/CP modules per string. The limitations described in section 1.1.2 apply.



Note
CPI I/O modules with extended functions, e.g. type CP-...-CL, -EL can also be operated on CP masters without extended functions (see Tab. 1/3).

1. System overview CPI/CP system

1.1.4 Basic rules for addressing

Addressing depends on:

- CPI/CP master used
- The fieldbus protocol used

The following rules apply:

- Addressing is carried out in ascending order of connection beginning on the CP master.
- In the case of CP masters without extended functions, each CPI/CP module occupies 16 inputs or 16 outputs, irrespective of the design.
- In the case of CPI masters with extended functions, the following difference applies:
 - Modules without extended functions usually occupy 16 inputs or 16 outputs.
 - Depending on the type, modules with extended functions occupy 8 ... 32 inputs or 8 ... 32 outputs.



Note

Further information on addressing can be found in the relevant manuals for the CP masters.

1. System overview CPI/CP system

Input modules types CP-E08-M...-CL and CP-E16-KL-CL

Chapter 2

Contents

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL 2-1

2.1 Function of the input modules CP-E08-M...-CL and CP-E16-KL-CL 2-3

2.1.1 Display and connecting elements 2-4

2.2 Mounting 2-7

2.3 Installation 2-8

2.3.1 Connecting sensors 2-9

2.3.2 Connect the input module to the CP string 2-12

2.4 Diagnosis 2-14

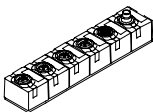
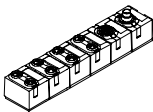
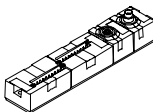
2.4.1 Diagnosis via LEDs 2-14

2.4.2 Diagnosis via the field bus 2-17

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

2.1 Function of the input modules CP-E08-M...-CL and CP-E16-KL-CL

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

Product illustration	Type	Explanation
Sensor connections via 4 sockets with M12 thread, 5-pin		
	CP-E08-M12-CL	Provides 8 PNP inputs (IP65/IP67).
Sensor connections via 8 sockets with M8 thread, 3-pin		
	CP-E08-M8-CL	Provides 8 PNP inputs (IP65/IP67).
Sensor connections via 2 series plugs, 10-pin and connector sockets in either screw or tension spring design.		
	CP-E16-KL-CL	Provides 16 PNP inputs. Especially suitable for fitting into a control cabinet (IP20).

Tab. 2/1: Overview of input modules

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

2.1.1 Display and connecting elements

The following diagram shows the display and connecting elements of input module CP-E08-M12-CL.

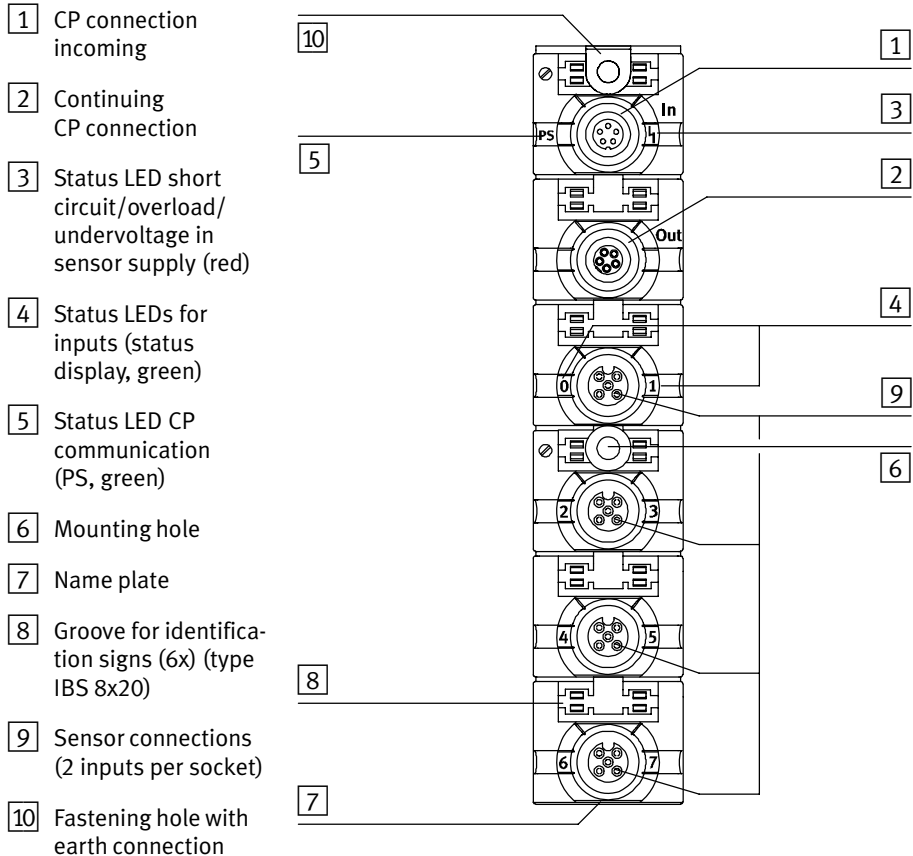


Fig. 2/1: Display and connecting elements type CP-E08-M12-CL

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

The following diagram shows the display and connecting elements of input module CP-E08-M8-CL.

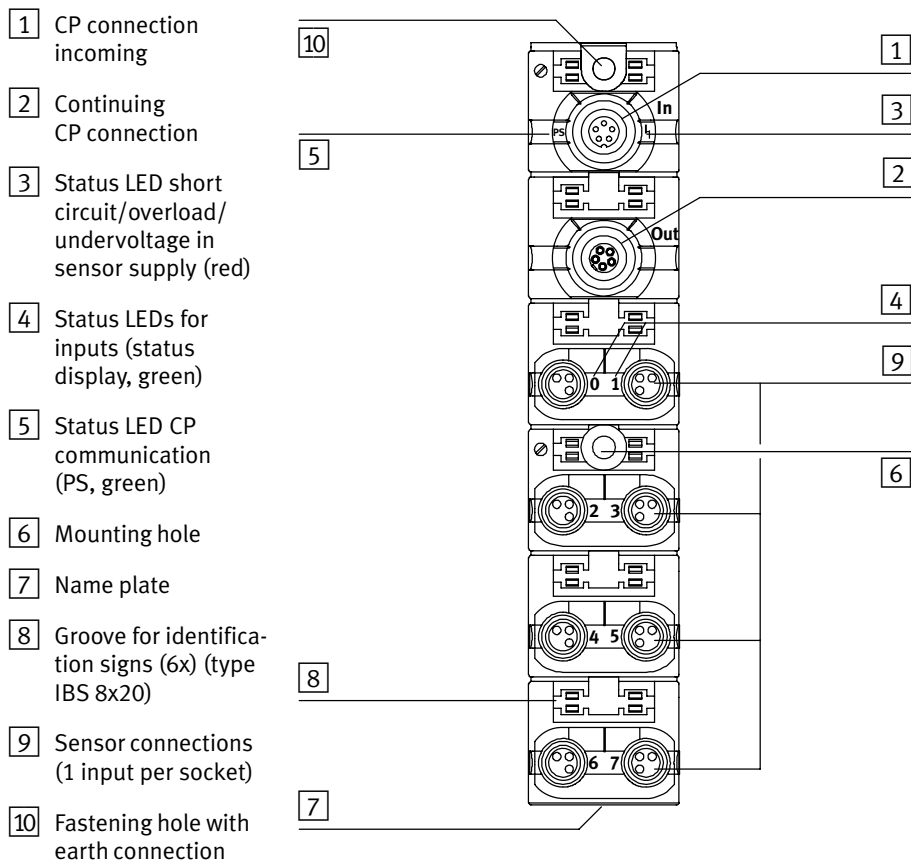


Fig. 2/2: Display and connecting elements type CP-E08-M8-CL

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

The following diagram shows the display and connecting elements of input module CP-E16-KL-CL.

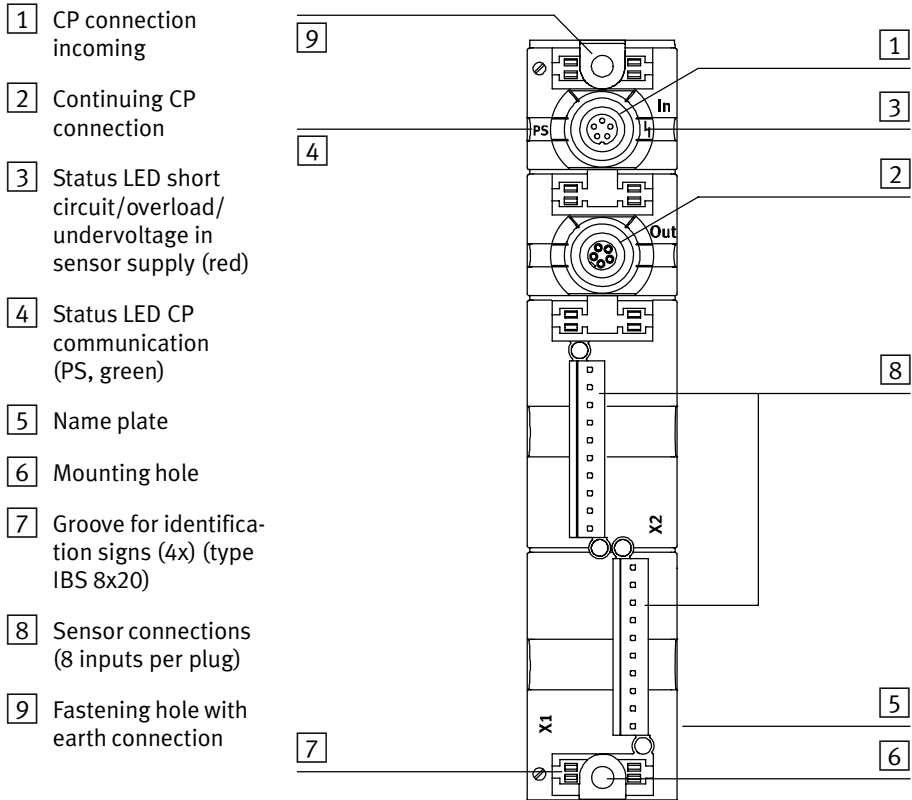


Fig. 2/3: Display and connecting elements type CP-E16-KL-CL

2.2 Mounting

The input modules are intended for fitting onto a wall or onto profiles. Take into account the following dimensions and weights:

Type	Dimensions	Weight
CP-E08-M12-CL	approx. 151 x 30 x 34.5 mm	approx. 165 g
CP-E08-M8-CL	approx. 151 x 30 x 34.5 mm	approx. 190 g
CP-E16-KL-CL	approx. 151 x 30 x 34.5 mm	approx. 145 g

Tab. 2/2: Dimensions of the input module

Fitting onto a wall

The following diagram shows the dimensions for the holes of screw size M4. Always fasten each module with 2 screws and a locking disc.

Tightening torque of the fastening screws: 2 ± 0.5 Nm.

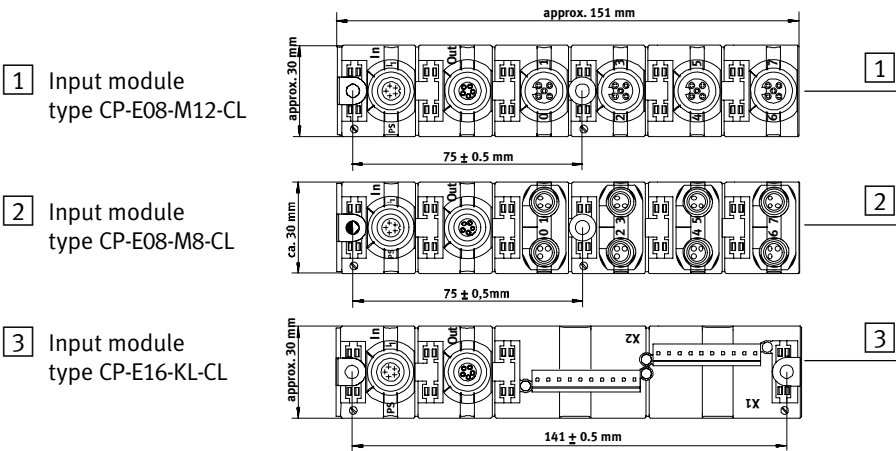


Fig. 2/4: Fitting dimensions CP-E...-CL

Tip:
The position of the fastening screws on clipped-in drawing plates is marked with the symbol $\otimes$.

2.3 Installation



Warning

Sudden unexpected movements of the connected actuators and undefined switching states of the electronics can cause injury to human beings and damage to property.

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

- the operating and load voltage supply on the CP master (e.g. CPI/CP field bus node)
- separate power supplies



Warning

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

Connect the earthing cable on the housing (screw under type plate, see Fig. 2/1, Fig. 2/2 or Fig. 2/3) at low impedance (short cable with large diameter) to the earth potential.

A suitable cable clip is supplied with the module.

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

2.3.1 Connecting sensors



Caution

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



Use plugs and cables from the Festo range (see Appendix A.6) for connecting sensors.

In the case of CP input modules type CP-E08-M12-CL and CP-E08-M8-CL:

- Tighten the plugs with the aid of the union nut in order to prevent unintentional loosening, e.g. due to shock.
- Seal unused connections with protective caps. Only in this way can you comply with protection class IP 65/IP67. Use protective caps from the Festo range (see Appendix A.6).

With CP input module type CP-E16-KL-CL:



Further information on connector sets as well as instructions on handling them can be found in Appendix A.6.4.

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

Pin assignment (PNP inputs)

The following diagrams show as an example the pin assignment of the sensor connections of the different CP input modules.

Pin assignment

- 1**
- 1: 24 V
 - 2: Ix+1
 - 3: 0 V
 - 4: Ix+0
 - 5: Ground terminal

Ix = Input x

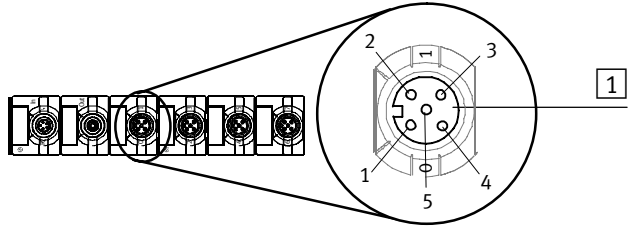


Fig. 2/5: Pin assignment type CP-E08-M12-CL

Pin assignment

- 1**
- 1: 24 V
 - 4: Ix+1
 - 3: 0 V
- 2**
- 1: 24 V
 - 4: Ix+0
 - 3: 0 V

Ix = Input x

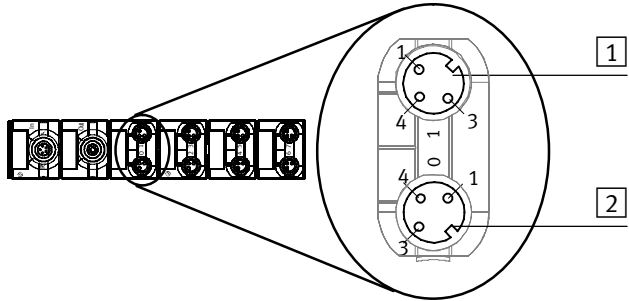


Fig. 2/6: Pin assignment type CP-E08-M8-CL

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

With input module type CP-E16-KL-CL, eight sensors can be connected to connections X1 and X2. The voltage supplied via the CP string is provided at the terminals + and – of X1 and X2 for supplying the sensors.

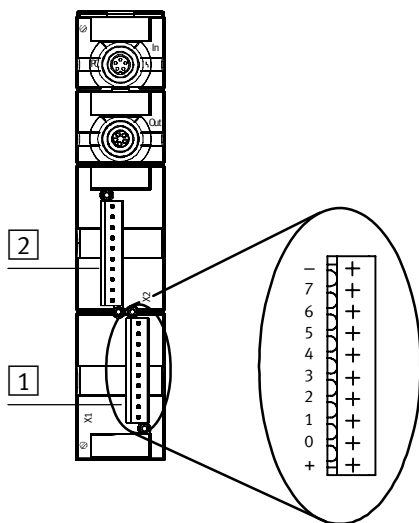


Caution

Do **not** connect an external supply to the terminals + and – of X1 and X2. Otherwise the input module will be damaged.

Pin assignment

- 1** Plug X1
–: 0 V DC
7: lx+7
6: lx+6
...
2: lx+2
1: lx+1
0: lx+0
+: 24 V DC
- 2** Plug X2
–: 0 V DC
7: lx+15
6: lx+14
...
2: lx+10
1: lx+9
0: lx+8
+: 24 V DC



lx = Input x

Fig. 2/7: Pin assignment of plugs X1 and X2 on type CP-E16-KL-CL

Use spring tension plugs or screw connector plugs from the Festo range (see Appendix A.6.4) for connecting sensors.

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

2.3.2 Connect the input module to the CP string



Caution

Fault in data transfer on the CP string.

Note the maximum permitted string lengths in the manual for the CP master used.

You will then avoid faults in data transfer between the input module and the CP master (e. g. CP field bus node).



Caution

Functional damage

Note the maximum permitted string lengths in the manual for the CP master used.

Use only the intended original cable type KVI-CP-... from Festo for connecting the CPI/CP modules, see manual for the CP master used.



Note

Specifications on the current consumption of the different CPI/CP modules can be found in the relevant manuals.

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

- Operating voltage for internal electronics
- Connection for data exchange
- Operating voltage for the connected sensors

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

The CPI modules are connected sequentially. The M9 plug is the incoming interface; the M9 socket is the continued interface (see Fig. 2/1 to Fig. 2/3).

If the continuing CP connection is not used:

- Seal the CP connection with a protective cap type FLANSCHDOSE SER.712, part no. 356684 (accessories). Only in this way can you comply with protection class IP 65/IP67.



Note

The continuing CP connection can only be used in conjunction with a CP master with extended functions.

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

2.4 Diagnosis

2.4.1 Diagnosis via LEDs

Status LED
CP communication (PS)

The operating status of the input module is shown by means
of the status LED CP communication (see Tab. 2/3).

LED PS (green)	Operating status	Error handling
 LED lights up	Operating voltage applied, CP communication OK	None
 LED is out	– Operating voltage not applied or no connection to CPI/CP master – CPI/CP input module not contained in string assignment of the CPI/CP master	• Check the CPI/CP cable and the operating voltage connection on the CP master • Save the CPI/CP string assignment on the CPI/CP master (see manual for the CPI/CP master)
 LED flashes	– Test phase when power supply has been switched on ¹⁾ - or – Undervoltage in sensor supply (< 17 V)	• None - or • Eliminate undervoltage
¹⁾ Only on CP masters without extended functions		

Tab. 2/3: Status LED CP communication (PS)

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

Status LED
Short circuit/overload

Short circuit or overload of the sensor supply is shown by means of the status LED short circuit/overload (see Tab. 2/4).

LED  (red)	Operating status	Error handling
 LED is out	– No short circuit/overload in sensor supply	• None
 LED lights up	– Short circuit/overload in sensor supply	• Remove short circuit and, if applicable, delete error

Tab. 2/4: Status LED short circuit/overload

Reaction to short circuit in the sensor supply

If there is a short circuit, the input module will switch off the power supply to the sensors and communicate the fault to the CP master. The status LEDs will be switched off and the inputs of the module supply a 0-signal.

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

Status LEDs
Status display for input

Only with types CP-E08-M12-CL and CP-E08-M8-CL:
Next to the sensor connections there is a green LED for every input. This shows the status of the signal at the relevant input.

LED status of input	Status
 LED lights up	Logical 1 (signal present)
 LED is out	Logical 0 (no signal)

Tab. 2/5: Status LEDs for status display of input

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

2.4.2 Diagnosis via the field bus

Depending on the CPI/CP master used, the CP modules type CP-...-EL provide different diagnostic information on fault searching.

Master	Diagnosis of short circuit/overload in sensor supply	Diagnostics, undervoltage, sensor supply
CP master (without extended functions)	Yes	No
CPI master (with extended functions)	Yes	Yes

Tab. 2/6: Diagnostic information



Note

Instructions on evaluating the diagnostic message can be found in the manual for the relevant CPI/CP master.

2. Input modules types CP-E08-M...-CL and CP-E16-KL-CL

Output module type CP-A04-M12-CL

Chapter 3

Contents

3. Output module type CP-A04-M12-CL 3-1

3.1 Function of output module type CP-A04-M12-CL 3-3

3.1.1 Display and connecting elements 3-4

3.2 Mounting 3-5

3.3 Installation 3-6

3.3.1 Connecting the actuators 3-7

3.3.2 Connect the output module to the CP string 3-8

3.4 Diagnostics 3-10

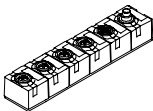
3.4.1 Diagnostics via LEDs 3-10

3.4.2 Diagnostics via the fieldbus 3-13

3. Output module type CP-A04-M12-CL

3.1 Function of output module type CP-A04-M12-CL

Output module type CP-A04-M12-CL provides 4 universally-usable digital outputs for controlling low-current consuming devices (e.g. bulbs, further valves, etc.).

Product illustration	Type	Explanation
Actuator connections via 4 sockets with M12 thread		
	CP-A04-M12-CL	Provides 4 PNP outputs (IP65/IP67).

Tab. 3/1: Overview of output modules

3. Output module type CP-A04-M12-CL

3.1.1 Display and connecting elements

The diagram below shows the display and connecting elements on the output modules.

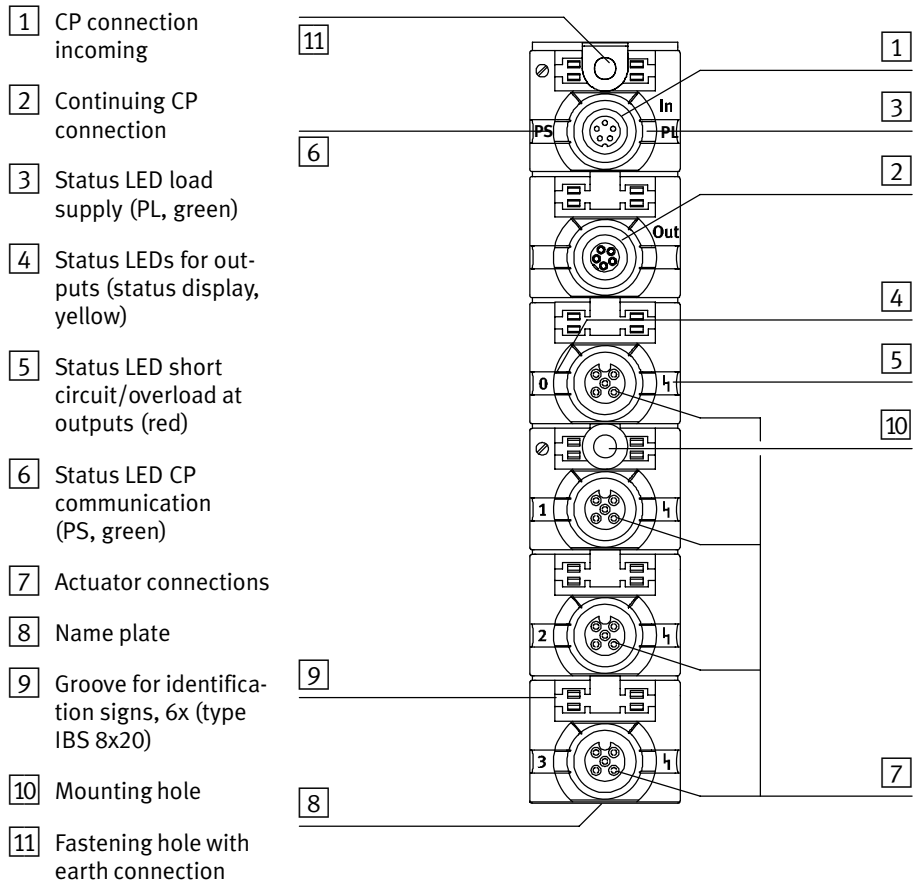


Fig. 3/1: Display and connecting elements type CP-A04-M12-CL

3. Output module type CP-A04-M12-CL

3.2 Mounting

The output module is intended for fitting onto a wall or onto profiles. Take into account the following dimensions and weights:

Type	Dimensions	Weight
CP-A04-M12-CL	approx. 151 x 30 x 34.5 mm	approx. 165 g

Tab. 3/2: Dimensions of output module

Fitting onto a wall

The following diagram shows the dimensions for the holes of screw size M4. Always fasten each module with 2 screws and a locking disc.
Tightening torque of the fastening screws: 2 ± 0.5 Nm.

1 Output module
type CP-A04-M12-CL

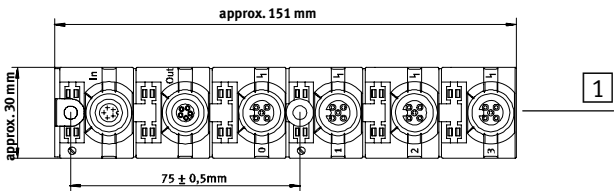


Fig. 3/2: Fitting dimensions CP-A04-M12-CL

Tip:
The position of the fastening screws on clipped-in drawing plates is marked with the symbol $\odot$.

3.3 Installation



Warning

Sudden unexpected movements of the connected actuators and undefined switching states of the electronics can cause injury to human beings and damage to property.

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

- The operating and load voltage supply on the CP master (e.g. CPI/CP fieldbus node)
- Separate power supplies



Warning

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

Connect the earthing cable on the housing (screw under type plate, see Fig. 3/1) at low impedance (short cable with large diameter) to the earth potential.

(A suitable cable clip is supplied with the module.)

3. Output module type CP-A04-M12-CL

3.3.1 Connecting the actuators



For connecting the actuators, use plugs and cables with union nut and M12 thread from the Festo range (see Appendix A.6).

- Tighten the plugs with the aid of the union nut in order to prevent unintentional loosening, e.g. due to shock.
- Seal unused connections with the protective caps supplied. Only in this way can you comply with protection class IP65/IP67.

Pin allocation

The following diagram shows as an example the pin allocation of the actuator connections on the CPI/CP output module.

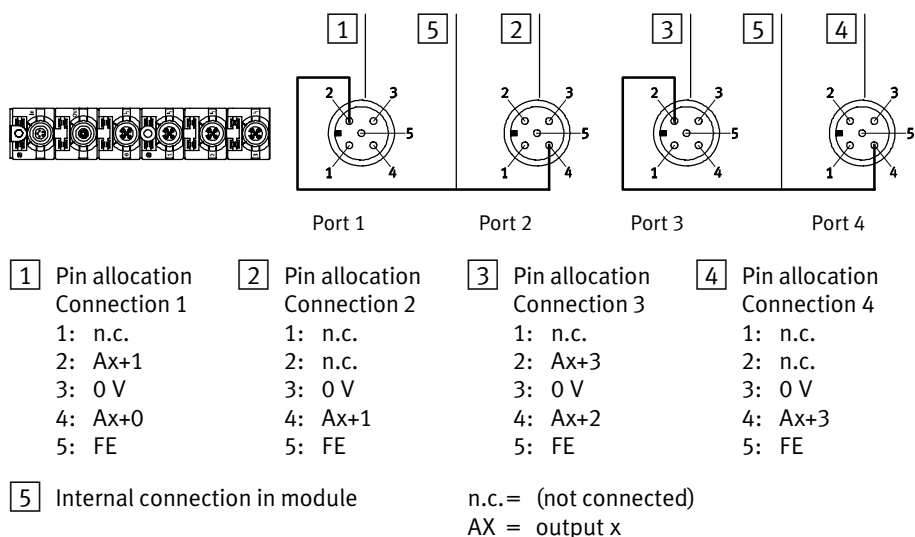


Fig. 3/3: Pin allocation type CP-A04-M12-CL

3. Output module type CP-A04-M12-CL



Note

When switching inductive loads, be sure to use a suitable safety circuit (e.g. free-wheeling diode).

3.3.2 Connect the output module to the CP string



Caution

Fault in data transfer on the CPI/CP string.

Note the maximum permitted string lengths in the manual for the CPI master used.

You will then avoid faults in data transfer between the input module and the CP master (e.g. CP fieldbus node).



Caution

Functional damage

Note the maximum permitted string lengths in the manual for the CPI master used.

Use only the intended original cable type KVI-CP-... from Festo for connecting the CPI/CP modules, see manual for the CPI master used.



Note

Specifications on the current consumption of the different CPI/CP modules can be found in the relevant manuals.

3. Output module type CP-A04-M12-CL

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

- Operating voltage for internal electronics
- Connection for data exchange
- Operating voltage for the connected actuators

The CPI modules are connected sequentially. The M9 plug is the incoming interface; the M9 socket is the continued interface (see Fig. 3/1).

If the continuing CP connection is not used:

- Seal the CP connection with a protective cap type FLANSCHDOSE SER.712, part no. 356684 (accessories). Only in this way can you comply with protection class IP65/IP67.



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 off the operating voltage for the valves and output modules, switching off the compressed air).

3.4 Diagnostics

3.4.1 Diagnostics via LEDs

Status LED
CP communication (PS)

The operating status of the output module is shown by means of the status LED CP communication (see Tab. 3/3).

LED PS (green)	Operating status	Error handling
 LED lights up	Operating voltage applied, CPI/CP communication OK	None
 LED is out	– Operating voltage not applied or no connection to CPI/CP master – CPI/CP output module not contained in string allocation of the CPI/CP master	• Check the CPI/CP cable and the operating voltage connection on the CPI/CP master • Save the CPI/CP string allocation on the CPI/CP master (see manual for the CPI/CP master)
 LED flashes	– Test phase when the power supply has been switched on ¹⁾	• None
¹⁾ Only on CPI masters without extended functions		

Tab. 3/3: Status LED CP communication (PS)

3. Output module type CP-A04-M12-CL

Status LED
Load supply (PL)

Short circuit or overload of the actuator supply is shown by means of the status LED short circuit/overload (see Tab. 3/4).

LED PL (green)	Operating status	Error handling
 LED lights up	Load supply OK	None
 LED flashes	– Undervoltage in actuator supply (< 17 V)	• Check the CPI/CP cable and the operating voltage connection on the CP master
 LED is out	– Load supply missing	• Check the CPI/CP cable and the operating voltage connection on the CP master

Tab. 3/4: Status LED load supply (PL)

Status LEDs
Status display of output

Next to the actuator connections there is a yellow LED for every output. This shows the status of the signal at the relevant output.

LED status of output	Status
 LED lights up	Output supplies 1-signal
 LED is out	Output supplies 0-signal

Tab. 3/5: Status LEDs for status display of output

3. Output module type CP-A04-M12-CL

Status LEDs

Short circuit/overload output

Next to the actuator connections there is a red LED for each output. This shows a short circuit or overload at the output.

LED  (red)	Operating status	Error handling
 LED is out	– No short circuit/overload	• None
 LED lights up	– Short circuit/overload at output	• Eliminate short circuit and delete the fault ¹⁾
¹⁾ Fault will not be deleted automatically.		

Tab. 3/6: Status LED short circuit/overload at output

Short circuit/overload

Reaction to short circuit in the load supply

If there is a short circuit/overload, the output module will switch off the output self-holding and communicate the fault to the CPI master. When the short circuit has been eliminated, delete this fault as follows:

- Reset the output (e.g. by user program).

3. Output module type CP-A04-M12-CL

3.4.2 Diagnostics via the fieldbus

Depending on the CPI/CP master used, the CP modules type CP-...-EL provide different diagnostic information on fault searching.

Master	Diagnostics of short circuit/over-load in sensor supply	Diagnostics, undervoltage, sensor supply
CP master (without extended functions)	Yes	No
CPI master (with extended functions)	Yes	Yes

Tab. 3/7: Diagnostic information



Note
Instructions on evaluating the diagnostic message can be found in the manual for the relevant CPI/CP master.

3. Output module type CP-A04-M12-CL

Input modules type CP-E16-M...-EL and CP-E32-M8-EL

Chapter 4

Contents

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL 4-1

4.1 Function of the input modules CP-E16-M...-EL and CP-E32-M8-EL 4-3

4.1.1 Display and connecting elements 4-4

4.2 Mounting 4-7

4.3 Labelling of inscription label holder 4-9

4.4 Installation 4-10

4.4.1 Connecting sensors 4-11

4.4.2 Connect the input module to the CP string 4-14

4.5 Diagnostics 4-16

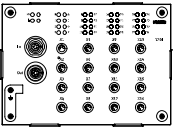
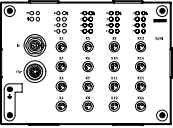
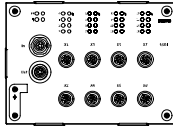
4.5.1 Diagnostics via LEDs 4-16

4.5.2 Diagnostics using fieldbus 4-20

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

4.1 Function of the input modules CP-E16-M...-EL and CP-E32-M8-EL

CPI input modules provide digital inputs for connecting sensors, thereby enabling e.g. cylinder positions to be scanned. A distinction is made between the following types:

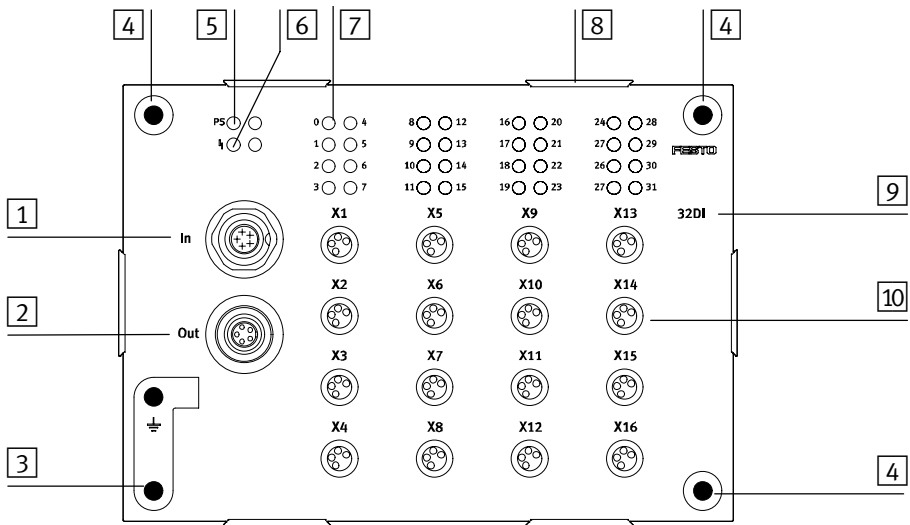
Product illustration	Type	Explanation
Sensor connections via 16 M8 sockets, 4-pin		
	CP-E32-M8-EL	Provides 32 PNP inputs (IP65). It can only be connected to the CPI system with extended functions (CPI master). The CP module CP-E32-M8-EL enables module diagnosis and module monitoring of the sensor voltage.
Sensor connections via 16 M8 sockets, 3-pin		
	CP-E16-M8-EL	Provides 16 PNP inputs (IP65). CP module CP-E16-M8-EL enables group diagnosis and group monitoring of the sensor voltage. A group consists of 4 inputs.
Sensor connections via 8 M12 sockets, 5-pin		
	CP-E16-M12-EL	Provides 16 PNP inputs (IP65). CP module CP-E16-M8-EL enables group diagnosis and group monitoring of the sensor voltage. A group consists of 4 inputs.

Tab. 4/1: Overview of input modules

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

4.1.1 Display and connecting elements

The following diagram shows the display and connecting elements of input module CP-E32-M8-EL.

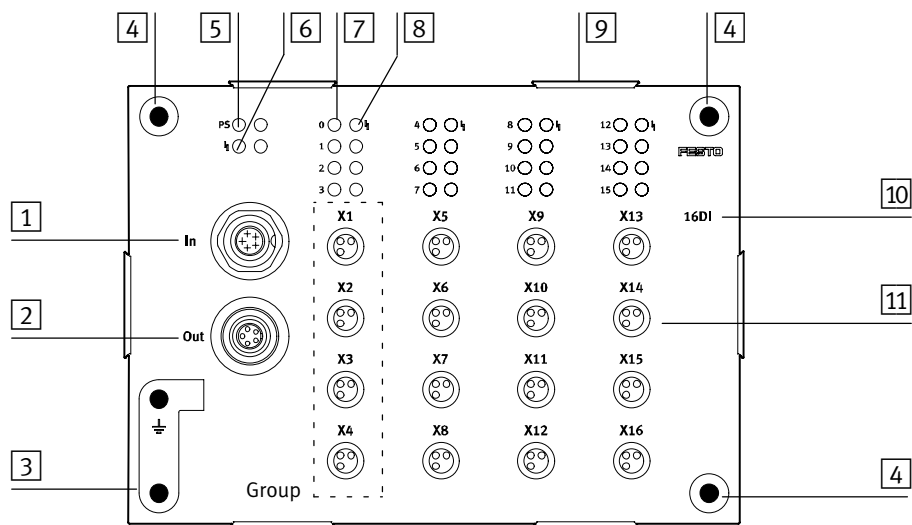


- | | |
|--|---|
| 1 CPI connection incoming | 7 Status LEDs for inputs (status display, green) |
| 2 CPI connection continuing | 8 Mounting for inscription label holder (type: ASCF-H-E2) |
| 3 Fastening hole with earth connection | 9 Module designation |
| 4 Fastening holes | 10 32 sensor connections (two inputs per socket) |
| 5 Status LED CP communication (PS, green) | |
| 6 Status LED short circuit/overload in sensor supply (red) | |

Fig. 4/1: Display components and connecting elements type CP-E32-M8-EL

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

The following diagram shows the display and connecting elements of input module CP-E16-M8-EL.

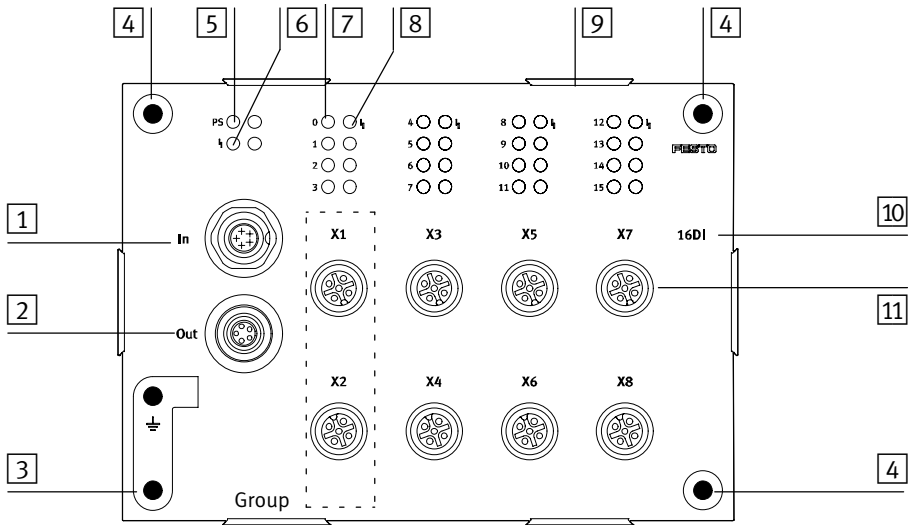


- | | |
|---|--|
| 1 CPI connection incoming | 7 Status LEDs for inputs (status display, green) |
| 2 CPI connection continuing | 8 Status LED (group) short circuit/overload in sensor supply (red) |
| 3 Fastening hole with earth connection | 9 Mounting for inscription label holder (type: ASCF-H-E2) |
| 4 Fastening holes | 10 Module designation |
| 5 Status LED CP communication (PS, green) | 11 16 sensor connections (one input per socket) |
| 6 Status LED (module) short circuit/overload in sensor supply (red) | |

Fig. 4/2: Display components and connecting elements type CP-E16-M8-EL

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

The following diagram shows the display and connecting elements of input module CP-E16-M12-EL.



- | | |
|---|--|
| 1 CPI connection incoming | 7 Status LEDs for inputs (status display, green) |
| 2 CPI connection continuing | 8 Status LED (group) short circuit/overload in sensor supply (red) |
| 3 Fastening hole with earth connection | 9 Mounting for inscription label holder (type: ASCF-H-E2) |
| 4 Fastening holes | 10 Module designation |
| 5 Status LED CP communication (PS, green) | 11 16 sensor connections (two inputs per socket) |
| 6 Status LED (module) short circuit/overload in sensor supply (red) | |

Fig. 4/3: Display components and connecting elements type CP-E16-M12-EL

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

H-rail mounting

The module is suspended from above in the H-rail (see arrow A in Fig. 4/5). The module is earthed via the clamping component (see arrow B in Fig. 4/5). The clamping component and the mounting screw are included with the module.

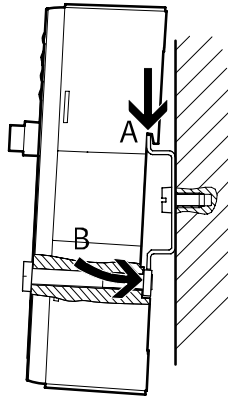


Fig. 4/5: H-rail mounting input module CP-E...-EL

4.3 Labelling of inscription label holder

Inscription label holders with part number 547473 (type ASCF-H-E2) are provided for labelling the EL modules. You can find the dimensions of the inscription field in Fig. 4/6.

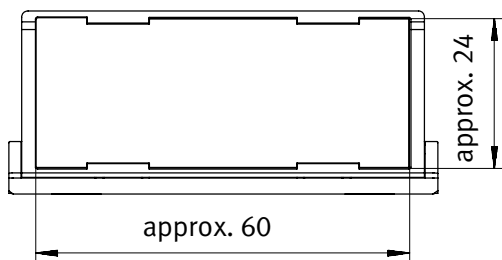


Fig. 4/6: Inscription label holders for EL modules, type ASCF-H-E2 (dimensions in mm)

4.4 Installation



Warning

Sudden unexpected movements of the connected actuators and undefined switching states of the electronics can cause injury to human beings and damage to property.

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

- The operating and load voltage supply on the CP master (e.g. CPI/CP fieldbus node)
- Separate power supplies



Warning

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

Connect the earth connection on the housing with low impedance (short cable with large cross-sectional area) to the earth potential.

A suitable cable lug is supplied with the module.



Note

- With wall mounting, earthing is done via a earthing cable.
- With H-rail mounting, earthing is done via a clamping component.

4.4.1 Connecting sensors

**Caution**

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



Use plugs and cables from the Festo range (see Appendix A.6) for connecting sensors.

For CPI input modules:

- Tighten the plugs with the aid of the union nut in order to prevent unintentional loosening, e.g. due to shock.
- Seal unused connections with protective caps. Only in this way can you comply with protection class IP65.
Use protective caps from the Festo range (see Appendix A.6).



Further information on connector sets as well as instructions on handling them can be found in Appendix A.6.4.

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

Pin allocation (PNP inputs)

The following diagrams show as an example the pin allocation of the sensor connections of the different CP...EL input modules.

Pin allocation

- 1
- 1: 24 V
 - 2: I_x+1
 - 3: 0 V
 - 4: I_x

I_x = Input x

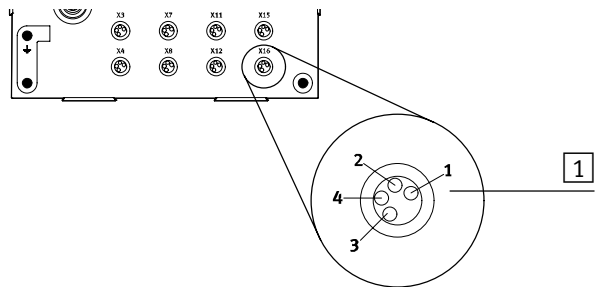


Fig. 4/7: Pin allocation type CP-E32-M8-EL

Pin allocation

- 1
- 1: 24 V
 - 3: 0 V
 - 4: I_x

I_x = Input x

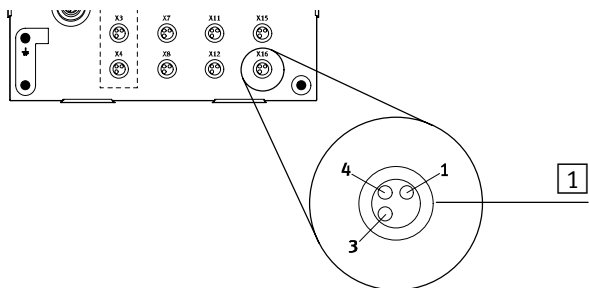


Fig. 4/8: Pin allocation type CP-E16-M8-EL

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

Pin allocation

- 1**
- 1: 24 V
 - 2: I_x+1
 - 3: 0 V
 - 4: I_x
 - 5: FE

I_x = Input x

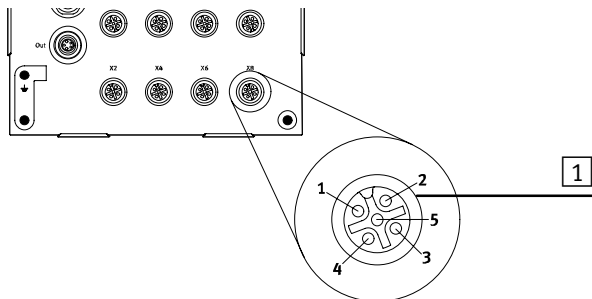


Fig. 4/9: Pin allocation type CP-E16-M12-EL

Use screw connector plugs from the Festo range (see Appendix A.6.4) for connecting sensors.

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

4.4.2 Connect the input module to the CP string

**Caution**

Fault in data transfer on the CP string.

Note the maximum permitted string lengths in the manual for the CPI/CP master used.

You will then avoid faults in data transfer between the input module and the CPI/CP master.

**Caution**

Functional damage

Note the maximum permitted string lengths in the manual for the CP master used.

Use only the intended original cable type KVI-CP-3-... from Festo for connecting the CP modules, see manual for the CP master used.

**Note**

Specifications on the current consumption of the different CP modules can be found in the relevant manuals.

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

- Operating voltage for internal electronics
- Connection for data exchange
- Operating voltage for the connected sensors

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

The CPI modules are connected sequentially. The M9 plug is the incoming interface; the M9 socket is the continued interface (see Fig. 4/1 to Fig. 4/3).

If the continuing CP connection is not used:

- Seal the CP connection with a protective cap type FLANSCHDOSE SER.712, part no. 356684 (accessories). Only in this way can you comply with protection class IP65.

**Note**

The continuing CP connection can only be used in conjunction with a CPI master (with extended functions).

4.5 Diagnostics

4.5.1 Diagnostics via LEDs

Status LED CP communication (PS) The operating status of the input module is shown by means of the status LED CP communication (see Tab. 4/3).

LED PS (green)	Operating status	Error handling
 LED lights up	Operating voltage applied, CP communication OK	None
 LED is out	– Operating voltage not applied or no connection to CPI/CP master – CPI input module not contained in string assignment of the CPI/CP master	• Check the CPI/CP cable and the operating voltage connection on the CPI/CP master • Save the CP string assignment on the CPI/CP master (see manual for the CPI/CP master)
 LED flashes	– Undervoltage in sensor supply ($\leq 17\text{ V}$)	• Eliminate undervoltage

Tab. 4/3: Status LED CP communication (PS)

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

Status LED
Short circuit/overload

Short circuit or overload of the sensor supply is shown by means of the status LED short circuit/overload (see Tab. 4/4 and Tab. 4/5).

LED  (red) module	Operating status	Error handling
 LED is out	– No short circuit/overload in sensor supply	• None
 LED lights up	Only for CP-E16-M8-EL and CP-E16-M12-EL: – Short circuit/overload in sensor supply (display module) 1 per module, lights up when a group LED  lights up	• Remove short circuit and, if applicable, delete error
 LED lights up	Only for CP-E32-M8-EL: – Short circuit/overload in sensor supply (display module) 1 per module, lights up when an input is faulty.	• Remove short circuit and, if applicable, delete error

Tab. 4/4: Status LED (display module) short circuit/overload

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

LED  (red) group	Operating status	Error handling
 LED is out	– No short circuit/overload in sensor supply	• None
 LED lights up	Only for CP-E16-M8-EL and CP-E16-M12-EL: – Short circuit/overload in sensor supply (Display group, see Fig. 4/2 and Fig. 4/3) 1 per four inputs, lights up when one input per group is faulty.	• Remove short circuit and, if applicable, delete error

Tab. 4/5: Status LED (display group) short circuit/overload

Reaction to short circuit in the sensor supply

If there is a short circuit, the input module will switch off the power supply to the sensors and communicate the fault to the CPI/CP master. The status LEDs will be switched off and the inputs of the module supply a 0-signal. After the short circuit or overload has been eliminated, the module must be separated from the supply voltage in order to reset the short circuit/overload.

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

Status LEDs
Status display for input

Above the sensor connections there is a green LED for every input. This shows the signal status at the relevant input.

LED status of input	Signal status
 LED lights up	Logical 1 (signal present)
 LED is out	Logical 0 (no signal)

Tab. 4/6: Status LEDs for status display of input

4. Input modules type CP-E16-M...-EL and CP-E32-M8-EL

4.5.2 Diagnostics using fieldbus

Depending on the CPI/CP master used, the CP modules type CP-...-EL provide different diagnostic information on fault searching.

Master	Diagnostics of short circuit/over-load in sensor supply	Diagnostics, undervoltage, sensor supply
CP master (without extended functions)	Yes	No
CPI master (with extended functions)	Yes	Yes

Tab. 4/7: Diagnostic information



Note
Instructions on evaluating the diagnostic message can be found in the manual for the relevant CPI/CP master.

Output module type CP-A08-M12-EL-Z

Chapter 5

Contents

5. Output module type CP-A08-M12-EL-Z 5-1

5.1 Function of the output module type CP-A08-M12-EL-Z 5-3

5.1.1 Display and connecting elements 5-4

5.2 Mounting 5-5

5.3 Labelling of inscription label holder 5-7

5.4 Installation 5-8

5.4.1 Connect external load supply 5-9

5.4.2 Connecting the actuators 5-10

5.4.3 Connect the output module to the CP string 5-11

5.5 Diagnostics 5-13

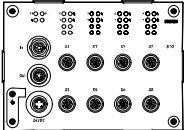
5.5.1 Diagnostics via LEDs 5-13

5.5.2 Diagnostics using fieldbus 5-16

5. Output module type CP-A08-M12-EL-Z

5.1 Function of the output module type CP-A08-M12-EL-Z

Output module type CP-A08...M12-EL-Z provides eight uni-versally usable digital outputs for controlling low-current con-suming devices (bulbs, further valves etc.).

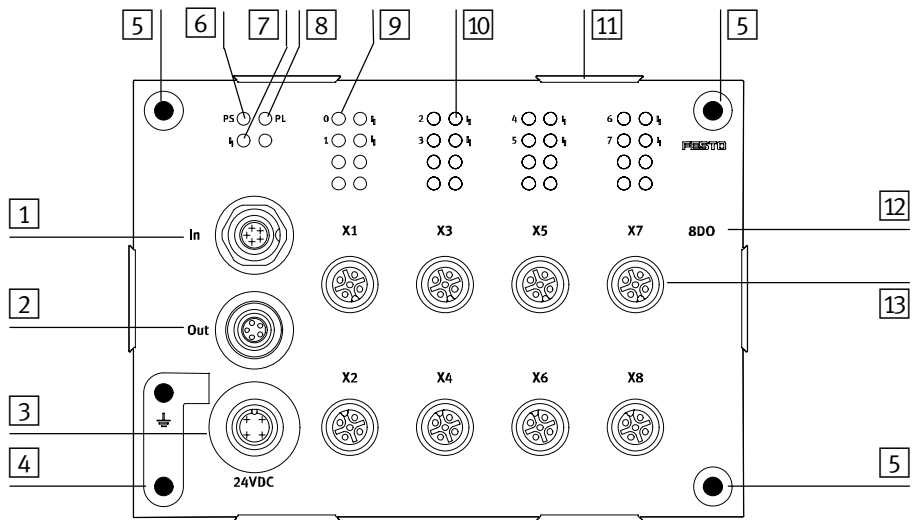
Product illustration	Type	Explanation
Actuator connections via 8 sockets with M12 thread		
	CP-A08-M12-EL-Z	Provides 8 PNP outputs (IP65). CP module CP-A08-M12-EL-Z has channel-by-channel monitoring of short circuit/overload of the outputs.

Tab. 5/1: Overview of output modules

5. Output module type CP-A08-M12-EL-Z

5.1.1 Display and connecting elements

The following diagram shows the display and connecting elements of output module CP-A08-M12-EL-Z.



- | | |
|--|--|
| 1 CPI connection incoming | 8 Status LED
Load supply (PL, green) |
| 2 CPI connection continuing | 9 Status LEDs for outputs
(status display, yellow) |
| 3 Load supply for outputs | 10 Status LED output (channel) short
circuit/overload (red) |
| 4 Fastening hole with earth connection | 11 Mounting for inscription label holder
(type: ASCF-H-E2) |
| 5 Fastening holes | 12 Module designation |
| 6 Status LED CP communication
(PS, green) | 13 8 outputs (1 output per socket) |
| 7 Status LED output (module) short
circuit/overload (red) | |

Fig. 5/1: Display components and connecting elements type CP-A08-M12-EL-Z

5. Output module type CP-A08-M12-EL-Z

H-rail mounting

The module is suspended from above in the H-rail (see arrow A in Fig. 5/3). The module is earthed via the clamping component (see arrow B in Fig. 5/3). The clamping component and the mounting screw are included with the module.

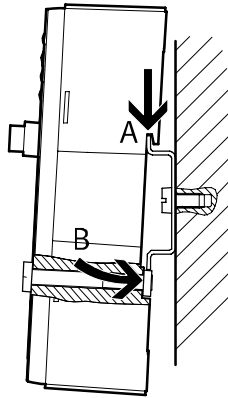


Fig. 5/3: H-rail mounting of output modules
CP-A08-M12-EL-Z

5.3 Labelling of inscription label holder

Inscription label holders with part number 547473 (type ASCF-H-E2) are provided for labelling the EL modules. You can find the dimensions of the inscription field in Fig. 5/4.

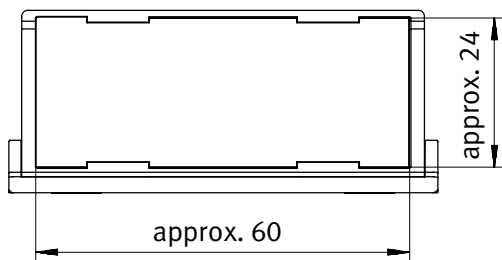


Fig. 5/4: Inscription label holders for EL modules, type ASCF-H-E2 (dimensions in mm)

5.4 Installation



Warning

Sudden unexpected movements of the connected actuators and undefined switching states of the electronics can cause injury to human beings and damage to property.

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

- Operating and load voltage supply for the CP master (e. g. CP fieldbus node)
- Separate power supplies



Warning

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

Connect the earth connection on the housing with low impedance (short cable with large cross-sectional area) to the earth potential.

A suitable cable lug is supplied with the module.



Note

- With wall mounting, earthing is done via a earthing cable.
- With H-rail mounting, earthing is done via a clamping component.

5. Output module type CP-A08-M12-EL-Z

5.4.1 Connect external load supply

The output module CP-A08-M12-EL-Z is supplied via an external load supply 24 V to supply the actuators.

- Power must be supplied via a power supply unit that meets EN 60204-1 / IEC204 (PELV power supply unit).
- Max. 0.5 A is available per channel.
- The outputs are designed to be short-circuit proof and overload proof channel-by-channel.

5. Output module type CP-A08-M12-EL-Z

5.4.2 Connecting the actuators



For connecting the actuators, use plugs and cables with M12 union nut from the Festo range (see Appendix A.6).

- Tighten the plugs with the aid of the union nut in order to prevent unintentional loosening, e.g. due to shock.
- Seal unused connections with the protective caps supplied. Only in this way can you comply with protection class IP65.

Pin allocation

The following diagram shows as an example the pin allocation of the actuator connections on the CPI output module.

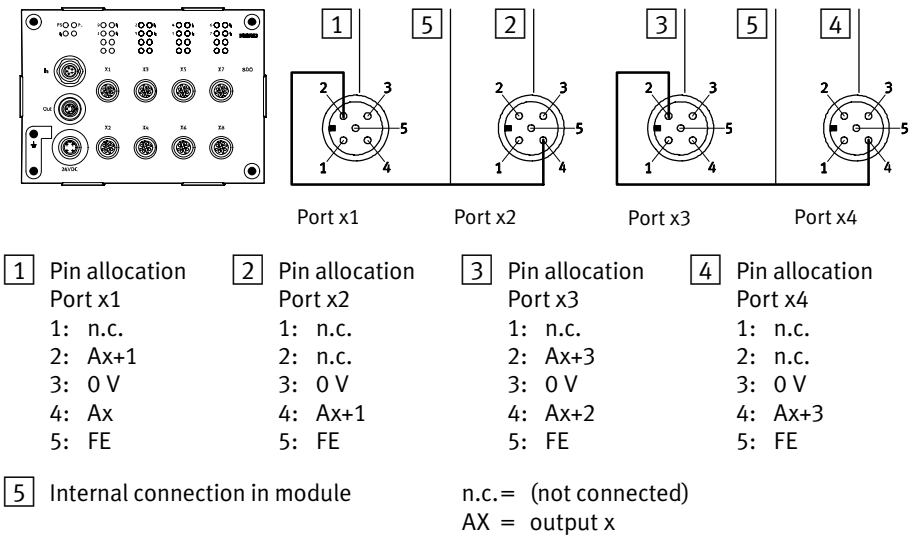


Fig. 5/5: Pin allocation type CP-A08-M12-EL-Z

5. Output module type CP-A08-M12-EL-Z



Note

When switching inductive loads, be sure to use a suitable safety circuit (e.g. free-wheeling diode).

5.4.3 Connect the output module to the CP string



Caution

Fault in data transfer on the CP string.

Note the maximum permitted string lengths in the manual for the CP master used.

You will then avoid faults in data transfer between the input module and the CP master (e. g. CP fieldbus node).



Caution

Functional damage

Note the maximum permitted string lengths in the manual for the CP master used.

Use only the intended original cable type KVI-CP-3-... from Festo for connecting the CP modules, see manual for the CP master used.



Note

Specifications on the current consumption of the different CP modules can be found in the relevant manuals.

5. Output module type CP-A08-M12-EL-Z

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

- Operating voltage for internal electronics
- Connection for data exchange

The CPI modules are connected sequentially. The M9 plug is the incoming interface; the M9 socket is the continued interface (see Fig. 5/1).

If the continuing CP connection is not used:

- Seal the CP connection with a protective cap type FLANSCHDOSE SER.712, part no. 356684 (accessories). Only in this way can you comply with protection class IP65.



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 off the operating voltage for the valves and output modules, switching off the compressed air).

5.5 Diagnostics

5.5.1 Diagnostics via LEDs

Status LED
CP communication (PS)

The operating status of the output module is shown by means of the status LED CP communication (see Tab. 5/3).

LED PS (green)	Operating status	Error handling
 LED lights up	Operating voltage applied, CP communication OK	None
 LED is out	– Operating voltage not applied or no connection to CPI/CP master – CPI output module not contained in string allocation of the CPI/CP master	• Check the CPI/CP cable and the operating voltage connection on the CPI/CP master • Save the CP string allocation on the CPI/CP master (see manual for the CPI/CP master)

Tab. 5/3: Status LED CP communication (PS)

Status LED
Load supply (PL)

Short circuit or overload of the actuator supply is shown by means of the status LED short circuit/overload (see Tab. 5/4).

LED PL (green)	Operating status	Error handling
 LED lights up	Load supply OK	None
 LED flashes	– Undervoltage in actuator supply ($\leq 17.5\text{ V}$)	• Check the CP cable and the operating voltage connection on the CPI/CP master
 LED is out	– Load supply missing ($\leq 11\text{ V}$)	• Check the CP cable and the operating voltage connection on the CPI/CP master

Tab. 5/4: Status LED load supply (PL)

5. Output module type CP-A08-M12-EL-Z

Status LEDs
Status display of output

Next to the actuator connections there is a yellow LED for every output. This shows the status of the signal at the relevant output.

LED status of output	Status
 LED lights up	Output supplies 1-signal
 LED is out	Output supplies 0-signal

Tab. 5/5: Status LEDs for status display of output

Status LEDs
Short circuit/overload output

Next to the actuator connections there is a red LED for each output. This shows a short circuit or overload at the output.

LED  (red) module	Operating status	Error handling
 LED is out	– No short circuit/overload	• None
 LED lights up	Display module: (1 per module, lights up when an output LED lights up) – Short circuit/overload output (display module)	• Eliminate short circuit and delete the fault ¹⁾
¹⁾ Fault will not be deleted automatically.		

Tab. 5/6: Status LED short circuit/overload output (display module)

5. Output module type CP-A08-M12-EL-Z

LED  (red) channel	Operating status	Error handling
 LED is out	– No short circuit/overload	• None
 LED lights up	Display channel: (1 per output) – Short circuit/overload output (display output)	• Eliminate short circuit and delete the fault ¹⁾
¹⁾ Fault will not be deleted automatically.		

Tab. 5/7: Status LED short circuit/overload output (display channel)

Reaction to short circuit in the load supply

Short circuit/overload

If there is a short circuit/overload, the output module will switch off the output self-holding and communicate the fault to the CP master. In case of short circuit, the output remains switched off. When the short circuit has been eliminated, delete this fault as follows:

- To reactive the output, the power supply or the complete module must be separated from the power supply. Only resetting the output does not trigger either the error message or the blocking of functions.

5.5.2 Diagnostics using fieldbus

Irrespective of the CPI/CP master used, the CP output module type CP-...-EL provides diagnostic information on fault searching.

Master	Diagnostics of short circuit/over-load in actuator supply	Diagnostics, undervoltage, actuator supply
CP master (without extended functions)	Common fault message	
CPI master (with extended functions)	Yes	Yes

Tab. 5/8: Diagnostic information



Note
Instructions on evaluating the diagnostic message can be found in the manual for the relevant CPI/CP master.

Technical appendix

Appendix A

Contents

A. Technical appendix A-1

A.1 Technical specifications A-3

 A.1.1 General technical data A-3

 A.1.2 Technical specifications of the CL input modules A-4

 A.1.3 Technical specifications of the CL output modules A-6

 A.1.4 Technical specifications of the EL input modules A-7

 A.1.5 Technical specifications of the EL output modules A-9

A.2 Internal structure of the inputs A-10

 A.2.1 Internal structure type CP-E32-M8-EL A-10

 A.2.2 Internal structure type CP-E08-M12-CL and CP-E16-M12-EL A-11

 A.2.3 Internal structure type CP-E08-M8-CL and CP-E16-M8-EL A-12

 A.2.4 Internal structure type CP-E16-KL-CL A-13

A.3 Internal structure of the outputs A-14

 A.3.1 Internal structure type CP-A04-M12-CL and CP-A08-M12-EL-Z ... A-14

A.4 Examples of circuitry A-15

 A.4.1 Circuitry examples for inputs A-15

 A.4.2 Circuitry examples for outputs A-20

A.5 General information on parameterisation A-22

 A.5.1 Input debounce time (only with CP-EL modules) A-22

 A.5.2 Signal extension (only with CP-EL modules) A-24

A.6 Accessories A-27

 A.6.1 General accessories A-27

 A.6.2 Accessories for modules with M12 connection A-27

 A.6.3 Accessories for modules with M8 connection A-28

 A.6.4 Connector sets for input module type CP-E16-KL-CL A-29

A.1 Technical specifications

A.1.1 General technical data

General technical specifications of the CPI/CP I/O modules	
Temperature range: – Operation – Storage/transport	-5 °C ... +50 °C -20 °C ... +70 °C
Relative air humidity	95 %, non-condensing
Protection against electric shock as per EN 60204-1/IEC 204 (protection against direct and indirect contact)	Via connection to a PELV (Protected Extra-Low Voltage) power supply unit
Electromagnetic compatibility – Interference emission – Interference immunity	See declaration of conformity ➔ www.festo.com
Vibration and shock – Vibration – Shock	Tested as per DIN/IEC 68/EN 60068 part 2-6; 0.35 mm path at 10 ... 60 Hz; 5 g acceleration at 60 ... 150 Hz Tested as per DIN/IEC 68/EN 60068 part 2-27; ±30 g at 11 ms duration; 5 shocks in each direction

Tab. A/1: Technical specifications of CP I/O modules (general)

A.1.2 Technical specifications of the CL input modules

Technical specifications	Type CP-E08-M12-CL, type CP-E08-M8-CL
General technical data	See section A.1.1
Protection class as per EN 60 529; plug connector inserted or fitted with protective cap	IP65/IP67
Digital inputs	
– Configuration	8 inputs per IEC 1131-2 type 2, 24 V DC, positive-switching (PNP)
– Logic level: 1-signal 0-signal	> 11 V < 5 V
– Current consumption (at 24 V) (input current from sensor to input)	At “logical 1” Typ. 8 mA
– Response delay (at 24 V)	Typical 3 ms
Sensor voltage supply	Via the CP connection
– Nominal value	24 V DC
– Tolerance	See manual for CP master
– Internal current consumption of the electronics via the CP connection (all inputs in 0-status)	< 35 mA
Load capacity	Sum > 0.8 A (electronic short-circuit protection)
Electrical isolation	None

Tab. A/2: Technical specifications type CP-E08-M12-CL and type CP-E08-M8-CL

A. Technical appendix

Technical specifications	Type CP-E16-KL-CL
General technical data	See section A.1.1
Protection class as per EN 60 529	IP20
Digital inputs	
– Configuration	16 inputs as per IEC 1131-2 type 2 inputs 24 V DC, positive or negative switching
– Logic level	
1-signal	$\geq 8.6 \text{ V}$
0-signal	$\leq 6 \text{ V}$
– Current consumption (at 24 V) (input current from sensor to input)	At “logical 1” Typ. 8 mA
– Response delay (at 24 V)	Typical 3 ms
Sensor voltage supply	Via the CP connection
– Rated value (protected against incorrect polarity)	24 V DC
– Tolerance	See manual for CP master
– Internal current consumption of the electronics via the CP connection (all inputs in 0-status)	< 35 mA
Load capacity	Total > 0.8 A (electronic short-circuit protection)
Electrical isolation	None

Tab. A/3: Technical specifications type CP-E16-KL-CL

A.1.3 Technical specifications of the CL output modules

Technical specifications	Type CP-A04-M12-CL
General technical data	See section A.1.1
Protection class as per EN 60 529; plug connector inserted or fitted with protective cap	IP65/IP67
Electrical isolation	None
Digital outputs	
– Configuration	4 outputs as per IEC 1131-2; 24 V DC positive-switching 0.5 A
– Load capacity per digital output	
– Electronic fuse (short circuit, overload) Trigger current Response time	Min. 750 mA Max. 1.5 ms
Internal current consumption of the electronics via the CP connection	< 35 mA

Tab. A/4: Technical specifications type CP-A04-M12-CL

A.1.4 Technical specifications of the EL input modules

Technical specifications	Type CP-E32-M8-EL
General technical data	See section A.1.1
Protection class as per EN 60 529; plug connector inserted or fitted with protective cap	IP65
Digital inputs	
– Configuration	32 inputs per IEC 1131-2 type 2, 24 V DC, positive-switching (PNP)
– Logic level: 1-signal 0-signal	> 11 V < 5 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, can be parametrised: 0.5 ms, 3 ms, 10 ms, 20 ms
Sensor voltage supply	Via the CP connection
– Nominal value	24 V DC
– Tolerance	See manual for CP master (20.4 V ... 26.4 V)
– Internal current consumption of the electronics via the CP connection (all inputs in 0-status)	Max. 75 mA at 24 V
Load capacity	Total max. 1.35 A / 500 µF (electronic short-circuit protection)
Electrical isolation	None

Tab. A/5: Technical data type CP-E32-M8-EL

A. Technical appendix

Technical data	Type CP-E16-M8-EL, CP-E16-M12-EL
General technical data	See section A.1.1
Protection class as per EN 60 529; plug connector inserted or fitted with protective cap	IP65
Digital inputs	
– Configuration	16 inputs per IEC 1131-2 type 2, 24 V DC, positive-switching (PNP)
– Logic level: 1-signal 0-signal	> 11 V < 5 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, can be parametrised: 0.5 ms, 3 ms, 10 ms, 20 ms
Sensor voltage supply	Via the CP connection
– Nominal value	24 V DC
– Tolerance	See manual for CP master (20.4 V ... 26.4 V)
– Internal current consumption of the electronics via the CP connection (all inputs in 0-status)	Max. 75 mA at 24 V
Load capacity	Max. 130 mA/ 100 µF per group (electronic short-circuit protection)
Electrical isolation	None

Tab. A/6: Technical data type CP-E16-M8-EL and CP-E16-M12-EL

A.1.5 Technical specifications of the EL output modules

Technical data	Type CP-A08-M12-EL-Z
General technical data	See section A.1.1
Protection class as per EN 60 529; plug connector inserted or fitted with protective cap	IP65
Digital outputs	8 outputs as per IEC 1131-2; 24 V DC positive-switching Max. 0.5 A
– Configuration	
– Load capacity per digital output	Min. 1.0 A Slow-blowing
– Electronic fuse per channel (short circuit/overload) Trigger current Response characteristics	
Actuator supply	24 V DC 24 V DC $\pm 25\%$ (18 V ... 30 V)
– Nominal value – Tolerance	
Internal current consumption of the electronics via the CP connection (all outputs in 0-status)	Max. 35 mA at 24 V
Electrical isolation	None

Tab. A/7: Technical data type CP-A08-M12-EL-Z

A.2 Internal structure of the inputs

A.2.1 Internal structure type CP-E32-M8-EL

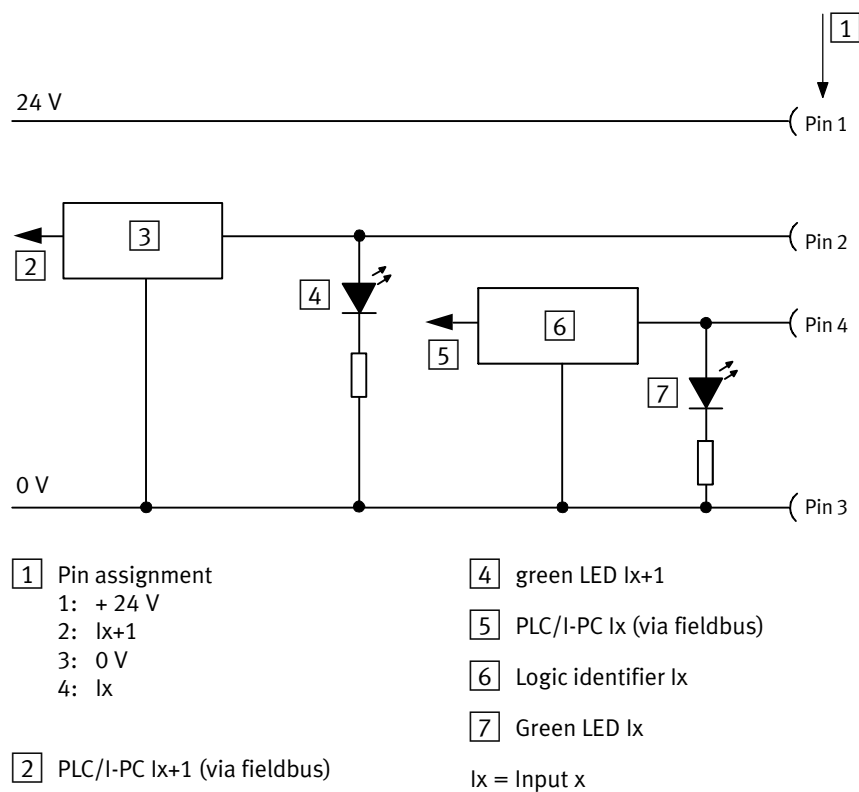


Fig. A/1: Internal structure type CP-E32-M8-EL

A.2.2 Internal structure type CP-E08-M12-CL and CP-E16-M12-EL

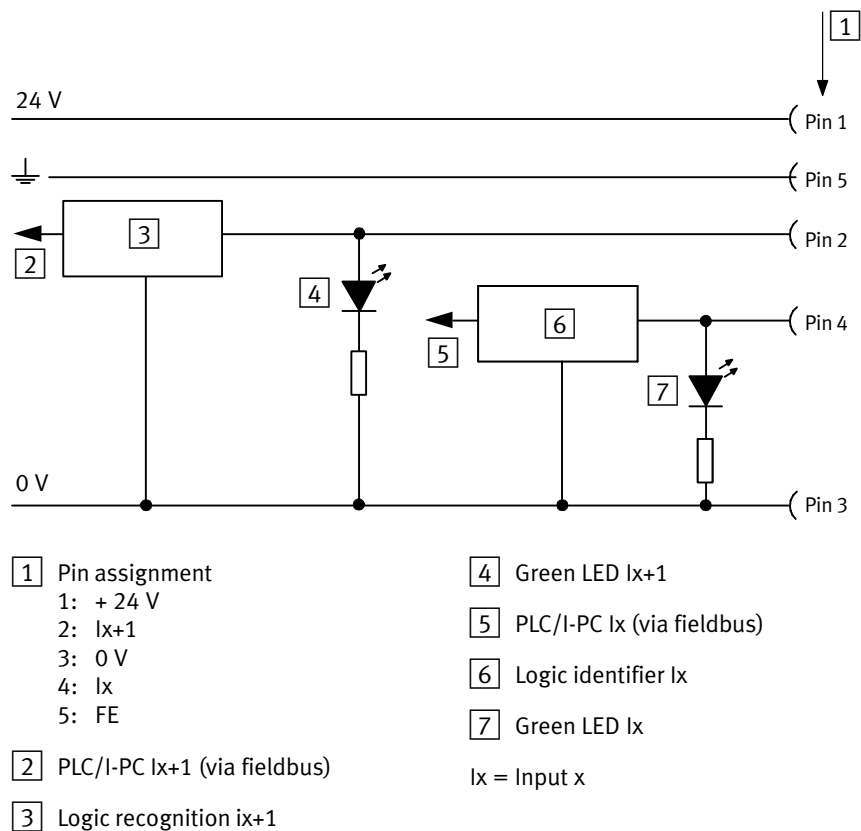


Fig. A/1: Internal structure type CP-E08-M12-CL and CP-E16-M12-EL

A.2.3 Internal structure type CP-E08-M8-CL and CP-E16-M8-EL

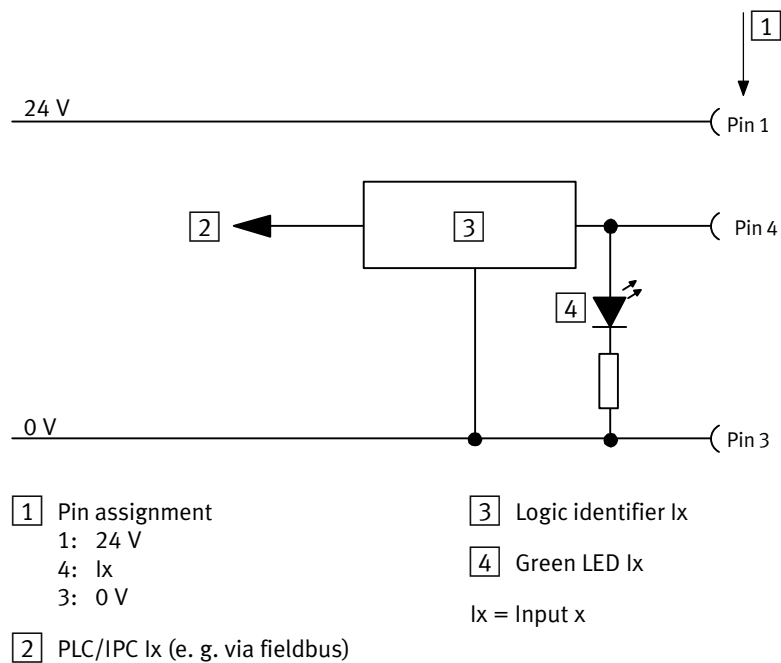


Fig. A/2: Internal structure type CP-E08-M8-CL and CP-E16-M8-EL

A.2.4 Internal structure type CP-E16-KL-CL

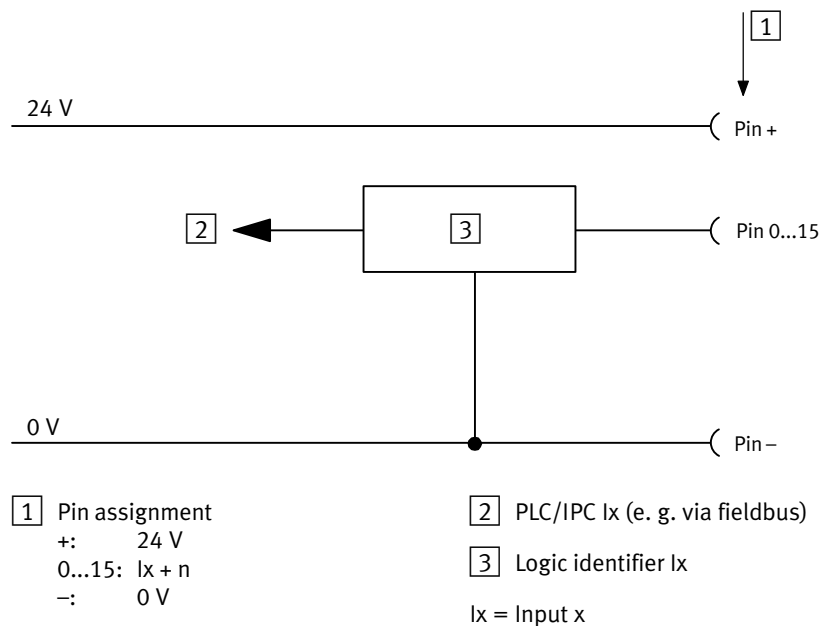


Fig. A/3: Internal structure type CP-E16-KL-CL

A.3 Internal structure of the outputs

A.3.1 Internal structure type CP-A04-M12-CL and CP-A08-M12-EL-Z

Name for ports: E.g.: 1 for CL modules, x1 for EL modules

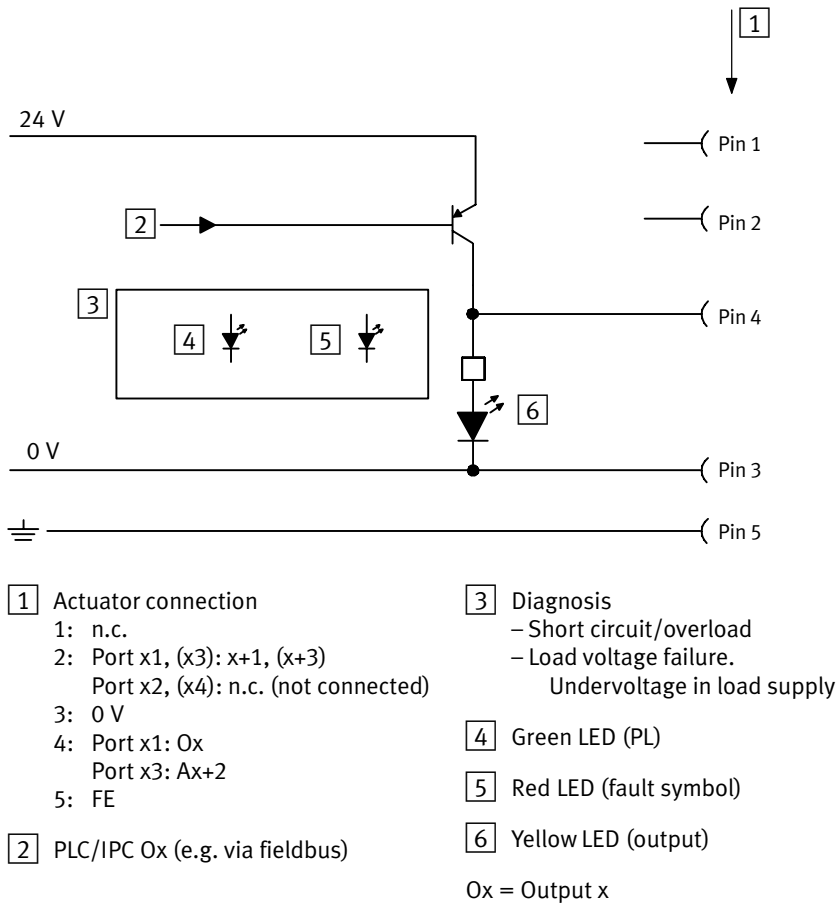


Fig. A/4: Internal structure type CP-A04-M12-CL and CP-A08-M12-EL-Z

A.4 Examples of circuitry

A.4.1 Circuitry examples for inputs

Example of circuitry type CP-E32-M8-EL

1 Pin assignment

1: 24 V

2: $I_x + 1$

3: 0 V

4: I_x

2 Dual distributor
(T-piece)

3 Sensor 2 ($I_x + 1$)

4 Sensor 1 (I_x)

I_x = Input x

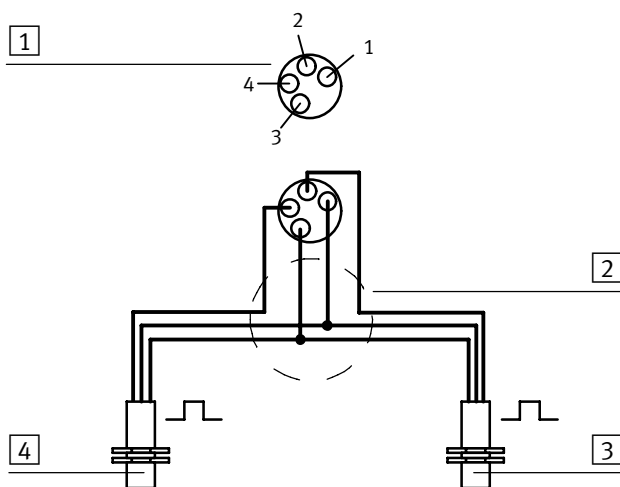


Fig. A/5: Example of circuitry type CP-E32-M8-EL

Example of circuitry type CP-E08-M12-CL and CP-E16-M12-EL

1 Pin assignment

- 1: 24 V
- 2: Ix +1
- 3: 0 V
- 4: Ix
- 5: Ground terminal

2 Dual distributor (T-piece)

3 Sensor 2 (Ix+1)

4 Sensor 1 (Ix)

Ix = Input x

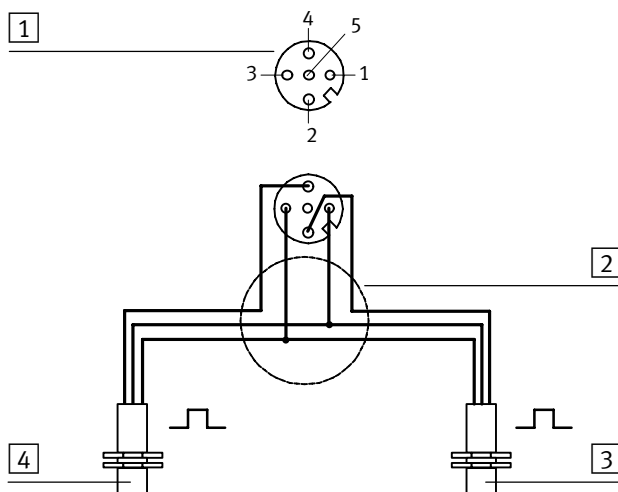


Fig. A/6: Example of circuitry type CP-E08-M12-CL and CP-E16-M12-EL

Examples of circuitry type CP-E08-M8-CL and CP-E16-M8-EL

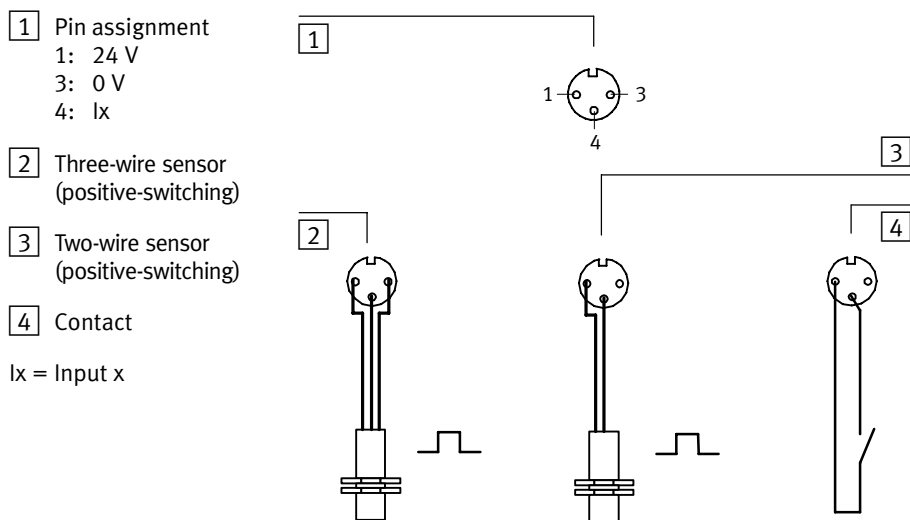


Fig. A/7: Example of circuitry type CP-E08-M8-CL and CP-E16-M8-EL

Circuitry example type CP-E16-KL-CL

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 pushbuttons) is intended for the 0 V distributor; the centre row (red pushbuttons) is intended for the 24 V distributor. The relevant voltage must be supplied by means of an external bridge from the 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: $I_x + n$
 -: 0 V

4 Contact

5 Two-wire sensor (positive-switching)

6 Three-wire sensor (positive-switching)

I_x = Input x

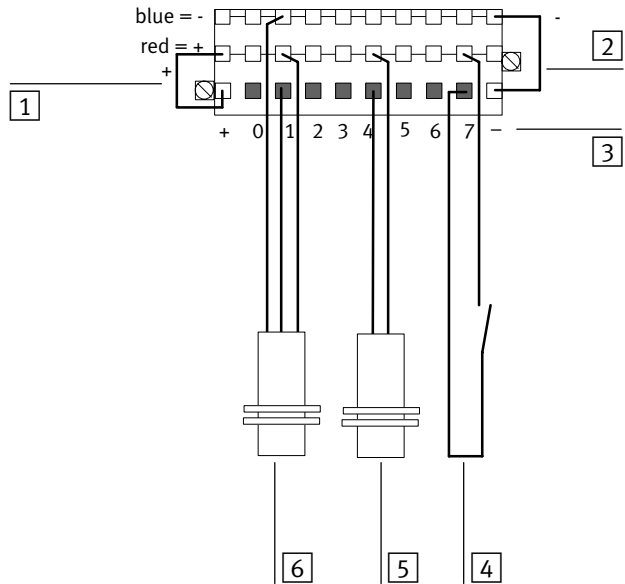


Fig. A/8: Circuitry example type CP-E16-KL-CL
 with 3-row connector set type CP-E16-KL-CL

Circuitry example type CP-E16-KL-CL with single-row connector socket

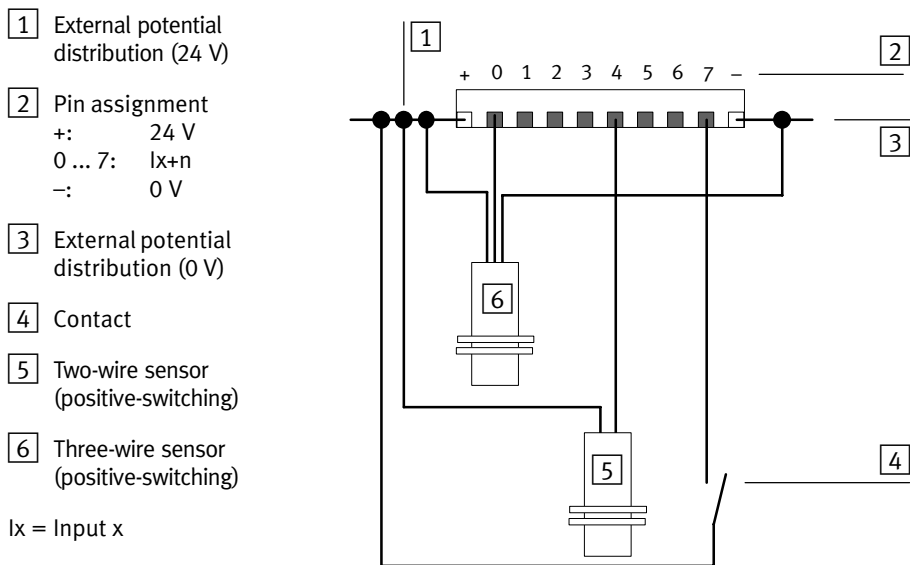
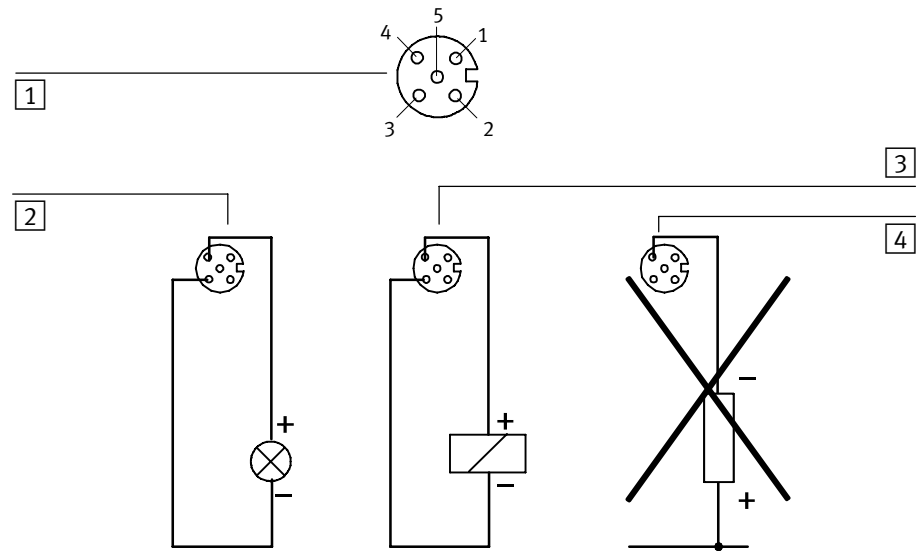


Fig. A/9: Circuitry example type CP-E16-KL-CL with single-row connector socket

A.4.2 Circuitry examples for outputs

Examples of circuitry type CP-A04-M12-CL and
CP-A08-M12-EL-Z

Name for ports: E.g.: 1 for CL modules, x1 for EL modules



1 Pin assignment

- 1: n.c.
- 2: *)
- 3: 0 V
- 4: Ox
- 5: Ground terminal

2 Example 1

3 Example 2

4 Not acceptable

*) – Port x0, x2, x4, x6:

Ox+1, Ox+3, Ox+5, Ox+7

– Port x1, x3, x5, x7: n.c. (not connected)

Ox = Output x

n.c. = not connected

Fig. A/10: Examples of circuitry output module type CP-A04-M12-CL and
CP-A08-M12-EL-Z

Circuitry example type CP-A04-M12-CL

- 1** Pin assignment
 Port 0 (2):
 1: n.c.
 2: Ox+1 (Ox+3)
 3: 0 V
 4: Ox+0 (Ox+2)
 5: Ground terminal

Ports 1, 3: not used

- 2** Magnet valve

Ox = Output x

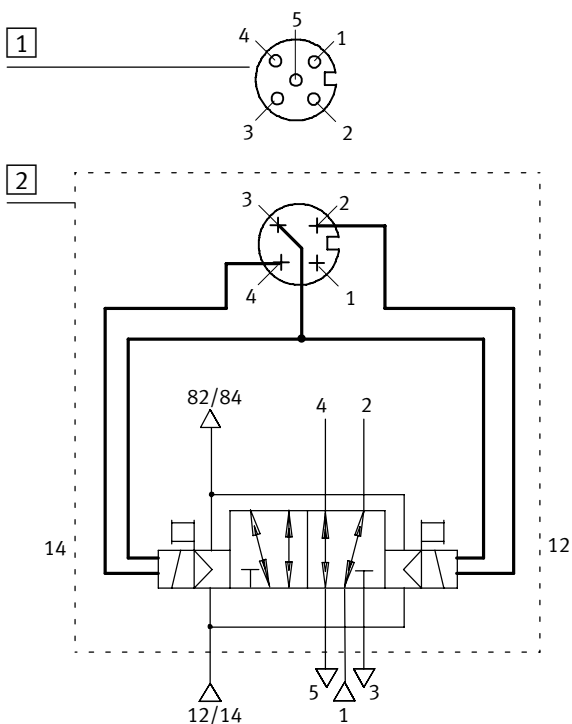


Fig. A/11: Circuitry example type CP-A04-M12-CL with magnet valve, e.g. type JMEBH-5/2-D-...-ZSR-C

A.5 General information on parameterisation



You can parameterise the behaviour of the CPI modules (e.g. diagnostic behaviour etc.). Access to the parameters depends on the CPI master used:

- CPX-CP interface as CPI master: parameterisation via the fieldbus or via the handheld (CPX-MMI).
- CPV Direct as CPI master: parameterisation via the fieldbus.

The basics of the parameters Input debounce time and Signal extension are described in what follows. Further information on parameterisation can be found in the CPX system manual.

A.5.1 Input debounce time (only with CP-EL modules)

Basics

Input debouncing times are specified in order to eliminate interfering changes of signal edge during switching procedures (bouncing of the input signal). For example, mechanical switches generate brief undesired signal edges during switching procedures. The signal states which are thereby produced can cause interference in the control sequence and should therefore frequently be suppressed.

Interfering, undesired signal edges can be suppressed by a PLC program in the higher-order controller. Interference can therefore be avoided. With the CPI system, undesired signal edges can be suppressed simply by parameterisation.

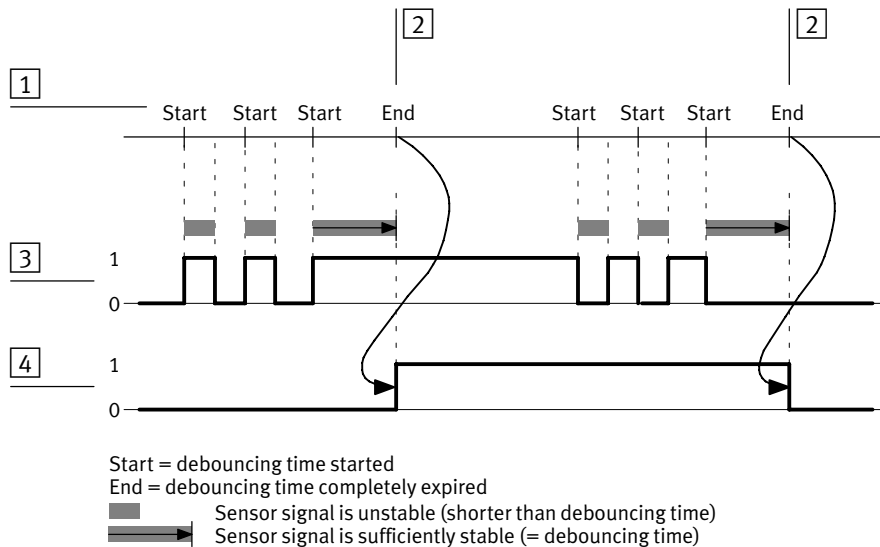
Parameterisation in the CPI system

With the CPI system, the input debouncing time can be set with an appropriate module parameter. The possible input debouncing times therefore depend on the particular type of module. Typical input debouncing times are: 0.1 ms, 3 ms (typical presetting), 10 ms and 20 ms.

Method of operation

Changes of edge in the sensor signal will be accepted as a logical input signal (see Fig. A/1) only when the specified debouncing time has expired.

Dependency diagram



1 Start and end (sequence) of the debouncing time

3 Sensor signal

2 Debouncing time has expired

4 Logical CPI signal

Fig. A/1: Input debouncing

A.5.2 Signal extension (only with CP-EL modules)

Basics

Signal extension times are specified when very short signals are to be taken into account in the control process. Short signals can occur, e.g. when an intermediate position is exceeded and evaluation is necessary in order to produce a time-optimised consequent process before an end position is reached.

Depending on the type of sensor, the length of the signal, which is generated when the intermediate position is exceeded, can fluctuate according to the positioning speed. There is a danger here that the short signals are not always “recognised” due to long cycle times of the higher-order controller.

With the CPI system, a signal extension time can be defined by parameterisation of the appropriate input signal. Short signals will then also be recognised reliably by the higher-order controller.

Parameterisation in the CPI system

With the CPI system, the signal extension time for the module is set with the appropriate module parameter. The possible signal extension times depend on the type of module. Typical signal extension times are: 0.5 ms (typical presetting), 15 ms, 50 ms and 100 ms.

The user must parameterise the signal extension time for activation.

Method of operation

Signal states accepted as logical input signals usually remain valid at least until the specified minimum signal duration has expired. Change of edge within the minimum signal duration are ignored (see Fig. A/2). Fixed debouncing times remain effective.

Case 1: Change of edge within the signal extension time

The logical CPI signal is supplied when the signal extension time and, if applicable, the debouncing time has expired.

- 1 Sensor signal
- 2 Logical CPI signal
- 3 Change of edge within the signal extension time

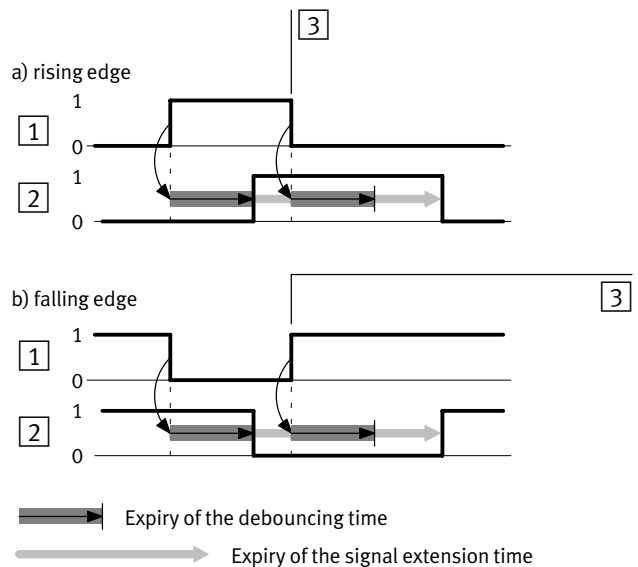


Fig. A/2: Change of edge within the signal extension time

Case 2: Change of edge after expiry of the signal extension time

The logical CPI signal follows the input signal and is supplied after it. If a debouncing time has been defined, the logical CPI signal is supplied when the debouncing time has expired.

- 1 Sensor signal
- 2 Logical CPI signal
- 3 Change of edge after expiry of the signal extension time

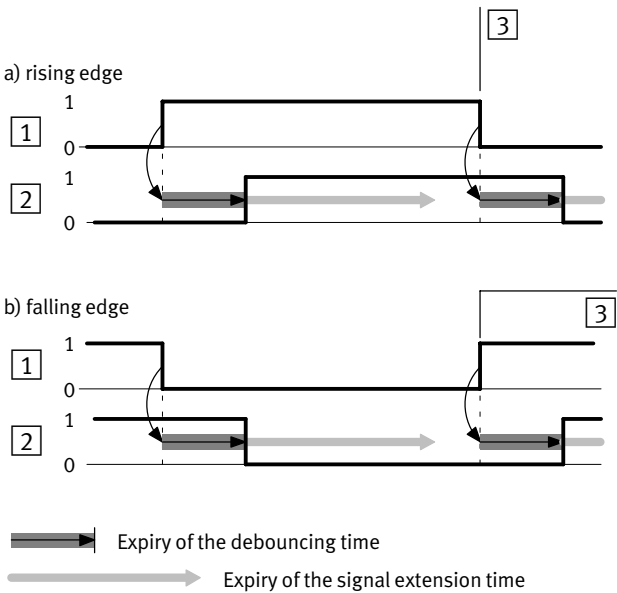
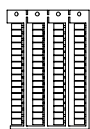


Fig. A/3: Change of edge after expiry of the signal extension time

A.6 Accessories

A.6.1 General accessories

Accessories	Type	Description
	ISB-8x20	64 identification signs 8 x 20
	ASCF-H-E2	10 inscription labels for CP-EL modules approx. 24 x 60 mm
	FLANSCHDOSE SER.712	– Protective caps for sealing unused CP connector sockets

A.6.2 Accessories for modules with M12 connection

Accessories	Type	Description
	SEA-G-S-7 SEA-4GS-7-2,5 SEA-GS-9 SEA-GS-11-DUO	M12 plug for connecting sensors and actuators, straight, 4-pin – PG7 screw connector, for cable diameter 4 ... 6 mm – PG7 screw connector, for cable diameter 2.5 ... 2.9 mm – PG9 screw connector – PG11 screw connector, 2 cable exits (DUO)
	SEA-M12-5GS-PG7 SEA-5GS-11-DUO	M12 plug for connecting sensors and actuators, straight, 5-pin – PG7 screw connector – PG11 screw connector
	KM12-DUO-M8-GDGD KM12-DUO-M8-GDWD KM12-DUO-M8-WDWD	DUO cable with 2 M8 plugs for modules with M12 connection: – straight/straight – straight/angled – angled/angled

Accessories	Type	Description
	KM12-M12-GSGD-... KM12-M12-GSWD-...	Extension cable for DUO cable in different lengths – Straight/straight – Straight/angled
	ISK-M12	– 10 protective caps for sealing unused M12 connector sockets

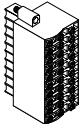
A.6.3 Accessories for modules with M8 connection

Accessories	Type	Description
	SEA-GS-M8 SEA-3GS-M8-S	M8 plug for connecting sensors, straight, 3-pin, PG7 screw connector – Solderable – Screw-in
	KM8-M8-GSGD-...	Connecting cable with plug and socket, M8, 3-pin, straight/straight in different lengths
	ISK-M8	– 10 protective caps for sealing unused M8 connector sockets

A.6.4 Connector sets for input module type CP-E16-KL-CL



Recommendation: Use the connector sockets type PS1-SAC31-30POL+LED for the input module type CP-E16-KL-CL.

Sockets type PS1-SAC31-30POL+LED	Number	Connection cross section	Recommended for connection
Tension spring sockets, 3-row + LED 	2	see leaflet with product	X1, X2

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. A/8).

- Fasten the sockets with the screws provided. The maximum tightening torque is 0.2 Nm.

Instructions on wiring the connector sockets

Solid wires and cables with end sleeves can be inserted easily in the desired tension spring terminal. For inserting flexible wires, you must use a suitable tool (e.g. screwdriver) to press down the coloured pushbutton for the relevant tension spring terminal.

- 1 Tension spring socket
- 2 Cable
- 3 Screwdriver

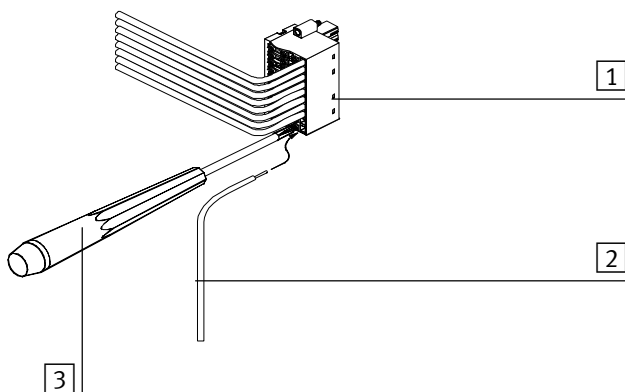


Fig. A/4: Wiring the connector socket

Index

Appendix B

B. Index B-1

A

Abbreviations, product-specific	XIII
Accessories	A-27

C

CL input modules	2-3
CL output modules	3-3
Connecting the actuators	3-7, 5-10
Connector sockets	A-29
CPI system, Rules	1-8
CPI/CP modules, Overview	1-5, 1-10

D

Diagnostics	
Diagnostics via LEDs	4-16, 5-13
Diagnostics via the fieldbus	4-20, 5-16

E

Earthing	
For wall mounting	4-10, 5-8
Via H-rail	4-10, 5-8
EL input modules	4-3
EL output modules	5-3
Example of circuitry of inputs	A-15
Example of circuitry of outputs	A-20

I

Input debounce time	A-22
Input module	
Connect to the node	2-12, 4-14

LEDs	2-14
LEDs	4-16
Internal structure type CP-E08-KL-CL	A-13
Internal structure type CP-E08-M12-CL	A-11 , A-12
Internal structure type CP-E16-M12-EL	A-11
Internal structure type CP-E16-M8-EL	A-12
Internal structure type CP-E32-M8-EL	A-10
Inscription label holder, Inscription	4-9 , 5-7
Intended use	VI

M

Mounting

Input module	2-7 , 4-7
Output module	3-5 , 5-5

N

Notes on the use of this manual	X
---------------------------------------	---

O

Output module

Connect external load supply	5-9
Connect to the node	3-9 , 5-12
LEDs	3-10 , 5-13
Internal structure type CP-A04-M12-CL	A-14
Internal structure type CP-A08-M12-EL-Z	A-14

P

Parameterisation, General information	A-22
---	------

Pictograms	IX
------------------	----

Pin allocation

Input module type CP-E32-M8-EL	4-12
Input module type CP-E16-M8-EL	4-12
Input module type CP-E16-M12-EL	4-13
Output module type CP-A04-M12-CL	3-7

Output module type CP-A08-M12-EL-Z	5-10
Pin assignment	
Input module type CP-E08-M12-CL	2-10
Input module type CP-E08-M8-CL	2-10
Input module type CP-E16-KL-CL	2-11
Power unit	VII

R

Rules for extending the CPI/CP system	1-8
---	-----

S

Sensors, Connecting	2-9, 4-11
Service	VII
Short circuit/overload	
Load supply	3-12, 5-15
Sensor supply	2-15, 4-18
Signal extension time	A-24

T

Target group	VII
Technical data	
Type CP-A08-M12-EL-Z	A-9
Type CP-E16-M12-EL	A-8
Type CP-E16-M8-EL	A-8
Technical specifications	
CPI/CP I/O modules (general)	A-3
Type CP-A04-M12-CL	A-3, A-6
Type CP-A08-M12-EL-Z	A-3
Type CP-E16-M12-EL	A-3
Type CP-E32-M8-EL	A-3, A-7
Type CP-E08-M12-CL	A-3, A-4
Type CP-E08-M8-CL	A-3, A-4
Type CP-E16-M8-EL	A-3
Type CP-E16-KL-CL	A-3, A-5

Text designations IX

U

User instructions VIII