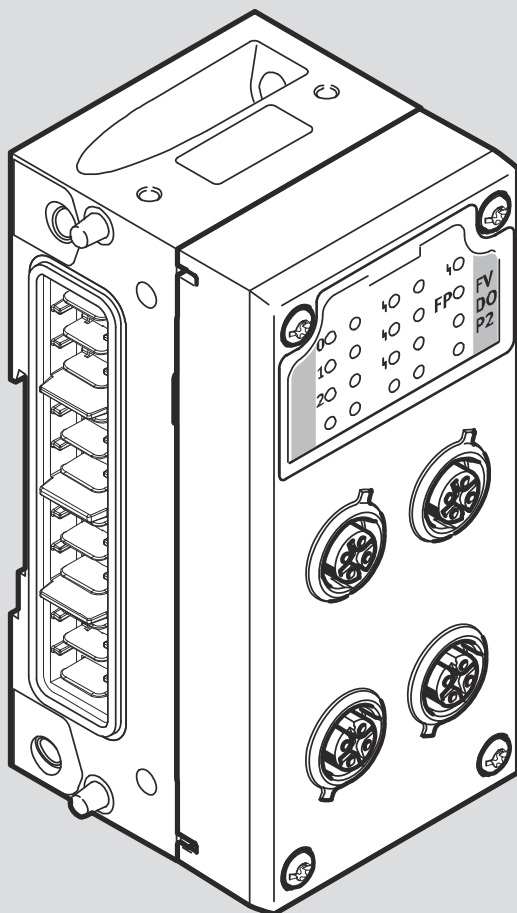


# CPX-FVDA-P2

Output module

# FESTO

Operating instruc-  
tion



8195564

8195564  
2023-11e  
[8195566]

Translation of the original instructions

PI PROFIBUS PROFINET, PROFIsafe are registered trademarks of the respective trademark owners in certain countries.

# Table of contents

<b>1</b>	<b>Safety</b>	<b>4</b>
1.1	Important user information	4
1.2	General safety instructions	4
1.3	Intended use	5
1.4	Rules for product configuration	6
1.5	Foreseeable misuse	8
1.6	Attainable safety level	9
1.7	Failures due to a common cause (Common Cause Failure – CCF)	9
1.8	Requirements for use of the product	9
1.9	Technical prerequisites	9
1.10	Training of qualified personnel	10
1.11	Product conformity	10
1.12	UL/CSA certification	10
1.13	Transport and storage conditions	11
1.14	Service	11
<b>2</b>	<b>Product identification</b>	<b>11</b>
<b>3</b>	<b>Connection and display components</b>	<b>12</b>
3.1	Design of the output module in a CPX terminal	12
3.2	Design of the output module in a valve terminal VTSA-F-CB	14
<b>4</b>	<b>Installation</b>	<b>15</b>
4.1	Setting the PROFIsafe address	15
4.2	Disassembly of the electronics module	16
4.3	Mounting the electronics module	17
4.4	Pin allocation	18
<b>5</b>	<b>Commissioning</b>	<b>20</b>
5.1	Start behaviour of the output module	20
<b>6</b>	<b>Service, repair, disposal</b>	<b>21</b>
<b>7</b>	<b>Technical data</b>	<b>21</b>

# 1 Safety

## 1.1 Important user information

Identification of dangers and notes on how to avoid them:

### **WARNING**

Dangers which could lead to death or serious injuries.

### **CAUTION**

Dangers which could lead to minor injuries or to serious material damage.

Other symbols:

### **NOTICE**

Material damage or loss of function



Recommendation or tip

### **ENVIRONMENT**

Information on environmentally friendly use



Link to accessories → [www.festo.com/catalogue](http://www.festo.com/catalogue)

## 1.2 General safety instructions

### **WARNING**

Non-observance of safety instructions can result in death, serious injuries or major material damage.

- The safety instructions must be observed.

### **NOTICE**

Electronics modules include electrostatically sensitive devices.

Incorrect handling can cause damage to the electronics modules.

- Observe the handling specifications for electrostatically sensitive devices.
- Discharge static electricity from your body before assembling or disassembling modules to protect the modules.

### **NOTICE**

To ensure compliance with the intended use:

- Every output channel that is in use must be switched at least once a week.
- If test pulses are switched off:  
Every output that is in use must be switched at least once a day.

## NOTICE

To ensure compliance with the safety level:

- Specify that every output channel in use must be switched on for more than 1 minute at a time for every 8 hours of operation.  
The operating time begins when the output module is first switched on.

## NOTICE

- Use a maximum of 2 output channels in a common safety pilot circuit.



Observe the regulations for electrical power supply (Protective Extra-Low Voltage, PELV) to CPX terminals in the system description CPX-SYS-... → [www.festo.com/sp](http://www.festo.com/sp).

## 1.3 Intended use

The output module CPX-FVDA-P2 is intended for use as a shut-off module for the safe shutdown of connected consumers (safety function) if the following condition is met:

- The connected consumers are switched to a safe state when the safety shutdown takes place.

### Product versions

The output module CPX-FVDA-P2 is available in three versions

→ Tab. 4 Permissible components:

- Version 1  
in combination with certain manifold and interlinking blocks of the CPX terminal
- Version 2  
as part of the pneumatic interface VABA-S6-1-X...-F1-CB of the valve terminal VTSA-F-CB
- Version 3  
as part of the pneumatic interface VABA-S6-1-X...-F2-CB of the valve terminal VTSA-F-CB

### Safety function

The safety function is achieved through dual-channel, P- and M-side disconnection of the load voltage supply for  $U_{VAL}$  valves:

- Version 1
  - Disconnection of the load voltage supply for  $U_{VAL}$  valves of the CPX terminal: output channel CH0 of the module.  
Output channel CH0 is used to supply valve terminal pneumatic modules in the CPX terminal fitted on the right-hand side.
  - Disconnection of the two outputs provided through the connection technology of the module: output channel CH1 and CH2 of the module, also supplied via the load voltage supply for  $U_{VAL}$  valves.

In addition, the unswitched load voltage supply  $U_{VAL}$  is made available through the connection technology of the module as operating voltage for the external components (24 V DC auxiliary supply).

- Version 2
  - Disconnection of the three internal safe voltage zones: CH0, CH1, CH2.

- Version 3
  - Disconnection of the two internal safe voltage zones: CH0, CH1.
  - Disconnection of the safe output provided through the connection technology of the pneumatic interface: CH2.

The voltage zones can be disconnected independently of each other in an electrically safe manner. The output channels of the output module CPX-FVDA-P2 each form a safety circuit with their connected consumers.



Information about the power supply for the CPX terminal → System description CPX-SYS-...

**Range of application**

The output module CPX-FVDA-P2 is a product with safety-related functions, intended for mounting in machines or automation systems and is to be used as follows:

- in excellent technical condition
- in its original condition, without unauthorised modifications
- exclusively in the configurations stated in the CPX-FVDA-P2-... description
- within the limits of the product defined by the technical data
  - 7 Technical data
- in an industrial environment

**NOTICE**

Note that the safety limits of the output module are also its physical limits.

**1.4 Rules for product configuration**

- The output module CPX-FVDA-P2 may only be operated in Festo CPX terminals of the variant CPX-M-... or in pneumatic interfaces for the valve terminal VTSA-F-CB-....
- Comply with all technical operating limits → 7 Technical data. Otherwise, malfunctions can occur.
- Operation of the CPX-FVDA-P2 is permissible only in combination with the following PROFIsafe-compatible CPX bus nodes → Bus node rating plate:

Bus node	From revision	Network protocol
CPX-FB13 <sup>1)</sup>	30	PROFIBUS
CPX-FB33 <sup>2)</sup>	21	PROFINET IO
CPX-M-FB34 <sup>2)</sup>	21	PROFINET IO
CPX-M-FB35 <sup>2)</sup>	21	PROFINET IO
CPX-FB43 <sup>2)</sup>	50	PROFINET IO
CPX-M-FB44 <sup>2)</sup>	50	PROFINET IO
CPX-M-FB45 <sup>2)</sup>	50	PROFINET IO

1) → Description of CPX-FB13...  
2) → Operating instructions for CPX-(M)-FB33/34/35/43/44/45  
Tab. 1: Permissible PROFIsafe-compatible CPX bus nodes

- Operation of the CPX-FVDA-P2 within valve terminals is only permissible with the following valve types:

Valve terminal	Type	Valve types
MPA-S-FB-VI	32	MPA1, MPA2 on VMPA...-FB-EMG-... <sup>1)</sup>
MPA-F-FB-VI	33	MPAF1, MPAF2 on VMPA...-FB-EMG-... <sup>1)</sup>
MPA-L-FB-VI	34	All <sup>1)</sup>
VTSA-FB-VI	44	All up to width of 52 mm <sup>1)</sup>
VTSA-F-FB-VI	45	All up to width of 52 mm <sup>1)</sup>
VTSA-F-CB-VI	46	All <sup>1)</sup>

1) Malfunctions may occur if the resultant current is exceeded.

Tab. 2: Permissible valve types

- Operation of switch-off groups within valve terminals is permitted only in conjunction with permissible pneumatics → Description of the respective valveterminal.
- Operation of switch-off groups in CPX terminals in the Remote I/O mode of operation is only allowed with the following approved output modules:

Output module
CPX-4DA <sup>1)</sup>
CPX-8DA <sup>1)</sup>
CPX-8DA-H <sup>1)</sup>
CPX-8DI-8DO <sup>1)</sup>

1) Malfunctions may occur if the total current is exceeded.

Tab. 3: Permissible output modules

Output modules on the right side of the CPX-FVDA-P2, which are switched off via CH1 or CH2, may only be supplied via the additional supply CPX-M-GE-EV-Z.

The use of a voltage relay on the right of CPX-M-GE-EV-FVO is not permitted.

- Only the following components are permitted when assembling the CPX-FVDA-P2:

Version	Component	Type
1	CPX-FVDA-P2 in combination with certain manifold and interlinking blocks of the CPX terminal	Interlinking block
		CPX-M-GE-EV-FVO
		Manifold block
		CPX-M-AB-4-M12X2-5POL
		CPX-AB-8-KL-4POL
2	CPX-FVDA-P2 <sup>1)</sup> as part of the	Pneumatic interface
	pneumatic interface of the	VABA-S6-1-X...-F1-CB
3	valve terminal VTSA-F-CB	Pneumatic interface
		VABA-S6-1-X...-F2-CB

1) Revision R04 (or a higher revision) of the output module required → Rating plate of the electronics module CPX-FVDA-P2

Tab. 4: Permissible components



Further information about the supported product versions can be found in the description CPX-FVDA-P2-... and the description of the valve terminal VTSA-F-CB.

Detailed information about the product, the supported product versions and required software versions as well as the permissible components of the CPX terminal can be found in the system description CPX-SYS-... → [www.festo.com/sp](http://www.festo.com/sp).

Information about permissible configurations of the CPX terminal in combination with the output module can be found in the catalogue → [www.festo.com/catalogue](http://www.festo.com/catalogue).

---

## 1.5 Foreseeable misuse

The following are examples of foreseeable misuse and are not approved as intended use:

- outdoor operation
- use in non-industrial areas
- use outside the limits of the product defined in the technical data
- unauthorised modifications
- use in combination with consumers where switching off can result in hazardous movements or conditions

### NOTICE

The use of manifold blocks, interlinking blocks and pneumatic interfaces that are not specified is **not permissible**.

---

### NOTICE

In the following cases, the use of the output module CPX-FVDA-P2 for formation of safety circuits is **not permissible**:

- in a CPX terminal equipped with CPX-FEC or CPX-CEC
  - in a CPX terminal with shut-off groups containing output modules other than those permitted
  - in a CPX terminal of variant P
  - in a CPX terminal with a connected valve terminal which is equipped with valve types other than the following: VTSA, MPA-S, MPA-F → Tab. 2 Permissible valve types
  - in a CPX terminal with a connected valve terminal where a proportional-pressure regulator VPPM is located in switching groups with a safety shutdown function
  - in impermissible switching configurations → Description CPX-FVDA-P2-...
- 

### NOTICE

The output module does not contain any wearing parts. Repairs are not allowed on the output module CPX-FVDA-P2. This invalidates the certification of the output module. Professional replacement of the electronics module by the user is permissible.

---

### NOTICE

If the product is damaged by unauthorised manipulation or use other than the intended use, the guarantee will be invalidated and the manufacturer will not be liable for damages.

---



## 1.6 Attainable safety level

With the CPX-FVDA-P2, safety functions can be implemented up to:

- Safety integrity level SIL 3 in accordance with IEC 61508
- Performance level e, Cat. 3 in accordance with EN ISO 13849-1
- Maximum SIL 3 in accordance with EN IEC 62061.

The attainable safety level of the overall safety device depends on the other components used to implement the safety function.

To maintain the safety level:

- Test the functionality of the safety device at adequate intervals.

## 1.7 Failures due to a common cause (Common Cause Failure – CCF)

Common cause failures cause the loss of the safety function, since both channels (P and M) in a dual-channel system fail simultaneously.

The following measures ensure that common cause failures are avoided:

- Comply with operating voltage limits
  - Comply with temperature range
    - ➔ Tab. 17 Further characteristic values
    - ➔ Fig. 7
  - Use a maximum of 2 output channels in a common safety pilot circuit
- Additional measures for avoidance of common cause failures may result from the application.

## 1.8 Requirements for use of the product

- This brief description must be available to the design engineer, installation technician and personnel responsible for commissioning the machine or system in which this product is used.
- Keep this brief description throughout the entire product lifecycle.
- Make sure that the specifications in the documentation are observed at all times. Also comply with the documentation for the other components and modules (e.g. bus nodes, pneumatics etc.).
- Take into consideration the legal regulations applicable for the location as well as:
  - instructions and standards
  - regulations of the testing organisations and insurers
  - national specifications
- Remove all packaging, such as foils, caps and cardboard. The material used in the packaging has been specifically chosen for its recyclability (exception: oiled paper = residual waste).
- Assembly must be performed in a professionally correct manner. To maintain the IP degree of protection:
  - Screw the manifold block on tight ➔ 4.3 Mounting the electronics module.
  - Mount cable entry and seals in a professionally correct manner.
  - Seal unused ports with cover caps.
- If the system had to be shut down for safety reasons such as an EMERGENCY STOP, make sure the safety controller monitors/controls all system restarts as intended.

## 1.9 Technical prerequisites

General conditions for the correct and safe use of the product, which must be observed at all times:

- Comply with the technical operating limits ➔ 7 Technical data.

- Only then is operation of the product ensured in accordance with the relevant safety regulations.
- When connecting standard auxiliary components, also observe the specified critical limits for temperatures, electrical data and torques.

1.10 Training of qualified personnel

The device may only be commissioned by trained, qualified control and automation technology technicians, who are familiar with:



- the installation and operation of control systems
- the applicable regulations for operating safety-related systems
- the applicable regulations for accident prevention and occupational safety
- the documentation for the product

NOTICE

Work on safety engineering systems may only be carried out by qualified personnel trained in safety engineering.

1.11 Product conformity

The product-relevant directives are listed in the declaration of conformity → [www.festo.com/sp](http://www.festo.com/sp).

Product conformity	
	in accordance with EU EMC Directive in accordance with EU Machinery Directive in accordance with EU RoHS Directive
	to UK EMC Regulations to UK Supply of Machinery Regulations to UK RoHS Regulations

Tab. 5: Product conformity

1.12 UL/CSA certification

Certain configurations of the product have been certified by Underwriters Laboratories Inc. (UL) for the USA and Canada.

These configurations bear the following mark:



UL Recognized Component Mark for Canada and the United States

**Only for connection to an NEC Class 2 supply.**

**Raccorder Uniquement a un circuit de Classe 2.**

Observe the following if your application must be in compliance with the UL requirements:

- Regulations for compliance with the UL certification can be found in the separate UL-specific special documentation.  
The relevant technical data in that documentation also takes priority if it does not influence the safety engineering values in an impermissible manner.
- The technical data in this documentation may show values deviating from this.

### 1.13 Transport and storage conditions

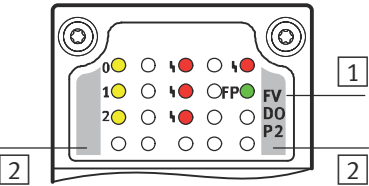
- Protect the product during transport and storage from excessive stress factors, such as:
  - Mechanical loads
  - Impermissible temperatures
  - Moisture
  - Aggressive atmospheres
- Store and transport the product in its original packaging.  
The original packaging offers sufficient protection from typical stresses.

### 1.14 Service

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

## 2 Product identification

The module identifier and product rating plate identify the product. The module identifier can be seen through the transparent cover of the manifold block/the cover for the pneumatic interface.

Module identifier	Meaning
	<ul style="list-style-type: none"> <li>– Module identifier <b>1</b>: FVDOP2 (F=Safety; V=Valves; D=Digital; O=Outputs; P=PROFIsafe; 2=Variant)</li> <li>– yellow background <b>2</b> for identification of the safety function</li> </ul>

Tab. 6: Module identifier of the output module CPX-FVDA-P2

The product labelling is for identification of the product and shows the following information:

Product labelling (example)	Meaning
CPX-FVDA-P2	Order reference
1971599	Part number
MM-YYYY:XX Rev XX	MM = manufacturing month YYYY = manufacturing year XX = plant number Rev XX = revision code
CE, UKCA and DataMatrix code	Identification
12345678901234	14-character serial number
Festo SE & Co. KG	Manufacturer's address
DE-73734 Esslingen	

Tab. 7: Product labelling (example)


Further information can be found in the CPX-SYS-... system description → [www.festo.com/sp](http://www.festo.com/sp)

**This brief description applies to the following product**

Type	Part number	Revision
CPX-FVDA-P2	1971599	R0x <sup>1)</sup>

1) x stands for a single digit from 1 to 9

Tab. 8: Applicability

- 
- Check if updated documentation is available for the revision of the product.
  - Before replacing a module, check whether the revision of the bus node corresponds to the requirements of the electronics module → Tab. 1 Permissible PROFIsafe-compatible CPX bus nodes.
  - Use only an electronics module with revision R04 (or higher) for the pneumatic interface VABA-S6-1-X...-F1/F2-CB  
→ Tab. 4 Permissible components.

### 3 Connection and display components

#### 3.1 Design of the output module in a CPX terminal

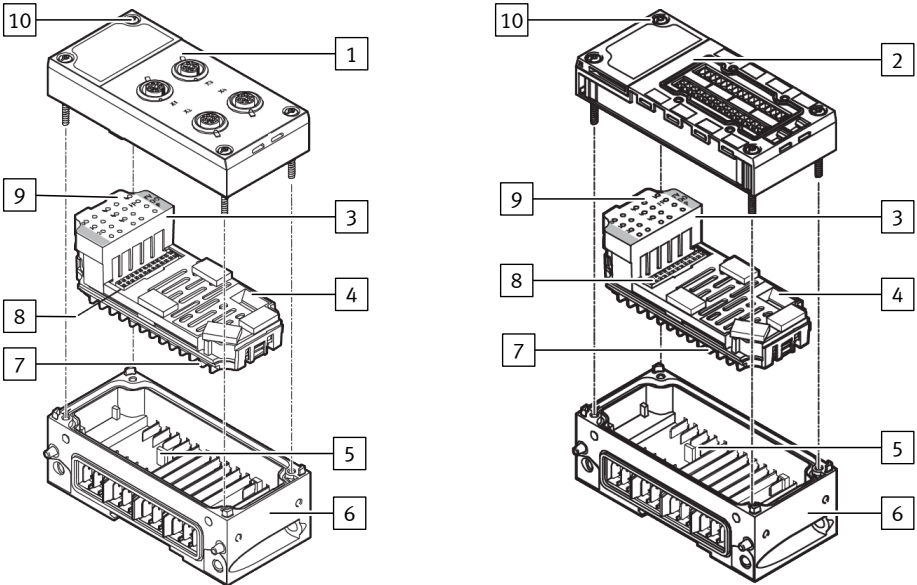


Fig. 1: Output module CPX-FVDA-P2 in a CPX terminal

- 1

Manifold block CPX-M-AB-4-M12X2-5POL

2

Manifold block CPX-AB-8-KL-4POL

3

Electronics module CPX-FVDA-P2
- 4

10-way DIL switch for PROFIsafe address

5

Mechanical coding

## Connection and display components

- |  |   |
|--|---|
| <div>6</div> Interlinking block with busbars CPX-M-GE-EV-FVO                         | <div>9</div> LEDs of the electronics module |
| <div>7</div> Rating plate (underneath)   | <div>10</div> Screws                        |
| <div>8</div> Electrical plug connector between electronics module and manifold block |   |

### 3.2 Design of the output module in a valve terminal VTSA-F-CB

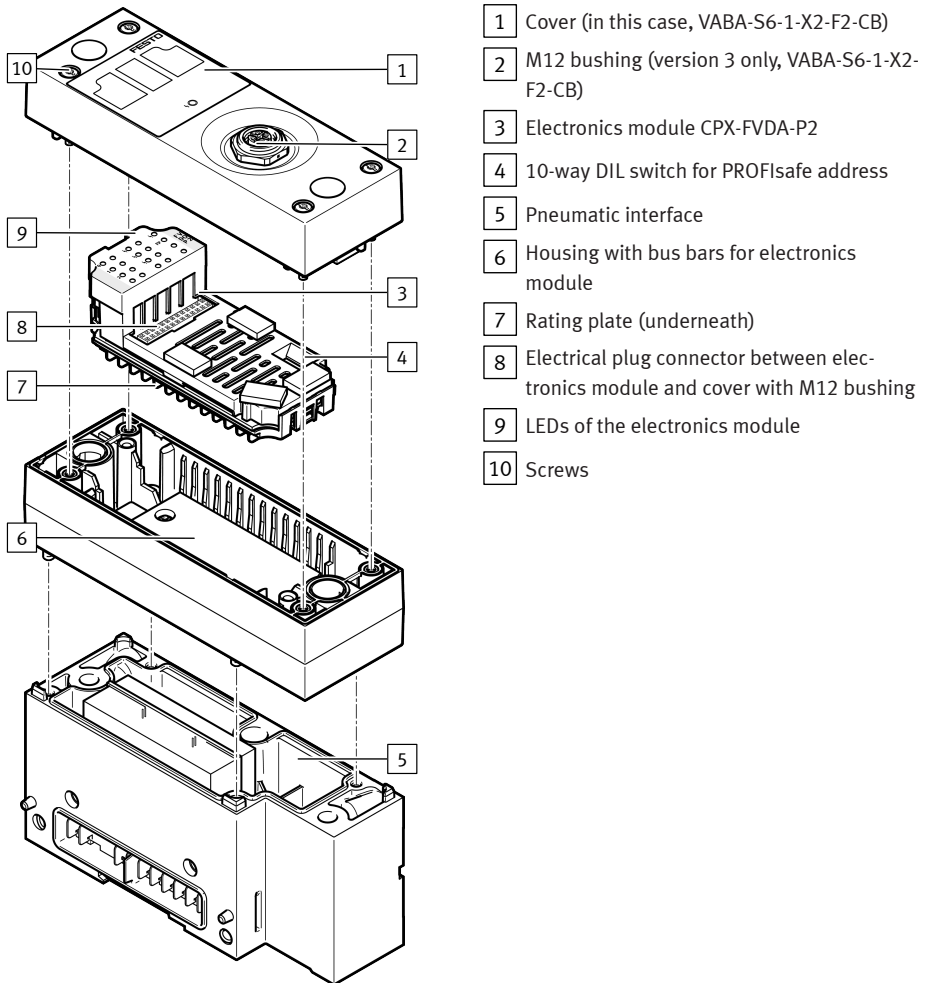


Fig. 2: Output module CPX-FVDA-P2 in a pneumatic interface VABA-S6-1-X...-F1/F2-CB of the valve terminal VTSA-F-CB

## 4 Installation

### WARNING

- For the electrical power supply, use only PELV circuits in accordance with EN 60204-1 (protective extra-low voltage, PELV).  
Also take into account the general requirements for PELV circuits in accordance with EN 60204-1.
- Only use power sources which guarantee reliable electrical isolation of the operating voltage from the mains in accordance with EN 60204-1.

Through the use of PELV circuits, protection from electric shock (protection from direct and indirect contact) in accordance with EN 60204-1 is ensured (Electrical equipment of machines. General requirements).

Compliance with the input voltage limits of the module is also ensured.

### NOTICE

Electronics modules include electrostatically sensitive devices.

- Observe the handling specifications for electrostatically sensitive devices.
- Discharge static electricity from your body before assembling or disassembling modules to protect the modules.

### NOTICE

The cross-circuit monitoring function monitors the device's own circuits.

- Ensure that cross circuits to other circuits are not possible by appropriate installation measures.
- Ensure that defective cables are replaced immediately.

- Switch off the supply voltages before assembly or installation.
- Switch on the electrical supply voltage only when the product is completely assembled, and all installation work is finished.

### 4.1 Setting the PROFIsafe address

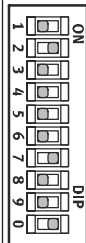
To allow communication via PROFIsafe, the correct PROFIsafe address must be set with binary coding on the output module with the 10-way DIL switch (➔ Tab. 9 10-way DIL switch of the electronics module).

PROFIsafe addresses in the range from 1 to 1023 are permissible.

### NOTICE

This PROFIsafe module accepts every PROFIsafe host address and thus fulfils the requirements for PROFIsafe address type 1.

The 10-way DIL switch is located directly on the electronics module and can be set while the manifold block or the cover of the pneumatic interface is not mounted.

10-way DIL switch	Addressing example																				
 <table><tr><td>1</td><td>1</td></tr><tr><td>2</td><td>2</td></tr><tr><td>3</td><td>4</td></tr><tr><td>4</td><td>8</td></tr><tr><td>5</td><td>16</td></tr><tr><td>6</td><td>32</td></tr><tr><td>7</td><td>64</td></tr><tr><td>8</td><td>128</td></tr><tr><td>9</td><td>256</td></tr><tr><td>10</td><td>512</td></tr></table>	1	1	2	2	3	4	4	8	5	16	6	32	7	64	8	128	9	256	10	512	$2 + 64 + 512 = 578$
1	1																				
2	2																				
3	4																				
4	8																				
5	16																				
6	32																				
7	64																				
8	128																				
9	256																				
10	512																				

Tab. 9: 10-way DIL switch of the electronics module

NOTICE

The DIL switch is a mechanically sensitive component due to its size.

- To set it, use an appropriate, small blunt tool (e.g. watchmaker's screwdriver) and proceed very carefully.
1. Switch off the power supplies of the CPX terminal.
  2. Remove the mounted manifold block (➔ Fig. 1) or the cover of the pneumatic interface (➔ Fig. 2).
  3. Carefully set the DIL switch.
  4. Replace the manifold block or the cover of the pneumatic interface ➔ 4.3 Mounting the electronics module.

4.2 Disassembly of the electronics module

NOTICE

Incorrect handling can damage the electronics module.

- Never pull the electronics module out of the interlinking block or the pneumatic interface when powered.

To avoid errors in assembly, both the interlinking block CPX-M-GE-EV-FVO and the electronics module CPX-FVDA-P2 are mechanically coded. The coding prevents a different module from being plugged into the interlinking block or the module from being plugged into an incorrect interlinking block.

The plugs connected to the manifold block can remain attached while disassembling the manifold block.

To disassemble:

1. Switch off the operating and load voltage supplies.
2. Unscrew the screws [10](#) and carefully lift off the manifold block [1](#) or [2](#) (linktarget doesn't exist but @y.link.required='true') or the cover of the pneumatic interface [1](#) (➔ Fig. 2).
3. If necessary: pull the electronics module [3](#) carefully off the busbars or contacts in the pneumatic interface or out of the manifold block.



### 4.3 Mounting the electronics module

#### NOTICE

Incorrect handling can damage the electronics module.

- Never push the electronics module into the interlinking block or the pneumatic interface when powered.

#### NOTICE

- Ensure that the interlinking block ([linktarget doesn't exist but @y.link.required=true](#)) or the housing of the pneumatic interface (➔ Fig. 2) is clean and free of foreign matter, especially on and near the contacts and busbars.
- Check the seals for damage in order to comply with the degree of protection IP65/IP67.
- Make sure connecting surfaces are clean in order to optimise the sealing effect and prevent contact errors.

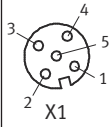
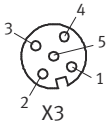
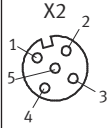
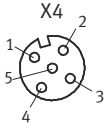
#### NOTICE

- Use only the supplied screws with metric threads for the metal interlinking block CPX-M-GE-EV-FVO.
- Use only the supplied self-tapping screws for the pneumatic interface.
- To avoid damaging the threads, ensure the screws are inserted precisely and use existing threads.
- Tighten the screws using a hand-held screwdriver only.
- Make sure threaded fittings are free of any distortion or mechanical tension.
- Observe the assembly instructions in the documentation that comes with the products for modules and components ordered at a later date.

For mounting:

1. Switch off the operating and load voltage supplies.
2. Align the electronics module [3](#) correctly and press it carefully into the interlinking block [6](#) ([linktarget doesn't exist but @y.link.required=true](#)) or into the housing [6](#) (➔ Fig. 2).
3. Check the seal and the sealing surfaces, align the manifold block [1](#) or [2](#) or the cover of the pneumatic interface and place it on the electronics module [3](#).
4. Set the screws [10](#) so that the existing threads can be used. Tighten the screws crosswise by hand. Tightening torque: 0.9 ... 1.1 Nm.

#### 4.4 Pin allocation

CPX-FVDA-P2 with manifold block CPX-M-AB-4-M12X2-5POL			
Pin allocation X1, X2		Pin allocation X3, X4	
 <p>X1</p>	<p>Bushing X1</p> <p>1: 0V CH1<sup>1)</sup></p> <p>2: +24V CH1<sup>1)</sup></p> <p>3: F-DO(M) CH1<sup>2)</sup></p> <p>4: F-DO(P) CH1<sup>2)</sup></p> <p>5: FE</p>	 <p>X3</p>	<p>Bushing X3</p> <p>1: n.c.</p> <p>2: n.c.</p> <p>3: n.c.</p> <p>4: n.c.</p> <p>5: FE</p>
 <p>X2</p>	<p>Bushing X2</p> <p>1: 0V CH2<sup>1)</sup></p> <p>2: +24V CH2<sup>1)</sup></p> <p>3: F-DO(M) CH2<sup>2)</sup></p> <p>4: F-DO(P) CH2<sup>2)</sup></p> <p>5: FE</p>	 <p>X4</p>	<p>Bushing X4</p> <p>1: n.c.</p> <p>2: n.c.</p> <p>3: n.c.</p> <p>4: n.c.</p> <p>5: FE</p>
<p>FE = functional earth</p> <p>n.c. = free (not connected)</p>			

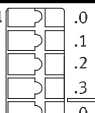
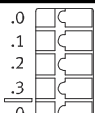

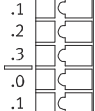
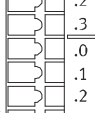
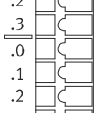


1) Unswitched voltage UVAL usable for supply of intelligent load systems (auxiliary supply)

2) All output voltages are also derived from the internal busbar UVAL.

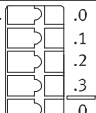
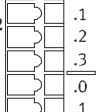
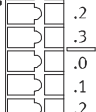
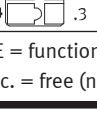
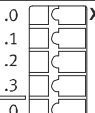
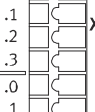
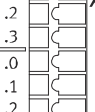

Tab. 10: CPX-FVDA-P2 with manifold block CPX-M-AB-4-M12X2-5POL



The metal thread of the manifold block CPX-M-AB-4-M12x2-5POL is connected internally with pin 5 (functional earth FE).

CPX-FVDA-P2 with manifold block CPX-AB-8-KL-4POL			
Pin allocation X1, X2, X3, X4		Pin allocation X5, X6, X7, X8	
<p>X1</p> 	<p>X1</p> <p>0: 0V CH1<sup>1)</sup></p> <p>1: F-DO (M) CH1<sup>2)</sup></p> <p>2: F-DO (P) CH1<sup>2)</sup></p> <p>3: FE</p>	<p>X5</p> 	<p>X5</p> <p>0: n.c.</p> <p>1: n.c.</p> <p>2: n.c.</p> <p>3: FE</p>
<p>X2</p> 	<p>X2</p> <p>0: n.c.</p> <p>1: n.c.</p> <p>2: +24V CH1<sup>1)</sup></p> <p>3: FE</p>	<p>X6</p> 	<p>X6</p> <p>0: n.c.</p> <p>1: n.c.</p> <p>2: n.c.</p> <p>3: FE</p>
<p>X3</p> 		<p>X7</p> 	<p>X7</p> <p>1: n.c.</p> <p>2: n.c.</p> <p>3: FE</p>
<p>X4</p> 		<p>X8</p> 	

**CPX-FVDA-P2 with manifold block CPX-AB-8-KL-4POL**

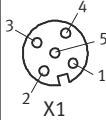
Pin allocation X1, X2, X3, X4		Pin allocation X5, X6, X7, X8	
<b>X1</b>  <b>X2</b>  <b>X3</b>  <b>X4</b> 	<b>X3</b> 0: 0V CH2 <sup>1)</sup> 1: F-DO (M) CH2 <sup>2)</sup> 2: F-DO (P) CH2 <sup>2)</sup> 3: FE  <b>X4</b> 0: n.c. 1: n.c. 2: +24V CH2 <sup>1)</sup> 3: FE	<b>X5</b>  <b>X6</b>  <b>X7</b>  <b>X8</b> 	<b>X7</b> 0: n.c. 1: n.c. 2: n.c. 3: FE  <b>X8</b> 0: n.c. 1: n.c. 2: n.c. 3: FE
FE = functional earth n.c. = free (not connected)			

1) Unswitched voltage UVAL usable for supply of intelligent load systems (auxiliary supply)

2) All output voltages are also derived from the internal busbar UVAL.

Tab. 11: CPX-FVDA-P2 with manifold block CPX-AB-8-KL-4POL

**CPX-FVDA-P2 in pneumatic interface VABA-S6-1-X...-F2-CB**

Pin allocation external channel CH2 on M12 bushing	
	<b>M12 bushing</b> 1: 0 V CH2 <sup>1)</sup> 2: +24 V CH2 <sup>1)</sup> 3: F-DO(M) CH2 <sup>2)</sup> 4: F-DO(P) CH2 <sup>2)</sup> 5: FE
FE = functional earth	

1) Unswitched voltage UVAL usable for supply of intelligent load systems (auxiliary supply)

2) All output voltages are likewise derived from the internal contact rail UVAL.

Tab. 12: CPX-FVDA-P2 in pneumatic interface VABA-S6-1-X...-F2-CB

## 5 Commissioning

### 5.1 Start behaviour of the output module

The following LEDs for on-site diagnostics are located under the transparent covering of the module:

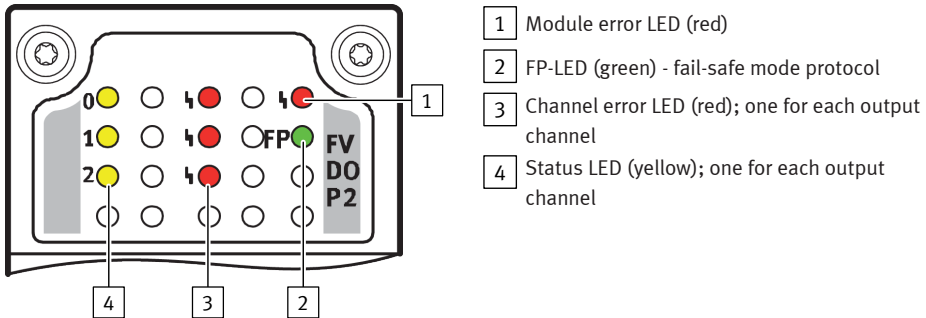


Fig. 3: LED indicators of the output module CPX-FVDA-P2

#### NOTICE

The LED display of the module was **not** designed for safety purposes.

- Please note that these LEDs should not be used for evaluation during safety-related activities.

When the operating voltage supply UEL/SEN is switched on, the module error LED **1** lights up for approx. 500 ms.

When the load voltage supply UVAL is switched on, the channel error LEDs **3** light up for approx. 1 s. The supplies can be switched on in any order as far as the output module is concerned.

If both power supplies are switched on simultaneously, the specified LEDs light up together. The FP LED flashes until the output module is correctly parameterised by means of a PROFIsafe master.

After correct parameterisation, the FP LED lights up and the module is ready for operation.

The following LEDs are on in the normal operating status:

- FP LED – fail-safe mode protocol **2** (green)
- Status LED 4 of the active output channels (yellow)

The status LEDs of inactive output channels and the module and channel error LEDs are not on.

#### NOTICE

- Test the functionality of the safety device at adequate intervals.

Selecting the type of test and time intervals between the tests is the responsibility of the operator. The manner in which the test is conducted must make it possible to verify that the safety device is functioning perfectly in interaction with all components.



Additional information can be found in the CPX-SYS-... system description → [www.festo.com/sp](http://www.festo.com/sp)

## 6 Service, repair, disposal

The output module does not contain any components requiring servicing.

### NOTICE

The module does not contain any wearing parts. Repairs are not allowed.  
This invalidates the certification of the output module.  
A professional replacement of the electronics module is permissible.

### NOTICE

- Always replace the output module in case of an internal defect.
- Send the unmodified defective output module, including a description of the error and the application, back to Festo for analysis.

Please contact your technical consultant to clarify the modalities of the return. When making your complaint, you should mention that the module is a safety device.  
For final disposal of the output module, please contact a certified waste management company for electronic waste.

## 7 Technical data



General technical data of the CPX terminal → CPX-SYS-... system description

Approval information	
CE	
Type-examination	The functional safety engineering of the product has been certified by an independent testing body, see EC-type examination certificate → <a href="http://www.festo.com/sp">www.festo.com/sp</a>
Certificate issuing authority	TÜV Rheinland, Certification Body of Machinery, NB 0035
Certificate no.	01/205/5294.02/23
UKCA	
Type-examination	The functional safety engineering of the product has been certified by an independent body, see UK-type examination certificate → <a href="http://www.festo.com/sp">www.festo.com/sp</a>
Certificate issuing authority	TÜV Rheinland UK Ltd, UK Approved Body No. 2571
Certificate no.	01/205U/5294.01/23

Tab. 13: Approval information

Safety characteristics <sup>1)</sup>		CPX-FVDA-P2
Switch off diagram per output channel		P- and M-switching
Internal reaction time to switch-off command [ms] ( $T_{WCDT}$ ) on output channel CH0		< 23
Internal reaction time to switch-off command ( $T_{WCDT}$ ) on output channels CH1 and CH2 depending on minimum load		Load diagrams → Fig. 5 → Fig. 6
PROFIsafe watchdog time	[ms]	F_WD_TIME
Max. response time of safety function	[ms]	F_WD_TIME + $T_{WCDT}$
Max. cyclical request rate	[rpm]	1
Mean time to dangerous failure (MTTF <sub>d</sub> )	[years]	> 750
Probability of failure per hour (PFH <sub>D</sub> )	[1/h]	< $1.0 \times 10^{-9}$
Max. useful life	[years]	20
Min. request rate for each output channel (CH0, CH1, CH2)		
– With test pulses switched on	[1/week]	1
– With test pulses switched off	[1/day]	1
Measures to avoid common cause failures (CCF)		<ul style="list-style-type: none"> <li>– Comply with operating voltage limits</li> <li>– Comply with temperature range → Tab. 17 Further characteristic values → Fig. 7</li> <li>– Combine a maximum of 2 output channels in a common safety pilot circuit</li> </ul>
Safety protocol		PROFIsafe Profile version 2.4 <sup>2)</sup>
Safe shutdown of the output channels		Level of safety function
IEC 61508		SIL 3
EN ISO 13849		Cat. 3, PL e
EN IEC 62061		Maximum SIL 3

1) In order to guarantee the safety level, a minimum switch-on period of 1 minute must be ensured every 8 operating hours for every output channel used.

2) Profile for Safety Technology on PROFIBUS DP and PROFINET IO; Version 2.4, March 2007

Tab. 14: Safety characteristics



Please note that compliance with the named standards is limited to the output module CPX-FVDA-P2. From the perspective of the output module, all disconnectable parts of a CPX terminal and/or valve terminal are treated as an external load.

Electrical characteristic values		CPX-FVDA-P2
Nominal operating voltage	[V DC]	24
Permissible voltage fluctuations	[%]	-15 ... +20
Operating voltage when tapping busbar 24 V <sub>VAL</sub> and 0 V <sub>VAL</sub> (integrated reverse polarity protection)	[V DC]	20.4 ... 28.8
Residual ripple (within tol.)	[Vss]	2
Voltage drop bypass time U <sub>VAL</sub>	[ms]	2
Intrinsic current consumption at nominal operating voltage	[mA]	typ. 65 for valves (from U <sub>VAL</sub> ) typ. 25 for electronics (from U <sub>EL/SEN</sub> )
Undervoltage monitoring U <sub>VAL</sub>	[V]	< 19.5 for t>250 ms
Overvoltage monitoring U <sub>VAL</sub>	[V]	> 29.5 for t>250 ms
Electrical isolation between V <sub>EL/SEN</sub> (or 5 V CBUS) and V <sub>VAL</sub>	[V rms]	min. 500
Electrical isolation between output channel (CH0, CH1, CH2) – and internal bus		Yes, with intermediate supply
Electrical isolation between output channel – output channel		no
Potential reference of the output channels		U <sub>VAL</sub>
Max. power supply CH0, CH1, CH2 (load current per output channel)	[A]	1.5 → Fig. 7
Max. load current per unswitched voltage U <sub>VAL</sub> (auxiliary supply)	[A]	2.5
Max. peak current per output channel	[A]	5 for t < 30 ms
Max. total current per module	[A]	5
Max. switching frequency of the output channels	[Hz]	1
Max. voltage drop per output channel under continuous load	[V]	0.6
Wire break detection (CH0, CH1, CH2)		can be parameterised, detection point I <sub>L</sub> approx. 50 mA <sup>1)</sup>
Max. cable length (CH1, CH2)	[m]	200
Max. load capacity against FE	[nF]	400
Max. load capacity P-M	[μF]	22
Max. load inductivity	[mH]	1000 at 150 mA, 100 at 600 mA; Characteristic curve → Fig. 4

Electrical characteristic values		CPX-FVDA-P2
Fuse protection (short circuit)		Integrated electronic fuse
Max. test pulse duration	[ $\mu$ s]	300
Max. voltage drop during test pulse	[V]	6

1) When using the output module in the pneumatic interface - without external voltage zones - deactivate the wire break detection function.

Tab. 15: Electrical characteristic values

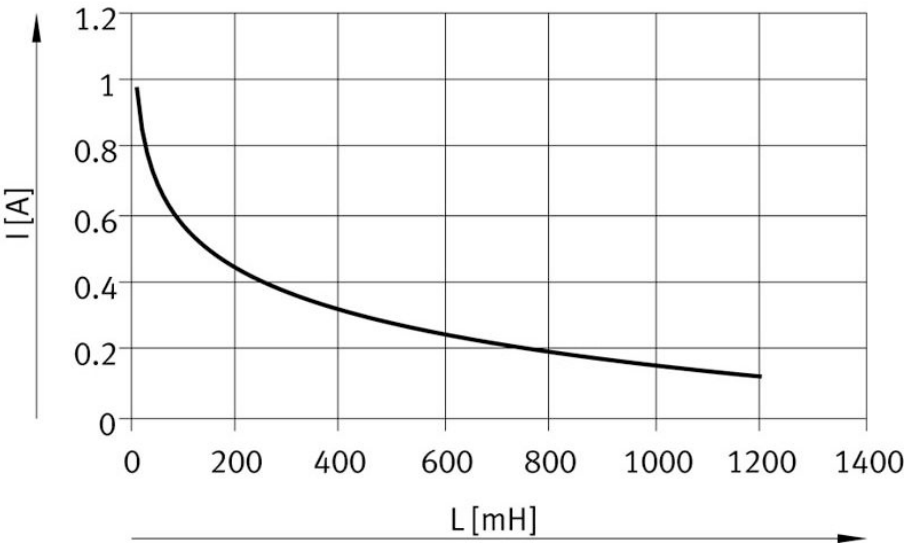


Fig. 4: Maximum permissible load inductivity at the output channels



Functional characteristic values		CPX-FVDA-P2
Module code		193d (C1h)
Sub-module code		8d (08h)
Compatible with fast start-up (FSU)		Yes
Start-up time until module ready	[s]	< 2
Diagnostics of external channel fault		Periodic inspection – for function – for external supply – for cross circuit
Response time for external channel errors	[min]	< 1
Response time to switch off command (typ.)	[ms]	< 10
Internal PROFIsafe processing time (T <sub>DAT</sub> )	[ms]	< 50

Tab. 16: Functional characteristic values

NOTICE

- Use the following diagram if the load current is known.

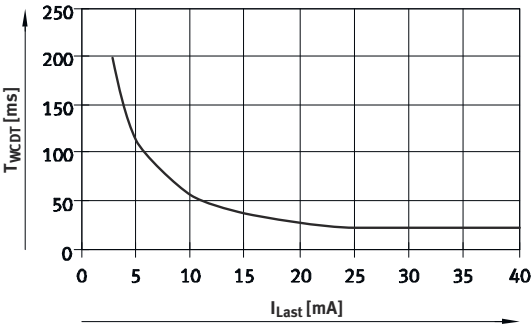


Fig. 5: Internal reaction time as a function of the minimum load current

NOTICE

- Internal reaction time as a function of the resistive minimum load

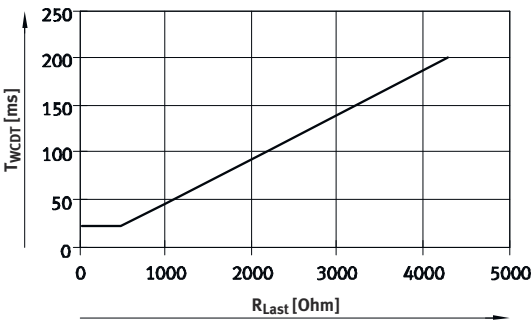


Fig. 6: Internal reaction time as a function of the resistive minimum load

Further characteristic values		
Ambient temperature in storage	[°C]	– 20 ... + 70
Ambient operating temperature		
– in interlinking block CPX-M-GE-EV-FVO	[°C]	– 5 ... + 50
with resultant current of 4.5 A for all 3 outputs		
– in pneumatic interface VABA-S6-1-X...-F1/F2-CB	[°C]	– 5 ... + 30
with resultant current of 4.5 A for all 3 outputs		
– in pneumatic interface VABA-S6-1-X...-F1/F2-CB	[°C]	– 5 ... + 40
with resultant current of 3 A for all 3 outputs		
– in pneumatic interface VABA-S6-1-X...-F1/F2-CB	[°C]	– 5 ... + 50
with resultant current of 1.5 A for all 3 outputs		
Relative humidity (non-condensing)	[%]	5 ... 90
Degree of protection to EN 60529		depending on the manifold block or the pneumatic interface <sup>1)</sup>
UL certification		c UL us – Recognized (OL)

1) ➔ Description of CPX-FVDA-P2-... “Technical data of the manifold blocks” or description of the valve terminal VTSA-F-CB

Tab. 17: Further characteristic values

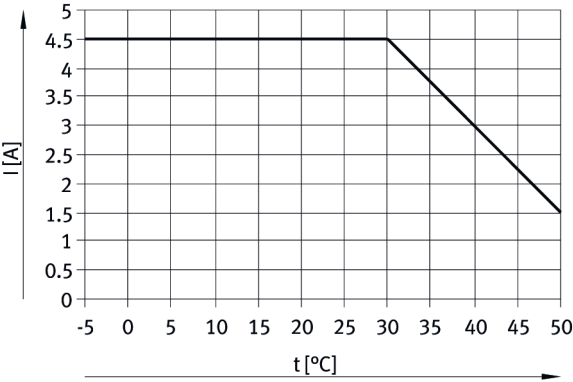


Fig. 7: Dependence of the maximum output current on the ambient temperature (during operation) when using the output module in the pneumatic interface VABA-S6-1-X...-F1/F2-CB

Copyright:  
Festo SE & Co. KG  
Ruiter Straße 82  
73734 Esslingen  
Germany

Phone:  
+49 711 347-0

Internet:  
[www.festo.com](http://www.festo.com)