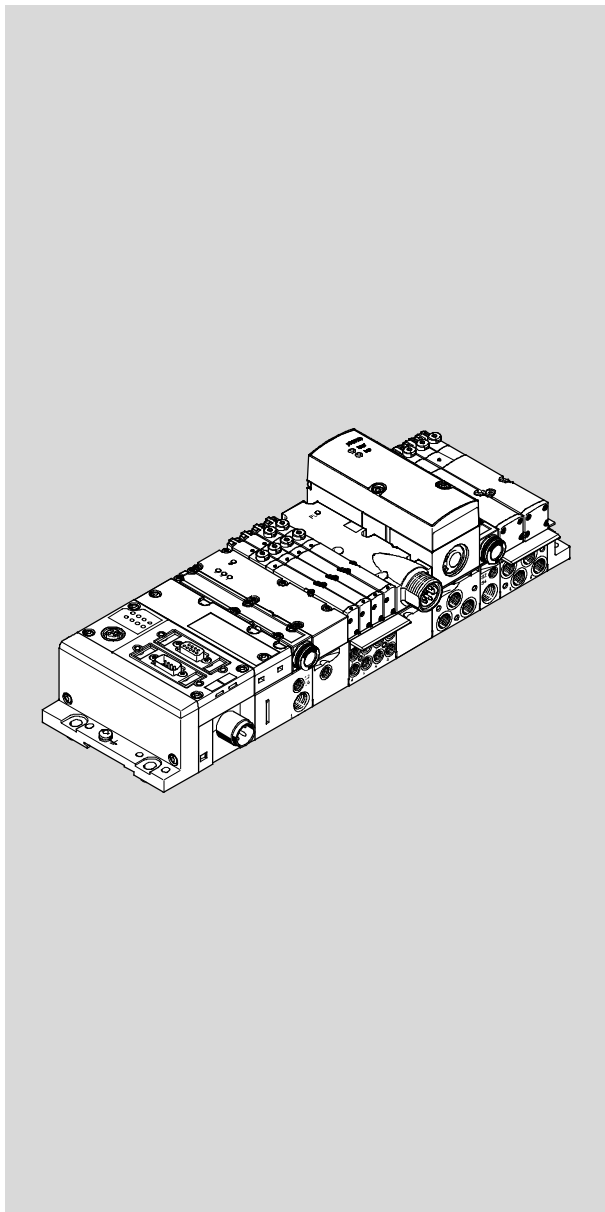


# Valve terminal

## MPA-S



# FESTO

### **Pneumatic components description**

Valve terminal with  
MPA-S pneumatics

Type:  
MPA-FB  
MPA-CPI  
MPA-MPM-... and  
MPA-ASI-...

534241  
1309f  
[8028624]

Translation of the original instructions

P.BE-MPA-EN

AS-Interface® is a registered trademark of its respective trademark holder in certain countries.

Identification of hazards and instructions on how to prevent them:



**Warning**

Hazards that can cause death or serious injuries.



**Caution**

Hazards that can cause minor injuries or serious material damage.

Other symbols:



**Note**

Material damage or loss of function.



Recommendations, tips, references to other documentation.



Essential or useful accessories.



Information on environmentally sound usage.

Text designations:

- Activities that may be carried out in any order.
- 1. Activities that should be carried out in the order stated.
- General lists.

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### **Instructions on this documentation**

This documentation serves the purpose of ensuring safe work with the MPS-S valve terminal and contains specific information on mounting, installing, commissioning, servicing and converting the MPA-S valve terminal. It covers only the description of the pneumatic components.

### **Service**

Please consult your regional Festo contact if you have any technical problems.

**Documentation**

Information on the electrical/electronic components can be found in the following documentation:

Design of the valve terminal	Documentation
MPA-S with CPX terminal	Description for the respective CPX module (You will find an overview of the descriptions in the system description of your CPX terminal.)
MPA-S with <ul style="list-style-type: none"><li>– multi-pin plug connection</li><li>– CPI interface</li><li>– AS-interface</li></ul>	respective package insert

Tab. 1 Documentation for the MPA-S valve terminal



**1                    Safety and requirements for product use**

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## 1.1 Safety

### 1.1.1 General safety instructions



#### Note

##### Damage to the product from incorrect handling.

- Switch off the supply voltage before mounting and installation work. Switch on supply voltage only when mounting and installation work are completely finished.
- Never unplug or plug in a product when powered!
- Observe the handling specifications for electrostatically sensitive devices.



### 1.1.2 Intended use

The valve terminal MPA-S is intended for installation in machines or automated systems and may be used only as follows:

- in excellent technical condition,
- in original status without unauthorised modifications,
- within the limits of the product defined by the technical data (➔ Appendix A),
- in an industrial environment.

The limit values specified for pressures, temperatures, electrical data, torques etc. must be observed. Comply with the legal rules and regulations and standards, rules of the testing organisations and insurance companies and national specifications applicable for the location.



#### Note

In the event of damage caused by unauthorised manipulation or other than intended use, the guarantee is invalidated and the manufacturer is not liable for damages.

## 1.2 Requirements for product use

- Make this documentation available to the design engineer, installer and personnel responsible for commissioning the machine or system in which this product is used.
- Make sure that the specifications of the documentation are always complied with. Also consider the documentation for the other components and modules.
- Take into consideration the legal regulations applicable for the destination, as well as:
  - regulations and standards,
  - regulations of the testing organizations and insurers,
  - national specifications.

### 1.2.1 Technical requirements

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

- Comply with the connection and environmental conditions specified in the technical data of the product (→ appendix A) and of all connected components.  
Only compliance with the limit values or load limits permits operation of the product in accordance with the relevant safety regulations.
- Observe the instructions and warnings in this documentation.

### 1.2.2 Qualification of the specialists (requirements for the personnel)

The product may only be commissioned by trained control and automation technology professionals, who are familiar with:

- installation and operation of control and automation systems,
- the applicable regulations for accident protection and industrial safety, and
- the documentation for the product.

### 1.2.3 Range of application and certifications

Standards and test values which the product complies with and fulfils can be found in the “Technical data” section (→ Appendix A). The product-relevant EU directives can be found in the declaration of conformity.



Certificates and the declaration of conformity for this product can be found at [www.festo.com](http://www.festo.com).

The product fulfils the requirements of EU directives and is marked with the CE 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 a NEC Class 2 supply.**  
**Raccorder Uniquement a un circuit de Classe 2.**



**Note**

Observe the following if the UL requirements are to be complied with in your application:

- Rules for observing the UL certification can be found in the separate UL-specific documentation. The relevant technical data listed there also apply here.
- The technical data in this documentation may show values deviating from this.

#### 1.2.4 Instructions on this description

This description contains specific information on mounting, installing, commissioning, servicing and converting the MPA-S valve terminal. It includes only the description of the pneumatic components.



Information on the electrical/electronic components can be found for:

- MPA-S with CPX terminal:  
in the description on the respective CPX module. An overview is provided in the system description of your CPX terminal, in the “Descriptions of the CPX terminal” table.
- MPA-S with multi-pin plug connection, CPI interface, AS-interface:  
in the respective package insert

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## 2.1 The MPA-S valve terminal

Festo supports your automation tasks at machine level with the MPA-S valve terminal. The modular structure of the MPA-S valve terminal enables you to match this valve terminal optimally to your machine or system.

The valve terminal pneumatics establish the following connection:

- Common ducts for supply and exhaust air
- Electric signals of all solenoid coils.

Working lines (2) and (4) are provided for each valve position on the individual pneumatic modules. The valves are supplied with compressed air (operating pressure and pilot pressure) via the common channels and connections in the basic components. The exhaust air (from the valves and the pilot exhaust air) is also exhausted via these common channels. Further components for pressure supply are also available, e.g. in order to supply pressure zones.

The MPA-S valve terminal is equipped with current reduction. The nominal current of the solenoid coils is then reduced after the high-current phase (switching operation). The current reduction offers the following advantages:

- The MPA-S valve terminal has a lower energy consumption
- The power unit for the voltage supply to the MPA-S valve terminal can be designed more economically depending on the individual case
- The solenoid coils have lower power loss and produce less waste heat.

2.2 Overview of variants

Valve terminal with CPX terminal

This variant of the MPA-S valve terminal is available in the following grades:

MPA-S valve terminal with CPX terminal	Number of valve positions <sup>1)</sup>	
Load voltage supply for the valves via ...	MPA1	MPA2
– CPX terminal <sup>2)</sup>	4, 8, 12 ... 32	2, 4, 6 ... 16
– CPX terminal and electric air supply plate (MPA) <sup>3)</sup>	4, 8, 12 ... 64	2, 4, 6 ... 32

1) Two solenoid coils can be controlled per valve position.

2) A max. of 64 solenoid coils can be supplied.

3) A max. of 128 solenoid coils can be supplied.

Tab. 2.1 Number of valve locations of the MPA-S valve terminal with CPX terminal

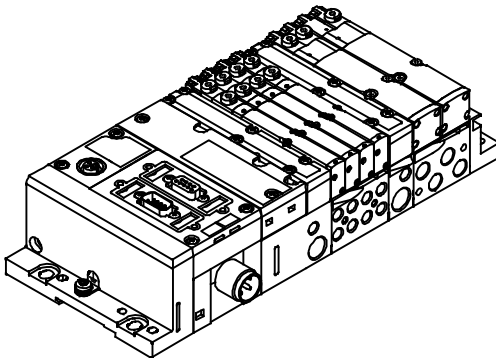


Fig. 2.1 MPA-S valve terminal with CPX terminal

**MPA-S valve terminal with CPI interface**

This variant of the MPA-S valve terminal is available in the following grades:

MPA-S valve terminal with CPI interface	Number of valve positions <sup>1)</sup>	
Load voltage supply for the valves via ...	MPA1	MPA2
CPI interface <sup>2)</sup>	4, 8 ... 12	2, 4, 6 ... 12
CPI interface and electric supply plate (MPA) <sup>3)</sup>	4, 8, 12 ... 16	2, 4, 6 ... 16

- 1) Two solenoid coils can be controlled per valve position.
- 2) A max. of 24 solenoid coils can be supplied.
- 3) A max. of 32 solenoid coils can be supplied.

Tab. 2.2 Number of valve positions of the MPA-S valve terminal with CPI interface

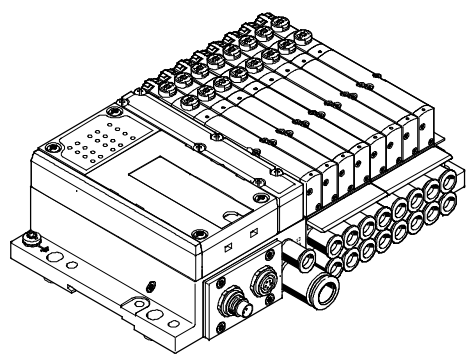


Fig. 2.2 MPA-S valve terminal with CPI interface



**Valve terminal MPA-S with multi-pin connection**

This variant of the MPA-S valve terminal is available in the following grades:

Number of valve positions <sup>1)</sup>	
<b>MPA1</b> 4, 8, 12 ... 24	<b>MPA2</b> 2, 4, 6, ... 24

1) A maximum of 24 solenoid coils can be actuated. The electrical connection of the solenoid coils is made centrally via the multi-pin plug.

Tab. 2.3    Number of valve positions of the valve terminal MPA-S with multi-pin plug connection

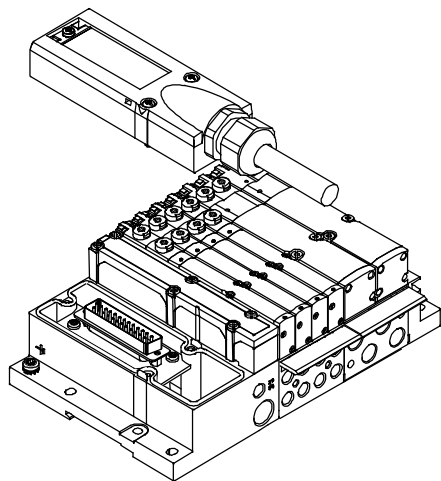


Fig. 2.3    Valve terminal MPA-S with multi-pin connection

**MPA-S valve terminal with AS interface**

This variant of the MPA-S valve terminal is available in the following grades:

MPA-S valve terminal with AS interface	Number of valve positions	
	MPA1	MPA2
With 4 inputs and 4 outputs of type VPMA-ASI-...-4E4A-Z <sup>1)</sup>	4	2, 4
With 8 inputs and 8 outputs of type VPMA-ASI-...-8E8A-Z <sup>2)</sup>	4, 8	2, 4, 6 ... 8

1) A max. of 4 solenoid coils can be supplied.

2) A max. of 8 solenoid coils can be supplied.

Tab. 2.4 Number of valve positions of the MPA-S valve terminal with AS interface



The maximum number of valve positions which can be controlled is dependent on the electronic module:

- VMPA1-MPM-EMM-8 and VMPA2-MPM-EMM-4 occupy 2 addresses per valve position
- VMPA1-MPM-EMM-4 and VMPA2-MPM-EMM-2 occupy 1 address per valve position

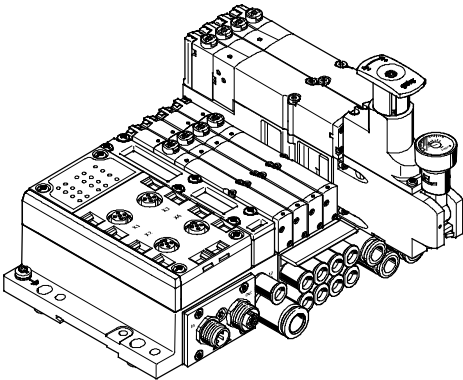
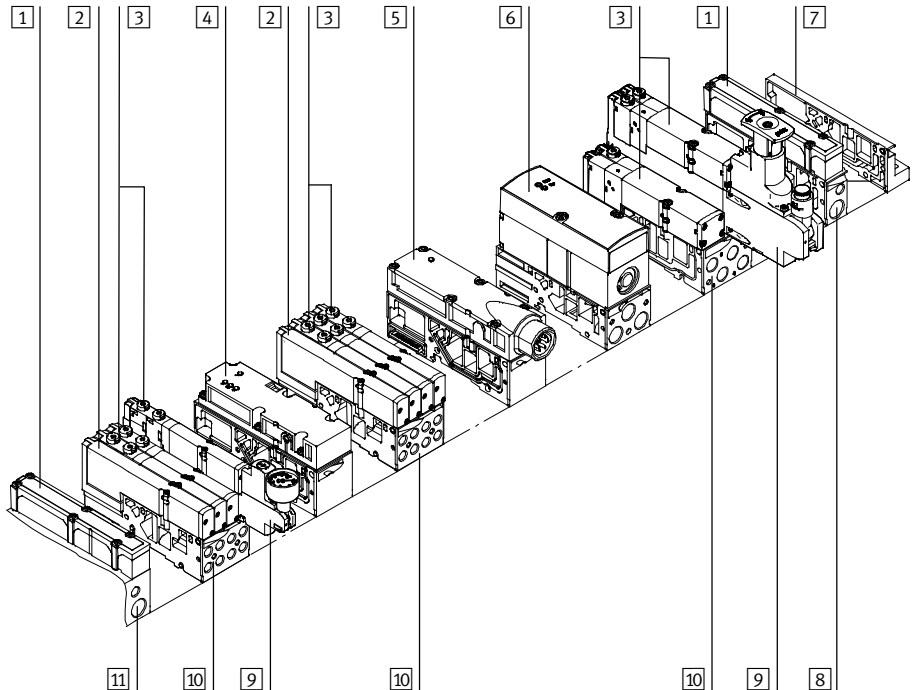


Fig. 2.4 MPA-S valve terminal with AS interface

## 2.3 Valve terminal design

The MPA-S valve terminal consists of the following pneumatic and electrical components. The most important components are shown in the following figure (➔ Fig. 2.5).



- |  |  |
|--|--|
| 1 Flat plate silencer or exhaust plate | 7 Right end plate  |
| 2 Blanking plate                       | 8 Pneumatic air supply plate   |
| 3 Valves                               | 9 Pressure regulator plate   |
| 4 Pressure sensor plate                | 10 Sub-base  |
| 5 Electrical supply plate              | 11 Multiple connector plate; AS interface, CPI interface or port pattern |
| 6 Proportional pressure regulator      |  |

Fig. 2.5 Main components of the MPA-S valve terminal

## 2.4 Description of components

The MPA-S valve terminal with CPX terminal or CPI module consists of the following pneumatic components:

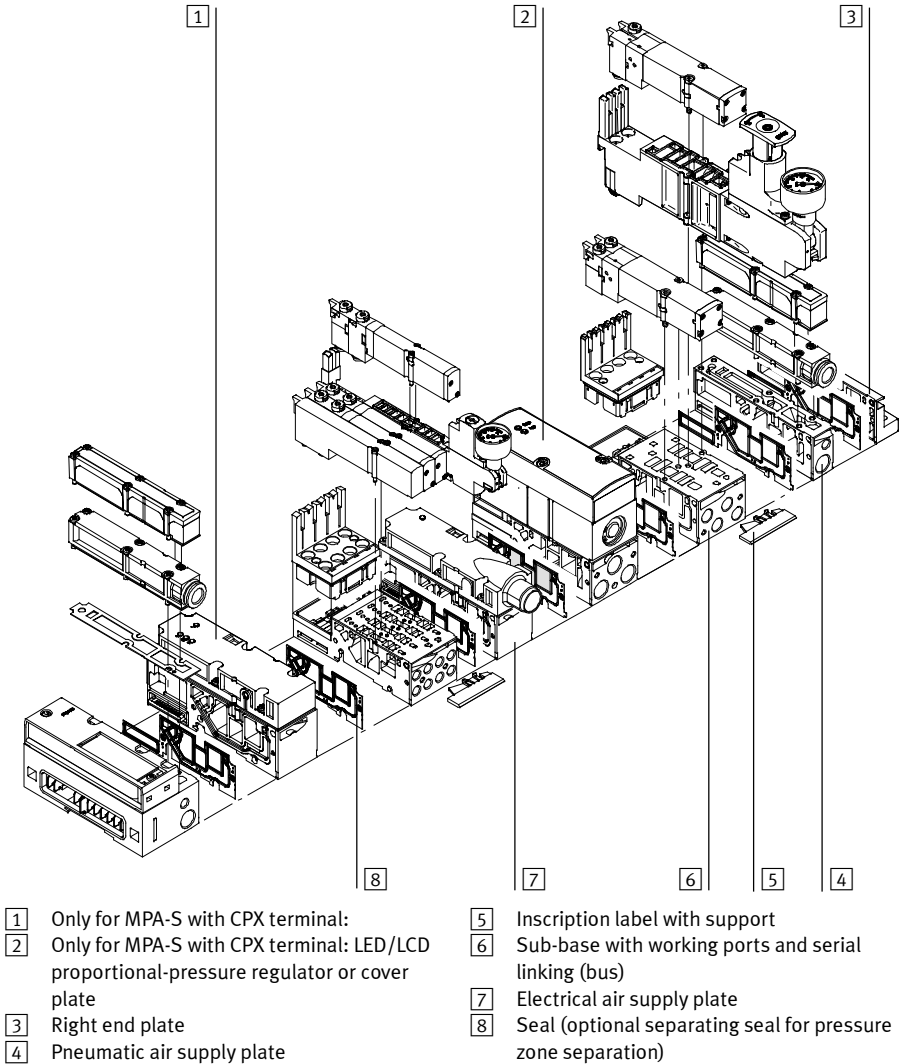


Fig. 2.6 Components of the MPA-S valve terminal with CPX terminal or CPI module, 1st level

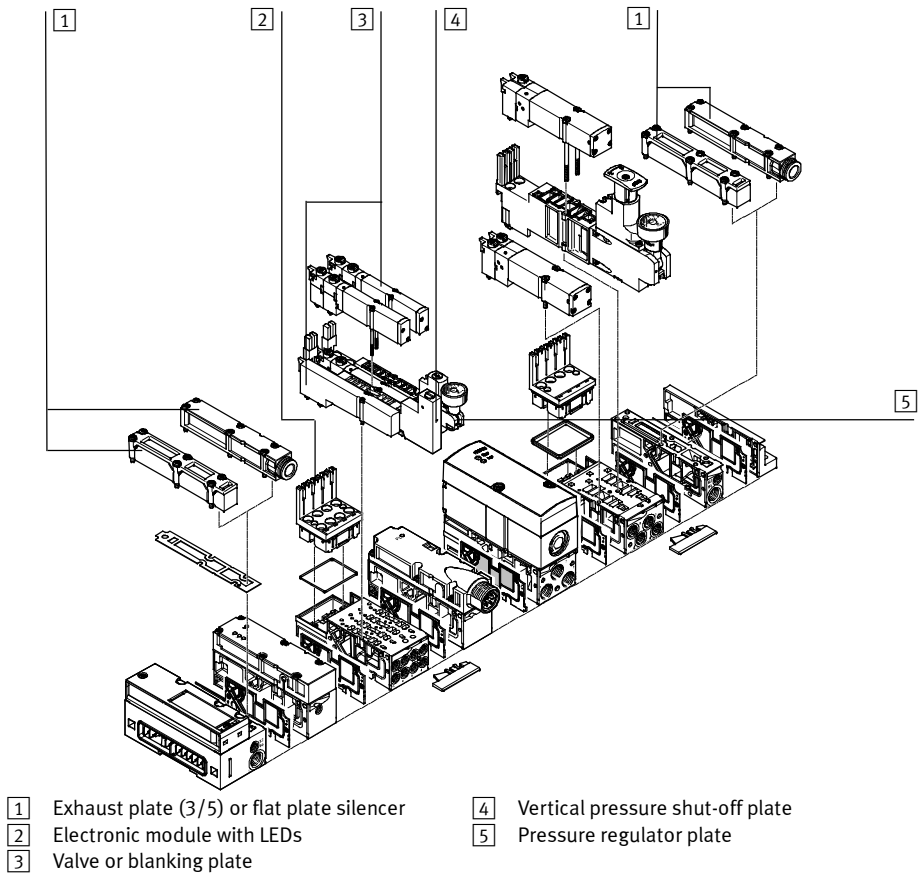


Fig. 2.7 Components of the MPA-S valve terminal with CPX terminal or CPI module, 2nd level

The MPA-S valve terminal with electric multi-pin or AS interface consists of the following pneumatic components:

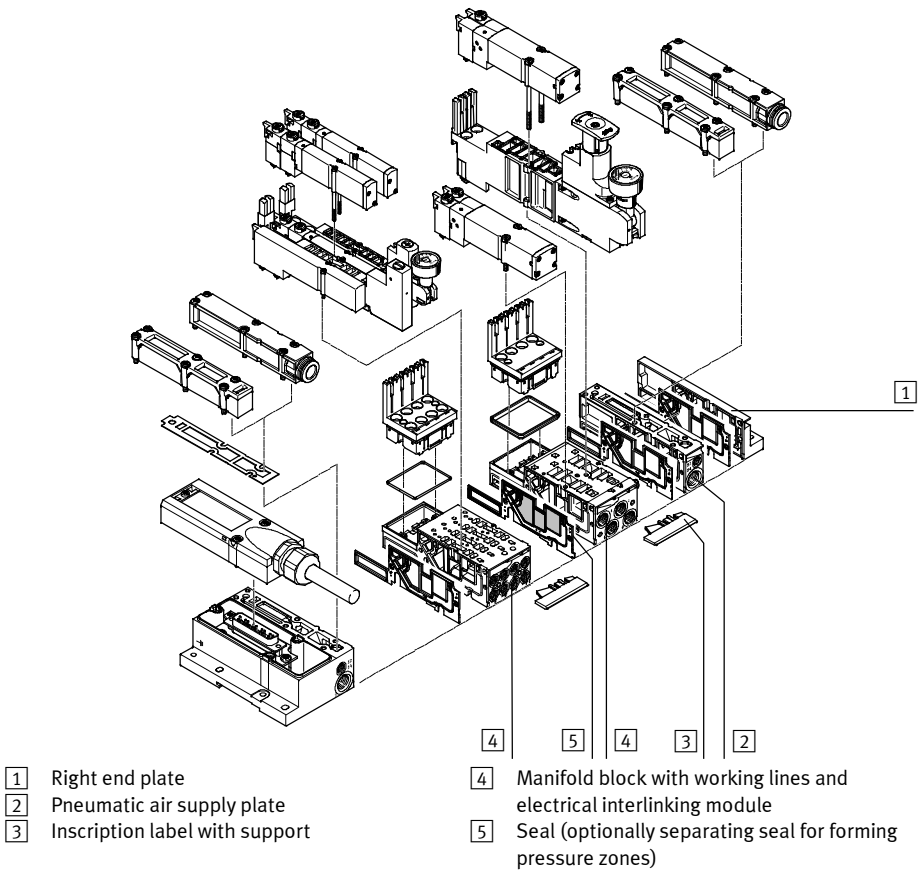


Fig. 2.8 Components of the MPA-S valve terminal with electric multi-pin or AS interface, 1st level

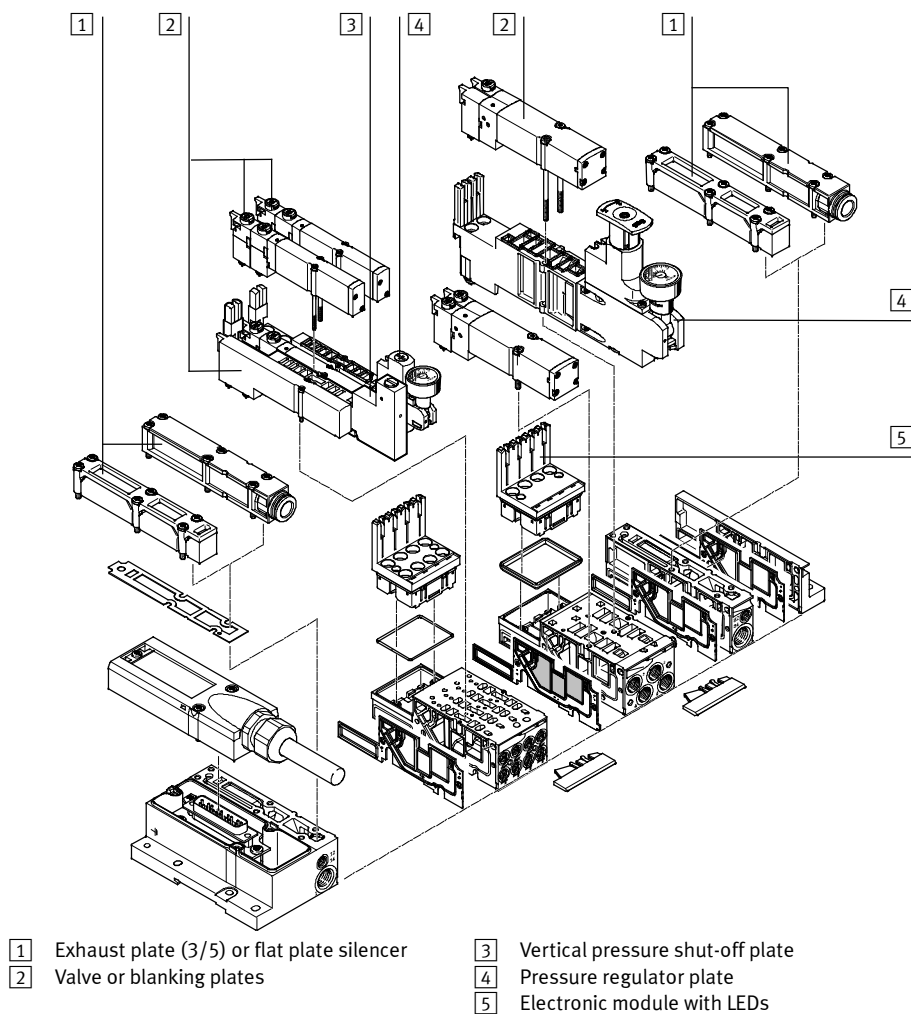


Fig. 2.9 Components of the MPA-S valve terminal with electric multi-pin or AS interface, 2nd level



A description of the electric components of the MPA-S valve terminal with CPI module or with AS interface can be found in the corresponding package insert.

The MPA-S valve terminal with CPX terminal consists of the following electric components:

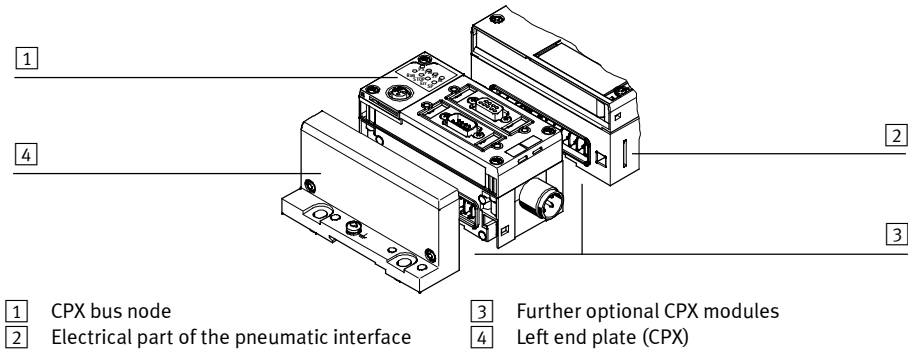


Fig. 2.10 Electric components of the MPA-S valve terminal with CPX terminal

The MPA-S valve terminal with multi-pin plug connection Sub-D consists of the following electric components:

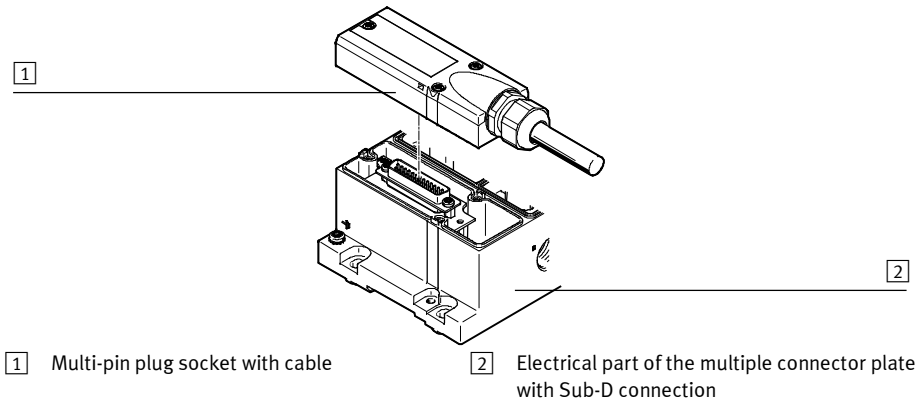


Fig. 2.11 Electric components of the MPA-S valve terminal with multi-pin plug connection Sub-D

### 2.4.1 Sizes

The components of the valve terminal are available in the sizes:

- MPA1: width 10 mm
- MPA2: width 20 mm

### 2.4.2 Valves

The MPA-S valve terminal can be equipped with 2x 2/2-way valves, 2x 3/2-way valves, 5/2-way valves (monostable and impulse), 5/3-way valves and proportional-pressure regulators.





All 5/2-way valves and 5/3-way mid-position valves can be used under all operating modes:

- Standard operation with one or more pressure zones
- Reversible operation with compressed air supply via connections (3), (5) and exhaust via port (1)
- Low pressure operation at 0 ... 3 bar
- Vacuum operation at -0.9 ... 0 bar

### Identification of the valves

The valves of the MPA-S valve terminal are marked by identification codes. By means of this identification on the top of the valve, you can ascertain the equipment of your MPA-S valve terminal.

Ident. code	Valve
B	Piston spool valve, 5/3-way valve, mid-position open
D	Piston spool valve, two monostable 2/2-way valves, normally closed, pneumatic spring return
DS	Piston spool valve, two monostable 2/2-way valves, normally closed, mechanical spring return
E	Piston spool valve, 5/3-way valve, mid-position exhausted
G	Piston spool valve, 5/3-way valve, mid-position closed
H	Piston spool valve, two monostable 3/2-way valves, control side 12 normally open, control side 14 normally closed, pneumatic spring return
HS	Piston spool valve, two monostable 3/2-way valves, control side 12 normally open, control side 14 normally closed, mechanical spring return
HU	Polymer poppet valve, two monostable 3/2-way valves, control side 12 normally open, control side 14 normally closed, mechanical spring return
I	<p>Piston spool valve, two 2/2-way valves, normally closed, pneumatic spring return</p> <p><b>For dual-pressure operation:</b> operating pressure at connection (1) or connection (5)</p> <p><b>For vacuum operation:</b> operating pressure via connection (1), vacuum at connection (5) (e.g. for vacuum switching with ejector pulse)</p> <p>➔ Instructions in the sections 3.6.2 (pressure zone separation) and 3.6.6 (vacuum/low pressure operation) and in the appendix B.1 (valve position components), Tab. B.1 ... Tab. B.4</p>
J	Piston spool valve, impulse 5/2-way valve
K	Piston spool valve, two monostable 3/2-way valves, normally closed, pneumatic spring return
KS	Piston spool valve, two monostable 3/2-way valves, normally closed, mechanical spring return
KU	Polymer poppet valve, two monostable 3/2-way valves, normally closed, mechanical spring return
M	Piston spool valve, monostable 5/2-way valve, pneumatic spring return
MS	Piston spool valve, monostable 5/2-way valve, mechanical spring return

Ident. code	Valve
MU	Polymer poppet valve, monostable 5/2-way valve, mechanical spring return
N	Piston spool valve, two monostable 3/2-way valves, normally open, pneumatic spring return
NS	Piston spool valve, two monostable 3/2-way valves, normally open, mechanical spring return
NU	Polymer poppet valve, two monostable 3/2-way valves, normally open, mechanical spring return
W	Piston spool valve, monostable 3/2-way valve, normally open, external compressed air supply via connection (2), pneumatic spring return
X	Piston spool valve, monostable 3/2-way valve, normally closed, external compressed air supply via connection (4), pneumatic spring return

Tab. 2.5 Identification codes of the valves



Further information on the valves can be found in Appendix B.

### 2.4.3 Proportional pressure regulator

The VPPM-...TA-... proportional pressure regulator is intended to regulate a pressure proportional to a specified setpoint value. A built-in pressure sensor records the pressure at the working line and compares this value with the setpoint value. In the event of deviations between the nominal/actual values, the valve regulates until the output pressure has reached the nominal value.

For a constant pressure supply, which is required for high control quality, the proportional pressure regulator has an additional supply port.



Configure the proportional pressure regulator via the PLC or the Festo Handheld (CPX-MMI).

Mounting of the proportional-pressure regulator is described in the mounting instructions VPPM-...TA-... .

Information on configuring the proportional-pressure regulator is provided in the MPA-... electronics description.

### Identification of the proportional pressure regulator

The proportional pressure regulators on the MPA-S valve terminal are marked by identification codes. With this identification, you can ascertain the type of proportional pressure regulator.

Ident. code		Proportional pressure regulator, normally closed
VPPM-6TA	VPPM-8TA	
2 % accuracy:		
QA	QG	0 ... 2 bar output pressure
QB	QH	0 ... 6 bar output pressure
QC	QK	0 ... 10 bar output pressure
1 % accuracy:		
QD	QL	0 ... 2 bar output pressure
QE	QM	0 ... 6 bar output pressure
QF	QN	0 ... 10 bar output pressure

Tab. 2.6 Identification code of the proportional pressure regulator

#### 2.4.4 Pressure sensor plate

Depending on the type, the pressure sensor plate monitors

- the operating pressure in channel (1) (type VMPA-FB-PS-1)
- an external processing pressure (type VMPA-FB-PS-P1)
- the pressure in exhaust ducts (3) and (5) (type VMPA-FB-PS-3/5).

Using three LEDs, the pressure sensor indicates whether the applied pressure exceeds, conforms to or falls below the setpoint value. An additional LED indicates common errors.

The MPA-S valve terminal can be equipped with up to 4 pressure sensor plates.

The limits for pressure monitoring are set through parameterisation. The pressure sensor plate can be parameterised via the PLC or the Festo Handheld (CPX-MMI).



Mounting of the pressure sensor plate is described in the mounting instructions VMPA-FB-PS-....

Information on parameterising the pressure sensor is provided in the MPA-... electronics description from Festo.

#### 2.4.5 Pneumatic air supply plate

You can supply the valves with operating pressure separately via the pneumatic supply plate. This is necessary, for example, in the case of valve terminals equipped with several pressure zones or when a large number of valves on the valve terminal are switched simultaneously to flow.



Mounting of the pneumatic connections is described in section 5.3.7

“Replacing the sub-base, supply plate or MPA-S end plate”.

#### 2.4.6 Electrical air supply plate

You can separately supply the valves with load voltage via the electrical supply plate.



Mounting of the electrical supply plate is described in the VMPA-FB-SP-...-V-... assembly instructions.

**2.4.7 Pressure zone separation**

The MPA-S valve terminal can be equipped with pressure zones.  
The pressure zones are formed either by special sub-bases or by special separating seals.

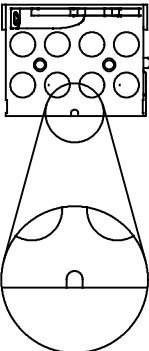
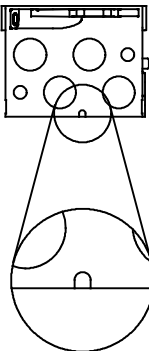
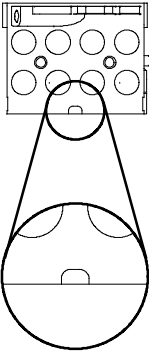
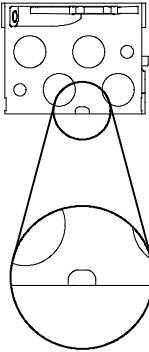


Pressure zone separation of the pilot channels (12/14) and (82/84) is not intended, as on the MPA-S valve terminal the pilot air supply for pilot control of the valves is supplied centrally via the corresponding electrical interface (pneumatic interface, multiple connector plate, AS interface or CPI interface).

**Pressure zone separation with sub-bases**

Sub-base for the proportional pressure regulator	Sub-bases to the valves
<p>The sub-base (type VMPA-...) for the proportional pressure regulator always has a pressure zone separation, which is not therefore explicitly marked on the exterior of the sub-base. Pressure zone separation takes place:</p> <ul style="list-style-type: none"><li>– for the channel (1) on the left side of the sub-base</li><li>– channels (3) and (5) on the left and the right side of the sub-base.</li></ul> <p>If the proportional pressure regulator is to regulate the operating pressure for the valves on the MPA-S valve terminal, the valves must be positioned to the right of the proportional pressure regulator.</p>	<p>On the sub-bases with integrated pressure zone separation, the separation is made in the centre of the sub-base, i.e. for</p> <ul style="list-style-type: none"><li>– MPA1: after the second valve position</li><li>– MPA2: after the first valve position.</li></ul> <p>The sub-bases are available in the following designs:</p> <ul style="list-style-type: none"><li>– only supply channel (1) separated</li><li>– supply channel (1) and exhaust ducts (3) and (5) separated</li></ul> <p>The sub-bases with integrated pressure zone separation are marked with notches. By means of the marking, you can detect the sub-base variant with which your valve terminal is equipped (➔ Tab. 2.8).</p>

Tab. 2.7 Pressure zone separation with sub-bases

Sub-base design	MPA1	MPA2
Sub-base with separated supply channel (1)	Type: VMPA1-FB-AP-4-1-T1 	Type: VMPA2-FB-AP-2-2-T0 
Sub-base with separated supply channel (1) and separated exhaust channels (3) and (5).	Type: VMPA1-FB-AP-4-1-S1 	Type: VMPA2-FB-AP-2-2-S0 

Tab. 2.8 Variants of the sub-bases with pressure zone separation

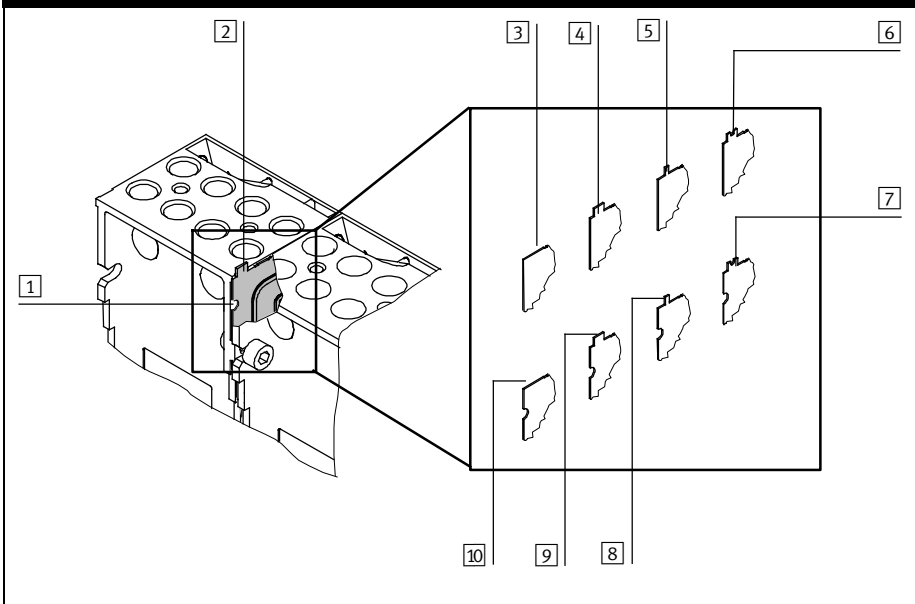
### Pressure zone separation with separating seals

The following channels can be separated with the separating seals (→ also Tab. 2.9):

- Supply duct (1) only
- Supply duct (1) and exhaust ducts (3) and (5)
- Exhaust ducts (3) and (5) only.

You can recognize whether your MPA-S valve terminal is equipped with pressure zones, and if so how many, either from the marking notch on the sub-base (→ Tab. 2.8) or the marking on the seal (→ Tab. 2.9).

Separating seals for MPA-S valve terminals

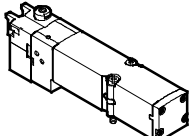
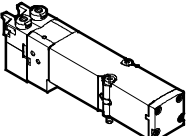
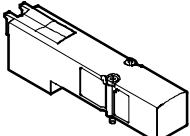
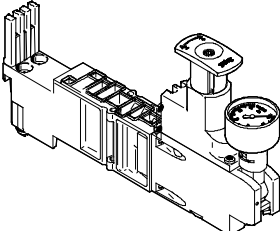
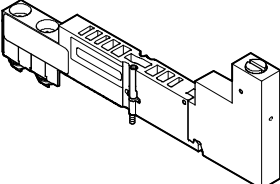
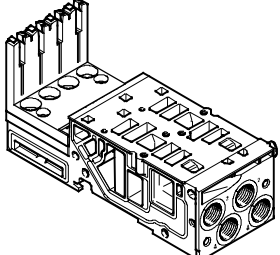


1	Additional identification of the seals/separating seals for the MPA-S valve terminal with exhaust plates		
2	Position of the marking for separating seals		
MPA-S with flat plate silencer		MPA-S with exhaust plate	
3	Without marking: seal with open channels (1), (3) and (5)	7	Separating seal, channels (3) and (5) blocked (Ident. code R)
4	Separating seal, channels (1), (3) and (5) blocked (Ident. code S)	8	Separating seal, channel (1) blocked (Ident. code I)
5	Separating seal, channel (1) blocked (Ident. code I)	9	Separating seal, channels (1), (3) and (5) blocked (Ident. code S)
6	Separating seal, channels (3) and (5) blocked (Ident. code R)	10	Without marking: seal with open channels (1), (3) and (5)

Tab. 2.9 Marking of the seal variants for sub-bases

### 2.4.8 Vertical stacking

You can mount further pneumatic components to each valve position between the sub-base and the valve. These components will enable you to implement certain additional functions as desired. The following components are available:

Component		
<p>Monostable 5/2-way valves</p> 	<p>Alternative: 2x 2/2-, 2 3/2-way valves or a 5/2-way bistable valve or a 5/3-way mid-position valve</p> 	<p>Alternative: Cover plate, for sealing an unused valve position type: MPA...</p> 
	<p>Vertical stacking <sup>1)</sup> Pressure regulator plate type: VMPA...-B8-R... (with or without pressure gauge). The Tab. 2.11 provides you with an overview of the available pressure regulator plate variants. The “Pressure regulator plate” section describes the functions of the major pressure regulator plates.</p>	
	<p>Vertical stacking <sup>1)</sup> Vertical pressure shut-off plate type VMPA1-HS The following section describes the functions of the vertical pressure shut-off plate.</p>	
	<p>Sub-base type MPA...-...-AP... with electronic module type VMPA...-...EM...</p>	

1) Instructions on installing the vertical stacking components → chapter 3

Tab. 2.10 Components of the pneumatics module of the MPA-S valve terminal

### Vertical pressure shut-off plate

With the vertical pressure shut-off plate, operating pressure for a valve can be switched off separately. As a result, for example, changing of the valve is possible without having to switch off operating pressure for the valve terminal.



The circuit symbol of the vertical pressure shut-off plate can be found in appendix B.1. Instructions on installation of the vertical pressure shut-off plate can be found in the assembly instructions VMPA1-HS.

### Pressure regulator plates

The pressure regulator plates of the vertical stacking are marked on the MPA-S valve terminal with the ident. code. This is marked on the side of the pressure regulator plate. You can identify the pressure regulator plate using the following table.

Ident. code	Vertical stacking component
PF	P pressure regulator plate for port (1), control range 0.5 ... 6 bar
PH	B pressure regulator plate for port (2), control range 2 ... 6 bar
PG	A pressure regulator plate for port (4), control range 2 ... 6 bar
PN	Reversible B pressure regulator plate for port (2), control range 0.5 ... 6 bar
PM	Reversible A pressure regulator plate for port (4), control range 0.5 ... 6 bar
PA	P pressure regulator plate for port (1), control range 0.5 ... 10 bar
PC	B pressure regulator plate for port (2), control range 2 ... 10 bar
PB	A pressure regulator plate for port (4), control range 2 ... 10 bar
PL	Reversible B pressure regulator plate for port (2), control range 0.5 ... 10 bar
PK	Reversible A pressure regulator plate for port (4), control range 0.5 ... 10 bar

Tab. 2.11 Identification of the pressure regulator plates in the type code



The circuit symbols of the pressure regulator can be found in the appendix B.1. Instructions on the installation of the pressure regulator plates can be found in the assembly instructions VMPA...-B8-R...C2-C....



<b>P pressure regulator (Ident. code PF, PA)</b>	
Pressurizing process	The P pressure regulator regulates the pressure in front of the valve in duct (1) (P). This provides the same regulated working air pressure in channels (2) and (4).
Exhaust process	In the valve, the exhaust flow is from channel (2) to channel (3) and from channel (4) to channel (5) through the pressure regulator plate to the valve terminal.

Tab. 2.12 P pressure regulator

The advantages of the P pressure regulator are:

- The pressure regulator is not affected by exhausting, since the pressure is regulated upstream of the valve.
- The pressure regulator can always be adjusted, because the pressure from the valve terminal is always present.

Sample application:

- An equal working pressure is required at working lines (2) and (4).
- A lower air pressure (e.g. 3 bar) is required than the operating pressure present at the valve terminal (e.g. 8 bar).

<b>A or B pressure regulator (Ident. code PH, PC, PG, PB)</b>	
Pressurizing process	The A or B pressure regulator regulates the corresponding pressure of the air in ducts (2) (B) or (4) (A) after the pressure medium has passed through the valve.
Exhaust process	During the exhaust process, the exhaust flow in the valve is unregulated from duct (2) to duct (3) for the B pressure regulator and from duct (4) to duct (5) via the A pressure regulator.

Tab. 2.13 A or B pressure regulator

Restrictions of the A or B pressure control:

- The exhaust flow in the regulating direction is limited by the pressure regulating valve.
- The pressure of the air in channel (2) can only be set and read at the pressure gauge when the valve is activated (flow from 1 → 2).

Application examples:

- If different air pressures are required at ports (2) and (4) instead of the operating pressure of the valve terminal.
- If the reversible pressure regulator cannot be used. For example, when 2x 3/2-way valves with ducted solenoid exhaust (82/84) are used.

Fig. 2.12 shows the following switching position of the B pressure regulator:  
The air is passed from channel (1) through the pressure regulator plate and the valve to pressure regulator B, where it is regulated and then passed to the port (2) of the sub-base. The unregulated exhaust air is then fed via channel (4) through the pressure regulator plate to the valve and from there to channel (5) and exhausted.

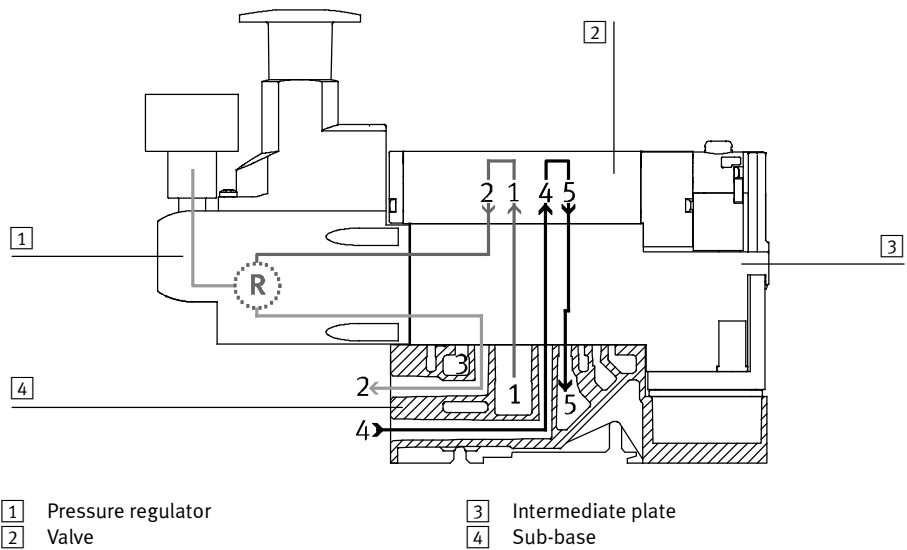


Fig. 2.12 B-pressure regulator

Reversible A or B pressure regulator (Ident. code PN, PL, PM, PK)	
Pressurizing process	The reversible pressure regulator splits up the supply air in channel (1) and regulates the pressure in front of the valve in the corresponding channel (→ 1 in Tab. 2.15), in the other channel (→ 2 in Tab. 2.15) the unregulated pressure from channel (1) is present. The regulated air is then switched to the corresponding work channel. The valve is thus operated in reversible mode.
Exhaust process	In the valve, the exhaust flows from the corresponding work channel (→ 3 in Tab. 2.15) to channel (1) and is guided in the pressure regulator plate to the corresponding exhaust channel of the sub-base.

Tab. 2.14 Reversible A or B pressure regulator

Reversible pressure regulator	Pressurizing process		Exhaust process
	Pressure of the supply air regulated in front of the valve <b>1</b>	Unregulated pressure of the supply air <b>2</b>	Exhaust vented via the pressure regulator plate <b>3</b>
Rev. A pressure regulator	in channel (5)	in channel (3)	from channel (4) through channel (1) to channel (5)
Rev. B pressure regulator	in channel (3)	in channel (5)	from channel (2) through channel (1) to channel (3)

Tab. 2.15 Mode of operation of the reversible A or B pressure regulator

**Advantages compared to the A or B pressure regulator:**

- Faster cycle times
- 50% higher exhaust flow rate, as air is not exhausted via the pressure regulator. The load on the pressure regulator is also reduced.
- No quick exhaust valves are required. The exhaust is ducted completely via the valve terminal.
- Operating pressure is always present at the pressure regulator, as the pressure is regulated upstream of the valve. In other words, the regulator can always be adjusted. With A or B pressure regulators, the valve must switch.

**Disadvantage compared to the A or B pressure regulator:**

- Cannot be combined with 2x 2/2-way valves with Ident. code D, I and 2x 3/2-way valves with Ident. code N, K, H (non- reversible valves). These valves require working pressure in channel (1) for the pneumatic spring (→ circuit symbol in appendix B, Tab. B.4 and Tab. B.3).

**Application examples:**

- If the air pressure in channel (2) or (4) is not supposed to be the same as the operating pressure of the valve terminal.
- When fast exhausting is required.
- When the pressure regulator must always be adjustable.

Fig. 2.13 shows the following switching position of the reversible B pressure regulator:

The supply air in channel (1) is split up:

- The regulated pressure of the supply air is present in channel (3). The pressure is regulated before the valve.
- The unregulated pressure of the supply air from channel (1) is present in channel (5).

The regulated pressure is switched to channel (2) inside the valve. The unregulated exhaust air is switched inside the valve from channel (4) to channel (1) and then in the pressure regulator plate to channel (3).

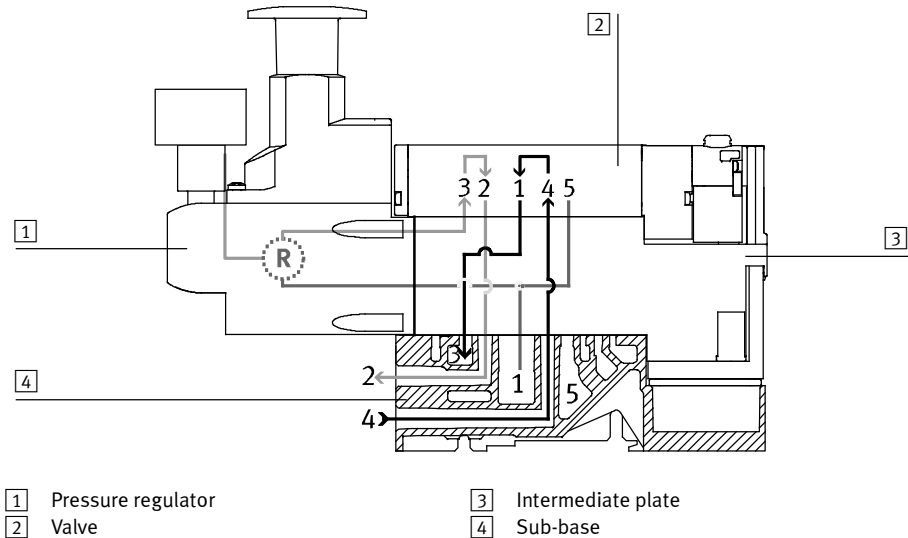
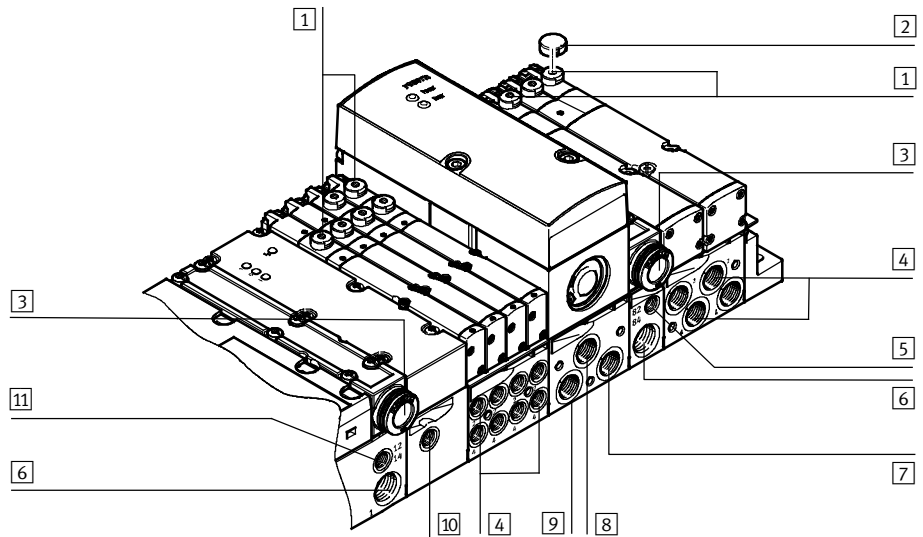


Fig. 2.13 Reversible B pressure regulator

## 2.5 Operation and connection elements

You will find the following pneumatic connecting and control elements on the MPA-S valve terminal:



- |   |  |
|---|--|
| <p>1 Manual override (per pilot solenoid coil, non-detenting or turning with detent)</p> <p>2 Manual override cover cap</p> <p>3 Common exhaust port (3/5), "Valves"</p> <p>4 Working ports (2) and (4), per valve</p> <p>5 Connection (82/84) only with variant for ducted exhaust, "Pilot exhaust"</p> <p>6 Supply port (1), "Operating pressure"</p> <p>7 Pressure output (2) of the proportional pressure regulator</p> | <p>8 Exhaust air (3) of the proportional pressure regulator</p> <p>9 Pressure input (1) of the proportional pressure regulator</p> <p>10 External pressure input of pressure sensor type VMPA-FB-PS-P1</p> <p>11 Pilot connection (12/14), "External pilot air supply"</p> |
|---|--|

Fig. 2.14 Pneumatic connecting and operating elements of the MPA-S valve terminal

### 2.5.1 Manual override (MO)

The manual override (MO) enables the valve to be actuated when not electrically activated or energised. You only need to switch on the compressed air supply.

You should use the manual override mainly when commissioning the pneumatic system in order to check the function and operation of the valve or the valve-actuator combination.

Actuation types of the manual override	
Non-detenting actuation:	The valve is activated by pressing the manual override. After the MO is released, the valve automatically switches by spring force back into the neutral position.
Detenting actuation:	The switching position can be engaged by turning the manual override clockwise. The manual override remains actuated until it is reset by hand.

Tab. 2.16 Actuation types of the manual override



The operation of the manual override is described in section 4.3.

The basic logic functions of the manual override can be changed by mounting a corresponding MO cover cap:

Functions of the MO cover caps	
Cover cap, non-detenting:	This cover cap prevents engaging of the MO. The manual override can then only be actuated in a non-detenting way.
Cover cap, concealed:	This cover cap completely covers the MO, which is thus secured against undesired actuation.

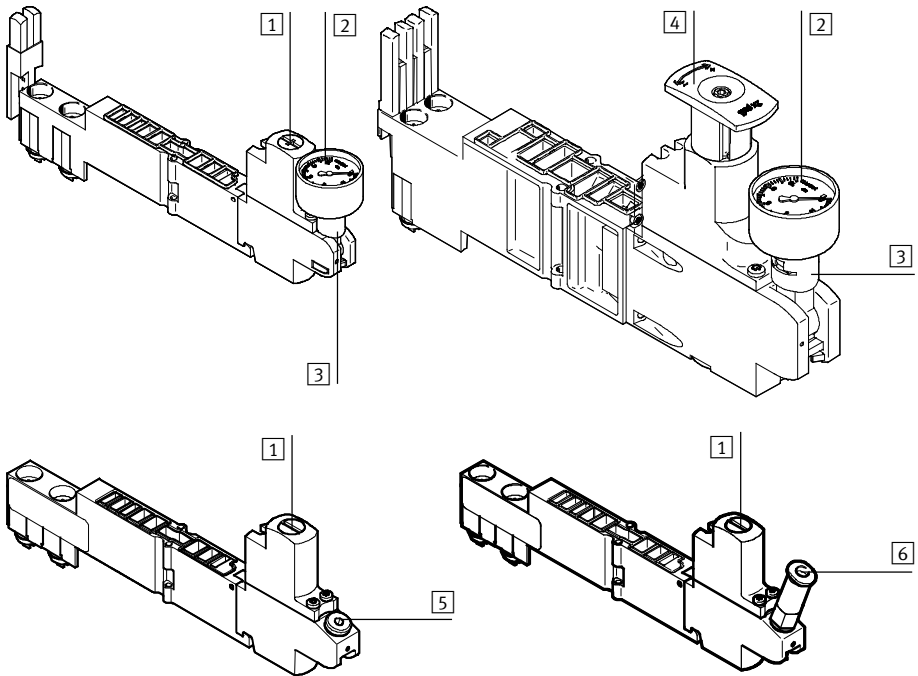
Tab. 2.17 Manual override cover caps



Mounting of the MO cover caps is described in section 4.4.

### 2.5.2 Operating and connection elements of the pressure regulator plates

On the pressure regulator plates you will find the following connection and control elements:

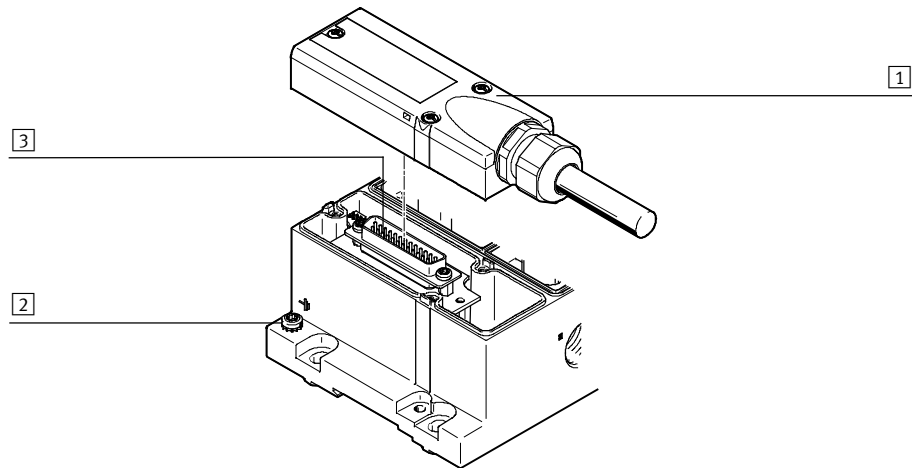


- |  |   |
|--|---|
| <b>1</b> Adjusting screw for pressure regulator plate MPA1 | <b>4</b> Pressure regulator plate MPA2 adjusting knob with freewheel unit and snap-in locking |
| <b>2</b> Pressure gauge (optional)                         | <b>5</b> Connection M5 with blanking plug   |
| <b>3</b> Connection for pressure gauge (can be turned 90°) | <b>6</b> Connection M5 with QS-fitting  |

Fig. 2.15 Operating and connection elements of the pressure regulator plates

### 2.5.3 Multi-pin connecting components

You will find the following electric connecting elements on the multi-pin plug connection of the MPA-S valve terminal:



1 Multi-pin plug cover with cable

2 Connection for functional earth

3 SUB-D connection

Fig. 2.16 Electric connecting elements of MPA-S valve terminal with multi-pin plug connection

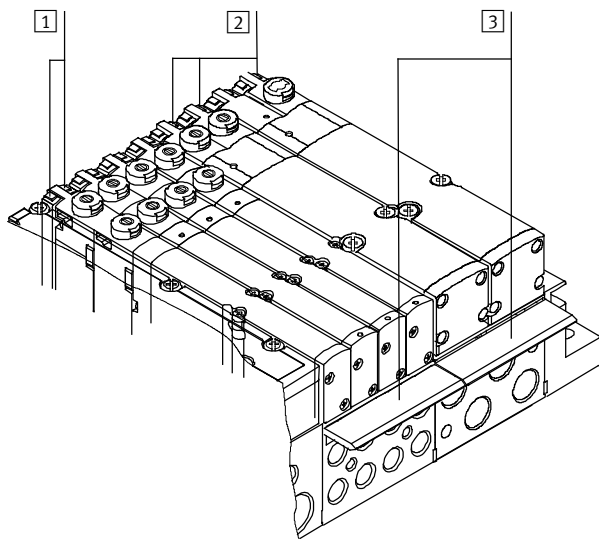


Information on the electronics module of the MPA-S valve terminal can be found in the package insert and the MPA-.... electronics description.



## 2.6 Display components

You will find the following display elements on the pneumatic modules of the MPA-S valve terminal with multi-pin plug connection or AS interface:



**1** MPA1:  
yellow LEDs: signal status display of the pilot  
solenoid coils

**2** MPA2:  
yellow LEDs: signal status display of the pilot  
solenoid coils

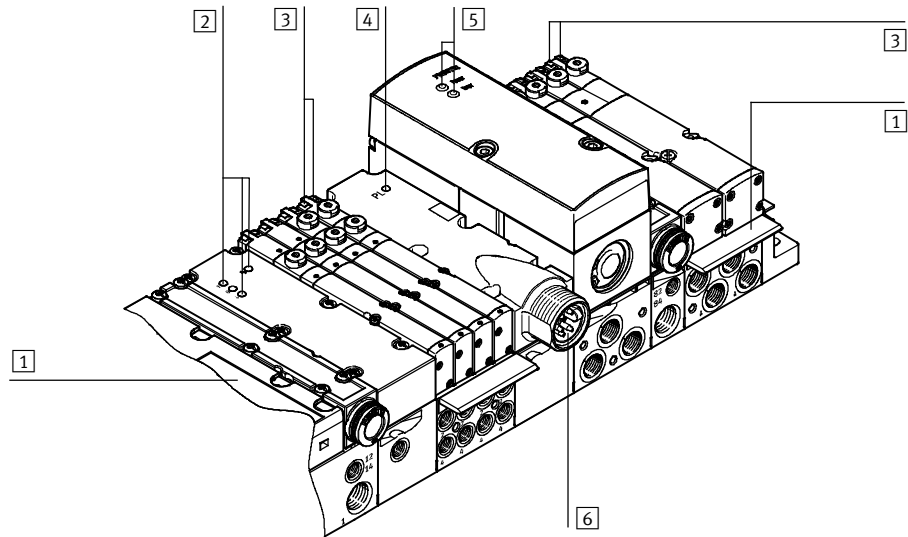
**3** Inscription label holder with inscription field

Fig. 2.17 Electric display elements of MPA-S valve terminal with multi-pin plug connection or with AS interface



Information on the electric connecting and display elements of the AS interface can be found in the package insert.

You will find the following electric connection and display elements on the pneumatic components of the MPA-S valve terminal with CPX terminal or CPI interface:



- |  |  |
|--|--|
| <p><b>1</b> Inscription fields</p> <p><b>2</b> Optional pressure sensor (only for MPA-S with CPX terminal):<br/>LEDs of the pressure sensor (→ Fig. 2.19)</p> <p><b>3</b> LEDs per valve: for MPA1 a two-colour LED/valve, for MPA2 two LEDs/valve<br/><b>yellow:</b><br/>signal status displays of the pilot solenoid coils<br/><b>red:</b><br/>error display</p> | <p><b>4</b> Optional electric auxiliary power supply: green power LED</p> <p><b>5</b> Optional LED/LCD proportional pressure regulator (only for MPA-S with CPX terminal): LEDs/LCD of the proportional pressure regulator (→ Fig. 2.20 or Fig. 2.21)</p> <p><b>6</b> Optional electric auxiliary power supply: load voltage connection for valves</p> |
|--|--|

Fig. 2.18 Electric connection and display components of the MPA-S valve terminal with CPX terminal or CPI interface



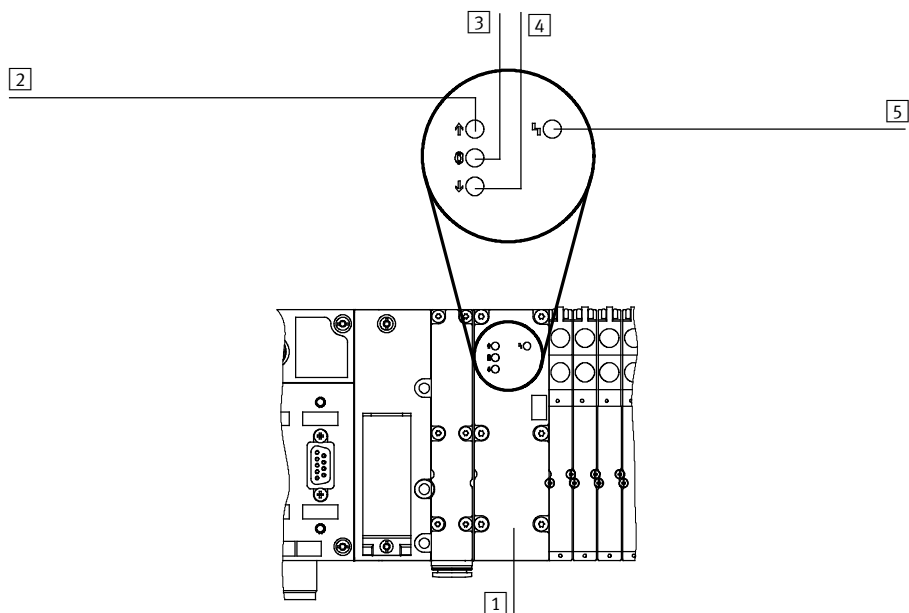
Information on the electric connection and display elements of the CPX bus node can be found in the corresponding electronics description (→ system description for your CPX terminal, table “Descriptions of the CPX terminal”).

Information on the electric connection and display components of the CPI interface can be found in the package insert supplied with the product.

Additional information on the LEDs of the electronic modules VMPA...-FB-EM.... is provided in the MPA... electronics description.

### 2.6.1 Pressure sensor plate

The pressure sensor plate has the following display elements:



- |   |  |
|---|--|
| <b>1</b> Pressure sensor plate          | <b>4</b> Red LED: pressure not reached |
| <b>2</b> Red LED: pressure exceeded     | <b>5</b> Red LED: common error display |
| <b>3</b> Green LED: pressure maintained |  |

Fig. 2.19 Display components of the pressure sensor plate

### 2.6.2 Proportional pressure regulator

The LED proportional pressure regulator has the following display components:

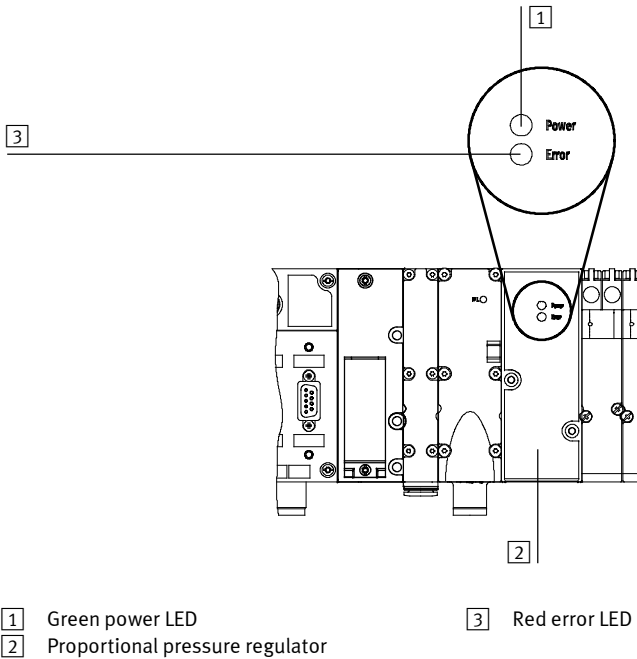


Fig. 2.20 Display elements of the proportional pressure regulator

### 2.6.3 Proportional-pressure regulator with LCD display

The proportional pressure regulator with LCD display has the following operation and display components:

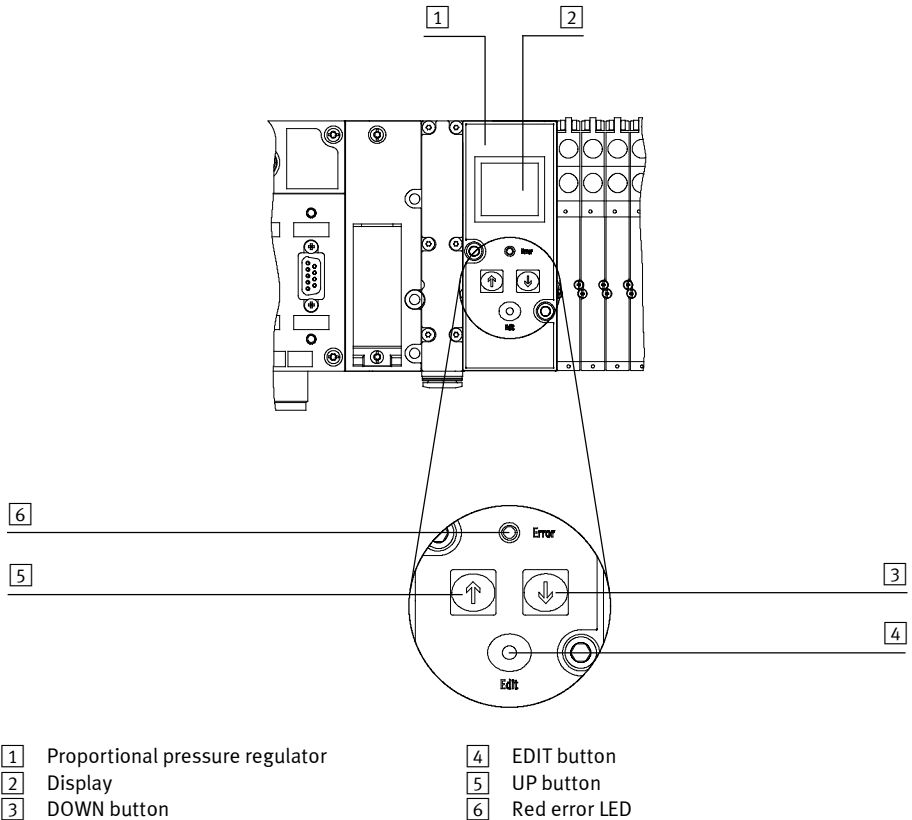


Fig. 2.21 Operation and display components of the LCD proportional pressure regulator

#### Menu navigation

##### RUN mode

The RUN mode is the basic condition of the pressure regulator. The following parameters are shown in the display:

- Comparator bit
- PRESET setting from the controller
- Current pressure valve (short pressing and holding down of the DOWN and/or UP key displays the setpoint value)
- Dynamic bar graph display for fast signal changes (dependent on the displayed signal in the numbers field)

**EDIT mode**

To reach the EDIT mode, the EDIT key must be pressed briefly. After 3 seconds or keystroke (key UP or key DOWN), “Exxx” is displayed in the numbers field. In this case, xxx stands for the display switch-off time in seconds. The display exposure time can now be set with the UP and DOWN keys. The setting range lies between OFF and 999 seconds.

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### 3.1 General instructions on mounting and dismantling



Special information on replacing or adding pneumatic components can be found in chapter 5.

- Information on mounting the MPA-S valve terminal with CPX terminal can be found in the CPX system manual.
- Information on dismantling and mounting of I/O modules is provided in the I/O module description (→ system description for your CPX terminal, table “Descriptions for the CPX terminal”).
- Information on mounting modules and components ordered at a later stage can be found in the package insert.



#### **Warning**

Accidental movements of the connected actuators and disconnected tubing lines can cause injury to persons and/or material damage.

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

- Compressed air supply
- Operating and load voltage supplies.



#### **Note**

Handle all modules and components of the MPA-S valve terminal with care. Make sure that the specified torques are complied with.



Electrostatically sensitive devices:

Do not touch any electrical or electronic components.



## 3.2 Mounting variants

You can mount the MPA-S valve terminal in one of two ways:

Mounting method	Description
H-rail	The MPA-S valve terminal is suitable for mounting onto an H-rail (DIN mounting rail as per EN 60715). There is a guide groove on the back cover for hanging the valve terminal onto the H-rail.
Wall	The multi-pin plug connection plate or the pneumatic interface and the end plates contain holes for wall mounting. For MPA-S valve terminals that are longer than 280 mm, additional mounting brackets on the air supply plate are required (➔ instructions on vibration and shock in Appendix A, Tab. A.4).

Tab. 3.1 Mounting methods of the MPA-S valve terminal



### Note

- Mount the MPA-S valve terminal so that there is sufficient space for heat dissipation and ensure that the maximum limits for temperatures are observed (➔ Technical data).

### 3.2.1 Mounting/dismounting on H-rails



#### Caution

H-rails with mounted valve terminals can break if they are subjected to vibration exceeding severity level 1:

- 0.15 mm path at 15 ... 58 Hz
- 2 g acceleration at 58...150 Hz

This can damage the valve terminal, your machine or your system.

- In this case use wall mounting.
- Note the permitted values for vibration and shock in appendix A “Technical data”.

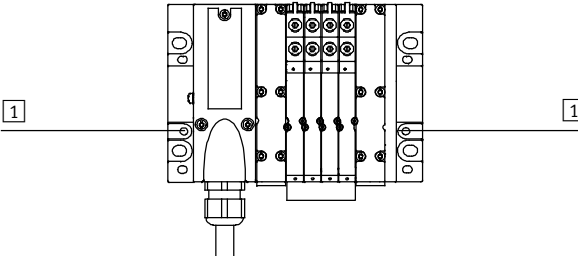
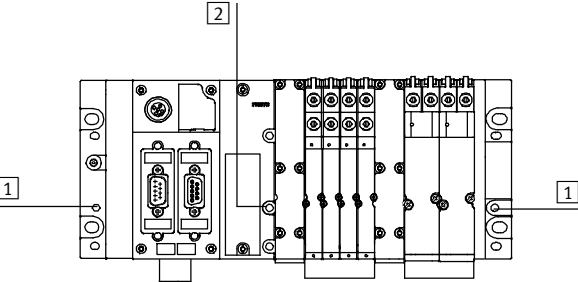


#### Caution

Mounting on H-rails without an H-rail clamping unit is impermissible.

- If the terminal is mounted in a sloping position or if it is subjected to vibration loads, secure the H-rail clamping unit additionally
  - against sliding down with the retaining screw intended for this purpose (➔ Tab. 3.2 and Fig. 3.1)
  - against unintentional loosening/opening.

To mount on H-rails, you need the mounting kit CPX-CPA-BG-NRH. This mounting kit consists of 3 clamping components and 3 screws M4x12.

Variant	Mounting points
<p><b>MPA-S valve terminal with multi-pin plug connection</b></p> 	<p>Required mounting of the H-rail clamping units:</p> <ul style="list-style-type: none"> <li>– In the right end plate and the multi-pin plug connection plate: each one M4-screw <span style="border: 1px solid black; padding: 0 2px;">1</span></li> </ul>
<p><b>MPA-S valve terminal with CPX terminal</b></p> 	<p>Required mounting of the H-rail clamping units:</p> <ul style="list-style-type: none"> <li>– in the end plates: each one M4 screw <span style="border: 1px solid black; padding: 0 2px;">1</span></li> <li>– in the pneumatic interface: one M4 screw <span style="border: 1px solid black; padding: 0 2px;">2</span></li> </ul>

Tab. 3.2 Required mounting points for mounting on H-rails

## Mounting

Proceed as follows:

1. Make sure the mounting surface can support the MPA-S valve terminal (weights → Appendix A.1, Tab. A.1).
2. Mount the H-rail (DIN mounting rail EN 60715 - 35x7.5; width 35 mm, height 7.5 mm). Make sure there is sufficient space for connecting the power supply cables and tubing. Fasten the H-rail to the mounting surface at intervals of approx. every 100 mm.
3. Mount the H-rail clamping units at all required mounting points (→ Tab. 3.2). Make sure that the clamping component is horizontal to the H-rail.
4. Hang the MPA-S valve terminal onto the H-rail (→ Fig. 3.1, arrow A).
5. Swing the MPA-S valve terminal onto the H-rail (→ Fig. 3.1, arrow B).

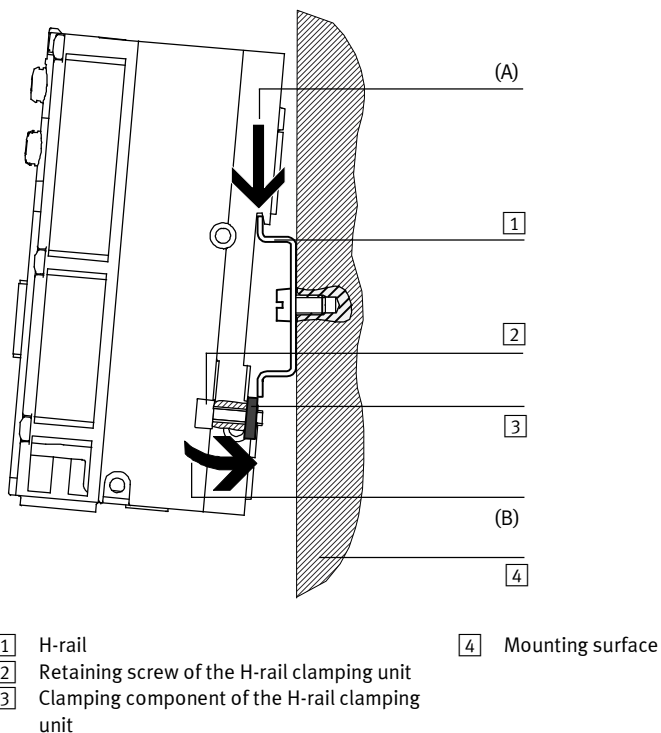
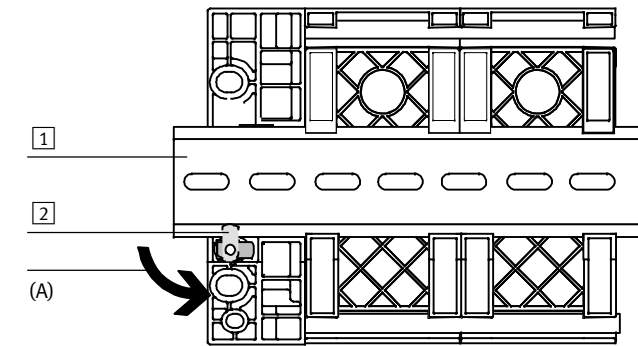


Fig. 3.1 Mounting of the MPA-S valve terminal on an H-rail

6. Turn the clamping components for mechanical interlock vertically behind the H-rail (→ Fig. 3.2, arrow A). Then tighten the retaining screws of the H-rail clamping unit with 1.3 Nm to secure the MPA-S valve terminal against tilting or sliding.



- 1 H-rail
- 2 Clamping component of the H-rail clamping unit

Fig. 3.2 Rear view: Mounting on an H-rail using the CPX terminal as an example

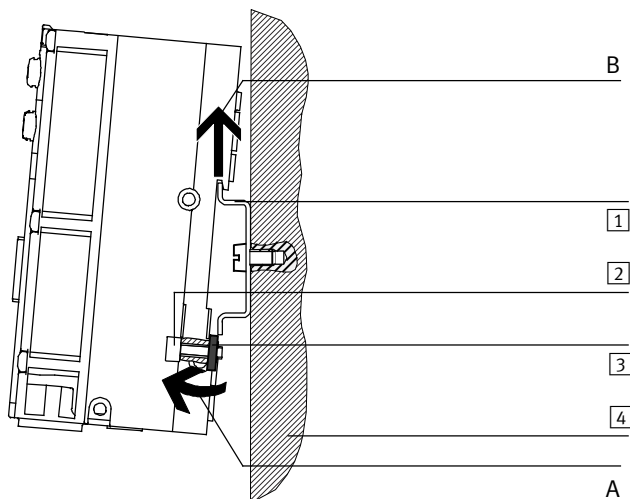


Further instructions on mounting the MPA-S valve terminal with CPX terminal on an H-rail can be found in the system description for your CPX terminal.

### Dismounting

Proceed as follows:

1. Loosen the retaining screw from the H-rail clamping unit (position of the screws → Tab. 3.2). Make sure that the clamping component is horizontal to the H-rail.
2. Swing the MPA-S valve terminal forwards from the H-rail (→ Fig. 3.3).
3. Lift the MPA-S valve terminal from the H-rail (→ Fig. 3.3).



- 1 H-rail
- 2 Retaining screw of the H-rail clamping unit
- 3 Clamping component of the H-rail clamping unit
- 4 Mounting surface

Fig. 3.3 Dismounting of the MPA-S valve terminal

### 3.2.2 Mounting/dismounting on walls



#### Note

Installation on uneven, flexible surfaces can damage the valve terminal MPA-S.

- Mount the MPA-S valve terminal only on a flat, torsionally rigid surface.



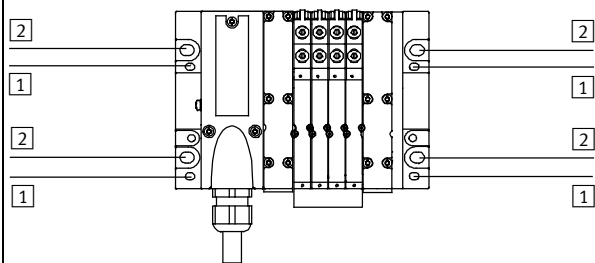
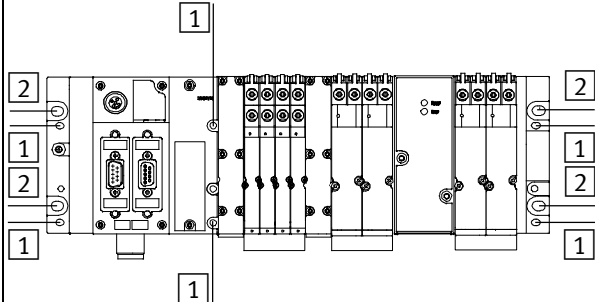
#### Note

Overloading of mounting holes or natural resonance when vibrating can cause damage.

- Besides the instructions on standard fastening points in section 3.2.3, also observe the instructions on additional fastening in section 3.2.4.

**3.2.3     Standard fastening points of the valve terminal**

The MPA-S valve terminal has standard fastening points for mounting on walls. The holes of these fastening points are located in the end plates, the multi-pin plug connection plate or the pneumatics interface (➔ Tab. 3.3).

Variant	Mounting points
<p><b>MPA-S valve terminal with multi-pin plug connection</b></p> 	<p>Required mounting:</p> <ul style="list-style-type: none"><li>– Multi-pin plug connection plate: two M4 <span style="border: 1px solid black; padding: 0 2px;">1</span> or M6 screws <span style="border: 1px solid black; padding: 0 2px;">2</span></li><li>– Right end plate: two M4 <span style="border: 1px solid black; padding: 0 2px;">1</span> or M6 screws <span style="border: 1px solid black; padding: 0 2px;">2</span></li></ul>
<p><b>MPA-S valve terminal with CPX terminal</b></p> 	<p>Required mounting:</p> <ul style="list-style-type: none"><li>– End plates: each two M4 <span style="border: 1px solid black; padding: 0 2px;">1</span> or M6 screws <span style="border: 1px solid black; padding: 0 2px;">2</span></li><li>– Port pattern: two M4 screws <span style="border: 1px solid black; padding: 0 2px;">1</span></li></ul>

Tab. 3.3     Mounting options for the MPA-S valve terminal

**Mounting**

Proceed as follows:

1. Make sure that the fastening surface is flat and that it can support the MPA-S valve terminal (weights ➔ Appendix A, Tab. A.1).



Make sure there is sufficient space for connecting the power supply cables and tubing.

2. Drill mounting holes in the mounting surface.
3. Fasten the MPA-S valve terminal with correspondingly long M4 or M6 screws to the fastening surface as per Tab. 3.3.

**Dismounting**

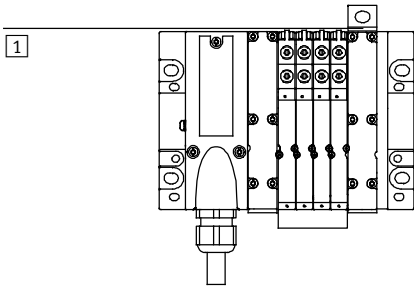
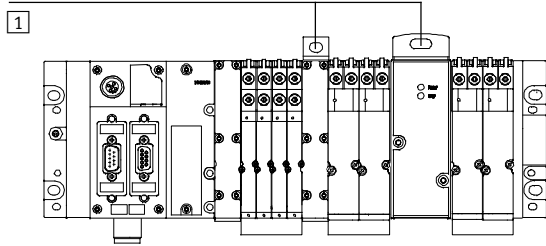
Proceed as follows:

- 1. Secure a hanging-mounted MPA-S valve terminal from falling down before you loosen it from the mounting surface.
- 2. Loosen the mounting screws (→ Tab. 3.3).
- 3. Remove the MPA-S valve terminal from the mounting surface.

**3.2.4      Additional fastening of the valve terminal**

The use of additional attachments is required under the following conditions (→ Tab. 3.4):

- for MPA-S valve terminals that exceed a length of 280 mm
- for increased vibration/shock loads (limits for vibrations and shock see → Appendix A, Tab. A.4)
- for MPA-S valve terminals equipped with three or more CPX interlinking blocks made of plastic
- for MPA-S valve terminals equipped with four or more CPX interlinking blocks made of metal.

Variant	Mounting points
<p><b>MPA-S valve terminal with multi-pin plug connection</b></p> 	<p>Additional mounting points:</p> <ul style="list-style-type: none"><li>– For each mounting bracket on the pneumatic air supply plate (→ also instructions in Appendix A, Tab. A.4): one M6 screw <b>1</b></li></ul>
<p><b>MPA-S valve terminal with CPX terminal</b></p> 	<p>Additional mounting points:</p> <ul style="list-style-type: none"><li>– For each mounting bracket on the pneumatic supply plate or proportional pressure regulator (→ also instructions in appendix A, Tab. A.4): one M6 screw <b>1</b></li></ul> <p><b>Note:</b> Dependent on the number of CPX interlinking blocks, mounting type CPX-(M-)BG-RW-... must be used as an additional attachment (→ system description for the CPX terminal).</p>

Tab. 3.4    Additional fastening points of the MPA-S valve terminal

### 3.3 Mounting/dismounting the inscription label holder

An inscription label holder can be mounted onto each sub-base to enable the valves or work connections to be distinguished.



Information on accessories can be found in the Festo Catalogue  
(→ [www.festo.com/catalogue](http://www.festo.com/catalogue)).

#### Mounting

Proceed as follows:

- Clip the inscription label holders into the recesses in the sub-bases (→ Fig. 3.4):

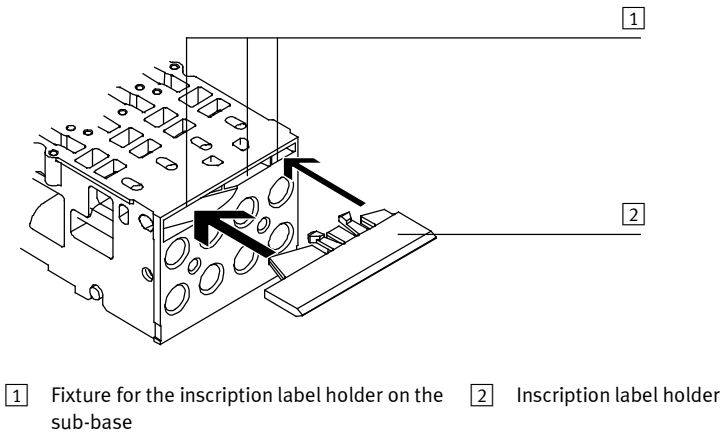


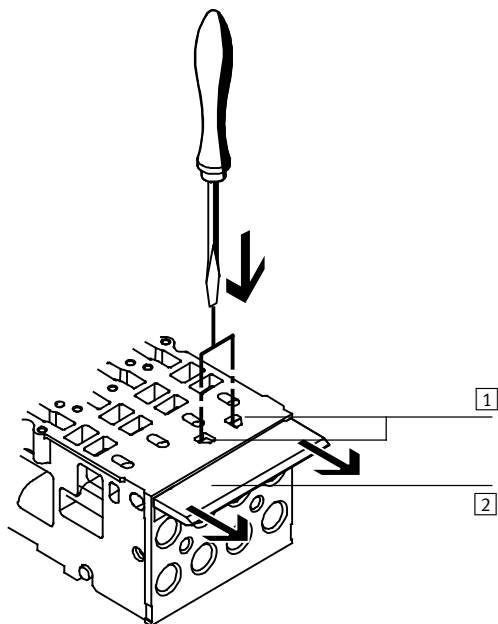
Fig. 3.4 Mounting the inscription label holder



### Dismounting

Proceed as follows:

1. Remove the 3rd and 4th valves from the corresponding sub-base.
2. Unlock the inscription label holder by using a screwdriver (blade width max. 3.5 mm) to press down the snap hooks (→ Fig. 3.5).



1 Hole for unlocking the inscription label holder

2 Inscription label holder

Fig. 3.5 Dismounting the inscription label holder

3. Pull the inscription label holder out of the fixture in the sub-base.

### 3.4 Compressed air preparation



#### Note

Unfiltered or incorrectly lubricated compressed air will reduce the service life of the valve terminal.

#### 3.4.1 Operation with unlubricated compressed air



#### Note

Too much residual oil content in the compressed air will reduce the service life of the valve terminal.

- When using bio-oils (oils that are based on synthetic ester or native ester, e.g. rapeseed oil methyl ester), the maximum residual oil content of  $0.1 \text{ mg/m}^3$  must not be exceeded (→ ISO 8573-1 class 2).
- When using mineral oils (e.g. HLP oils to DIN 51524 Part 1 to 3) or corresponding oils based on polyalphaolefin (PAO), the maximum residual oil content of  $5 \text{ mg/m}^3$  must not be exceeded (→ ISO 8573-1 class 4).

This avoids operative malfunctions of the valves.

Excessive residual oil content is not permissible, independent of the compressor oil, as otherwise the basic lubrication will be washed out with time.

#### 3.4.2 Operation with lubricated compressed air



Operate system equipment with unlubricated compressed air, if possible. In this way, you protect the environment. Festo pneumatic valves and actuators have been designed so that, if used as intended, they will not require additional lubrication and will still achieve a long service life.



#### Note

Operation with lubricated compressed air will cause the life-time lubrication, which is necessary for unlubricated operation, to be “washed out”.

If the system was commissioned with lubricated compressed air, a changeover to provisioning with unlubricated compressed air is not possible.



Observe the subsequent information if the use of lubricated compressed air is essential: The compressed air produced after the compressor must correspond to the quality of unlubricated compressed air. If possible, do not operate the total system with lubricated compressed air. If possible, always install the lubricators directly upstream of the consuming actuators.



**Note**

Incorrect supplemental oil and an oil rate in the compressed air that is too high will reduce the service life of the valve terminal.

- Use Festo special oil OFSW-32 or the alternatives listed in the Festo catalogue (as per DIN 51524-HLP32, basic viscosity 32 CST at 40 °C).
- The additional lubrication must not exceed 25 mg/m<sup>3</sup> (ISO 8573-1 class 5).
- Check the correct lubricator setting (➔ subsequent section)

This avoids operative malfunctions of the valves.

**Setting the lubricator**

With the machine running (typical operating status) 0.2 to max. 1 drop/min. or 0.5 to 5 drops/1000 l air.

**Check setting**

- Check the service units for condensate and lubricator setting twice a week.

The procedure described subsequently can be used to check the lubricator setting.

Proceed as follows:

1. Ascertain the actuator which is furthest from the lubricator.
2. Ascertain the valve terminal which controls this actuator.
3. Remove the silencer, if present, from the port (3/5).
4. Hold a piece of white cardboard at a distance of 10 cm from the exhaust port.
5. Let the system run for some time.

➔ There must be only a slight yellow colouring on the cardboard. If oil droplets appear, this is an indication that too much oil has been used.

Another indicator of over-lubrication is the coloration or status of the exhaust air silencer. A distinctly yellow colouring of the filter element or drops of oil on the silencer indicate that the lubricator setting is too high.

### 3.5 General instructions on installation



#### Warning

Accidental movements of the connected actuator technology and uncontrollable movements of loose tubing lines can cause injury to persons and/or damage to property.

- Before carrying out mounting, installation and maintenance work, switch off the following:
  - Compressed air supply
  - Operating and load voltage supplies.



#### Note

Observe the following if the UL requirements are to be complied with in your application:

- Rules for complying with the UL certification can be found in the separate UL-specific special documentation. The technical data listed there also apply here.
- The technical data in this documentation may show values deviating from this.



The components of the valve terminals contain electrostatically sensitive components. The components can be damaged if you touch the contact surfaces of the plug connectors or if you do not observe the handling specifications for electrostatically sensitive devices.



#### Note

Handle all modules and components of the MPA-S valve terminal with great care.

- Note especially the following:
  - Exact placement of screws in the plastic thread (to avoid damage to thread)
  - Manual screwing in of the screws
  - Compliance with the specified torques
  - Clean connecting services (avoidance of leaking and contact errors) and intact seals and sealing surfaces
  - Sealing of unused connections with blanking plugs to avoid contamination and maintain reliability.

For the optimum performance of the valve terminal, we recommend that the valves should be supplied via more than one supply and exhaust line if:

- more than 6 valves of size MPA1 or
  - more than 3 valves of size MPA2
- are switched simultaneously to flow.

When exhausting large-volume actuators or if the exhaust performance is too small, back pressures can build up in the valve terminal exhaust ducts. The back pressures can lead to pneumatic actuation of other valves, especially with unswitched 3/2-directional control valves that are normally closed.

To avoid back pressures:

- Optimise the pressurisation and ventilation capacity of the valve terminal, for example, by using larger diameter tubing or an additional compressed air supply via pneumatic air supply plates with exhausting via silencers or exhaust port covers.
- Separate the exhaust ducts, if necessary, by using pressure zones (➔ section 2.4.7).

### 3.6 Connecting the MPA-S valve terminal

Connections on the following components are available for pneumatic supply to the valve terminal:

- on the electrical interface (pneumatic interface, CPI interface, multi-pin plug connection plate, AS interface)
- on the optional pneumatic supply plate, maximum between each sub-base.

#### 3.6.1 Pilot control (pilot air supply)

Dependent on the variant of the pneumatic interface, CPI interface, multiple connector plate or AS interface, the pilot control is supplied with internal or external pilot air. You can ascertain the pilot control variant for which your MPA-S valve terminal is equipped by the following features (→ Tab. 3.5).

Pilot control variants	Pilot connection (12/14) on the electrical interface:
Operation with external pilot air	marked and open
Operation with internal pilot air supply	not marked and closed

Tab. 3.5 Recognition features of the pilot control variants

#### Internal pilot air supply

If the operating pressure lies within the required pilot pressure range for the valves (→ Appendix A, Fig. A.1 ... Fig. A.5), you can operate the pilot control with an internally branched pilot air supply.



The internal pilot air supply is branched centrally from the supply port (1) in the pneumatic interface or multi-pin connection plate. This also applies when the MPA-S valve terminal is operated with several pressure zones (→ Fig. 3.6).

#### External pilot air supply

If the operating pressure lies below the required pilot pressure or above 8 bar (→ Appendix A, Fig. A.1 ... Fig. A.5), you must operate the pilot control with an external pilot air supply.



- Preferably use regulated external pilot air supply. Reliable, trouble free operation of the MPA-S valve terminal is then possible, e.g. even with fluctuating operating pressure.
- The external pilot air supply for all solenoid coils is fed centrally via the pilot port (12/14) on the pneumatic interface or the multi-pin plug connection plate. This is the case even if the MPA-S valve terminal is operated with different pressure zones.
- Adapt the external pilot air supply to the operating pressure at which these valves are operated (→ diagrams in Appendix A, Fig. A.1 ... Fig. A.5).

Conversion between internal and external pilot air supply is described in section 5.4.1.

### 3.6.2 MPA-S valve terminal with pressure zone separation



#### Note

- Operate the valves with ident. code I (2x 2/2-directional control valve) in a separate pressure zone with separated exhaust duct (5) if the MPA-S valve terminal is also equipped with other valves.
- Note the following for an MPA-S valve terminal, which is operated with an **internal** pilot air supply and which has several pressure zones:
  - The internal pilot air supply is branched centrally from the supply connection (1) of the pneumatic interface or from the multiple connector plate (→ Fig. 3.6).
  - The pressure zone, which is supplied via the supply connection(1) of the pneumatic interface or the multi-pin plug connection plate must be operated at a pressure that corresponds to the required pilot pressure (→ diagrams Appendix A, Fig. A.1 ... Fig. A.5).



If the proportional pressure regulator is to regulate the operating pressure for the valves on the MPA-S valve terminal, the valves must be positioned to the right of the proportional pressure regulator.



For every pressure zone, a pressure zone seal and a pneumatic air supply plate are required (→ Fig. 3.6).

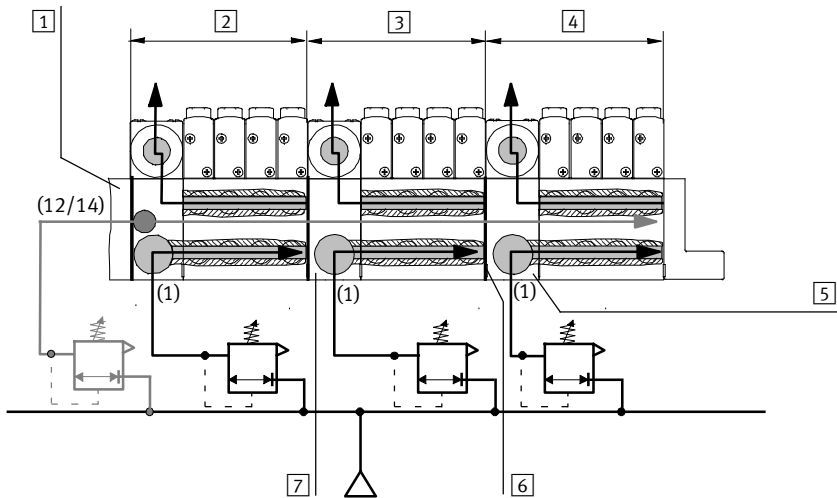
The ports (1) or (3/5) are:

- for the pressure zone on the outside left of the port pattern or multi-pin plug connection plate.
- for all other pressure zones on the pneumatic air supply plate which lies within the corresponding pressure zones. The position of the air supply plate in the pressure zone (left, centre or right) can be any, but two air supply plates (e.g. of adjacent pressure zones) must not lie next to each other.



By mounting an additional pneumatic air supply plate within a pressure zone, you can provide additional supply air or extract exhaust air.

The following figure (→ Fig. 3.6) shows the assignment of the supply and exhaust ports to the valves using an example of an MPA-S valve terminal with blocked ducts (1), (3) and (5).



- |   |   |
|---|---|
| <p><b>1</b> Pneumatic interface or multi-pin plug connection plate with supply port (1) for pressure zone 1 and pilot connection (12/14) for the total valve terminal</p> <p><b>2</b> Pressure zone 1</p> <p><b>3</b> Pressure zone 2</p> | <p><b>4</b> Pressure zone 3</p> <p><b>5</b> Air supply plate for pressure zone 3</p> <p><b>6</b> Identification of the pressure zone separating seal (projecting flag)</p> <p><b>7</b> Air supply plate for pressure zone 2</p> |
|---|---|

Fig. 3.6 Example of an MPA-S valve terminal with 3 pressure zones

### 3.6.3 Operation of the MPA-S... valve terminal with reversible pressure regulators



#### Note

Operation of the MPA-S... valve terminal with reversible pressure regulators (Ident. code PN, PM, PL, PK):

- No 2x 2/2-directional control valves with ident. code D, I and 2x 3/2-directional control valves with ident. code N, K, H (non-reversible valves) may be operated with these pressure regulators.
- Reversible pressure regulators must not be used on reversibly operated valve terminals.

### 3.6.4 Setting the pressure regulator

The pressure regulator plates can be set using the following operator control elements:

- with the adjusting screw for size MPA1
- with the adjusting knob or the adjusting screw for size MPA2.





**Note**

For the A and B pressure regulator plates of type VMPA...B8-R...C2-C-... (ident code: PH, PG, PC, PB), the control pressure should not be below 2 bar.

- For control pressures below 2 bar, use the **reversible** A or B pressure regulators (identifier in the type code: PN, PM, PL, PK, → Tab. 2.11).

**Setting the pressure regulator (MPA1) with the adjusting screw**

Proceed as follows:

- Turn the adjusting screw **1** (position → Fig. 3.7) to set the desired controlled variable (→ “Flow diagrams of the pressure regulator plates” in Appendix A).

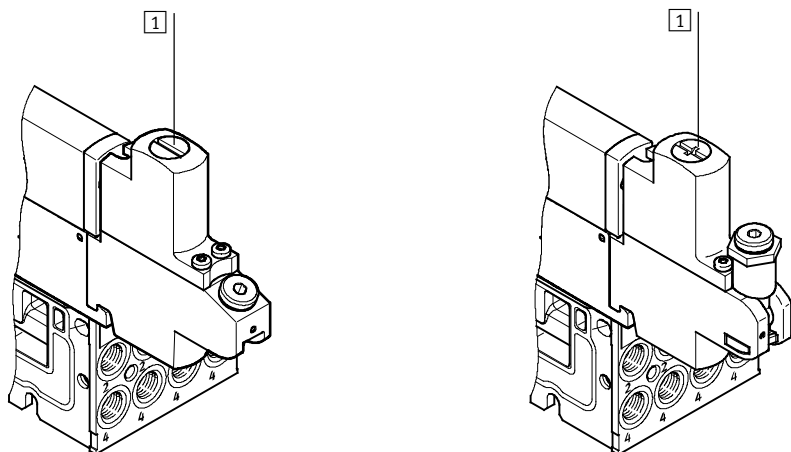
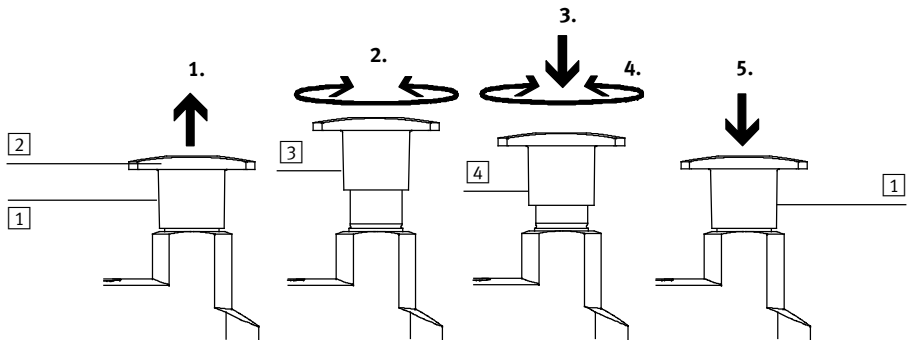


Fig. 3.7 Setting the pressure regulator plates (size MPA1) with the adjusting screw **1**

### Setting the pressure regulating valve (MPA2) with the adjusting knob

Proceed as follows:

1. Pull the adjusting knob [2] as far as possible out of the locking level [1] into the setting level [3] (→ Fig. 3.8).
2. Set the desired controlled variable at this level by turning the adjusting knob (→ “Flow diagrams of the pressure regulating plates” in Appendix A).
3. Press the adjusting knob into the free-running level [4]. In this position you can turn the setting wheel without modifying the controlled variable.
4. Turn the adjusting knob longitudinally toward the pressure regulator plate.
5. Press the adjusting knob in this position into the snap-in locking of the locking level [1].



- |   |  |
|---|--|
| [1] Adjusting knob in the locking level | [3] Adjusting knob in the setting level      |
| [2] Adjusting knob                      | [4] Adjusting knob in the free-running level |

Fig. 3.8 Setting the pressure regulator plates (size MPA2) with the aid of the adjusting knob

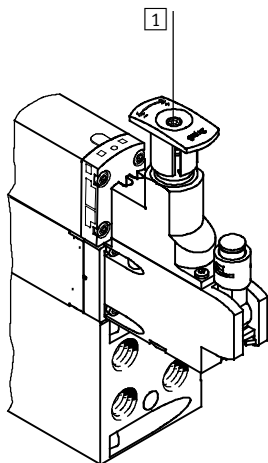
### Setting the pressure regulator (MPA2) with the adjusting screw in the adjusting knob



If the space around the adjusting knob is not sufficient for setting the pressure regulating valve (size MPA2), use the socket head screw in the adjusting knob.

Proceed as follows:

- Turn the adjusting screw **1** (position → Fig. 3.9) to set the desired controlled variable (→ “Flow diagrams of the pressure regulator plates” in Appendix A).

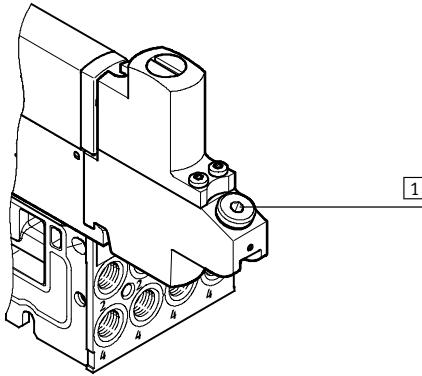


- 1** Adjusting screw, internal hexagon socket  
(spanner size 2.0)

Fig. 3.9 Setting the pressure regulator plates (size MPA2) with the adjusting screw **1**

### 3.6.5 Controller with rigid threaded connection (MPA1)

In the size MPA1, there are controllers with rigid threaded connection M5. A non-return valve (type HB-M5-QS-4) can be screwed into this threaded connection. As a result, connection of an external pressure gauge or measuring device is possible through a hose.



1 Threaded connection M5

Fig. 3.10 Controller with rigid threaded connection

### 3.6.6 Vacuum/low-pressure operation



#### Note

If valves are used for switching a vacuum, filters must be used in the suction line to avoid operative malfunctions caused by foreign matter sucked into the line.

The 2x 2/2-directional control valves with ident. code D, I and the 2x 3/2-directional control valves with ident. code N, K, H are not suitable for vacuum or low pressure operation. If you supply the MPA-S valve terminal with vacuum or low pressure via port (1):

- Operate these valves in a separate pressure zone.
- Set the operating pressure for this pressure zone in accordance with the diagram in Fig. A.1.

The following requirements must be fulfilled in order to operate your MPA-S valve terminal at the supply port (1) with vacuum or low pressure between  $-0.9 \dots 3$  bar:

- The pilot control is operated with regulated external pilot air supply.
- The valve terminal is fitted with the following valve sub-bases and sometimes has additional pressure zones.

Valve sub-bases	
Pressure zone with vacuum or low pressure supply via connection (1) <sup>1) 2)</sup>	<p>The pressure zone must be equipped only with the following valve sub-bases:</p> <ul style="list-style-type: none"> <li>– 5/2-directional control valve, monostable (ident. code M, MS, MU)</li> <li>– 5/2-way bistable valve (ident. code J)</li> <li>– 5/3-directional control valves (ident. codes B, E and G)</li> <li>– 2x 3/2-directional control valves (ident. code HS, HU, KS, KU and NS)</li> <li>– 3/2-directional control valve (ident. code W and X) see also the subsequent note</li> <li>– 2x 2/2-directional control valve (ident. code DS)</li> </ul>
Pressure zone with excess pressure supply <sup>3)</sup> via port (1)	<p>The pressure zone can be equipped additionally with the following valve sub-bases:</p> <ul style="list-style-type: none"> <li>– 2x 3/2-directional control valves (ident. code H, K and N)</li> <li>– 2x 2/2-directional control valves (ident. code D and I), see also subsequent footnote</li> </ul>

1) The valve sub-bases with Ident. codes D, H, K, N and I are **not** resistant to vacuum or low pressure if they are supplied via connection (1)!

2) Pilot pressure → diagram Appendix A, Fig. A.3

3) Pilot pressure → diagram Appendix A, Fig. A.1

Tab. 3.6 Valve sub-bases



Valve with ident. code I, 2x 2/2-directional control valves:

- With this valve, vacuum is supplied at connection (5). Solenoid coil 14 switches the vacuum to connection (4).
- The operating pressure at port (1) can be used as an ejector pulse at port (2). The operating pressure is switched to port (2) with solenoid coil 12. If the MPA-S valve terminal is also equipped with other valves, operate this valve in a separate pressure zone with separated exhaust duct (5).



Valves with ident. code W and X, 3/2-directional control valve:

- These valves can be supplied individually and therefore operated in the entire pressure range from –0.9 ... 10 bar. They are independent of supply connection (1) of the valve terminal. The connections through which these valves are supplied with compressed air or vacuum and through which exhaust air is removed are shown in Tab. 3.7.

The pilot air is supplied through the valve terminal.

3/2-directional control valve	Compressed air or vacuum via connection	Exhaust air through port
Ident. code X	(4)	(3)
Ident. code W	(2)	(5)

Tab. 3.7 Connections to valves with ident. code X and W

### 3.6.7 Connecting the pneumatic lines

- Use blanking plugs to seal connections not required for the functional reliability of the MPA-S valve terminal.

#### Position of the pneumatic ports



If the MPA-S valve terminals are equipped with flat plate silencers, the exhaust air (3/5) and (82/84) will be vented through the flat plate silencers.



On the MPA-S valve terminal with exhaust plates, the pilot exhaust air is vented on at least one supply plate via connection (82/84).

- Make sure that the proportional pressure regulator is supplied with a constant pressure.



A constant supply pressure is necessary for good control quality. To guarantee this, each proportional pressure regulator must be connected to a separate pressure supply.

- Mount the fitting or the silencer in accordance with Tab. 3.8. Then lay the tubing lines.

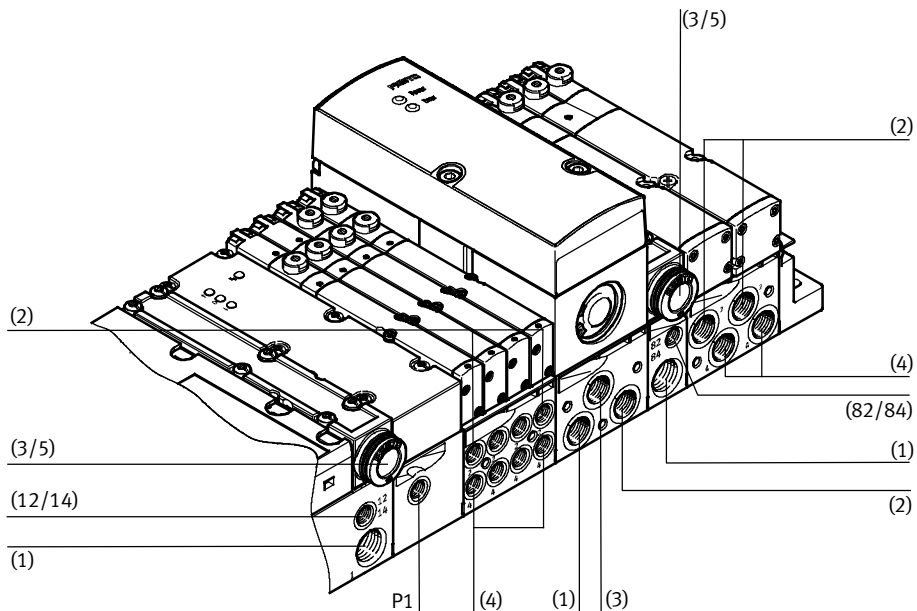


Fig. 3.11 Pneumatic connections of the MPA-S valve terminal

Line	Connection code (ISO 5599)	Connection size (ISO 228)	Connection <sup>1)</sup>
Compressed air or vacuum	(1)	G1/4"	Fitting in electrical interface or in the pneumatic air supply plate
Pilot air (external pilot air supply)	(12/14)	M7	Fitting in electrical interface or in the multi-pin plug connection plate
Ducted exhaust air from the valves	(3/5)	QS10	Fitting in exhaust plate <sup>2)</sup>
Ducted exhaust air from the pilot control	(82/84)	M7	Fitting in the air supply plate <sup>2)</sup>
Air or vacuum	(2) or (4)	MPA1: M7 MPA2: G1/8"	Fitting in the sub-base
Connection for external pressure	P1	M7	Fitting in pressure sensor plate type VMPA-FB-PS-P1
Pressure input	(1)	G1/4"	Fitting in the sub-base of the proportional pressure regulator
Pressure output	(2)	G1/4"	
Exhaust air of the VPPM-...TA	(3)	G1/4"	

1) Dependent on your order, the MPA-S valve terminal may already be equipped with QS fittings.

2) Only for valve terminal MPA-S with exhaust plate or air supply plate

Tab. 3.9 Assignment of the connections

### 3.7 Installation of the tubing lines



If elbow connectors or multiple distributors are used, the air flow will in general be reduced.

#### 3.7.1 Connecting

Proceed as follows:

1. Push the tubing as far as possible into or over the tube coupling of the fitting.
2. Tighten the clamping screw 1 or, if applicable, pull the locking ring 2 over the tube coupling.
3. Seal connections that are not required with blanking plugs 3.
4. For a better overview of the system, bundle the installed tubes with a tubing strap or multiple hose holder



Fig. 3.12 Mounting the tubing connections

#### 3.7.2 Removing



##### Warning

If the pneumatic tubing is under pressure when dismantled, it may execute uncontrolled movements, causing injury to persons. Carry out the subsequent steps first before disconnecting the pneumatic tubing on the MPA-S valve terminal:

- Switch off the compressed air supply.
- Make sure that all pneumatic tubing is unpressurized.
- Exhaust all actuators controlled by valves which are closed in normal or mid-positions.



Proceed as follows:

1. Mark all pneumatic tubing.
2. Loosen the clamping screw **1** of the fitting or, if necessary, press down the locking ring of the fitting **2**, e.g. with the QSO releasing tool from Festo.
3. Remove the tubing from the fitting.



Fig. 3.13 Removing the tubing connection

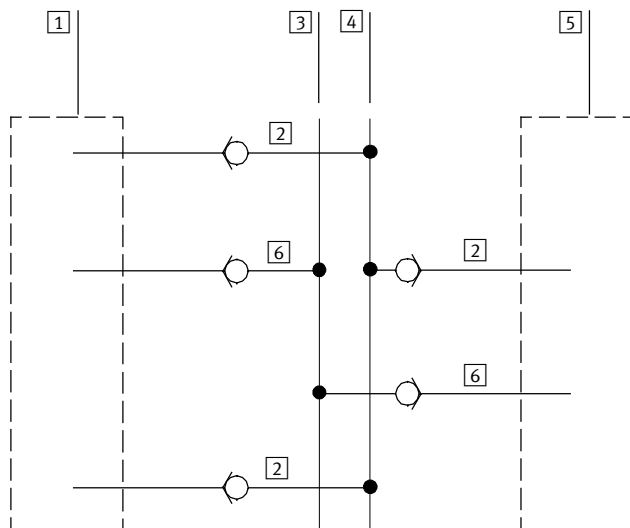
### 3.7.3 Common pneumatic lines

Observe the following instructions on installing the pneumatic components. Only then can you guarantee faultless operation.



If there are several systems with centrally ducted exhaust air:

- Use non-return valves in the common exhaust lines (3/5) or (82/84) in order to prevent functional impairment due to back pressures.



**1** First MPA-S valve terminal

**2** Common (3/5)

**3** Central (82/84)

**4** Central (3/5)

**5** Second MPA-S valve terminal

**6** Common (82/84)

Fig. 3.14 Common lines with non-return valves

### 3.8 Connecting the electric cables



#### Warning

- Only use PELV circuits in accordance with IEC/EN 60204-1 (protective extra-low voltage, PELV) for the electrical power supply.
- Also observe the general requirements for PELV circuits in accordance with IEC/EN 60204-1.
- Only use voltage sources which ensure reliable electrical disconnection of the operating voltage in accordance with IEC/EN 60204-1.

The use of PELV circuits ensures protection from electric shock (protection from direct and indirect contact) in accordance with IEC/EN 60204-1 (Electrical equipment of machines, General requirements).



#### Note

- Ascertain which measures, in line with your EMERGENCY OFF procedures, are necessary for putting your machine/system into a safe state in the event of an EMERGENCY OFF (e.g. switching off the operating voltage for the valves and output modules, switching off or pressure).



MPA-S valve terminal with multi-pin plug connection:

Instructions on electrically connecting the MPA-S valve terminal with multi-pin plug connection can be found in the package insert.

MPA-F valve terminal with CPX terminal:

Instructions on connecting the operating voltage can be found in the system description of your CPX terminal.

Detailed instructions on connecting the CPX modules (bus node, I/O modules, etc.) can be found in the corresponding descriptions for the CPX modules (→ the system description of your CPX terminal, table “Descriptions of the CPX terminal”).

#### 3.8.1 Load voltage supply via electrical supply plate (only for MPA-S valve terminal with CPX terminal or CPI interface)

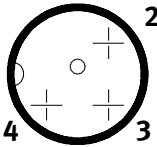
The electric air supply plate type VMPA-FB-SP-...-V-... supplies the valves additionally with load voltage when, for example, the valve terminal is to be operated with different voltage zones or when the required load voltage cannot be provided by the CPX terminal alone.

**Note**

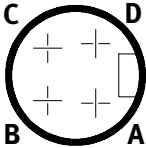
Damage to components and malfunctions!

- Please observe,
  - that with MPA-S valve terminals with more than 8 sub-bases, an electric supply plate is required for supplemental supply of load voltage.
  - to the right of the electrical air supply plate, only electronics modules with separated circuits of type VMFA...-FB-EMG-.... are permitted (➔ also section 5.3.6). If your MPA-S valve terminal is only equipped with electronic modules with a common circuit (type VMFA...-FB-EMS-....), then you can supply the pneumatics as follows:
    - for valve terminals with CPX terminal: exclusively via an interlinking block with 4-pin system supply, type CPX-GE-EV-**S** or CPX-GE-EV-**S-7/8-4POL** of the CPX terminal.
    - for valve terminals with CPI interface: through the CPI interface of type VMFA-CPI.
  - that the electric supply plate must not be installed directly to the left of a pneumatic air supply plate (type VMFA1-FB-SP...).
  - that you do not touch the electrostatically sensitive contact surfaces of the plug connectors on the side of the electric supply plate.

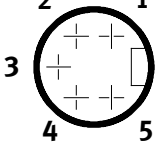
Connect the corresponding electrical air supply plate as shown in subsequent tables:

M18 plug	Pin allocation	
	Pin 2	24 V DC valves
	Pin 3	0 V DC valves
	Pin 4	Functional earth

Tab. 3.10 Pin assignment of the electric air supply plate type VMFA-FB-SP-V


7/8" plug, (4-pin)	Pin allocation	
	Pin A	Not connected
	Pin B	24 V DC valves
	Pin C	Functional earth
	Pin D	0 V DC valves

Tab. 3.11 Pin assignment of the electric air supply plate type VMFA-FB-SP-7/8-V-4POL

7/8" plug, (5-pin)	Pin allocation	
	Pin 1	0 V DC valves (leading)
	Pin 2	Not connected
	Pin 3	Functional earth (leading)
	Pin 4	Not connected
	Pin 5	24 V DC valves

Tab. 3.12 Pin assignment of the electric air supply plate type VMPA-FB-SP-7/8-V-5POL

**3.8.2     Earthing the MPA-S valve terminal**

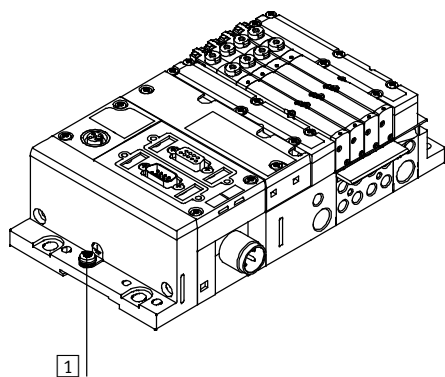


**Note**  
Earth your MPA-S valve terminal!

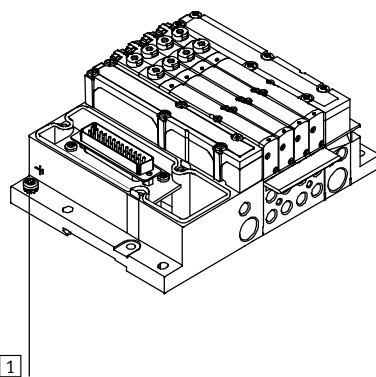
- Connect the earth connection with the left end plate or the multi-pin plug connection plate (→ Fig. 3.15) at low impedance (short cable with large cross-sectional area) to the earth potential.
- Please note the supplementary instructions on the MPA-S valve terminals with CPX terminal in the system description of your CPX terminal.

This prevents malfunctions due to electromagnetic interference and ensures electro-magnetic compatibility in accordance with EMC directives.

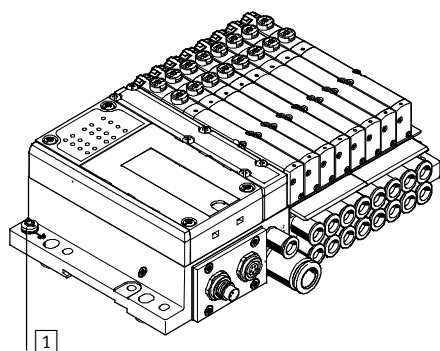
MPA-S valve terminal with CPX terminal



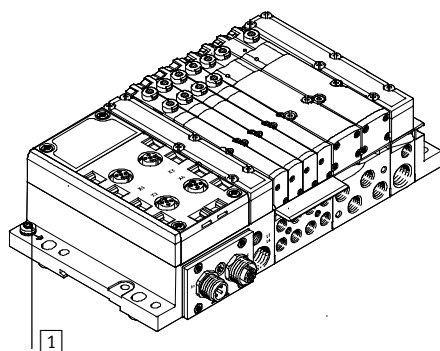
MPA-S valve terminal with multi-pin plug connection



MPA-S valve terminal with CPI interface



MPA-S valve terminal with AS interface



**1** Earth terminal

Fig. 3.15 Earthing the MPA-S valve terminal

### 3.9 Address assignment of the valves

#### 3.9.1 MPA-S valve terminal with CPX terminal



Maximum 16 MPA pneumatic modules are permitted on the MPA-S valve terminal with CPX terminal. The following number of solenoid coils is therefore possible (if only valves of the same size are used):

- MPA1: up to 128 solenoid coils (maximum of 64 valve positions)
- MPA2: up to 64 solenoid coils (maximum of 32 valve positions)

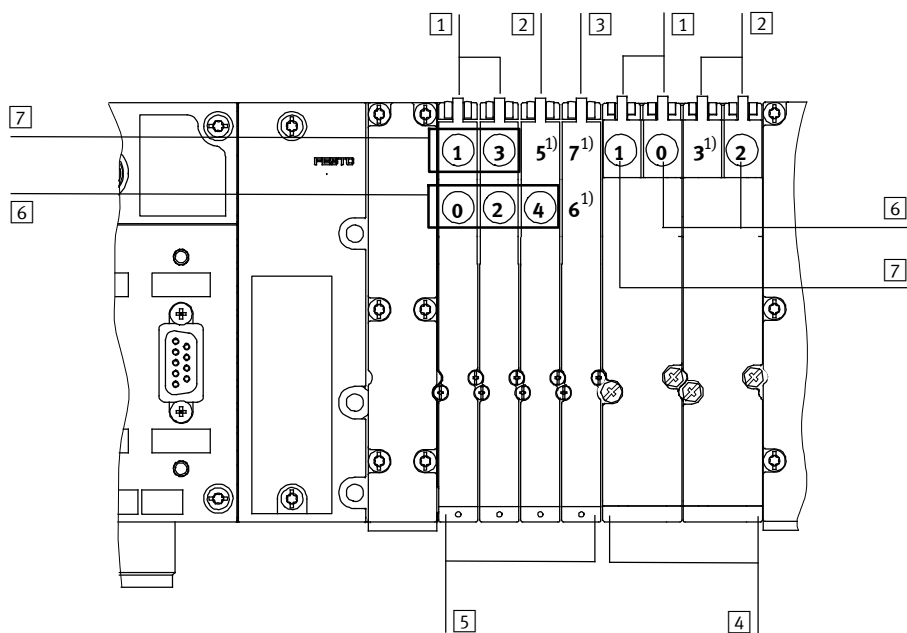


#### Note

Note with the addressing that an MPA2 pneumatics module only occupies 4 addresses.

#### Address allocation

- The assignment of the addresses is module-orientated
- A pneumatic module always occupies
  - MPA1: 8 addresses
  - MPA2: 4 addresses
- Counting begins on the valve terminal from left to right
- Each valve position occupies 2 addresses, independent of the valve or blanking plate mounted. The following assignment applies:
  - Solenoid coil 14 occupies the less significant address,
  - Solenoid coil 12 occupies the higher-value address.



1) Unused addresses

- |   |   |   |                                    |
|---|---|---|------------------------------------|
| 1 | Valve sub-bases with two solenoid coils | 5 | Pneumatics module (MPA1)           |
| 2 | Valve sub-bases with one solenoid coil  | 6 | Addresses of the solenoid coils 14 |
| 3 | Blanking plate                          | 7 | Addresses of the solenoid coils 12 |
| 4 | Pneumatics module (MPA2)                |   |                                    |

Fig. 3.16 Example: address assignment of an MPA-S valve terminal with CPX terminal, 6 valve positions (top view)



Detailed instructions on addressing the pneumatics modules of the MPA-S valve terminal with CPX terminal can be found in the MPA... electronics description or the corresponding description for the bus node (→ system description for your CPX terminal, table “Descriptions of the CPX terminal”).

### 3.9.2 MPA-S valve terminal with CPI module or AS-interface



Instructions on addressing the pneumatics modules can be found in the package insert.

### 3.9.3 MPA-S valve terminal with multi-pin plug connection

- Address allocation in ascending order without gaps (→ example)
- Address assignment does not depend on it is equipped with blanking plates or valve plates.
- Depending on the electronics module, a valve position occupies the following number of addresses:

Number of addresses	Electronics module	
	MPA1	MPA2
One address per valve position	VMPA1-MPM-EMM-4 The E-module occupies 4 addresses.	VMPA2-MPM-EMM-2 The E-module occupies 2 addresses.
Two addresses per valve position	VMPA1-MPM-EMM-8 The E-module occupies 8 addresses.	VMPA2-MPM-EMM-4 The E-module occupies 4 addresses.

Tab. 3.13 Electronics module for multi-pin plug connection

- If a valve location occupies 2 addresses, the following applies:
  - Solenoid coil 14 occupies the less significant address,
  - Solenoid coil 12 occupies the higher-value address.

#### Example of address assignment



#### Caution

Note that addresses may be shifted if the valve terminal is expanded subsequently.

In the subsequent example, an MPA-S valve terminal type MPA-MPM-PI with the following components is addressed:

Component	MPA1	MPA2
In-line valve manifolds	2 (8 valve positions)	2 (4 valve positions)
Electronics module	1 VMPA1-MPM-EMM-8 1 VMPA1-MPM-EMM-4	1 VMPA2-MPM-EMM-4 1 VMPA2-MPM-EMM-2

Tab. 3.14 Example: Electronics module for multi-pin plug connection



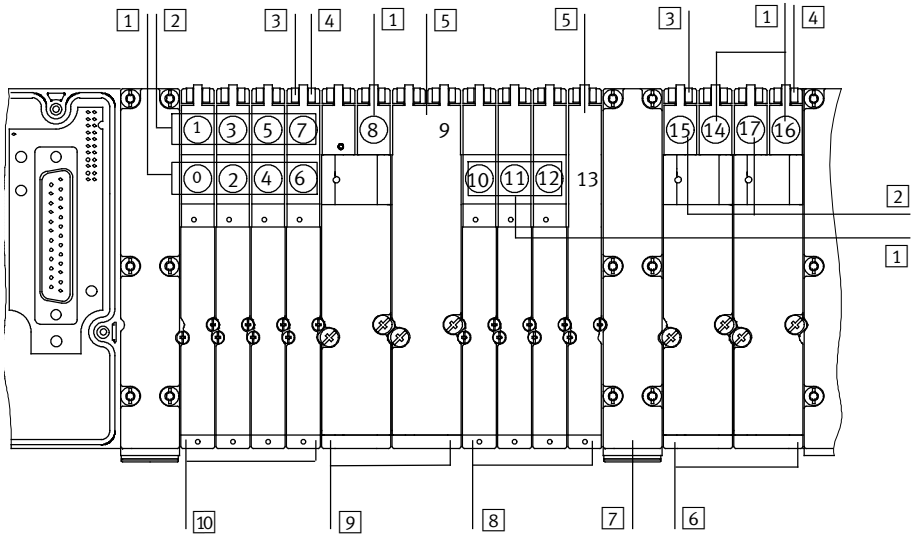
For controlling the valves, each solenoid coil is assigned to a certain pin of the multi-pin plug socket.

Pin	Address	Valve position number	Solenoid coil	Electronics module
1	0	0	12	<b>VMPA1-MPM-EMM-8</b> (for 4 MPA1 valves each with two solenoid coils)
2	1		14	
3	2	1	14	
4	3		12	
5	4	2	14	
6	5		12	
7	6	3	14	
8	7		12	
9	8	4	14	<b>VMPA2-MPM-EMM-2</b> (for 2 MPA2 valves, each with one solenoid coil)
10	9	5	14	
11	10	6	14	<b>VMPA1-MPM-EMM-4</b> (for 2 MPA2 valves, each with one solenoid coil)
12	11	7	14	
13	12	8	14	
14	13	9	14	
15	14	10	14	<b>VMPA2-MPM-EMM-4</b> (for 2 MPA2 valves, each with 2 solenoid coils)
16	15		12	
17	16	11	14	
18	17		12	
...	...	...	...	...
25	0 V <sup>1)</sup>			

1) 0 V with positive-switching control signals; in the case of negative switching control signals, connect 24 V; mixed operation is impermissible!

Tab. 3.15 Example: address assignment of the MPA-S valve terminal with multi-pin plug connection and 12 valve positions

Example of address assignment (top view):



- |  |   |
|--|---|
| <p>1 Addresses of solenoid coils 14 (manual override 14)</p> <p>2 Addresses of solenoid coils 12 (manual override 12)</p> <p>3 LED for solenoid coil 12</p> <p>4 LED for solenoid coil 14</p> <p>5 Unused valve position</p> <p>6 Sub-base with electronics module VMPA2-MPM-EMM-4 occupies two addresses per valve position</p> | <p>7 Supply plate for additional compressed air supply</p> <p>8 Sub-base with electronics module VMPA1-MPM-EMM-4 occupies one address per valve position</p> <p>9 Sub-base with electronics module VMPA2-MPM-EMM-2 occupies one address per valve position</p> <p>10 Sub-base with electronics module VMPA1-MPM-EMM-8 occupies two addresses per valve position</p> |
|--|---|

Fig. 3.17 Example: address assignment of the MPA-S valve terminal with multi-pin plug connection and 12 valve positions, type MPA-MPM-... (top view)

## 4 Commissioning

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## 4.1 Prior to commissioning

- Switch off the power supply before connecting or disconnecting plug connectors (otherwise functional damage).
- Only commission a valve terminal that has been mounted and wired completely.
- Make sure that there is a sufficient supply of fresh air (cooling) for the following operating conditions:
  - maximum number of valves
  - maximum operating voltage
  - endurance stress off the solenoid coil
- Please observe the subsequent instructions on pressure build-up in the overall supply.



Commissioning of the CPX terminal is described in the corresponding description for the CPX bus node (→ the system description of your CPX terminal, table “Descriptions of the CPX terminal”).

### 4.1.1 Pressure build-up in the overall supply



#### Warning

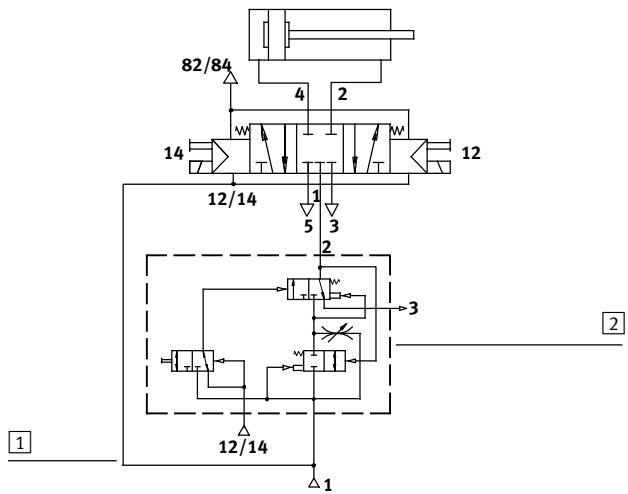
If the pressure build-up of the pilot air supply is too slow or delayed, this may cause the actuators to perform sudden unexpected movements under the following conditions:

- when the compressed air is connected via a soft-start valve (gradual pressure build-up) and
- if there are electric signals (e.g. after EMERGENCY OFF).

This can cause damage to the machine or system and even injury to persons.

- Operate the valve terminal with an external pilot air supply (3 ... 8 bar). Branch the pilot air supply off upstream of the safety start-up valve (→ Fig. 4.1).

The pilot air supply must reach a pressure of 3 ... 8 bar immediately after it is switched on (dependent on the valve, → Appendix A, Fig. A.1 ... Fig. A.5). Otherwise there is no guarantee that the valve will switch directly (→ Fig. 4.1). If the pressure is less than the minimum required pilot pressure, there may be a delay before the valve reverses, despite the presence of an electric signal. The gradual pressure build-up of the overall supply does not affect the actuator in that case. The actuator would react suddenly (e.g. a cylinder would extend or retract suddenly, depending on the valve function).



- 1 Externally supplied pilot air branched before the safety start-up valve      2 Safety start-up valve (gradual pressure build-up of the complete supply)

Fig. 4.1 Example of valve-cylinder combination with gradual pressure build-up of the complete system

The table below shows the effects of gradual start-up pressurisation when there are electric signals:

External pilot air supply	Pressure rise in the overall supply	Pressure rise in the pilot air supply (12/14)	Time when a valve reverses	Movement of the actuator
branched downstream of the safety start-up valve	<b>slowly</b>	slowly	<b>after</b> pressure rise at (1)	<b>fast</b>
branched upstream of the soft-start valve	<b>slowly</b>	fast	<b>before</b> pressure rise at (1)	<b>slowly</b>

Tab. 4.1 Effects of slow start-up pressurisation

4.2      **Manual override (MO)**

The manual override has been designed to be used as follows:

Actuation type	Mode of operation
non-detenting	After actuation, the manual override is reset automatically by a spring.
turning with detent	The manual override remains actuated until it is reset by hand.

Tab. 4.2    Actuation types of the manual override

■ ■ ■      The detenting/non-detenting function of the manual override can be modified to only non-detenting actuation if a cap is fitted.

The assignment of the manual overrides to the solenoid coils is as follows:

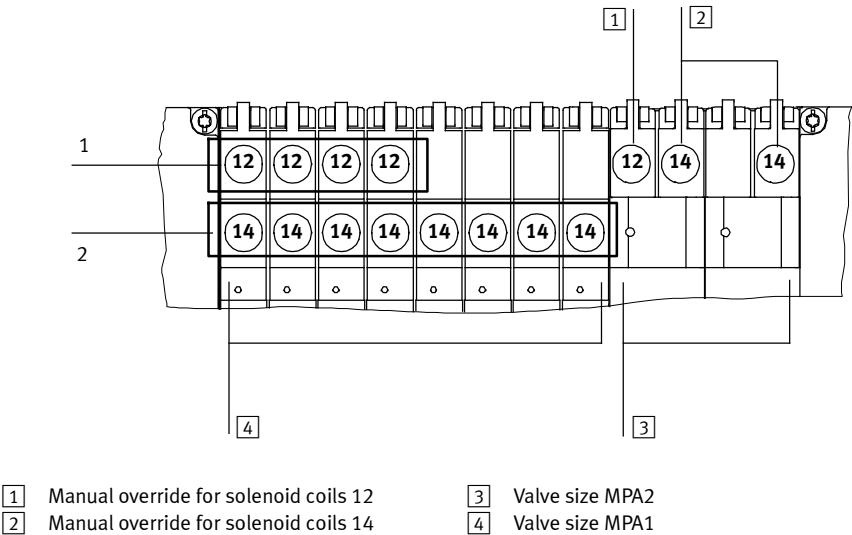


Fig. 4.2    Position of the manual overrides (top view)

### 4.3 Testing the valves and the valve/actuator combination



#### Note

Before commissioning the MPA-S valve terminal, observe the specifications concerning the medium (→ section 3.6.1 “Pilot control (pilot air supply)”).

The MPA-S valve terminal should be commissioned as follows:

Commissioning variants	Activity
Preliminary test of the pneumatic tubing connection	Checking the valve-actuator combination through manual override
Complete commissioning of the complete system	Installing and connecting the overall system. Program control via PLC/industrial PC.

Tab. 4.3 Commissioning variants

Commissioning the pneumatics by means of the manual override is described below.



Commissioning of the CPX terminal is described in the corresponding description for the CPX bus node (→ the system description of your CPX terminal, table “Descriptions of the CPX terminal”).



#### Warning

Before operating the manual override:

Uncontrolled actuation of solenoid coils can cause the actuators to perform accidental movements, which may cause personal injury and material damage.

- Disconnect the operating power supply for the solenoid coils from the corresponding connections of the MPA-S valve terminal.

This prevents accidental actuation of the solenoid coils.

Before switching on the operating voltage:

During commissioning, manual override functions which are activated can cause actuators to perform accidental movements, which can cause injury to people and material damage.

- Make sure that all manual overrides are reset to their initial position.

You will thereby avoid undefined switching states of the valves.

Proceed as follows:



#### Warning

Before testing the valve/actuator combination:

- Make sure that nobody is in the danger zone.

**Note**

A valve that has been switched by an electric signal cannot be reset by the manual override. The electric signal is dominant in this case.

- Reset the electric signal before actuating the manual override.

1. Switch on the compressed air supply.
2. Check the functioning and operation of each individual valve/actuator combination by actuating the corresponding manual override as shown in the following diagrams.

**Note**

Incorrect actuation of the non-detenting manual override can lead to malfunctioning or damage to the manual override.

- Use a screwdriver (blade width max. 3 mm) to actuate the manual override.
- Actuate the manual override with a max. of 25 N only.

3. For detenting use of the manual override: After testing the valves, check that all manual overrides are back in their initial positions.

**Caution**

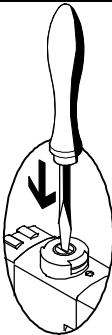
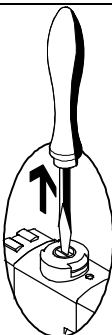
Valves with activated manual overrides can move actuators accidentally during commissioning. This can cause injury to people and material damage.

- Prior to commissioning, reset all manual overrides to their initial positions.

If the manual override is in the actuated state, it is not possible to reset the valve to its neutral position with an electric signal. The manual override is dominant in this case.

4. Switch off the compressed air supply after testing the valves.

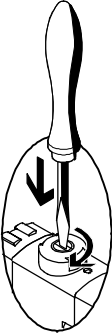
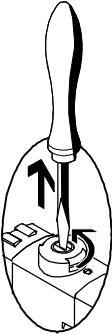


Non-detenting operation of the manual override (reset: automatic)		
Operation		Valve response
	<ul style="list-style-type: none"> <li>Use a screwdriver (max. blade width 3 mm) to press down the plunger of the manual override until the valve switches.</li> </ul> <p><b>Note:</b> In the case of manual overrides without a cap, do <b>not</b> turn the pressed-down plunger as otherwise the manual override will lock.</p>	The pilot valve switches and controls the power valve in the activated position.
	<ul style="list-style-type: none"> <li>Hold down the plunger of the MO.</li> </ul>	The power valve remains activated.
	<ul style="list-style-type: none"> <li>Remove the screwdriver.</li> </ul>	The spring force presses the plunger of the manual override into the initial position. The pilot valve returns to its neutral position and thus also the monostable power valve (not for impulse valve, ident. code J).

Tab. 4.4 Non-detenting operation of the manual override



The detenting actuation of the manual override is only possible if a manual override cap is not fitted.

<b>Detenting actuation of the manual override (manual reset)</b>		
<b>Operation</b>		<b>Valve response</b>
	<ul style="list-style-type: none"> <li>• Use a screwdriver (max. blade width 3 mm) to press down the plunger of the manual override until the valve switches.</li> <li>• Then turn the plunger in a clockwise direction one fourth of a turn.</li> </ul>	The pilot valve switches and controls the power valve in the activated position.
	<ul style="list-style-type: none"> <li>• Remove the screwdriver.</li> </ul>	The valve maintains the switching position.
	<ul style="list-style-type: none"> <li>• With the screwdriver, turn the plunger one fourth of a turn anti-clockwise.</li> <li>• Remove the screwdriver.</li> </ul>	<p>The spring force presses the plunger of the manual override into the initial position.</p> <p>The pilot valve returns to its neutral position and thus also the power valve (not for impulse valve, ident. code J).</p>

Tab. 4.5 Turning with detent actuation of the manual override

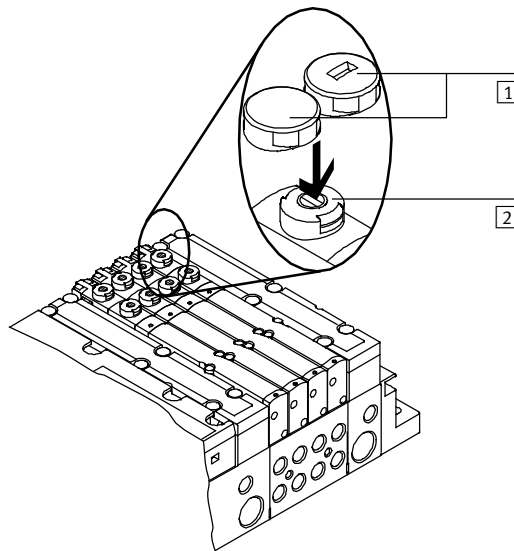
## 4.4 Mounting/removing the manual override cover cap (optional)

The detenting/non-detenting function of the manual override can be modified to only non-detenting actuation by mounting the MO cover cap.

### 4.4.1 Mounting

Proceed as follows:

1. Check that the corresponding manual override is in an unactuated status. If applicable, place a detenting manual override in the initial position (→ Tab. 4.5).
2. Place the cap on the manual override so that the snap hooks of the cover can grip into the recess on the manual override.
3. Clip the manual override cap into the recesses of the manual override (→ Fig. 4.3):



1 Manual override cover caps

2 MO

Fig. 4.3 Mounting the manual override cover caps



**Note**

The manual override cover caps serve to limit the function of the manual override and are constructed so that they can only be removed with an increased exertion of force. During dismantling, the snap hooks of the cover will be damaged.

#### 4.4.2 Dismounting

Proceed as follows:

- Use a suitable screwdriver to lift the manual override cover caps from the manual override (→ Fig. 4.4):

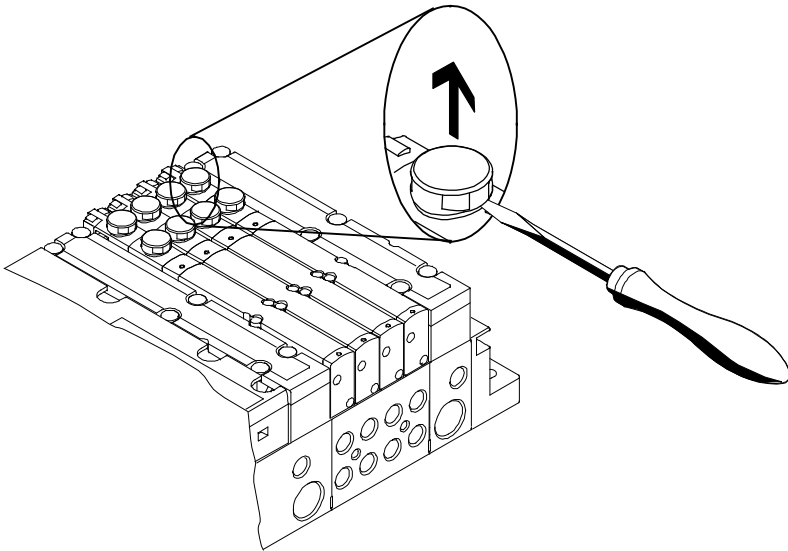
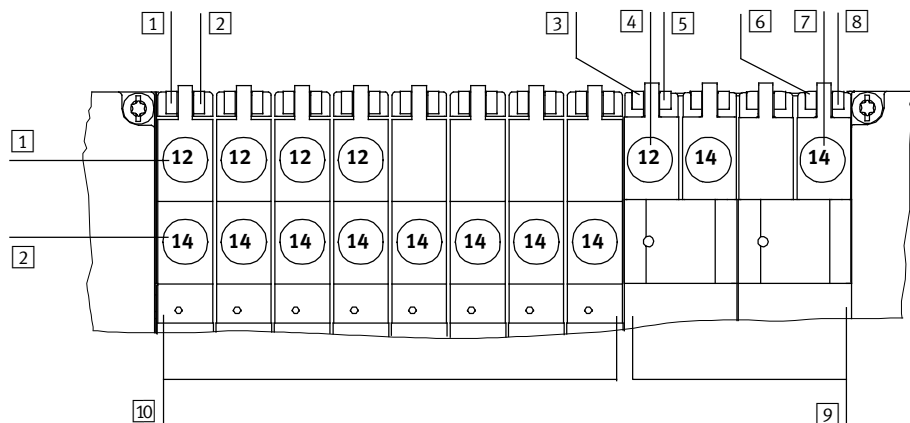


Fig. 4.4 Dismounting the manual override cover caps

## 4.5 LED display of the valves

There is an LED and a manual override (MO) for each solenoid coil. The position of the LED and MO for the corresponding solenoid coil is as follows:



- |   |   |
|---|---|
| 1 MPA1:<br>MO and red/yellow LED for solenoid coil 12 | 5 MPA2: red LED for solenoid coil 12    |
| 2 MPA1:<br>MO and red/yellow LED for solenoid coil 14 | 6 MPA2: yellow LED for solenoid coil 14 |
| 3 MPA2: yellow LED for solenoid coil 12               | 7 MPA2: MO for solenoid coil 14         |
| 4 MPA2: MO for solenoid coil 12                       | 8 MPA2: red LED for solenoid coil 14    |
|   | 9 Valve size MPA2                       |
|   | 10 Valve size MPA1                      |

Fig. 4.5 Assignment of the LEDs and manual overrides to the solenoid coils

#### 4.5.1 MPA-S valve terminal with CPX terminal or CPI connection

The two-colour LEDs on the valves have a double function.

- When illuminated yellow, the LEDs display the switching status of the solenoid coils.
- When illuminated red during operation, the LEDs indicate an error in the electronic module.

LED	Position of the valve	Correct status	Error status
Dark	– Normal position	Logic 0 (signal not present)	—
	– Activated	—	Logic 0 but MO actuated
Lights up yellow	– Activated	Logic 1 (signal is present)	—
	– Normal position	—	Logic 1 but: <ul style="list-style-type: none"> <li>– The compressed air supply is not OK or</li> <li>– The pilot exhaust is blocked or</li> <li>– Servicing required</li> </ul>
Illuminated red	– In the starting phase for approx. 2 seconds	Check phase when the supply voltage has been switched on	—
	– During operation	—	➔ Electronics description of the MPA pneumatics module
Flashing red	– During operation	—	MPA-S with electronics module VMPA...-FB-EM...-D2...: ➔ electronics description of MPA pneumatics module

Tab. 4.6 Significance of the LED display (MPA-S valve terminal with CPX terminal or CPI module)



Further instructions on commissioning and diagnosing the MPA pneumatics modules can be found in the MPA-... electronics description.

#### 4.5.2 MPA-S valve terminal with multi-pin plug connection or AS-interface

The LEDs on the valves show the switching status of the valve solenoid coils.

LED	Position of the valve	Correct status	Error status
Dark	– Normal position	Logic 0 (signal not present)	–
	– Activated	–	Logic 0 but MO actuated
Lights up yellow	– Activated	Logic 1 (signal is present)	–
	– Normal position	–	Logic 1 but: <ul style="list-style-type: none"> <li>– Operating voltage of the valves lies below the permitted tolerance range (18 V DC ... 30 V DC)</li> <li>– The compressed air supply is not OK or</li> <li>– The pilot exhaust is blocked or</li> <li>– Servicing required</li> </ul>

Tab. 4.7 Significance of the LED display (MPA-S valve terminal with multi-pin plug connection or AS-interface)

## 4.6 Commissioning instructions for the proportional pressure regulator



### Note

- Make sure there is sufficient space for the tube couplings. In this way you will prevent the tubes from being bent.
- Make sure that high-frequency radiation (e.g. from radios, mobile telephones or other interference-emitting devices) is kept away from the proportional pressure regulator. In this way you will avoid increased tolerances in the output pressure (refer to specifications on EMC in Appendix A).
- When switching off the proportional pressure regulator, make sure that first the supply pressure, then the supply voltage is switched off.
- Pressurize the proportional pressure regulator with an input pressure at least 1 bar higher than the maximum desired output pressure. An output pressure P2 proportionate to the setpoint value is then set. Tab. 4.8 shows the output pressure which is assigned to the end ranges (1 % FS or 100 % FS) of the setpoint value.



- The proportional pressure regulator interprets nominal values which are smaller than 1 % full scale as zero point switch-off, i.e. the valve is force-ventilated and therefore assumes a defined position.
- If the load voltage is switched off (for example, with EMERGENCY OFF), the last output pressure set of the proportional pressure regulator remains intact. In the medium term, the pressure at the output can increase or diminish. For the QX variant of the proportional pressure regulator, this means that the last set pressure is applied at output 2 of the sub-base. For the QZ variant of the proportional pressure regulator, the last set pressure in channel 1 applies, i.e. all valves of this pressure zone are pressurized with the last pressure set.

VPPM-...TA-...	Output pressure with signal 1 % FS <sup>1) 2)</sup>	Output pressure with signal 100 % FS <sup>1) 2)</sup>
2 bar type	0.02 bar	2 bar
6 bar type	0.06 bar	6 bar
10 bar type	0.1 bar	10 bar

1) FS = Full scale (1 % FS = 0.1 V / 100 % FS = 10 V)

2) 0 V = 0 bar

Tab. 4.8 Output signal of the proportional pressure regulator



Additional important specifications on commissioning the proportional pressure regulator, such as parameterisation, significance of the LED display, can be found in the MPA-... electronics description.



## 4.7 Error handling

### 4.7.1 Impairment of functions

After switching on the compressed air supply or when subsequently testing the individual valves, you can learn the following about the operating status of the pneumatic system:

Operating status of the pneumatic system	Error handling when the compressed air supply has been switched off
Air flows out at common-line or working-line connections	<ul style="list-style-type: none"> <li>• Check tube assembly</li> </ul>
Valve or pneumatic system does not react as expected	<ul style="list-style-type: none"> <li>• Check the installation of the tubing lines</li> <li>• Check the electric cables</li> </ul>
Valve or pneumatic system does not react	<ul style="list-style-type: none"> <li>• Bring the detenting manual override into the initial position</li> <li>• After switching on again, check the operating pressure (if necessary for each pressure zone). Set operating pressure in accordance with instructions in chapter 3.</li> <li>• Servicing required</li> </ul> <p>Valve terminals with regulated external pilot air supply:</p> <ul style="list-style-type: none"> <li>• After switching on again, check the pilot pressure (adjust in accordance with the operating pressure if necessary, → chapter 3 or Appendix A, Fig. A.1 ... Fig. A.5)</li> </ul>

Tab. 4.9 Function impairment of the pneumatic system

Operating status of the proportional pressure regulator	Possible cause	Remedy
Proportional pressure regulator does not react	Supply voltage not applied, POWER LED or display does not light up.	<ul style="list-style-type: none"> <li>• Check the 24 V DC supply voltage.</li> </ul>
	No supply pressure	<ul style="list-style-type: none"> <li>• Switch on supply pressure.</li> </ul>
	Setpoint value reached	<ul style="list-style-type: none"> <li>• Modify setpoint value.</li> </ul>
	Proportional pressure regulator defective	<ul style="list-style-type: none"> <li>• Send the valve to the Festo repair service.</li> </ul>
Flow rate too low	Restriction of the flow cross section due to connection technology (swivel fittings)	<ul style="list-style-type: none"> <li>• Use alternative connections.</li> </ul>
Pressure increase too slow	Large cylinder volume and long tube length	<ul style="list-style-type: none"> <li>• Select another parameter record.</li> </ul>

Operating status of the proportional pressure regulator	Possible cause	Remedy
Pressure constant despite modified setpoint specification	Too little supply pressure p1	<ul style="list-style-type: none"> <li>• Increase supply pressure.</li> </ul>

Tab. 4.10 Functional impairment of the proportional pressure regulator

#### 4.7.2 Operating statuses of the pneumatic system

The following requirements should be fulfilled in order to achieve the desired pneumatic operating statuses listed below:

Desired pneumatic operating status	Requirement	Comment
Zero leakage	<ul style="list-style-type: none"> <li>– Tubing connected with care</li> <li>– Regulated pilot air supply</li> </ul>	—
Fast reaction	Sufficient pressure supply by means of compressed air supply	Exhaust the MPA-S valve terminal via all exhaust plates.
Trouble-free	Non-return valves in common exhaust line	This applies when several systems with centrally ducted exhaust air are used
Two or more pressure zones	<ul style="list-style-type: none"> <li>– Limitation of the pressure zones by means of separating seals with blocked channels</li> <li>– Corresponding number of pneumatic air supply plates for supplying the different pressure zones</li> </ul>	Subsequent conversion possible (→ chapter 5)
Vacuum or low-pressure operation	Externally supplied regulated pilot air supply	Vacuum/low pressure operation not with 2x 2/2- and 2x 3/2 directional control valves (ident. code D, I, H, K, N)
EMERGENCY OFF of pressure zones	Guarantee of the controller function for the pilot air supply despite the overall supply being switched off	The controller regulates the pilot air supply to all valve sub-bases of an MPA-S valve terminal.
Slow start-up after EMERGENCY OFF	If control signals are present, the pilot air supply must be at the required level immediately after switch-on	—

Tab. 4.11 Pneumatic operating statuses

## 5 Conversion and maintenance

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## 5.1 General instructions



Information on the delivery status of your valve terminal can be found using the product key (→ section A.1.5).



### Warning

Uncontrolled movements of the connected actuator technology and loose tubing can cause injury to persons and/or damage to property.

- Before carrying out installation and maintenance work, switch off the following:
  - Compressed air supply
  - Operating and load voltage supply.



### Note

- Handle all modules and components of the MPA-S valve terminal with care.
- Note especially the following when mounting components:
  - Position screws exactly before tightening (otherwise their threads may be damaged).
  - Screws should only be tightened by hand. Screws must be placed so that the self-cutting threads can be used.
  - The specified torques must be observed.
  - Threaded fittings must be free of distortion and mechanical tension.
  - Check the seals for damage (IP 65).
  - The contact surfaces must be dry and clean (sealing effect, avoidance of leakage and contact errors).

## 5.2 Dismantling the MPA-S valve terminal

Providing the MPA-S valve terminal is easily accessible, it need not be dismantled when the following components are replaced or removed:

- Valves or blanking plates
- Electronics module
- Exhaust plates or flat plate silencer.

### 5.2.1 Disconnect the electrical connections

Alternative connections	Procedure
CPX terminal	Information for dismantling the electric connections can be found in the system description for the CPX terminal.
Multi-pin plug connection	<ul style="list-style-type: none"> <li>• Loosen the mounting screws of the SUB-D multi-pin plug and remove it.</li> </ul>

Tab. 5.1 Disconnect the electrical connections

### 5.2.2 Disconnecting the pneumatic connections



Chapter 3 describes how to disconnect the pneumatic ports.

### 5.2.3 Dismantling the MPA-S valve terminal



The procedure for dismantling the MPA-S valve terminal is described in chapter 3.

## 5.3 Maintenance of the MPA-S valve terminal

### 5.3.1 Service and maintenance measures to be executed regularly

#### Housing and mechanical system

Observe the tightening torque every six months

- of the tie rods
- of all housing screws
- of all mounting screws.

#### Electrical components

Check every six months

- the tightening torque of the screw of the earthing cable
- the correct seating of all plug connectors
- the tightening torque of the cable connectors (present with some plug connectors).

### 5.3.2 Cleaning the flat plate silencer



#### Caution

Fire risk due to highly inflammable cleaning materials

- Observe the safety regulations for handling highly inflammable cleaning materials.



#### Caution

Health hazard

- For cleaning, do not use chlorinated hydrocarbons (CHCs), such as trichloroethylene (TCE), but petrol or kerosene instead.



#### Note

Avoiding malfunctions

Dirt in the flat plate silencer can cause an increase in pressure in exhaust ducts (3) and (5).

- Clean the flat plate silencer if it is yellow/black or has a dark colour, or replace it with a new insert.

You can then guarantee faultless functioning of the flat plate silencer and avoid malfunctioning of the valves.

Proceed as follows:

1. Loosen the 6 mounting screws of the flat plate silencer and remove it from the base components.
2. Clean the flat plate silencer with petrol or paraffin.
3. Check the seal between the basis component and the flat plate silencer for damage. Replace the seal if it is damaged.
4. Fasten the flat plate silencer only with the original screws. Tighten the screws in diagonally opposite sequence with 1.0 Nm ( $\pm 10\%$ ).

### 5.3.3 Replace the flat plate silencer or the exhaust plate

Proceed as follows:

1. Loosen the 6 mounting screws of the flat plate silencer or exhaust plate and remove it from the base component.
2. Check the seal between the basis component and the surface-mounted silencer or exhaust plate for damage. Replace the seal if it is damaged.
3. Make sure that the seal is seated correctly. This is determined by guides in the flat plate silencer or in the exhaust plate.
4. Fasten the flat plate silencer or exhaust plate only with the original screws. Tighten the sub-bases in diagonally opposite sequence with 0.65 Nm ( $\pm 10\%$ ) or the flat plate silencer with 1.0 Nm ( $\pm 10\%$ ).

### 5.3.4 Replacing valves or cover plates



The sub-bases of the MPA-S valve terminal with multi-pin plug connection support actuation of one or two solenoid coils per valve position, dependent on the built-in MPA electronics module (→ Tab. 5.4).

#### Dismantling

Proceed as follows:

- Use a screwdriver with a narrow blade to loosen the mounting screws and remove the component from the sub-bases (→ Fig. 5.1).

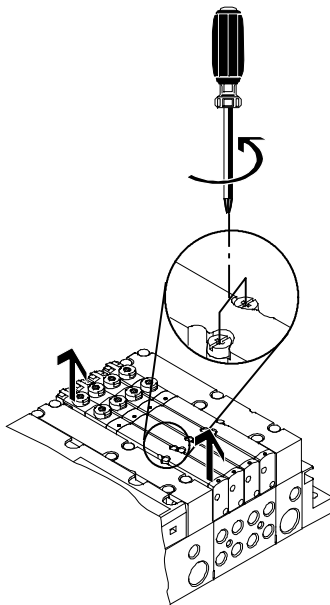
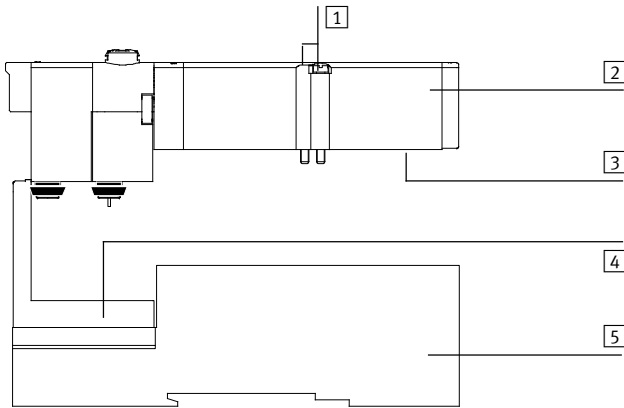


Fig. 5.1 Removing valves or cover plates

#### Mounting

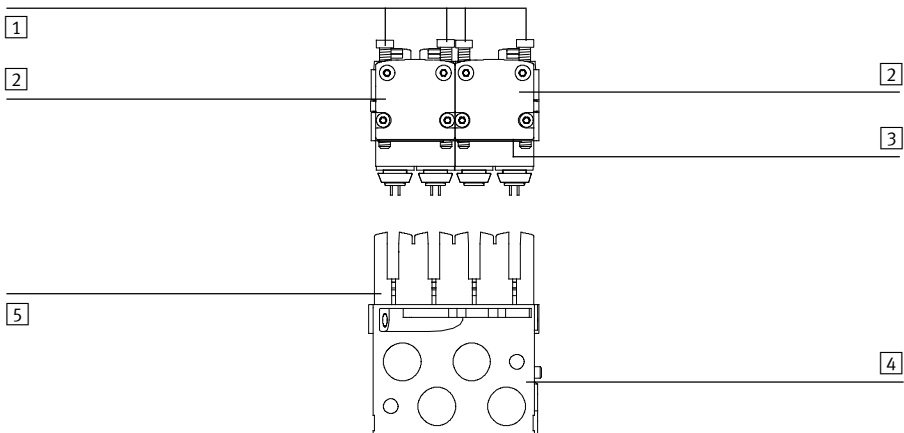
Proceed as follows:

1. Check the seal for damage.
2. Replace seals if they are damaged.
3. Make sure that the cord seal between sub-base and component is in the correct position: The cord seal must sit in the cut-out of the component.



- |   |  |   |                    |
|---|--|---|--------------------|
| 1 | Mounting screws of the valve or blanking plate | 3 | Cord seal          |
| 2 | Valve or blanking plate                        | 4 | Electronics module |
|   |  | 5 | Sub-base           |

Fig. 5.2 Mounting valve or blanking plate (MPA1)



- |   |                                  |   |                    |
|---|----------------------------------|---|--------------------|
| 1 | Mounting screws of the component | 4 | Sub-base           |
| 2 | Valve or blanking plate          | 5 | Electronics module |
| 3 | Cord seal                        |   |                    |

Fig. 5.3 Mounting valve or blanking plate (MPA2)

4. Place the component on the sub-base.



5. Screw the component at first only slightly and then tighten with the following tightening torque:

- MPA1: 0.25 Nm ( $\pm 20\%$ )
- MPA2: 0.65 Nm ( $\pm 10\%$ )

### 5.3.5 Replacing the proportional pressure regulator



Mounting of the proportional pressure regulator is described in the mounting instructions VPPM-...TA-... .

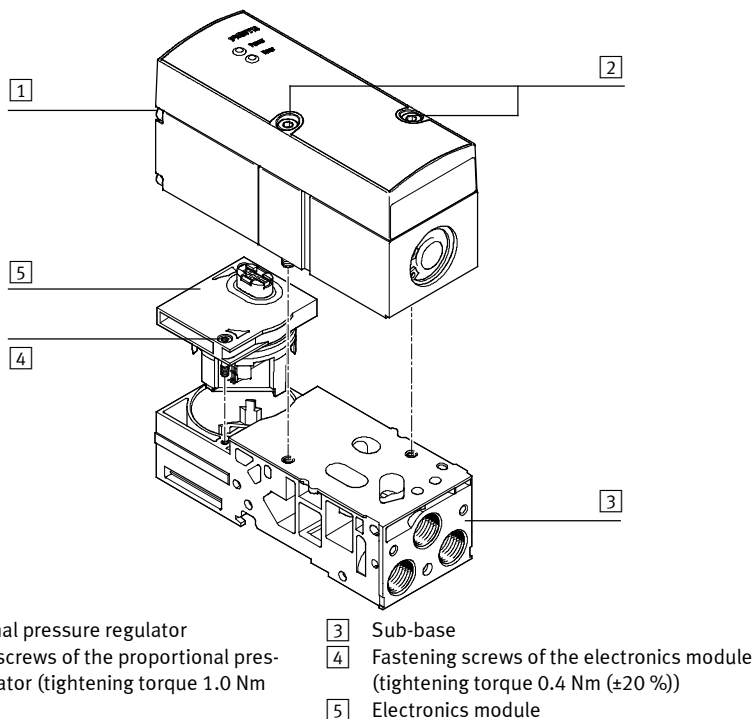


Fig. 5.4 Mounting the proportional pressure regulator and the electronics module

### 5.3.6 Replacing electronics modules



Mounting of the electronics module to the proportional pressure regulator is described in the assembly instructions VMPA-...TA-... .

The MPA-S valve terminal is equipped with one electronics module per sub-base. It provides the following number of contacts between the electrical interlinking module and the solenoid coils, dependent on the size of the sub-bases:

- for size MPA1 contacts for 4 valve positions
- for size MPA2, contacts for 2 valve positions.

An integral part of the electronics module are the LEDs (function → section 4.5) and other electronic components.



The electronics module may be damaged if it is handled incorrectly.

- Switch off the power supply before removing the electronics modules.
- Do not touch any components.
- Observe the handling specifications for electrostatically sensitive devices.
- Discharge yourself before assembling or disassembling modules to protect the modules from discharges of static electricity.



#### Caution

- Replace an electronics module only by an electronics module of the same type.

There are different designs of the electronics module, dependent on the alternative connection.

### Electronics modules for the MPA-S valve terminal with CPX terminal



#### Caution

Damage to components and operative malfunctions!

It is **not** permissible to supply voltage to MPA pneumatic modules that are equipped with electronics modules and have a common circuit via interlinking blocks of type CPX-GE-EV-V... (valve feed) or 5-pin system feed (type CPX-GE-EV-S-7/8-5POL).

- If your MPA-S pneumatics are equipped with electronics modules of type VMPA1-FB-EMS- or VMPA2-FB-EMS-, you must supply power to the MPA-S pneumatics **exclusively** via a **four-pin system supply module** of type CPX-GE-EV-S or CPX-GE-EV-S-7/8-4POL of the CPX terminal.

Observe the summary in Tab. 5.2.

Note that MPA electronics modules may only be supplied with power via the following supply modules:

MPA electronics module...	Permissible supply modules
...with <b>common</b> circuit: – VMPA1-FB-EMS-... – VMPA2-FB-EMS-...	– System supply module (M18, 4-pin): type CPX-GE-EV- <b>S</b> – System supply (7/8", 4-pin): type CPX-GE-EV-S-7/8- <b>4POL</b> MPA-S valve terminal with CPI interface: – via the CPI interface, type VMPA-CPI.
...with <b>separated</b> circuits: – VMPA1-FB-EMG-... – VMPA2-FB-EMG-...	– Valve supply modules (M18 or 7/8"): type CPX-GE-EV- <b>V</b> ... – Electric supply plate MPA-S, type VMPA-FB-SP-...-V-... – System supply modules (M18 or 7/8") <sup>1)</sup> , type CPX-GE-EV- <b>S</b> ... MPA-S valve terminal with CPI interface: – Electric supply plate MPA-S, type VMPA-FB-SP-...-V-...

1) If a 4-pin system supply is used, separation of the circuits is eliminated.

Tab. 5.2 Permissible supply modules for MPA electronics modules

In the case of MPA electronics modules with **separated** circuits of type VMPA1-FB-EMG-... or VMPA2-FB-EMG-...,  $U_{EL/SEN}$  and  $U_{VAL}$  are completely separated. In combination with the following voltage supplies, it is therefore possible to switch off the valve supply voltage at all poles:

- Interlinking block with valve supply (M18 or 7/8"), type CPX-GE-EV-**V**...
- System supply (7/8", 5-pin), type CPX-GE-EV-S-7/8-**5POL**
- Electric supply plate MPA, type VMPA-FB-SP-...-V-...



#### Note

The electrical function of an MPA pneumatic module is determined by the electronics module used, e.g.:

- electromagnetic compatibility (EMC)
- switching off of the valve supply voltage at all poles

You must unconditionally observe the instructions in the MPA-... electronics description if you wish to install an electronics module of a different type.

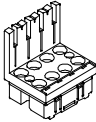
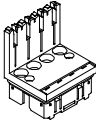
Recommendation:

Replacing electronics modules only with the same type.



The electronics modules type VMPA...-FB-... support the actuation of two solenoid coils per valve position.

The following electronics modules are available for MPA-S with CPX terminal:

Type	Description of the electronics module	
 VMPA1-FB...	VMPA1-FB-EMG-8	<ul style="list-style-type: none"> <li>– 4 valve positions/8 outputs (solenoid coils)</li> <li>– with <b>separated</b> circuits</li> </ul>
	VMPA1-FB-EMG-D2-8	<ul style="list-style-type: none"> <li>– 4 valve positions/8 outputs (solenoid coils)</li> <li>– with <b>separated</b> circuits</li> <li>– <b>with diagnostic functions D2</b></li> </ul>
	VMPA1-FB-EMS-8	<ul style="list-style-type: none"> <li>– 4 valve positions/8 outputs (solenoid coils)</li> <li>– with <b>common</b> circuit</li> </ul>
	VMPA1-FB-EMS-D2-8	<ul style="list-style-type: none"> <li>– 4 valve positions/8 outputs (solenoid coils)</li> <li>– with <b>common</b> circuit</li> <li>– <b>with diagnostic functions D2</b></li> </ul>
 VMPA2-FB...	VMPA2-FB-EMG-4	<ul style="list-style-type: none"> <li>– 2 valve positions/4 outputs (solenoid coils)</li> <li>– with <b>separated</b> circuits</li> </ul>
	VMPA2-FB-EMG-D2-4	<ul style="list-style-type: none"> <li>– 2 valve positions/4 outputs (solenoid coils)</li> <li>– with <b>separated</b> circuits</li> <li>– <b>with diagnostic functions D2</b></li> </ul>
	VMPA2-FB-EMS-4	<ul style="list-style-type: none"> <li>– 2 valve positions/4 outputs (solenoid coils)</li> <li>– with <b>common</b> circuit</li> </ul>
	VMPA2-FB-EMS-D2-4	<ul style="list-style-type: none"> <li>– 2 valve positions/4 outputs (solenoid coils)</li> <li>– with <b>common</b> circuit</li> <li>– <b>with diagnostic functions D2</b></li> </ul>

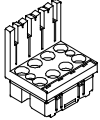
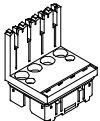
Tab. 5.3 Electronics modules for the MPA-S valve terminal with CPX terminal



Additional information on MPA electronics modules can be found in the package insert and in the corresponding MPA-.... electronics description.

**MPA-S valve terminal with multi-pin plug connection or AS interface**

The following electronics modules are available:

Type	Description of the electronics module	
 <b>VMPA1...</b>	VMPA1-MPM-EMM-8	– 4 valve positions/8 outputs (solenoid coils) <sup>1)</sup>
	VMPA1-MPM-EMM-4	– 4 valve positions/4 outputs (solenoid coils) <sup>2)</sup>
 <b>VMPA2...</b>	VMPA2-MPM-EMM-4	– 2 valve positions/4 outputs (solenoid coils) <sup>1)</sup>
	VMPA2-MPM-EMM-2	– 2 valve positions/2 outputs (solenoid coils) <sup>2)</sup>

1) **Two** solenoid coils can be controlled per valve position.

2) **One** solenoid coil can be controlled per valve position.

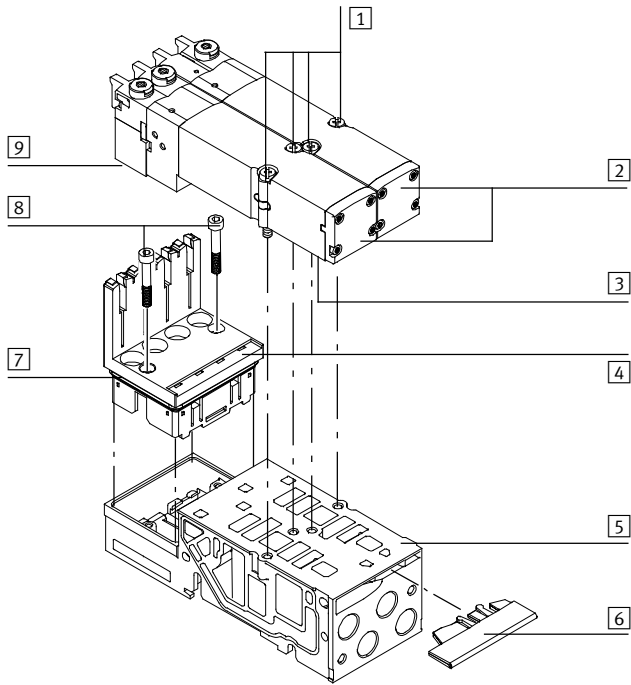
Tab. 5.4 Electronics modules for the MPA-S valve terminal with multi-pin plug connection (MPA...-MPM-...)

**Dismantling the electronics module**

Before dismantling the electronics module, all valves or blanking plates on the corresponding electronics module must first be removed (→ section 5.3.4).

Proceed as follows:

1. Loosen the screws with which the electronics module is fastened to the sub-base.
2. Pull the electronics module upwards out of the body of the sub-base.



- |   |  |   |  |
|---|--|---|--|
| 1 | Mounting screws of the valve or blanking plate | 6 | Inscription label holder                         |
| 2 | Valve or blanking plate                        | 7 | Seal of the electronics module                   |
| 3 | Cord seal                                      | 8 | Mounting screws of the electronics module        |
| 4 | Electronics module                             | 9 | 2 conical ring seals per valve or blanking plate |
| 5 | Sub-base                                       |   |  |

Fig. 5.5 Dismantling and mounting the electronics module (example MPA1)

### Mounting the electronics module



#### Caution

When replacing an electronics module, mount only an electronics module of the same type.

- You then avoid problems in actuating the solenoid coils and damage to the electrical contacts.

**Note**

Before mounting, check the condition and position of the following seals:

- The seals of the electronics module
- Ring seal of the electrical contacts
- The cord seal of the valve plates or blanking plates

Proceed as follows:

1. Place the electronics module in the sub-base and fasten it (tightening torque of the screws 0.4 Nm ( $\pm 20\%$ )).
2. Then mount the valve or blanking plates (→ section 5.3.4).

### 5.3.7 Replacing the sub-base, supply plate or MPA-S end plate

#### Dismantling

Proceed as follows:

1. Disconnect the electrical and pneumatic connections and then remove the MPA-S valve terminal from its mounting surface (→ section 3.2).
2. Place the MPA-S valve terminal on a flat working surface.
3. Loosen the screws of the component (sub-base, supply plate or end plate) you wish to remove in the sequence **3**, **2**, **1**. (→ Fig. 5.6).

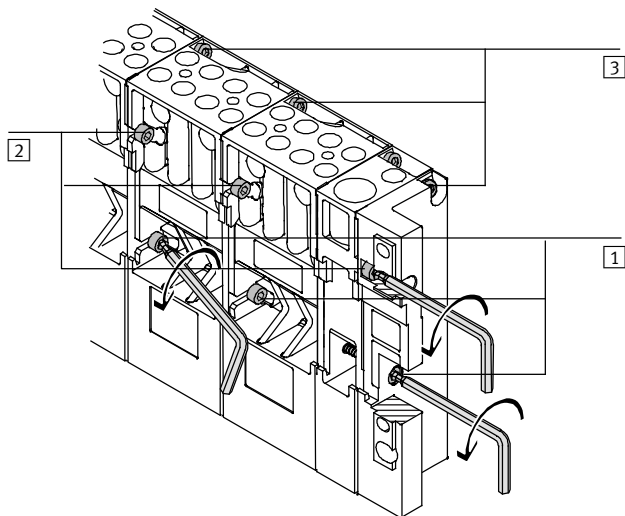


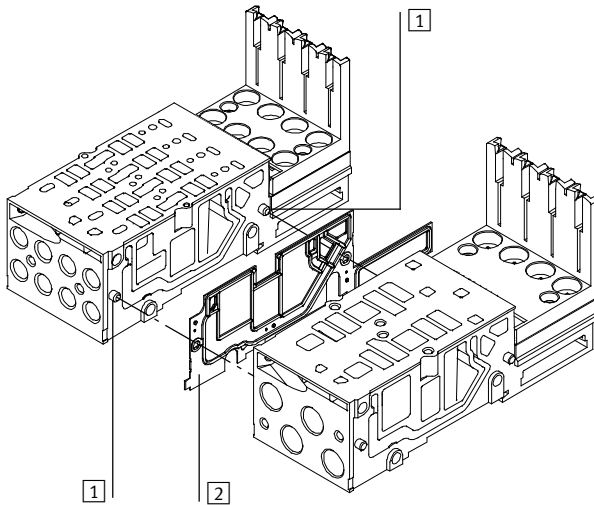
Fig. 5.6 Position of the fittings on sub-bases and the right end plate

4. Then loosen and remove the screws. Loosened sub-bases are now held together only by the electrical interlinking or by the bus.
5. Pull the corresponding component away from the adjacent component.

### Mounting

Proceed as follows:

1. Check the exposed seals for damage. Replace damaged seals.
2. Place the seal onto the guide pins of the sub-base or air supply plate.



**1** Guide pins

**2** Seal (optional separating seal for pressure zone separation)

Fig. 5.7 Sub-base mounting



3. Screw the sub-bases together. Tighten the screws hand-tight in the sequence **1**, **2**, **3** (→ Fig. 5.8). Then tighten the screws with a tightening torque of 1.8 Nm ( $\pm 10\%$ ).

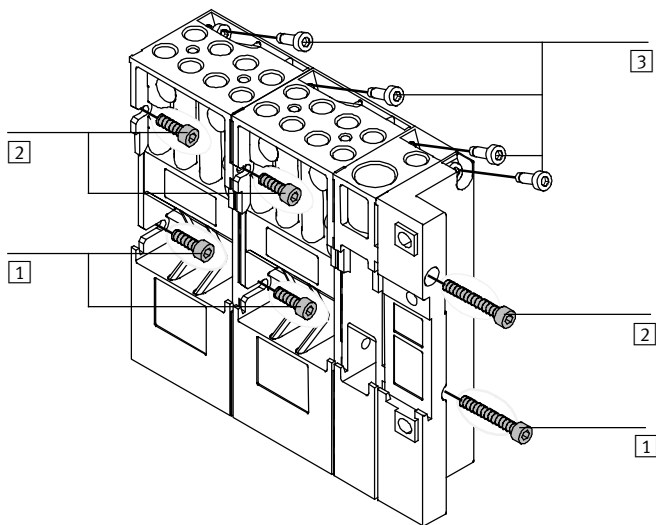
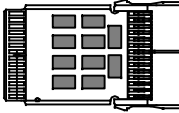
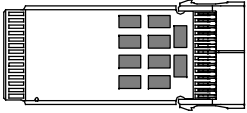
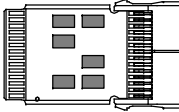
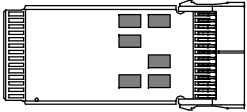
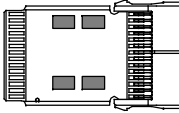
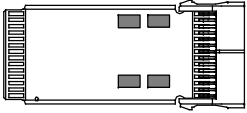


Fig. 5.8 Sub-base fittings

4. Mount the MPA-S valve terminal onto the mounting surface (→ section 3.2, “Wall mounting” or “H-rail mounting”).
5. Then install the pneumatic and electrical connections (→ chapter 3).

5.3.8 Replacing interlinking boards – MPA-S with multi-pin plug connection or AS interface

With the multi-pin plug connection, the electrical interlinking has a modular construction. That means, every sub-base has its own board. The following interlinking boards are available for the MPA-S valve terminal with multi-pin plug connection:

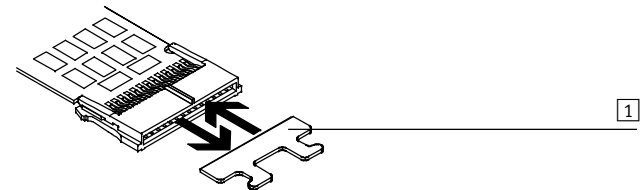
Interlinking board for ...		Design
One sub-base	One connection and one air supply plate	
Type: VMPA1-MPM-EV-AB-8 	Type: VMPA1-MPM-EV-ABV-8 	Only for size MPA1: Printed circuit board for actuating a total of 8 solenoid coils per sub-base.
Type: VMPA1-MPM-EV-AB-4 	Type: VMPA1-MPM-EV-ABV-4 	For size MPA1 and MPA2: Printed circuit board for actuating a total of 4 solenoid coils per sub-base.
Type: VMPA2-MPM-EV-AB-2 	Type: VMPA2-MPM-EV-ABV-2 	Only for size MPA2: Printed circuit board for actuating a total of 2 solenoid coils per sub-base.

Tab. 5.5 Interlinking boards type VMPA...-MPM-...

Dismantling

Proceed as follows:

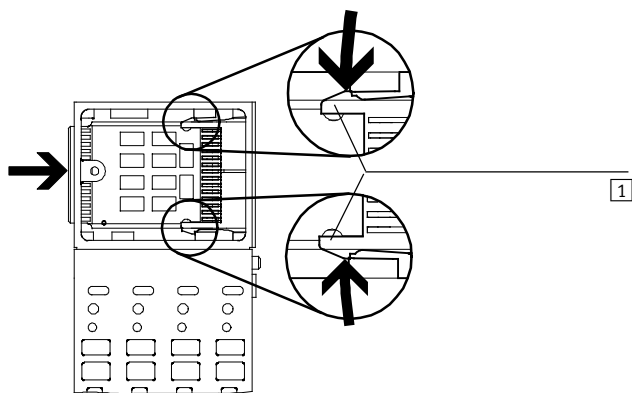
1. Loosen all valve and blanking plates on the sub-base from which you wish to remove the interlinking board (→ section 5.3.4).
2. Remove the electronics module from the sub-base (→ section 5.3.6).
3. Loosen the sub-base from the adjacent components (→ section 5.3.7).
4. If you wish to remove the last interlinking board in front of the right MPA end plate, you must remove the end piece type MPA from this interlinking board.



1 End piece type MPA

Fig. 5.9 Dismantling of the end piece from the last interlinking board

5. Loosen the corresponding interlinking board from above by unlocking the safety clips (e.g. with a small screwdriver). Then pull the interlinking board to the right out of the sub-base.



1 Locking clip

Fig. 5.10 Unlocking the interlinking board

### Mounting

Proceed as follows:

1. Push the interlinking board to be mounted into the sub-base from the right until it clips into position.

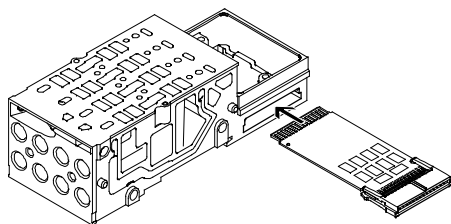
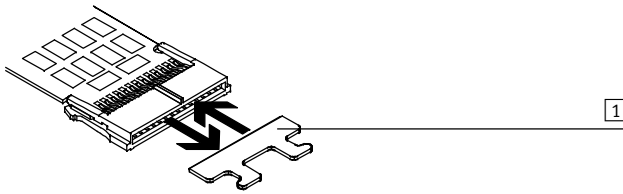


Fig. 5.11 Mounting the interlinking board

2. If the mounted interlinking board is the last one in front of the right MPA end plate, you must insert the end piece type MPA into this interlinking board.



**1** End piece type MPA

Fig. 5.12 Mounting the end piece into the last interlinking board

3. Mount the sub-base to the adjacent components (→ section 5.3.7).
4. Mount the electronics module into the sub-base (→ section 5.3.6).
5. Mount all the valves and blanking plates again onto the sub-base (→ section 5.3.4).

## 5.4 Conversion of the MPA-S valve terminal



The MPA-S valve terminal can be subsequently expanded/converted. Information on permissible possible combinations of MPA-S components can be found in the Festo Catalogue (→ [www.festo.com/catalogue](http://www.festo.com/catalogue)).

The following conversion work can be undertaken on the MPA-S valve terminal:

- Conversion between ducted and unducted exhaust air
- Conversion to internal or external pilot air supply
- Conversion to different pressure zones
- Adding valve positions (sub-bases)
- Adding supply plates to the pneumatic supplemental supply.

### 5.4.1 Conversion to internal or external pilot air supply

Pilot control can be undertaken with internal or external pilot air, dependent on the pneumatic interface or the multi-pin plug connection plate.



#### Note

Mixed operation of the MPA-S valve terminal with internal and external pilot air supply is not intended. Independent of the available pressure zones, all pilot controls of the MPA-S valve terminal are supplied with the same pilot air supply.

You can ascertain the pilot control variant for which your MPA-S is equipped by the following features listed in chapter 3, Tab. 3.5.

The following pneumatic interfaces or multi-pin plug connection plates are available for pilot control of the MPA-S valve terminal:

Variant	Pneumatics interface	Multi-pin plug connection plates	Identification features
<ul style="list-style-type: none"> <li>– Operation with internal pilot air supply</li> <li>– Ducted exhaust air</li> </ul>	VMPA...-FB-EPL-G	MPA1-MP-EPL-G / VMPA1-MPM-EPL-G	<ul style="list-style-type: none"> <li>– Sealed connection (12/14)</li> <li>– Exhaust plate</li> </ul>
<ul style="list-style-type: none"> <li>– Operation with internal pilot air supply</li> <li>– Exhausting via flat plate silencer</li> </ul>	VMPA...-FB-EPL-GU	MPA1-MP-EPL-GU / VMPA1-MPM-EPL-GU	<ul style="list-style-type: none"> <li>– Sealed connection (12/14)</li> <li>– Flat plate silencer</li> </ul>
<ul style="list-style-type: none"> <li>– Operation with external pilot air supply</li> <li>– Ducted exhaust air</li> </ul>	VMPA...-FB-EPL-E	MPA1-MP-EPL-E / VMPA1-MPM-EPL-E	<ul style="list-style-type: none"> <li>– Open connection (12/14)</li> <li>– Exhaust plate</li> </ul>
<ul style="list-style-type: none"> <li>– Operation with external pilot air supply</li> <li>– Exhausting via flat plate silencer</li> </ul>	VMPA...-FB-EPL-EU	MPA1-MP-EPL-EU / VMPA1-MPM-EPL-EU	<ul style="list-style-type: none"> <li>– Open connection (12/14)</li> <li>– Flat plate silencer</li> </ul>

Tab. 5.6 Variants of the pneumatic interface and multi-pin plug connection plate

### MPA-S valve terminal with CPX terminal



Disconnecting the CPX pneumatic interface:

- from the sub-base of the MPA-S valve terminal is described in Appendix B.
- from the CPX terminal is described in the system description of your CPX terminal.

### MPA-S valve terminal with multi-pin plug connection

To dismantle, proceed as follows:

1. Loosen the electric and pneumatic connections (→ chapter 3) and then remove the MPA-S valve terminal from the mounting surface (→ chapter 3).
2. Place the MPA-S valve terminal on a flat working surface.
3. Loosen the mounting screws between the multi-pin plug connection plate and the pneumatic sub-bases in the sequence **3**, **2**, **1** (→ Fig. 5.13).

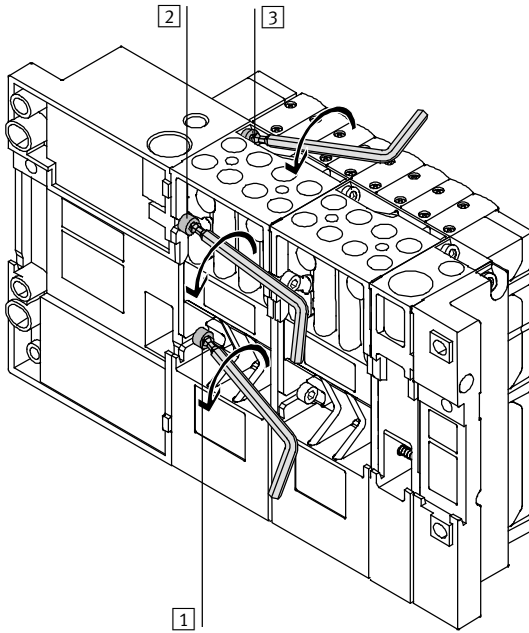
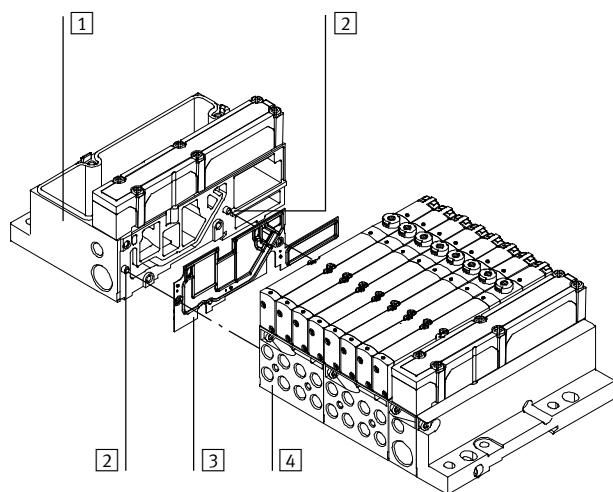


Fig. 5.13 Position of the sub-base fittings

4. Loosen and then remove the mounting screws.
5. Pull the multi-pin plug connection plate away from the pneumatic sub-bases.

For mounting, proceed as follows:

1. Check the exposed seals for damage. Replace damaged seals.
2. Place the seal onto the guide pins of the multi-pin plug connection plate.



- |   |                                 |   |                    |
|---|---------------------------------|---|--------------------|
| 1 | Multi-pin plug connection plate | 3 | Seal               |
| 2 | Guide pins                      | 4 | Pneumatic sub-base |

Fig. 5.14 Mounting the multi-pin plug connection plate

3. Push the multi-pin plug connection plate together with the pneumatic sub-bases. Make sure that the seal and the components are correctly positioned.

4. Screw the multi-pin plug connection plate to the pneumatic sub-bases. Tighten the screws in the sequence 1, 2, 3 as shown in Fig. 5.15, in the sequence 1, 2, 3, first slightly and then with 1.8 Nm ( $\pm 10\%$ ).

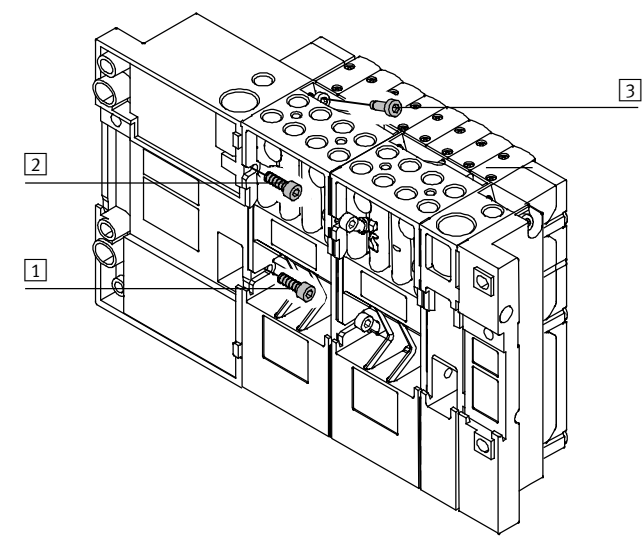


Fig. 5.16
Sub-base fittings

5. Mount the MPA-S valve terminal onto the mounting surface (wall mounting or H-rail mounting, → chapter 3).
6. Then install the pneumatic and electrical connections (→ chapter 3).

5.4.2
Conversion of the MPA-S valve terminal to different pressure zones



Basic information on pressure zone separation can be found in chapter 2 (→ section 2.4.7).

The MPA-S valve terminal can be equipped with the following number of pressure zones, depending on the alternative electrical connection:

Alternative electrical connection	Number of pressure zones
MPA-S valve terminal with CPX terminal	1 ... 8 <sup>1)</sup> or 1 ... 16 <sup>2)</sup>
MPA-S valve terminal with multi-pin plug connection	1 ... 12

- 1) Electrical supply of the valves via the CPX terminal
- 2) Electrical supply of the valves via the electric supply plate

Tab. 5.7
Number of pressure zones

The pressure zones are formed either by special sub-bases or by special separating seals (→ section 2.4.7).



The formation of pressure zones with the aid of separating seals is described subsequently.



#### Note

Note the following if the MPA-S valve terminal is subsequently extended or converted:  
The separating seals for forming pressure zones are divided into two groups  
(→ chapter 2, Tab. 2.9):

- Separating seals for MPA-S valve terminals equipped with flat plate silencers.
- Separating seals for MPA-S valve terminals equipped with exhaust plates.

For converting the valve terminal, you will require the following components for each pressure zone:

- Separating seal with pressure zone separation (→ chapter 2, Tab. 2.9)
- If not already present, one of the following pneumatic air supply units with exhaust plate or flat plate silencer:

<b>Pneumatic air supply plates for the MPA-S valve terminal with ...</b>	
<b>CPX terminal</b>	<b>Multi-pin plug connection plate</b>
VMPA...-FB-SP or VMPA...-FB-SPU	VMPA-FB-SP or VMPA-FB-SPN

Tab. 5.8 Pneumatic air supply plates

- When adding a pneumatic air supply plate:
  - MPA-S valve terminal with multi-pin plug connection:  
a correspondingly lengthened interlinking board (→ section 5.3.8).
  - Valve terminal MPA-S with CPX terminal:  
for the pneumatic air supply plate, the corresponding interlinking board type: MPA1-FB-EV-V.

### Dismantling

Proceed as follows:

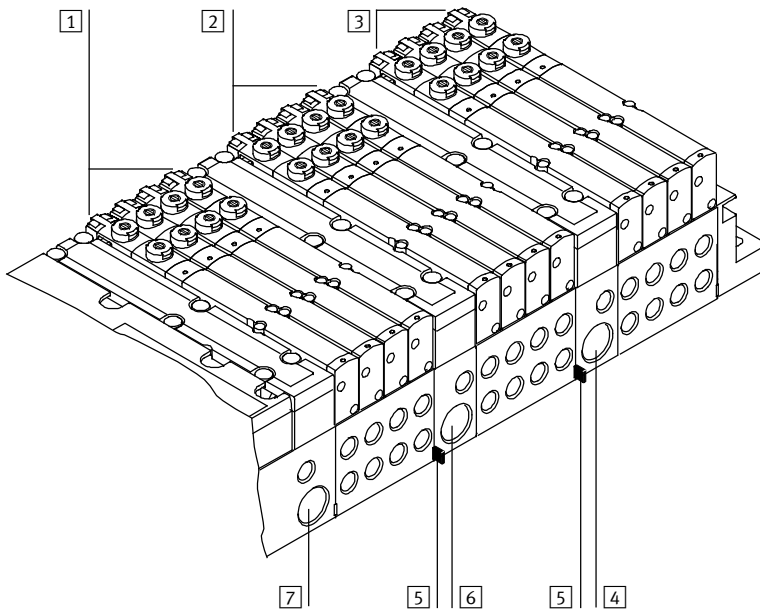
1. Loosen the electrical and pneumatic connections and then remove the MPA-S valve terminal from the mounting surface (→ chapter 3).
2. Place the MPA-S valve terminal on a flat working surface.
3. Loosen the sub-base where the separating seal for pressure zone separation is to be inserted (→ section 5.3.7).

### Mounting

Proceed as follows:

1. Insert the separating seal for the pressure zone separation.
2. If not already present, mount a corresponding pneumatic air supply plate for each of the pressure zones 2 ... 8 (→ section 5.3.7).
3. MPA-S valve terminal with multi-pin plug connection:  
A lengthened version of the interlinking board is required for bridging the pneumatic air supply plate. In the sub-base which follows the pneumatic supply plate, replace the short interlinking board with a longer version (→ section 5.3.8).
4. Mount the sub-base (→ section 5.3.7).
5. Mount the MPA-S valve terminal onto the mounting surface (→ chapter 3, “Wall mounting” or “H-rail mounting”).
6. Then install the pneumatic and electrical connections (→ chapter 3).

The following diagram shows the structure of pressure zones using as an example an MPA-S valve terminal with CPX terminal.



- |  |  |
|--|--|
| <p>1 Valve sub-bases of the 1st pressure zone</p> <p>2 Valve sub-bases of the 2nd pressure zone</p> <p>3 Valve sub-bases of the 3rd pressure zone</p> <p>4 Air supply plate with port (1) for compressed air supply to the 3rd pressure zone</p> <p>5 Marking of the separating seal with pressure zone separation</p> | <p>6 Air supply plate with port (1) for compressed air supply to the 2nd pressure zone</p> <p>7 Pneumatic interface with connection (1) for compressed air supply to the 1st pressure zone</p> |
|--|--|

Fig. 5.17 Example: MPA-S valve terminal with CPX terminal and 3 pressure zones

### 5.4.3 Adding valve positions

You can easily adapt the MPA-S valve terminal to the requirements of your machine or system by adding valve positions. The smallest extension unit is a sub-base with 4 valve positions (MPA1) or 2 valve positions (MPA2).

**MPA-S valve terminal with multi-pin plug connection**

The valve terminals can be configured with as many sub-bases as there are addresses available (→ Tab. 5.9). With these valve terminals, the maximum number of solenoid coils which can be actuated by the multi-pin plug connection is limited to 24 addresses.

If equipped exclusively with one size (MPA 1 or MPA 2) and valves with the same number of solenoid coils, this will result in the following maximum number of sub-bases:

MPA-S valve terminal	Valve positions per sub-base (n <sub>1</sub> )	Solenoid coils per valve position (n <sub>2</sub> )	Max. number of sub-bases (X <sub>max</sub> ) <sup>1)</sup>
MPA1	4	1	6
		2	3
MPA2	2	1	12
		2	6

1) Maximum number of sub-bases when exclusively equipped with one size and with valves having the same number of solenoid coils

Tab. 5.9 Maximum number of sub-bases



With 24 actuated solenoid coils, the maximum number of sub-bases X<sub>max</sub> can be calculated as follows:

$$X_{\max} = \frac{24}{(n_1 \times n_2)}$$

**MPA-S valve terminal with CPX terminal**



**Note**  
A maximum of 16 MPA sub-bases are permitted for the MPA-S valve terminal with CPX terminal and electric supply plate. Without the electric supply plate, 8 MPA sub-bases are permitted.

For expansion, you will require the following components:

Components	MPA-S valve terminal with ...	
	CPX terminal	Multi-pin plug connection
One sub-base per: – MPA1: 4 valve positions – MPA2: 2 valve positions	VMPA1-FB-AP-4-1 <sup>1)</sup> or VMPA1-FB-AP-4-1-... <sup>2)</sup> VMPA2-FB-AP-2-2 <sup>1)</sup> or VMPA2-FB-AP-2-2-... <sup>2)</sup>	
One electronics module per sub-base	→ Tab. 5.3	→ Tab. 5.4
Valve or blanking plates: – MPA1: 4 per sub-base – MPA2: 2 per sub-base	VMPA1-M1H-... or VMPA1-RP VMPA2-M1H-... or VMPA2-RP	
Possibly additional pneumatic air supply plate: – With exhaust plate – With flat plate silencer	VMPA...-FB-SP VMPA...-FB-SPU	
If necessary, additional electric supply plate: – With plug M18 – With plug 7/8" (4-pin) – With plug 7/8" (5-pin)	VMPA-FB-SP-V VMPA-FB-SP-7/8-V-4POL VMPA-FB-SP-7/8-V-5POL	—
For each added sub-base or pneumatic air supply plate, the corresponding interlinking boards: – Interlinking board for sub-base – Interlinking boards for pneumatic air supply plate	VMPA1-FB-EV-AB VMPA1-FB-EV-V	→ Tab. 5.5
For each added sub-base or pneumatic air supply plate, the corresponding seal or separating seal	→ chapter 2, Tab. 2.9	

1) Sub-bases **without** pressure zone separation

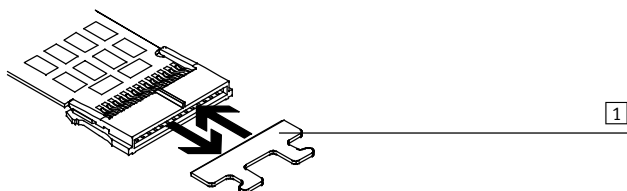
2) Sub-bases **with** pressure zone separation in channel (1) (→ also chapter 2, Tab. 2.9).

#### Tab. 5.10 Valve position extension

### Dismantling

Proceed as follows:

1. Loosen the MPA-S valve terminal from the mounting surface (→ chapter 3).
2. Dismantle the sub-base or air supply plate at the point where you wish to extend the terminal (→ section 5.3.7).
3. Only MPA-S valve terminal with multi-pin plug connection:  
If you wish to mount a further sub-base to the last sub-base before the right MPA end plate, you must remove the end piece type MPA from the last interlinking board (→ Fig. 5.18)



1 End piece type MPA

Fig. 5.18 Removing/mounting the end piece of the last interlinking board

### Mounting

Proceed as follows:

1. Mount the new sub-base and another pneumatic air supply plate, if applicable (→ section 5.3.7).
2. Only MPA-S valve terminal with multi-pin plug connection:  
If the added sub-base is the last one in front of the right MPA end plate, insert the type MPA end piece into the last interlinking board (→ Fig. 5.18).
3. Mount the valve or blanking plates onto the empty valve positions (→ section 5.3.4).
4. Mount the MPA-S valve terminal onto its mounting surface (→ chapter 3 “Wall mounting” or “H-rail mounting”).
5. Then install the pneumatic and electrical connections (→ chapter 3).



#### Note

If a sub-base is inserted between existing sub-bases, the address assignment of all valves to the right of the inserted sub-base will be shifted.

#### 5.4.4 Adding an electric supply plate (only for MPA-S valve terminal with CPX terminal or CPI interface)

The electric supply plate is intended as an intermediate supplier of load voltage for the valves.

**Note**

Damage to components and malfunctions!

Please note, ...

- that with valve terminals of type MPA-S with more than 8 sub-bases, an electric supply plate is required for supplemental supply of load voltage.
- that to the right of the electric supply plate, only electronics modules with separated circuits of type VMPA...-FB-EMG... are permitted (→ also chapter 5.3.6). If your MPA-S valve terminal is only equipped with electronics modules with a common circuit (type VMPA...-FB-EMS...), you can supply the pneumatics as follows:
  - for valve terminals with CPX terminal: exclusively via an interlinking block with 4-pin system supply, type CPX-GE-EV-S or CPX-GE-EV-S-7/8-4POL of the CPX terminal.
  - for valve terminals with CPI interface: through the CPI interface of type VMPA-CPI.
- that the electric supply plate must not be installed directly to the left of a pneumatic air supply plate (type VMPA1-FB-SP...).
- that you do not touch the electrostatically sensitive contact surfaces of the plug connectors on the side of the electric supply plate.

For expansion you will need:

Components	Type
One of the following MPA electric supply plates	
– With plug M18, (3-pin)	VMPA-FB-SP-V
– With plug 7/8" (4-pin)	VMPA-FB-SP-7/8-V-4POL
– With plug 7/8" (5-pin)	VMPA-FB-SP-7/8-V-5POL
Also, a seal without channel separation or a separating seal with channel separation	→ chapter 2, Tab. 2.9

Tab. 5.11 Electric supply plates

**Mounting**

Proceed as follows:

1. Loosen the electric and pneumatic connections and then remove the MPA-S valve terminal from its mounting surface (→ chapter 3).
2. Mount the electric supply plate as described in the VMPA-FB-SP-...-V-... assembly instructions.
3. Mount the MPA-S valve terminal onto the mounting surface (→ chapter 3, "Wall mounting" or "H-rail mounting").
4. Then install the pneumatic and electrical connections (→ chapter 3).

### 5.4.5 Adding a pressure sensor plate

For expansion you will need:

Components	Type
One of the subsequent pressure sensor plates:	
– For displaying the operating pressure in channel (1)	VMPA-FB-PS-1
– For displaying the pressure in exhaust ducts (3) and (5)	VMPA-FB-PS-3/5
– For displaying an external pressure (P1)	VMPA-FB-PS-P1
Also, a seal without channel separation or a separating seal with channel separation	➔ chapter 2, Tab. 2.9

Tab. 5.12 Pressure sensor plates

### Mounting

Proceed as follows:

1. Loosen the electric and pneumatic connections and then remove the MPA-S valve terminal from its mounting surface (➔ chapter 3).
2. Mount the pressure sensor plate as described in the mounting instructions VMPA-FB-PS-...-... .
3. Mount the MPA-S valve terminal onto the mounting surface (➔ chapter 3, “Wall mounting” or “H-rail mounting”).
4. Then install the pneumatic and electrical connections (➔ chapter 3).

### 5.4.6 Adding a proportional pressure regulator

For expansion you will need:

Components	Type
Proportional pressure regulator	VPPM-...TA-L-1-F-0L...
Electronics module	VMPA-FB-EMG-P1
Sub-base	VMPA-FB-AP-P1
Interlinking board	MPA
Also, a seal without channel separation or a separating seal with channel separation	➔ Tab. 2.9

Tab. 5.13 Components of the proportional pressure regulator

### Dismantling

Proceed as follows:

1. Loosen the electric and pneumatic connections and then remove the MPA-S valve terminal from its mounting surface (➔ chapter 3).
2. Dismantle the sub-base or air supply plate at the point where you wish to extend the terminal (➔ section 5.3.7).

### Mounting

Proceed as follows:

1. Then proceed logically as described in the section 5.3.7, under Mounting point 1 ... 3.
2. Mount the proportional pressure regulator as described in the mounting instructions VMPA-...TA-... .
3. Mount the MPA-S valve terminal onto the mounting surface (→ chapter 3, “Wall mounting” or “H-rail mounting”).
4. Then install the pneumatic and electrical connections (→ chapter 3).

## 5.5 De-commissioning and disposal

Observe the instructions on dismantling in chapter 3.

### Disposal



Observe the local regulations for environmentally appropriate disposal of electronic modules.

The product is RoHS-compliant.



**A            Technical appendix**

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## A.1 Technical data

### A.1.1 General


Mechanical	
Weight	
Pneumatic interface or multi-pin plug connection plate (with exhaust plate/flat plate silencer)	324 g/315 g
CPI sub-base (with exhaust plate/flat plate silencer)	427 g/418 g
AS-interface (with exhaust plate/flat plate silencer)	396 g/360 g
Per sub-base (with seal, electronics module, electrical interlinking module, inscription label holder, screws)	185 g
Per pneumatic air supply plate (with seal, electrical interlinking module, screws, exhaust plate/flat plate silencer)	120 g/111 g
Per electrical air supply plate (with seal, electrical interlinking module, screws)	200 g
Per pressure sensor plate	200 g
Per proportional pressure regulator with sub-base and electronics module)	Approx. 575 g
Per complete CPX module	Approx. 210 g
Left end plate (CPX terminal)	Approx. 80 g
Right end plate (MPA-S)	55 g
Per valve (MPA1/MPA2)	Approx. 56 g/approx. 100 g
Per cover plate (MPA1/MPA2)	24 g/44 g
Per pressure regulator plate (MPA1/MPA2)	100 g/180 g

Tab. A.1 Technical data: mechanical

<b>Mechanical</b>	
<b>Materials</b>	
Piston spool valve, sub-bases, supply plates and end plates	Al
Polymer poppet valve	Reinforced PPA
Electronics module	POM/polycarbonate
Multi-pin plug connection	Polyamide 6
Seals	Elastomer, NBR
Cover of the proportional pressure regulator	PAXMD6-GF50/gr-P; PA6-GB20, GF10/gr-P
<b>Tightening torques (M<sub>A</sub>)</b>	
Electronics modules on sub-bases	0.4 Nm (±20 %)
Proportional pressure regulator on sub-base	2.0 Nm (±20 %)
Exhaust plates	0.65 Nm (±10 %)
Flat plate silencer	1.0 Nm (±10 %)
Mounting of sub-bases, electric and pneumatic supply plates (linking)	1.8 Nm (±10 %)
Board in multi-pin plug connection plate	1.0 Nm (±10 %)
Multi-pin hood on multi-pin plug connection plate	0.65 Nm (±10 %)
Mounting bracket on sub-bases or air supply plates	1.8 Nm (±10 %)
Retaining screw for H-rail clamping unit	1.30 Nm
Components on sub-bases (valve, blanking plate or pressure regulator)	MPA1: 0.25 Nm (±10 %) MPA2: 0.65 Nm (±10 %)

Tab. A.2 Technical data: mechanical

**A.1.2      Operating and environmental conditions**



**Note**

The valves can be used at temperatures up to –5 °C. In order to prevent the condensate and humidity from freezing, we recommend installation of a dryer, with which condensate and humidity can be removed.

Ambient conditions	
Permitted temperature range	
Long-term storage	–20 ... +40 °C
Operation	–5 ... +50 °C
Medium	–5 ... +50 °C
Relative air humidity	90 % at 40 °C
Protection class to EN 60529	IP 65 (with cable from Festo accessories)
Corrosion protection	KBK1 (as per FN940070)
Mounting position	any, with H-rail mounting only horizontal

Tab. A.3    Technical data: ambient conditions

<b>Vibration and shock resistance <sup>1) 2)</sup></b>	
Vibration	<p>Checked as per IEC/EN60068 part 2 ... 6,  For horizontal H-rail mounting: severity level 1  For wall mounting: MPA-S valve terminal with CPX terminal:</p> <ul style="list-style-type: none"> <li>– up to a length of 280 mm between the pneumatic interface and right end plate, without additional fastening: severity level 2</li> <li>– from a length of 280 mm between the pneumatic interface and right end plate, with additional fastening at the pneumatic air supply plates: severity level 2</li> </ul> <p>For wall mounting: Valve terminal MPA-S with CPI, ASI or multi-pin plug connection:</p> <ul style="list-style-type: none"> <li>– up to a valve terminal length of 280 mm, without additional fastening: severity level 2</li> <li>– from a valve terminal length of 280 mm, with at least one additional fastening in the centre of the valve terminal at the pneumatic air supply plate: severity level 2</li> </ul>
Shock	<p>Checked as per IEC/EN60068 part 2 ... 27,  For horizontal H-rail mounting: severity level 1  For wall mounting: MPA-S valve terminal with CPX terminal:</p> <ul style="list-style-type: none"> <li>– up to a length of 280 mm between the pneumatic interface and right end plate, without additional fastening: severity level 2</li> <li>– from a length of 280 mm between the pneumatic interface and right end plate, with additional fastening at the pneumatic air supply plates: severity level 2</li> </ul> <p>For wall mounting: Valve terminal MPA-S with CPI, ASI or multi-pin plug connection:</p> <ul style="list-style-type: none"> <li>– up to a valve terminal length of 280 mm, without additional fastening: severity level 2</li> <li>– from a valve terminal length of 280 mm, with at least one additional fastening in the centre of the valve terminal at the pneumatic air supply plate: severity level 2</li> </ul>
Continuous shock	<p>Checked as per IEC/EN60068 part 2 ... 29,  For wall and H-rail mounting: severity level 1</p>

1) Specifications on vibration and shock resistance of the CPX terminal can be found in the CPX system description

2) Explanations of the severity levels → Tab. A.5

Tab. A.4 Technical data: vibration and shock resistance

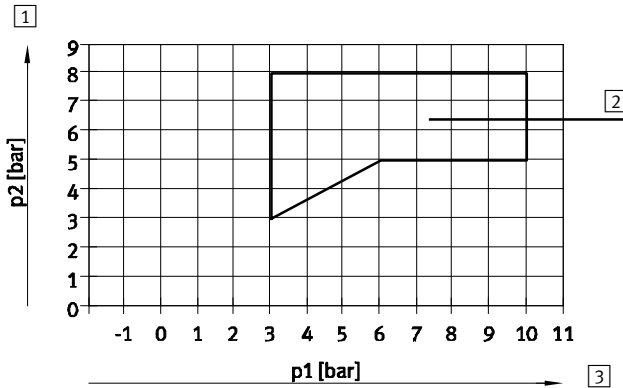
Explanations of vibration and shock – severity level	
<b>Severity level 1</b> (SL1, as per IEC/EN 60068, part 2 – 29)	Vibration: 0.15 mm path at 10 ... 58 Hz; 2 g acceleration at 58 ... 150 Hz
	Shock: ±15 g at 11 ms duration; 5 shocks per direction
	Continuous shock: ±15 g at 6 ms duration; 1000 shocks per direction
<b>Severity level 2</b> (SL2, as per IEC/EN 60068, part 2 – 27)	Vibration: 0.35 mm path at 10 ... 60 Hz; 5 g acceleration at 60 ... 150 Hz
	Shock: ±30 g at 11 ms duration; 5 shocks per direction
	Continuous shock: —

Tab. A.5    Technical data: explanation on vibration and shock resistance (severity level)

**A.1.3 Pneumatics**

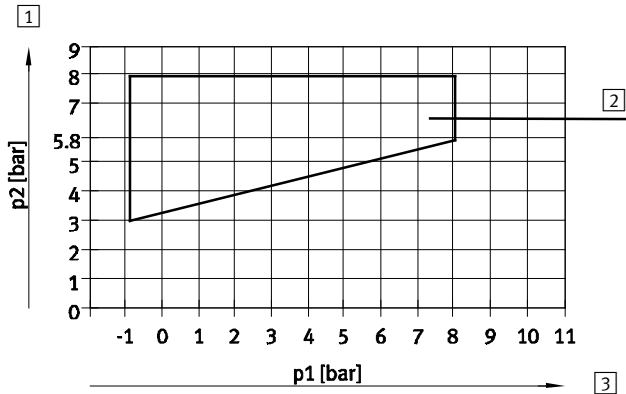
<b>Solenoid valves</b>	
Operating/pilot medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]
Notes on the operating/pilot medium	Lubricated operation possible (in which case lubricated operation will always be required)
Design	<ul style="list-style-type: none"> <li>– Valve sub-bases with piston spool valves</li> <li>– Valve sub-bases with poppet valves</li> </ul>
Manual override	Non-detenting or turning with detent
Operating pressure/pilot pressure	
– Valves with <b>internal pilot air supply</b> (branched from connection (1))	
All valve sub-bases on port (1)	The pressure at the connection (1) must lie within the range of the required pilot pressure of the valves. (→ diagrams Fig. A.1 ... Fig. A.5, max. 8 bar)
– Valves with <b>external pilot air supply</b>	
Valve position Ident code B, E, G, J and M at port (1)	–0.9 ... 10 bar
Valve position Ident. code DS, HS, KS, MS and NS at port (1)	–0.9 ... 8 bar
Valve position Ident. code W at port (2)	–0.9 ... 10 bar
Valve position Ident. code X at port (4)	–0.9 ... 10 bar
Valve position Ident. code D, H, I, K and N at port (1)	3 ... 10 bar
Valve position Ident. code MU, NU, KU, and HU at port (1)	–0.9 ... 10 bar
All valve sub-bases at port (12/14)	→ Diagrams Fig. A.1 ... Fig. A.5, pressure P2 (max. 8 bar)

Tab. A.6 Technical data: solenoid valves



- 1 Pressure of the pilot air supply at port (12/14) [bar]
 2 Work range
 3 Operating pressure at port (1) [bar]

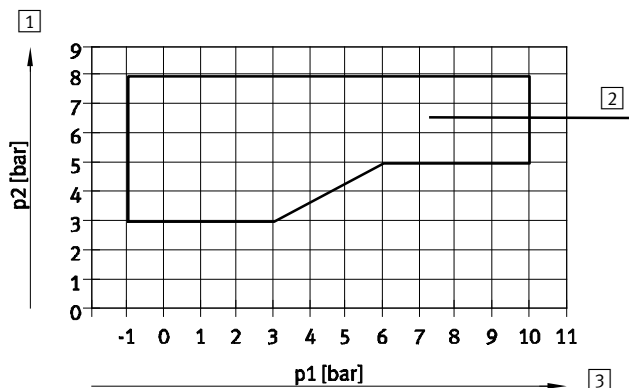
Fig. A.1 Diagram: Required pilot pressure related to the operating pressure with use of valve sub-bases with ident. code D, H, I, K and N



- 1 Pressure of the pilot air supply at port (12/14) [bar]
 2 Work range
 3 Operating pressure at port (1) [bar]

Fig. A.2 Diagram: Required pilot pressure related to the operating pressure with use of valve sub-bases with ident. code DS, HS, KS, MS and NS, width 10 mm



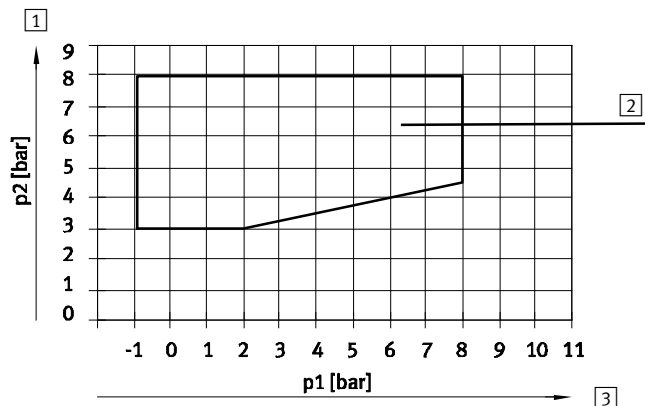


1 Pressure of the pilot air supply at port  
(12/14) [bar]

2 Work range

3 Operating pressure at port (1) [bar]

Fig. A.3 Diagram: Required pilot pressure related to the operating pressure with use of valve sub-bases with ident. code B, E, G, J, M, W and X

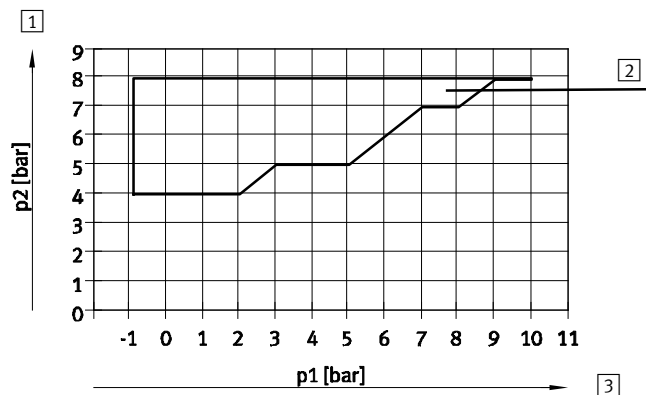


1 Pressure of the pilot air supply at port  
(12/14) [bar]

2 Work range

3 Operating pressure at port (1) [bar]

Fig. A.4 Diagram: Required pilot pressure related to the operating pressure with use of valve sub-bases with ident. code DS, HS, KS, MS and NS, width 20 mm



- 1** Pressure of the pilot air supply at port (12/14) [bar]      **2** Work range  
**3** Operating pressure at port (1) [bar]

Fig. A.5      Diagram: Required pilot pressure related to the operating pressure with use of valve sub-bases with ident. code MU, NU, KU and HU



The fittings of the pneumatic ports cause a reduction in the nominal flow rate of the valves.

<b>Standard nominal flow rates MPA1 (width 10 mm)</b>			
<b>Ident. code <sup>1)</sup></b>	<b>Valve</b>	<b>Standard nominal flow rates [l/min], measured with fitting QS-M7-6-I</b>	
		<b>1 → 2 or 1 → 4 <sup>2)</sup></b>	<b>2 → 3/5 or 4 → 3/5 <sup>2)</sup></b>
M, MS, J	5/2-way	360	360
MU	5/2-way	190 (1 → 2)/160 (1 → 4)	190 (2 → 3)/160 (4 → 5)
B	5/3-way, pressurized	300 (220) <sup>3)</sup>	270
G	5/3-way, closed	320	320
E	5/3-way, exhausted	240	240 (200) <sup>3)</sup>
H	2x 3/2-way	300	300
HS	2x 3/2-way	300	305
K, KS	2x 3/2-way	230	310
N, NS	2x 3/2-way	300	300
KU	2x 3/2-way	160	170
NU	2x 3/2-way	190	160
HU	2x 3/2-way	190 (1 → 2)/160 (1 → 4)	160 (2 → 3)/170 (4 → 5)
W, X	1x 3/2-way	255	295
D, DS	2x 2/2-way	230	—
I	2x 2/2-way	260	260

1) Ident. code of the valve sub-base

2) Flow direction 1 → 4 or 4 → 3/5 not with valves having ident. codes I, W and X

3) Values for the mid-position are specified in brackets

Tab. A.7 Technical data: nominal flow rates MPA1

Standard nominal flow rates MPA2 (width 20 mm)					
Ident. code <sup>1)</sup>	Valve	Standard nominal flow rates [l/min] measured,			
		without fitting		with fitting QS-G <sup>1</sup> / <sub>8</sub> -I	
		1 → 2 or 1 → 4 <sup>2)</sup>	2 → 3/5 or 4 → 3/5 <sup>2)</sup>	1 → 2 or 1 → 4 <sup>2)</sup>	2 → 3/5 or 4 → 3/5 <sup>2)</sup>
M, MS, J	5/2-way	700	700	670	670
B	5/3-way, pressurized	520	650 (350) <sup>3)</sup>	510	600 (350) <sup>3)</sup>
G	5/3-way, closed	630	630	610	610
E	5/3-way, exhausted	610	440 (350) <sup>3)</sup>	590	420 (350) <sup>3)</sup>
H, HS, N, NS	2x 3/2-way	560	490	550	480
K, KS	2x 3/2-way	500	560	500	540
W, X	1x 3/2-way	500	590	470	560
D, DS	2x 2/2-way	680	—	650	—
I	2x 2/2-way	680	500	650	500

1) Ident. code of the valve sub-base

2) Flow direction 1 → 4 or 4 → 3/5 not with valves having ident. codes I, W and X

3) Values for the mid-position are specified in brackets

Tab. A.8 Technical data: nominal flow rates MPA2

Valve switching times MPA1 (width 10 mm)			
Ident. code <sup>1)</sup>	Valve	Valve switching times [ms]	
		(Measuring method 0 ... 10 % as per FN 942032)	
		On/changeover	Off
M	5/2-way, monostable	10	20
MS	5/2-way, monostable	10	27
MU	5/2-way, monostable	10	12
J	5/2-way, bistable	10/15	—
B, G, E	5/3-way valves	10	35
H, K, N	2x 3/2-way	10	20
HS, KS, NS	2x 3/2-way	14	16
KU, HU	2x 3/2-way	8	10
NU	2x 3/2-way	8	8
W, X	1x 3/2-way	10	20
D, I	2x 2/2-way	10	20
DS	2x 2/2-way	14	16

1) Ident. code of the valve sub-base

Tab. A.9 Technical data: valve switching times MPA1

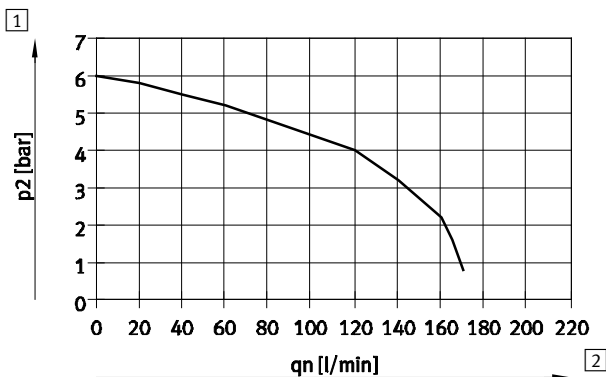
Valve switching times MPA2 (width 20 mm)			
Ident. code <sup>1)</sup>	Valve	Valve switching times [ms] (Measuring method 0 ... 10 % as per FN 942032)	
		On/changeover	Off
M	5/2-way, monostable	15	28
MS	5/2-way, monostable	8	36
J	5/2-way, bistable	9/22	—
B	5/3 directional control valves, pressurized	11/23	46
G	5/3-way, closed	10/21	40
E	5/3-way, exhausted	11/23	47
H, K, N	2x 3/2-way	8	28
HS, KS, NS	2x 3/2-way	12	25
W, X	1x 3/2-way	13	22
D, I	2x 2/2-way	7	25

1) Ident. code of the valve sub-base

Tab. A.10 Technical data: valve switching times MPA2

## Pressure regulator plates

### P pressure regulator MPA1

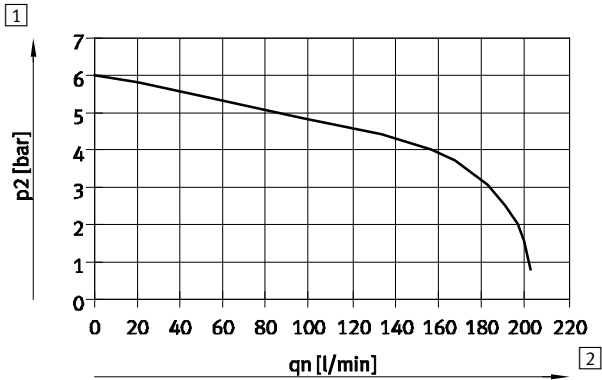


1 Output pressure

2 Flow rate

Fig. A.6 Diagram on size MPA1 of the P pressure regulator (ident. code: PF and PA): flow as a function of the output pressure

### B pressure regulator MPA1

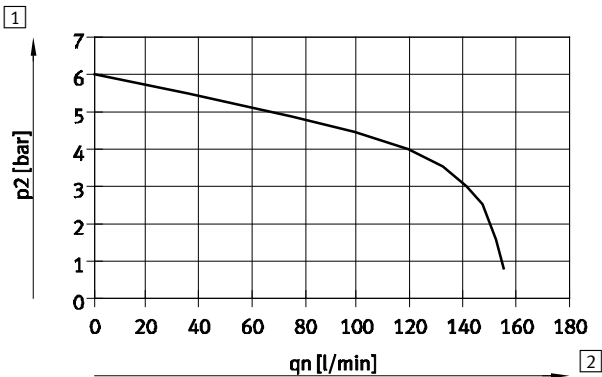


1 Output pressure

2 Flow rate

Fig. A.7 Diagram on size MPA1 of the B pressure regulator (ident. code: PH and PC): flow as a function of the output pressure

### A pressure regulator MPA1

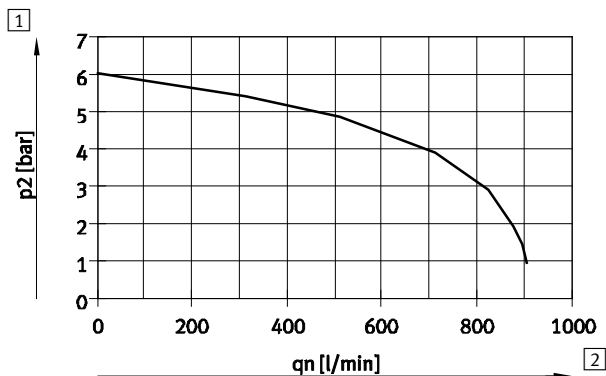


1 Output pressure

2 Flow rate

Fig. A.8 Diagram on size MPA1 of the B pressure regulator (ident. code: PG and PB): flow as a function of the output pressure

### P pressure regulator MPA2

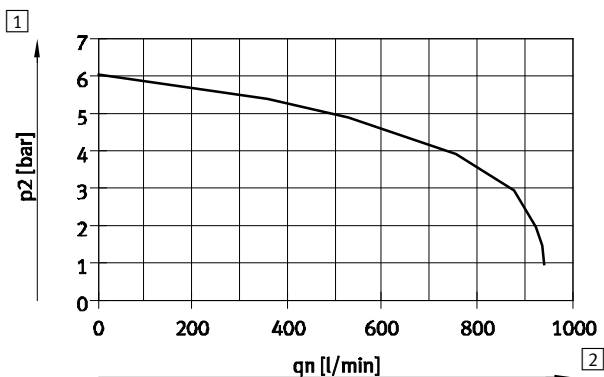


1 Output pressure

2 Flow rate

Fig. A.9 Diagram on size MPA2 of the P pressure regulator (ident. code: PF and PA): flow as a function of the output pressure

### B pressure regulator MPA2

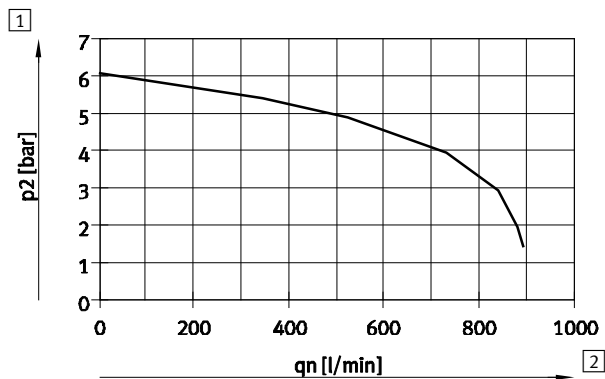


1 Output pressure

2 Flow rate

Fig. A.10 Diagram on size MPA2 of the B pressure regulator (ident. code: PH and PC): flow as a function of the output pressure

### A pressure regulator MPA2

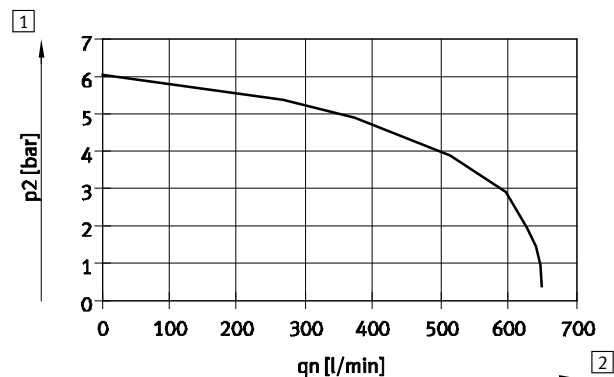


1 Output pressure

2 Flow rate

Fig. A.11 Diagram on size MPA2 of the B pressure regulator (ident. code: PG and PB): flow as a function of the output pressure

### Reversible B pressure regulator MPA2



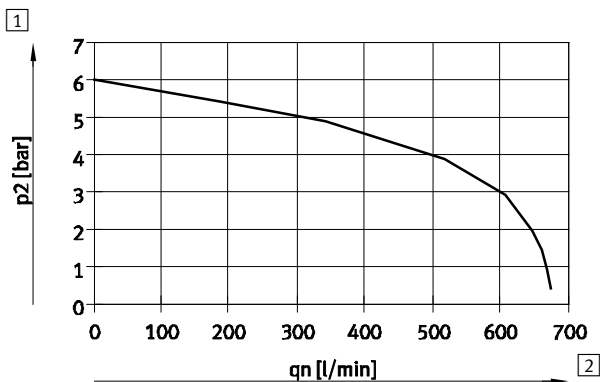
1 Output pressure

2 Flow rate

Fig. A.12 Diagram for size MPA2 of the reversible B pressure regulator (ident. code: PN and PL): Flow as a function of the output pressure



# **Reversible A pressure regulator MPA2**



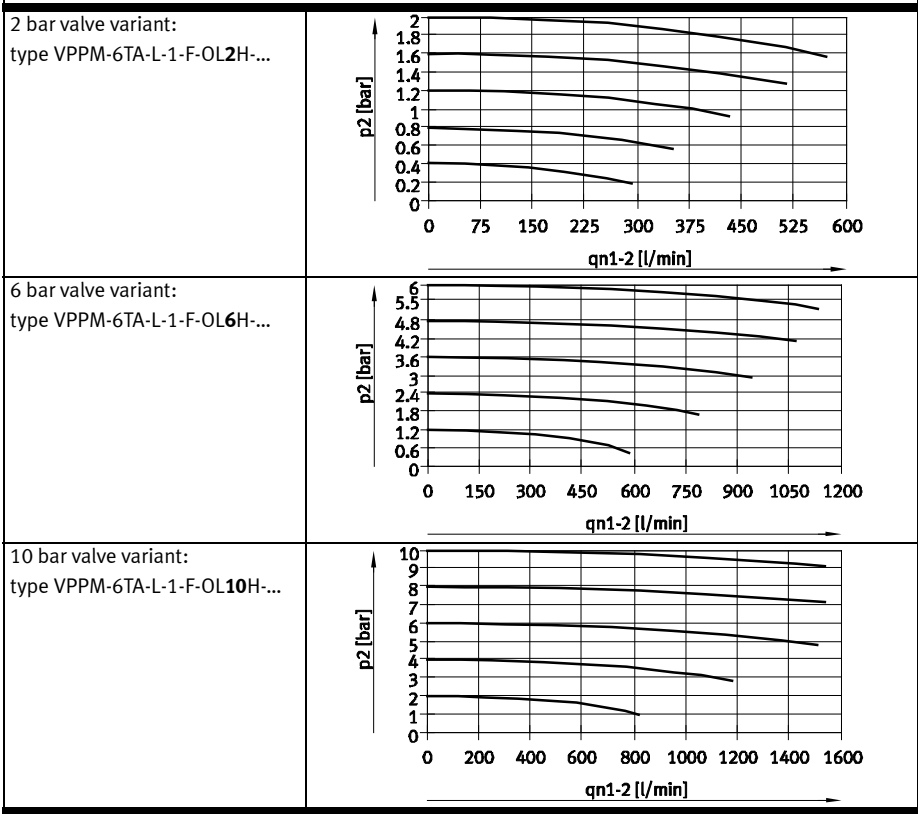
[1] Output pressure

[2] Flow rate

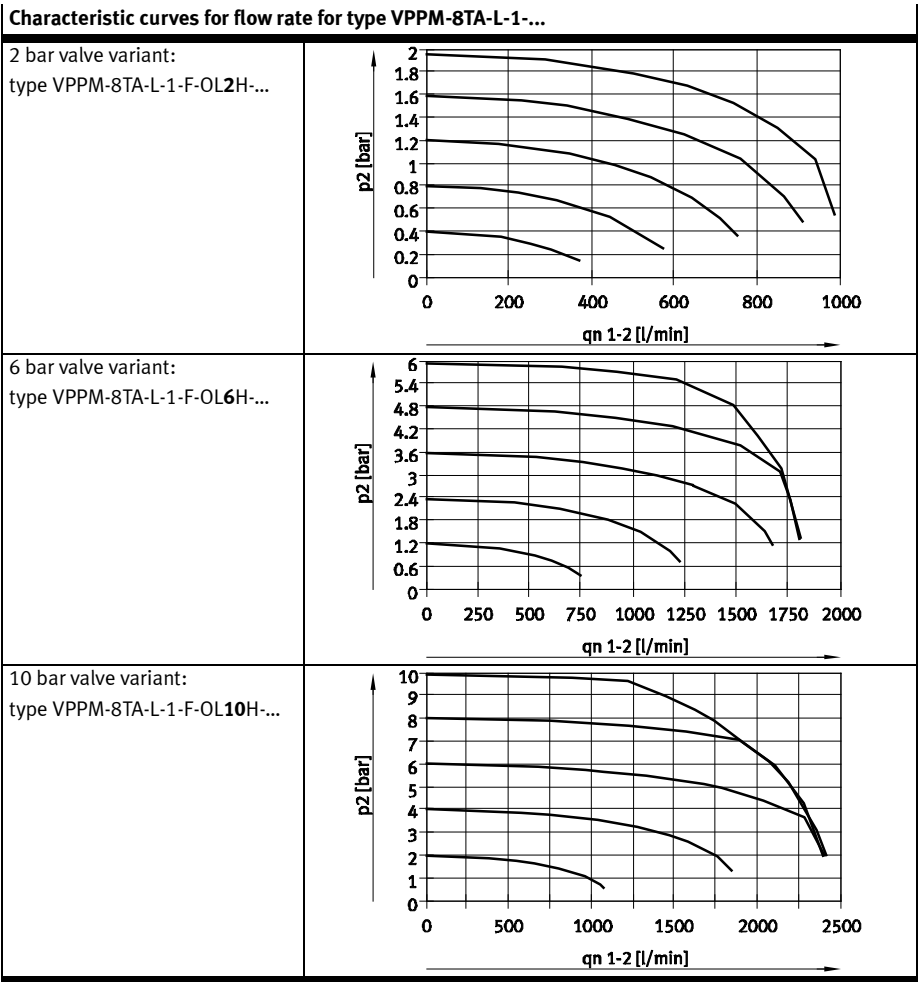
Fig. A.13 Diagram for size MPA2 of the reversible A pressure regulator (ident. code: PM and PK): Flow as a function of the output pressure

Proportional pressure regulators

Characteristic curves for flow rate for type VPPM-6TA-L-1-...



Tab. A.11 Characteristic curves for flow rate of the proportional pressure regulator type VPPM-6TA-L-1-...



Tab. A.12 Characteristic curves for flow rate of the proportional pressure regulator type VPPM-8TA-L-1-...

Certifications	
CE marking (see declaration of conformity) → <a href="http://www.festo.com">www.festo.com</a>	to EU EMC Directive – Emitted interference <sup>1)</sup> – Immunity to interference <sup>2)</sup>

- 1) The MPA-S valve terminal is intended for use in an industrial environment. Outside of industrial environments, e.g. in commercial and mixed-residential areas, actions to suppress interference may have to be taken.
- 2) The maximum signal cable length for the MPA-S valve terminal with multi-pin plug connection is 10 m

Tab. A.13 Technical data: certifications

#### A.1.4 Electrical data



MPA-F valve terminal with multi-pin plug connection:

- The maximum number of sub-bases that can be configured corresponds to the number of addresses available. The maximum number of solenoid coils which can be actuated is limited by the multi-pin plug connection to 24 addresses.

MPA-S valve terminal with CPX terminal:

- A maximum of 16 sub-bases (MPA-S with electric supply plate) or 8 sub-bases (MPA-S without electric supply plate) are permitted.

General	
Protection against electric shock (protection against direct and indirect contact in accordance with IEC/EN 60204-1)	Through the use of PELV circuits (Protected Extra-Low Voltage)

Tab. A.14 Electrical data: general

MPA-S valve terminal with multi-pin plug connection or AS-interface		
Power supply		
Nominal voltage	24 V DC ±25 %	
Residual ripple	4 Vpp	
Current consumption per pin at the sub-D multi-pin plug connection (for each valve solenoid coil) at 24 V	MPA1	MPA2
Nominal pick-up current/duration	80 mA/25 ms	100 mA/30 ms
Nominal current with current reduction	25 mA after 25 ms	20 mA after 30 ms

Tab. A.15 Electrical data: MPA-S valve terminal with multi-pin plug connection



Technical data on electric components of the MPA-S valve terminal with multi-pin plug connection or AS-interface can be found in the respective package insert.

MPA-S valve terminal with CPX terminal or CPI-interface		
Electronics module VMPA...-FB-...		
Operating voltage supply for electronics (U <sub>EL/SEN</sub> ):		
Nominal voltage	24 V DC ±25 %	
Intrinsic current consumption at 24 V (internal electronics, all outputs logic 0)	typ. 8 mA	
Load voltage supply for valves (U <sub>VAL</sub> )	VMPA...-FB-EMG-...	VMPA...-FB-EMS-...
Nominal voltage	24 V DC ±25 %	24 V DC ±25 %
Intrinsic current consumption at 24 V (internal electronics, without valves)	typ. 23 mA	typ. 3 mA
Diagnostic message undervoltage U <sub>VAL</sub> , load voltage outside the function range	≤17.5 ... 15.5 V	≤17.5 ... 15.5 V
Current consumption per solenoid coil out of load voltage U <sub>VAL</sub> at 24 V	MPA1	MPA2
Pull current	58 mA for 24 ms	99 mA for 24 ms
With current reduction	9 mA after 24 ms	18 mA after 24 ms
Pressure sensor plate		
Current consumption U <sub>EL/SEN</sub> at 24 V	21 mA	
Accuracy	±2.5 % FS (full scale)	
Display increments	20 mbar	
Proportional pressure regulator VMPA-...TA...		
Operating voltage supply		
Nominal voltage	24 V DC (permitted residual ripple max. ±10 %)	
Current consumption	Max. 300 mA	
Example of current calculation		
Current consumption with two solenoid coils MPA2 switched in parallel and one electronics module without separate circuits:		
– I <sub>EL/SEN</sub> = 1 x 8 mA = 8 mA		
– Current consumption during pick-up phase (24ms): I <sub>VAL</sub> = 3 mA + 2 x 99 mA = 202 mA		
– Current consumption with current reduction: I <sub>VAL</sub> = 3 mA + 2 x 18 mA = 39 mA		

Tab. A.16 Electric data: MPA-S valve terminal with CPX terminal or CPI-interface



Technical data on the electronics module of the MPA-S valve terminal with CPX terminal or CPI-interface can be found in the electronics description for the module (→ system description for your CPX terminal, table “Descriptions of the CPX terminal”).

### **A.1.5 Product key**

The product key is an 11-character alphanumeric code that uniquely identifies a product. With it, you can retrieve the following product data:

- Type designation
- Manufacturing date
- Complete order code (degree of completion at the time of shipment from Festo)
- Revision (hardware/software version)
- Serial number
- Customer-order-related information.

You can obtain these product data in the internet at → [www.festo.com](http://www.festo.com) → Support/Downloads. Enter the product key in the search field here.

You can get help with a click on the Help button in the search field or the rating plate next to the search field.



For more and more products, there is a data matrix code on the rating plate, which includes the direct link to the mobile support portal and the product key of the product.

## **A.2 Festo accessories**

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

**B                    Supplementary component overview**

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B.2	Separating the MPA-S valve terminal from the CPX terminal .....	161
B.2.1	Dismantling .....	162
B.2.2	Mounting .....	163

B.1 Overview of valve position components



If the designations of the connections and control elements on the valve terminal differ from the logical designation of the circuit symbols, the designations of the connections and control elements are specified additionally in brackets in the circuit symbols.



MPA-S valve terminal with multi-pin plug connection and modular electrical interlinking module (type MPA-MPM-...):

How many addresses a valve occupies depends on:

- the corresponding electronics module (➔ chapter 3, Tab. 3.13)
- the corresponding interlinking board (➔ chapter 5, Tab. 5.5)

5/2-directional control valves	
	Ident. code: J (piston spool valve) Function: <ul style="list-style-type: none"><li>– One bistable 5/2-directional control valve</li></ul>
	Ident. code: M (piston spool valve) Function: <ul style="list-style-type: none"><li>– One monostable 5/2-directional control valve</li><li>– Pneumatic spring return</li></ul>
	Ident. code: MS (piston spool valve) Function: <ul style="list-style-type: none"><li>– One monostable 5/2-directional control valve</li><li>– Mechanical spring return</li></ul>
	Ident. code: MU (polymer poppet valve) Function: <ul style="list-style-type: none"><li>– One monostable 5/2-directional control valve</li><li>– Mechanical spring return</li></ul>

Tab. B.1 5/2-directional control valves



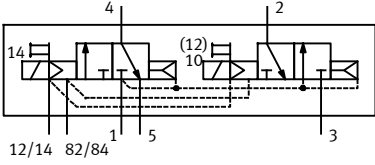
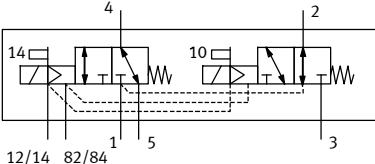
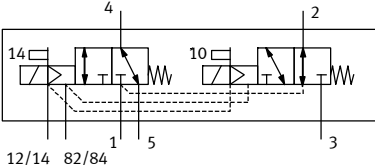
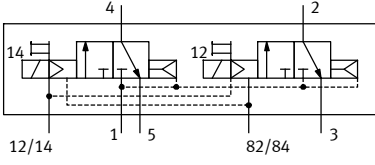
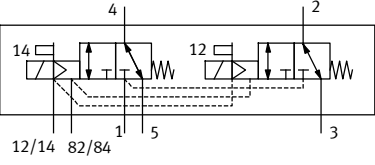
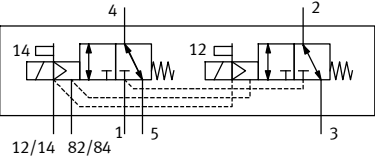


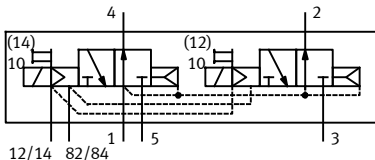
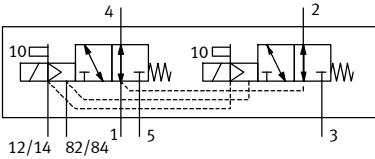
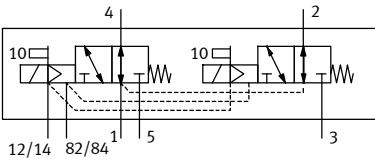
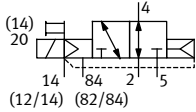
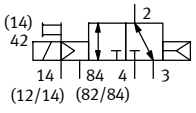
- In a de-energised state 5/3-directional control valves assume the mid-position by means of spring force.
- If both solenoid coils on 5/3-directional control valves are energised simultaneously, the valve remains in the previous switching position.

5/3-directional control valves	
	Ident. code: B (piston spool valve) Function: <ul style="list-style-type: none"><li>- 5/3-directional control valve</li><li>- Open in mid-position</li></ul>
	Ident. code: E (piston spool valve) Function: <ul style="list-style-type: none"><li>- 5/3-directional control valve</li><li>- Mid-position exhausted</li></ul>
	Ident. code: G (piston spool valve) Function: <ul style="list-style-type: none"><li>- 5/3-directional control valve</li><li>- Mid position closed</li></ul>

Tab. B.2    5/3-directional control valves

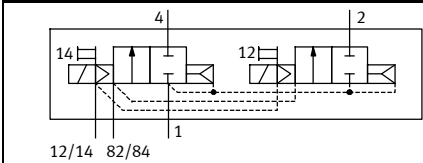
### 3/2-directional control valves

	<p>Ident. code: H (piston spool valve)</p> <p>Function:</p> <ul style="list-style-type: none"> <li>– On control side 14, one monostable 3/2-directional control valve (normally closed)</li> <li>– On control side 12, one monostable 3/2-directional control valve (normally open)</li> <li>– Pneumatic spring return</li> </ul>
	<p>Ident. code: HS (piston spool valve)</p> <p>Function:</p> <ul style="list-style-type: none"> <li>– On control side 14, one monostable 3/2-directional control valve (normally closed)</li> <li>– On control side 12, one monostable 3/2-directional control valve (normally open)</li> <li>– Mechanical spring return</li> </ul>
	<p>Ident. code: HU (polymer poppet valve)</p> <p>Function:</p> <ul style="list-style-type: none"> <li>– On control side 14, one monostable 3/2-directional control valve (normally closed)</li> <li>– On control side 12, one monostable 3/2-directional control valve (normally open)</li> <li>– Mechanical spring return</li> </ul>
	<p>Ident. code: K (piston spool valve)</p> <p>Function:</p> <ul style="list-style-type: none"> <li>– Two monostable 3/2-directional control valves</li> <li>– Normally closed</li> <li>– Pneumatic spring return</li> </ul>
	<p>Ident. code: KS (piston spool valve)</p> <p>Function:</p> <ul style="list-style-type: none"> <li>– Two monostable 3/2-directional control valves</li> <li>– Normally closed</li> <li>– Mechanical spring return</li> </ul>
	<p>Ident. code: KU (polymer poppet valve)</p> <p>Function:</p> <ul style="list-style-type: none"> <li>– Two monostable 3/2-directional control valves</li> <li>– Normally closed</li> <li>– Mechanical spring return</li> </ul>

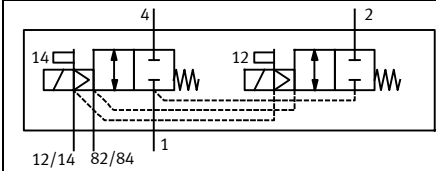
<b>3/2-directional control valves</b>	
	<p>Ident. code: N (piston spool valve)</p> <p>Function:</p> <ul style="list-style-type: none"> <li>– Two monostable 3/2-directional control valves</li> <li>– Normally open</li> <li>– Pneumatic spring return</li> </ul>
	<p>Ident. code: NS (piston spool valve)</p> <p>Function:</p> <ul style="list-style-type: none"> <li>– Two monostable 3/2-directional control valves</li> <li>– Normally open</li> <li>– Mechanical spring return</li> </ul>
	<p>Ident. code: NU (polymer poppet valve)</p> <p>Function:</p> <ul style="list-style-type: none"> <li>– Two monostable 3/2-directional control valves</li> <li>– Normally open</li> <li>– Mechanical spring return</li> </ul>
	<p>Ident. code: W (piston spool valve)</p> <p>Function:</p> <ul style="list-style-type: none"> <li>– A 3/2-way valve, monostable, normally open, external compressed air supply</li> <li>– Pneumatic spring return</li> </ul>
	<p>Ident. code: X (piston spool valve)</p> <p>Function:</p> <ul style="list-style-type: none"> <li>– A 3/2-way valve, monostable, normally closed, external compressed air supply</li> <li>– Pneumatic spring return</li> </ul>

Tab. B.3 3/2-directional control valves

**2/2-directional control valves**

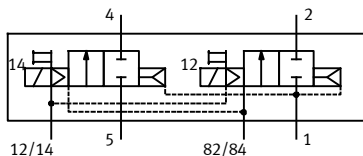


Ident. code: D (piston spool valve)  
Function:  
– Two monostable 2/2-directional control valves, normally closed  
– Pneumatic spring return



Ident. code: DS (piston spool valve)  
Function:  
– Two monostable 2/2-directional control valves, normally closed  
– Mechanical spring return

## 2/2-directional control valves



Ident. code: I (piston spool valve)

Function: <sup>1)</sup>

- Two monostable 2/2-directional control valves, both valves normally closed, reversible valve on control side 14
- Pneumatic spring return

### With dual-pressure operation:

- Supply operating pressure via port 1
- Operating pressure can be separately supplied at port (3/5).
- With solenoid coil 14, operating pressure is switched from port (5) to port (4).
- With solenoid coil 12, operating pressure is switched from port (1) to port (2)

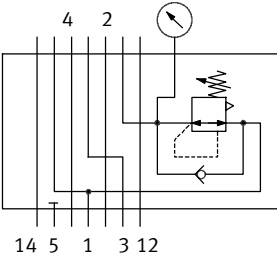
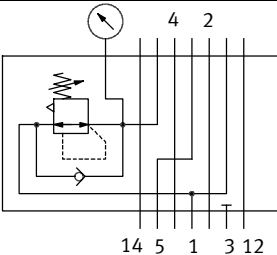
### With vacuum operation:

- Supply operating pressure via port (1)
- Supply vacuum via port (5).
- With solenoid coil 14, vacuum is switched to port (4).
- Plan a filter at port (4) or in tubing 4 so that no contamination can enter the valve.
- With solenoid coil 12, operating pressure is switched to port (2) (e.g. for an ejector pulse in vacuum operation).
- For an ejector pulse, establish a connection using a T-piece between ports (2), (4) and the suction cup complete.

1) Note: If this 2/2-directional control valve (ident. code I) is also operated with other valves on the MPA-S valve terminal, this 2/2-directional control valve must be operated in a separate pressure zone with a separated exhaust duct (5).

Tab. B.4 2/2-directional control valves

Pressure regulator plates	
	<p>Pressure regulator plate for port (1) (P regulator)  Ident. code: PF or PA  Function:  – Regulates the operating pressure in duct (1) upstream of the directional control valve</p>
	<p>Pressure regulator plate for port (2) (B regulator)  Ident. code: PH or PC  Function:  – Regulates the operating pressure in channel (2) downstream of the directional control valve.</p>
	<p>Pressure regulator plate for port (4) (A regulator)  Ident. code: PG or PB  Function:  – Regulates the operating pressure in channel (4) downstream of the directional control valve.</p>

Pressure regulator plates	
	<p>Pressure regulator plate for port (2), reversible (B regulator)</p> <p>Ident. code: PN or PL</p> <p>Function:</p> <ul style="list-style-type: none"> <li>Channels the operating pressure upstream of the directional control valve from channel (1) to channels (3) and (5)</li> <li>Regulates the pressure in channel (3) upstream of the directional control valve</li> <li>Conducts the exhaust from channel 1 to channel (3) after the directional control valve</li> </ul> <p><b>Instructions:</b></p> <p>Combination with 2x 2/2-directional control valves (ident. codes D and I) and 2x 3/2-directional control valves (ident. codes H, K and N) is not permitted.</p>
	<p>Pressure regulator plate for port (4), reversible (A regulator)</p> <p>Ident. code: PM or PK</p> <p>Function:</p> <ul style="list-style-type: none"> <li>Conducts the operating pressure from channel 1 to channels (5) and (3)</li> <li>Regulates the pressure in channel (5) upstream of the directional control valve</li> <li>Channels the exhaust air downstream of the directional control valve from channel (1) to channel (5)</li> </ul> <p><b>Instructions:</b></p> <p>Combination with 2x 2/2-directional control valves (ident. codes D and I) and 2x 3/2-directional control valves (ident. codes H, K and N) is not permitted.</p>

Tab. B.5 Pressure regulator plates for regulating outputs (1), (2) and (4)

Proportional pressure regulator VPPM-...TA-...	
The diagram shows a hydraulic circuit for a proportional pressure regulator. It includes a solenoid valve with two positions, controlled by a pilot line from a proportional valve (E/P). The main valve has ports 1, 2, 3, and x. Port 1 is the inlet, port 2 is the outlet, port 3 is the pilot line, and port x is the reference pressure. The circuit also includes a spring and a check valve.	<p>Ident. code: QA, QB, QC, QD, QE, QF, QG, GH, GK, QL, QM, QN</p> <p>Function:</p> <ul style="list-style-type: none"><li>– Regulates the pressure proportional to a specified nominal value</li></ul>

Tab. B.6    Proportional pressure regulator

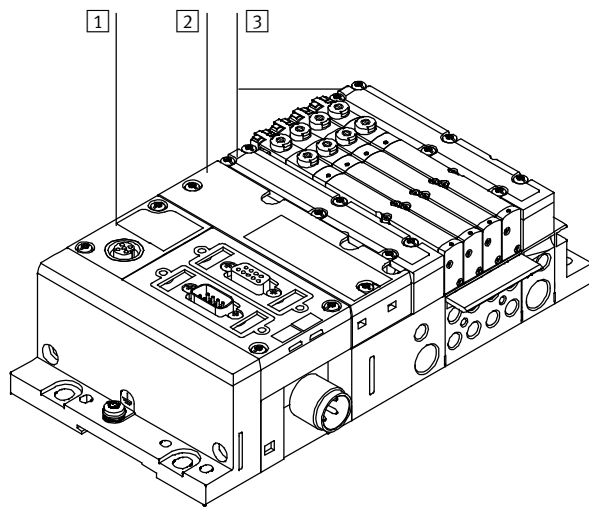
Vertical pressure shut-off plate VMPA1-HS	
The diagram shows a hydraulic circuit for a vertical pressure shut-off plate. It includes a solenoid valve with two positions, controlled by a pilot line from a proportional valve (E/P). The main valve has ports 1, 2, 3, 4, 5, 12/14, and 33. Port 1 is the inlet, port 2 is the outlet, port 3 is the pilot line, port 4 is the reference pressure, port 5 is the spring, port 12/14 is the outlet, and port 33 is the inlet. The circuit also includes a spring and a check valve.	<p>Ident. code: PS</p> <p>Function:</p> <ul style="list-style-type: none"><li>– Permits a valve change under operating and pilot pressure</li></ul>

Tab. B.7    Vertical pressure shut-off plate



## B.2 Separating the MPA-S valve terminal from the CPX terminal

The valve terminal MPA-S is connected to the CPX terminal through a port pattern (→ Fig. B.1).



1 CPX terminal

2 Port pattern

3 Valve terminal MPA-S

Fig. B.1 Port pattern

### B.2.1 Dismantling

Proceed as follows:

1. Loosen the electrical and pneumatic connections and then remove the MPA-S valve terminal from its mounting surface (→ section 5.2, “Dismantling the MPA-S valve terminal”).
2. Loosen the fastening screws between the port pattern and the MPA manifold block in the sequence **3**, **2**, **1** (→ Fig. B.2).
3. Then loosen the mounting screws.

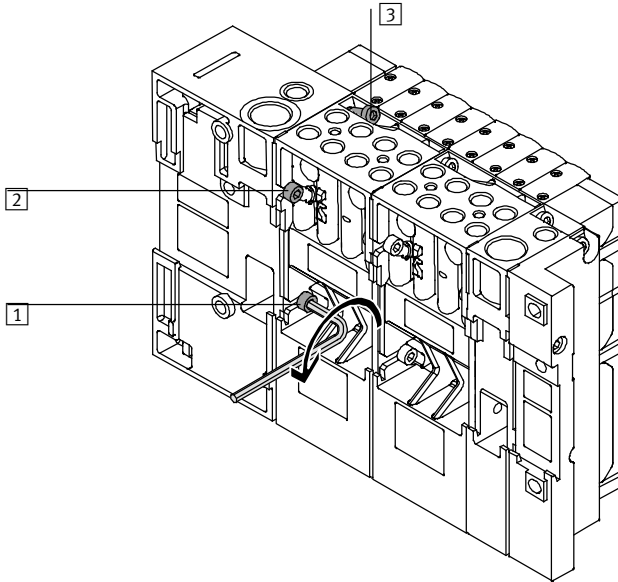


Fig. B.2 Dismounting the MPA-S valve terminal from the port pattern

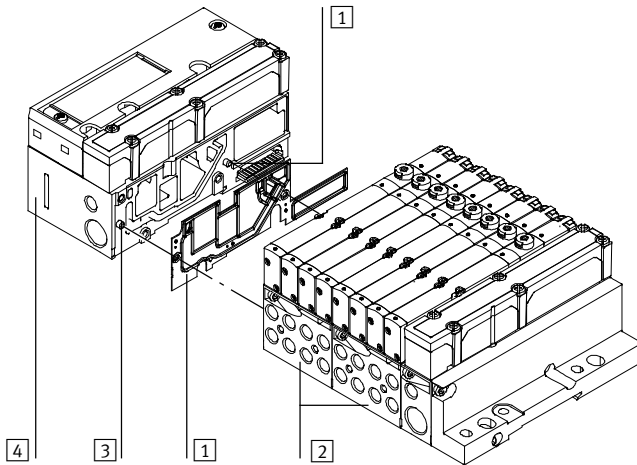


Information on replacing the port pattern can be found in the CPX system description.

### B.2.2 Mounting

Proceed as follows:

1. Check the exposed seals for damage. Replace the seals if they are damaged.
2. Place the seal onto the guide pins of the port pattern.



- |   |                           |   |              |
|---|---------------------------|---|--------------|
| 1 | Guide pins                | 3 | Seal         |
| 2 | Pneumatic manifold blocks | 4 | Port pattern |

Fig. B.3 Mounting the MPA-S valve terminal to the port pattern

3. Push the port pattern together with the pneumatic manifold blocks. Make sure that the seal and the components are correctly positioned toward each other.

4. Insert the mounting screws in the corresponding holes. Tighten the screws in the sequence **1**, **2**, **3** (→ Fig. B.4), at first slightly and then with 1.8 Nm ( $\pm 10\%$ ).

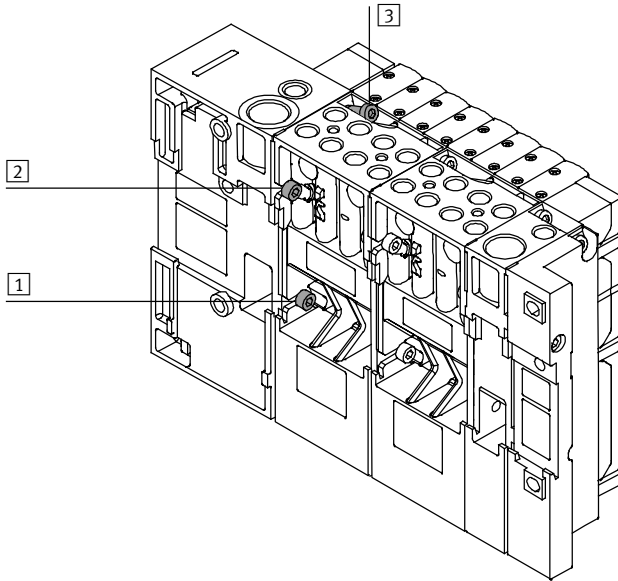


Fig. B.4 Mounting the MPA-S valve terminal to the port pattern

5. Fasten the MPA-S valve terminal to the mounting surface (→ CPX system description).
6. Complete the electrical and pneumatic connections of the MPA-S valve terminal to the CPX terminal.
- Further information can be found
- on the electrical connections in the CPX system description
  - on the pneumatics in chapter 3 of this description.

## **C Glossary**

Term/abbreviation	Description
Basic components	Component (port pattern, multi-pin plug connection plate, pneumatic sub-base or pneumatic air supply plate) on which further components (exhaust plates, flat plate silencers, pressure regulators, valves or blanking plates) are mounted.
Blanking plate	Plate without valve function for sealing unused valve positions on sub-bases
Components	Common term for port pattern, multi-pin plug connection plate, exhaust plate, flat plate silencer, pneumatic sub-base, pneumatic air supply plate, electric supply plate, pressure sensor plate, proportional pressure regulator, end plate, pressure regulator plate, valve and blanking plate
CPX modules	Common term for the various modules which can be incorporated into a CPX terminal
CPX terminal	Modular electrical terminal
Electric air supply plate	Plate for additional supply of load voltage to the valves
Electrical interface	Common term for port pattern, CPI interface, multi-pin plug connection plate and AS-interface
Electronics module	Module in the sub-base with an LED and solenoid coil management
End plate	<p>Extreme right plate:</p> <ul style="list-style-type: none"> <li>– with/without pneumatic supply ports</li> <li>– with holes for H-rail and wall mounting</li> </ul> <p>Extreme left plate:</p> <ul style="list-style-type: none"> <li>– of the CPX terminal</li> <li>– of the valve terminal with multi-pin plug connection</li> <li>– with holes for H-rail and wall mounting</li> </ul>
Exhaust plate	Plate for ducted exhaust air with connection (3/5)
I/O modules	Input/output modules
MO	Manual override
MPA1 or MPA2	Size of the valves: MPA1 = 10 mm, MPA2 = 20 mm
MPA-S valve terminal with multi-pin plug connection type MPA...-MPM-...	Variant of the MPA-S valve terminal with Sub-D plug All solenoid coils are connected centrally via the Sub-D plug. The electrical interlinking is modular, i.e. every sub-base has its own board.
Multi-pin plug connection	Connection with modular electric interlinking module of type MPA...-MPM-...
Pneumatic air supply plate	Plate for additional supply of compressed air to the valves, e.g. if there are several pressure zones.
Pneumatics module	Module consisting of pneumatic sub-bases, electronics module, valves or blanking plates
Port pattern	The port pattern is the interface between the modular electrical peripherals of the CPX terminal and the MPA-S pneumatics

Term/abbreviation	Description
Sub-base	Plate for mounting monostable, impulse or mid-position valves, with working ports (2) and (4). <ul style="list-style-type: none"> <li>– Size MPA1 (type MPAS...4) with 4 valve positions</li> <li>– Size MPA2 (type MPAS...2) with 2 valve positions</li> </ul>
Separating seal	Special seal for formation of pressure zones
Tubing connections	Connecting the pneumatic supply cables (tubing) to the MPA-S valve terminal
Valve	Monostable, impulse or mid-position valves
Valve terminal MPA-S	<b>M</b> odular <b>P</b> erformance <b>A</b> nschlussplatten (sub-bases) <b>S</b> ize-optimized valve terminal (type 32) with multi-pin plug connection, AS-interface, CPX terminal or CPI interface.

Tab. C.1 Terms and abbreviations





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