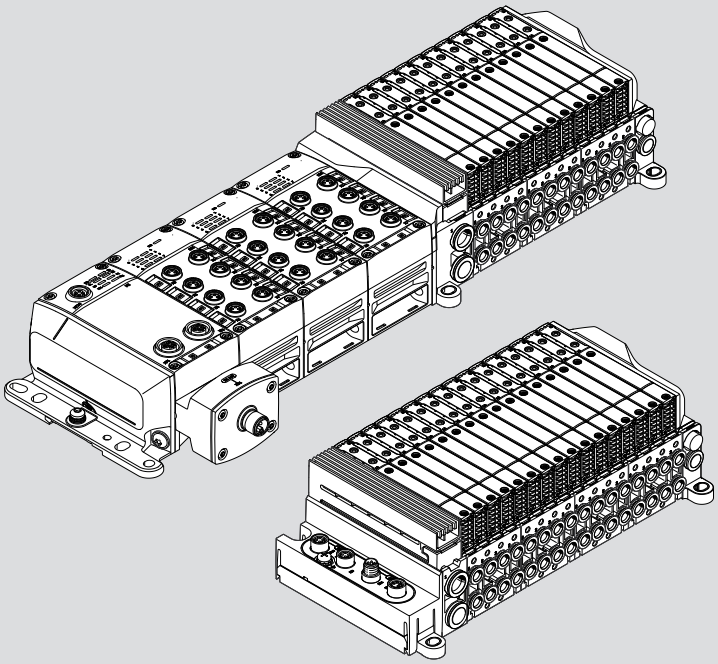
VTUX-A-S
Valve terminal



FESTO

Operating instruction |
Serial Communication

8214914

8214914
2024-07
[8214916]

Original instructions

Table of contents

1 About this document

1.1 Applicable documents

All available documents for the product ➔ www.festo.com/sp.

Identifier	Contents
Operating instructions of the manifold sub-bases with electrical feed VABX-A-S-EL-...	Description of the manifold sub-bases (left end plates) with serial communication and instruction manual and important information on electrical interfaces, commissioning, parameterisation and diagnostics of the electrical feeds for the valve terminal VTUX-A-S
Operating instruction for remote I/O system CPX-AP-I	Description of the remote I/O system and its components with instruction manual and important information on assembly, electrical installation, conversion and diagnostics
Operating instruction for remote I/O system CPX-AP-A	
Assembly instructions for valve terminal VTUX	Description of the mounting conditions and dynamic loads for H-rail mounting and wall mounting

Tab. 1: User documentation for the product

1.2 Product version

This document refers to the following product versions:

Product	Version
Valve terminal VTUX-A-S	Valve terminal without revision status
Interlinking block for switching valves VABX-AS-BV-...VAAAA or VABX-AS-BV-V4A VABX-AS-BV-...VBBBB or VABX-AS-BV-V4B	Revision 1 and later The product version can be queried with suitable software, e.g. the Festo Automation Suite. The Festo Automation Suite is available in the Festo Support Portal ➔ www.festo.com/sp.

Tab. 2: Product version

There may be an updated version of this document for this or later product versions ➔ www.festo.com/sp.

1.3 Product labelling

The product labelling is located on the front of the left end plate.

The data matrix code on the sticker "Complete Unit" contains the Product Key, which is the unique identification of the product.
If the VTUX valve terminal is configured at the factory, the complete configuration of the valve island can be accessed via the Product Key. If manifold sub-bases with electrical power feed are subsequently ordered individually, the information about this separate component can only be accessed with the Product Key.

2 Safety

2.1 Safety instructions

- Only use the product in its original condition without unauthorised modifications. Only the conversions or modifications described in the documentation are permitted.
  Conversions can change the function of the valve terminal. Check the purpose of the conversion with the configurator before carrying out conversions
  ➔ www.festo.com.
- Only use the product if it is in perfect technical condition.
- Observe the identifications on the product.
- Take into account the ambient conditions at the location of use.
- Store the product in a cool, dry environment protected from UV and corrosion. Keep storage times short.
- For assembly and disassembly: support the product and use suitable lifting gear.
- Before working on the product, switch off the compressed air supply and lock it to prevent it from being switched on again.
- Before working on the product: Switch off the power supply, ensure that it is off and secure it against being switched on again.
- Do not connect or disconnect the push-in connector while the voltage is live.
- Comply with the handling specifications for electrostatically sensitive devices.
- Use only in an industrial environment. Outside industrial environments, e.g. in commercial and residential/mixed-use areas, it may be necessary to take measures to suppress radio interference.
- Only operate the product with a silencer or ducted exhaust air.

2.2 Intended use

The valve terminal switches and controls compressed air.

2.2.1 Permissible components

If the original configuration of the valve terminal is changed by replacing components:

- Check the new configuration in the online configurator to ensure that it is valid.
- Check the new configuration for the tie rod configuration
  ➔ www.festo.com/spareparts, tab ‘Modification aid’.
- In the event of uncertainty contact the regional Festo representative
  ➔ www.festo.com.

2.3 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers. The qualified personnel have skills and experience in dealing with electropneumatic (open-loop) control technology.

3 Additional information

- Contact the regional Festo contact if you have technical problems
  ➔ www.festo.com.
- Accessories ➔ www.festo.com/catalogue.

4 Product overview

4.1 Structure

4.1.1 Product design

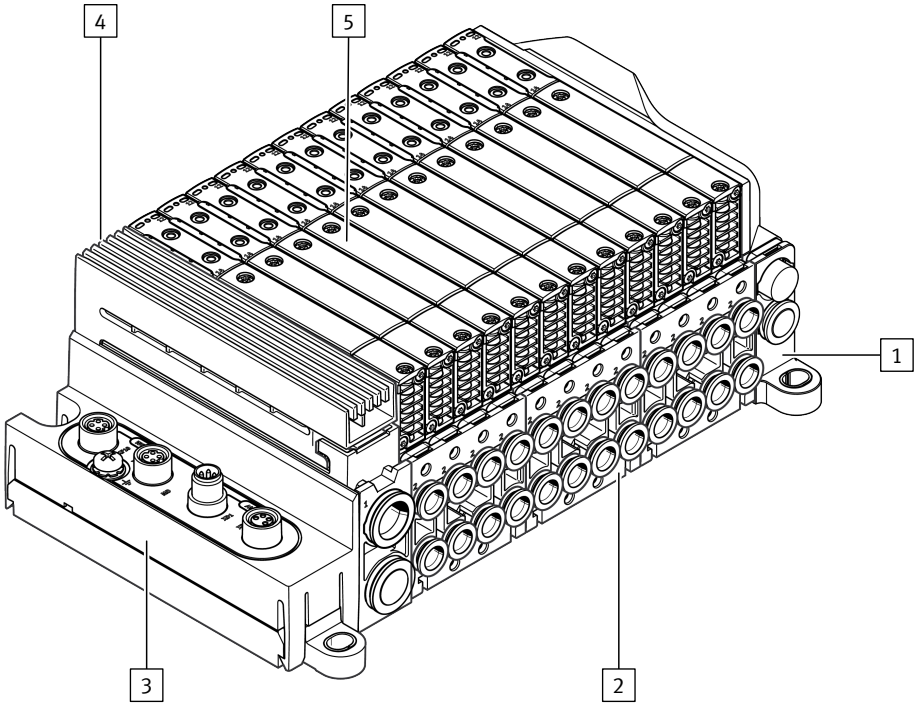


Fig. 1: Pneumatic components of the valve terminal

1 End plate, right
2 Manifold sub-base
3 Manifold sub-base with electrical feed, in this case: CPX-AP-I
4 Flat plate silencer
5 Valve

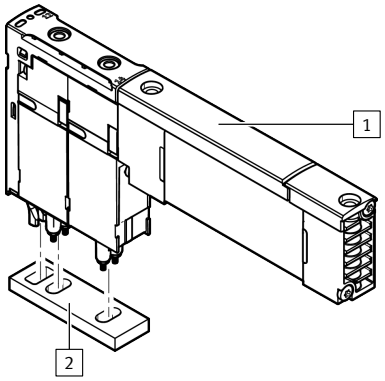
4.1.2 Pneumatic components

4.1.2.1 Tie rods

The valve terminal is based on a modular system of components. It is based on manifold interlinking blocks that are braced by tied rods between the end plates. Each of the three tie rods consists of a threaded rod or threaded rod combination and a screw with an internal hexagon.
Additional information ➔ 12.2.2 Installing tie rods.

4.1.2.2 Valves

The valve terminal can be configured with different valve functions, see the following tables. Unassigned valve positions must be sealed with cover plates.



1 Valve, bistable
2 IP65 seal

Fig. 2: Solenoid valve VUVX

The valve terminal can be configured with degree of protection IP40 or IP65. The version with degree of protection IP65 has additional seals between the manifold sub-bases and valves. The seals can be seen from the outside on the back of the valve terminal.

Valve widths

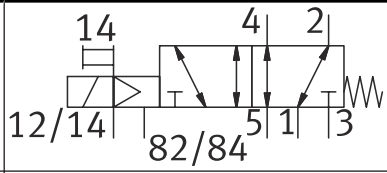
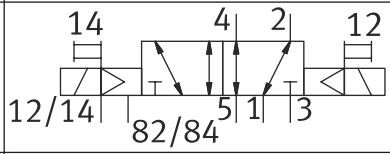
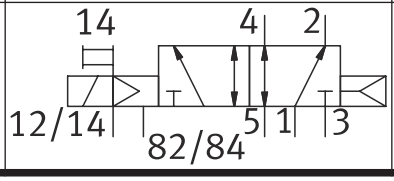
Type code	Widths	Can be used on
VUVX-BK10-...	10 mm	– Manifold sub-bases VABX-A-...-BV-AH, size 1 with grid dimension 10.5 mm – Manifold sub-bases VABX-A-...-BV-BH, size 2 with grid dimension 12.5 mm

Tab. 3: Valve widths

Identification of the valves

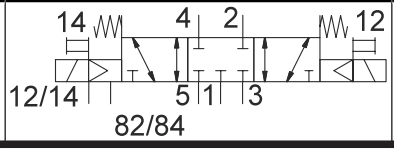
The configuration of the valve terminal can be identified by ID codes. The ID codes are located on the top of the valves.

Variants of the 5/2-way valves

ID code	Circuit symbol	Description
A		5/2-way valve, monostable, mechanical spring
J		5/2-way valve, bistable
M		5/2-way valve, monostable, pneumatic spring

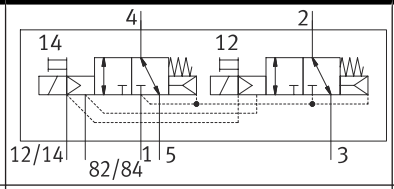
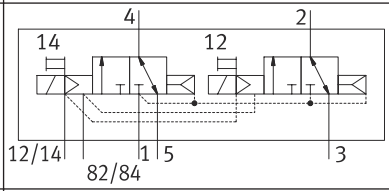
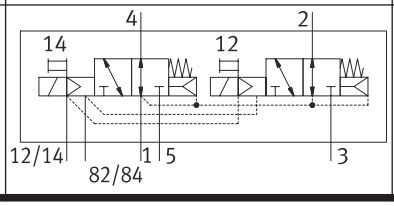
Tab. 4: Variants of the 5/2-way valves

Variants of the 5/3-way valves

ID code	Circuit symbol	Description
G		5/3-way valve, mid-position closed

Tab. 5: Variants of the 5/3-way valves

Variants of the 2x 3/2-way valves

ID code	Circuit symbol	Description
K		2x3/2-way valve, normally closed, pneumatic and mechanical spring The 5/3-way mid-position exhausted function can be implemented by this valve.
KC		2x3/2-way valve, normally closed, pneumatic spring
NS		2x3/2-way valve, normally open, pneumatic and mechanical spring The 5/3-way mid-position pressurised function can be implemented by this valve. Different control logic: channels (12) and (14) are exchanged.

Tab. 6: Variants of the 2x 3/2-way valves

4.1.2.3 Manifold sub-bases for switching valves

The manifold sub-bases have space for four bistable valves and have pneumatic and electrical feeds. They have the internal pneumatic ducts for the compressed air supply and for exhaust of the valve terminal.
The valve positions can be fitted with monostable or bistable valve variants or with cover plates. Unassigned valve positions must be sealed with cover plates.

1 Electrical interlinking module

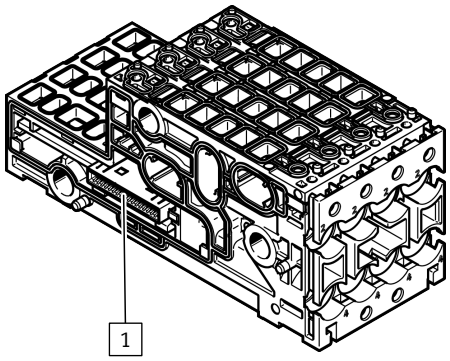


Fig. 3: Manifold sub-base VABX-A-S-BV-..., quadruple, grid dimension 10.5 mm

Variants of electrical interlinking module

The following variants are available:
- VABX-AS-BV-...-RV...: block of four of a manifold sub-base with common electrical interlinking module
- VABX-AS-BV-...-SV...: quadruple pack of screw-retained separate manifold sub-bases with common electrical interlinking module. Separators can be installed between the individual manifold sub-bases to isolate the pressure zones. The separate pressure zones are marked by inscription labels on the manifold sub-bases.

Function of the electrical interlinking module

The electrical interlinking module in the manifold sub-bases supplies electrical power to the valves and transfers the communication data by serial communication. It is integrated into the manifold sub-bases to prevent loss.

The electrical interlinking module is fitted with holding current reduction and can switch up to 8 solenoid coils. There is a switching cycle counter for every solenoid coil.
Information about the address assignment ➔ 4.4 Address assignment of valve positions.
Information about the switching cycle counter ➔ 10.4 Application-specific diagnostic functions.

4.1.2.4 Supply plates with exhaust

The main supply of the valve terminal with operating pressure is implemented via the manifold sub-base with electrical interface.

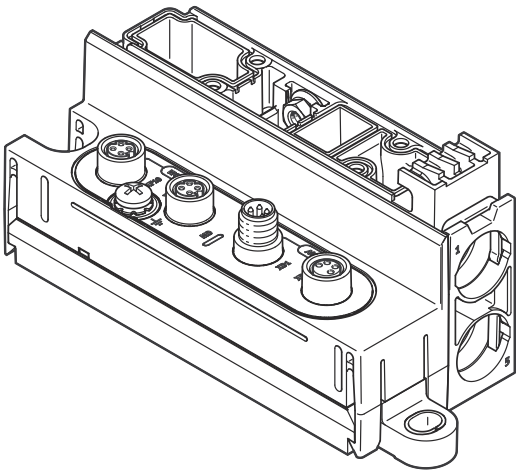


Fig. 4: Manifold sub-base with electrical feed and integrated supply plate

The separate pneumatic supply plates offer the following functions:
- Supply of additional pressure zones with operating pressure that have a duct separation of the duct (1).
- Additional supply of the valve terminal or pressure zone with operating pressure, e.g. to increase the pressurisation and exhaust output.
- The port (5) in the supply plates can also be used to increase exhaust air output. This requires the blanking plug in port (5) to be replaced by cartridge and tubing or a plug-in silencer.

The pneumatic supply plates can be installed at any position within the pressure zones.

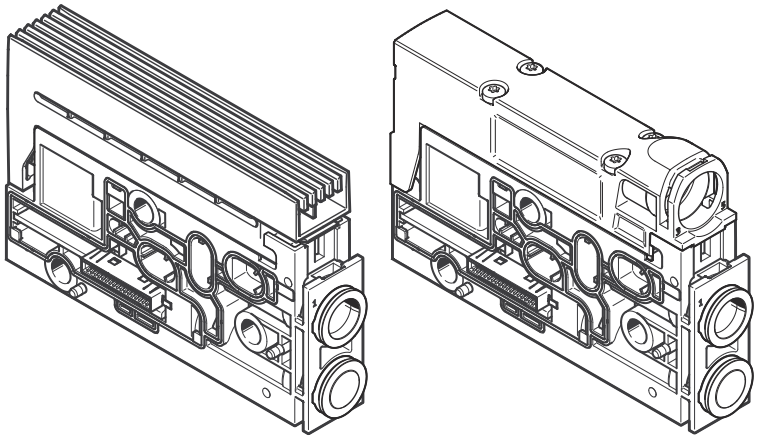
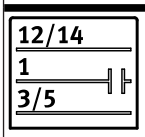
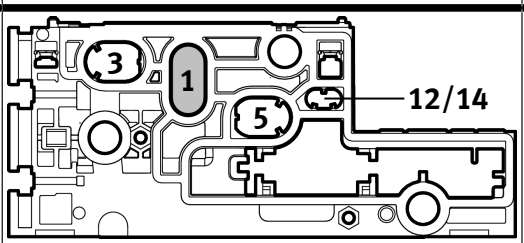
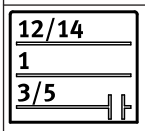
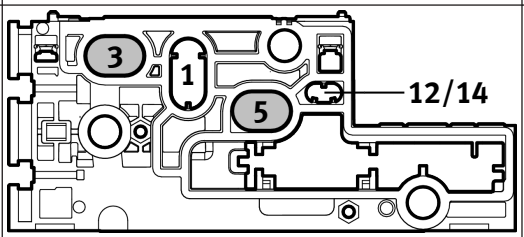
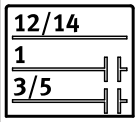
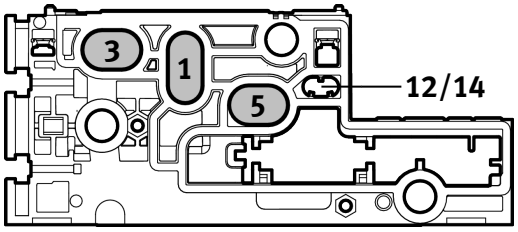
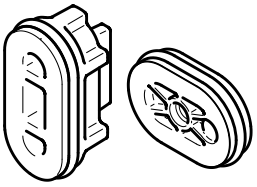


Fig. 5: Supply plate VABX-A-...-BU with silencer or exhaust air cover

4.1.2.5 Separators for forming pressure zones

Pressure zones can be formed within a valve terminal. The pressure zones are limited by separators inserted into one or more ducts of the manifold sub-bases. The separators are inserted into the manifold sub-base from the right.
The separate ducts can be marked with inscription labels on the valve terminal. The inscription labels are already attached to the manifold sub-bases on valve terminals that have been pre-assembled at the factory.

Inscription label	Separated ducts	Manifold sub-base with duct separations	Separators
 ASLR-C-XA-TP	Supply duct (1)		 VABD-XA-12-P1
 ASLR-C-XA-TR	Exhaust ducts (3) and (5)		 VABD-XA-12-P2
 ASLR-C-XA-TS	Supply duct (1) Exhaust ducts (3) and (5)		 Combination of separators shown above

Tab. 7: Pressure zone identification

Additional information ➔ 4.2.1.4 Forming pressure zones

4.1.2.6 End plate, right

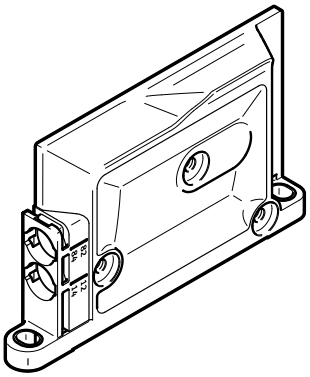


Fig. 6: End plate, right

The right end plate offers the following functions:
- external pilot air supply to the valve terminal with inserted separator, feed via duct (12/14)
  or
- internal pilot air supply to the valve terminal from duct (1)
- ducted or unducted auxiliary pilot air, duct (82/84)

Additional information ➔ 12.3.4 Converting pilot air supply

4.1.3 Electrical components

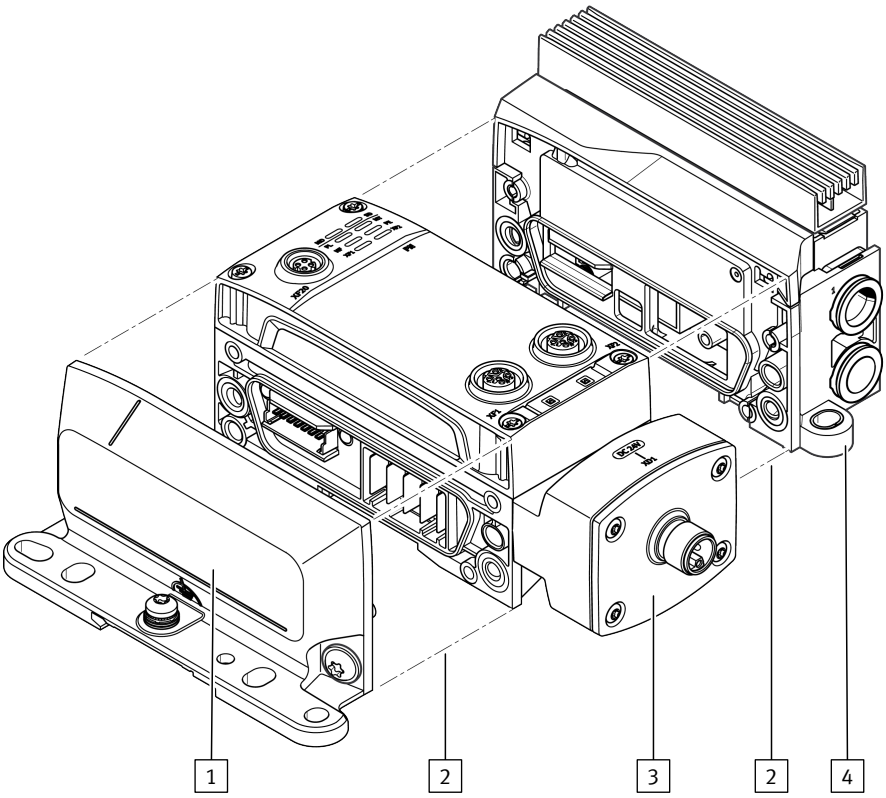


Fig. 7: Electrical components of a valve terminal with remote I/O system CPX-AP-A

1 Left end plate with connection for functional earth
2 Additional CPX-AP modules
3 Interlinking module with system supply and interface
4 Manifold sub-base with electrical supply

4.1.4 Display elements of the pneumatic components

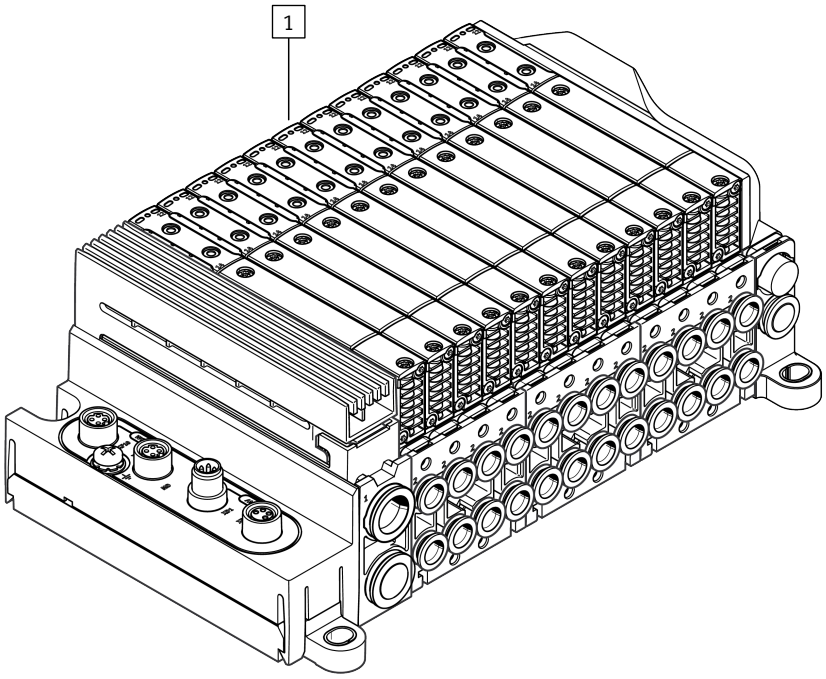


Fig. 8: Display elements of the pneumatic valve terminal components

1 LED display for switching status of the valves and diagnostics

Further information on the meaning of the LED displays ➔ 10 Diagnostics.

4.1.5 Display elements of the electrical components

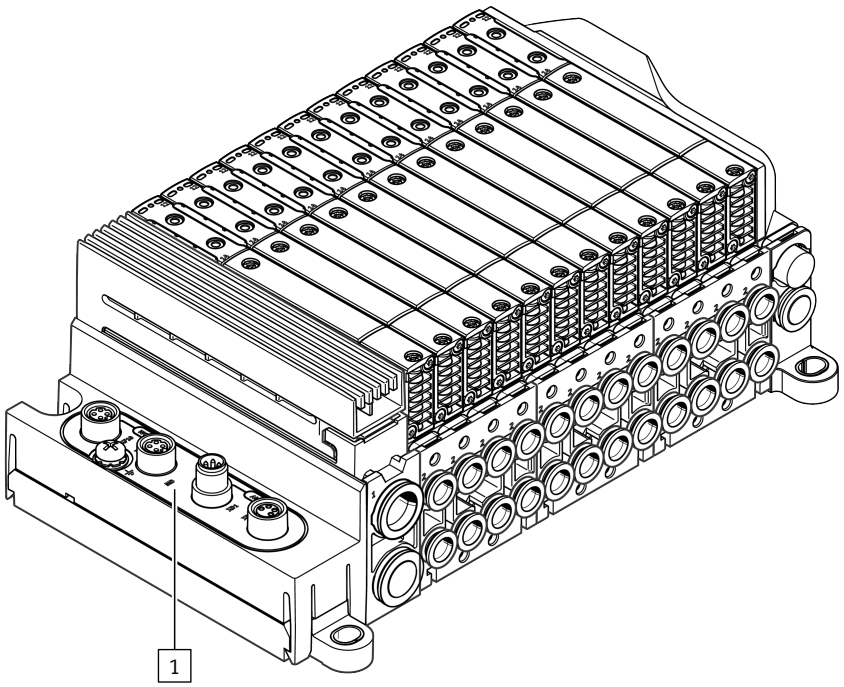


Fig. 9: Display elements of the electrical valve terminal components

1 LED display for diagnostics

Further information on the presence and meaning of the LED display ➔ Operating instructions for the manifold sub-base with electrical supply ➔ 1.1 Applicable documents.

4.1.6 Control elements of the pneumatic components

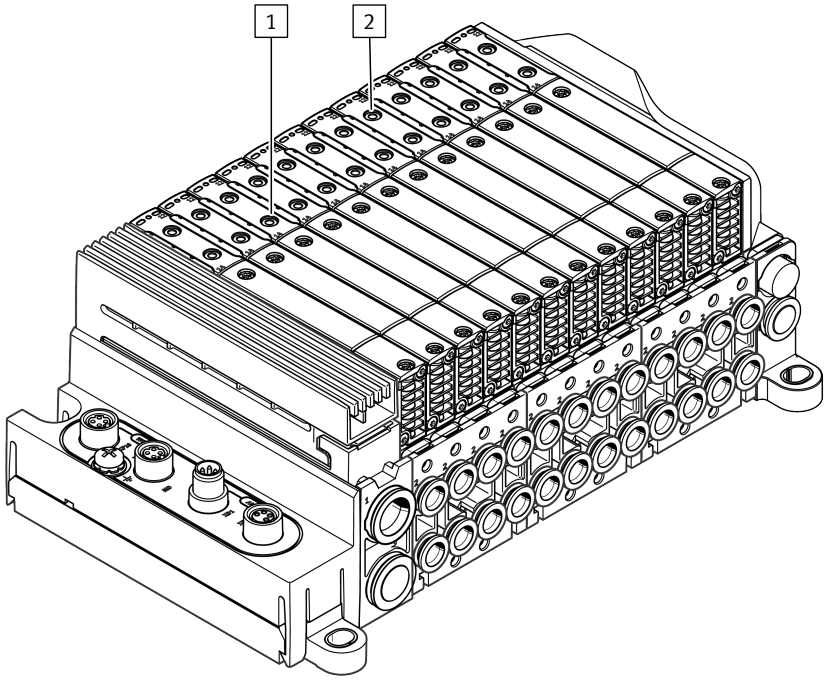


Fig. 10: Control elements of the pneumatic valve terminal components

1 Non-detenting manual override (MO) of the solenoid coil 14	2 Non-detenting manual override (MO) of the solenoid coil 12

Additional information on using the manual override ➔ 7.1.1 Functional test by manual override (MO).
Additional information on the functional limitation of the manual override ➔ 7.1.2 Installing cover caps - optional.

4.1.6.1 Manual override (MO)

The valves are equipped with non-detenting and self-resetting manual overrides (MO), which can be operated with a small screwdriver or pin. When the compressed air supply is switched on, the manual override can be used to switch a valve to a non-electrically actuated, de-energised state. The non-detenting basic function can be changed by installing optional cover caps ➔ www.festo.com/catalogue.
The manual override is primarily used during commissioning to check the valve-actuator combinations.➔ 7.1 Commissioning, pneumatic.

4.1.7 Connecting elements of the pneumatic components

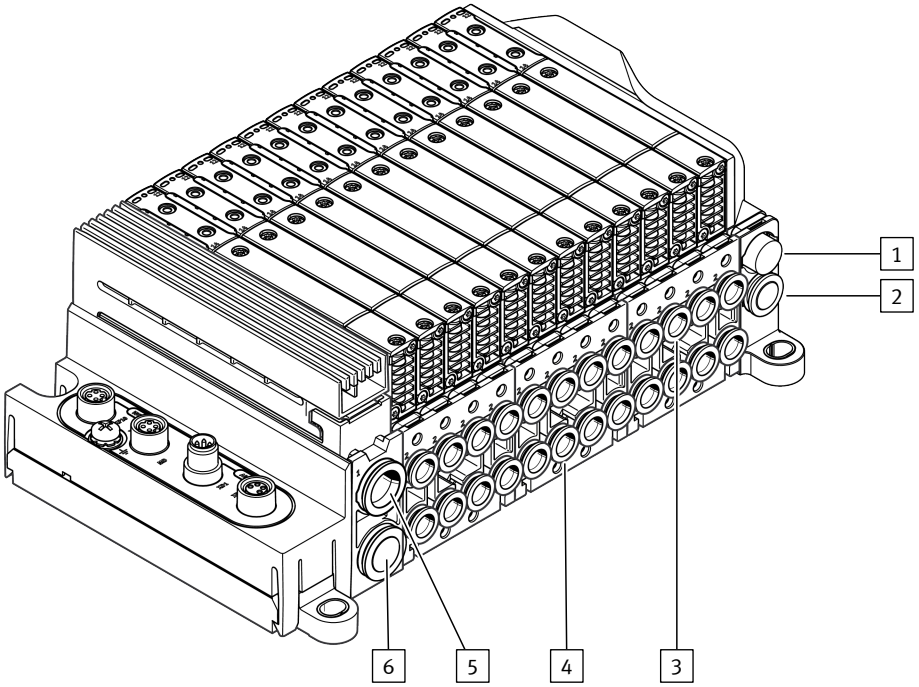


Fig. 11: Connecting elements of the pneumatic components

1 Port for auxiliary pilot air (82/84), here fitted with a silencer
2 Port for external pilot air supply (12/14), here fitted with blanking plug
3 Working ports, duct (2), per valve position
4 Working ports, duct (4), per valve position
5 Main supply connection for operating pressure, duct (1)
6 Exhaust port, duct (5), here fitted with blanking plugs

4.1.8 Connection elements of the electrical components

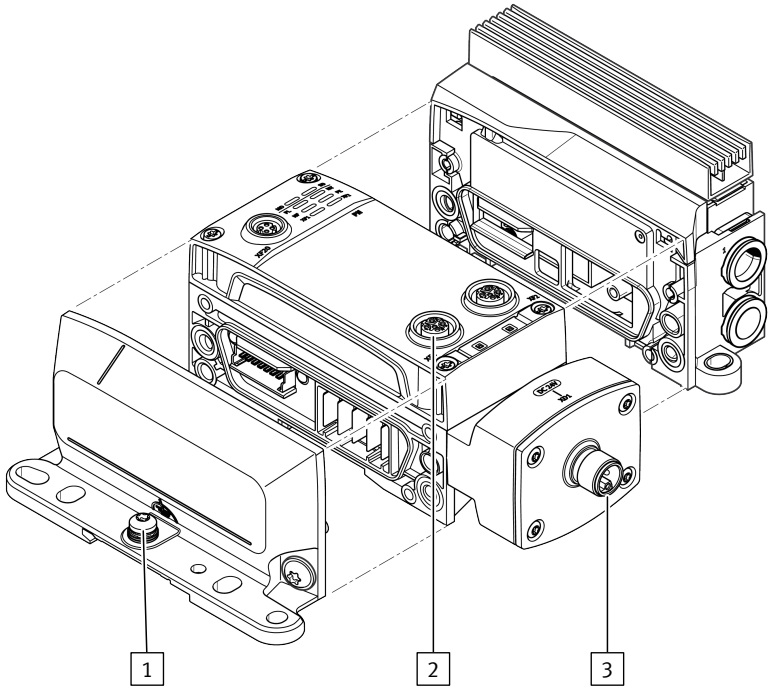


Fig. 12: Connection elements of the electrical components of a valve terminal with remote I/O system CPX-AP-A

1 Connection for functional earth
2 Communication connection of the remote I/O system CPX-AP-A, fieldbus-specific
3 Power supply connection for remote I/O system and valve terminal

The electrical power supply of a valve terminal with remote I/O system CPX-AP-A is connected via the power supply connection ➔ Fig. 12.
The electrical power supply of a valve terminal without remote I/O system CPX-AP-A is connected via the manifold sub-base VABX-AS-EL-...

Further information about the electrical components ➔ 1.1 Applicable documents

4.2 Function

4.2.1 Pneumatics functions

4.2.1.1 Compressed air supply to the valve terminal

The valve terminal can be supplied with operating pressure and exhausted by the following components:
- Main ^power supply via manifold sub-bases VABX-A-...-EL-... with electrical feed (left end plate) ➔ 1.1 Applicable documents
- Main supply of additional pressure zones and additional supply via pneumatic supply plates ➔ 4.1.2.4 Supply plates with exhaust

4.2.1.2 Pilot air supply

The pilot air for all pressure zones within the valve terminal is supplied by the right end plate.

Characteristics	Internal pilot air supply	External pilot air supply
Supply component for valve terminals with **one** pressure zone	The auxiliary pilot air is diverted internally from the operating pressure (1) from – the manifold sub-base with electrical feed (left end plate) or – the supply plate.	The pilot air must be supplied externally via (12/14) at the right end plate.
Supply component for valve terminals with **multiple** pressure zones	The pilot air is diverted internally from the operating pressure (1) of the pressure zone furthest to the right.	The pilot air must be supplied externally via (12/14) at the right end plate.
Modifications to the right end plate	End plate – **without** separator VABD-XA-12-P1 – with blanking plugs in port (12/14)	End plate – **with** separator VABD-XA-12-P1 – with cartridge in the port (12/14)
Required pilot pressure	The pilot pressure corresponds to the operating pressure (1) of the supplying pressure zone	The valve variant with the highest required pilot pressure determines the pilot pressure that is to be set for the entire valve terminal ➔ 13.5 Technical data, characteristics
Operating pressure at the port (1)	0.15 ... 0.7 MPa, depending on the valves in use and the operating mode	–0.09 ... +0.7 MPa, depending on the valves in use and the operating mode
Vacuum or low-pressure operation	These operating modes require pressure zone separation in duct (12/14).	These operating modes depend on the valve variants in use. ➔ Check that the configuration in the online configurator is valid.

Tab. 8: Types of pilot air supply

Additional information ➔ 12.3.4 Converting pilot air supply

4.2.1.3 Auxiliary pilot air

The auxiliary pilot air is directed within the valve terminal to the right end plate and discharged there.

Unducted auxiliary pilot air	Ducted auxiliary pilot air
Use the silencer AMTX at the port (82/84).	Cartridge with tubing line at the port (82/84) of the right end plate

Tab. 9: Auxiliary pilot air on the right end plate

Additional information ➔ 12.3.4 Converting pilot air supply

4.2.1.4 Forming pressure zones

A maximum of 16 pressure zones can be created within a valve terminal depending on the configuration.
Pressure zones are used within a valve terminal in the following cases:
– To supply valves with different operating pressures
– To set up different operating modes

The pressure zones are delimited on the right side of the manifold sub-base by separators ➔ 4.1.2.5 Separators for forming pressure zones.
Every pressure zone must be supplied separately with compressed air. Unsupplied pressure zones must not occur.

4.3 Operating modes

The following operating modes of the valve terminal may be used depending on the valve variants in use:
- Default operation with one or more pressure zones
- Low-pressure operation
- Vacuum operation

4.3.1 Low-pressure operation or vacuum operation

The valve terminal can be operated at low pressure or vacuum if the following requirements are met:
- Low pressure or vacuum is fed into the relevant pressure zone via duct (1).
  - Pressure range for low-pressure operation: 0 ... 0.3 MPa
  - Pressure range for vacuum operation: –0.09 ... 0 MPa
- The pilot control is operated with an external pilot air supply and a pressure of at least 0.3 MPa.
- The pressure zones for low-pressure operation or vacuum operation are fitted exclusively with suitable valve variants ➔ www.festo.com/catalogue.

4.4 Address assignment of valve positions

The manifold sub-bases for switching valves provide 8 addresses each. The manifold sub-bases with electrical feed VABX-AS-EL-... and the supply plates VABX-AS-BU-... do not occupy addresses.
Information about the process data of the manifold sub-bases ➔ 9 Process data.

Key features of the address assignment

- The address assignment is implemented without gaps in ascending order from left to right and is independent of whether cover plates or valves are fitted.
- Monostable valves with 1 solenoid coil or bistable valves with 2 solenoids can be used at all valve positions for bistable valves.
- If a bistable valve occupies both addresses of a valve position:
  - Solenoid coil 14 occupies the lower-value address.
  - Solenoid coil 12 occupies the higher-value address.
- Monostable valves with 1 solenoid coil also occupy the second address of a valve position for bistable valves.

Component	Grid dimension [mm]	Valve locations on manifold sub-base	Address assignment per manifold sub-base
Manifold sub-bases for switching valves			
VABX-A-S-BV-...-RVAAAA VABX-AS-BV-...-SVAAAA	10.5	4	8
VABX-A-S-BV-...-RVBBBB VABX-AS-BV-...-SVBBBB	12.5	4	8

Component	Grid dimension [mm]	Valve locations on manifold sub-base	Address assignment per manifold sub-base
Supply plate for intermediate supply			
VABX-A-S-BU-E12	–	–	– Signals are forwarded.

Tab. 10: Coding on the circuit board and address assignment per manifold sub-base

Example of an address assignment

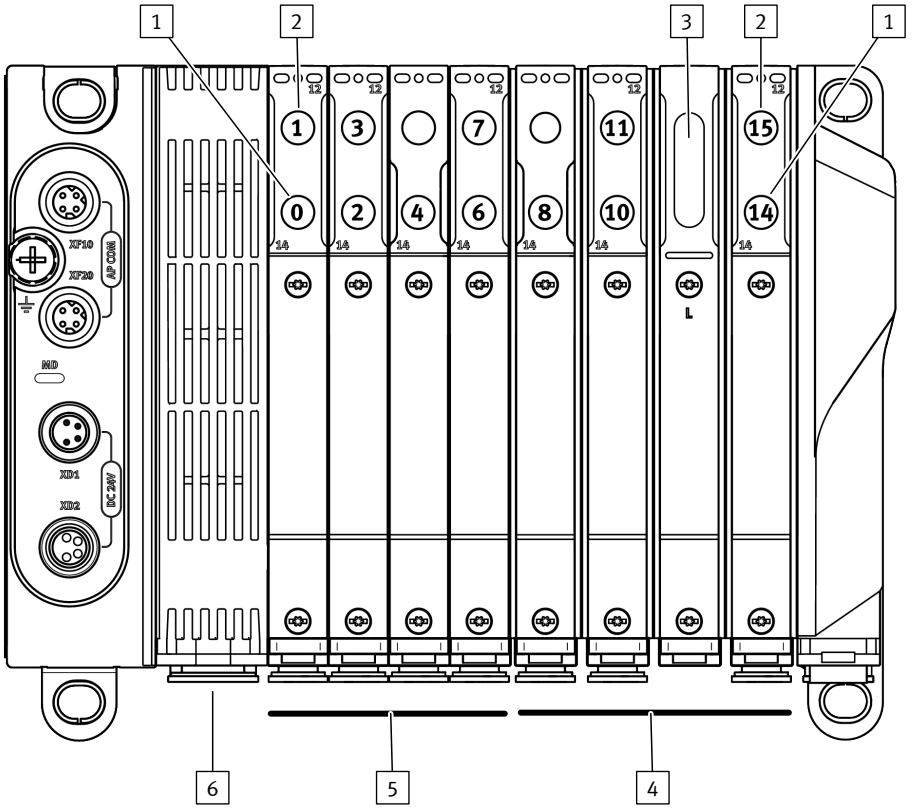


Fig. 13: Valve terminal with CPX-AP-API connection – example

1 Addresses of solenoid coils 14
2 Addresses of solenoid coils 12
3 reserved valve position - vacant position
4 Quadruple manifold sub-base VABX-A-S-BV-BH-RVBBBB, grid dimension 12.5 mm, occupies 2 addresses per valve position
5 Quadruple manifold sub-base VABX-A-S-BV-AH-RVAAAA, grid dimension 10.5 mm, occupies 2 addresses per valve position
6 Manifold sub-base with electrical and/or pneumatic supply, does not occupy an address

Address/bit	Valve position no.	Solenoid coil	Electrical interlinking module
0 1	0	14 12	VABX-A-S-BV-AH-RVAAAA (Manifold sub-base for 4 bistable valves each with 2 solenoid coils, grid dimension 10.5 mm)
2 3	1	14 12	
4 5[1)]	2	14 —	
6 7	3	14 12	

Address/bit	Valve position no.	Solenoid coil	Electrical interlinking module
0 1[1)]	4	14 —	VABX-A-S-BV-BH-RVAAAA (Manifold sub-base for 4 bistable valves each with 2 solenoid coils, grid dimension 12.5 mm)
2 3	5	14 12	
4[1)] 5[1)]	6	— —	
6 7	7	14 12	

1) Address is reserved for a solenoid coil by the electrical interlinking module, but is not used in the example.

Tab. 11: Address assignment for valve terminal with CPX-AP-API connection – example

5 Mounting

5.1 Mounting types

The valve terminal can be mounted in the following ways:

Mounting	Wall	H-rail
Valve terminal with – manifold sub-base with electrical supply – remote I/O system CPX-AP-A	yes, any orientation	yes, horizontal

Tab. 12: Mounting types

Assembly conditions and dynamic load ➔ Assembly instructions ➔ 1.1 Applicable documents

6 Installation

6.1 Installation, pneumatic

6.1.1 Common pneumatic lines

When using common pneumatic lines through multiple valve terminals, check valves must be provided in the exhaust lines to avoid back pressure. Back pressure may affect the performance and switching response of valves.

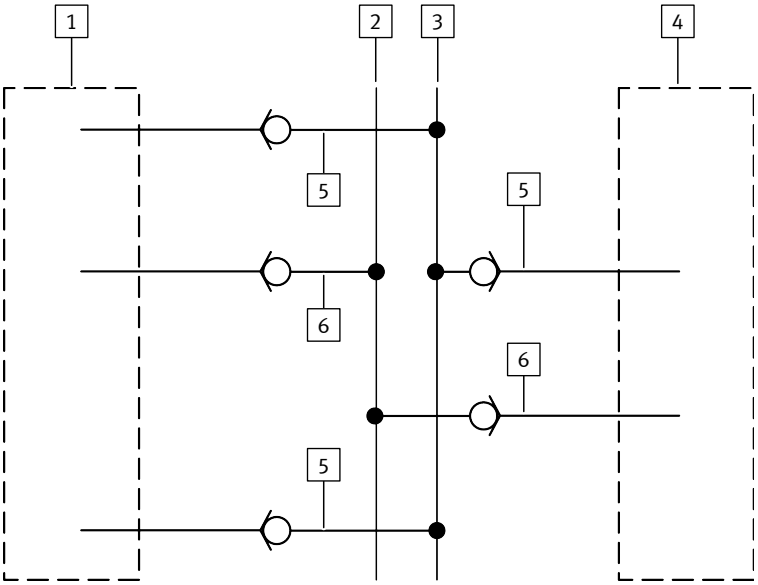


Fig. 14: Common pneumatic lines with check valves

1 Valve terminal 1
2 central auxiliary pilot air line
3 Central exhaust line (3/5)
4 Valve terminal 2
5 Exhaust line (3/5) of the valve terminal
6 Auxiliary pilot air line of the valve terminal

6.1.2 Compressed air preparation

Quality requirements for the compressed air supply must be continuously monitored.

Quality of compressed air

- Unfiltered compressed air will reduce the service life of the valve terminal.
- An excess of residual oil content in the compressed air will cause valves to malfunction, and will wash out the life-time lubrication necessary for unlubricated operation.

Operation with unoiled compressed air

Operation with unoiled compressed air is preferred. The factory-set permanent lubrication ensures a long service life without additional lubrication. If the valve terminal has been operated with oiled compressed air, switching to a supply with unoiled compressed air is not permitted.

Operation with oiled compressed air

Operation with oiled compressed air is possible, but has the following restrictions:

- The lifetime lubrication required for unoiled operation will be flushed out by operation with oiled compressed air.
- Incorrect added oil and oil content in the compressed air that is too high will cause malfunctions in the valves and will reduce the service life of the valve terminal.

6.1.3 Unthreaded cartridges

Mounting cartridges

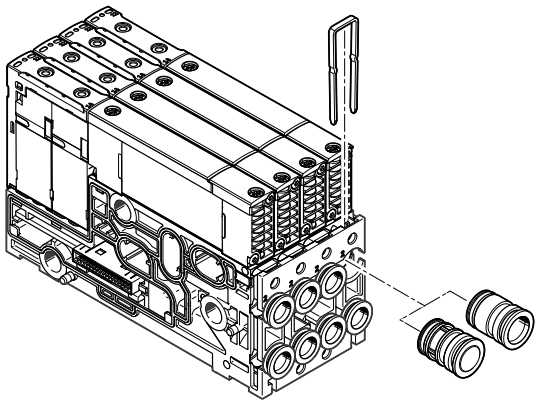


Fig.15

1. Insert the cartridge NPQX-D into the connection hole and press it in against the slight resistance to the stop.
2. Insert the clamping clip into the locking grooves on both sides.
3. Push the clamping clip over the locking lugs to the end position and the clamping clip no longer protrudes.
4. Check that the cartridge is firmly seated to prevent it from being ejected during pressurisation.

Disassembling cartridges

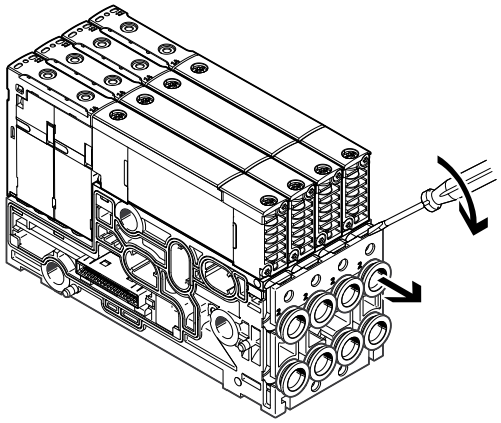


Fig.16

1. Use a narrow slotted screwdriver to lever the clamping clip over the locking lugs.
2. Pull out the clamping clip.
3. Pull the cartridge out of the connection hole with a short attached piece of hose.

6.1.4 Connecting pneumatic lines

6.1.4.1 Mounting tubing

All pneumatic ports on the valve terminal are marked with duct numbers and can be fitted with cartridges depending on the configuration. To adapt the configuration ➔ 6.1.3 Unthreaded cartridges

1. Push the tubing into the cartridge to the stop.
2. For a better overview of the system bundle the installed tubing together with:
   – Tubing straps
   – Tubing clamps
3. Seal unused ports with blanking plugs.
4. Fit silencers to the exhaust ports for unducted exhaust air.

6.1.4.2 Removing tubing

Recommended: label all pneumatic tubing to avoid confusion when reconnecting it.

1. Press down the cartridge lock ring.
2. Pull the tubing from the cartridge.

6.1.5 Preventing back pressure

Back pressure in the exhaust ducts of the valve terminal may accumulate when exhausting high-volume actuators or if the exhaust performance is too low. The back pressure may influence the switching response of valves, especially with non-switched 3/2-way valves that are normally closed.
Remedial measures:

1. Optimise pressurisation and exhaust performance of the valve terminal, e.g. with the following measures:
   – larger tubing diameters
   – additional pressure feed via pneumatic supply plates
   – exhausting via pneumatic supply plates with silencer or exhaust plate
   – Do not merge separate exhaust ducts; it is better to lay out exhaust lines separately.
   – Keep exhaust ducts separate by pressure zones.
2. Install check valves in manifolds ➔ 6.1.1 Common pneumatic lines.

6.2 Installation, electrical

6.2.1 Information for installation

⚠ WARNING

Risk of injury due to electric shock.

- For the electric power supply, use SELV or PELV circuits that guarantee a reliable electric disconnection from the mains network.
- Observe IEC 60204-1/EN 60204-1.

Long signal lines reduce the immunity to interference.
Maximum permissible signal cable lengths depend on the specific manifold sub-base with electrical supply ➔ 1.1 Applicable documents.

6.2.2 Switching on the power supply

Connecting electrical cables

Requirement: the valve terminal is completely assembled and mounted.

1. Establish the logic supply PS via the remote I/O system CPX-AP or the manifold sub-base with electrical supply VABX-A-...-EL-... in accordance with the operating instructions ➔ 1.1 Applicable documents.
2. Establish the load supply PL via the remote I/O system CPX-AP or the manifold sub-base with electrical supply VABX-A-...-EL-... in accordance with the operating instructions ➔ 1.1 Applicable documents.
   ⇨ The electrical cables are connected but power is still off.

6.2.3 Earthing valve terminal

The earth terminal is a functional earth connection. It serves to reduce the immunity to interference and is not for protection.

Preventing malfunction due to electrostatic influence
- Connect the earth terminal to the earth potential with low impedance.
- Avoid interference voltages on the conductive substrate.
- Use earth wire with a nominal cross-section 4 … 6 mm^2, preferably an earthing strap made of copper braid.
- Earthing cables should be kept as short as possible.

Valve terminal with remote I/O system CPX-AP-A

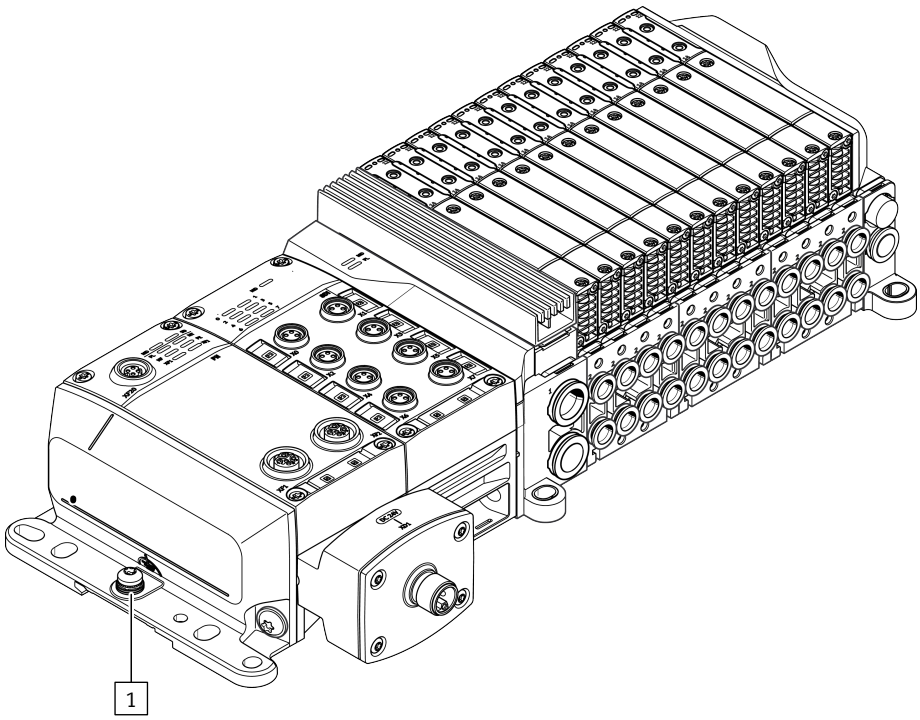


Fig. 17: Location of the earth terminal
1 Earth terminal FE

Valve terminal with electrical manifold sub-base

It may be necessary to earth the valve terminal, depending on the specific manifold sub-base with electrical supply ➔ Manifold sub-base operating instructions ➔ 1.1 Applicable documents

7 Commissioning

7.1 Commissioning, pneumatic

7.1.1 Functional test by manual override (MO)

A valve that has been actuated by an electric signal cannot be reset by actuating the manual override. The electrical signal is dominant in this case.
A valve switched by a detenting actuation mechanism cannot be switched back into normal position by setting or by resetting/cancelling an electrical signal. The manual override is dominant in this case.
- Before performing the functional test, reset manual overrides and electrical signals.

The power supply is switched off.

1. Switch on the compressed air supply.
   Pressurise the system slowly to avoid jerky or unwanted movements of connected actuators.
2. Check the functionality and operation of the various valve-actuator combinations by activating the corresponding MO.
3. Switch off the compressed air supply after the test.

Non-detenting actuation, automatic reset

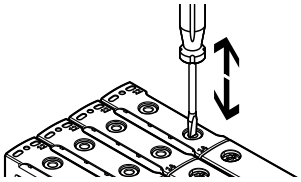
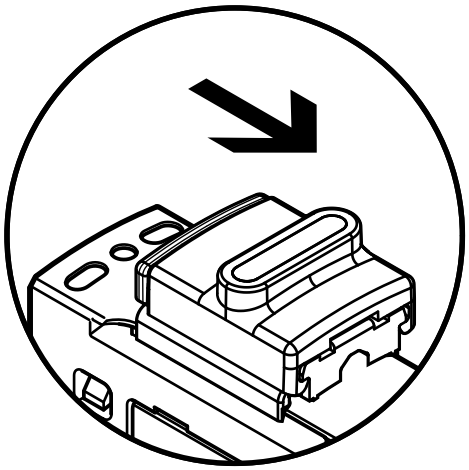


Fig.18

1. Press the MO plunger in until the valve switches.
   ⇨ The valve goes to the switching position.
2. Press and hold the MO plunger.
   ⇨ The valve remains in switching position.
3. Release the plunger.
   ⇨ The mechanical spring returns the MO plunger to its normal position.
   ⇨ The valve returns to the normal position.
   Bistable 5/2-way valves remain in the current switching position.

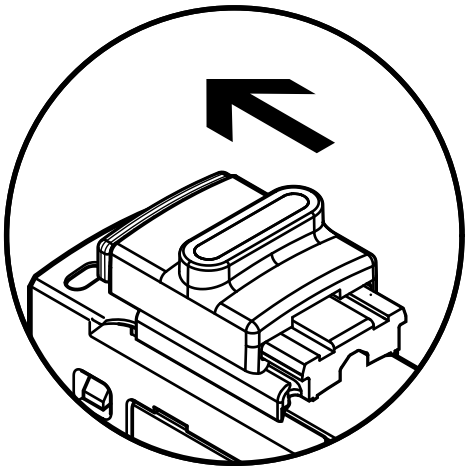
Detenting actuation, manual reset

1. Move the slide of the cover cap in the direction of the arrow until the slide clicks into the end position.



   ⇨ The valve goes to the switching position.

2. Move the slide of the cover cap in the direction of the arrow until the slide clicks into the end position.



⇨ The mechanical spring returns the MO plunger to its normal position.
⇨ The valve returns to the normal position
Bistable 5/2-way valves remain in the current switching position.

7.1.2 Installing cover caps - optional

It takes additional force to remove the cover caps. The snap hooks of the cover caps can be damaged during disassembly.
- Mount the cover caps only after commissioning.

Mounting cover cap

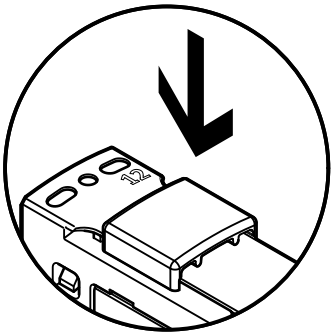


Fig.19

- Clip the cover cap VAMC-XA-CS onto the valve.
  ⇨ This can prevent unwanted activation.

Demounting cover cap

- Use a suitable screwdriver to lever the cover cap for the MO off the MO.

7.2 Commissioning, electrical

7.2.1 Completing commissioning

The electrical installation has been carried out.

1. Switch on the power supply.
2. Check the success of the commissioning in accordance with the operating instructions of the remote I/O system CPX-AP-A or the manifold sub-base with electrical supply ➔ 1.1 Applicable documents.
   ⇨ The valve terminal is ready for operation.

8 Parameterisation

Various parameters are available for reading out information about the modules of the valve terminal and to adjust the modules to the application situation. The parameters are typically accessed by the higher-level controller using the device descriptions specific to the host system.

Manifold sub-bases for switching valves

The following parameter tables apply to the manifold sub-bases for switching valves. The parameters of other valve terminal components can be found in the applicable operating instructions ➔ 1.1 Applicable documents.

Instances

Various numbers of instances are available for the parameters depending on the purpose or the use:
- 1 instance: refers to the manifold sub-base
- 4 instances: refer to the valve positions of a manifold sub-base, counted from left to right
- 5 instances: refer to the manifold sub-base (instance 1) and its valve positions (instances 2 ... 5)
- 8 instances: refer to the solenoid coils of a manifold sub-base, counted from left to right, each solenoid coil 14, followed by solenoid coil 12

Fieldbus startup parameters

ID	Parameters	Instances	Data type	Access[1]	Array size
20021	Enable diagnosis for defect valve (factory setting: FALSE)	1	BOOL	rw	–
20022	Setup monitoring load supply PL – 0: Load supply monitoring inactive – 1: Load supply monitoring active, undervoltage diagnosis suppressed in case of switch-off (default) – 2: Load supply monitoring active	1	UINT8	rw	–
20052	Behaviour in fail state (communication error) – 0: Reset Outputs (default) – 1: Hold last state	1	UINT8	rw	–

1) ro = read only; rw = read write

Tab. 13: Fieldbus startup parameters

Fieldbus parameters (status/information)

ID	Parameters	Instances	Data type	Access[1]	Array size
20094	Condition counter critical limit	8	UINT32	rw	–
20095	Condition counter actual value	8	UINT32	rw	–
20116	Lifecycle counter set point	8	UINT32	rw	–
20118	Application specific tag	5	CHAR	ro	32
20201	Type of digital input module – 0: 8 DI module, PNP, M8 – 1: 8 DI module, PNP, push in – 2: 8 DI module, NPN, M8 – 3: 8 DI module, NPN, push in – 8: no DI module	1	UINT8	ro	–
20203[2]	B10 value	4	UINT32	ro	–
20205[2]	Valve function	4	CHAR	ro	4

ID	Parameters	Instances	Data type	Access[1]	Array size
20206[2]	Lifecycle counter actual value	8	UINT32	ro	–
20208[2]	Setup diagnosis: wrong valve connected – 0: Save current valve setup as target value / diagnosis disabled (default) – 1: Enable diagnosis when target value and current valve setup differ	1	UINT8	rw	–

1) ro = read only; rw = read write
2) currently without function, reserved for later expansion stages

Tab. 14: Fieldbus parameters (status/information)

AP parameter

ID	Parameters	Instances	Data type	Access[1]	Array size
246	Fieldbus Serial Number	1	UINT32	ro	–
791	Product key	5	CHAR	ro	12
960	Firmware version	1	CHAR	ro	30
20000	Modul Code	1	UINT32	ro	–
20003	Firmware Version PL Controller	1	CHAR	ro	30
20085	Temperature Value AP-ASIC [°C]	1	INT16	ro	–
20087	Current value logic supply PS [mV]	1	UINT16	ro	–
20088	Current value load supply PL [mV]	1	UINT16	ro	–
20093	Hardware version	1	UINT8	ro	–

1) ro = read only; rw = read write

Tab. 15: AP parameter

The AP parameters can be queried with suitable software, e.g. with the Festo Automation Suite. The Festo Automation Suite is available in the Festo Support Portal ➔ www.festo.com/sp.

9 Process data

Manifold sub-bases for switching valves

The manifold sub-bases for switching valves supply 1 byte of process output data for valves and 1 byte of process input data for digital inputs.
The process data of other valve terminal components can be found in the applicable operating instructions ➔ 1.1 Applicable documents.

Process output data

2 bits per valve position are occupied regardless of whether monostable or bistable valves or cover plates are fitted.

Byte '0'	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Valve position	3		2		1		0	
Solenoid coil	12	14	12	14	12	14	12	14

Tab. 16: Process output data per interlinking block for switching valves

Process input data (prepared)

Every manifold sub-base for switching valves has 8 bits allocated for digital input signals regardless of their use (currently without function, reserved for later expansion stages).

Byte '0'	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Digital inputs	7	6	5	4	3	2	1	0

Tab. 17: Process input data

10 Diagnostics

10.1 Diagnostics information

The degree of severity of a diagnostic message is indicated by the diagnostic status.

Status	Description
Error	Error – The valve terminal is no longer ready for operation. – Urgent troubleshooting action required.
Warning	Warning – The valve terminal cannot be operated with its full range of functions. – Troubleshooting action required.
Maintenance	Maintenance – Maintenance required.
Information	Information – No action required.

Tab. 18: Diagnostic status

The following diagnostic tables apply to the manifold sub-bases for switching valves. The diagnostic options for other valve terminal components can be found in the applicable operating instructions ➔ 1.1 Applicable documents.

10.2 Diagnostics on the product via LEDs

Signal status display and diagnostics via LED

An LED is allocated to every solenoid coil to indicate the signal status.
Every valve also has a diagnostic LED to display channel diagnostics. The diagnostic LEDs of all valves on the manifold sub-base are activated to display module diagnostics.

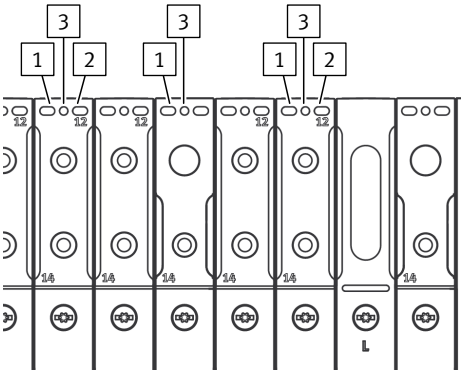
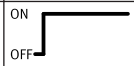


Fig. 20: Allocation of LEDs

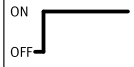
1 LED (blue): signal state of solenoid coil 14 for channel (4)

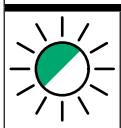
2 LED (blue): signal state of solenoid coil 12 for channel (2)

3 LED (multi-coloured): diagnostics

Signal state of solenoid coils 12 and 14		Meaning	Possible error
off		– A signal to switch the valve is not pending. – logic 0	–
blue light		– The signal to switch the valve is pending. – logic 1	The valve has not switched although a signal is pending. The following malfunctions may be present: – The operating voltage of the valve is outside the permissible tolerance range. – The compressed air supply is faulty. – The pilot air supply or auxiliary pilot air is faulty. – The pending signal for solenoid coil 12 is indicated by the LED, but a monostable valve or a cover plate is installed in the valve position. – Service case

Tab. 19: Signal status of the solenoid coils

Diagnostics LED		Meaning and possible errors
off		– OK – diagnostics not active – power supply not active
flashing green (1 Hz)		Diagnostics active, "Information" severity, e.g. disconnection of load supply PL
flashing red (1 Hz)		Diagnostics active, "Warning" severity
red light		Diagnostics active, "Error" severity, e.g. valve defective or load supply PL undervoltage
fast flashing red (2 Hz)		Module ramp-up not yet completed. System communication not yet initialised

Diagnostics LED		Meaning and possible errors
 fast flashing green (2 Hz)		Module identification (service function via Festo Automation Suite)
 yellow light		Diagnostics active, "Maintenance" condition, e.g. condition counter critical limit has been reached.

Tab. 20: Signal state of the diagnostics LED

10.3 Diagnostic messages

The diagnostic messages are signalled on the manifold sub-base by the LED displays and sent to the remote I/O system CPX-AP. Some of the diagnostic messages are generated depending on the parameter settings.

Module and channel diagnostics

ID hex (dec)	Message	Description	
01 l 01 l 010B (16843019)	Short circuit/overload in sensor supply	A short-circuit/overload of the sensor supply was detected	
		Remedy	- check sensor for correct function, in particular for current consumption. - check sensor wiring.
		Diagnostic status	Error
02 l 01 l 0016 (33619990)	Undervoltage in logic supply PS 24 V DC	Undervoltage in logic supply PS was detected.	
		Remedy	– Check logic supply PS.
		Diagnostic status	Error
02 l 01 l 0017 (33619991)	Overvoltage in logic supply PS 24 V DC	Overvoltage in logic supply PS was detected.	
		Remedy	– Check logic supply PS.
		Diagnostic status	Error
02 l 01 l 0105 (33620229)	Undervoltage in load supply PL 24 V DC	Undervoltage in load supply PL was detected.	
		Remedy	– Check load supply PL. – Check for short circuit.
		Diagnostic status	Error
02 l 01 l 0106 (33620230)	Load supply PL 24 V DC switched-off	A switch-off of the load supply PL was detected. The cause may be a intentional switch-off by emergency stop.	
		Remedy	– Check if emergency stop has been activated. – Check load supply PL.
		Diagnostic status	Information
02 l 01 l 013F (33620287)	Overvoltage load supply PL 24 V DC	Overvoltage of the load supply PL was detected.	
		Remedy	– Check load supply PL.
		Diagnostic status	Error
07 l 06 l 0268 (117834344)	Valve defect	A short circuit or wire break (open load) was detected on the solenoid coil of a valve.	
		Remedy	– Check and/or replace valve.
		Diagnostic status	Error
0C l 01 l 01B5 (201392565)	Condition counter value for valve coil reached.	The specified setpoint of the condition counter for the valve coil was reached.	

ID hex (dec)	Message	Description	
0C l 01 l 01B5 (201392565)	Condition counter value for valve coil reached.	Remedy	– Reset condition counter for valve coil. – Perform customer-specific/application-specific maintenance on the valve.
		Diagnostic status	Maintenance

Tab. 21: Module and channel diagnostics

10.4 Application-specific diagnostic functions

Switching cycle counter (Condition counter)

The manifold sub-base for switching valves provides a channel-based switching cycle counter for every solenoid coil. A diagnostic message is sent when the switching cycle counter reaches the critical limit (set point). The diagnostic message can be used as a trigger for all types of maintenance work in the application (e.g. reminder of lubrication or replacement of parts). The diagnostic message has the diagnostic status Maintenance and is deactivated by default.

- Every solenoid coil is assigned an actual value memory and a critical limit memory: fieldbus parameters ID 20095 and ID 20094.
- The switching cycle counter is incremented at every rising edge of the switching signal.
- The switching cycle counter counts up to its maximum value of 0xFF.FF.FF.FF. The switching cycle counter then remains at the maximum value. There is no overflow.
- If the critical limit is reached or exceeded, the channel-based diagnostic message ID0Cl01l01B5 (201392565) is sent.
- The diagnostic message can be cancelled by setting the critical limit to a value higher than the current actual value. Or the actual value or the critical limit can be set to 0.
- The diagnostic message ID0Cl01l01B5 (201392565) is deactivated if the critical limit memory has the value 0 (factory setting).
- When the manifold sub-base is replaced, actual values and critical limit values can be manually transferred to another manifold sub-base by read-out and read-in.
- When replacing a valve, the actual value remains unchanged in the manifold sub-base and it can be reset manually via the fieldbus parameter ID 20095.
- The actual value of the switching cycle counter is saved to the non-volatile memory of the manifold sub-base when the logic supply PS is switched off.

Load supply PL voltage monitoring

In the factory setting the load voltage monitoring differentiates between "undervoltage/overvoltage load supply PL" and "shutdown load supply PL". The difference between "undervoltage load supply PL" and "shutdown load supply PL" is useful if a deliberately initiated shutdown is not intended to trigger an error message in the higher-level controller, e.g. emergency stop. A critical undervoltage, e.g. as a result of excessive voltage drop in the cable, is always reported as an error.

The activation/deactivation and use of the load voltage monitoring is controlled via the fieldbus startup parameter with ID 20022.

For additional information on load voltage monitoring see ➔ operating instructions remote I/O system CPX-AP-I or CPX-AP-A ➔ 1.1 Applicable documents.

Valve diagnostics

The valve diagnostics is deactivated in the factory setting and can be activated individually for every manifold sub-base: fieldbus parameter ID 20021. The valve diagnostics detects a short circuit or wire break (open load) on the solenoid coils and sends the channel-based diagnostic message ID 07 | 06 | 0268 (117834344).
Fault clearance procedure:

1. For fault clearance switch off the load voltage PL.
   ⇨ The diagnostics LED on the valve remains on while the operating voltage PS remains switched on. This supports troubleshooting on the valve terminal.
2. Replace the valve or correct the short circuit.
3. Switch the load voltage PL on again.
   ⇨ The diagnostics are no longer present unless there is still a short circuit or wire break (open load) or an unoccupied channel is connected (solenoid coil 12 on a valve position with a monostable valve or cover plate).

Application specific tag (Application specific tag)

The user can parameterise a text label as a "digital/electronic rating plate". This parameter provides a total of five instances with a maximum of 32 characters each for each of the four valve positions and for the manifold sub-base for this purpose: fieldbus parameter ID 20118.

11 Fault clearance

Fault description	Cause	Remedy
Air flows out of a common line.	Inadequate assembly of: – Tubing in fittings – Fittings in sub-bases	Check tubing connections.
Air flows out of a working line.		
Valve or pneumatic system does not respond as expected.	–	– Check routing of tubing lines. – Check the electrical wiring.
Valve or pneumatic system does not respond.	ducts (3), (5) or (82/84) intended for exhaust air are closed	– Check pneumatic circuit and pressure zone formation. – Check pressure zones for supply with operating and pilot pressure.
	–	Service case

Tab. 22: Fault clearance

12 Modification

12.1 Preparations

The valve terminal can be shortened by removing components and replacing tie rods VAME-XA-Z-... with shorter versions.
The valve terminal can be extended by adding components and replacing existing tie rods VAME-XA-Z-... with longer versions or tie rod combinations.

If the original configuration of the valve terminal is changed by replacing components:
- Check the new configuration in the online configurator to ensure that it is valid.
- Check the new configuration for the tie rod configuration
  ➔ www.festo.com/spareparts, tab ‘Modification aid’.
- In the event of uncertainty contact the regional Festo representative
  ➔ www.festo.com.

The valve terminal configuration can be extended to the right of the existing valve locations so long as addresses can still be assigned. The address assignment must be checked if additional valve positions are inserted into the existing valve island configuration or existing valve positions are removed.

Preparations for conversion

1. Switch off the electrical and pneumatic power supplies and exhaust ducts (2) and (4).
2. Disconnect the electrical and pneumatic connections.
3. Remove the valve terminal from the mounting surface.
4. Place the valve terminal on a flat working surface.
5. On completing the conversion, carry out these steps in reverse order.

12.2 Converting valve terminal

12.2.1 Disassembling tie rods

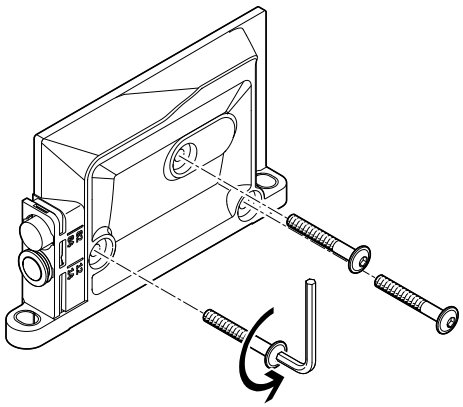


Fig. 21: Disassemble the tie rod screws on the right end plate

1. Loosen the 3 tie rod screws on the right end plate.
   – Allen key, size 2.5
2. Remove the 3 tie rod screws. The loose sub-bases are now only held together by the electrical interlinking module.
3. Pull off the components to the right of the components that are to be replaced or extended.
4. Remove the component that is being replaced.
5. If tie rods need to be shortened or lengthened: loosen and unscrew tie rods from the manifold sub-base with electrical supply.
   – Allen key, size 4

12.2.2 Installing tie rods

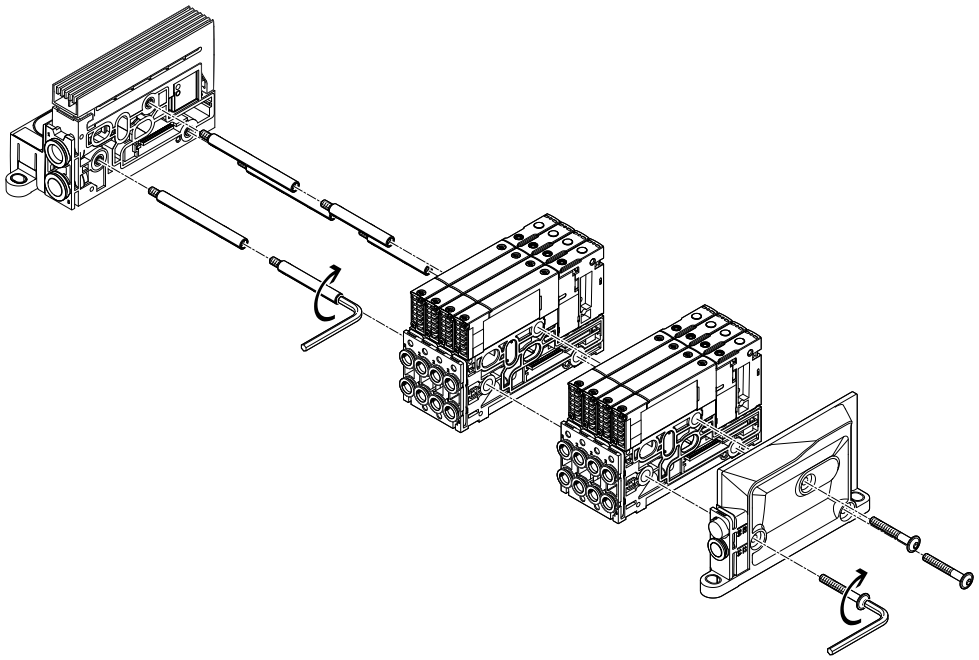


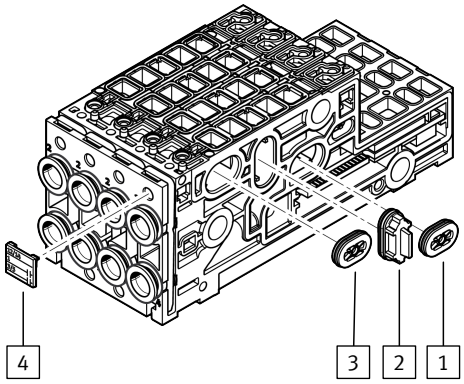
Fig. 22: Assembly of valve terminal components with tie rods

1. If necessary, line up combinations of tie rods and screw them together. Screw in the tie rod.
   ⇨ Check that all 3 tie rods are the same length.
2. Screw the 3 tie rods into the left-hand manifold sub-base with electrical supply and tighten them.
   – Allen key, size 4
   – Tightening torque: 1.4 Nm ± 15%
3. Check the seals at the separation points of the manifold sub-bases for damage.
4. Replace manifold sub-bases with damaged seals.
5. If necessary, check the position of the separators.
6. Attach the manifold sub-bases to the tie rods.
7. Attach the right end plate to the manifold sub-bases.
8. Insert the 3 tie rod screws through the holes in the right end plate and into the threaded sleeves of the tie rods then tighten them.
9. Tighten the 3 tie rod screws.
   – Allen key, size 2.5
   – Tightening torque: 1.4 Nm ± 15%

12.3 Replacing valve terminal components

12.3.1 Converting pressure zones

In order to convert the valve terminal to 2 and more pressure zones, the following components are required for every pressure zone:
– Separator(s) VABD-XA-12-P... for separating the desired duct(s)
– Identification plate ASLR-C-XA-T...
– Manifold sub-base with pneumatic supply and exhaust plate VABX-A-...-BU-E12
– Exhaust plate VABF-XA-...-M... with flat plate silencer or exhaust port



1 Separator VABD-XA-12-P2 for ducts (3) and (5), here: duct (5)
2 Separator VABD-XA-12-P1 for duct (1)
3 Separator VABD-XA-12-P2 for ducts (3) and (5), here: duct (3)
4 Identification plate ASLR-C-XA-T...

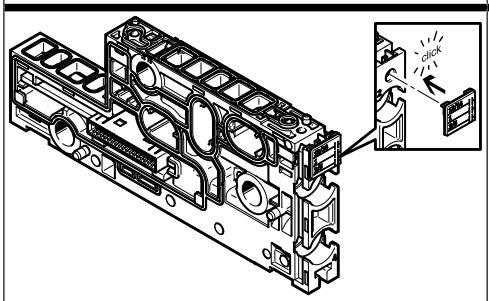
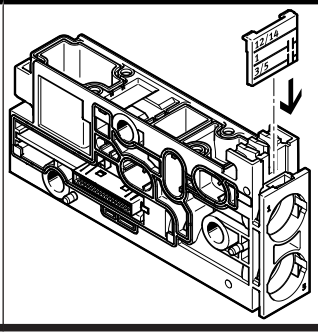
Fig. 23: Form and label the pressure zone

Removal

- Loosen the tie rod screws and remove the manifold sub-bases to the right of the planned pressure zone separation point.

Mounting

1. Grease the seals of the separating elements VABD-XA-12-P... to facilitate assembly.
2. Insert the separators(s) VABD-XA-12-P... into the ducts of the manifold sub-base or supply plate from the right to form the boundary of the pressure zone in the future. For separator VABD-XA-12-P1, note the mounting position with control element from the right.
   ⇨ The valve above the manifold sub-base with inserted separators is supplied from the left-hand pressure zone.
3. Attach an inscription label ASLR-C-XA-T... to for identification of the pressure zone boundary on the manifold sub-base or supply plate.
4. Install the manifold sub-bases.
5. Mount the tie rod screws.

Manifold sub-base VABX-AP-BV-...-F with inscription label	Supply plate VABX-A-...-BU with inscription label
	

Tab. 23

12.3.2 Replacing exhaust plate

Disassembling an exhaust plate

1. Loosen the 4 retaining screws on the exhaust plate.
2. Remove the exhaust plate.

Mounting an exhaust plate

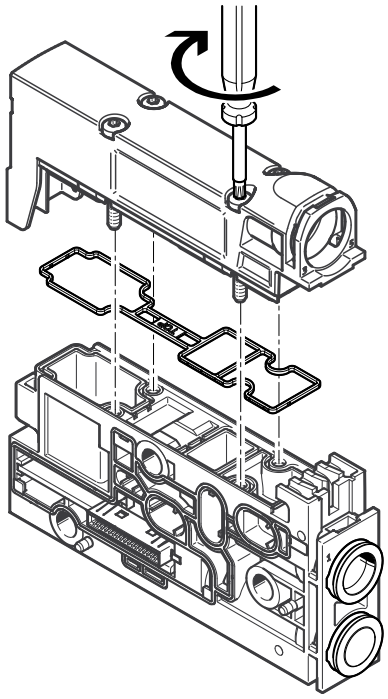


Fig. 24: Installing exhaust plate

1. Check the seal for damage and replace if necessary
   ➔ www.festo.com/spareparts.
2. Insert the seal into the recess in the supply plate.
3. Place the exhaust plate on the supply plate.
4. Screw in the 4 retaining screws of the exhaust plate.
5. Tighten the retaining screws.
   – Tightening torque 0.8 Nm ± 20%

12.3.3 Replacing flat plate silencer

Disassembling a flat plate silencer

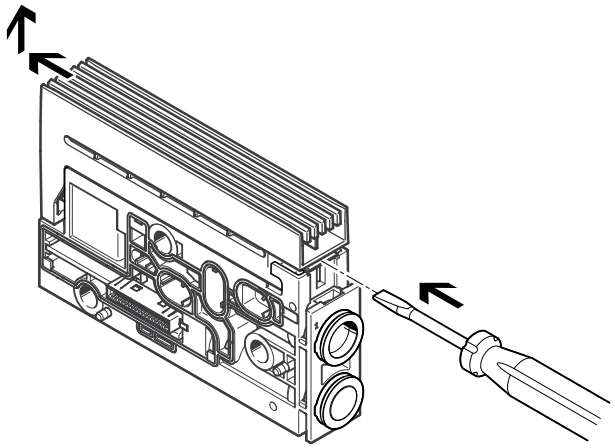


Fig. 25: Disassemble the flat plate silencer

1. Press the snap hooks upwards with a slotted screwdriver to unlock.
2. Push the flat plate silencer back and lift it off.

Mounting a flat plate silencer

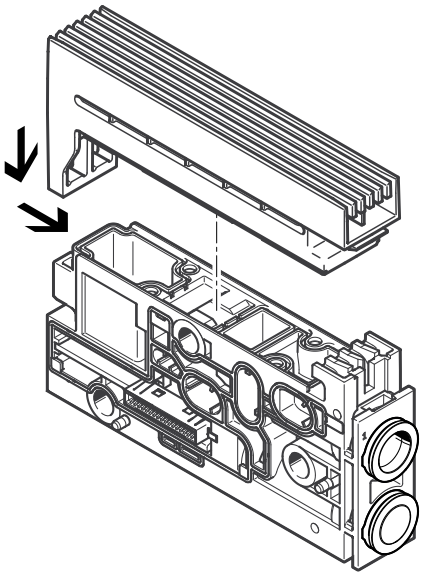
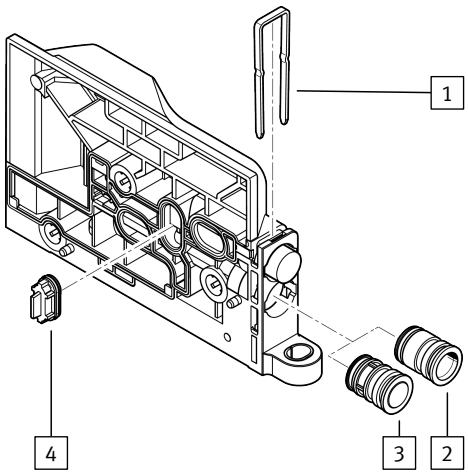


Fig. 26: Installing flat plate silencer

- Place the flat plate silencer on the supply plate and push it forward until the lock engages.

12.3.4 Converting pilot air supply

Conversion from internal to external pilot air supply



1 Clamping clip
2 Cartridge
3 Blanking plug
4 Separator

Fig. 27: Converting pilot air supply

1. Disassemble the right end plate ➔ 12.2 Converting valve terminal.
2. Disassemble the clamping clip ➔ 6.1.3 Unthreaded cartridges.
3. Remove the blanking plug from port (12/14).
4. Insert a cartridge into the port (12/14) and secure it with the clamping clip.
5. Insert a separator VABD-XA-12-P1 into the oval duct opening of duct (1) in the right end plate.
6. Mount the right end plate.

Conversion from external to internal pilot air supply

1. Disassemble the right end plate ➔ 12.2 Converting valve terminal.
2. Remove the separator from the oval duct opening in the right end plate.
3. Disassemble the clamping clip ➔ 6.1.3 Unthreaded cartridges.
4. Remove the cartridge from port (12/14).
5. Install a blanking plug in port (12/14) and secure it with the clamping clip.
6. Mount the right end plate.

12.3.5 Replacing valves or cover plates

Removal

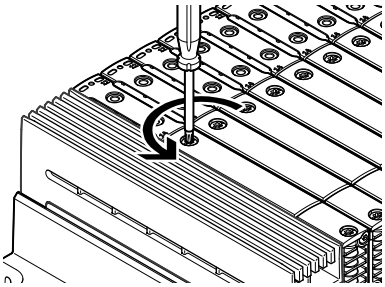


Fig. 28: Removing valve

1. Loosen the 2 retaining screws of the component.
   – Screwdriver ➔ Tab. 24 Tightening torques.
2. Remove the component.

Mounting

1. Replace damaged seals.
2. Insert the seal into the recess in the manifold sub-base.
3. Place the component on the manifold sub-base.
4. Screw in the 2 retaining screws.
5. Tighten the retaining screws.
   – Tightening torques ➔ Tab. 24 Tightening torques.

Component	Width	Screw	
		TORX drive	Tightening torque
– Valve VUVX-BK10-... – Cover plate VABB-XA-10-T	10 mm	T8	0.3 Nm ± 25%

Tab. 24: Tightening torques

12.4 Separating valve terminal and remote I/O system

To separate the remote I/O system from the valve terminal unscrew the self-tapping screws between the far right interlinking module of the remote I/O system and the electrical linkage of the valve terminal ➔ 1.1 Applicable documents.

12.5 Adding valve positions

The following components are required to add valve positions to the valve terminal:
– Manifold sub-bases VABX-A-...-BV-...H, single or quadruple
– Cartridges NPQX-D/-P-PC... for the ports (2) and (4)
– Valves VUVX-BK... or cover plates VABB-XA-...-T

If a manifold sub-base is added, the address assignment of all valves to the right of the added manifold sub-base changes.

Removal

1. Loosen the tie rod screws ➔ 12.2 Converting valve terminal.
2. Remove the manifold sub-bases to the position at which the valve terminal is to be extended.

Mounting

1. Mount additional manifold sub-base and, if necessary, an additional pneumatic supply plate.
2. Mount components on the additional manifold sub-base:
   – Valves or blanking plates
   – Exhaust air plate
3. Check the tie rod system and extend it if necessary.
4. Reinstall the tie rod system.

13 Technical data

13.1 Technical data, general

VTUX		
Certificates, declaration of conformity		➔ www.festo.com/sp
Ambient temperature	[°C]	–5 ... +50
Temperature of medium	[°C]	–5 ... +50
Storage temperature	[°C]	–20 ... +70
Max. storage time	[months]	48
Relative humidity	[%]	5 ... 95
Max. setup altitude above MSL	[m]	≤ 2000, without reduction
	[m]	2000 ... 3500, with reduction of the permissible maximum ambient temperature according to IEC 61131-2
Max. number of valves/solenoid coils		64/128
Degree of protection in accordance with EN 60529		IP40 IP65 when using the IP65 seal on all solenoid valves
		– In mounted state – With connected cables – Unused ports closed with cover caps
Mounting position		Wall mounting: any H-rail: horizontal

Tab. 25: Technical data, general

The valves can be operated down to a temperature of –5 °C. Condensate and moisture may freeze at lower temperatures.
Recommendation:
- Install a dryer to remove condensate and moisture.

13.2 Technical data, mechanical

Vibration resistance and shock resistance in accordance with EN 60068	
Vibration	H-rail: not permitted Wall: severity level 1
Shock	H-rail: not permitted Wall: severity level 1
Continuous shock	H-rail: not permitted Wall: severity level 1

Tab. 26: Vibration resistance and shock resistance

Type of severity level (SL)					
Vibration load					
Frequency range [Hz]		Acceleration [m/s²]		Deflection [mm]	
SL1	SL2	SL1	SG2	SL1	SL2
2 … 8	2 … 8	–	–	±3.5	±3.5
8 … 27	8 … 27	10	10	–	–
27 … 58	27 … 60	–	–	±0.15	±0.35
58 … 160	60 … 160	20	50	–	–
160 … 200	160 … 200	10	10	–	–

Type of severity level (SL)					
Shock load					
Acceleration [m/s²]		Duration [ms]		Shocks per direction	
SL1	SL2	SL1	SL2	SL1	SL2
±150	±300	11	11	5	5
Continuous shock load					
Acceleration [m/s²]		Duration [ms]		Shocks per direction	
±150		6		1000	

Tab. 27: Type of severity level (SL)

13.3 Technical data, pneumatic

13.3.1 General pneumatic data

VTUX	
Medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]
	Inert gases
	Lubricated operation possible (required for operation thereafter)
Information on the operating medium	Ester oil ‹0.1 mg/m³, conforms to ISO 8573-1, Class [-:-:2]

Tab. 28: General pneumatic data

VUVX		
Width	[mm]	10
Valve functions		– 5/2 monostable – 5/2 bistable – 5/3 closed – 2x3/2 closed monostable – 2x3/2 open monostable
Actuation type		electrical
Type of control		piloted
Design		Piston spool valves
Sealing principle		soft

Tab. 29: Valve data

13.3.2 Operating pressure/pilot pressure

Valves VUVX, width 10 mm		
Operating pressure	[MPa]	–0.1 ... 0.7
	[bar]	–1 ... 7
Pilot pressure with internal pilot air supply from port (1)	[MPa]	0.3 ... 0.7 Valves with identity code K: 0.4 ... 0.7
	[bar]	3 ... 7 Valves with identity code K: 4 ... 7
Pilot pressure with external pilot air supply from port (12/14)		The required pilot pressure depends on the operating pressure ➔ 13.5 Technical data, characteristics

Tab. 30: Operating pressure/pilot pressure of valves

Valves VUVX at 24 V DC, width 10 mm					
ID code	Valve switching times [ms]			Nominal flow rate normalised in accordance with ISO 8778 [l/min]	
	On	Reverse	Off	Pressurisation	Exhaust
M	10	–	18	730	700
A	8	–	32	730	700
J	–	9	–	730	700
KC	12	–	22	600	650
K	14	–	17	555	545
NS	14	–	17	555	545
G	10	18	48	510	465

Tab. 31: Switching times and flow values of the valves

Nominal flow rate normalised in accordance with ISO 8778 under the following conditions:
- Valve, width 10 mm, on 4x manifold sub-bases, grid dimension 12.5 mm, valve in position 4
- Pneumatic port:
  - Main supply connection for operating pressure (1) on manifold sub-base with electrical supply: QS-10
  - Working ports (2) and (4) on pneumatic manifold sub-base: QS-8
  - Exhaust air (3) and (5) via flat plate silencer

The use of smaller cartridges on the pneumatic ports reduces the specified nominal flow rates of the valves.

13.4 Technical data, electrical

VTUX		Manifold sub-bases for switching valves
Protection against electric shock (protection against direct and indirect contact in accordance with IEC 61010-1)		By the use of SELV/PELV circuits (safe extra-low voltage/protected extra-low voltage)
Logic supply PS	[V DC]	24 ± 25 % Tolerance range varies for some modules.
Max. acceptable current load for logic supply PS	[A]	4
Intrinsic current consumption at nominal operating voltage 24 V from PS	[mA]	Typically 24
Load supply PL	[V DC]	24 ± 10 %
Max. acceptable current load for load supply PL	[A]	4
Intrinsic current consumption at nominal operating voltage 24 V from PL (if no valves are switched)	[mA]	Typically 7
Characteristic coil data at 24 V DC	[W]	0.35
Capacitive load of the manifold sub-base for switching valves on load supply PL		
24 V PL to 0 V PL	[nF]	0
24 V PL to FE	[nF]	0
0 V PL to FE	[nF]	0
Electrical isolation		
Between PS and PL		Yes
Between the channels		No
Short-circuit protection		
Per channel		Electronic
Response after end of overload		Automatic recovery

Tab. 32: Technical data, electrical

13.5 Technical data, characteristics

5/2-way valves

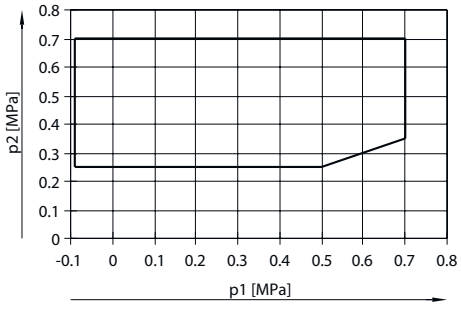


Fig. 29: Pilot pressure as a function of the operating pressure for valves with external pilot air supply, identification code A

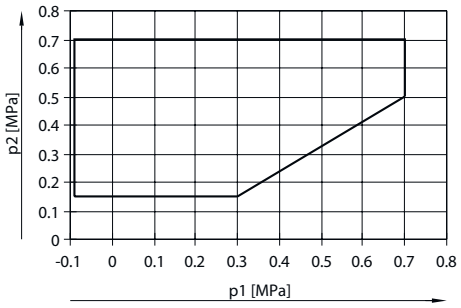


Fig. 30: Pilot pressure as a function of the operating pressure for valves with external pilot air supply, identification code J

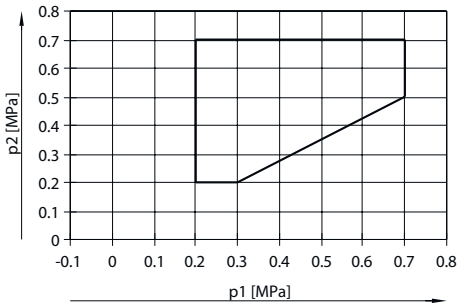


Fig. 31: Pilot pressure as a function of the operating pressure for valves with external pilot air supply, identification code M

5/3-way valves

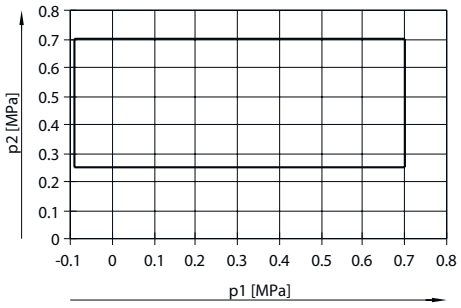


Fig. 32: Pilot pressure as a function of the operating pressure for valves with external pilot air supply, identification code G

2x 3/2-way valves

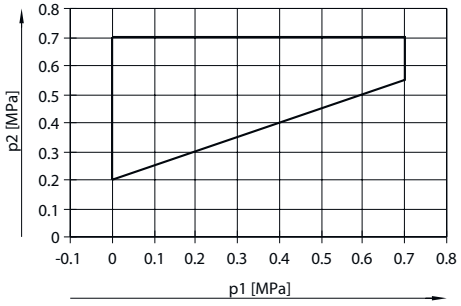


Fig. 33: Pilot pressure as a function of the operating pressure for valves with external pilot air supply, identification code K and NS

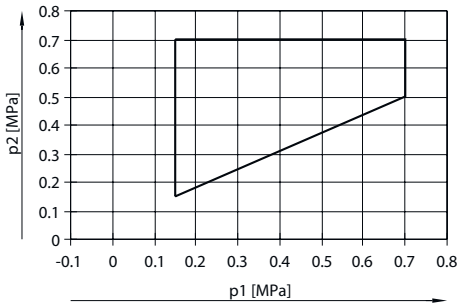


Fig. 34: Pilot pressure as a function of the operating pressure for valves with external pilot air supply, identification code KC

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

Phone: +49 711 347-0
www.festo.com