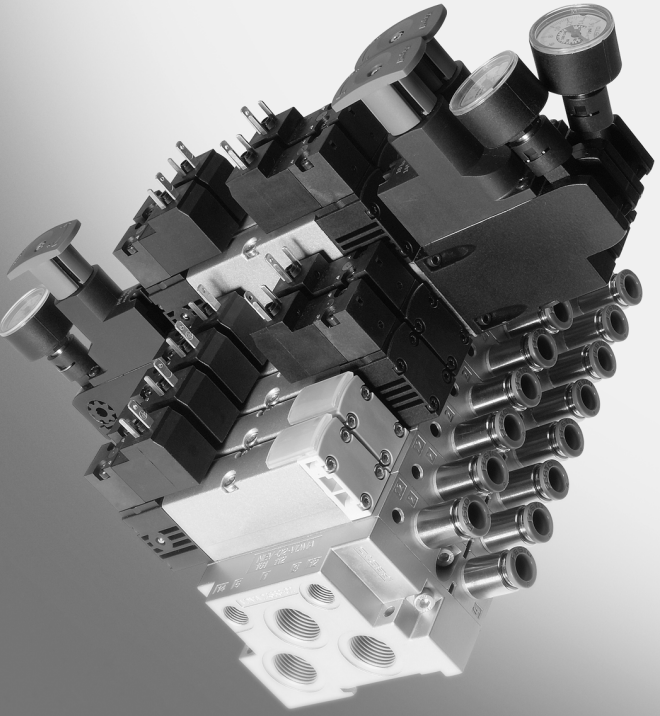
VTIA valve terminal



FESTO

Pneumatics manual
VTIA

Valve terminal
type VTIA-...
with valves
type VSVA-B-...-R...
and
type VSVA-B-...-C1

Manual
538 929
en 0705NH
[679 040]

Original ..... de

Edition ..... en 0705NH

Designation ..... P.BE-VTIA-EN

Order no. 538 929

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

Contents

Intended use

The VTIA valve manifold described in this manual is intended for fitting into a machine or automated system. The user must at all times observe the safety regulations specified in this manual as well as the instructions concerning the designated use of the relevant VTIA valve manifold. The VTIA valve manifolds may only be used as follows:

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

When used together with commercially available components, such as actuators, the specified limits for pressures, temperatures, electrical data, torques etc. must be observed. National and local safety regulations must also be observed.

Target group

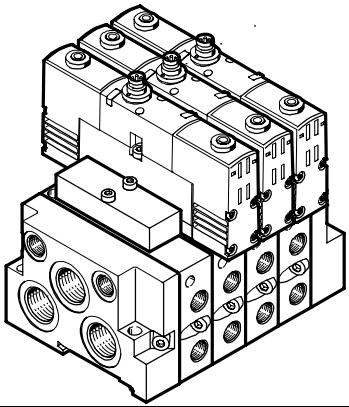
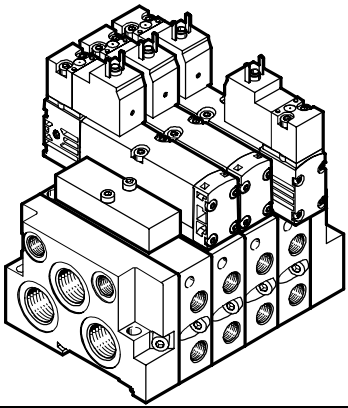
This manual is directed exclusively at technicians trained in control and automation technology.

Service

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

Notes on the use of this manual

This manual contains specific information on fitting, installing, commissioning, servicing and converting the VTIA valve manifold. This manual describes only the pneumatic components and refers to the valve manifold variants listed in the table below.

Variants of the VTIA valve manifold	
VTIA valve manifold with valves with central plug type VSVA-B-...-R...	VTIA valve manifold with valves with square plug (individual connection) type VSVA-B-...-C1
	

Tab. 0/1: Connection variants of the VTIA valve manifold

Important user instructions

Danger categories

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

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

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

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

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

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

Marking special information

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

Pictograms

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

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

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

Text markings

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

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

– Hyphens indicate general activities.

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

Term/abbreviation	Meaning
Central plug	Electrical individual connection of type VSVA-B-...-R... valves with M8 or M12 plug socket
Components	Collective term for the manifold block, intermediate plate, end plate, vertical supply plate, pressure regulator plate, throttle plate, valve or cover plate
Connecting the tubing	Connecting the supply lines (tubing) to the valve manifold
Cover plate	Cover for a non-assigned valve location on the manifold block
End plate	Right-hand and left-hand plate of the VTIA valve manifold with pneumatic supply connections and holes for wall mounting
Intermediate plate	Adapter plate with which sizes 18mm and 26 mm can be combined on the VTIA valve manifold
Manifold sub-base	Base for mounting a valve, with working lines 2 and 4
Manual override	Manual override actuator
Square plug	Electrical individual connection, square plug according to plug connection pattern DIN EN 175301-803, type C for valves with pneumatic interface according to ISO 15218 (type VSVA-B-...-C1)
Valve	VSVA solenoid valve, as a single-solenoid valve, double-solenoid valve or mid-position valve
Vertical pressure shut-off plate	Plate for blocking the pressure supply of a valve on the relevant valve location
Vertical supply plate	Plate on a valve location for individual pressure supply
VTIA valve manifold	Valve manifold with pneu. port pattern according to ISO 15407-1, which can be configured with valves of types VSVA-B-...-R... and VSVA-B-...-C1 from Festo.

Tab. 0/2: Product-specific terms and abbreviations

Summary of components

Chapter 1

Contents

Contents of this chapter

This chapter provides the following information on the VTIA valve manifold:

- The maximum number of valve locations
- The connection variants and components of the valve manifold
- The identification codes of the pneumatic components
- Connection, display and operating elements

1.1 The VTIA valve manifold

Festo assists you in solving your automation tasks at machine level with VTIA valve manifolds. The modular structure of the valve manifold enables you to match it optimally in your machine or system.

The manifold sub-bases of the valve manifold form the collecting channels for supply air and exhaust air. Work connections 2 and 4 are provided for each valve location on the individual manifold sub-bases. The valves are supplied with operating pressure and the valve exhaust is vented through the collecting channels of the manifold sub-bases and the connections in the end plates.

The pilot pressure is routed to connection 14 of the left-hand end plate.

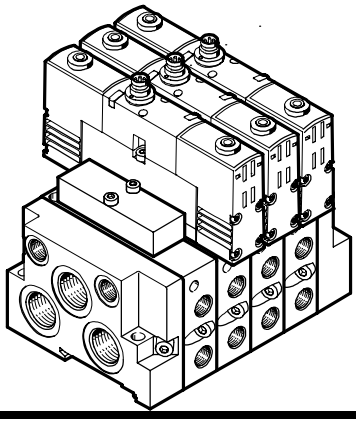
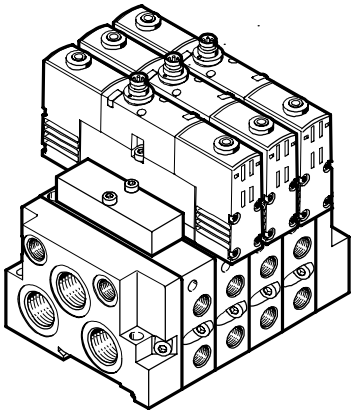
The scope of functions at each valve location can be extended by means of additional vertical stacking components, e.g. exhaust restriction or pressure regulation.

Depending on the manifold sub-bases used, the VTIA valve manifold is available with 1, 2, 3 ... 16 valve locations (see also section 1.1.2 Description of components – Manifold sub-bases).

1.1.1 Overview of variants

Sizes of the VTIA valve manifold

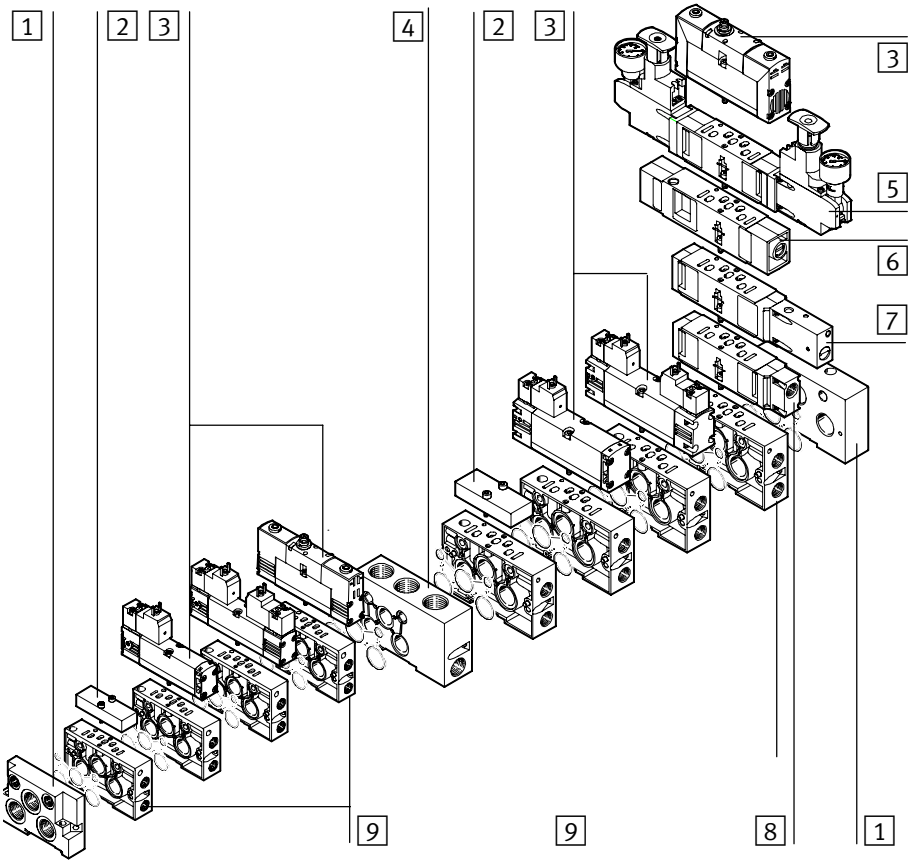
The valve manifold is available in the sizes 18 mm and 26 mm. Combination of both sizes on a valve manifold requires an intermediate plate.

Electrical connection variants	
VTIA valve manifold with valves of type VSVA-B-...-R... with central plug: The valves are actuated via the central plug on the valve. These valves are available in the voltage variant DC 24 V.	VTIA valve manifold with valves of type VSVA-B-...-C1 for square plugs according to DIN EN 175301-803: The valves are actuated individually on each pilot valve. These valves are available in the voltage variants DC 12 V, DC 24 V, AC 24 V, AC 110 V and AC230 V.
	

Tab. 1/1: Electrical connection variants of the VTIA valve manifold

1.1.2 Description of components

The VTIA valve manifold consists of the following pneumatic components:



1 Right-hand/left-hand end plate

2 Cover plate for valve location (optional)

3 Valves

4 Intermediate plate (optional)

5 Pressure regulator plate (optional)

6 Throttle plate (optional)

7 Vertical pressure shut-off plate (optional)

8 Vertical pressure supply plate (optional)

9 Manifold blocks

Fig. 1/1: Pneumatic components of the VTIA valve manifold

Valves

The VTIA valve manifold can be fitted with 2x3/2-way valves (standard and reversible), 5/2-way valves (single-solenoid and double-solenoid) and 5/3-way mid-position valves.

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

- standard mode
- reversible mode
- low-pressure mode
- vacuum mode.

Identifying the valves

The valves on the VTIA valve manifold are marked by type codes. These are printed on the rear of the valves. An identification within the type code indicates the valve function, e.g. the identification **T32C-A** in type code VSVA-B-**T32C**-AZH-A1-1-R2 means that this valve consists of two single-solenoid 3/2-way valves, normally closed. You can identify the valve function with the aid of the following table. In the sales documentation and in the Festo Configurator the valves are marked with an Indent. code.

Identification in the type code	**Ident. code**	**Valves**
3/2-way valves:		
T32**C**-A	K	two single-solenoid 3/2-way valves, normally closed
T32**H**-A	H	two single-solenoid 3/2-way valves, control side 12 normally open, control side 14 normally closed
T32**U**-A	N	two single-solenoid 3/2-way valves, normally open

Identification in the type code	Ident. code	Valves
Reversible 3/2-way valves:		
T32**F**-A	P	two single-solenoid reversible 3/2-way valves, normally open
T32**N**-A	Q	two single-solenoid reversible 3/2-way valves, normally closed
T32**W**-A	R	two single-solenoid reversible 3/2-way valves, control side 14 normally open, control side 12 normally closed
5/2-way valves:		
B52	J	5/2-way double solenoid valve, bistable
D52	D	5/2-way double solenoid valve, bistable, dominant
M52-**A**	M	single-solenoid 5/2-way valve, pneumatic reset (pneumatic spring)
M52-**M**	O	single-solenoid 5/2-way valve, mechanical reset (spring)
5/3-way valves:		
P53**C**-M	G	5/3-way valve, mid-position closed
P53**E**-M	E	5/3-way valve, mid-position exhausted
P53**U**-M	B	5/3-way valve, open in mid-position

Tab. 1/2: Identification of the valve function in the type code

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

Pilot control of the valve solenoid coils

The type of pilot control (internal or external pilot air) is determined by the type of valve.
Valves for operation with external pilot air are marked with the identifier Z in the type code, e.g.
VSVA-B-T32C-A**Z**H-A1-1-R2.

Pressure zone separation

The VTIA valve manifold can be provided with pressure zones:

– If only one size is used, a maximum of two pressure zones can be implemented.

– If the sizes 18 mm and 26 mm are combined, a maximum of three pressure zones can be implemented.

The pressure zones are formed by special seal plates that are inserted in the channels (see Fig. 1/2).

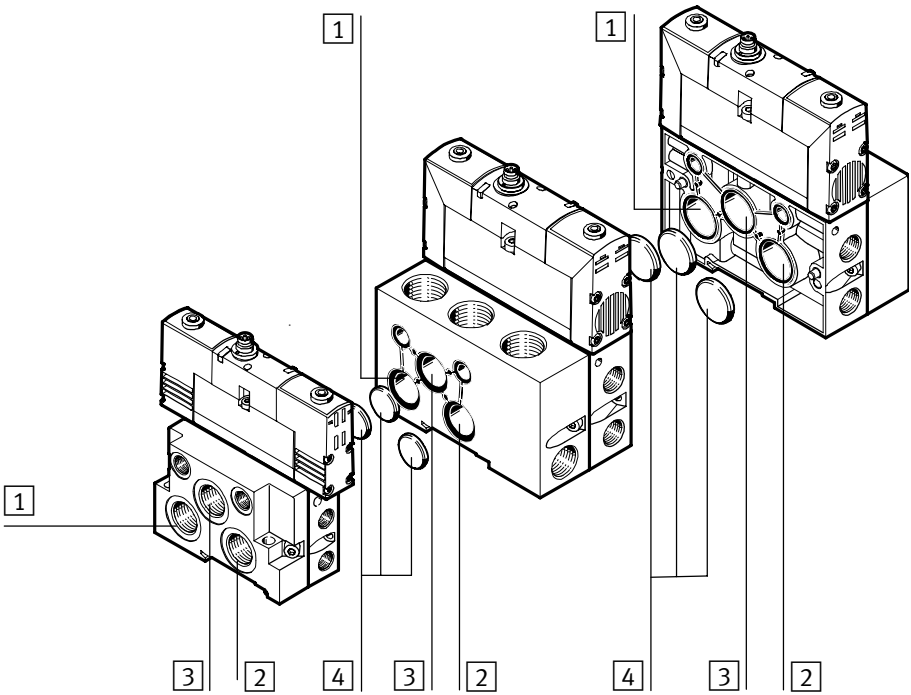
The following channels can be separated with the seal plates:

– Supply channel (1)

– Exhaust channel (3)

– Exhaust channel (5)

In the VTIA valve manifold, external pilot air is supplied via the end plates. A pressure zone separation of pilot channels 12 and 14 is not possible.



1 Channel 5

2 Channel 3

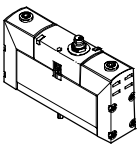
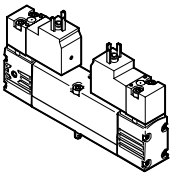
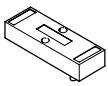
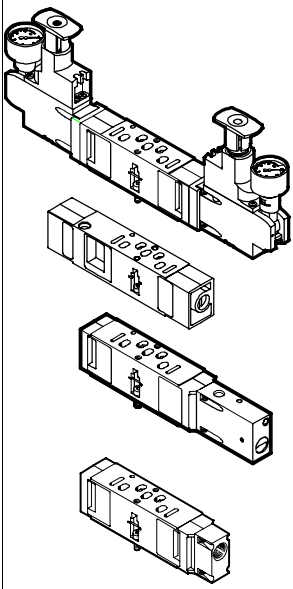
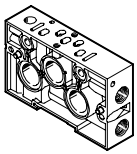
3 Channel 1

4 Seal plate

Fig. 1/2: Seal plates

Vertical stacking

In each valve location you can fit further pneumatic components between the manifold sub-base and the valve. This vertical stacking will enable you to implement certain additional effects as desired. The following diagram shows the available components:

Component		
Valve with central plug type VSVA-B-...-R...	Alternative: valve with square plug type VSVA-B-...-C1	Alternative: cover plate, for sealing an unused valve location type NAV-...-VDMA
		
	Vertical stacking, optional components: [1] Pressure regulator plate type VABF-S3-1R... (with or without manometer), description of the function see following paragraph. Throttle plate type VABF-S4-...F1B1-... This plate serves to restrict the exhaust in channels 3 and 5 of a valve in order to set the speed of the actuator. Vertical pressure shut-off plate type VABF-S3-...L1D1... With this plate a valve can be cut off from the operating pressure of the valve manifold. This means that the valve manifold can be removed without shutting off the pressure. Vertical pressure shut-off plate type VABF-S3-...P1A3... With this plate a valve can be supplied with individual operating pressure irrespective of the operating pressure of the valve manifold.	
	Manifold sub-base type NAW-...	
[1] Notes on installing the vertical stacking components see chapter 3		

Tab. 1/3: Components of the pneumatic module of the VTIA valve manifold

The vertical stacking components on the VTIA valve manifold are marked by type codes. The code is marked on the side of the component. Identification within the type code indicates the function of the components, e.g. identification **R1** in type code VABF-S4-1**R1**C2-C-**10,** indicates that this component is a P-pressure regulator with a control range of 0 ... 10 bar. You can identify the vertical stacking components with the aid of the following table. In the sales documentation and in the Festo Configurator the valves are marked with an Ident. code.

Identification in the type code	Ident. code	Vertical stacking components
R1-...-6	ZF	Pressure regulator plate for connection 1, control range 0 ... 6 bar
R2-...-6	ZH	Pressure regulator plate for connection 2, control range 0 ... 6 bar
R3-...-6	ZG	Pressure regulator plate for connection 4, control range 0 ... 6 bar
R4-...-6	ZI	Pressure regulator plate for connect. 2 and 4, control range 0 ...6 bar
R6-...-6	ZM	Pressure regulator plate for connection 2, control range 0 ... 6 bar, reversible
R7-...-6	ZN	Pressure regulator plate for connection 4, control range 0 ... 6 bar, reversible
R5-...-6	ZJ	Pressure regulator plate for connections 2 and 4, control range 0 ... 6 bar, reversible
R1-...-10	ZA	Pressure regulator plate for connection 1, control range 0 ... 10 bar
R2-...-10	ZC	Pressure regulator plate for connection 2, control range 0 ... 10 bar
R3-...-10	ZB	Pressure regulator plate for connection 4, control range 0 ... 10 bar
R4-...-10	ZD	Pressure regulator plate for connect. 2 and 4, control range 0 ... 10 bar
R6-...-10	ZK	Pressure regulator plate for connection 2, control range 0 ... 10 bar, reversible
R7-...-10	ZL	Pressure regulator plate for connection 4, control range 0 ... 10 bar, reversible
R5-...-10	ZE	Pressure regulator plate for connections 2 and 4, control range 0 ... 10 bar, reversible
F1B1	X	Throttle plate for restricting the exhaust in channels 3 and 5

Tab. 1/4: Identification of the vertical stacking component in the type code

Pressure regulator plates

P pressure regulator
(Ident. code ZF and ZA)

Mode of operation:

The P-pressure regulator regulates the pressure in front of the valve in channel 1 (P). In this way channels 2 and 4 have the same regulated pressure. During the exhaust procedure the valve is exhausted from channel 2 to channel 3 and from channel 4 to channel 5.

The advantages of this pressure regulator are:

– the pressure regulator is not affected by the exhaust procedure because regulation takes place upstream of the valve.

– The pressure regulator can always be set, because the pressure from the valve manifold is always present.

Application example:

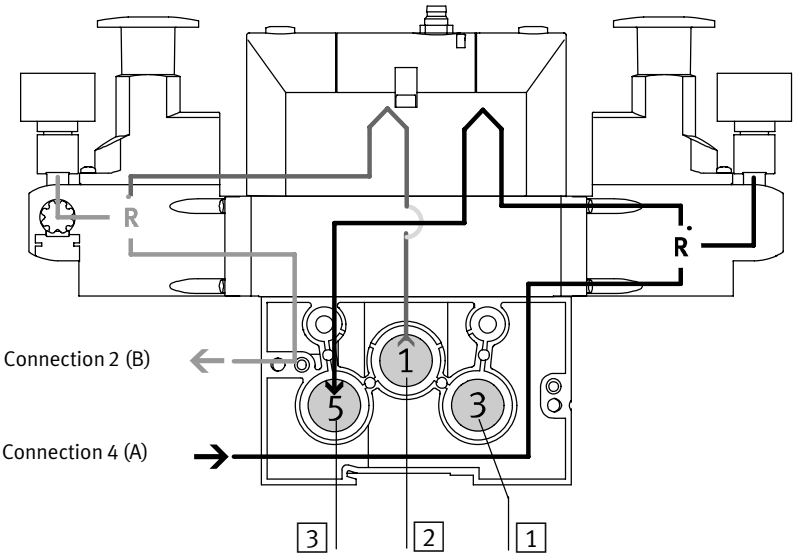
– An equally high output pressure is required at work connections 2 and 4.

– A lower output pressure (e.g. 3 bar) is required than the operating pressure present at the valve manifold (e.g. 8 bar).

AB pressure regulator
(Ident. code ZI and ZD)

Mode of operation:
The AB pressure regulator regulates the pressure in channels 2 (B) and 4 (A) when the pressure medium has passed through the valve. Exhausting takes place via the valve and the pressure regulator from channel 2 to channel 3 and from channel 4 to channel 5.

The following example shows the following switching position:
The supply air is passed from channel 1 through the pressure regulator plate and through the valve to pressure regulator B, where it is regulated and then passed to connection 2 of the manifold sub-base. The exhaust is passed via channel 4 to the pressure regulator and then via the valve in channel 5.



1 Channel 3 (exhaust)

2 Channel 1 (supply air)

3 Channel 5 (exhaust)

Fig. 1/3: AB pressure regulator

Restrictions:

– The exhaust flow is restricted by the pressure regulator.

– The pressure regulator cannot be set in the exhaust state, e.g. the pressure regulator for channel 4 cannot be set if the valve pressurizes in switch position from channel 1 to channel 2 and exhausts from channel 4 to channel 5.

Application examples:

– If two different output pressures are required at connections 2 and 4 instead of the operating pressure of the valve manifold.

– If it is not possible to use the reversible pressure regulator, e.g. when 2x3/2-way valves with ducted exhaust 82/84 or when a throttle plate is used.

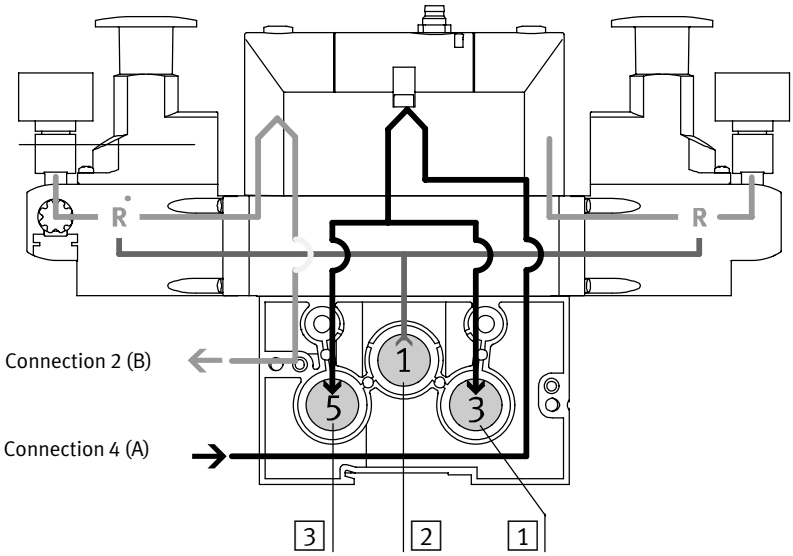
Reversible AB pressure regulator (Ident. code ZJ and ZE)

Mode of operation:
With the reversible pressure regulator the supply air (channel 1) is divided and passed directly to both pressure regulators. In each case the regulated air is present in channels 3 and 5 on the valve. The valve is therefore operated reversibly (see Fig. 1/4). This means

– channel 3 passes the output pressure to connection 2

– channel 5 passes the output pressure to connection 4.

The following example shows the following switching position:
The supply air in channel 1 is passed in the pressure regulating plate to pressure regulators A and B, regulated there and then passed to connections 3 and 5 on the valve. In the valve, the supply air is routed to port 2 of the manifold sub-base. The exhaust is passed via channel 4 in the pressure regulator plate and split there to channels 3 and 5 and exhausted.



1 Channel 3 (exhaust)

2 Channel 1 (supply air)

3 Channel 5 (exhaust)

Fig. 1/4: Reversible AB pressure regulator

Advantages compared with the AB pressure regulator

- Faster cycle times
- 50 % higher exhaust flow, as exhausting is not carried out via the pressure regulator. Also the pressure regulator is loaded less.
- No quick exhaust valves are required. The exhaust is ducted completely via the valve manifold.
- The operating pressure is always present on the pressure regulator because regulating takes place in front of the valve, i.e. both regulators can always be set simultaneously and independently of the valve switching position. On the AB pressure regulator the valve must switch for this.

Disadvantages compared with the AB pressure regulator

– It is not possible to use 2x3/2-way valves (Ident. code H, K and N) in combination with ducted exhaust 82/84, because reversible pressure is present at the valve interface.

– No practical combination with an intermediate throttle plate possible.

Examples of application

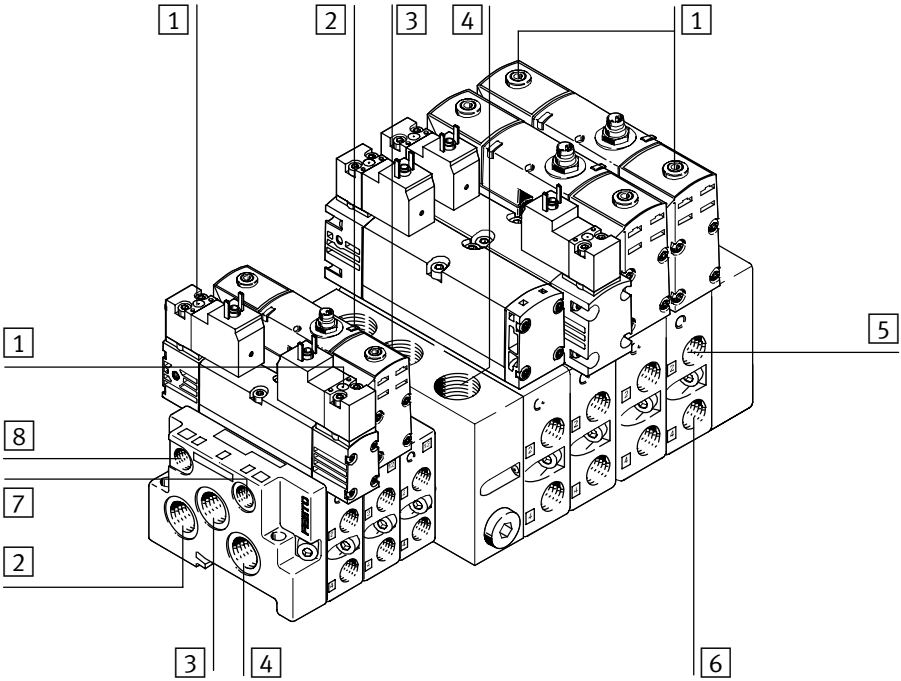
– If, instead of the operating pressure of the valve manifold, two further different pressures are required in channels 2 and 4.

– When fast exhaust performance is required.

– If the pressure regulator for both sides is always to be set.

Notes on installing this pressure regulator see chapter 3.3.6

You will find the following pneumatic connecting and operating elements on the VTIA valve manifold without vertical stacking:



1 Manual override (for each pilot solenoid coil)

2 Exhaust port (3) “Valve”

3 Supply connection (1) “Operating pressure”

4 Exhaust port (5) “Valves”

5 Work connections (2), for each valve position

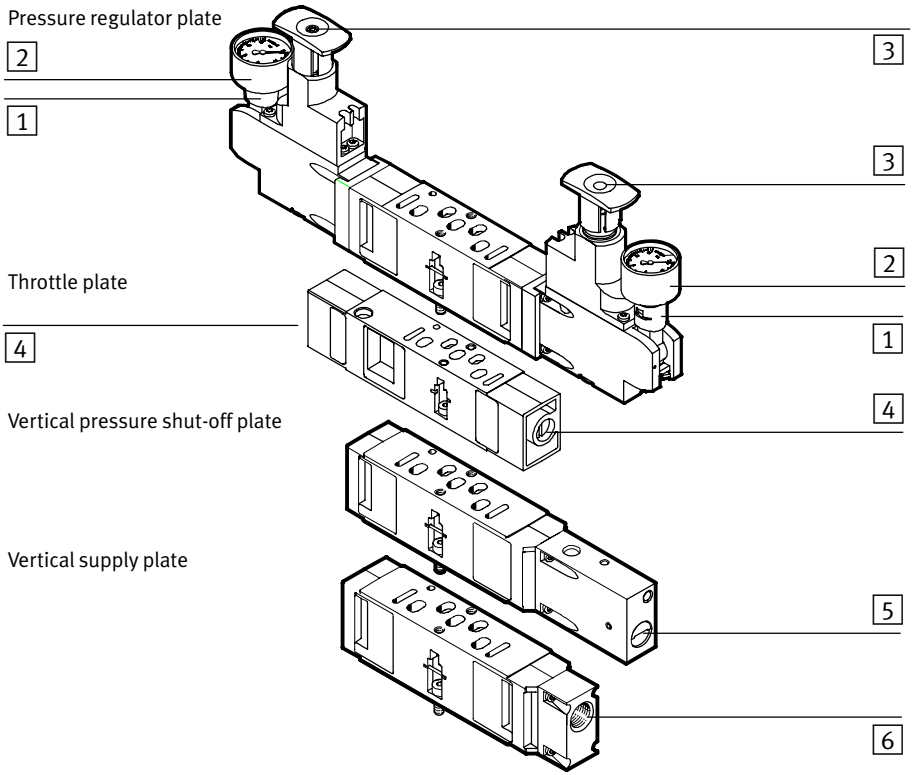
6 Work connections (4), for each valve position

7 Pilot connection (14) for supplying the external pilot air

8 Pilot exhaust air connection (12) for ducted exhaust of the pilot exhaust air (not ISO-compliant) for appropriately configured valves

Fig. 1/5: Pneumatic connecting and operating elements of the VTIA valve manifold

On the components for vertical stacking you will find the following connecting and operatingelements:



1 Connection for manometer (can be swung 90°)

2 Manometer (optional)

3 Adjusting knob with free-wheeling and snap-in locking

4 Adjusting screw for flow restriction

5 Operating pressure blocking screw for one valve location

6 Supply connection 1 (individual operating pressure for one valve position)

Fig. 1/6: Operating and connecting elements of the components for vertical linking

The valve manifold with valves with central plug consists of the following electrical components:

1 Central plug

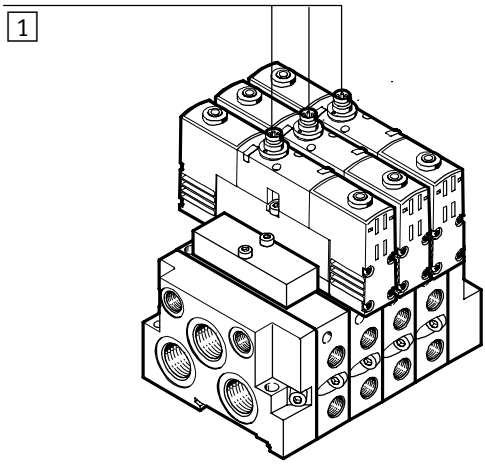


Fig. 1/7: Electrical components of the VTIA valve manifold with valves with central plug

The valve manifold with valves with square plug consists of the following electrical components:

1 Electrical connection 12 according to DIN EN 175301-803

2 Electrical connection 14 according to DIN EN 175301-803

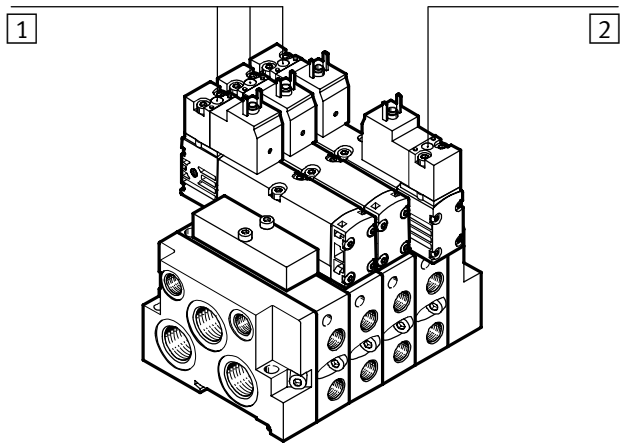
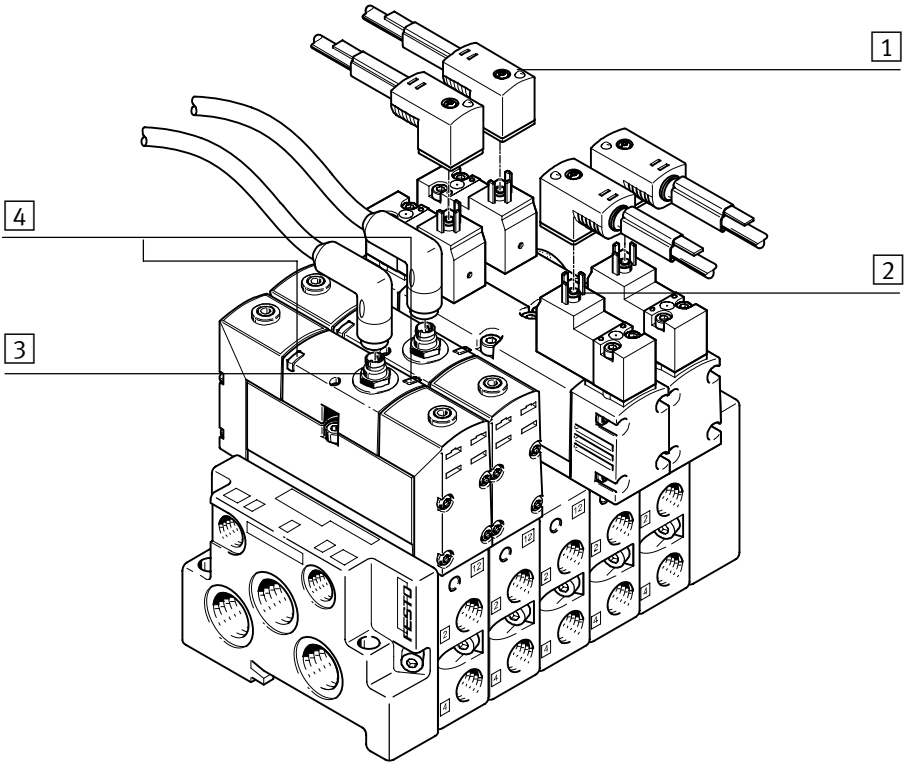


Fig. 1/8: Electrical components of the VTIA valve manifold with valves with square plug

You will find the following electrical connecting and display elements on the VTIA valve manifold:



1 Signal status display (yellow LED) for pilot solenoid coils in plug socket with cable type KMEB-1-24-...-LED or KMEB-3-...-LED

2 Square plug according to DIN EN 175301-803 on valves of type VSVA-B-...-C1

3 M8-/M12 central connector

4 Signal status display (yellow LEDs) of the pilot solenoid coils

Fig. 1/9: Electrical connecting and display elements of the VTIA valve manifold

Fitting

Chapter 2

Contents

Contents of this chapter

The VTIA valve manifold is already assembled when supplied from the factory.

This chapter describes how to fit and remove:

– The complete valve manifold (hat rail or wall mounting)

– The inscription labels

Further information

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

2.1 General instructions on fitting and dismantling

Warning
Sudden unexpected movements of the connected actuators and uncontrolled movements of loose tubing can cause injury to human beings and/or damage to property.

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

– the compressed air supply

– the operating and load voltage supplies.

Note
Handle all modules and components of the valve manifold with great care. Note especially the following:

– The specified torques must be observed.

– Electrostatically sensitive components.
Do not therefore touch any contact surfaces.

2.2 Fitting variants

You can fit the VTIA valve manifold in one of two ways:

Fitting method	Description
Hat-rail mounting	The valve manifold is suitable for fitting onto a hat rail (support rail as per EN 60715). Note here the safety instructions in the following chapter. A guide groove on the back of the valve manifold is used for mounting on the hat rail.
Wall mounting	The end plates and additionally the manifold sub-bases contain holes for fitting onto a wall. When there are more than 4 manifold sub-bases, also use the additional attachment holes in the interlinking blocks (see the following instructions and the information on vibration and shock in appendix A, Tab. A/2).

Tab. 2/1: Fitting methods for the VTIA valve manifold

Note
Fit the VTIA valve manifold so that there is sufficient space for heat dissipation and ensure that the maximum limits for temperatures are observed (see “Technical specifications”).

2.2.1 Fitting onto/removing from a hat rail

Caution

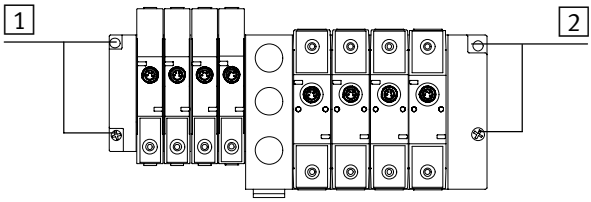
– Make sure that the hat rail can bear the weight of the VTIA valve manifold, and that it can absorb torsion, e.g. through the vertical stacking.

– When fitting the valve manifold onto a hat rail, note the specifications in EN 60715 and the specifications on vibration and shock in the technical specifications in appendix A.

– A hat-rail fitting without a hat-rail clamping unit is not permitted.

• If the manifold is fitted in a sloping position or if it is subjected to vibration, secure the hat-rail clamping unit additionally
  – against sliding down with the locking screws (see Fig. 2/1, item 2)
  – against unintentional loosening/opening.

For fitting the VTIA valve manifold onto a hat rail, you will require the mounting kit CPA-BG-NRH. This kit consists of two M4x10 screws and two clamping elements.

VTIA valve manifold	Mounting element
	Hole for hat rail clamping units: 1 in the left-hand end plate 2 in the right-hand end plate

Tab. 2/2: Holes for the hat rail clamping unit

Fitting

Proceed as follows:

1. Make sure that the fastening surface can support the weight of the valve manifold (weights see appendix A, Tab. A/4).
2. Fit the hat rail (support rail EN 60715 – 35x7.5; width 35 mm, height 7.5 mm). Make sure there is sufficient space for connecting the supply cables and tubing.
3. Fasten the hat rail to the fastening surface at intervals of approx. every 100 mm.
4. Fit the hat rail clamping units (see Tab. 2/2)
5. Hang the valve manifold onto the hat rail (see Fig. 2/1, arrow (A)).
6. Swing the valve manifold onto the hat rail (see Fig. 2/1, arrow (B)). Make sure that the clamping element lies horizontally to the hat rail.

[1] Hat rail

[2] Clamping element of the hat rail clamping unit

[3] Locking screw of the hat rail clamping unit

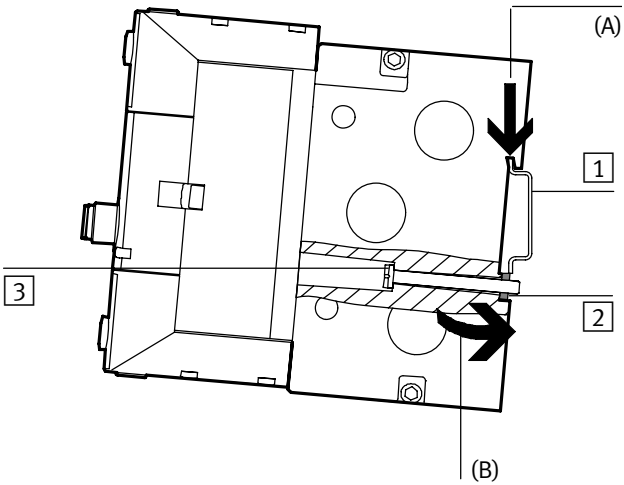


Fig. 2/1: Fitting the VTIA valve manifold onto a hat rail

7. Fasten the VTIA valve manifold against tilting or sliding by tightening the locking screws with 1.3 Nm.

[1] Hat rail

[2] Clamping element of the hat-rail clamping unit

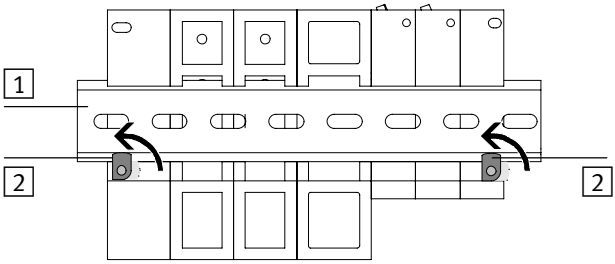


Fig. 2/2: Rear view: Hat-rail mounting

Dismantling

Proceed as follows:

1. Loosen the locking screw of the hat rail clamping unit (position of the screws see Tab. 2/2). Make sure that the clamping element lies horizontally to the hat rail.
2. Swing the VTIA valve manifold forwards from the hat rail (see Fig. 2/3, arrow (B)).
3. Lift the valve manifold off the hat rail (see Fig. 2/3, arrow (A)).

1 Hat rail

2 Clamping element of the hat rail clamping unit

3 Locking screw of the hat rail clamping unit

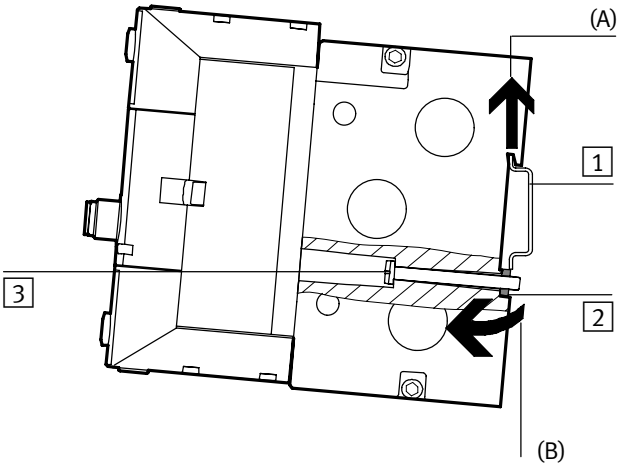


Fig. 2/3: Removing the VTIA valve manifold from the hat rail

2.2.2 Fitting onto/removing from a wall

The end plates and additionally the manifold sub-bases contain holes for fitting onto a wall.

Caution
The VTIA valve manifold can become distorted and therefore damaged if it is mounted on an uneven pliable surface.

- Mount the valve manifold only on a flat rigid surface.

Fitting

Proceed as follows:

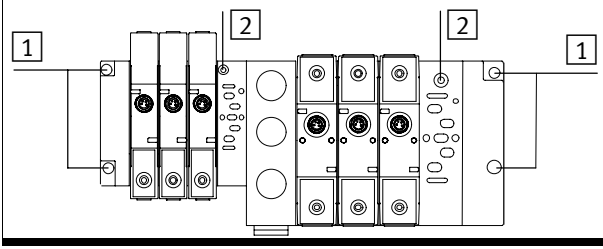
1. Make sure that the fastening surface is flat and that it can support the VTIA valve manifold (weights see appendix A, Tab. A/4).

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

2. Drill mounting holes in the fastening surface.

Note
For wall mounting, Festo recommends using, in addition to the holes in the end plates, also the holes in every fourth manifold sub-base.
Also observe here the specifications on vibration and shock in appendix A.

3. Fasten the valve manifold to the fastening surface with M6 screws of sufficient length.

VTIA valve manifold	Mounting element
	1 Hole in the left-hand and right-hand end plate for two M6 screws 2 Hole in the manifold sub-base for M6 screw

Tab. 2/3: Mounting elements for fitting the VTIA valve manifold onto a wall

Dismantling

Proceed as follows:

1. Prevent a hanging valve manifold from falling down before you loosen it from the fastening surface.
2. Loosen the fastening screws (see Tab. 2/3).
3. Remove the valve manifold from the fastening surface.

2.3 Fitting the inscription labels (optional)

To identify the valve solenoid coils, inscription labels can be fitted as shown in the following table.

Fitting

Clip the inscription labels into the recesses in the valve, the pilot solenoid coil and/or the socket (see Fig. 2/4).

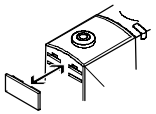
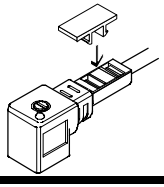
Valve with central plug type VSVA-B-...-R...	**Socket KMEB-1-... and KMEB-3-... for valve with square plug type VSVA-B-...-C1**
	

Fig. 2/4: Fitting the inscription labels

Installation

Chapter 3

Contents

Contents of this chapter

This chapter describes the tubing and cabling of the VTIA valve manifold. In particular this includes:

- General instructions on preparing the compressed air and on connecting the tubing
- Instructions on pilot control of the valve solenoid coils with internal or external pilot air.
- Instructions on operating the valve manifolds with pressure zones
- Instructions on operating the valve manifold with reversible 2x3/2-way valves
- Fitting the QS screw connectors
- Connecting the power supply
- Earthing the valve manifold

3.1 Preparing the compressed air

Caution
Non-filtered or incorrectly lubricated compressed air will reduce the service life of the valve manifold.

3.1.1 Operation with non-lubricated compressed air

Caution
Too much residual oil in the compressed air will reduce the service life of the valve manifold.

- If bio-oils are used (oils with synthetic ester or true ester basis, e.g. rape oil methylester) the residual oil content must not exceed 0.1 mg/m^3 (see ISO 8573-1 class 2).
- If mineral oils are used (e.g. HLP oils as per DIN 51524 parts 1 to 3) or corresponding oils on a polyalphaolefine basis (PAO), the residual oil content must not exceed 5 mg/m^3 (see ISO 8573-1 class 4).

You will thereby avoid functional damage to the valves.

Excessive residual oil cannot be permitted irrespective of the compressor oil, as otherwise the basic lubrication will be washed out during the course of time.

3.1.2 Operation with lubricated compressed air

Operate your equipment with non-lubricated compressed air if possible. This will prevent pollution of 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.

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

Note the following instructions if lubricated compressed air must be used.
The compressed air prepared with the compressor must correspond in quality to non-lubricated compressed air. If possible, do not operate the complete system with lubricated compressed air. If possible, always install the lubricators directly in front of the consuming actuator.

Caution
Incorrect additional oil and too much residual oil content in the compressed air will reduce the service life of the valve manifold.

- Use Festo special oil OFSW-32 or the other oils 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^3 (ISO 8573-1 class 5).
- Make sure that the lubricator setting is correct (see following section).

You will thereby avoid functional damage to 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.

Checking the setting

The procedure described below can be used for checking the setting of the lubricator.

Proceed as follows:

- Check the service units in respect of condensate and lubricator setting twice a week.

1. Ascertain the cylinder which is furthest from the lubricator.
2. Ascertain the valve manifold which controls this cylinder.
3. Remove the silencer, if fitted, from connection 3/5.
4. Hold a piece of white cardboard 10 cm in front of the exhaust port.
5. Let the system run for a short period.

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

Another indication of over-lubrication is the colouring or the condition 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.

3.2 General notes on connecting the tubing

Warning
Sudden unexpected movements of the connected actuators and uncontrolled movements of loose tubing can cause injury to human beings and/or damage to property.

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

– the compressed air supply

– the operating and load voltage supplies.

Pay particular attention to the following:
The components of the valve manifold contain electrostatically sensitive elements. The components will be damaged if you touch the contact surfaces of the plug connectors or if you do not observe the regulations for handling electrostatically sensitive components.

3.2.1 Laying the tubing

If elbow screw connectors or multiple distributors are used, the airflow will be reduced slightly.

Connecting

Proceed as follows:

1. Push the tubing as far as possible into or over the tube connection of the screw connector.
2. Pull the locking ring [1] over the tubing connection or tighten the locking screw [2].
3. For reasons of clarity, group the tubing together with:
   – tube straps or
   – multiple hose holders.

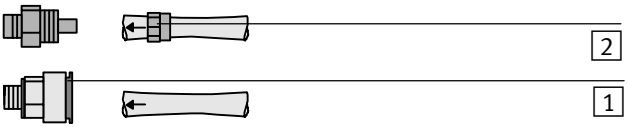


Fig. 3/1: Fitting the tubing

Disconnecting

Proceed as follows:

Warning
If the pneumatic tubing is under pressure when connections are loosened, it may perform sudden unexpected movements, thereby causing injury to human beings. Carry out the following steps before disconnecting the pneumatic tubing on the valve manifold:

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

1. Mark all pneumatic tubing.
2. Press down the locking ring of the screw connector [1] e.g. with a screwdriver or the loosening tool QSO from Festo or loosen the locking screw [2] of the screw connector.
3. Remove the tubing from the screw connector.
4. Seal non-required screw connectors with blanking plugs [3].

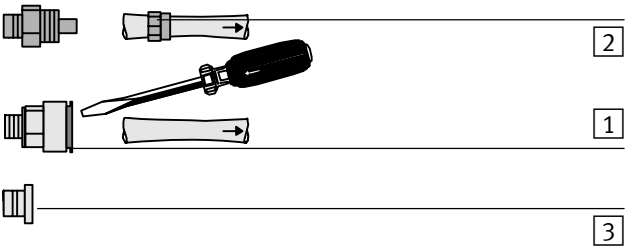


Fig. 3/2: Disconnecting the tubing

3.3 Connecting the VTIA valve manifold

Seal work connections (2 or 4) on non-assigned valve positions (valve positions which are fitted with blanking plates) with blanking plugs or threaded blanking plugs to protect them from dirt.

In order to guarantee the optimum efficiency of the valve manifold, we recommend in the following cases that more than one supply or exhaust line be used:

– when large volume cylinders are operated at high speeds

– when several valves (e.g. 10 valves) are switched simultaneously to the flow position.

VTIA valve manifolds VTIA that are fitted with valves of sizes 18 mm and 26 mm can additionally be supplied via the intermediate plate. (See section 5.3.3 “Replacing the manifold sub-base, intermediate plate or end plates”.)

3.3.1 Ducted exhaust of pilot air and breathable air

As per standard ISO 15407-1, connections 12 and 14 are intended for supplying the valve manifold with external pilot air. For the VTIA valve manifold, valves from Festo require a pilot air supply exclusively via channel 14.

In the case of the reversible 2x3/2-way valves from Festo, additional operating pressure is required at channel 12 for the internal pneumatic spring. This operating pressure must correspond to the pilot pressure.

If the VTIA valve manifold is fitted with valves that are configured for ducted pilot and breathable exhaust air via channel 12, then there must be no pressure applied to channel 12. Otherwise the valves will not be able to switch.

Please note therefore the following points if you wish to use channel 12 for ducted pilot and breathable exhaust air:

– The valve manifold is not fitted with reversible 2x3/2-way valves.

– The valve manifold is not fitted with valves from other manufacturers.

– The seals between the manifold blocks and the valves must be fitted in the appropriate position (see section 5.4.1).

3.3.2 Pilot control of the valve solenoid coils (pilot air)

Note

- For the VTIA valve manifold, in addition to the reversible valves, all of the other valves are available in two pilot control variants:
  – valves with pilot control via internal pilot air supply
  – valve with pilot control via external pilot air supply.
- Valves with pilot control for external pilot air supply are marked with the identifier Z in the type code.
- Festo recommends using valves with the same pilot control variant (either internal or external pilot air) on the VTIA valve manifold.
- Before commissioning the VTIA valve manifold, check which pilot control variant your valves are designed for.
- If the VTIA valve manifold is also fitted with reversible 2x3/2-way valves (Ident. code P, Q and R), then the pilot air must also be supplied via connection 12. The pneumatic spring of these valves is supplied via this connection.

Internal pilot air

If the operating pressure lies within the required pilot pressure range for the valves (see appendix A, Tab. A/5 and Fig. A/1), then you can use valves for internal pilot air. In these valves, the pilot air is branched from supply channel 1.

External pilot air

If the operating pressure lies outside the required pilot pressure range for the valves (see appendix A, Tab. A/5 and Fig. A/1), then you have to use valves for external pilot air. Supply the external pilot air via connection 14. Under certain conditions (see section 3.3.1) you can exhaust the pilot air and breathable exhaust air via connection 12.

Note

- If you use regulated exernal pilot air, then reliable, trouble-free operation of the VITA valve manifold is possible even with fluctuating operating pressure.
- The external pilot air is supplied for all valve solenoid coils via pilot connection 14 on the left-hand or right-hand end plate. This also applies when the valve manifold is operated with different pressure zones (see Fig. 3/3).
- Set the pilot pressure according to the specifications in appendix A, Tab. A/5 or in the diagrams Fig. A/1.

Valve position with vertical pressure shut-off plate:

- In this valve position, channel 14 is blocked by the vertical pressure blocking plate (see appendix B, Tab. B/10). The valves are supplied with internal pilot air.

3.3.3 VTIA valve manifold with pressure zone separation

Note
Note the following in the case of type VTIA valve manifolds which are operated with internal pilot air and which have several pressure zones:

- The pilot air for all valve solenoid coils is branched centrally from supply connection 1 in the right-hand end plate.
- The pressure zone, which is supplied via connection 1 on the right-hand end plate, must be operated at a pressure which corresponds at least to the pilot pressure required for the valve manifold (see appendix A, Tab. A/5).

The pressure zones are formed by special isolating discs that are inserted into channels 1, 3, and 5. VTIA valve manifolds which are fitted exclusively with valves of a single size can have a maximum of two pressure zones. VTIA valve manifolds which are fitted with valves of sizes 18 mm and 26 mm can have a maximum of three pressure zones.

The following diagram shows as an example of a VTIA valve manifold with blocked channels 1, 3 and 5 the assignment of the supply and exhaust connections to the valves.

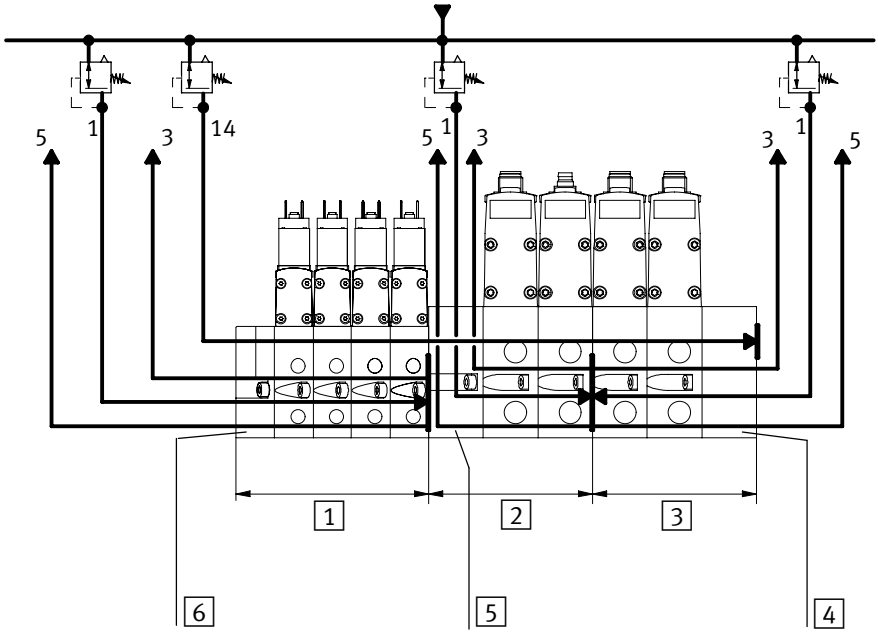
The connections 1 or 3 and 5 are:

– the left-hand outside pressure zone via the left-hand end plate

– the middle pressure zone via the intermediate plate

– the right-hand outside pressure zone via the tight-hand end plate.

External pilot air can be supplied for the entire valve manifold via connection 14 on the left-hand or right-hand end plate.



1 Pressure zone 1

2 Pressure zone 2

3 Pressure zone 3

4 Supply for pressure zone 3 via the right-hand end plate

5 Supply for pressure zone 2 (middle pressure zone) via the intermediate plate (Prerequisite: the valve manifold is fitted with both sizes)

6 Supply for pressure zone 1 via the left-hand end plate

Fig. 3/3: Example of VTIA valve manifold with 3 pressure zones and pilot control with external pilot air

3.3.4 Reversibly operated VTIA valve manifold

With reversible operation of the VTIA valve manifold the operating pressure is supplied via connections 3 and 5 and the exhaust is vented via connection 1.

Note
Operate a reversible VTIA valve manifold only with external pilot air.

3.3.5 Operating the VTIA valve manifold with reversible 2x3/2-way valves

Note
If reversible 2x3/2-way valves (Ident. code P, Q, and R) are operated on the valve manifold together with standard 2x3/2-way valves (Ident. code H, K and N), then the reversible valves must be operated in a separate pressure zone.
Exception:
If the reversible 2x3/2-way valves are operated with reversible pressure regulators (Ident. code ZJ and ZE) (circuit diagrams see appendix B, Tab. B/5 and Tab. B/8), then a separate pressure zone is not required.

The VTIA valve manifold can be operated with reversible 2x3/2-way valves (Ident. code P, Q and R) under the following conditions.

– The pilot air and breathable exhaust air must not be exhausted ducted. The reversible 2x3/2-way valves require compressed air at channel 12 for the pneumatic spring. Channel 12 is therefore no longer available for venting the ducted pilot air and breathed exhaust air. Valves which are configured for exhaust disposal via channel 12 can then no longer switch (see section 5.4.1).

3.3.6 Operating the VTIA valve manifold with reversible pressure regulators

Note
Operating the VTIA valve manifold with reversible pressure regulators (Ident. code ZM, ZN, ZJ, ZK, ZL and ZE):

- Reversible pressure regulators must not be used on reversibly operated valve manifolds.
- Standard 2x3/2-way valves with (Ident. code H, K and N) (non-reversible valves) must not be operated with reversible pressure regulators.
- If reversible 2x3/2-way valves (Ident. code P, Q, and R) are combined with reversible pressure regulators, then no separate pressure zone is required. With this combination pressure is supplied via channel 1 and the exhaust is vented via channels 3 and 5.

3.3.7 Setting the pressure regulator

You can set the pressure regulator plates in one of two ways:

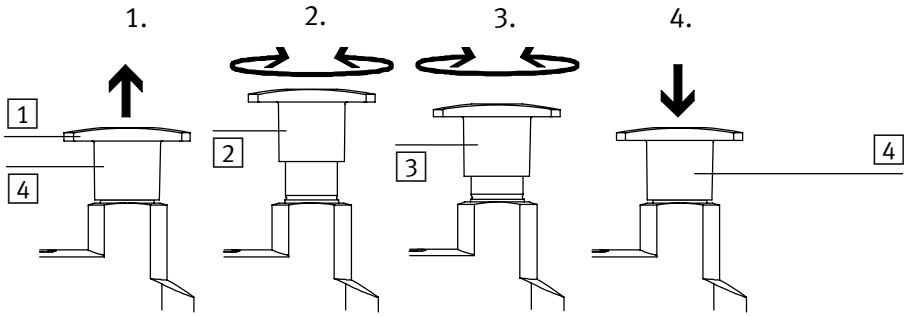
– conveniently with the aid of the adjusting knob

– using the Allen screw in the adjusting knob.

Setting the pressure regulator using the adjusting knob

Proceed as follows:

1. Pull the adjusting knob [1] as far as possible out of the locking level [4] into the setting level [2] (see Fig. 3/4).
2. Set the desired regulating variable at this level by turning the adjusting knob (see “Flow diagrams for the pressure regulator plates” in appendix A).
3. Press the adjusting knob into the free running level [3]. In this position you can turn the setting wheel without modifying the regulating variable. Turn the adjusting knob at right angles to the pressure regulating plate.
4. Press the adjusting knob in this position into the snap-in locking of the locking level [4].



[1] Adjusting knob

[2] Adjusting knob in setting level

[3] Adjusting knob in free running level

[4] Adjusting knob in locking level

Fig. 3/4: Setting the pressure regulator plates with the aid of the adjusting knob

Setting the pressure regulator using the adjusting screw

Note
If there is not enough room around the adjusting knob to set the pressure regulator, then you can use the Allen screw in the adjusting knob.

Proceed as follows:

- Set the desired regulating variable by turning the adjusting screw (see “Flow diagrams for the pressure regulator plates” in appendix A).

[1] Adjusting screw, Allen head (2.0 across flats)

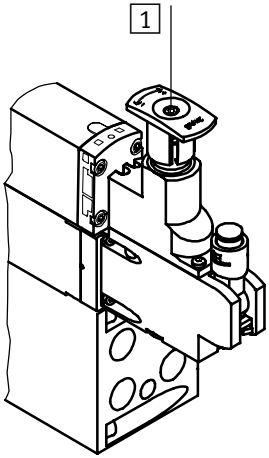


Fig. 3/5: Setting the pressure regulator plates with the aid of the adjusting screw

3.3.8 Vacuum/low pressure operation

Note
Standard 2x3/2-way valves (Ident. code H, K and N) with supply via connection 1 are not suitable for vacuum or low pressure.

- Operate these valves in a separate pressure zone.
- The operating pressure for this pressure zone must be set in accordance with the diagram in appendix A, Fig. A/1.

The following conditions must be fulfilled before you can operate your VTIA valve manifold at supply connection 1 with vacuum or low pressure between -0.9 ... 2 bar:

– Only the following valves can be used for regulated external pilot air:

  – single-solenoid 5/2-way valves (identifier M52-**AZ** / M52-**MZ**)

  – 5/2-way double-solenoid valves (identifier **B**52-**Z** / **D**52-**Z**)

  – 5/3-way mid-position valves (identifier P53**C**-**Z** / P53**E**-**Z** / P53**U**-**Z**)

  – reversible 2x3/2-way valves (identifier T32**F**-A**Z** / T32**N**-A**Z** / T32**W**-A**Z**). These valves must be operated via connections 3 and 5 in a separate pressure zone with vacuum or low pressure.

3.3.9 Connecting the pneumatic tubing

Note
- Use blanking plugs to seal all connections **not** required for the functioning of the valve manifold.

Fit the screw connector or the silencers according to the table below. The position of the pneumatic connections is shown in Fig. 3/6. Then lay the tubing.

Tubing	**Connection identifier (ISO 5599)**	**Connection size (ISO 228)**	**Connection** [1]
Compressed air or vacuum	1	Size 26 mm: G½" Size 18 mm: G⅜"	Screw connector in the end plates
		G½"	Screw connector in the intermediate plate
		Size 26 mm: G¼" Size 18 mm: G⅛"	Screw connector in the vertical supply plate
Ducted exhaust from the valves	3 or 5	Size 26 mm: G½" Size 18 mm: G⅜"	Screw connector in the end plates.
		G½"	Screw connector in the intermediate plate
Pilot air (external pilot air) [2]	14	G⅛"	Screw connector in the end plates
Conforms with ISO standard: – Pilot air (external pilot air) – Supply air for pneumatic spring of the rev. 2x3/2-way valves Alternative, does not conform to ISO standard: [3] – Ducted pilot exhaust of the pilot control [4]	12		

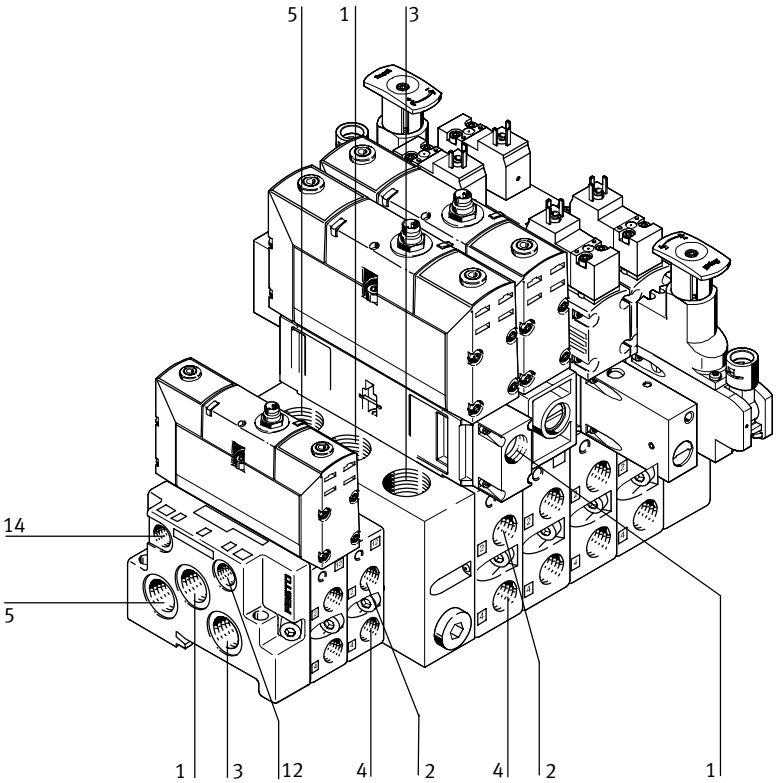
Tubing	Connection identifier (ISO 5599)	Connection size (ISO 228)	Connection [1]
Work air or vacuum	2 or 4	Size 26 mm: G¼" Size 18 mm: G⅛"	Screw connector in the manifold sub-bases

[1] Depending on what you have ordered, the valve manifold will already be fitted screw connectors.
[2] The external pilot air is supplied as standard via connection 14.
[3] Requirement: The valve manifold must be fitted with Festo valves (except reversible 2x3/2-way valves)
[4] Note the following if you wish to exhaust the pilot air ducted.

Tab. 3/4: Pneumatic connections of the VTIA valve manifold

Note
If the VTIA valve manifold is to be operated in conformity with the ISO standard, the pilot exhaust air will be vented non-ducted directly at the valve.

If the pilot air is to be vented ducted via connection 12, the valve manifold can no longer be operated with ISO valves from other manufacturers. Note here the instructions of the manufacturer.
Conversion of the valve manifold to ducted pilot exhaust is described in section 5.4.1.



Note: Position of the pneumatic connections on the right-hand end plate equivalent to the left-hand end plate

Fig. 3/6: Position of the pneumatic connections

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

Note
In the case of several systems with centrally ducted exhaust air:

- Use non-return valves in the exhaust tubing or pilot air tubing in order to prevent functional impairment due to back pressures.

1 Valve manifold 1

2 Central control exhaust line 82/84

3 Central exhaust tubing 3/5

4 Valve manifold 2

5 Exhaust line 5

6 Control exhaust line 12 (82/84)

7 Exhaust line 3

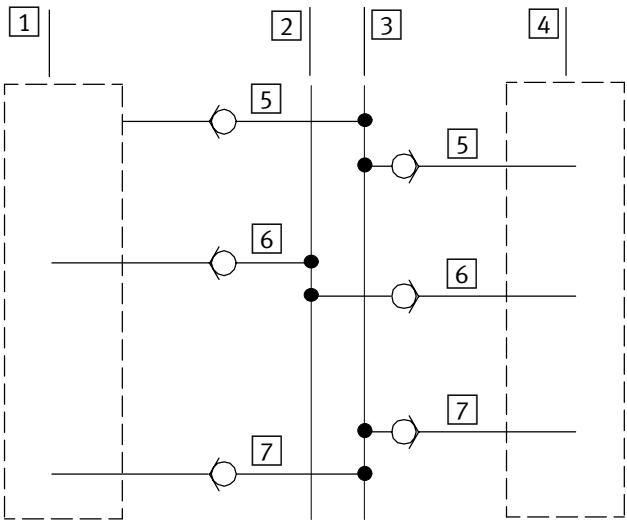


Fig. 3/7: Centrally ducted exhaust with non-return valves

3.3.10 Connecting the electric cables

Warning
VTIA valve manifolds with DC 12 V or DC 24 V control voltage:

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

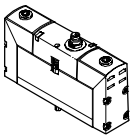
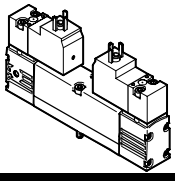
VTIA valve manifolds with AC 24 V, AC 110 V or AC 230 V control voltage:

- Observe the valid safety regulations for working with 110 V AC and AC 230 V control voltage.
- Make sure that the earth connection of the valve manifold is connected to the protective earth.

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

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

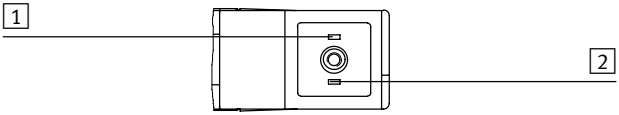
The VTIA valve manifold can be fitted with the following electrical connection and voltage variants:

Valve	Type of electrical connection	Voltage variants
Type VSVA-B-...-R... 	The solenoid coils of the valve are supplied via a single connection – central plug on the valve – 4-pin (M8) or 3-pin (M12)	– 24 V DC
Type VSVA-B-...-C1 	Each solenoid coil is connected separately – square plug on the solenoid coil – 3-pin	– 24 V DC Non-standard voltages: – 12 V DC – 24 V AC – 110 V AC – 230 V AC

Note
Use cables from the Festo range for connecting the valve manifold. Compliance with protection class IP65 is thus ensured.

Use a uniform method of control.
Preferably all control signals should be positive-switching (1-switching), otherwise all control signals negative-switching (0-switching).

Square plug (2-pin) [1]

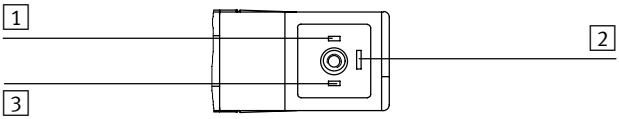


	Comment [2]	Core colour [3]
1	Connection-pin power supply	BK
2	Connection-pin power supply	BK

1) Solenoid coils for DC 12 V, DC 24 V and AC 24 V voltage
2) Connection assignment according to DIN EN 175301-803
3) For using the socket with cable according to Festo accessories.

Tab. 3/5: Pin allocations, square electr. plug

Square plug (3-pin) [1]

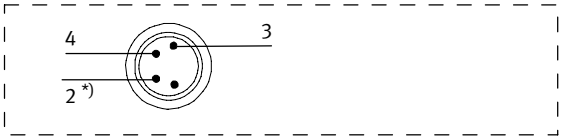


	Comment [2]	Core colour [3]
1	Connection-pin power supply	BK
2	Connection-pin power protective earth	YE/GN
3	Connection-pin power supply	BK

1) Solenoid coils for AC 110 V and AC 230 V voltage
2) Connection assignment according to DIN EN 175301-803
3) For using the socket with cable according to Festo accessories.

Tab. 3/6: Pin allocations, square electr. plug

M8 central plug (4-pin)



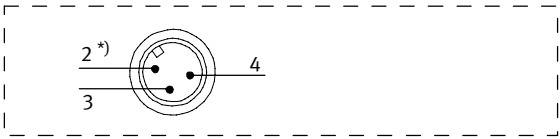
*) For valves with only one pilot solenoid coil, pin 2 is not used

Pin	Electrical connection	Core colour 1)	Comment
–	–	BN	–
2	Signal coil 12	WH	Solenoid coil 12
3	com	BU	0 V or 24 V 2)
4	Signal coil 14	BK	Solenoid coil 14

1) For using the socket with cable according to Festo accessories. Designation of the core colours as per DIN/IEC 757
2) Connect 0 V with positive-switching control signals, 24 V with negative-switching control signals.

Tab. 3/7: Pin allocations, M8 central plug

M12 central plug (3-pin)



*) For valves with only one pilot solenoid coil, pin 2 is not used

Pin	Electrical connection	Core colour 1)	Comment
–	–	BN	–
2	Signal coil 12	WH	Solenoid coil 12
3	com	BU	0 V or 24 V 3)
4	Signal coil 14	BK	Solenoid coil 14
–	–	GY 2)	–

1) For using the socket with cable according to Festo accessories.
2) Only for a socket with cable of type SIM-M12-5...
3) Connect 0 V with positive-switching control signals, 24 V with negative-switching control signals.

Tab. 3/8: Pin allocations, M12 central electr. plug

Earthing the valve manifold

Note
Earth your VTIA valve manifold.

- Provide a low-resistance connection (short cable with large cross-section) between the valve manifold and the earth potential, for example via an attachment hole in an end plate (see Fig. 3/8).

You can thereby avoid errors due to electromagnetic influences and ensure electromagnetic compatibility in accordance with EMC guidelines.

[1] Earthing the valve manifold, e.g. via an attachment hole in the end plate

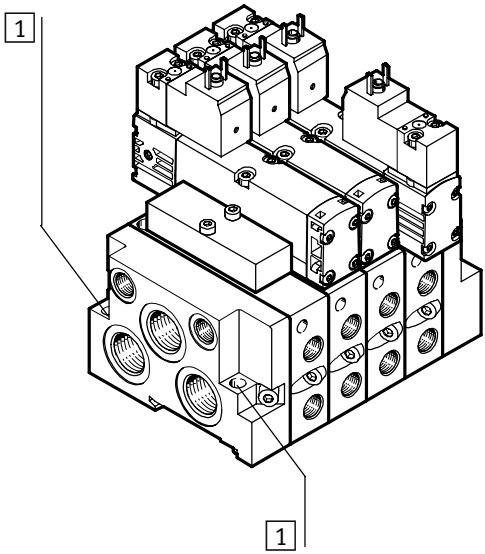
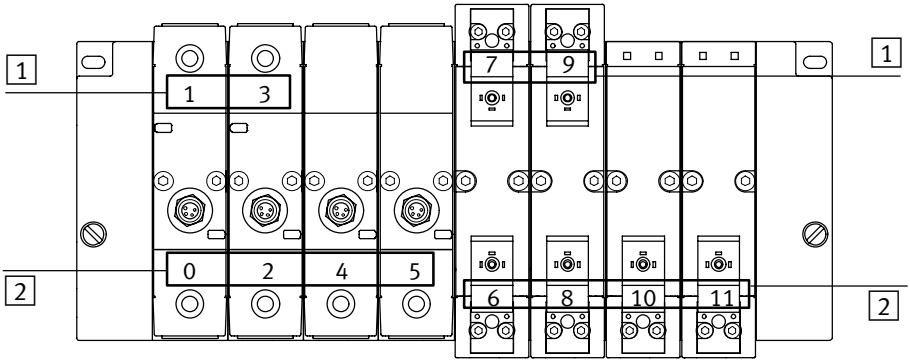


Fig. 3/8: Earthing the VTIA valve manifold

3.4 Address assignmentof the valves

Recommended address assignment

- Counting begins on the valve manifold from left to right
- For valves with two solenoid coils, the following applies:
  - solenoid coil 14 occupies the lower-value address
  - solenoid coil 12 occupies the higher-value address.



1 Addresses of valve solenoid coils 12 2 Addresses of valve solenoid coils 14

Fig. 3/9: Example of address assignment for the VTIA valve manifold

Commissioning

Chapter 4

Contents

Contents of this chapter

This chapter describes the commissioning of the VTIA valve manifold. In particular this includes:

- Instructions on building up pressure in the complete supply
- Operating the manual overrides
- Checking the valves and the valve-actuator combination
- The assignment of LEDs and manual overrides to the valve solenoid coils
- Function impairments
- Operating states of the pneumatic system

4.1 General information

4.1.1 Before commissioning

- Switch off the power supply before connecting or disconnecting plugs (otherwise this could lead to functional damage).
- Commission only a valve manifold which has been fitted and wired completely.
- Make sure that there is a sufficient supply of fresh air (cooling) for the following operating conditions:
  – when the maximum number of valves are fitted
  – when the maximum operating voltage is applied
  – when the solenoid coil is constantly under stress.
- Please observe the following instructions on building up pressure in the complete supply.

4.1.2 Pressure increase in the complete supply

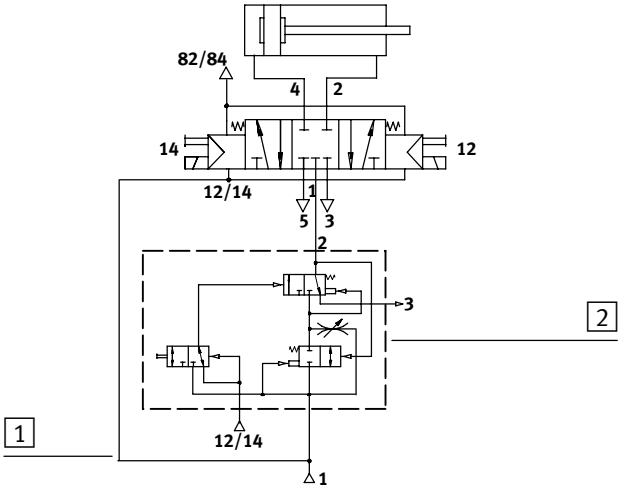
Warning
If the build up of pilot air is too slow or delayed, this may lead to sudden unexpected movements of the actuators under the following conditions:

– when the compressed air is switched on with a safety start-up valve (slow build up of pressure) and
– if there are electric signals (e.g. after EMERGENCY STOP).

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

- Operate the valve manifold with external pilot air corresponding to the pressure specified in appendix A, Tab. A/5. Branch the pilot air in front of the safety start-up valve (see Fig. 4/1).

The pilot air must be applied immediately after it is switched on at the minimum pressure specified in appendix A, Tab. A/5 for the relevant valves. Otherwise there is no guarantee that the valve will switch directly (see Fig. 4/1).
If the pressure is less than the minimum specified, there may be a delay before the valve is switched, in spite of an electric signal being present. The slow increase in pressure of the complete supply does not then affect the actuator. 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 in front of the safety start-up valve

2 Safety start-up valve (slow build up of pressure of complete supply)

Fig. 4/1: Example of valve-cylinder combination with slow increase in pressure of the complete supply

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

External pilot supply air	**Pressure increase in complete supply**	**Pressure increase in the pilot air (12/14)**	**Time point when a valve switches**	**Movement of the actuator**
branched after the safety start-up valve	**slow**	slow	**after** pressure increase at (1)	**fast**
branched in front of the safety start-up valve	**slow**	fast	**before** pressure increase at (1)	**slow**

Tab. 4/1: Effects of slow start-up pressurisation

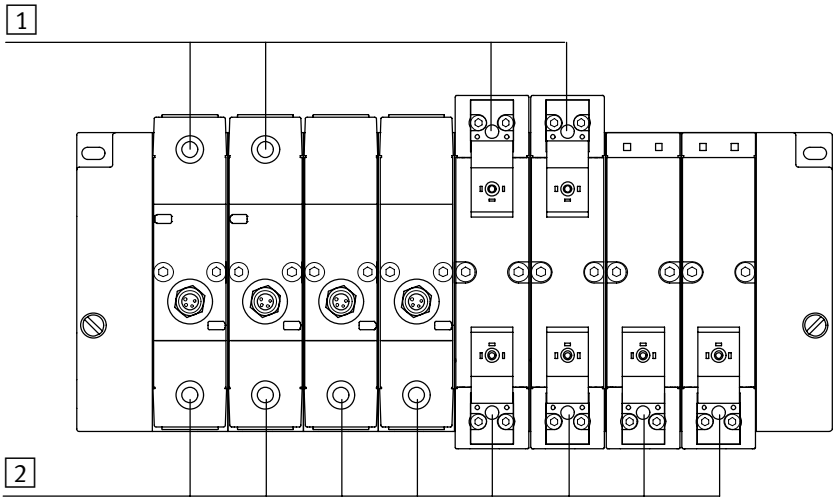
4.2 Manual override

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

By actuating the manual override, you can switch the valve without an electric signal. You only need to switch on the compressed air supply.

The non-locking manual override is designed so that it is automatically reset by spring force after it is actuated.

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



1 Manual override for valve solenoid coils 12

2 Manual override for valve solenoid coils 14

Fig. 4/2: Position of the manual overrides on the VTIA valve manifold (top view)

4.3 Checking the valves and the valve-actuator combination

The VTIA valve manifold should be commissioned as follows:

Commissioning variants	Activity
Preliminary test of the pneumatic tubing	Test the valve-actuator combination by means of the manual override
Complete commissioning of the complete system	Installing and connecting the complete system Program control via PLC/industrial PC

Tab. 4/2: Commissioning variants

Commissioning the pneumatic components by means of the manual override is described below.

Warning
Before actuating the manual override:

Uncontrolled actuation of the valve solenoid coils can cause the actuators to perform sudden unexpected movements which may cause injury to human beings and damage to property.

- Disconnect the operating voltage supply for the valve solenoid coils from the relevant connections on the valves.

You will thereby avoid undesired actuation of the valve solenoid coils.

Proceed as follows:

Warning
Before testing the valve-actuator combination:

– Make sure that nobody is in the danger zone.

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

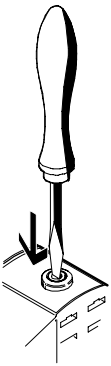
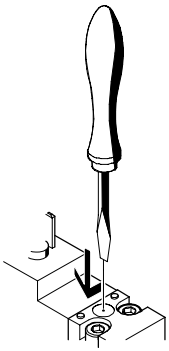
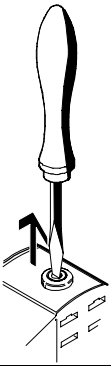
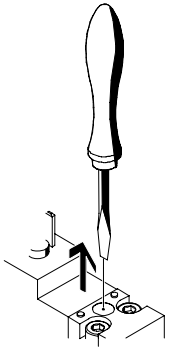
- Reset the electric signal before actuating the manual override.

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

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

- Use a screwdriver (blade width max. 4 mm) for actuating the manual override.
- Actuate the manual override with only max 25 N.

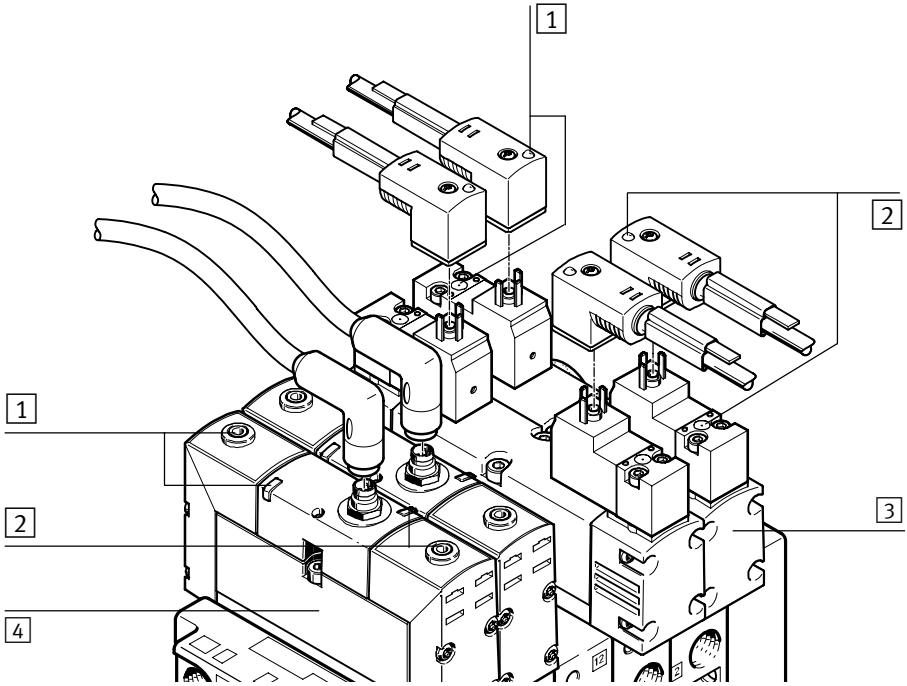
3. Switch off the compressed air supply after testing the valves.

Before actuating the manual override: (automatic reset)			
Valve with central plug type VSVA-B-...-R...	**Valve with square plug type VSVA-B-...-C1**	**Operation**	**Valve response**
		• Use a screwdriver (max. blade width 4 mm) to press down the plunger of the manual override until the valve switches.	The valve: – moves to the switching position
		Keep the plunger of the manual override pressed down.	– remains in the switching position
		• Release the plunger (the spring resets the plunger of the manual override to the basic position).	– returns to basic position (not with double-solenoid valve (identifier **B**52/**D**52)

Tab. 4/3: Non-locking actuation of the manual override

4.4 LED display of the valves

For each valve solenoid coil there is a manual override, and depending on the type of valve an LED. The positions of the LEDs and manual overrides for the corresponding valve solenoid coils is as follows:



1 LED and manual override for valve solenoid coil 14

2 LED and manual override for valve solenoid coil 12

3 Valve with square plug type VSVA-B-...-C1 and plug socket with cable type KMEB-...LED

4 Valve with central plug type VSVA-B-...-R...

Fig. 4/3: The assignment of LEDs and manual overrides to the valve solenoid coils of the VTIA valve manifold

The LEDs indicate the switching status of the valve solenoid coils.

LED	Switching position of the valve	Meaning
off	Basic position	Logical 0 (no signal)
yellow alight	– Switch position or – Basic position	Logical 1 (signal present)

Tab. 4/4: Meaning of the LED display (VTIA valve manifold)

4.5 Eliminating faults

4.5.1 Impairment of function

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	**Fault treatment when the compressed air supply has been switched off**
Air escapes from ... – common line or work line connections	• Check the tubing fitting
The valve or the pneumatic system ... – does not react as expected	• Check the tubing • Check the electric cables
– does not react	• After switching on again check the operating pressure (if necessary for each pressure zone). Set operating pressure in accordance with instructions in chapter 3. • In the case of valves which are operated with regulated external pilot air, check the pilot pressure after switching on again (if necessary set as a factor of the operating pressure, see chapter 3). • Servicing required

Tab. 4/5: Function impairment of the pneumatic system

4.5.2 Operating states of the pneumatic system

The following conditions should be fulfilled, in order that the desired pneumatic operating states listed below can be achieved:

Desired pneumatic operating status	**Requirement**	**Comment**
Free of leakage	– Tubing connected with care – Regulated pilot air	—
Fast reaction	Sufficient pressure supply via pneumatic supply plates or vertical supply plates	• Vent the VTIA valve manifold via all exhaust ports
Trouble free	Non-return valves in common exhaust line	This applies when several systems with centrally ducted exhaust are used
Two or three pressure zones	Limitation of the pressure zones by means of seal plates in the corresponding channel	Subsequent conversion possible (see chapter 5)
Vacuum or low-pressure operation	Regulated external pilot air (pressure range see appendix A, Tab. A/5)	Note the conditions for operating the valve manifold with vacuum or low-pressure in the section 3.3.8 Vacuum/low-pressure operation
EMERGENCY STOP of pressure zones	Guarantees the functioning of the pressure regulator for the pilot air despite the complete supply being switched off	The regulator regulates the pilot air of all the valve plates on a valve manifold
Slow start-up after EMERGENCY STOP	If control signals are present, the pilot air must be applied immediately after being switched on with at least the minimum pressure specified in appendix A, Tab. A/5	

Tab. 4/6: Pneumatic operating states

Maintenance and conversion

Chapter 5

Contents

Contents of this chapter

This chapter explains how to fit and remove the following components for maintenance work and conversion:

- On valve positions: the fitting and removal of valves, blanking plates, pressure regulator plates, throttle plates, vertical pressure shut-off plates and vertical supply plates.
- The fitting and removal of the manifold sub-bases, the intermediate plate and the end plates.

The following activities are also described:

- Adding pressure zones
- Conversion of the valve manifold to ducted pilot and breathable exhaust air

5.1 General precautionary measures

Warning
Sudden unexpected movements of the connected actuators and uncontrolled movements of loose tubing can cause injury to human beings and/or damage to property.

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

- the compressed air supply
- the operating and load voltage supplies.

Note
Handle all modules and components of the valve manifold with great care. Note especially the following when fitting components:

- Screws must be fitted accurately (otherwise threads will be damaged).
- Screws must be fastened at first only by hand. Screws must be placed so that the self-cutting threads can be used.
- The specified torques must be observed.
- Screw connections must be fitted free of offset and mechanical tension.
- Check the seals for damage (IP65).
- The contact surfaces must be dry and clean (sealing effect, avoid leakage and contact faults).

5.2 Dismantling the valve manifold

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

Components	
in valve positions	**in vertical stacking**
– Valves – Blanking plates	– Pressure regulators – Flow control valves – Vertical pressure shut-off plates – Vertical supply plates

Tab. 5/1: Pneumatic components

Loosen the electrical connections

Connecting variants	Procedure
Valve with central plug type VSVA-B-...-R...	• Loosen the union nut on the M8 or M12 central plug and remove the plug.
Valve with square plug type VSVA-B-...-C1	• Loosen the fastening screws of the square plug • Pull out the plug.

Tab. 5/2: Loosen the electrical connections

Loosen the pneumatic connections

Loosening the pneumatic connections is described in chapter 3.

Dismantling the valve manifold

Dismantling the valve manifold is described in chapter 2.

5.3 Replacing valve manifold components

Components on the manifold sub-bases of the VTIA valve manifold can easily be replaced for maintenance and conversion work.

5.3.1 Replacing valves or blanking plates

Dismantling

Proceed as follows:

- Use a screwdriver to loosen the fastening screws and remove the components from the manifold block (see Fig. 5/1).

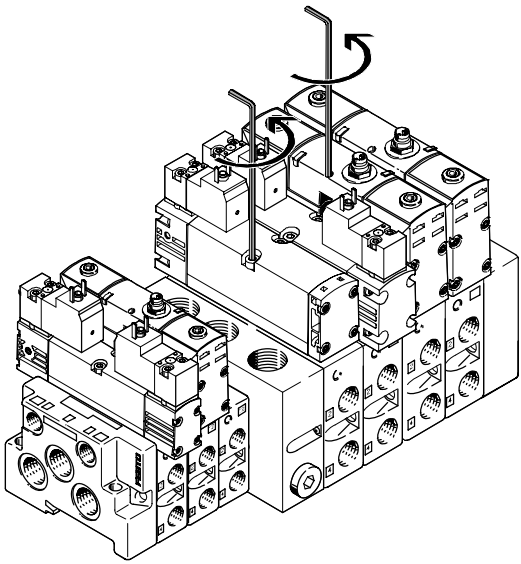


Fig. 5/1: Removing valve plates or blanking plates

Fitting

Proceed as follows:

1. Make sure the seal is not damaged. Replace seals if they are damaged.
2. Make sure that the seals are seated correctly between the manifold sub-base and components.
   - For blanking plates, the seal must be seated in the recess of the blanking plate.
   - For valves, the seal must be seated in the recess of the valve according to the exhaust variant (see section 5.4.1).
3. Place the component on the manifold block.
4. Screw the component at first only slightly and then tighten with the following torque:

– valves with width 18 mm: 1.0 Nm (±10 %)

– valves with width 26 mm: 2.0 Nm (±10 %)

5.3.2 Replacing/adding components for vertical stacking

The valve manifold can be fitted with the following components for vertical stacking:

– pressure regulator plate

– throttle plate

– vertical pressure shut-off plate

– vertical supply plate.

Note
No valve function.

Do not combine standard 2x3/2-way valves (identifier T32**C**-A / T32**H**-A / T32**U**-A) with reversible pressure regulator plates (identifier R5-..., R6-..., R7-...). With this combination the pneumatic spring of the valves does not function. The valves cannot return from the switching position to the basic position.

Vertical stacking with pressure regulator plate:
In the combination pressure regulator plate with throttle plate, vertical pressure shut-off plate or vertical supply plate you can mount the above-mentioned components under the pressure regulator plate. You thereby guarantee free access to the adjusting screws and connections (see Tab. 5/3).

The following component sequence is recommended for valve positions with vertical stacking:

1 Valve

2 Optional pressure regulator plate

3 Optional throttle plate

4 Optional Vertical pressure shut-off plate

5 Optional vertical supply plate

6 Manifold sub-base

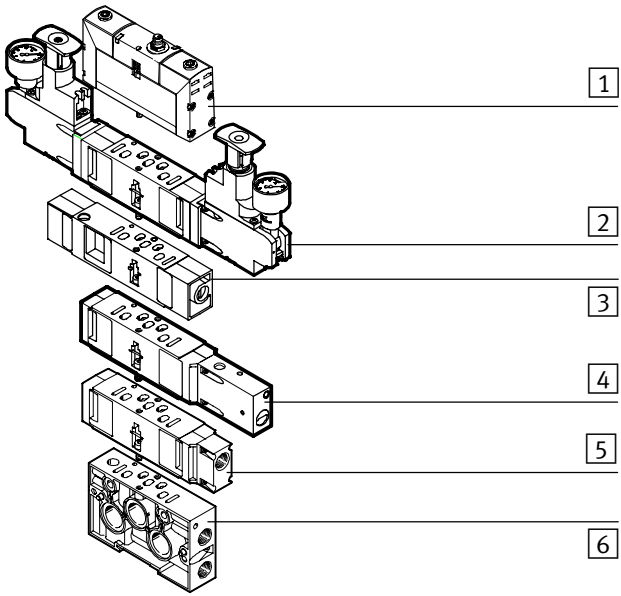


Fig. 5/2: Recommended sequence of valve position components

Note

- Reversible pressure regulator plates may only be combined with valves which can be operated reversibly.
- Valve position with vertical pressure shut-off plate:
  The pilot air for the valve is branched internally from channel 1 in the vertical pressure shut-off plate, even if the valve manifold is operated with external pilot air (see appendix B, section B.1). If all the valve positions on the VTIA valve manifold are fitted with vertical pressure shut-off plates, it will not be necessary to supply the valve manifold with external pilot air. The operating pressure at which the valve manifold is operated must in this case lie within the range of the required pilot pressure (see appendix A, Tab. A/5 and Fig. A/1).
- The combination of reversibly operated valve manifolds with the following components for vertical stacking is **not** permitted:
  - reversible pressure regulator plates
  - throttle plates
  - vertical pressure shut-off plates
  - vertical supply plates.

Removing the components

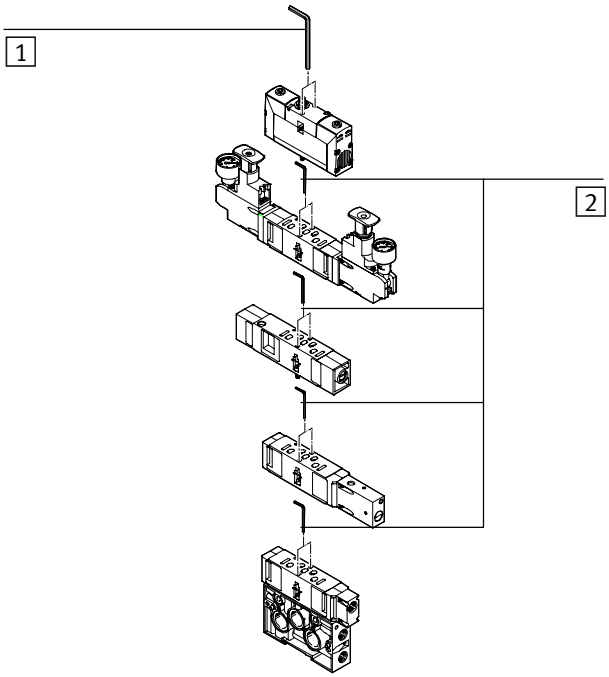
1. Unscrew the screws of all components above the relevant position.
2. Remove these components from the valve position.

Fit new components.

1. Check the seals for damage. Replace the seals if they are damaged.
2. When fitting the valve:
   Insert the seal between the valve and the vertical stacking component in accordance with the desired exhaust variant (see section 5.4.1)

3. Place the new component on the valve position or onto a component already fitted.
4. Fasten the new component. Width across flats of the hexagon socket wrench see Tab. 5/3.

Vertical stacking with pressure regulator plate



Valve size 18 mm	Valve size 26 mm
1 Hexagon socket wrench Width across flats 2.5	1 Hexagon socket wrench Width across flats 3
2 Hexagon socket wrench Width across flats 2	2 Hexagon socket wrench Width across flats 2.5

Tab. 5/3: Vertical stacking

5. Fit the removed components in the same manner as before.

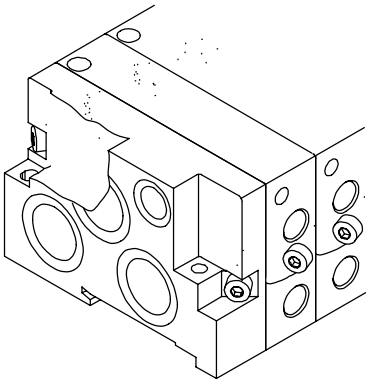
5.3.3 Replacing manifold sub-bases or end plates

Note
The VTIA valve manifold can be fitted with a maximum of 16 sub-bases.

Dismantling

Proceed as follows:

1. Loosen the electrical and pneumatic connections and remove the valve manifold from its fastening surface (see this chapter “Dismantling the VTIA valve manifold”).
2. Place the valve manifold on a flat working surface.
3. Loosen and remove the screws of the components (manifold sub-base and end plate) which you wish to dismantle (see Fig. 5/3).



Width across flats of the hexagon socket wrench SW4

Fig. 5/3: Position of the screw connectors

Fitting

Proceed as follows:

1. Make sure the seals are not damaged. Replace the seals if they are damaged.
2. Insert the seal into the indent in the manifold sub-base / the end plate.
3. If necessary, insert type NSC... isolating discs into the appropriate channels in order to form pressure zones (see section 5.4.2).

[1] Seal

[2] Interlinking blocks

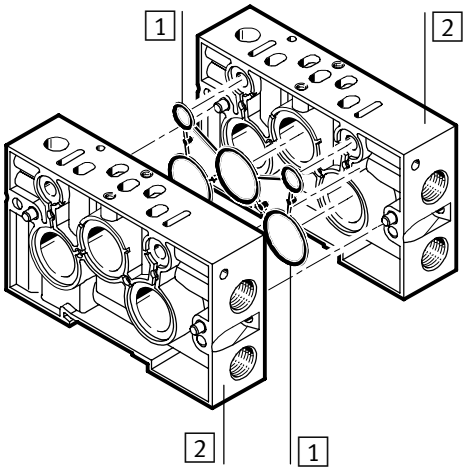


Fig. 5/4: Fitting manifold blocks

1 Left-hand end plate

2 Seal

3 Manifold sub-base

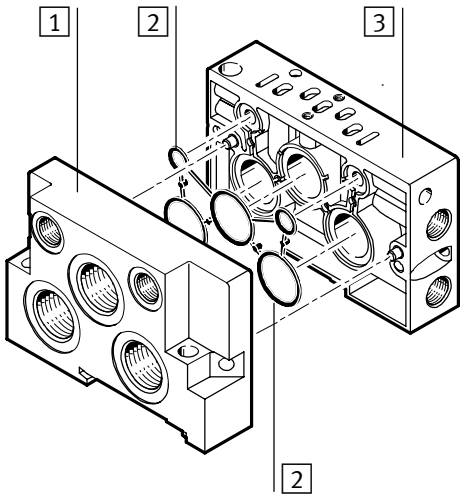


Fig. 5/5: Fitting end plates

4. Screw the components. Tighten the screws at first slightly and then with 3.0 Nm (±10 %). (position see Fig. 5/3).

5. Fit the valve manifold onto the fastening surface (see chapter 2 Fitting, “Fitting onto a wall” or “Fitting onto a hat rail”).

6. Then complete the pneumatic and electrical connections (see chapter 3 Installation, “Connecting the VTIA valve manifold”).

5.4 Conversion of the VTIA valve manifold

The following conversion work can be undertaken on the VTIA valve manifold:

- conversion of the valve manifold to ducted pilot and breathable exhaust air.
- addition of pressure zones
- addition of vertical stacking components
- addition of valve positions (manifold sub-bases) or supply blocks.

5.4.1 Conversion to ducted pilot and breathable exhaust air

By turning the valve seals, you can vent the pilot exhaust air ducted via connection 12 on the right-hand end plate.

Note that ducted exhausting of the pilot air via connection 12 does not conform to the ISO standard. In some circumstances, the VTIA valve manifold can no longer be operated with ISO valves of other manufacturers.

Proceed as follows:

1. Please observe the general safety measures in the section 5.1.
2. Use a hexagon spanner to loosen the fastening screws of all the valves. Remove the valves from the manifold blocks (see Fig. 5/1).
3. Check the exhaust variant for which the VTIA valve manifold has been constructed.

	Exhaust variant	
	for non-ducted pilot exhaust air	**for ducted pilot exhaust air**
Position of the valve seals	Seal is visible in the viewing window on control side 14. The "ISO" mark is visible on the designation label (see Fig. 5/6).	Seal is visible in the viewing window on control side 12. The "ISO" mark is visible on the designation label.

Tab. 5/4: Positions of the valve seals on the pilot exhaust variants

4. Turn all valve seals according to the desired exhaust variant (see Fig. 5/6).

1 Viewing window at control side 12

2 Seal is visible in the viewing window on control side 14

3 Designation label

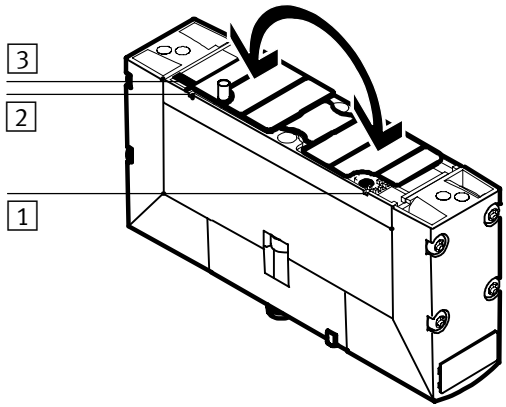


Fig. 5/6: Turning the valve seal

5.4.2 Conversion of the VTIA valve manifold to two or more pressure zones

The valve manifold can be equipped with 1 ... 3 pressure zones.

A VTIA valve manifold which is fitted exclusively with valves of a single size can be provided with a maximum of 2 pressure zones.
If the valve manifold is fitted with valves in two sizes, then the valve manifold can be provided with up to 3 pressure zones.

The pressure zones are formed by special isolating discs that are inserted into the following channels:

- Supply channel (1)
- Exhaust channel 3
- Exhaust channel 5

To convert the VTIA valve manifold to 2 ... 3 pressure zones requires a type NSC... isolating disc for each channel separation.

Dismantling

Proceed as follows:

1. Loosen the electrical and pneumatic connections and remove the valve manifold from the fastening surface (see section 5.2).
2. Place the valve manifold on a flat working surface.
3. Loosen the manifold block at the point where the isolating discs for channel separation are to be inserted (see section 5.3.3).

Fitting

Proceed as follows:

1. Insert the seal into the manifold sub-base.
2. Then insert the isolating discs into the appropriate channels of the manifold sub.base.

1 Seal

2 Interlinking blocks

3 Type NSC...
isolating discs
for channel
separation

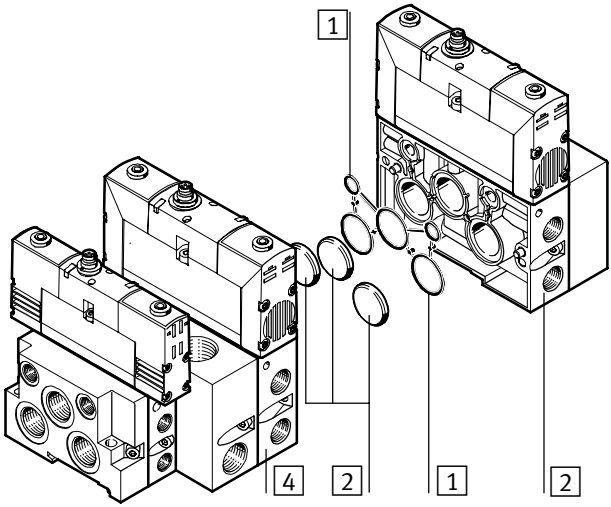


Fig. 5/7: Fitting manifold blocks

3. Fit the manifold block (see section 5.3.3).
4. Fit the valve manifolds onto the fastening surface (see chapter 2, section 2.2.1 for the “Hat rail fitting” or section 2.2.2 for the “Wall fitting”).
5. Then complete the pneumatic and electrical connections (see chapter 3, section 3.3).

5.4.3 Adding valve positions

You can easily adapt the VTIA valve manifoldto the requirements of your machine or systemby adding valve positions.

For extension you will require:

Components	**Type**
1 manifold sub-base per valve position	NAW-...-VDMA
Valves or blanking plates per manifold sub-base – Valve with central plug – Valve with square plug – If necessary appropriate components for vertical stacking – Blanking plate	 VSVA-B-...-R... VSVA-B-....-C1 see Tab. 1/3 NDV-...-VDMA

Tab. 5/5: Valve position extension

Dismantling

Proceed as follows:

1. Loosen the valve manifold from the fastening surface (see section 5.2).
2. Dismantle the manifold sub-base at the point where you wish to extend the valve manifold (see section 5.3.3).

Fitting

Proceed as follows:

1. Fit the new manifold sub-base (see section 5.3.3).
2. Fit the appropriate components at the empty valve position, such as components of the vertical stacking, valve or blanking plate
   - see section 5.3.2 for the fitting of components of the vertical stacking
   - see section 5.3.3 for the fitting of valves or blanking plates.
3. Fit the valve manifolds onto their fastening surface (see chapter 2 Fitting, “Fitting onto a wall” or “Fitting onto a hat rail”).
4. Then complete the pneumatic and electrical connections (see chapter 3 Installation, “Connecting the VTIA valve manifold”).

Technical appendix

Appendix A

Contents

A.1 Technical specifications

General information	Size 18 mm	Size 26 mm
Permitted temperature range – Long-time storage – Operation – Medium	 -20 ... +40 °C -5 ... +50 °C -5 ... +50 °C	
Protection class (with cable from Festo accessories)	IP65 as per DIN 60529 NEMA 4 according to DIN EN 60529	
Relative humidity	90 % at 40 °C	
Protection against corrosion	KBK 0 (as per FN 940070)	
Assembly position	as desired	
Tightening torques – Valve, cover plate and components of the vertical stacking on manifold sub-base – Fastening the manifold block – Fastening screw of plug socket with cable KMEB-...	 1.0 Nm (±10 %) 2.0 Nm (±25 %) 0.5 Nm	 2.0 Nm (±10 %) 2.0 Nm (±25 %) 0.5 Nm
Materials – Housing – Seal	 die-cast aluminium NBR	

Tab. A/1: General technical specifications of the VTIA valve manifold

Note
The valves can be used at temperatures down to -5 °C. In order to prevent the condensate and the humidity from freezing, we recommend that you fit a dryer with which condensate and humidity can be removed.

Note
– If the valve manifold is fitted onto a wall, additional fastenings (a hole in each manifold sub-base) must be fitted after every 4 manifold sub-bases, depending on the vibration/shock loading (see Tab. A/2).

General	
Vibration and shock [3]	
– Vibration [1]	Tested as per DIN/IEC 68 / EN 60068 part 2-6, with hat rail fitting: no vibration or shock loads are permitted with wall fitting: [2] [3]
– Shock [1]	Tested as per DIN/IEC 68 / EN 60068 part 2-27, with hat rail fitting: no vibration or shock loads are permitted with wall fitting: [2] [3]
– Continuous shock	Tested as per DIN/IEC 68 / EN 60068 part 2-29, with wall and hat rail fitting: Severity level 1

[1] Explanations on the severity classes see following table.
[2] With wall fitting of the VTIA valve manifold with M4 fastening screws and additional fastenings (see note above): Severity level 2
[3] With wall fitting of the VTIA valve manifold and with more than one vertical stacking component: Severity level 1

Tab. A/2: Vibration and shock

Sever. level	**Vibration**	**Shock**	**Continuous shock**
1	0.15 mm displacem. at 10 ... 58 Hz 2 g acceleration at 58 ... 150 Hz	±15 g at 11 ms duration; 5 shocks per direction	±15 g at 6 ms duration; 1000 shocks per direct.
2	0.35 mm displacem. at 10 ... 60 Hz 5 g acceleration at 60 ... 150 Hz	±30 g at 11 ms duration; 5 shocks per direction	-----

Tab. A/3: Values for vibration and shock as per DIN/IEC 68

General information	Size 18 mm	Size 26 mm
Weights		
– intermediate plate	223 g	
– per end plate	approx. 120 g	approx. 240 g
– per manifold sub-base (one valve position)	120 g	208 g
– per valve	approx. 180 g	approx. 300 g
– per cover plate for non-assigned valve position	22 g	36 g
– per pressure regulator plate (P)	245 g	305 g
– per pressure regulator plate (A or B)	245 g	305 g
– per pressure regulator plate (AB)	370 g	430 g
– per throttle plate	228 g	320 g
– per vertical supply plate	146 g	201 g
– per vertical pressure shut-off plate	212 g	286 g

Tab. A/4: General technical specifications of the VTIA valve manifold (continued)

Pneumatic	
Medium	compressed air, filtered (‹ 40 µm), lubricated (oil: VG 32) or non-lubricated/vacuum, inert gases
Design	spool valves
Operating pressure/pilot pressure – Valves with pilot control with internal pilot air supply – Valves with pilot control with external pilot air supply	**Pressure range** operating and pilot pressure at connection 1: – 5/2-way valve identifier M52-**M** and all 5/3-way valves: 3 ... 10 bar – all other valves: 2 ... 10 bar operating pressure at connection 1: – all 2x3/2-way valves: 2 ... 10 bar – all other valves (also reversible 2x3/2-way valves): -0.9 ... 10 bar pilot pressure at connection 14: – see diagram Fig. A/1 and Fig. A/2
Manual override actuator	non-locking

Tab. A/5: Medium and pressure range of the VTIA valve manifold

1 Pilot pressure at connection 14 [bar]

2 Working range for valves with external pilot air

3 Operating pressure at connection 1 [bar]

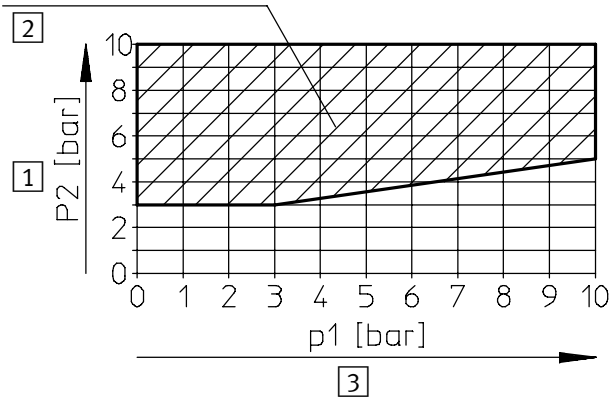


Fig. A/1: Diagram: Necessary pilot pressure as a function of operating pressure for 2x3/2-way valves for external pilot air

1 Pilot pressure at connection 14 [bar]

2 Working range of the valves for external pilot air

3 Operating pressure at connection 1 [bar]

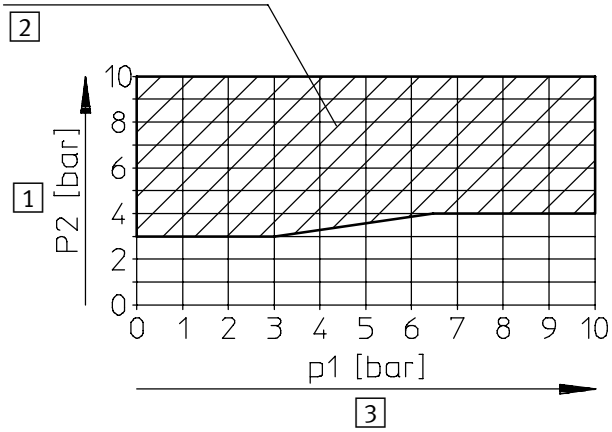


Fig. A/2: Diagram: Necessary pilot pressure as a function of operating pressure for 5/2- and 5/3-way valves for external pilot air

Note
The screw connectors of the pneumatic connections and the standard port pattern cause a reduction in the rated flow rates of the valves.

Standard rated flows [l/min]		**Valve on valve manifold**	**Valve (solo)**
Valve size	**Valve function (identifier 1))**	**1 → 2 or 4 2 or 4 → 3/5**	**1 → 2 or 4 2 or 4 → 3/5**
18 mm	**2x3/2-way valves** (T32C-A / T32H-A / T32U-A / T32F-A / T32N-A / T32W-A)	400	600
	5/2-way valves (M52-A / M52-M / B52 / D52)	550	750
	5/3-way mid-position valves – closed (P53C-M) – exhausted / pressurized (P53E-M / P53U-M)	450 450 (300) 2)	650 650 (430) 2)

Standard rated flows [l/min]		Valve on valve manifold	Valve (solo)
26 mm	**2x3/2-way valves** (T32C-A / T32H-A / T32U-A / T32F-A / T32N-A / T32W-A)	900	1250
	5/2-way valves (M52-A / M52-M / B52 / D52)	1100	1400
	5/3-way mid-position valves – closed (P53C-M) – exhausted / pressurized (P53E-M / P53U-M)	1000 1000 (700) [2]	1400 1400 (1000) [2]
[1] Identifier of the valve in the type code [2] Values for the mid-position are quoted in brackets			

Tab. A/6: Rated flows

Valve switching times			Switching times in [ms] [1]	
Valve size	**Identifier in the type code**	**Valve**	**On / change-over**	**Off**
18 mm	T32C-A / T32H-A / T32U-A T32F-A / T32N-A / T32W-A M52-A M52-M B52 / D52 P53U-M / P53C-M / P53E-M	2x3/2-way 2x3/2-way, reversible 5/2-way valve, single solenoid, pneumatic spring 5/2-way, single solenoid, spring 5/2-way, double-solenoid 5/3-way	13 / — 21 / — 21 / — 17 / — — / 15 18 / 20	21 13 19 35 --- 30
26 mm	T32C-A / T32H-A / T32U-A T32F-A / T32N-A / T32W-A M52-A M52-M B52 / D52 P53U-M / P53C-M / P53E-M	2x3/2-way 2x3/2-way, reversible 5/2-way valve, single solenoid, pneumatic spring 5/2-way, single solenoid, spring 5/2-way, double-solenoid 5/3-way	20 / — 28 / — 35 / — 26 / — — / 18 23 / 20	28 20 43 56 --- 58
[1] Measuring method 0 ... 10 %, as per FN 942032				

Tab. A/7: Valve switching times

Flow diagrams for the pressure regulator plates at 10 bar operating pressure and 6 bar output pressure

P pressure regulator

1 Output pressure

2 Characteristic curve of the 6 bar regulator

3 Flow rate

4 Characteristic curve of the 10 bar regulator

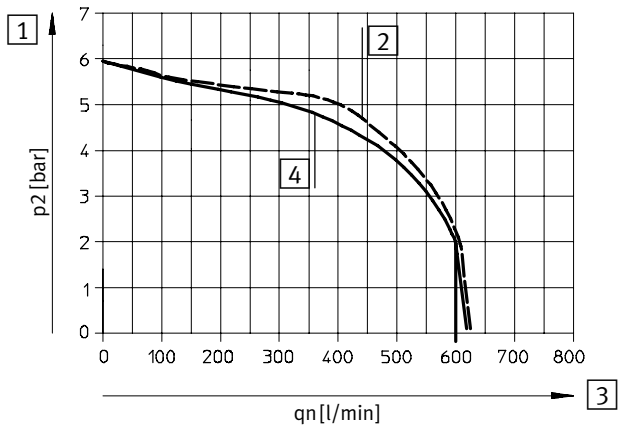


Fig. A/3: Diagram: Flow as a factor of output pressure for P-pressure regulator, size 18 mm (identifier R1-...)

1 Output pressure

2 Characteristic curve of the 6 bar regulator

3 Flow rate

4 Characteristic curve of the 10 bar regulator

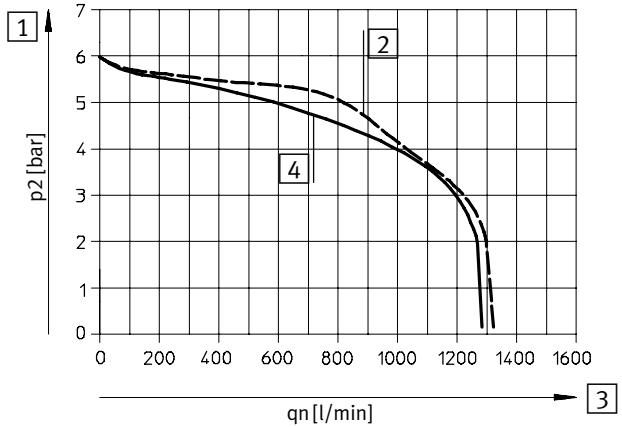


Fig. A/4: Diagram: Flow as a factor of output pressure for P-pressure regulator, size 26 mm (identifier R1-...)

A, B and AB pressure regulators

1 Output pressure

2 Characteristic curve of the 6 bar regulator

3 Flow rate

4 Characteristic curve of the 10 bar regulator

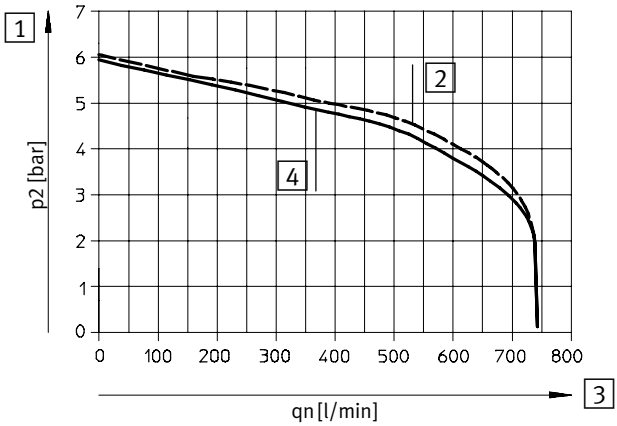


Fig. A/5: Diagram: Flow as a factor of output pressure for A, B and AB pressure regulators, size 18 mm (identifier R2-..., R3-... and R4-...)

1 Output pressure

2 Characteristic curve of the 6 bar regulator

3 Flow rate

4 Characteristic curve of the 10 bar regulator

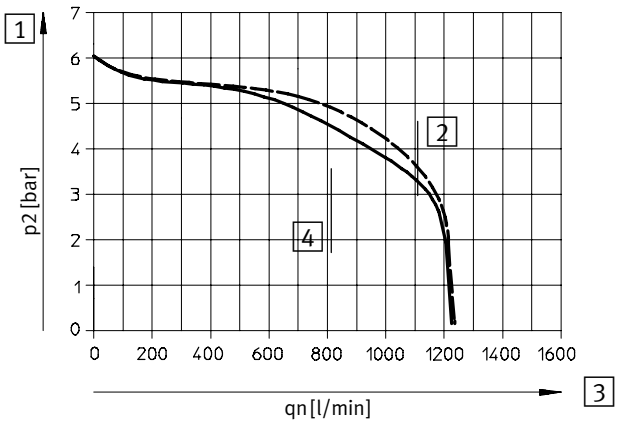


Fig. A/6: Diagram: Flow as a factor of output pressure for A, B and AB pressure regulators, size 26 mm (identifier R2-..., R3-... and R4-...)

Reversible AB pressure regulator

1 Output pressure

2 Characteristic curve of the 6 bar regulator

3 Flow rate

4 Characteristic curve of the 10 bar regulator

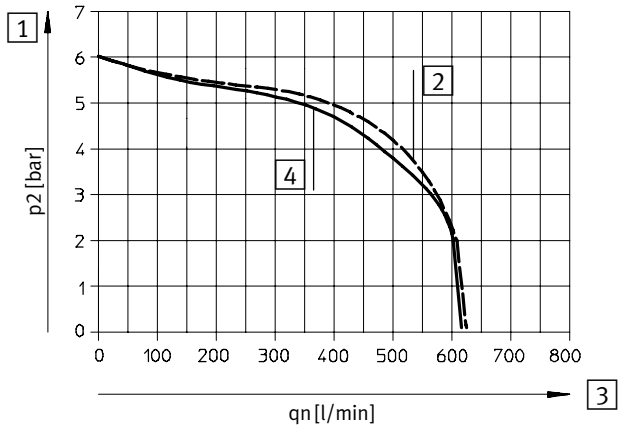


Fig. A/7: Diagram: Flow as a factor of output pressure for reversible AB pressure regulators, size 18 mm (identifier R5-...)

1 Output pressure

2 Characteristic curve of the 6 bar regulator

3 Flow rate

4 Characteristic curve of the 10 bar regulator

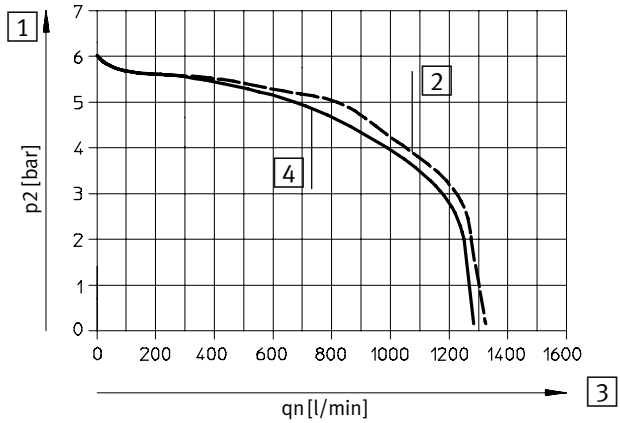
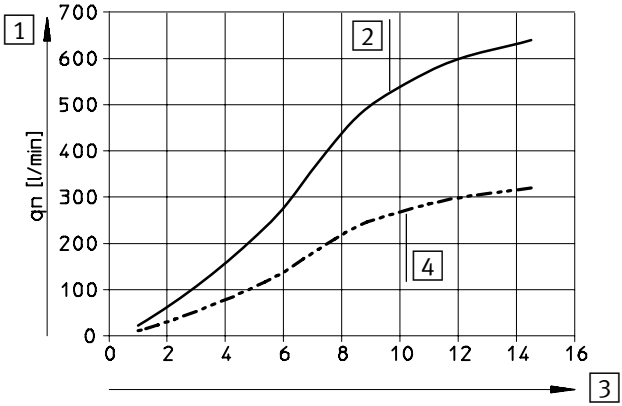


Fig. A/8: Diagram: Flow as a factor of output pressure for reversible AB pressure regulators, size 26 mm (identifier R5-...)

Flow diagram of the throttle plates



1 Flow

2 Characteristic curve of the throttle plate (size 26 mm)

3 Revolutions of the adjusting screw

4 Characteristic curve of the throttle plate (size 18 mm)

Fig. A/9: Diagram: Flow as a factor of restriction (throttle plate identifier F1B1)

Electrical components	
Protection against electric shock (protection against direct and indirect contact as per IEC/DIN EN 60204-1)	by connection to a PELV power unit (Protected Extra Low Voltage)
Operating voltage supply for the valves (V_{VAL}) 1) Valves with central plug: – Rated voltage (tolerance) Valves with square plug: – Rated voltage (tolerance) – Non-standard voltages (tolerance)	 – DC 24 V (±10 %) – DC 24 V (+10/-15 %) – for valves of type ...-12DCA: DC 12 V (+10/-15 %) and AC 24 V (+10/-15 %) – for valves of type ...-110AC 2): AC 110 V (±10 %) – for valves of type ...-230AC 2): AC 230 V (+10/-15 %)
Power consumption per solenoid coil Valves with central plug – High-current phase – Holding current phase – Break time 3) – Rate of change 3) Valves with square plug – Rated power of the coil	 2.4 W 1.0 W min. 3.4 ms min. 0.4 V/ms (min. power supply requirement) DC 12 V and DC 24 V: 1.8 W AC 24 V, AC 110 V and AC 230 V: 3 VA
Electromagnetic compatibility (EMC) – Emitted interference 4) and resistance to interference 5)	see declaration of conformity (www.festo.com)

1) Rated value, protected against incorrect polarity (permitted tolerance)
2) For control voltages of AC 110 V or AC 230 V the protective earth conductor at the connection must be connected to the protective earth.
3) To achieve the high current phase
4) The VTIA valve manifold is intended for industrial usage.
5) The maximum signal cable length for VTIA valve manifolds is 10 m

Tab. A/8: Technical specifications for the electric components

Note
– The valve manifold can be configured with a maximum of 16 valves. The maximum number of solenoid coils that can be controlled is thus limited to 32 addresses.

A.2 Festo accessories

→ www.festo.com/catalogue

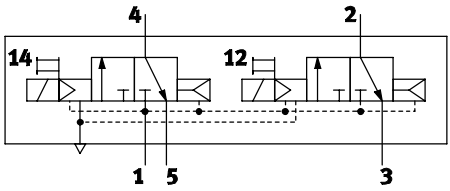
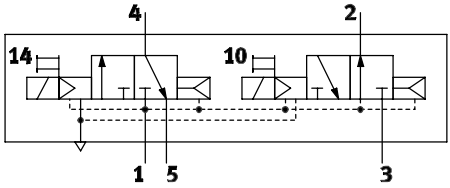
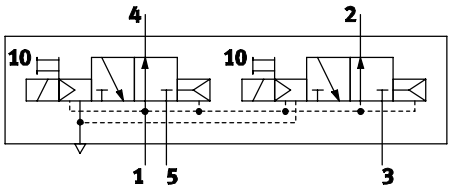
Supplementary component summary

Appendix B

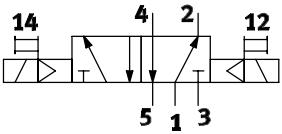
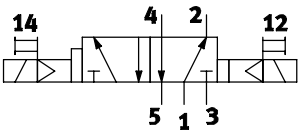
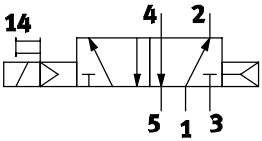
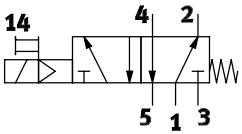
Contents

B.1 Overview of valve position components

B.1.1 Valves with internal pilot air supply

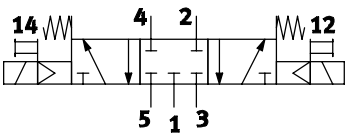
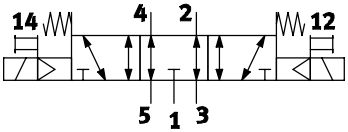
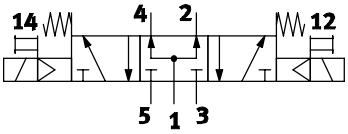
2x3/2-way valves with internal pilot air supply	
	Ident. code: K Function: – 2x3/2-way valves – Single solenoid – 2x normally closed
	Ident. code: H Function: – 2x3/2-way valves – Single solenoid – Control side 14 normally closed – Control side 12 normally open
	Ident. code: N Function: – 2x3/2-way valves – Single solenoid – 2x normally open

Tab. B/1: 2x3/2-way valves (internal pilot air supply)

5/2-way valves with internal pilot air supply	
	Ident. code: J Function: – One bistable 5/2-way valve – Double solenoid
	Ident. code: D Function: – One bistable 5/2-way valve – Double solenoid – Dominant on control side 14
	Ident. code: M Function: – One single-solenoid 5/2-way valve – Pneumatic spring reset **Note** The number of outputs, which are occupied by this valve, depends on the type of manifold block (see section 3.4).
	Ident. code: O Function: – One single-solenoid 5/2-way valve – Spring reset **Note** The number of outputs, which are occupied by this valve, depends on the type of manifold block (see section 3.4).

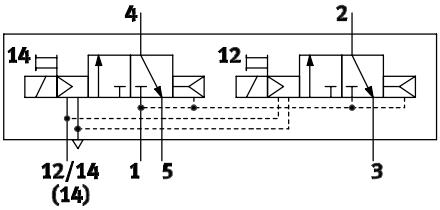
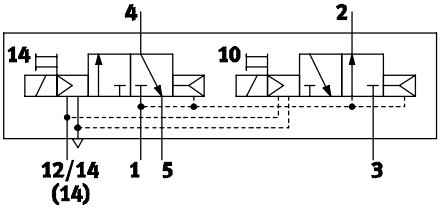
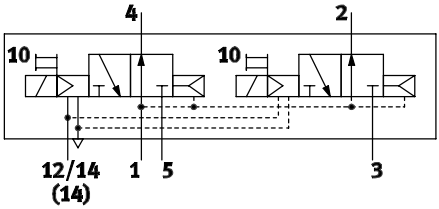
Tab. B/2: 5/2-way valves (internal pilot air supply)

Note
- When deenergized, 5/3-way valves are moved to the mid-position by spring force.
- If both solenoid coils of a 5/3-way valve are energized at the same time, the valve remains in the switching position it was in previously.

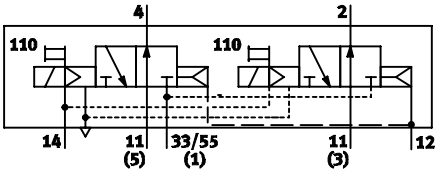
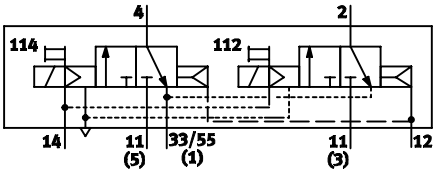
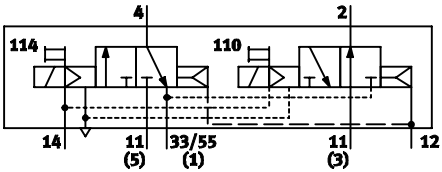
5/3-way mid-position valves with internal pilot air supply	
	Ident. code: G Function: – 5/3-way valve – Mid-position closed
	Ident. code: E Function: – 5/3-way valve – Mid-position exhausted
	Ident. code: B Function: – 5/3-way valve – Mid-position pressurized

Tab. B/3: 5/3-way mid-position valves (internal pilot air supply)

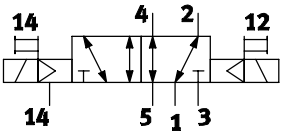
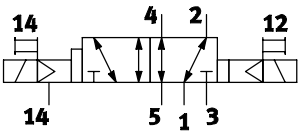
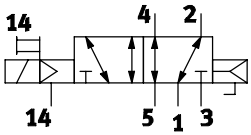
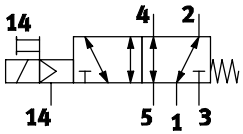
B.1.2 Valves with external pilot air supply

2x3/2-way valves with external pilot air supply	
	Ident. code: K Function: – 2x3/2-way valves – Single solenoid – 2x normally closed
	Ident. code: H Function: – 2x3/2-way valves – Single solenoid – Control side 14 normally closed – Control side 12 normally open
	Ident. code: N Function: – Two single solenoid 2x3/2-way valves – 2x normally open

Tab. B/4: 2x3/2-way valves (external pilot air supply)

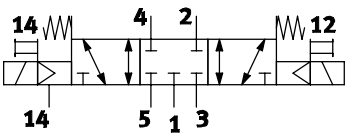
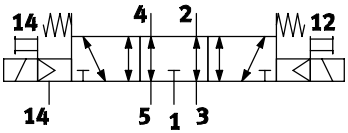
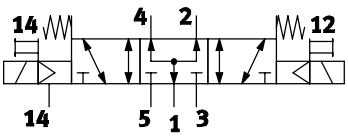
Reversible 2x3/2-way valves with external pilot air supply	
	Ident. code: P Function: – 2x3/2-way valves – Reversible – Single solenoid – Normally open
	Ident. code: Q Function: – 2x3/2-way valves – Reversible – Single solenoid – Normally closed
	Ident. code: R Function: – 2x3/2-way valves – Reversible – Single solenoid – Control side 14 normally closed – Control side 12 normally open

Tab. B/5: Reversible 2x3/2-way valves (external pilot air supply)

5/2-way valves with external pilot air supply	
	Ident. code: J Function: – One bistable 5/2-way valve – Double solenoid
	Ident. code: D Function: – One bistable 5/2-way valve – Double solenoid – Dominant on control side 14
	Ident. code: M Function: – One single-solenoid 5/2-way valve – Pneumatic spring reset
	Ident. code: O Function: – One single-solenoid 5/2-way valve – Spring reset

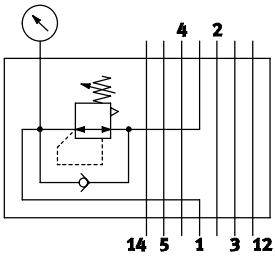
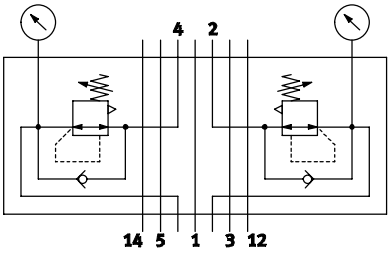
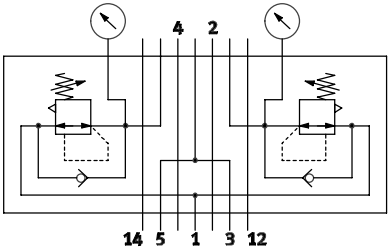
Tab. B/6: 5/2-way valves (external pilot air supply)

Note
- When deenergized, 5/3-way valves are moved to the mid-position by spring force.
- If both solenoid coils of a 5/3-way valve are energized at the same time, the valve remains in the switching position it was in previously.

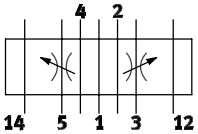
5/3-way mid-position valves with external pilot air supply	
	Ident. code: G Function: – 5/3-way valve – Mid-position closed
	Ident. code: E Function: – 5/3-way valve – Mid-position exhausted
	Ident. code: B Function: – 5/3-way valve – Mid-position pressurized

Tab. B/7: 5/3-way mid-position valves (external pilot air supply)

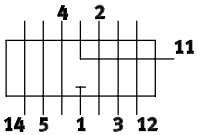
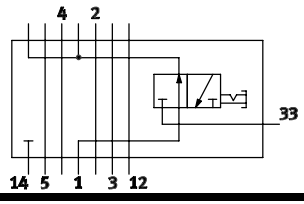
B.1.3 Vertical stacking components

Pressure regulator plates	
	P-pressure regulator plate Ident. code: ZF or ZA Function: – Regulates the operating pressure in channel 1 before the directional control valve.
	AB-pressure regulator plate Ident. code: ZI or ZD Function: – Regulates the output pressure in channels 2 and 4 behind the directional control valve. **Note** This pressure regulator plate is **not** combinable with reversible 2x3/2-way valves (Ident. code P, Q and R).
	Reversible AB-pressure regulator plate Ident. code: ZJ or ZE Function: – Reversible pressure regulator for connections 2 and 4 – Pressure regulation before the valve – Conducts the operating pressure from channel 1 to channels 3 and 5 – Conducts the exhaust from channel 1 to channels 3 and 5 **Notes** Combination with standard 2x3/2-way valves (Ident. code identifier H, K and N) is not permitted. Reversible 2x3/2-way valves (Ident. code P, Q, and R) must not be operated in a separate pressure zone in combination with these pressure regulators.

Tab. B/8: Pressure regulator plates

Throttle plate	
	Throttle plate Ident. code: X Function: – Restricts the exhaust behind the valve in channels 3 and 5. **Note** On reversibly operated valve manifolds, the supply air in channels 3 and 5 is restricted in front of the valve.

Tab. B/9: Throttle plate

Vertical pressure supply plate and vertical pressure shut-off plate	
	Vertical pressure supply plate Function: – Plate with connection 11 for providing an individual operating pressure for a valve position.
	Vertical pressure shut-off plate Function: – 3/2-way valve for shutting off the operating pressure (channel 1) at the valve position. – Blocks channel 14 for the valve position. – Supplies the valve position with internal pilot air.

Tab. B/10: Vertical pressure supply plate and vertical pressure shut-off plate

B. Supplementary component summary

Index

Appendix C

Contents

A

B

C

D

E

F

H

I

L

M

N

O

P

R

S

T

V

W