Piezo valves VEMP

FESTO

New

Piezo valves VEMP

Key features

Innovative

- Piezo technology
- Very low energy consumption
- Very precise

Versatile

- When combined with pressure sensor and control electronics it can be used as a proportional pressure regulator
- When combined with a flow sensor and control electronics it can be used as a proportional flow control valve

Reliable

- No self-heating
- Long service life

Easy to install

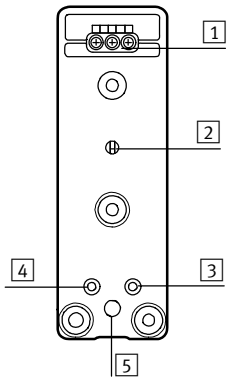
- Can be mounted on a sub-base or manifold rail
- Small installation space
- Light weight

Piezo valves VEMP

Key features

Mode of operation

Description



1 Electrical connection
2 Connection for pressure sensor
3 Port 1 (pressure supply port)
4 Port 3 (exhaust)
5 Port 2 (working port)

The VEMP is a proportional 3/3-way valve in which a split piezo actuator (piezo actuator 1 and 2) is controlled electrically. The valve also has a connection for a pressure sensor.

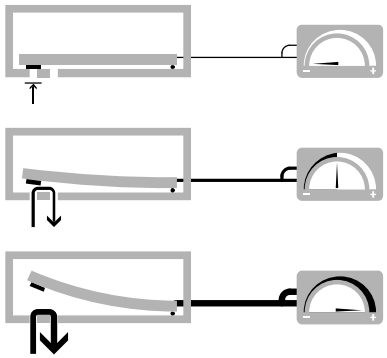
When combined with a pressure sensor and control electronics, the 3/3-way proportional valve can be used as a proportional pressure regulator.

Alternatively, the flow can also be controlled by means of a closed loop circuit by integrating a flow sensor in the outlet line (operation as 2/2-way valve).

In the normal position, the valve is closed. The working and pressure sensor ports are connected and always open, regardless of the switching status.

The two piezo actuators can only be controlled separately; if they are activated simultaneously, safe and reliable operation cannot be ensured.

Control response



No voltage
No flow

Medium voltage
Medium flow

High voltage
High flow

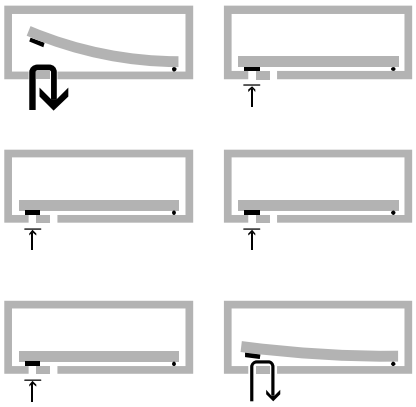
The piezo actuators are controlled using variable voltage to give proportional closed-loop control.

This allows either pressure or flow to be controlled, depending on the design.

The pressure or flow behaviour is controlled by integrating a sensor in the outlet line of the closed-loop control circuit.

The piezo valve VEMP exhibits the typical hysteresis behaviour of a proportional valve. Linear behaviour can be achieved by combining electronic control with a flow sensor.

Operation as a proportional 3/3-way valve



Pressure build-up

Maintaining pressure

Reducing pressure

Pressurisation, piezo actuator 1

Exhausting, piezo actuator 2

The piezo actuators installed in valves VEMP provide proportional regulation of both the pressure and flow rate for pressurisation as well as proportional exhausting.

Pressurisation:
During pressurisation, piezo actuator 1 opens, enabling flow from port 1 (pressure supply port) to port 2 (working port). At the same time, piezo actuator 2 closes port 3 (exhaust).

Exhausting:
During exhausting, piezo actuator 2 opens, enabling flow from port 2 (working port) to port 3 (exhaust). At the same time, piezo actuator 1 closes port 1 (pressure supply port).

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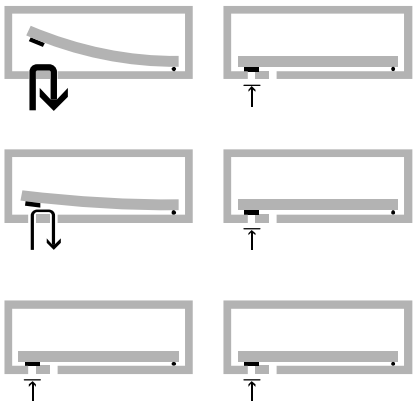
Key features

Mode of operation

Operation as a proportional 2/2-way valve

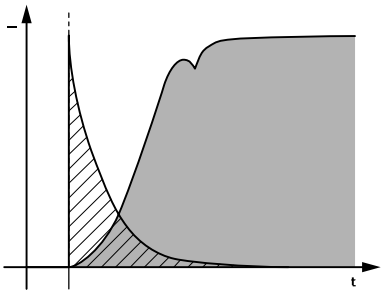


When used as a proportional 2/2-way valve, only piezo actuator 2 (exhaust) is switched; piezo actuator 1 (pressure supply port) must be electrically connected to earth (GND).

Flow takes place from port 2 (working port) to port 3 (exhaust). When used as a 2/2-way valve, port 1 (pressure supply port) is not used, and must be closed.

The flow behaviour is controlled by integrating a sensor in the supply or outlet line of the closed-loop control circuit.

Low energy consumption



Compared with solenoid valves, proportional valves with piezo technology require virtually no energy to maintain an active state, thanks to their capacitive principle. The piezo valve operates like a capacitor: it needs current only at the start in order to charge the piezoceramics.

No further energy is needed to maintain its state. The valves therefore generate no heat. They consume up to 95% less energy than solenoid valves, which permanently require an electrical current

Piezo valves VEMP

Peripherals overview

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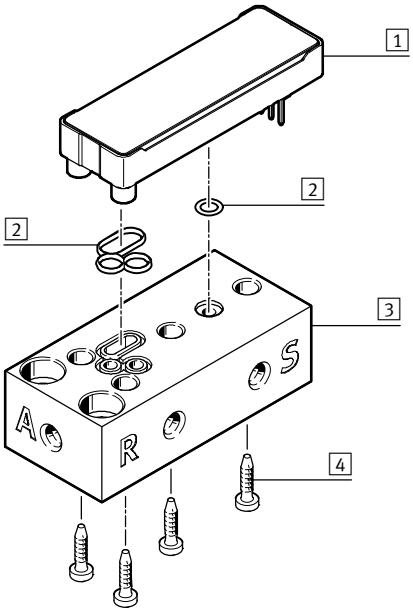
Example of VEMP with manifold rail

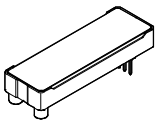


Designation		➔ Page/Internet
1	Piezo valve VEMP	14
2	Seal set	14
3	Manifold rail	14
4	Screw set	14

New

Piezo valves VEMP

Product range overview

Function	Description		Nominal width	Flow	Operating pressure	Operating voltage	
				[l/min]	[bar]	0 ... 310 V	0 ... 250 V
Sub-base valve		3/3-way valve, normally closed, monostable					
		Flange	1.3 mm	19/20	0 ... 1.1	–	■
		3/3-way valve, normally closed, monostable					
		Flange	1.3 mm	28/30	0 ... 1.7	■	–
		3/3-way valve, normally closed, monostable					
		Flange	1.6 mm	18/19	0 ... 0.7	■	–
		3/3-way valve, normally closed, monostable					
		Flange	1.6 mm	28/27	0 ... 1.1	■	–

Piezo valves VEMP

Type codes

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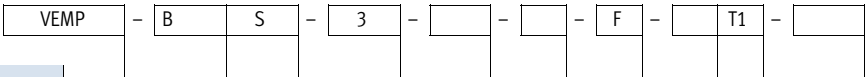

Type	
VEMP	Proportional pressure regulator

Type of directional control valve	
B	Sub-base valve

Design principle	
S	Bending actuator

Valve function	
3	3/3-way valve, normally closed

Nominal width	
13	1.3 mm
16	1.6 mm

Pressure range	
D5	0 … 0.5 bar
D7	0 … 1 bar
D19	0 … 1.7 bar

Pneumatic connection	
F	Flange/sub-base

Operating voltage	
22	250 V DC
28	310 V DC

Electrical connection	
T1	Pin

Packaging unit quantity	
	Standard (1 unit)
P30	30 (30 units)

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Technical data

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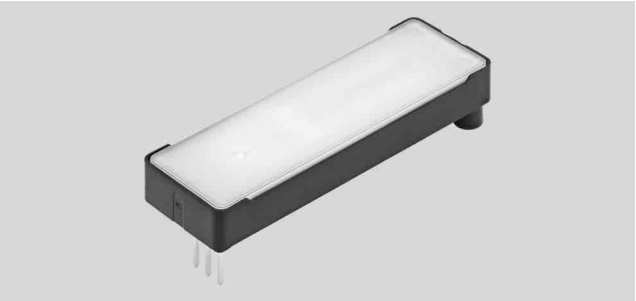
Flow rate
19 … 30 l/min

Voltage
0 … 250 V DC
0 … 310 V DC

Operating pressure
0 … 1.7 bar



General technical data					
		VEMP-BS-3-13-D7-…	VEMP-BS-3-13-D19-…	VEMP-BS-3-16-D5-…	VEMP-BS-3-16-D7-…
Valve function		3/3-way valve, monostable	3/3-way valve, monostable, 2/2-way valve, monostable	3/3-way valve, monostable	3/3-way valve, monostable
Normal position		Closed			
Standard nominal flow rate 1➔2	[l/min]	19	28	18	27
Standard nominal flow rate 2➔3	[l/min]	20	29	19	28
Dimensions W x L x H	[mm]	17.2 x 52.1 x 7.2			
Nominal width	[mm]	1.3	1.3	1.6	1.6
Grid dimension	[mm]	17.2			
Pneumatic connection 1, 2, 3		Flange			
Actuation type		Electrical			
Type of mounting		On manifold rail/sub-base			
Mounting position		Any			
Flow direction		1 ➔2 and 2 ➔3			
Product weight	[g]	8			
Special characteristics		Oxygen-compatible to DIN EN 1797			

Electrical data					
		VEMP-BS-3-13-D7-…	VEMP-BS-3-13-D19-…	VEMP-BS-3-16-D5-…	VEMP-BS-3-16-D7-…
Nominal operating voltage	[V DC]	250	310	310	310
Operating voltage range	[V DC]	0 … 250	0 … 310	0 … 310	0 … 310
Max. electrical power consumption	[mW]	1			
Max. current consumption	[mA]	5			
Max. switching frequency	[Hz]	5			
Degree of protection		Depending on manifold block			

Piezo valves VEMP

Technical data

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Operating and environmental conditions					
		VEMP-BS-3-13-D7-...	VEMP-BS-3-13-D19-...	VEMP-BS-3-16-D5-...	VEMP-BS-3-16-D7-...
Operating pressure	[bar]	0 ... 1.1	0 ... 1.7	0 ... 0.7	0 ... 1.1
Nominal operating pressure	[bar]	1	1.7	0.5	1
Operating medium		• Compressed air to ISO 8573-1:2010 [6:3:4] • Inert gases • Air • Oxygen • Nitrogen			
Note on the operating/pilot medium		Lubricated operation not possible			
Air quality	[µm]	≤ 5			
Ambient temperature	[°C]	–20 ... 70			
		0 ... 50 in operation as 2/2-way valve			
Temperature of medium	[°C]	–20 ... 60			
		0 ... 50 in operation as 2/2-way valve			
Corrosion resistance class CRC		2[1]			

1) Corrosion resistance class CRC 2 to Festo standard FN 940070
Moderate corrosion stress. Indoor applications in which condensation may occur. External visible parts with primarily decorative requirements for the surface and which are in direct contact with the ambient atmosphere typical for industrial applications.

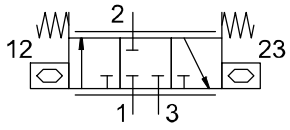
Safety data	
CE marking (see declaration of conformity)	To EU Low Voltage Directive[1]
Shock resistance	Shock test with severity level 2, to EN 60068-2-27
Vibration resistance	Transport application test with severity level 2, to EN 60068-2-6

1) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: www.festo.com/sp ➔ User documentation.
If the component is subject to restrictions on usage in residential, office or commercial environments or small businesses, further measures to reduce the emitted interference may be necessary.

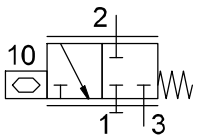
Materials	
Seals	EPDM
Housing	PA reinforced
Cover	PA reinforced
Note on materials	RoHS compliant

Version

Circuit symbol



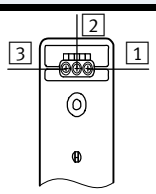
- 3/3-way valve, normally closed



- 2/2-way valve, normally closed

Note on risk assessment when used in medical equipment

The product has no redundancy and no error detection. Malfunctions must be detected by measures in the customer product if required.

Pin allocation		
	Pin	Function
	1	GND
	2	Pressurizing
	3	Exhausting

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Technical data

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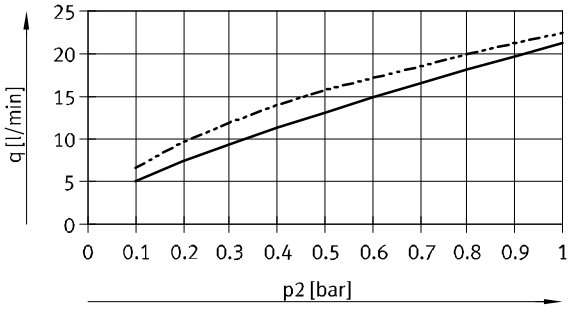
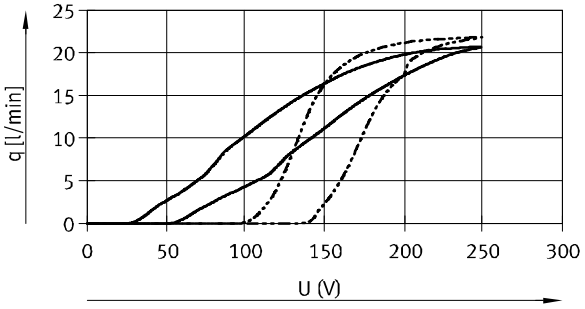
VEMP-BS-3-13-D7-F-22T1, 1.3 mm nominal width

Flow plotted against operating pressure at 250 V



Flow 1 --> 2
Flow 2 --> 3

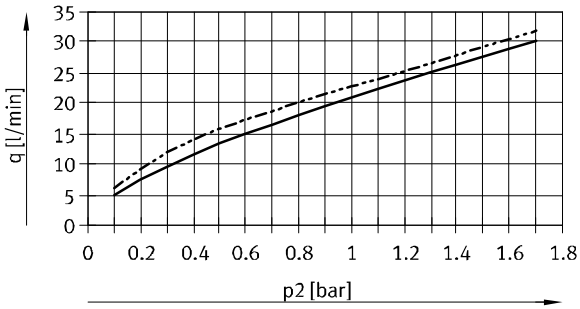
Flow plotted against voltage at room temperature, operating pressure 1 bar



Flow 1 --> 2
Flow 2 --> 3

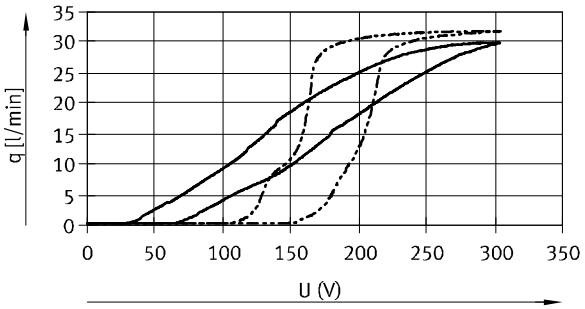
VEMP-BS-3-13-D19-F-28T1, 1.3 mm nominal width

Flow plotted against operating pressure at 310 V



Flow 1 --> 2
Flow 2 --> 3

Flow plotted against voltage at room temperature, operating pressure 1.7 bar



Flow 1 --> 2
Flow 2 --> 3

Piezo valves VEMP

Technical data

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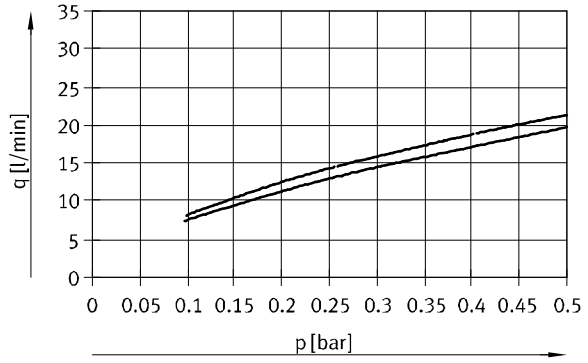
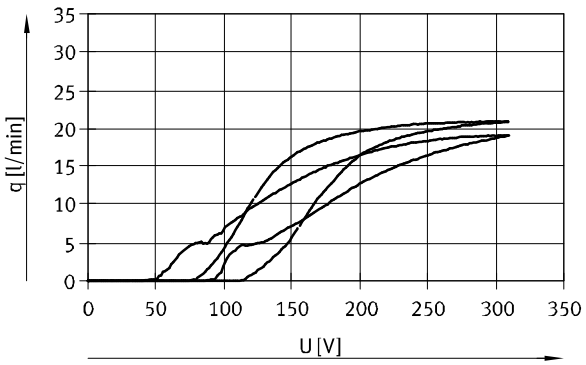
VEMP-BS-3-16-D5-F-28T1, 1.6 mm nominal width

Flow plotted against operating pressure at 310 V



Flow 1 --> 2
Flow 2 --> 3

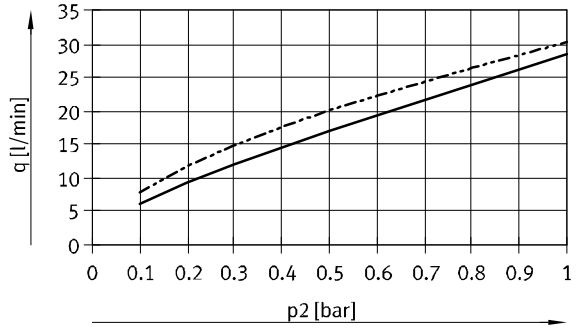
Flow plotted against voltage at room temperature, operating pressure 0.5 bar



Flow 1 --> 2
Flow 2 --> 3

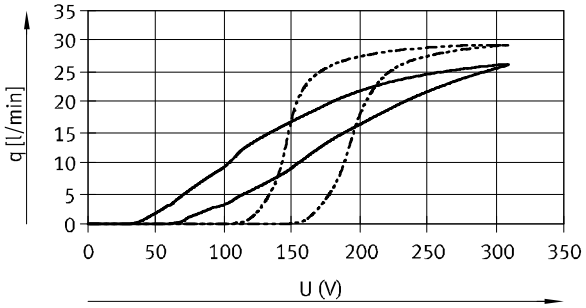
VEMP-BS-3-16-D7-F-28T1, 1.6 mm nominal width

Flow plotted against operating pressure at 310 V



Flow 1 --> 2
Flow 2 --> 3

Flow plotted against voltage at room temperature, operating pressure 1 bar

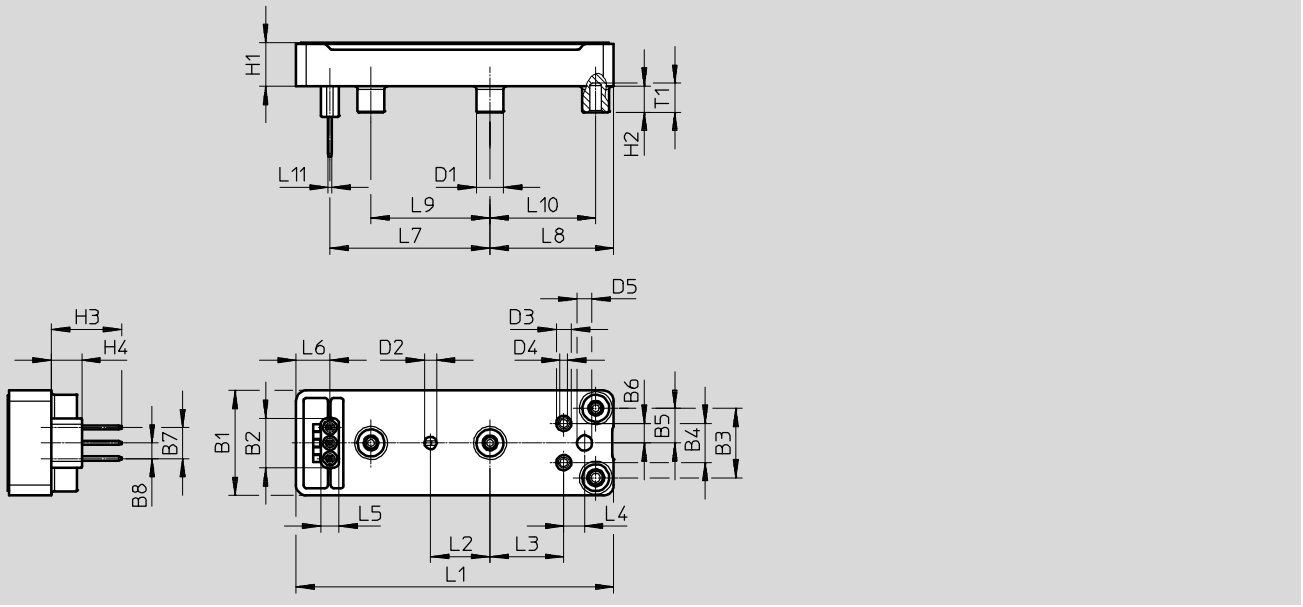


Flow 1 --> 2
Flow 2 --> 3

Piezo valves VEMP

Technical data

Dimensions Download CAD data ➔ **www.festo.com**



Type	B1	B2	B3	B4	B5	B6	B7	B8	D1 ∅	D2 ∅	D3 ∅	D4 ∅	D5 ∅
VEMP	17.2	8.1	11.4	6.4	5.7	3.2	5.1	2.5	4.4	2	2.5	1.3/1.6	2.5

Type	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	T1
VEMP	7.2	4.3	11.6	5	52.1	9.8	12.1	3.4	3	5.6	26.3	20.3	19.5	17.4	0.6	4.8

Piezo valves VEMP

Technical data

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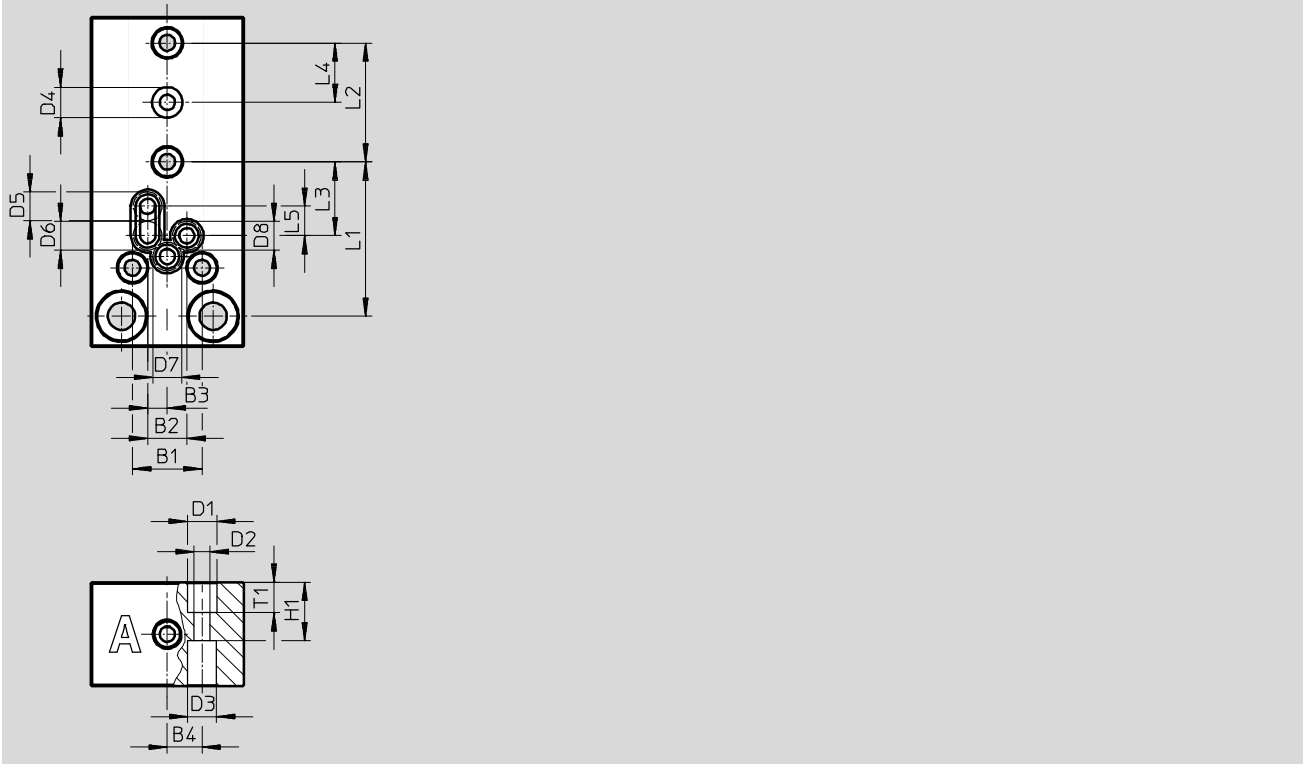
Dimensions Download CAD data ➔ **www.festo.com**

Example of manifold rail, seal



B1	B2	B3	B4	D1 ∅	D2 ∅	D3 ∅	D4 ∅	D5 ∅	D6 ∅	D7 ∅	D8 ∅	H1	L1	L2	L3	L4	L5	T1
11.4	6.4	3.2	5.7	4.8	2.6	4.7	5	4.7	4.7	4.7	4.7	9.6	25.3	19.5	12.1	9.8	4.8	5

Piezo valves VEMP

Accessories

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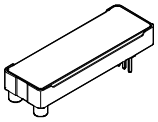
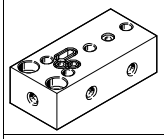
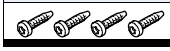
Ordering data					
	Description	Nominal size [mm]	Operating pressure [bar]	Part No.	Type
Sub-base valve					
	3/3-way valve, monostable, normally closed	1.3	0 ... 1.1	**8064292**	**VEMP-BS-3-13-D7-F-22T1**
				8064293	**VEMP-BS-3-13-D7-F-22T1-P30**
			0 ... 1.7	**8065734**	**VEMP-BS-3-13-D19-F-28T1**
				8065735	**VEMP-BS-3-13-D19-F-28T1-P30**
		1.6	0 ... 0.7	**8065738**	**VEMP-BS-3-16-D5-F-28T1**
				8065739	**VEMP-BS-3-16-D5-F-28T1-P30**
			0 ... 1.1	**8064294**	**VEMP-BS-3-16-D7-F-28T1**
				8064295	**VEMP-BS-3-16-D7-F-28T1-P30**
Manifold rail					
	For 3/3-way valve, with 4 pneumatic connections M5 (pressure supply port, exhaust, working port, sensor connection). The sensor connection is connected with the working port.			**8068637**	**VABS-P12-S-M5-P3**
Seal set					
	For 30 valves, comprising seal (30 units) and O-ring for sensor connection (30 units)			**8065525**	**VABD-P12-S-P30**
Screw set					
	120 screws for 30 valves (4 screws per valve VEMP)			**8065526**	**VAME-P12-MK**

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1 Festo Inc.

5300 Explorer Drive
Mississauga, ON L4W 5G4
Canada

Festo Customer Interaction Center
Tel: 1 877 463 3786
Fax: 1 877 393 3786
Email: customer.service.ca@festo.com

2 Festo Pneumatic

Av. Ceylán 3,
Col. Tequesquináhuac
54020 Tlalnepantla,
Estado de México

Multinational Contact Center
01 800 337 8669

ventas.mexico@festo.com

3 Festo Corporation

1377 Motor Parkway
Suite 310
Islandia, NY 11749

Festo Customer Interaction Center
1 800 993 3786
1 800 963 3786
customer.service.us@festo.com

4 Regional Service Center

7777 Columbia Road
Mason, OH 45040

Connect with us

www.festo.com/socialmedia

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Subject to change