

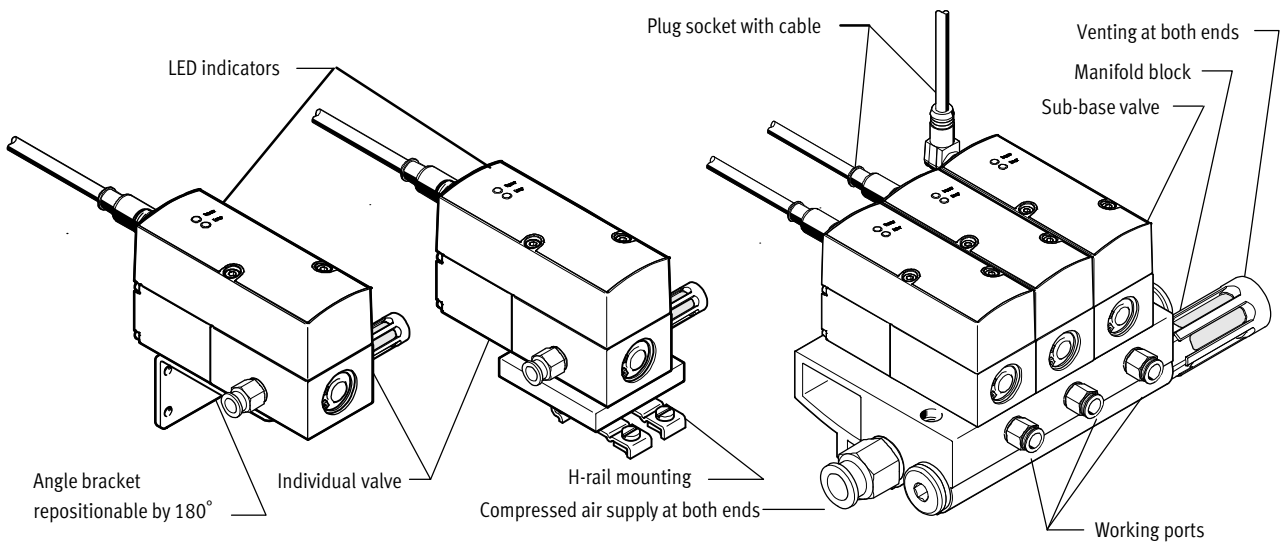
# Proportional pressure regulators VPPX



# Proportional pressure regulators VPPX

Features

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## Innovative

- Multi-sensor control (cascade control)
- Control characteristic adjustable via FCT
- Temperature compensated
- High dynamic response
- High repetition accuracy

## Versatile

- Individual valves (in-line valve)
- Sub-base valves (manifold/flanged valve)
- Actual value input for external sensors
- Limit value freely adjustable
- Possible to control many physical variables
- Setpoint value and actual value individually adjustable via FCT

## Reliable

- Integrated pressure sensor with separate output
- Wire break monitoring
- Pressure is maintained if the controller fails

## Easy to mount

- Manifold block (connection block)
- H-rail mounting
- Individually via mounting bracket
- QS fittings

# Proportional pressure regulators VPPX

Key features

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## Overview of VPPX

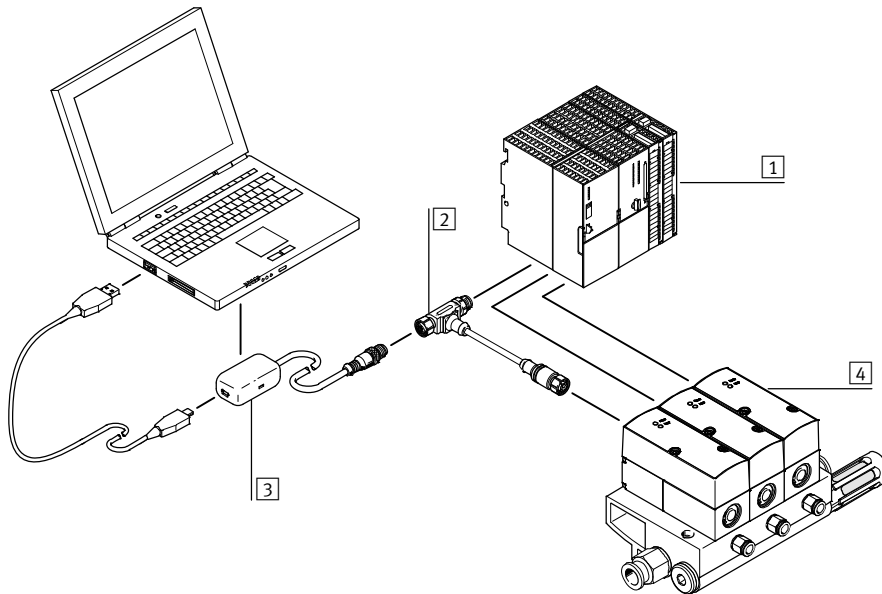
### Parameterisation

Parameterisation of the proportional valve VPPX can be carried out using the Festo Configuration Tool.

The Festo Configuration Tool can be downloaded from the Support Portal.  
→ [www.festo.com](http://www.festo.com)

The connection between the PC and the proportional valve VPPX takes place via a programming cable (VAVE) and the adapter (NEFC-M12G5-0.3-U1G5).

A standard USB connecting cable is used to connect the adapter to the PC.

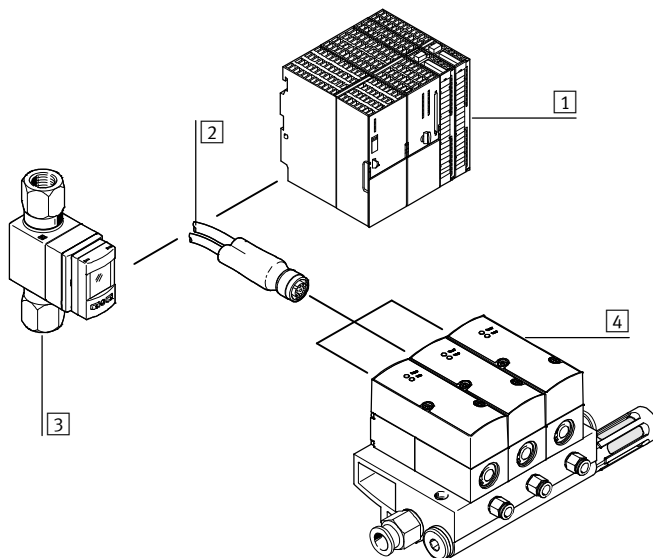


- 1 PLC
- 2 Programming cable VAVE
- 3 Adapter NEFC
- 4 Valve manifold VPPX

### Sensor connection

The DUO cable makes it possible to easily connect an external sensor to the VPPX.

To ensure a secure connection, the sensor and valve signals are pre-assigned.

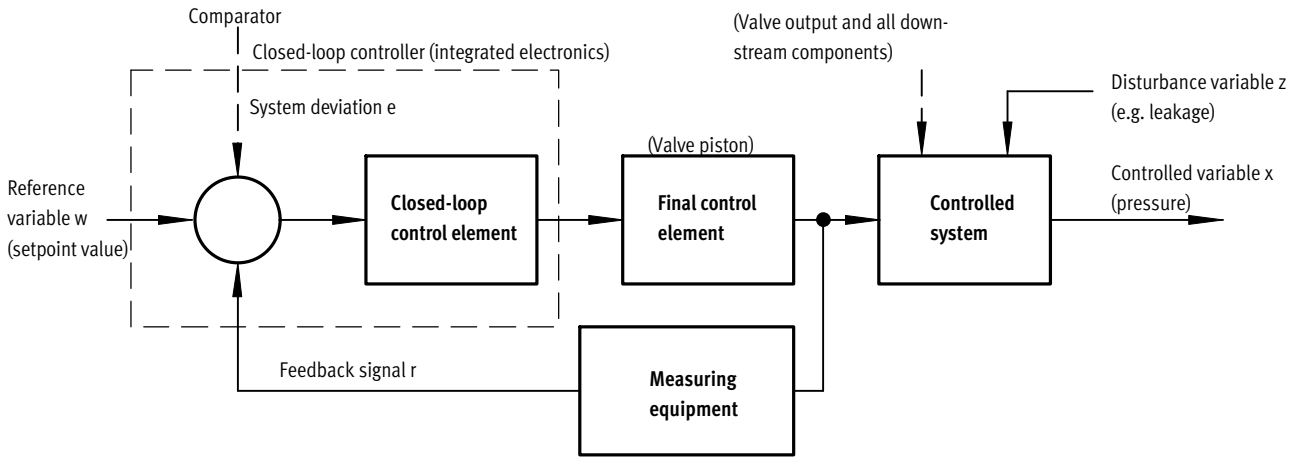


- 1 PLC
- 2 DUO cable NEDU
- 3 Sensor SFAB
- 4 Valve manifold VPPX

# Proportional pressure regulators VPPX

Key features

## Layout of a control circuit



### Configuration

The figure shows a closed-loop control circuit. The reference variable  $w$  (setpoint value, e.g. 5 volts or 8 mA) initially acts on a comparator. The measuring equipment sends the controlled variable  $x$  value (actual value, e.g. 3 bar) to the comparator as a feedback signal  $r$ . The closed-loop control element detects the system

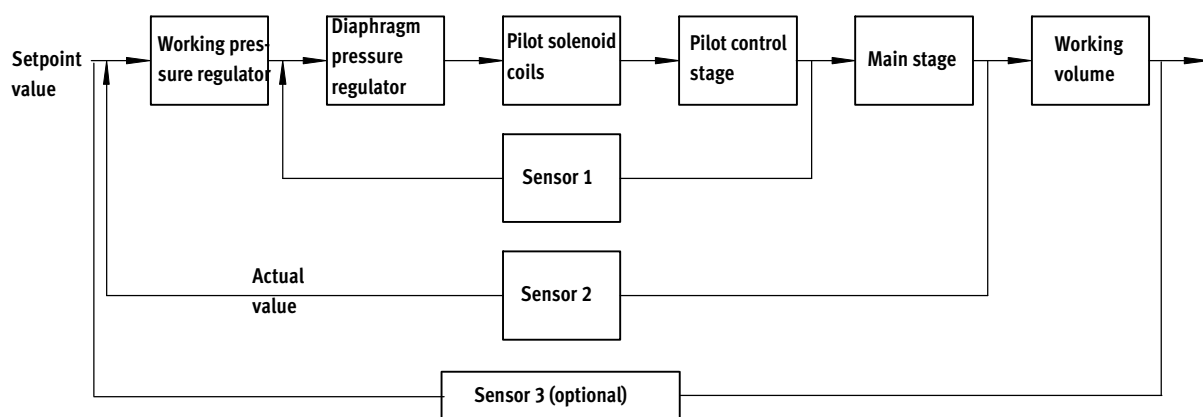
deviation  $e$  and actuates the final control element. The output of the final control element acts on the controlled system. The closed-loop control element thus attempts to compensate for the difference between the reference variable  $w$  and the controlled variable  $x$  by using the final control element.

### Method of operation

This process runs continuously so changes in the reference variable are always detected. However, a system deviation will also occur if the reference variable is constant but the controlled variable changes. This happens when the flow through the valve changes in response to a switching operation, a cylinder movement or a

change in load. The disturbance variable  $z$  will also cause a system deviation. An example of this is when the pressure drops in the air supply. The disturbance variable  $z$  acts on the controlled variable  $x$  unintentionally. In all cases, the regulator attempts to readjust the controlled variable  $x$  to the reference variable  $w$ .

## Multi-sensor control (cascade control) of the VPPX



### Cascade control

Unlike conventional direct-acting regulators, with multi-sensor control several control circuits are nested inside each other. The overall controlled

system is divided into smaller subsections that are easier to control for the specific task.

### Control precision

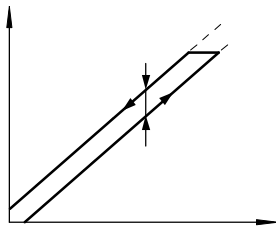
Multi-sensor control significantly improves control precision and dynamic response in comparison with single-acting regulators.

# Proportional pressure regulators VPPX

Key features

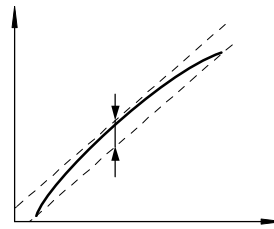
## Terms related to the proportional pressure regulator

### Hysteresis



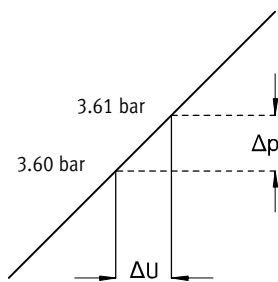
There is always a linear relationship within a certain tolerance between the setpoint value entered and the pressure output. Nevertheless, it makes a difference whether the setpoint value is entered as rising or falling. The difference between the maximum deviations is referred to as hysteresis.

### Linearity error



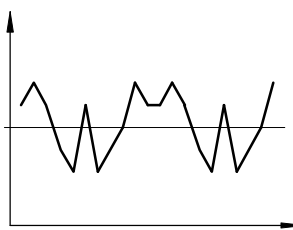
A perfectly linear progression of the control characteristic of the output pressure is theoretical. The maximum percentage deviation from this theoretical control characteristic is referred to as the linearity error. The percentage value refers to the maximum output pressure (full scale).

### Response sensitivity



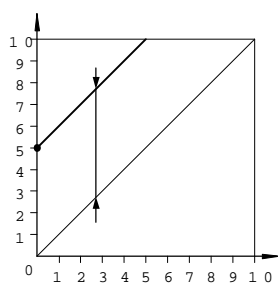
The response sensitivity of the device determines how sensitively one can change, i.e. adjust, a pressure. The smallest setpoint value difference that results in a change in the output pressure is referred to as the response sensitivity. In this case, 0.01 bar.

### Repetition accuracy (reproducibility)



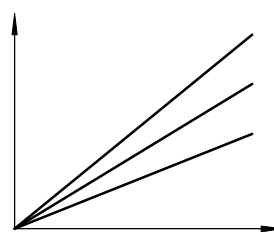
The repetition accuracy is the margin within which the fluid output variables are scattered when the same electrical input signal coming from the same direction is repeatedly adjusted. The repetition accuracy is expressed as a percentage of the maximum fluid output signal.

### Zero offset



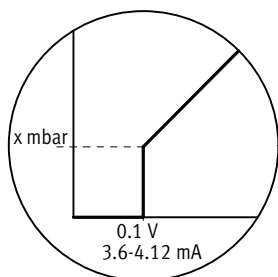
If, for example, a VPPX cannot be vented for safety reasons, the minimum pressure can be increased from the zero point. The smallest setpoint value is then assigned an output pressure of 5 bar, for example, and the largest setpoint value an output pressure of 10 bar. Zero point suppression is automatically switched off if the zero offset is used.

### Pressure range adaptation



In the delivery status, 100% setpoint value corresponds to 100% of the fluid output signal. Pressure range adaptation or adjustment enables the fluid output variable to be matched to the setpoint value.

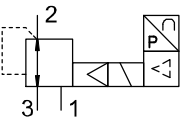
### Zero point suppression



In practice there may be residual voltage or residual current at the setpoint input of the VPPX via the setpoint generator. Zero point suppression is used so that the valve is reliably vented at a setpoint value of zero.

# Proportional pressure regulators VPPX

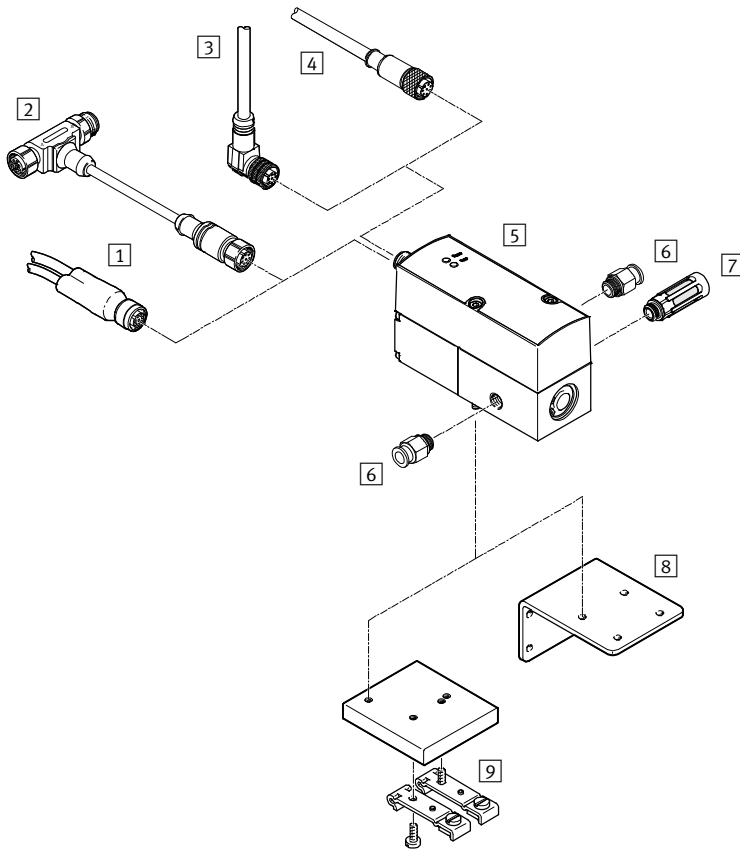
Product range overview

Function	Circuit symbol	Description	Pneumatic connection 1, 2, 3	Nominal width for pressurisation/exhaust [mm]	→ Page/Internet
Pressure regulators	<b>LED operator unit (standard)</b>				
		<ul style="list-style-type: none"> <li>• Piloted diaphragm valve</li> <li>• Pressure regulation range: 0.1 ... 10 bar</li> <li>• Setpoint value input: 0 ... 10 V DC, 0 ... 20 mA, 4 ... 20 mA</li> </ul>	G1/8	6/4.5	11
			Sub-Base	6/4.5	
				8/7	
			G1/4	8/7	
G1/2	12/12				

# Proportional pressure regulators VPPX

Peripherals overview

## Individual valve VPPX-6L ..., VPPX-8L ...



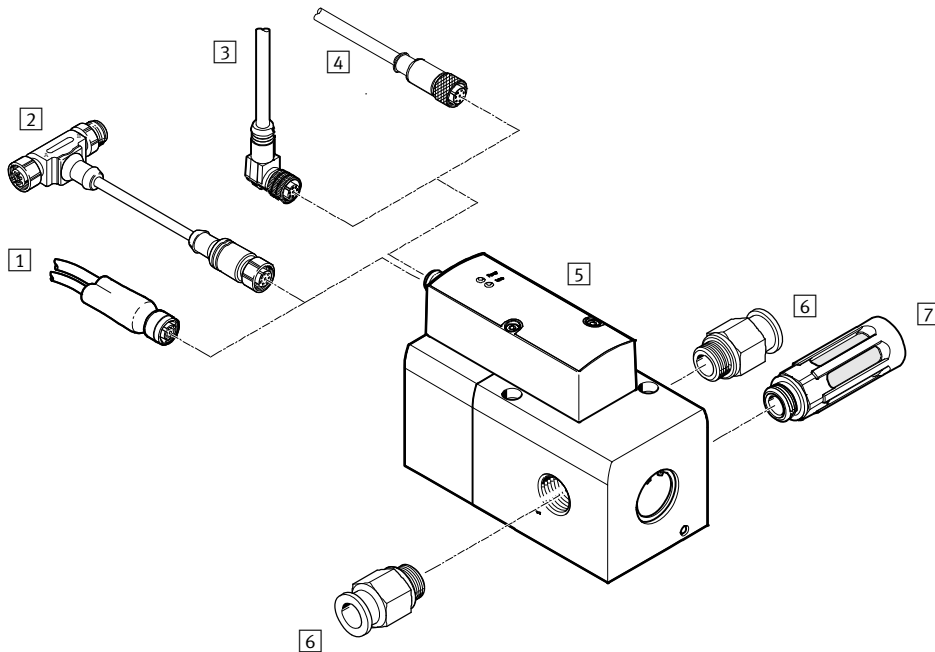
Accessories		
	Description	→ Page/Internet
1	DUO cable	For connecting one sensor with the VPPX
2	Programming cable VAVE	For adapter NEFC
3	Angled plug socket with cable NEBU-M12W8-...	–
4	Straight plug socket with cable SIM-M12-8GD-...	–
5	Proportional pressure regulator VPPX	Operator unit with LED
6	Push-in fitting QS	For connecting compressed air tubing with standard outside diameter
7	Silencers	For fitting in exhaust ports
8	Angle bracket VAME-P1-A	For mounting the valve
9	H-rail mounting VAME-P1-T	For mounting on an H-rail

# Proportional pressure regulators VPPX

Peripherals overview

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## Individual valve VPPX-12L ...



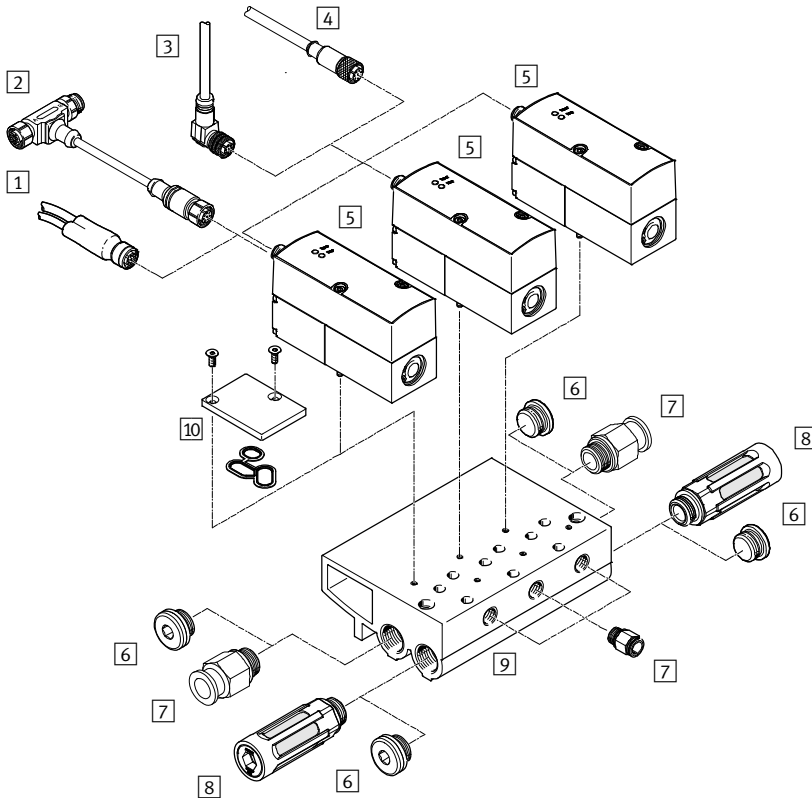
Accessories		
	Description	→ Page/Internet
1	DUO cable	For connecting one sensor with the VPPX
2	Programming cable VAVE	For adapter NEFC
3	Angled plug socket with cable NEBU-M12W8-...	-
4	Straight plug socket with cable SIM-M12-8GD-...	-
5	Proportional pressure regulator VPPX	Operator unit with LED
6	Push-in fitting QS	For connecting compressed air tubing with standard outside diameter
7	Silencers	For fitting in exhaust ports



# Proportional pressure regulators VPPX

Peripherals overview

## Manifold assembly with VPPX-6F ..., VPPX-8F ...



Accessories		Description	→ Page/Internet
1	DUO cable	For connecting one sensor with the VPPX	22
2	Programming cable VAVE	For adapter NEFC	21
3	Angled plug socket with cable NEBU-M12W8-...	–	21
4	Straight plug socket with cable SIM-M12-8GD-...	–	21
5	Proportional pressure regulator VPPX	Operator unit with LED	11
6	Blanking plug B	–	b
7	Push-in fitting QS	For connecting compressed air tubing with standard outside diameter	qs
8	Silencers	For fitting in exhaust ports	u
9	Manifold block VABM	–	17
10	Blanking plate VABB-P1	For vacant position; seal and countersunk screws included in the scope of delivery	18

# Proportional pressure regulators VPPX

Type codes

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VPPX - 6 - L - L - 1 - G18 - 0L 10H - S1

Type	
VPPX	Proportional pressure regulator Modular

Nominal width	
6	6 mm
8	8 mm
12	12 mm

Design	
L	In-line valve
F	Flanged valve

Dynamic response class	
L	Low

Valve function	
1	3/2-way valve, normally closed

Pneumatic connection	
G18	G1/8 thread
G14	G1/4 thread
G12	G1/2 thread
F	Flange/sub-base




Lower pressure value of control range	
0L	0 bar

Upper pressure value of control range	
10H	10 bar

Overall accuracy	
S1	1%

# Proportional pressure regulators VPPX

Technical data


-  - Flow rate  
1,400 ... 7,000 l/min
-  - Voltage  
21.6 ... 26.4 V DC
-  - Pressure regulation range  
0.02 ... 10 bar

- Variants
- Analogue setpoint signal adjustable via FCT 0 ... 10 V, 0 ... 20 mA, 4 ... 20 mA
  - External sensor input
  - Actual value output adjustable via FCT 0 ... 10 V, 0 ... 20 mA, 4 ... 20 mA
  - Programming interface



General technical data							
Port		G1/8	G1/4	G1/2	Sub-base		
Valve function		3-way proportional pressure regulator					
Design		Piloted diaphragm regulator					
Sealing principle		Soft					
Actuation type		Electric					
Type of control		Piloted					
Reset method		Mechanical spring					
Type of mounting		Via through-hole, via accessories					
Mounting position		Any					
Nominal width	Pressurisation	[mm]	6	8	12	6	8
	Exhaust	[mm]	4.5	7	12	4.5	7
Standard nominal flow rate		[l/min]	→ Graphs				
Product weight		[g]	400	560	2050	400	560

Electrical data							
Type		VPPX-6	VPPX-8	VPPX-12			
Electrical connection		Plug, round design, 8-pin, M12					
Operating voltage range		[V DC]	24 ± 10% = 21.6 ... 26.4				
Residual ripple		[%]	10				
Duty cycle		[%]	100				
Max. electrical power consumption		[W]	7	7	12		
Setpoint input signal	Voltage	[V DC]	0 ... 10				
	Current	[mA]	0 ... 20, 4 ... 20				
Protection against short circuit		For all electrical connections					
Protection against polarity reversal		For all electrical connections					
Protection class		IP65					

-  - Note  
Output pressure remains unregulated if the power supply cable is interrupted.

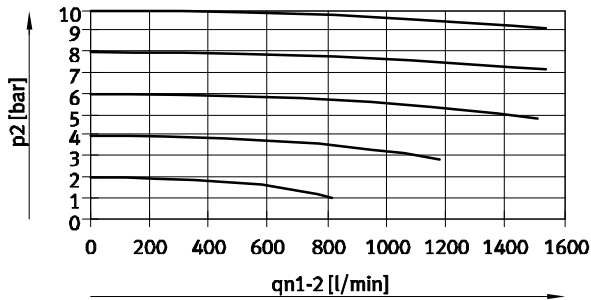
# Proportional pressure regulators VPPX

Technical data

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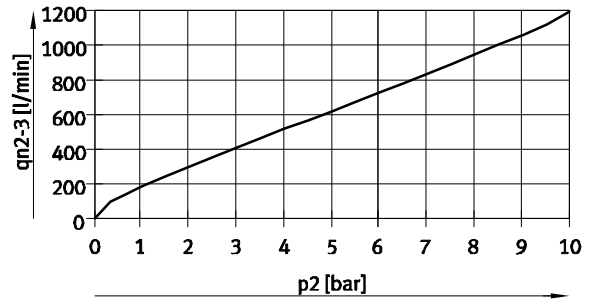
Flow rate  $q_n$  from 1  $\rightarrow$  2 as a function of output pressure  $p_2$

VPPX-6L/F-...-0L10H-... (10 bar)



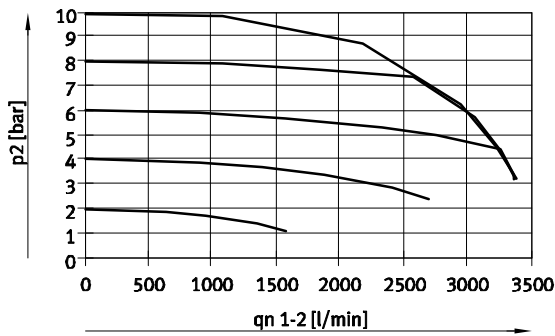
Flow rate  $q_n$  from 2  $\rightarrow$  3 as a function of output pressure  $p_2$

VPPX-6L/F-...-0L10H-... (10 bar)



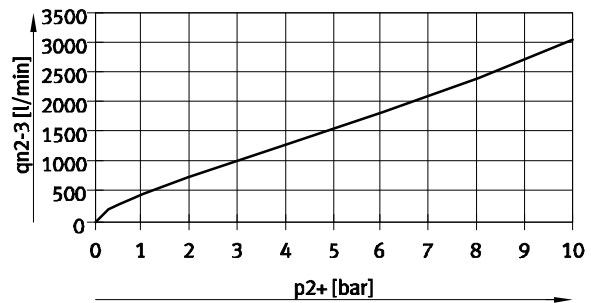
Flow rate  $q_n$  from 1  $\rightarrow$  2 as a function of output pressure  $p_2$

VPPX-8L-...-0L10H-... (10 bar)



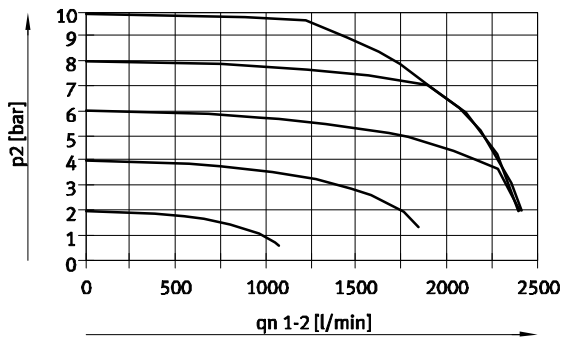
Flow rate  $q_n$  from 2  $\rightarrow$  3 as a function of output pressure  $p_2$

VPPX-8L-...-0L10H-... (10 bar)



Flow rate  $q_n$  from 1  $\rightarrow$  2 as a function of output pressure  $p_2$

VPPX-8F-...-0L10H-... (10 bar)



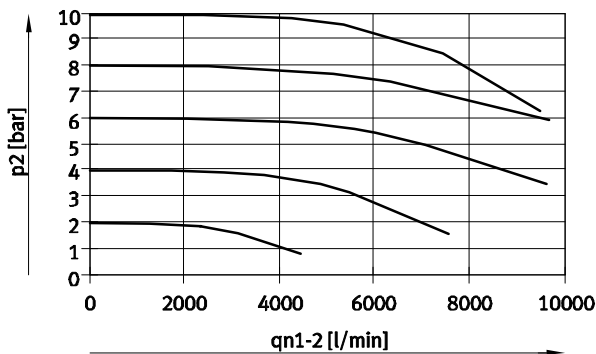
Flow rate  $q_n$  from 2  $\rightarrow$  3 as a function of output pressure  $p_2$

VPPX-8F-...-0L10H-... (10 bar)



Flow rate  $q_n$  from 1  $\rightarrow$  2 as a function of output pressure  $p_2$

VPPX-12L-...-0L10H-... (10 bar)



Flow rate  $q_n$  from 2  $\rightarrow$  3 as a function of output pressure  $p_2$

VPPX-12L-...-0L10H-... (10 bar)



# Proportional pressure regulators VPPX

Technical data

Operating and environmental conditions		
Pressure regulation range	[bar]	0.1 ... 10
Operating medium		Compressed air to ISO 8573-1:2010 [7:4:4] Inert gases
Note on operating/pilot medium		Lubricated operation not possible
Supply pressure 1 <sup>1)</sup>	[bar]	0 ... 11
Pressure regulation range	[bar]	0.1 ... 10
Max. pressure hysteresis	[mbar]	50
FS (full scale) linearity error	[%]	± 0.5
FS (full scale) repetition accuracy	[%]	0.5
Temperature coefficient	[%/K]	0.04
Ambient temperature, operator unit LED (standard)	[°C]	0 ... 60
Ambient temperature, operator unit with LCD	[°C]	0 ... 50
Temperature of medium	[°C]	10 ... 50
Note on materials		RoHS-compliant
Corrosion resistance class	[CRC]	2 <sup>2)</sup>
CE marking		To EU EMC Directive (see declaration of conformity) <sup>3)</sup>
Certification		RCM trademark c UL us - Listed (OL)

1) Supply pressure 1 should always be 1 bar greater than the maximum regulated output pressure.

2) Corrosion resistance class CRC 2 to Festo standard FN 940070

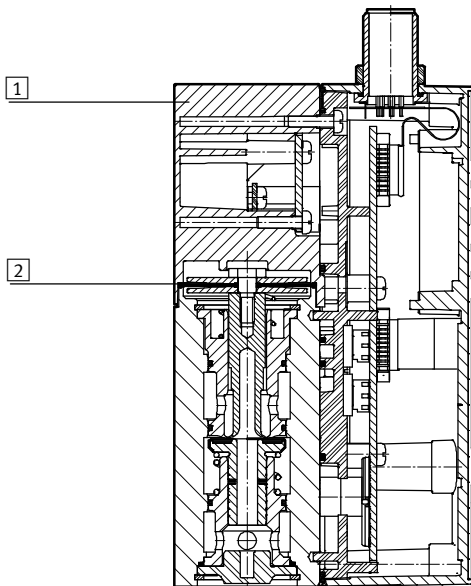
Moderate corrosion stress. Indoor applications in which condensation may occur. External visible parts with primarily decorative requirements for the surface and which are in direct contact with the ambient atmosphere typical for industrial applications.

3) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: [www.festo.com/sp](http://www.festo.com/sp) → Certificates.

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

Sectional view VPPX-6 ..., VPPX-8 ...



1	Housing	Wrought aluminium alloy
2	Diaphragm	NBR

# Proportional pressure regulators VPPX

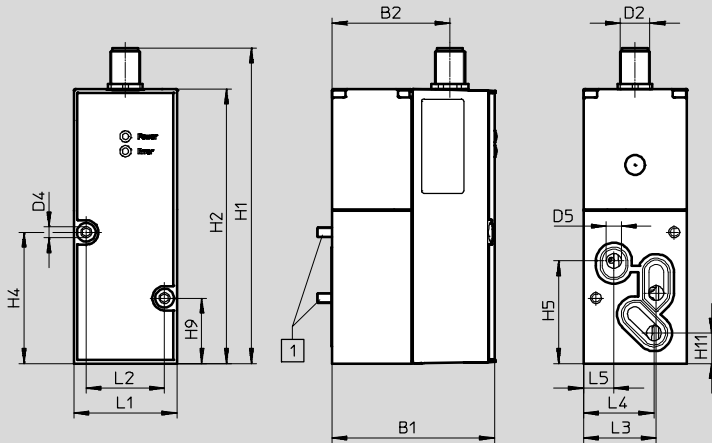
Technical data

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## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)

### VPPX-6F

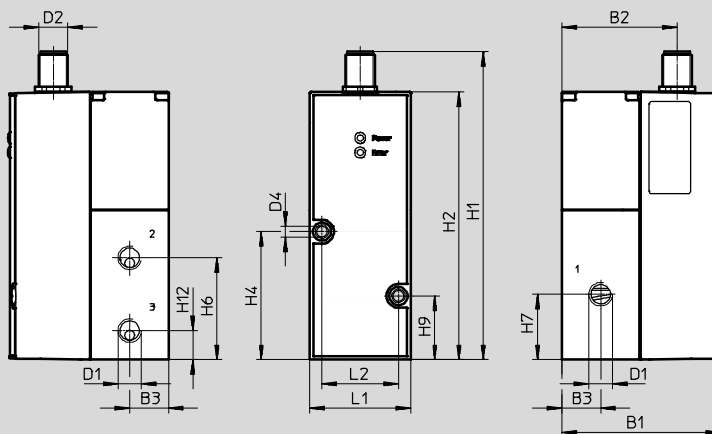


1 Socket head screw M4x65

Type	B1	B2	D2	D4 Ø	D5 Ø	H1	H2	H4	H5	H8	H9	H11
VPPX-6F	65.4	47.5	M12	4.4	6	126.9	110.4	52.8	41.3	28.3	26.3	12.2

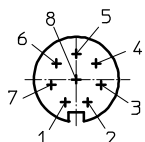
Type	L1	L2	L3	L4	L5
VPPX-6F	41.5	31.5	29.3	28.4	12.3

### VPPX-6L



Type	B1	B2	B3	D1	D2	D4 Ø	H1	H2	H4	H6	H7	H9	H12	L1	L2
VPPX-6L	65.5	47.5	16	G1/8	M12	4.4	126.9	110.4	52.8	42	27	26.3	12	41.5	31.5

## M12 – Pin allocation



- |                          |                        |                                  |
|--------------------------|------------------------|----------------------------------|
| 1 Do not connect Tx_PC   | 4 Analogue input W+    | 7 0 V DC or GND                  |
| 2 24 V DC supply voltage | 5 Do not connect Rx_PC | 8 Input for ext. sensor signal + |
| 3 Analogue input W-      | 6 Analogue output X    |                                  |

# Proportional pressure regulators VPPX

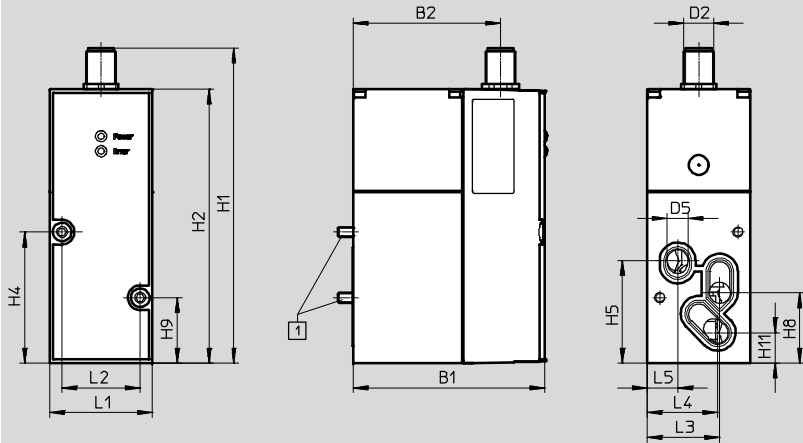
Technical data

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## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)

### VPPX-8F

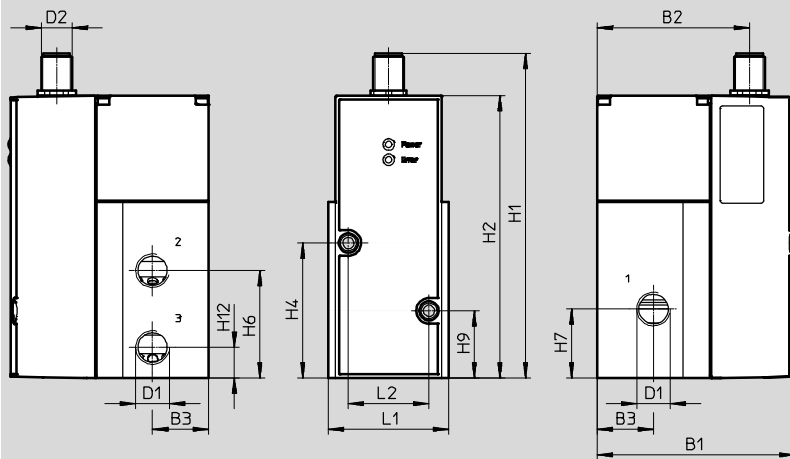


1 Socket head screw M4x77

Type	B1	B2	D2	D5 Ø	H1	H2	H4	H5	H8	H9	H11
VPPX-8F	77.4	59.5	M12	8.5	126.9	110.4	52.8	41.3	28.3	26.3	12.2

Type	L1	L2	L3	L4	L5
VPPX-8F	41.5	31.5	29.3	28.4	12.3

### VPPX-8L



Type	B1	B2	B3	D1	D2	H1	H2	H4	H6	H7	H9	H12	L1	L2
VPPX-8L	77.4	59.5	22	G1/4	M12	126.9	110.4	52.8	42	27	26.3	12	47	31.5

# Proportional pressure regulators VPPX

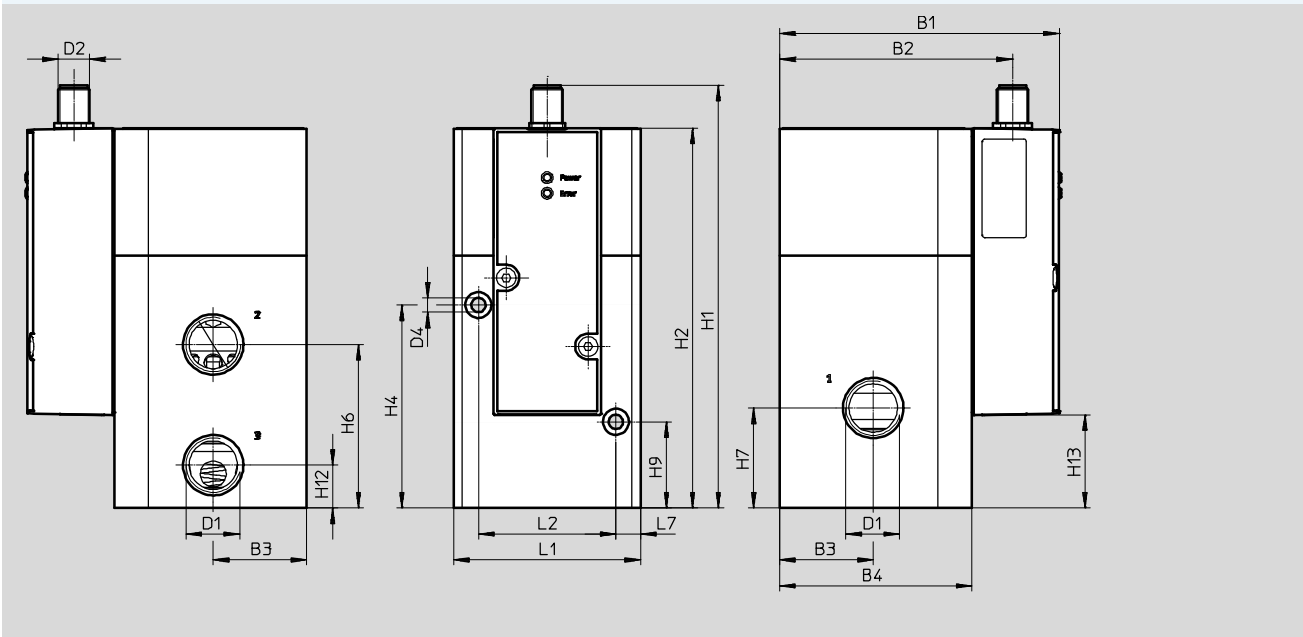
Technical data

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## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)

VPPX-12L



Type	B1	B2	B3	B4	D1	D2	H1	H2	H4	H6	H7	H9	H12	L1	L2	L7
VPPX-12L	107.3	89.4	36	74	G1/2	M12	162.8	146.3	78.2	63	38.5	33.2	16.5	72	53	9.5

## Ordering data

Proportional pressure regulators VPPX	Pneumatic connection 1, 2, 3	Part No.	Type
Voltage type 0 ... 10 V			
	G1/8	570967	VPPX-6L-L-1-G18-0L10H
	G1/4	570969	VPPX-8L-L-1-G14-0L10H
	G1/2	2448444	VPPX-12L-L-1-G12-0L10H-S1
	Sub-base	570968	VPPX-6F-L-1-F-0L10H
		570970	VPPX-8F-L-1-F-0L10H



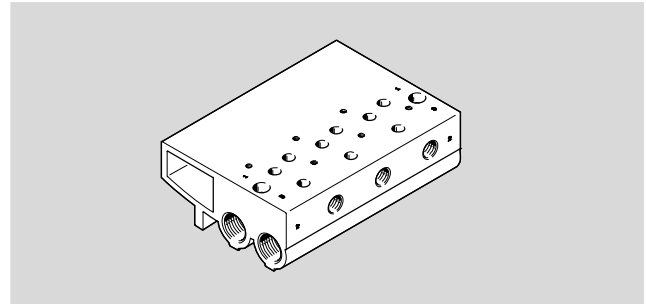
# Proportional pressure regulators VPPX

Accessories

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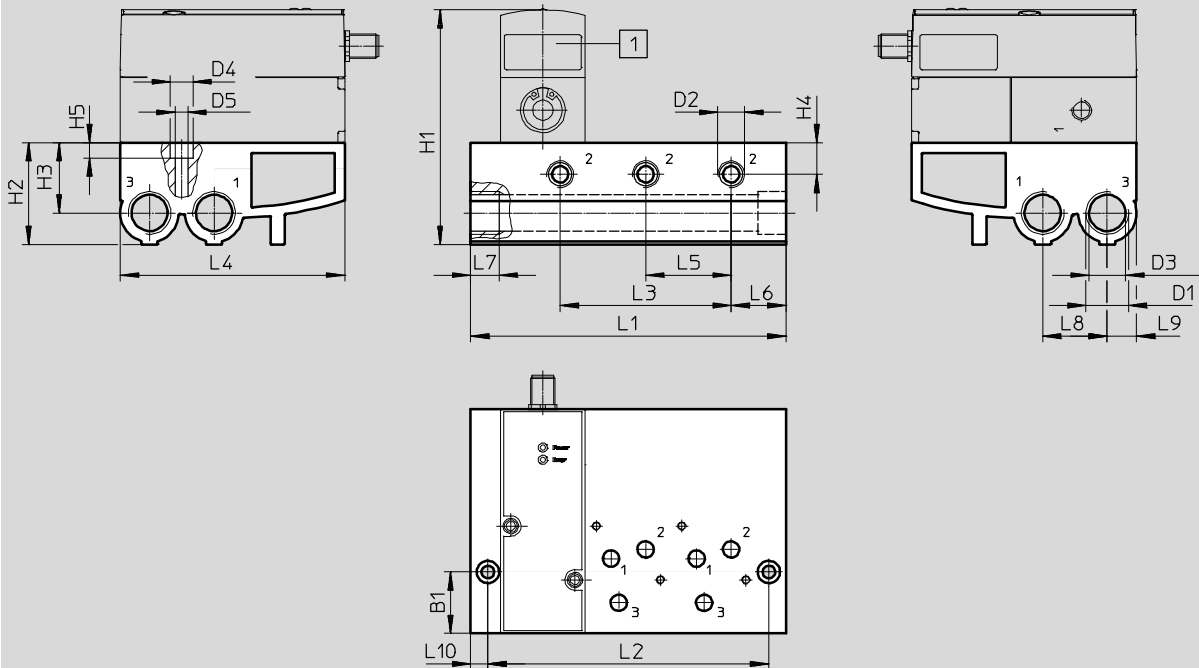
Manifold block  
VABM-P1

Material:  
Wrought aluminium alloy



## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)



1 Proportional pressure regulator  
VPPX

### Dimensions and ordering data

Valve positions	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
2	113	96	42	110.4	42	27	14	31.7	14.4	8.5
3	155	138	84	110.4	42	27	14	31.7	14.4	8.5
4	197	180	126	110.4	42	27	14	31.7	14.4	8.5

### Dimensions and ordering data

Valve positions	B1	D1	D2	D3	D4	D5	H1	H2	H3	H4	H5	Part No.	Type
2	30.2	G1/2	G1/4	17.8	11	6.2	116	50	34.5	15.5	7.5	542252	VABM-P1-SF-G14-2-P3
3	30.2	G1/2	G1/4	17.8	11	6.2	116	50	34.5	15.5	7.5	542253	VABM-P1-SF-G14-3-P3
4	30.2	G1/2	G1/4	17.8	11	6.2	116	50	34.5	15.5	7.5	542254	VABM-P1-SF-G14-4-P3

-  - Note

Only flanged valves VPPX-6F- ... and VPPX-8F- ... may be used in combination with the manifold block VABM-P1- ...

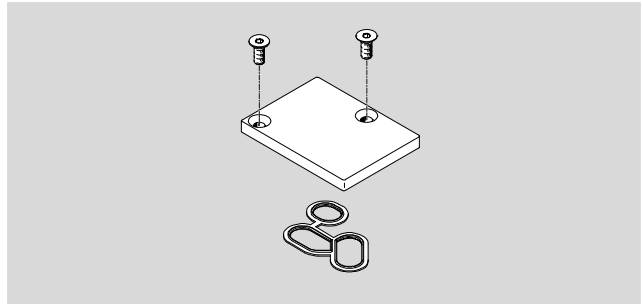
# Proportional pressure regulators VPPX

Accessories

FESTO

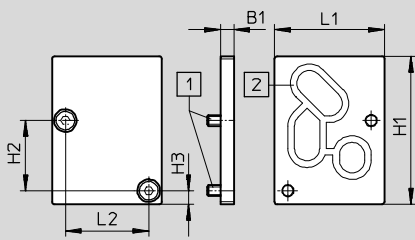
Blanking plate  
VABB-P1

- Material:
- Wrought aluminium alloy
  - NBR
  - Steel



## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)



- 1 Countersunk screw M4x10      2 Seal VMPA- ...

## Dimensions and ordering data

B1	H1	H2	H3	L1	L2	Part No.	Type
5	56	26.5	5.2	41.5	31.5	558350	VABB-P1

# Proportional pressure regulators VPPX

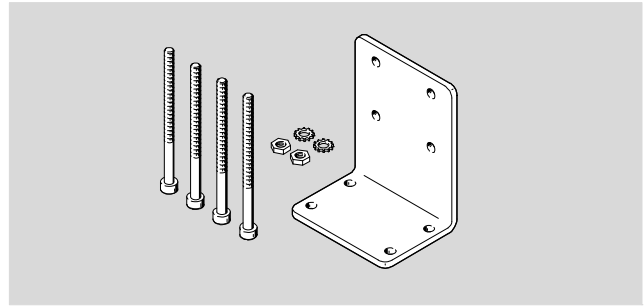
Accessories

FESTO

Angle bracket  
VAME-P1-A

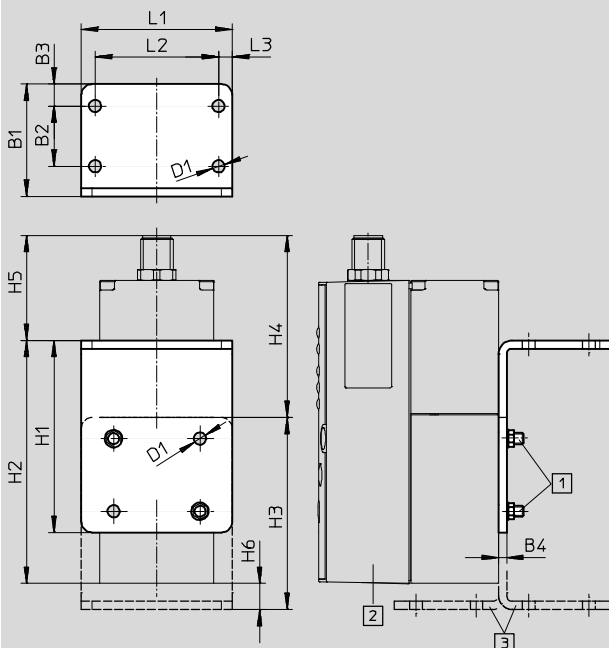
Material:

- Wrought aluminium alloy
- Steel



## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)



1 Socket head screw M4

2 Proportional pressure regulator VPPX

3 Bracket can be reversed if required

## Dimensions and ordering data

B1	B2	B3	B4	D1	H1	H2	H3	H4	H5	H6	L1	L2	L3	Part No.	Type
41	22	8	3	4.5	70	88.6	70	66.4	38.3	9.5	55	45	5	542251	VAME-P1-A

-  - Note

Only in-line valves VPPX-6L- ... and VPPX-8L- ... may be used in combination with the angle bracket VAME-P1-A.

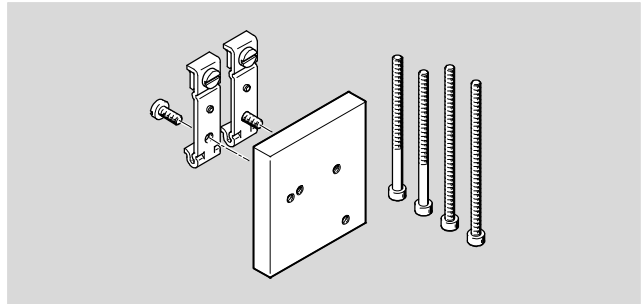
# Proportional pressure regulators VPPX

Accessories



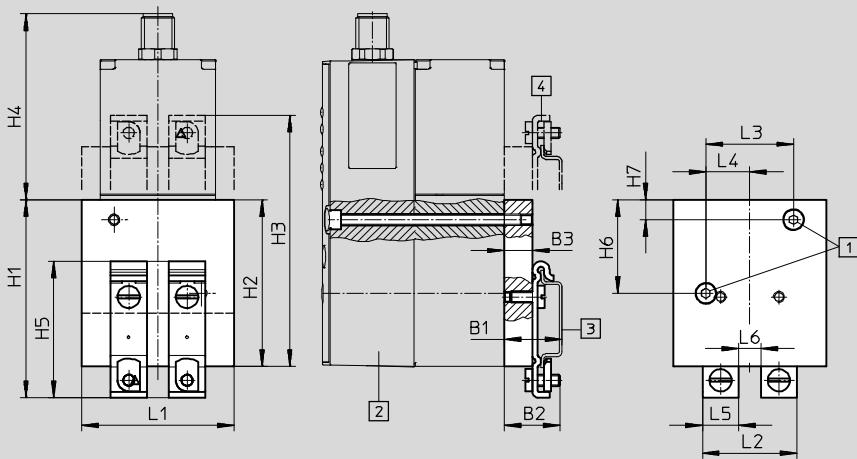
**H-rail mounting**  
**VAME-P1-T**

- Material:
- Wrought aluminium alloy
  - Steel



## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)



1 Socket head screw M4

2 Proportional pressure regulator VPPX

3 H-rail NRH

4 H-rail mounting can be rotated by 180° if required

## Dimensions and ordering data

B1	B2	B3	H1	H2	H3	H4	H5	H6	H7	L1	L2	L3	L4	L5	L6	Part No.	Type
20.7	20	10	71.2	60	90.3	66.9	49.1	33.7	7.2	55	34	31.5	15.8	13	8	542255	VAME-P1-T

- - Note

Only in-line valves VPPX-6L- ... and VPPX-8L- ... may be used in combination with the H-rail VAME-P1- T.

# Proportional pressure regulators VPPX

Accessories

FESTO

## Programming cable VAVE

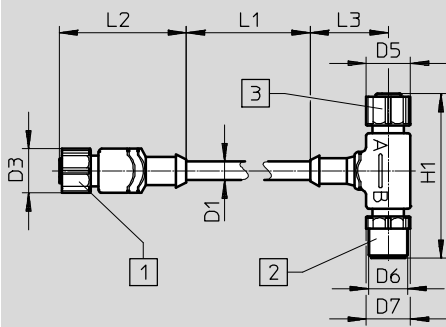
Material:

- Screw locking: Die-cast zinc, nickel plated
- Housing: TPE-U(PUR)
- Cable sheath: TPE-U(PUR)
- Seals: NBR
- Contacts: Gold-plated brass



## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)



1 M12x1 socket, 8-pin

2 M12x1 plug, 8-pin

3 M12x1 socket, 4-pin

## Dimensions and ordering data

D1	D3	D5	D6	D7	H1	L1	L2	L3	Part No.	Type
6.2	14.5	14.5	M12x1	14.5	54	150	41.7	11.1	570971	VAVE-P8-VPS

## Ordering data

Description		Part No.	Type
Connecting cable		Technical data → Internet: connecting cable	
	Straight socket, 8-pin, M12	2 m	525616 SIM-M12-8GD-2-PU
		5 m	525618 SIM-M12-8GD-5-PU
		10 m	570008 SIM-M12-8GD-10-PU
	Angled socket, 8-pin, M12	2 m	542256 NEBU-M12W8-K-2-N-LE8
		5 m	542257 NEBU-M12W8-K-5-N-LE8
		10 m	570007 NEBU-M12W8-K-10-N-LE8
Setpoint module		Technical data → Internet: mpz	
	Setpoint module for generating 6 + 1 analogue voltage signals	546224	MPZ-1-24DC-SGH-6-SW5
Adapter		Technical data → Internet: nefc	
	For connecting the interface on the VPPX valves/VPPX manifold to the PC. A standard USB cable with mini USB connector is also required	547432	NEFC-M12G5-0.3-U1G5

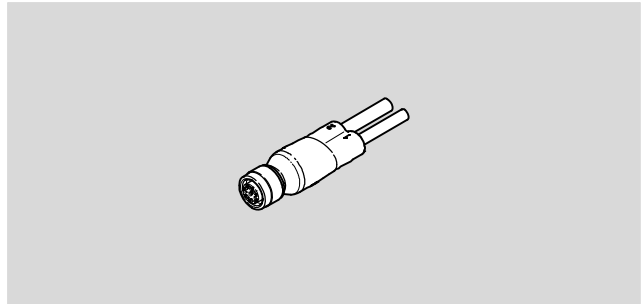
# Proportional pressure regulators VPPX

Accessories

FESTO

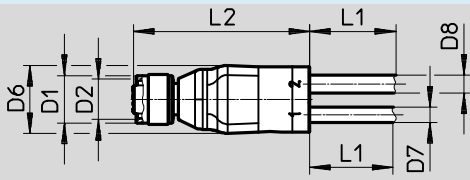
**DUO cable**  
**NEDU-L1R2-V9-M12G8-E**

- Material:
- Screw locking: Nickel plated brass
  - Seals: FPM
  - Housing: TPE-U(PU)
  - Cable sheath: TPE-U(PUR)
  - Insulating sheath: PVC
  - Contacts: Gold-plated brass



## Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)



Type	D1 -Ø-	D2	D6 -Ø-	D7 -Ø-	D8 -Ø-	L1	L2
NEDU-L1R2-V9	14.5	M12x1	20	4.5	54	5000 + 200	51.6

## Ordering data

Electrical connection	Part No.	Type
Socket M12, 8-pin	2903567	• Open cable end, 3-core
		• Open cable end, 5-core
		<b>NEDU-L1R2-V9-M12G8-E-LE5-5R1-LE3-5R2</b>