

Proportional pressure regulators VPPM

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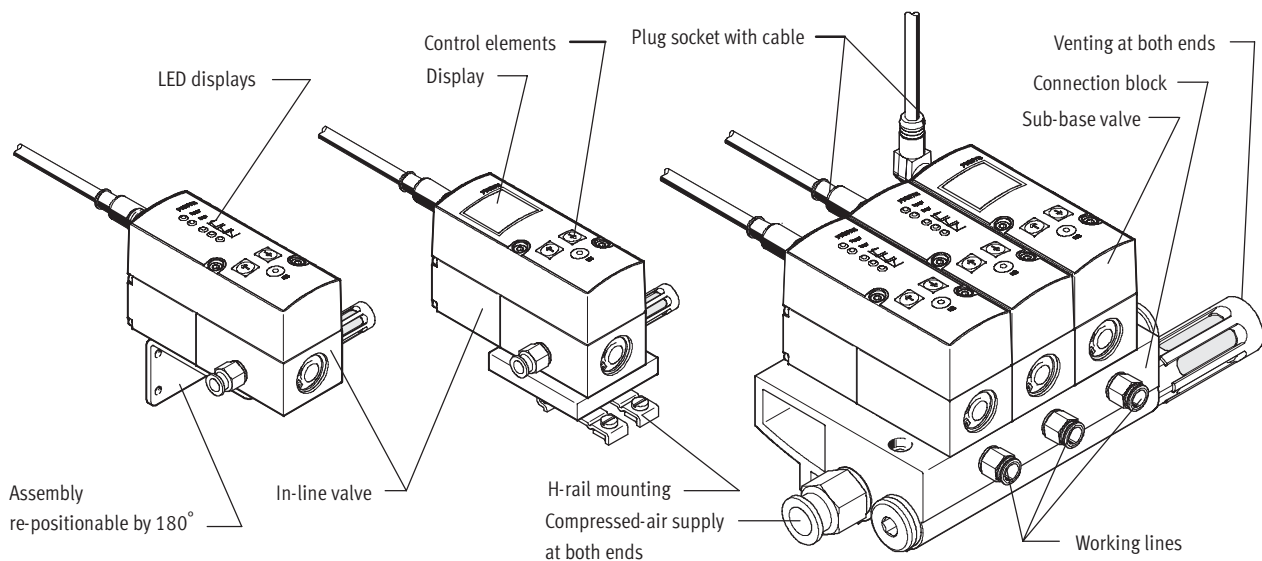
- Inline or flanged sub-base valve
- Manifold assembly
- Choice of pressure ranges
- Special adaptation to individual pressure ranges
- Setpoint value input as analogue voltage or current signal
- Optional setpoint module
- Connection sizes
G $\frac{1}{8}$, G $\frac{1}{4}$, G $\frac{1}{2}$



Proportional pressure regulators VPPM

General information

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Innovation

- Multi-sensor control (cascade control)
- Diagnostics
- Choice of regulation characteristics
- Temperature compensated
- High dynamic response
- High repetition accuracy
- Versatile product assembly

Versatile

- Individual valves (inline valve)
- Manifold valves (sub-base/flange valve)
- Various user interfaces
 - LED displays
 - LCD display
 - Adjustment/selection buttons
- A choice of valves with different pressure ranges
- Pressure range on valve can be modified
- Choice of different setpoint specifications
 - Current input
 - Voltage input

Reliable

- Integrated pressure sensor
 - with independent output
- Cable break monitor
- Pressure maintained during control failure

Easy to mount

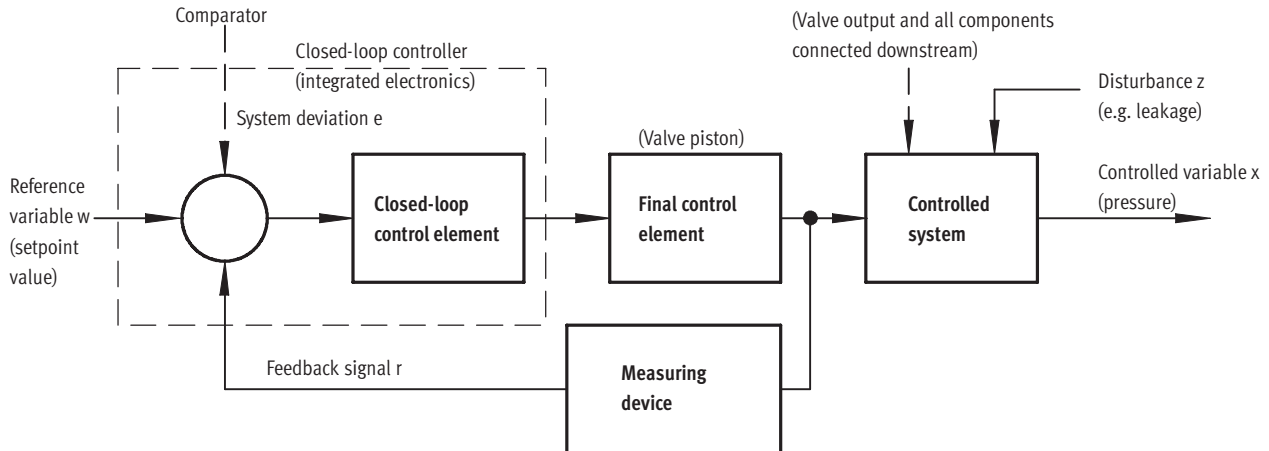
- in-line valve manifold (manifold block)
- H-rail mounting
- Individual with mounting bracket
- QS fittings

Proportional pressure regulators VPPM

General information

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Layout of control circuit



Layout

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 measurement device 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

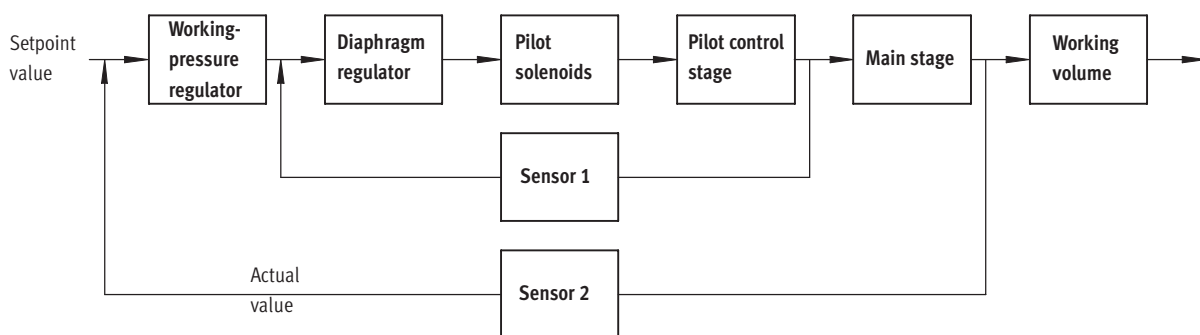
control element. The output of the final control element acts on the controlled system. The closed-loop control element therefore attempts to compensate for the difference between the reference variable w and the controlled variable x by using the final control element.

Action

This process runs continuously so changes in the reference variable are always noticed. However, a system deviation will also appear 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 action, 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 in a way which is not intended. In all cases, the regulator attempts to readjust the controlled variable x to the reference variable w .

Multi-sensor control (cascade control) of the VPPM



Cascade regulator

Unlike conventional direct-acting regulators, with this principle of multi-sensor control, several control circuits are nested inside each other. The overall controlled system is therefore

divided into smaller sub-controlled circuits which are easier to control for the specific task.

Regulator precision

With multi-sensor control, the control precision and dynamic response are

many times better than those of a single acting regulator.

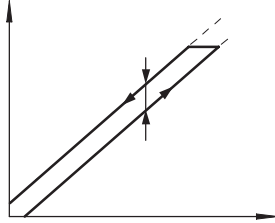
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General information

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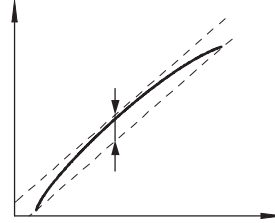
Terms for proportional-pressure regulator

Hysteresis



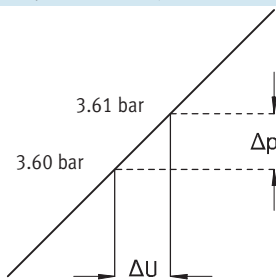
There is always a linear relationship between the setpoint value entered and the pressure output within a certain tolerance. Nevertheless, there is a difference between whether the setpoint value entered is increasing or decreasing. The difference in maximum deviations is referred to as hysteresis.

Linearity error



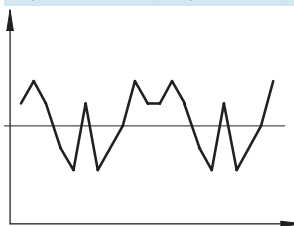
The full linear trend of the control characteristic of the output pressure is theoretical. The maximum percentage deviation from this theoretical control characteristic is referred to as the linearity error. The percentage value is related to the maximum output pressure. (Full scale)

Response sensitivity



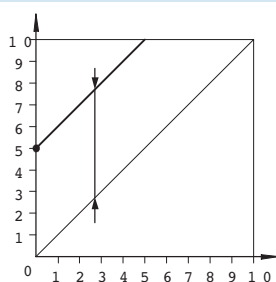
The response sensitivity of the device determines how sensitively a pressure can change, i.e. be changed. The smallest differential in setpoint value which is able to change the output pressure is referred to as the response sensitivity. In this case, 0.01 bar.

Repetition accuracy (reproducibility)



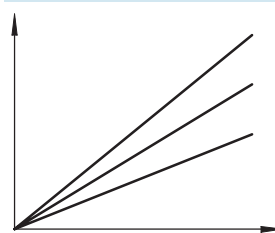
The repetition accuracy is the margin within which the fluid output variables are scattered when the same electrical input signal coming from the same direction is repeatedly adjusted. The repetition accuracy is expressed as a percentage of the maximum fluid output signal.

Zero offset



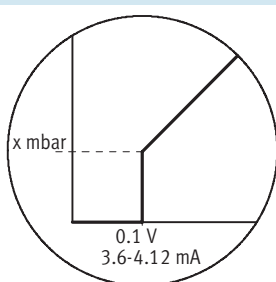
When a VPPM cannot be vented for any reason, such as safety considerations, the minimum pressure can be shifted from the zero point upwards. An output pressure of 5 bar can be assigned to the lowest setpoint and an output pressure of 10 bar can be assigned to the highest setpoint. If a zero offset is applied, the zero point suppressor is switched off automatically.

Pressure range adaptation



In the delivery condition, 100% setpoint value equals 100% fluid output signal. The pressure range adaptation or adjustment makes it possible to match the fluid output signal to the setpoint variable.

Zero point suppression

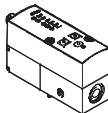
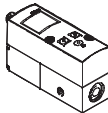


In practice, it is possible for a residual voltage or residual current to be applied at the setpoint input of the VPPM via the setpoint adjuster. The zero-point suppressor is used so that the valve is reliably vented at setpoint zero.

Proportional pressure regulators VPPM

Product range overview

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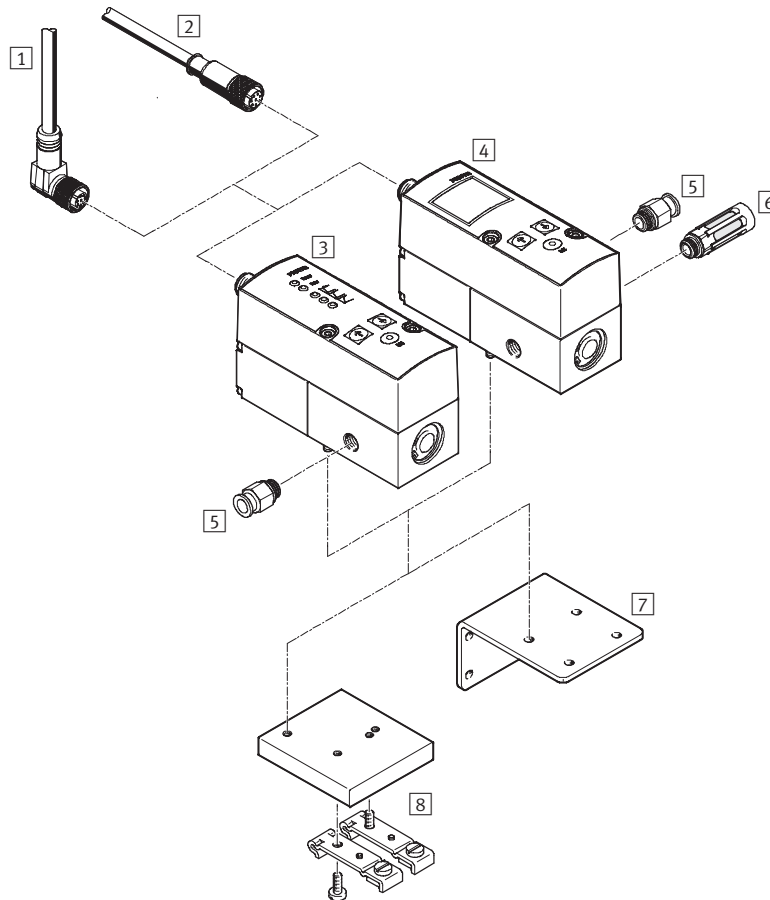
Function	Version	Constructional design	Pneumatic connection 1, 2, 3	Nominal diameter, pressurise/ exhaust [mm]	Pressure regulation range [bar]	Setpoint value input Voltage type 0 ... 10 V Current type 4 ... 20 mA		→ Page/Internet
Pressure regulators	With LED							
		Piloted dia- phragm valve	G1/8	6/4.5	0.02 ... 2 0.06 ... 6 0.1 ... 10	■	■	9
			Sub-base	6/4.5	0.02 ... 2 0.06 ... 6 0.1 ... 10	■	■	
	With LCD							
		Piloted dia- phragm valve	G1/8	6/4.5	0.02 ... 2 0.06 ... 6 0.1 ... 10	■	■	9
Sub-base			6/4.5	0.02 ... 2 0.06 ... 6 0.1 ... 10	■	■		

Proportional pressure regulators VPPM

Peripherals overview

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Individual valve



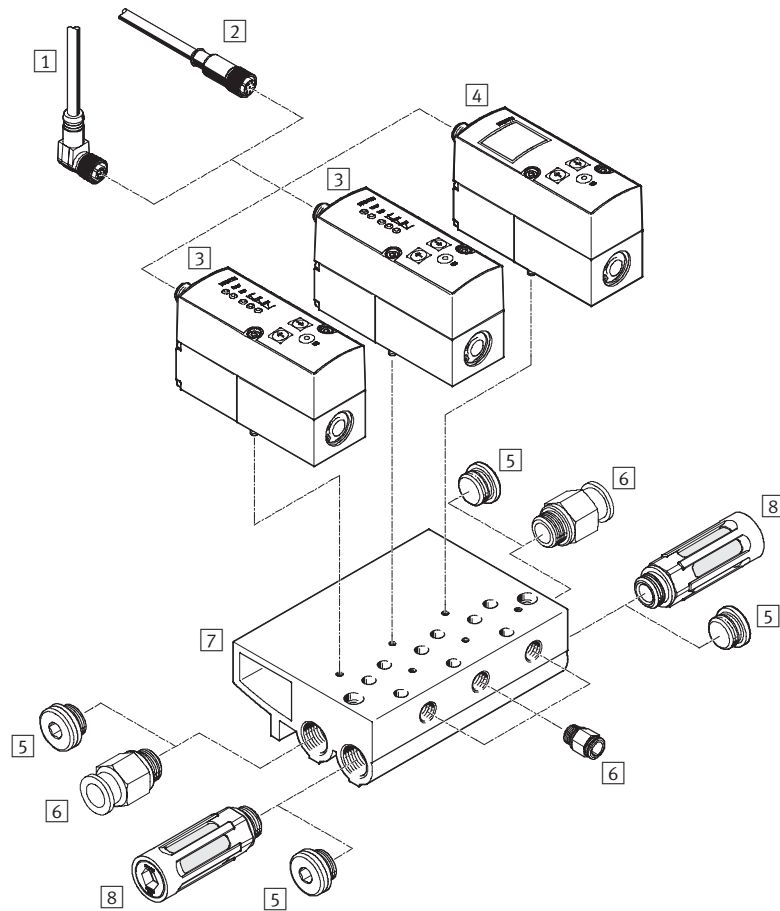
Accessories		
	Brief description	→ Page/Internet
1	Plug socket with cable, angled NEBU-M12W8-...	21
2	Plug socket with cable, straight SIM-M12-8GD-...	21
3	Proportional pressure regulator VPPM	Operator unit with LED 9
4	Proportional pressure regulator VPPM	Operator unit with LCD 9
5	Push-in fitting QS	For connecting compressed air tubing with standard external diameters quick star
6	Silencer	For fitting in exhaust ports u
7	Mounting bracket VAME-P1-A	For attaching the valve 19
8	DIN H-rail mounting VAME-P1-T	For mounting on a DIN H-rail 18

Proportional pressure regulators VPPM

Peripherals overview

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Valve manifold



Accessories		
	Brief description	→ Page/Internet
1	Plug socket with cable, angled NEBU-M12W8-...	21
2	Plug socket with cable, straight SIM-M12-8GD-...	21
3	Proportional pressure regulator VPPM	Operator unit with LED 9
4	Proportional pressure regulator VPPM	Operator unit with LCD 9
5	Blanking plug B	– b
6	Push-in fitting QS	For connecting compressed air tubing with standard external diameters quick star
7	Manifold block VABM	– 18
8	Silencer	For fitting in exhaust ports u

Type codes

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Type		VPPM	-	6	L	-	L	-	1	-	G18	-	0L	6H	-	V1	N	-	S1	-	
VPPM	Modular proportional pressure regulator																				
Nominal diameter		6	6 mm																		
Design		L	In-line valve																		
F	Flanged valve																				
Mounting method			Freely mountable																		
Dynamic response class		L	Low																		
Valve function		1	3/2-way valve, normally closed																		
Pneumatic connection		G18	G $\frac{1}{8}$ thread																		
F	Flange/sub-base																				
Lower pressure value of regulation range		0L	0 bar																		
Upper pressure value of regulation range		2H	2 bar																		
6H	6 bar																				
10H	10 bar																				
Setpoint specification for individual valve		V1	0 ... 10 V																		
A4	4 ... 20 mA																				
Switch output		N	Negative switching																		
Accuracy			2% (standard)																		
S1	1%																				
Operator unit			LED (standard)																		
C1	With LCD, pressure unit variable																				

Proportional pressure regulators VPPM

Technical data

 Flow rate
380 ... 1,200 l/min

 Voltage
21.6 ... 26.4 V DC

 Pressure regulation range
0.02 ... 10 bar

Variants

- Setpoint input as analogue voltage signal 0 ... 10 V
- Setpoint input as analogue current signal 4 ... 20 mA



General technical data				
Pneumatic connection 1 and 2			G $\frac{1}{8}$	Connecting plate
Constructional design			Pilot-actuated diaphragm regulator	
Sealing principle			Soft	
Actuation type			Electrical	
Control type			Pilot actuated via 2/2-way valves	
Type of mounting			Via through-hole, via accessories	
Mounting position			Any	
Nominal diameter	Pressurising	[mm]	6	
	Exhaust	[mm]	4.5	
Standard nominal flow rate		[l/min]	→ Graphs	
Product weight		[g]	400	

Electrical data				
Electrical connection			Plug, round design, 8-pin, M12	
Operating voltage range		[V DC]	24±10% = 21.6 ... 26.4	
Residual ripple			10%	
Max. electrical power consumption		[W]	7	
Signal setpoint input	Voltage	[V DC]	0 ... 10	
	Current	[mA]	4 ... 20	
Protection against short circuit			For all electrical connections	
Protection against polarity reversal			For all electrical connections	
Protection class			IP65	
CE mark			EU conformity in accordance with the directive 89/336/EEC (EMC)	

 Note

If the power supply cable is interrupted, output pressure is maintained unregulated.

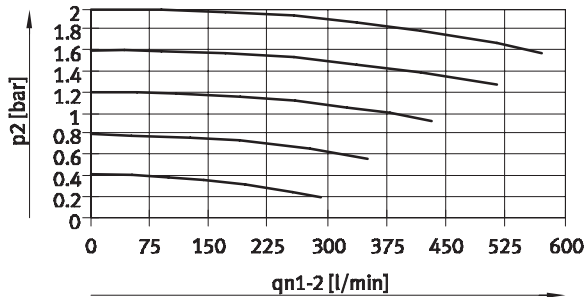
Proportional pressure regulators VPPM

Technical data

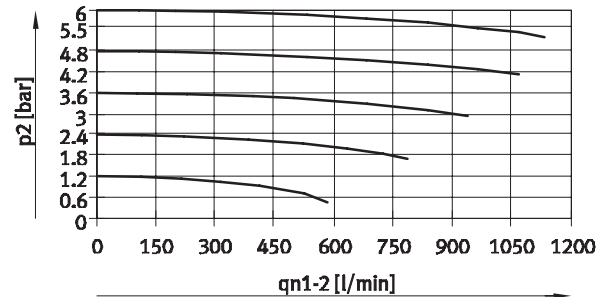
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Flow rate q_n from 1→2 as a function of the output pressure p_2

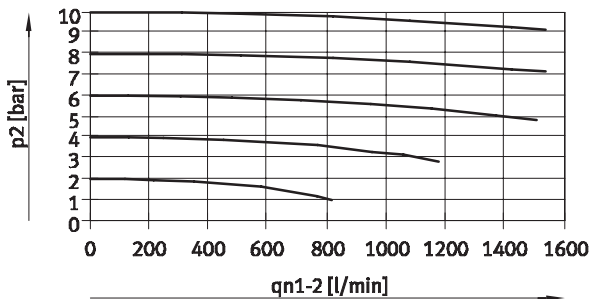
VPPM-6L-...-0L2H-... (2 bar)



VPPM-6L-...-0L6H-... (6 bar)

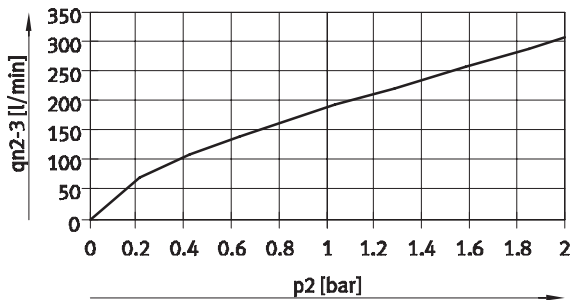


VPPM-6L-...-0L10H-... (10 bar)

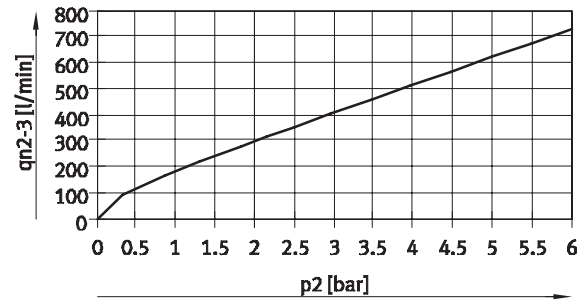


Flow rate q_n from 2→3 as a function of the output pressure p_2

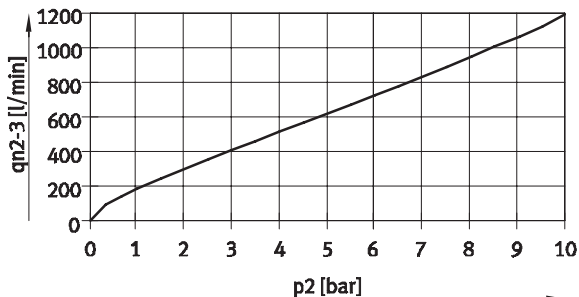
VPPM-6L-...-0L2H-... (2 bar)



VPPM-6L-...-0L6H-... (6 bar)



VPPM-6L-...-0L10H-... (10 bar)



Proportional pressure regulators VPPM

Technical data

Operating and environmental conditions				
Pressure regulation range	[bar]	0.02 ... 2	0.06 ... 6	0.1 ... 10
Operating medium		Compressed air, filtered, unlubricated, grade of filtration 40µm Neutral gases		
Input pressure 1	[bar]	0 ... 4 ²⁾	0 ... 8 ²⁾	0 ... 11 ²⁾
Max. hysteresis	[mbar]	10	30	50
Linearity error FS	[%]	±0.5		
Repetition accuracy FS	[%]	0.5		
Temperature coefficient	[%/°C]	0.04/1		
Ambient temperature	[°C]	0 ... 60		
Temperature of medium	[°C]	10 ... 50		
Corrosion resistance class	[CRC]	2 ¹⁾		

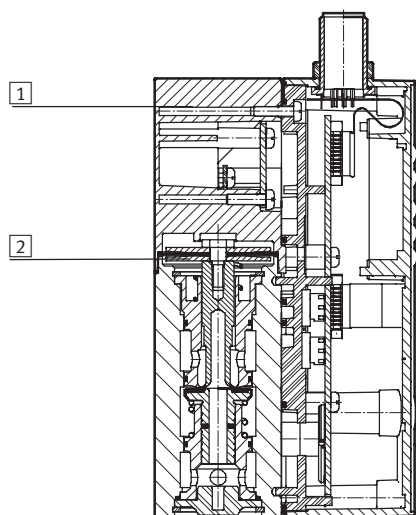
1) Corrosion resistance class 2 to Festo standard 940 070

Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents.

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

Materials

Sectional view



1	Housing	Wrought aluminium alloy
2	Diaphragm	Nitrile rubber

Proportional pressure regulators VPPM

Technical data

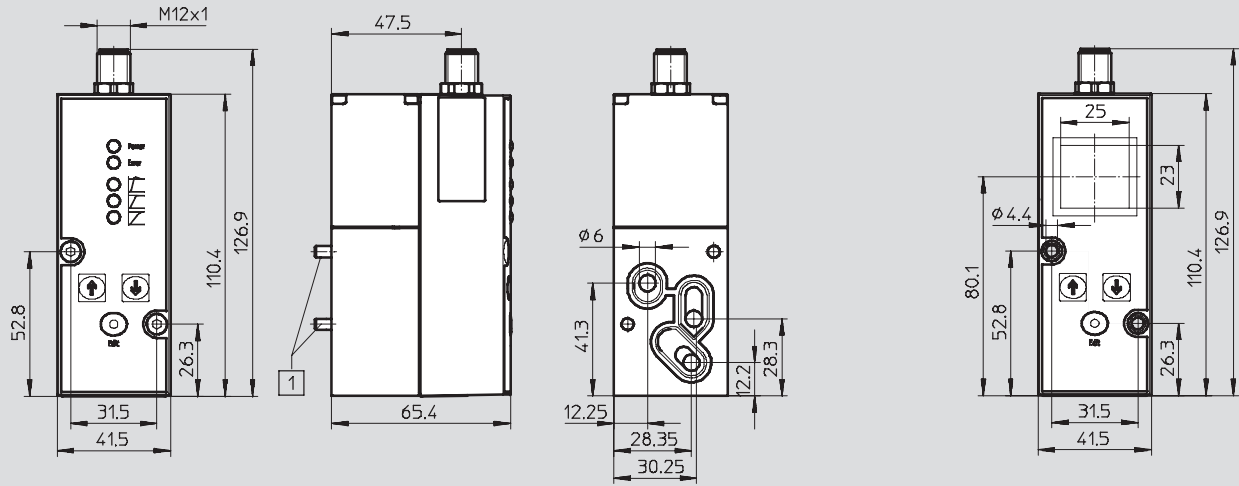
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Dimensions

Download CAD data → www.festo.com

VPPM-6F

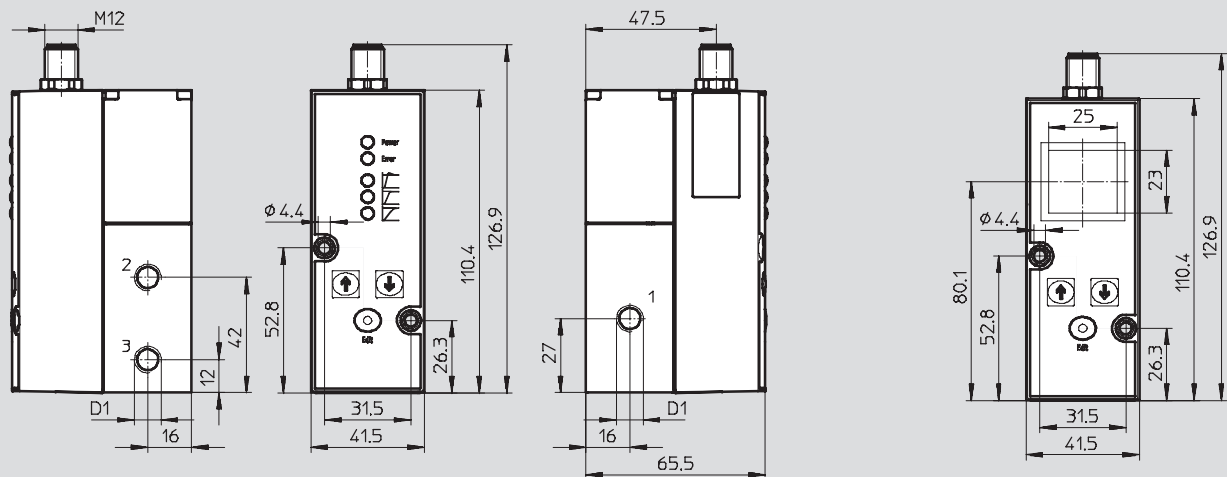
With LCD



1 Socket head screw M5x65

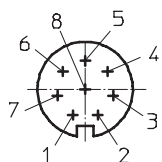
VPPM-6L

With LCD



D1 = G $\frac{1}{8}$

M12 – Pin allocation



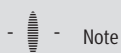
- 1 Digital InS1
- 2 24 V DC
- 3 Nom. Value –
- 4 Nom. Value +
- 5 Digital In-S2
- 6 Analogue Out
- 7 Ground
- 8 Digital Out

Proportional pressure regulators VPPM

Technical data

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Ordering data					
Pneumatic connection	Pressure regulation range [bar]	Voltage type 0 ... 10 V		Current type 4 ... 20 mA	
		Part No.	Type	Part No.	Type
Overall accuracy 2%					
G $\frac{1}{8}$	0.02 ... 2	542 233	VPPM-6L-L-1-G18-OL2H-V1N	542 236	VPPM-6L-L-1-G18-OL2H-A4N
	0.06 ... 6	542 234	VPPM-6L-L-1-G18-OL6H-V1N	542 237	VPPM-6L-L-1-G18-OL6H-A4N
		558 337	VPPM-6L-L-1-G18-OL6H-V1P-C1	558 338	VPPM-6L-L-1-G18-OL6H-A4P-C1
G $\frac{1}{8}$	0.1 ... 10	542 235	VPPM-6L-L-1-G18-OL10H-V1N	542 238	VPPM-6L-L-1-G18-OL10H-A4N
Sub-base	0.02 ... 2	542 245	VPPM-6L-L-1-F-OL2H-V1N	542 248	VPPM-6L-L-1-F-OL2H-A4N
	0.06 ... 6	542 246	VPPM-6L-L-1-F-OL6H-V1N	542 249	VPPM-6L-L-1-F-OL6H-A4N
		558 339	VPPM-6L-L-1-F-OL6H-V1P-C1	558 340	VPPM-6L-L-1-F-OL6H-A4P-C1
		558 347	VPPM-6L-L-1-F-OL6H-V1N-C1		
	0.1 ... 10	542 247	VPPM-6L-L-1-F-OL10H-V1N	542 250	VPPM-6L-L-1-F-OL10H-A4N
Overall accuracy 1%					
G $\frac{1}{8}$	0.02 ... 2	542 227	VPPM-6L-L-1-G18-OL2H-V1N-S1	542 230	VPPM-6L-L-1-G18-OL2H-A4N-S1
	0.06 ... 6	542 228	VPPM-6L-L-1-G18-OL6H-V1N-S1	542 231	VPPM-6L-L-1-G18-OL6H-A4N-S1
	0.1 ... 10	542 229	VPPM-6L-L-1-G18-OL10H-V1N-S1	542 232	VPPM-6L-L-1-G18-OL10H-A4N-S1
		558 335	VPPM-6L-L-1-G18-OL10H-V1P-S1C1	558 336	VPPM-6L-L-1-G18-OL10H-A4P-S1C1
Sub-base	0.02 ... 2	542 239	VPPM-6L-L-1-F-OL2H-V1N-S1	542 242	VPPM-6L-L-1-F-OL2H-A4N-S1
	0.06 ... 6	542 240	VPPM-6L-L-1-F-OL6H-V1N-S1	542 243	VPPM-6L-L-1-F-OL6H-A4N-S1
	0.1 ... 10	542 241	VPPM-6L-L-1-F-OL10H-V1N-S1	542 244	VPPM-6L-L-1-F-OL10H-A4N-S1



Note

Further variants can be ordered using the modular system.

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Proportional pressure regulators VPPM

Ordering data – Modular products

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Mandatory data →

Module No.	Design	Nominal diameter	Valve type	Dynamic response	Valve mode	Connection type
543 432	VPPM	6	L F	L	1	G18 F
Order example						
543 432	VPPM	- 6	F	- L	- 1	- F

Ordering table					
Size	6	Condi- tions	Code	Enter code	
M Module No.	543 432				
Design	Modular pressure regulator		VPPM		VPPM
Nominal diameter	6		-6		-6
Valve type	In-line	[1]	L		
	Flanged valve	[2]	F		
Dynamic response	Low dynamic response (pilot-actuated, soft-sealing)		-L		-L
Valve mode	3/2-way valve, normally closed		-1		-1
Connection type	G1/8 thread		-G18		
	Flange/connecting plate		-F		

[1] L Only with connection type G18 (G1/8 thread)

[2] F Only with connection type F (flange/sub-base)

Transfer order code

543 432	VPPM	-	6		-	L	-	1	-	
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Proportional pressure regulators VPPM

Ordering data – Modular products

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→ [M] Mandatory data					[O] Options	
Pressure regulation range	Alternative lower pressure regulation range	Alternative upper pressure regulation range	Setpoint specification	Switch output	Overall accuracy	Operator unit
0L2H 0L6H 0L10H	0.1 ... 10L	0.1 ... 10H	V1 A4	P N	S1	C1
-	6.5L	7.1H	- A4	P	- S1	C1

Ordering table					
Size	6	Condi- tions	Code		Enter code
↓ [M]	Pressure regulation range	0 ... 2 bar	-0L2H		
		0 ... 6 bar	-0L6H		
		0 ... 10 bar	-0L10H		
	Alternative lower pressure regulation range	0.1 ... 10 bar	[3] -...L		
	Alternative upper pressure regulation range	0.1 ... 10 bar	[4] ...H		
	Setpoint specification	Voltage (standard 0 ... 10 V)	-V1		
		Current (standard 4 ... 20 mA)	-A4		
	Switch output	Positive switching	P		
		Negative switching	N		
[O]	Overall accuracy	1%	-S1		
	Operator unit	With LCD, pressure unit variable	C1		

[3] ...L Not with pressure regulation range (0L2H, 0L6H, 0L10H).
Must always be less than alternative upper pressure regulation range H

[4] ...H Not with pressure regulation range (0L2H, 0L6H, 0L10H).
Must always be greater than alternative lower pressure regulation range L

Transfer order code

- - -

Proportional pressure regulators MPPE/VPPE/MPPES

Accessories

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Setpoint module MPZ

-  - Voltage
20 ... 30 V DC

Function

- Generation of 6+1 analogue setpoint values for the proportional pressure regulators MPPE, MPPES and MPYE
- Digital controller
- Output voltage adjustable via spindle potentiometer



General technical data			
Mode of operation		Digital-analogue circuit with analogue output	
Electrical connection		Screw terminal	
Connection cross section	[mm ²]	2.5	
Operating voltage range	[V DC]	20 ... 30	
Adjustable output voltage	[V DC]	0 ... 10	
Max. output current	[mA]	27	
Power consumption at 24 V DC	[W]	1.5	
Supply setpoint value adjustment	Voltage	[V]	10 ... 10.6
	Current	[mA]	6 ... 6.36
External setpoint input	Voltage	[V DC]	0 ... 10
	Potentiometer	[kΩ]	2.5 ... 10
Setpoint controller	Input resistance	[kΩ]	3
Residual ripple	[%]	Max. 10	
Display	Ready	Green LED	
	Setpoint active	Yellow LED	
Type of mounting		On H-rail	
Assembly position		Any	
Product weight	[g]	80	

Operating and environmental conditions		
Ambient temperature	[°C]	0 ... 60
Protection class		IP20
CE symbol (declaration of conformity)		In accordance with EU EMC directive
Corrosion resistance class CRC ¹⁾		2

1) Corrosion resistance class 2 according to Festo standard 940 070
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents

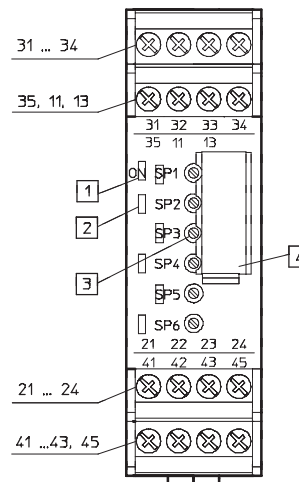
Proportional pressure regulators MPPE/VPPE/MPPES

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Accessories

Connections and control elements

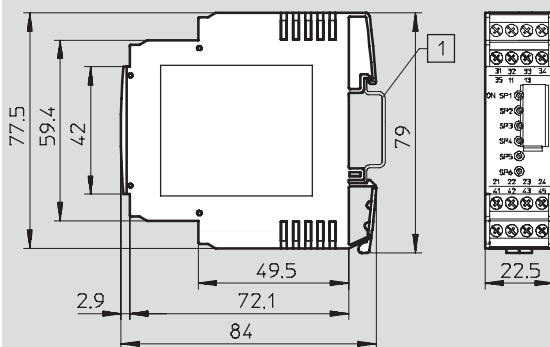
Connections			Priority
31	Activate setpoint 1	SP1	1 (highest)
32	Activate setpoint 2	SP2	2
33	Activate setpoint 3	SP3	3
34	Activate setpoint 4	SP4	4
35	Activate setpoint 5	SP5	5
11	Activate setpoint 6	SP6	6
13	Control line	0 V	–
21	Control line	0 V	–
22	External setpoint input	$U_{w, in} = 0 \dots 10 \text{ V DC}$	7 (lowest)
23	Control line	10 V DC	–
24	Screening	PE	–
41	Control line	0 V DC	–
42	Setpoint output	$U_{w, out}$	–
43	Power supply	–	–
45	Power supply	+	–



- 1 Operational status display, green LED
- 2 Setpoint display active (SP1 ... SP6), yellow LED
- 3 Setpoint potentiometer SP1 ... SP6
- 4 Inscription label

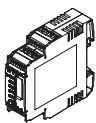
Dimensions

Download CAD data → www.festo.com



- 1 H-rail to DIN EN 60715

Ordering data

	Description	Part No.	Type
	Setpoint module for generating 6 + 1 analogue voltage signals	546 224	MPZ-1-24DC-SGH-6-SW

Proportional pressure regulators VPPM

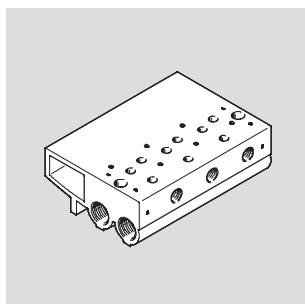
Accessories

FESTO

Manifold block VABM-P1

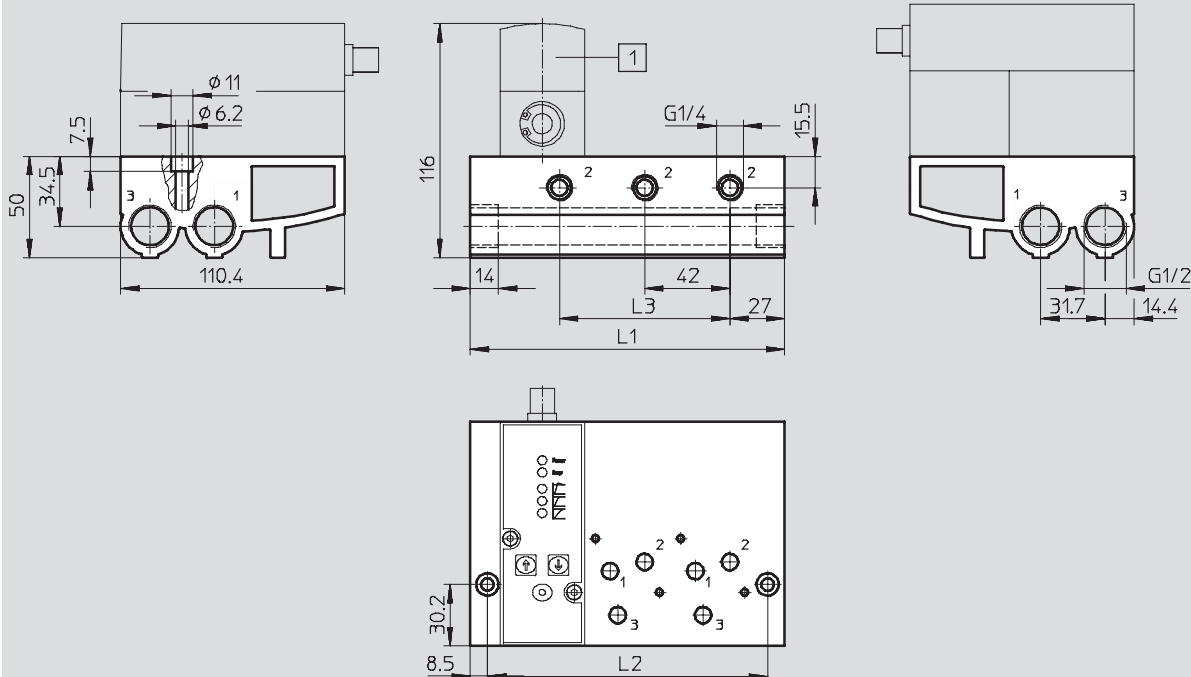
Material:

Wrought aluminium alloy



Dimensions

Download CAD data → www.festo.com



1 Proportional pressure regulator
VPPM

Dimensions and ordering data

Valve positions	L1	L2	L3	Weight [g]	CRC ¹⁾	Part No.	Type
2	113	96	42	900	2	542 252	VABM-P1-SF-G18-2-P3
3	155	138	84	1,230	2	542 253	VABM-P1-SF-G18-3-P3
4	197	180	126	1,565	2	542 254	VABM-P1-SF-G18-4-P3

1) Corrosion resistance class 2 to Festo standard 940 070

Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents.

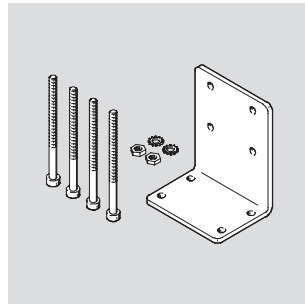
Proportional pressure regulators VPPM

Accessories

Mounting bracket VAME-P1-A

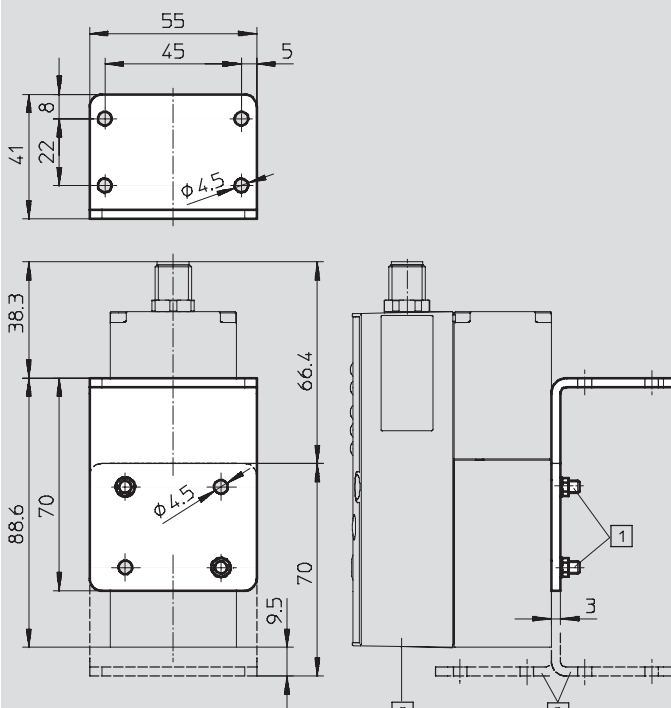
Material:

Wrought aluminium alloy, steel



Dimensions

Download CAD data → www.festo.com



1 Socket head screw M4

2 Proportional pressure regulator VPPM

3 Mounting bracket can optionally be turned

Ordering data

Weight [g]	CRC	Part No.	Type
71	1 ¹⁾	542 251	VAME-P1-A

1) Corrosion resistance class 1 to Festo standard 940 070

Components requiring low corrosion resistance. Transport and storage protection. Parts that do not have primarily decorative surface requirements, e.g. in internal areas that are not visible or behind covers.

Proportional pressure regulators VPPM

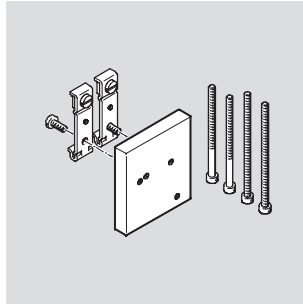
Accessories

FESTO

H-rail mounting VAME-P1-T

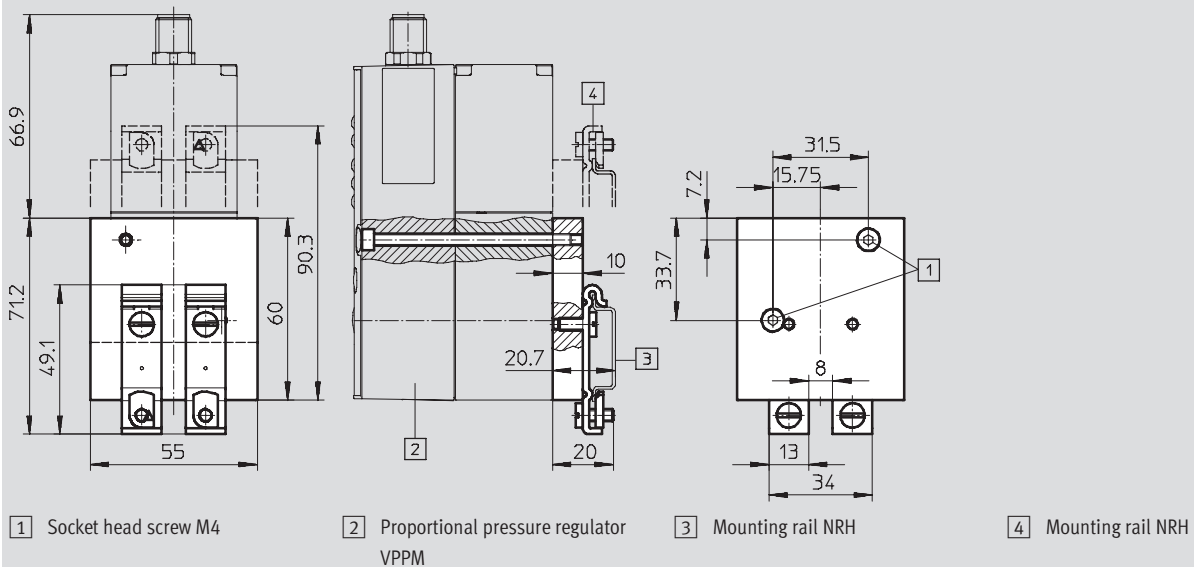
Material:

Wrought aluminium alloy, steel



Dimensions

Download CAD data → www.festo.com



Ordering data			
Weight [g]	CRC	Part No.	Type
150	1 ¹⁾	542 255	VAME-P1-T

1) Corrosion resistance class 1 to Festo standard 940 070
Components requiring low corrosion resistance. Transport and storage protection. Parts that do not have primarily decorative surface requirements, e.g. in internal areas that are not visible or behind covers.

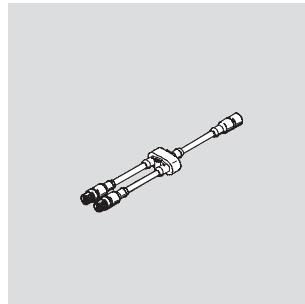
Proportional pressure regulators VPPM

Accessories

Steckdosenkabel

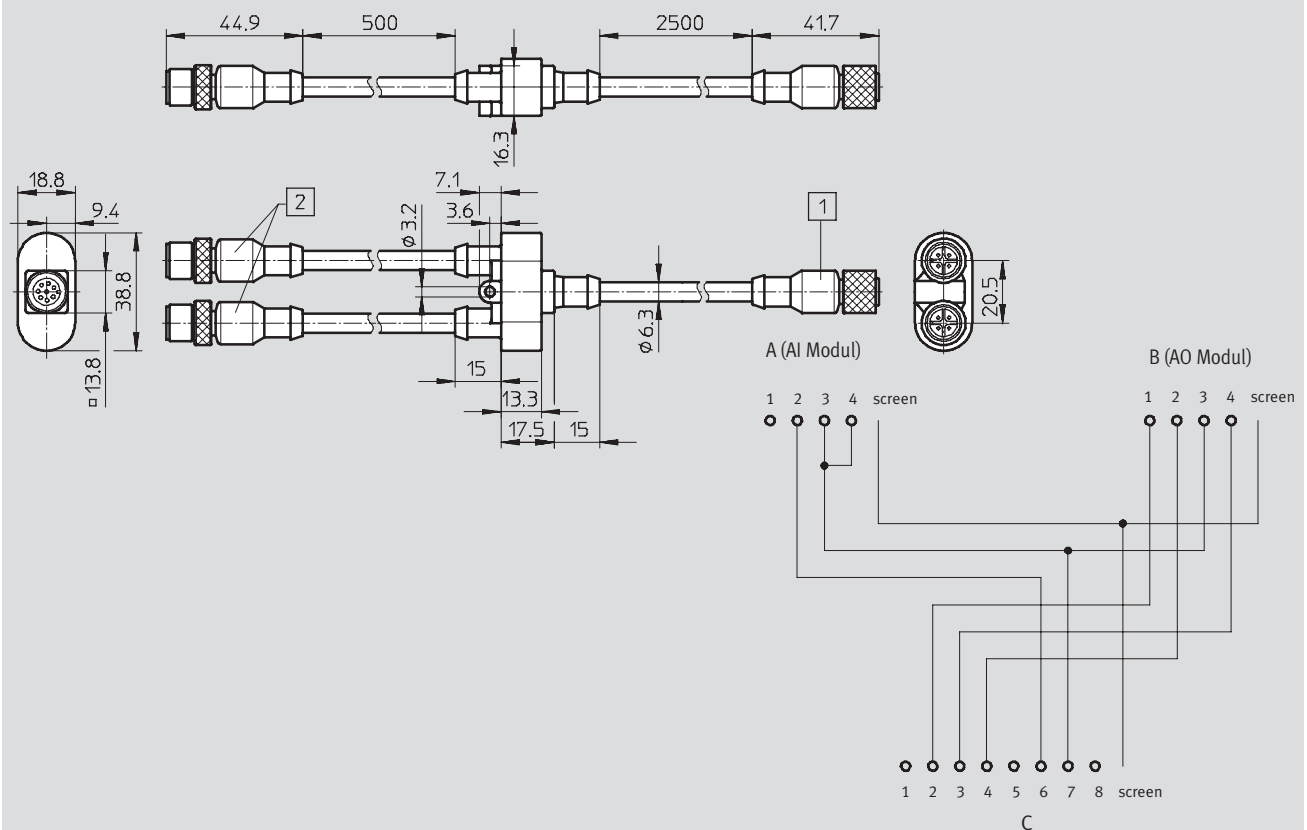
NEBV-M12G8-KD-3-M12G4

for connecting the VPPM with the analogue modules of the CPX controller.

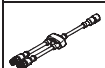


Dimensiones and pin allocation

Download CAD data → www.festo.com



- 1 Straight socket 8-pin for VPPM 2 Straight plugs for CPX-Module

Ordering data				
	Description	Cable length [m]	Part No.	Type
Plug socket with cable			Technical data → Internet: sim, nebu	
	Straight, 8-pin, M12	2	525 616	SIM-M12-8GD-2-PU
		5	525 618	SIM-M12-8GD-5-PU
	Angled, 8-pin, M12	2	542 256	NEBU-M12W8-2-N-LE8
		5	542 257	NEBU-M12W8-5-N-LE8
	1 straight socket, 8-pin, 2 straight plugs, 4-pin	—	547 888	NEBV-M12G8-KD-3-M12G4