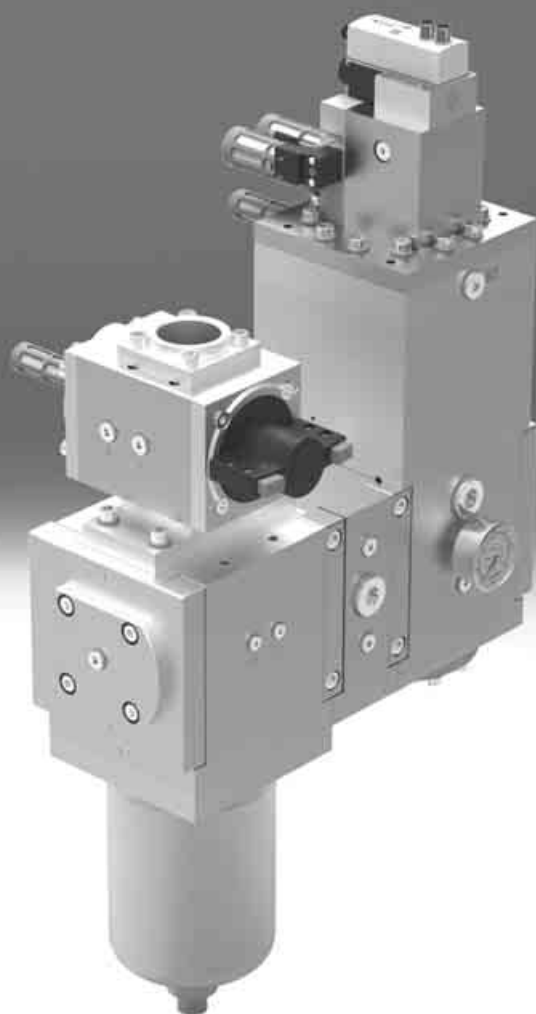


Pneumatic components for high-pressure applications

FESTO



Pneumatic components for high-pressure applications, series L

FESTO

Product range overview

Function	Version	Type	Size	Pneumatic connection 1, 2		→ Page
				Direct	With connecting plate/flange	
Service units	Electric pressure regulator					
		PREL	90	–	G¼, G½, G¾, G1, G1¼	3
			186	–	G¼, G1¼, G1½, G2, G2½	
	Shut-off valve for electric pressure regulator PREL					
		PAHL	–	Mounted on electric pressure regulator PREL	–	14
	Micro filter					
		PFML	90	–	G¼, G½, G¾, G1, G1¼	25
			186	–	G¼, G1¼, G1½, G2, G2½	
	On/off valve					
		PVEL	124	–	SAE flange	32
	Branching module					
		PMBL	90	–	G¼, G½, G¾, G1, G1¼	36
			186	–	G¼, G1¼, G1½, G2, G2½	
Valves	Proportional pressure regulator					
		VPPL	–	- Mounted on electric pressure regulator PREL or on shut-off valve PAHL - G¼	–	18

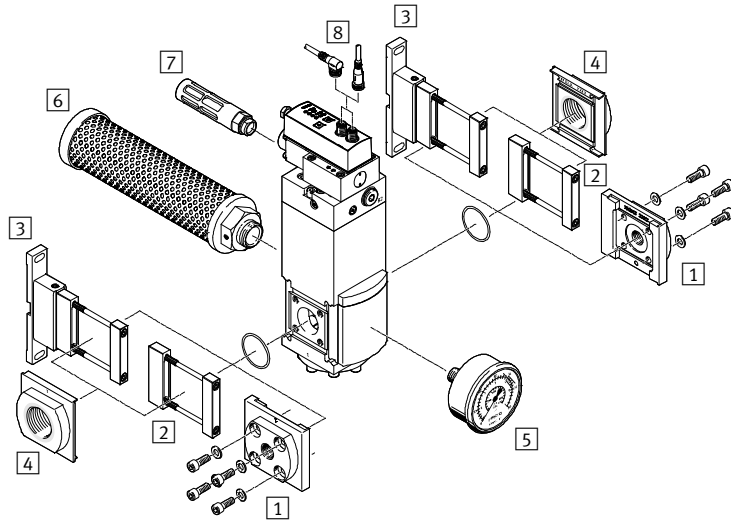
Electric pressure regulators PREL, series L

Peripherals overview

FESTO

Accessories

Size 90



Mounting components and accessories		→ Page/Internet
1	Connecting plate PAML-CP	42
2	Module connector PAML-MK	45
3	Mounting bracket PAML-MB	47
4	Connecting plate PAML-CP-...-G114	42
5	Pressure gauge PAGL	49
6	Silencer U-G1-HD-SA	On request
7	Silencer U-3/8-B	51
8	Connecting cable NEBU-M12	51

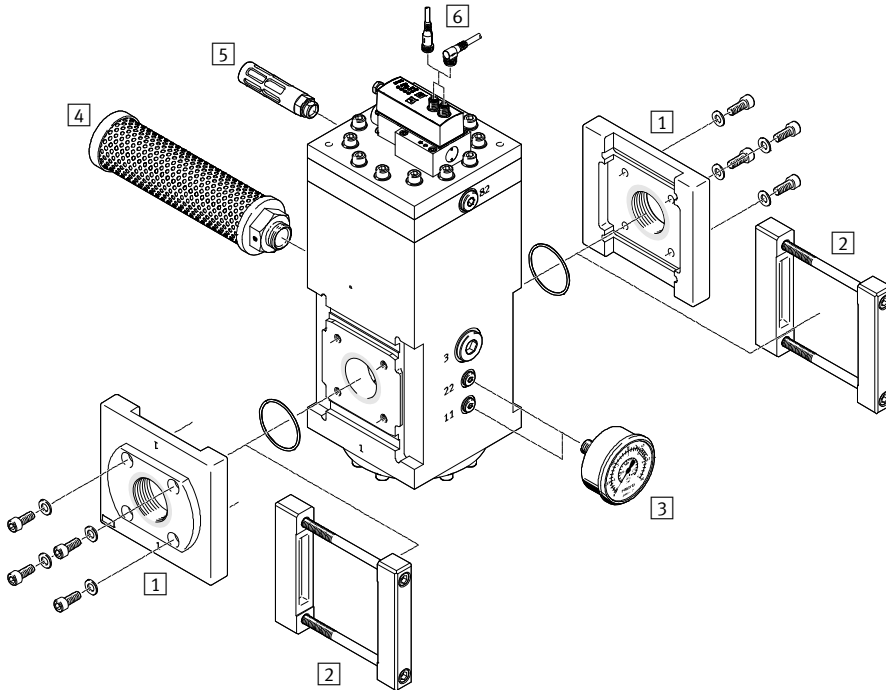
Electric pressure regulators PREL, series L

Peripherals overview

FESTO

Accessories

Size 186



Mounting components and accessories

→ Page/Internet

1	Connecting plate PAML-CP	42
2	Module connector PAML-MK	45
3	Pressure gauge PAGL	49
4	Silencer U-G1-HD-SA	On request
5	Silencer U-1/2-B	51
6	Connecting cable NEBU-M12	51

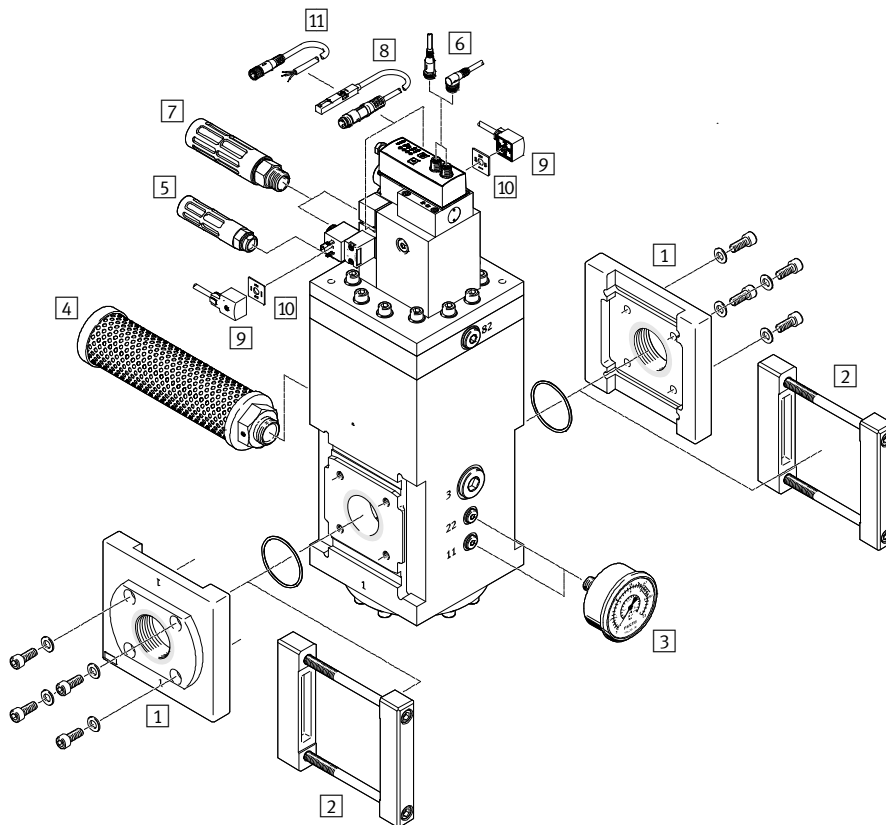
Electric pressure regulators PREL, series L

Peripherals overview

FESTO

Accessories

Size 186, with shut-off valve PAHL



Mounting components and accessories

		→ Page/Internet
1	Connecting plate PAML-CP	42
2	Module connector PAML-MK	45
3	Pressure gauge PAGL	49
4	Silencer U-G1-HD-SA	On request
5	Silencer U-1/2-B	51
6	Connecting cable NEBU-M12	51
7	Silencer (included in the scope of delivery) U-3/4-B	51
8	Proximity sensor (included in the scope of delivery) SME-8	51
9	Connecting cable KMC	51
10	Illuminating seal MC-LD	51
11	Connecting cable NEBU-M8	51

Electric pressure regulators PREL, series L

Type codes

FESTO

Size 90

PREL - 90 - HP3 - V1 - A - 40 C F X - S1 - 2

Service function

PREL Electric pressure regulator, series L

Size

90 90 mm

Pressure range

HP3 0 ... 50 bar

Setpoint specification (input)

V1 0 ... 10 V

A4 4 ... 20 mA

Actual value (output)

V 0 ... 10 V

A 4 ... 20 mA

Pressure regulation range

20 Up to 20 bar

40 Up to 40 bar

Regulator type

C Piloted

Regulator venting

F Integrated return flow function with secondary venting

Regulator element

X Proportional valve

Overall accuracy

S1 1%

Valve variant

2 Variant 2, without external auxiliary pilot air

4 Variant 4, with external auxiliary pilot air

5 Variant 5, with external auxiliary pilot air, with 2 bar offset in setpoint input

8 Variant 8, with external auxiliary pilot air

Electric pressure regulators PREL, series L

Type codes

FESTO

Size 186

PREL - 186 - HP3 - V1 - A - 40 C F X2 - 1

Service function

PREL Electric pressure regulator, series L

Size

186 186 mm

Pressure range

HP3 0 ... 50 bar

Setpoint specification (input)

V1 0 ... 10 V

A4 4 ... 20 mA

Actual value (output)

V 0 ... 10 V

A 4 ... 20 mA

Pressure regulation range

40 Up to 40 bar

Regulator type

C Piloted

Regulator venting

F Integrated return flow function with secondary venting

Regulator element

X Proportional valve

X2 Proportional valve with 2-channel exhaust

Valve variant

1 Variant 1, without external auxiliary pilot air

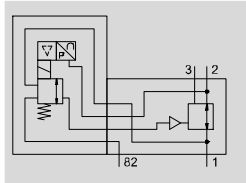
Electric pressure regulators PREL, series L

Technical data

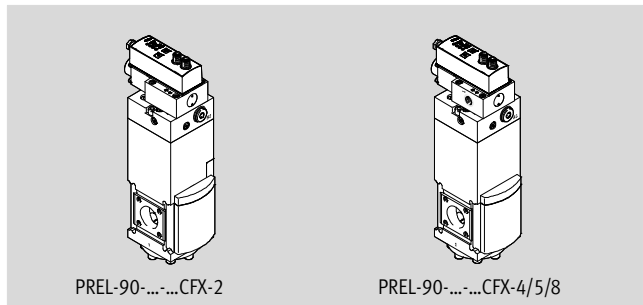
FESTO

Function

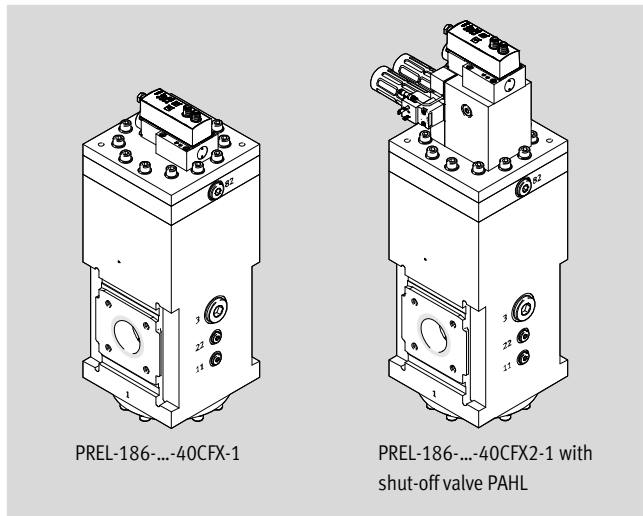
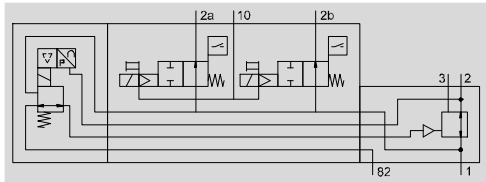
PREL-90/186-...-...CFX, proportional valve



- - Temperature range
+5 ... +50 °C
- - Operating pressure
0 ... 50 bar



PREL-186-...-40CFX2, proportional valve with 2-channel exhaust



The outlet pressure of the electric pressure regulator PREL is determined by the proportional pressure regulator VPPL via an integrated pressure sensor and compared internally to the setpoint value. In case of deviations, the VPPL actuates the regulator of the PREL until the outlet pressure reaches the setpoint value. In initial position (no setpoint specification), the outlet pressure is reduced with the vent seat fully open.

The variant PREL-186-...-40CFX2 is additionally equipped with the two-channel shut-off valve PAHL. With the integrated solenoid valves and sensors and in combination with an external controller, it is used to implement the safety function "Exhausting the control chamber" to EN ISO 13849-1, Performance Level "d".

- Slow pressure rise from 0.6 bar/s in the case of a setpoint value specification up to 8 bar, then 4.4 bar/s
- Connection options for pressure gauge on the front and the rear, one each for the operating and outlet pressure
- Shut-off valve PAHL for electric pressure regulator PREL-186 can be retrofitted

Note
The electric pressure regulator PREL can only be operated together with the proportional pressure regulator VPPL. The technical data for the shut-off valve PAHL can be found from page 14 onwards, and that for the proportional pressure regulator VPPL can be found from page 18 onwards.

Safety data	
Electric pressure regulator PREL-186-...-40CFX2-1 with shut-off valve PAHL	
Conforms to standard	EN ISO 13849-1
Safety function	Exhausting the control chamber
Performance Level (PL)	Exhausting the control chamber: category 3, PL d

Electric pressure regulators PREL, series L

FESTO

Technical data

General technical data		
Size	90	186
Nominal width DN	24	45
Pneumatic connection 3	G1	
Pneumatic connection 11, 12	G $\frac{1}{4}$	
Pneumatic connection 82	G $\frac{3}{8}$	G $\frac{1}{2}$
Actuation type	Electric	
Design	Electrically adjustable pressure regulator	
Regulator function	Outlet pressure constant, with primary pressure compensation, with secondary venting	
Type of mounting	On service unit	
	Via accessories	
Mounting position	Vertical	
Pressure regulation range [bar]	0.2 ... 18	–
	2 ... 40	–
	0.4 ... 40	
Max. pressure hysteresis [bar]	0.1	

Electrical data				
Type		PREL-...-V1-A	PREL-...-V1-V	PREL-...-A4-A
Electrical connection	IN	Plug connector, M12, 5-pin, A-coded		
	OUT	Plug connector, M12, 5-pin, A-coded		
Nominal operating voltage	[V DC]	24		
Analogue input signal range	[V]	0 ... 10	0 ... 10	–
	[mA]	–	–	4 ... 20
Analogue output signal range	[V]	–	0 ... 10	–
	[mA]	4 ... 20	–	4 ... 20
Setpoint/actual values	[V]	Voltage type 0 ... 10		
	[A]	–		
				Current type 4 ... 20

Operating and environmental conditions		
	Electric pressure regulator	Electric pressure regulator with shut-off valve PAHL
Operating pressure [bar]	0 ... 50	
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]	
	Inert gases	
Ambient temperature [°C]	+5 ... +50	
Temperature of medium [°C]	+5 ... +50	
Storage temperature [°C]	–10 ... +60	
Corrosion resistance class CRC ¹⁾	2	
CE marking (see declaration of conformity) ²⁾	In accordance with EU Pressure Equipment Directive	
	–	To EC Machinery Directive
Suitable for use in the food industry ²⁾	See supplementary material information	
Certification	Special Equipment Type Test Certification	

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.

2) Additional information www.festo.com/sp → Certificates.

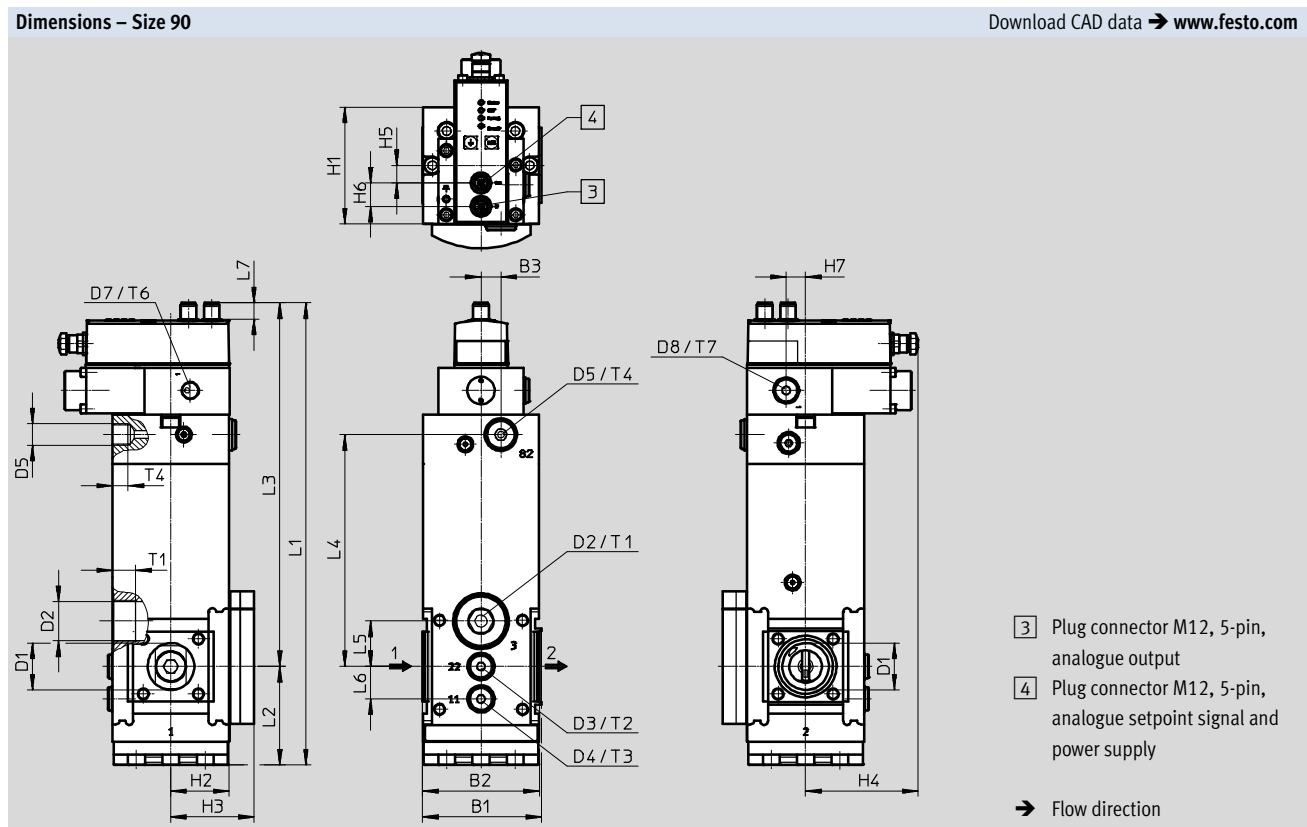
Weight [g]		
Size	90	186
Electric pressure regulator	6100	37100
Electric pressure regulator with shut-off valve PAHL	–	40400

Electric pressure regulators PREL, series L

Technical data

FESTO

Materials	
Housing	Anodised aluminium
Spring	Spring steel
Cap, bottom	Anodised aluminium
Seals	NBR
Note on materials	RoHS compliant
	Contains paint-wetting impairment substances



Type	B1	B2	B3	D1 Ø	D2	D3	D4	D5	D7	D8	H1	H2	H3	H4	H5	H6	H7
PREL-90-...-CFX-...-2	91.5	90	~15.3	36	G1	G1/4	G1/4	G3/8	-	-	90	~45	~64	~87	13.5	18	~14.9
PREL-90-...-CFX-...-4/5/8																	

Type	L1	L2	L3	L4	L5	L6	L7	T1	T2	T3	T4	T6	T7
PREL-90-...-CFX-...-2	~355	76	~279	~179	~35	~25	~12.6	18	12	12	12	-	-
PREL-90-...-CFX-...-4/5/8												12	12

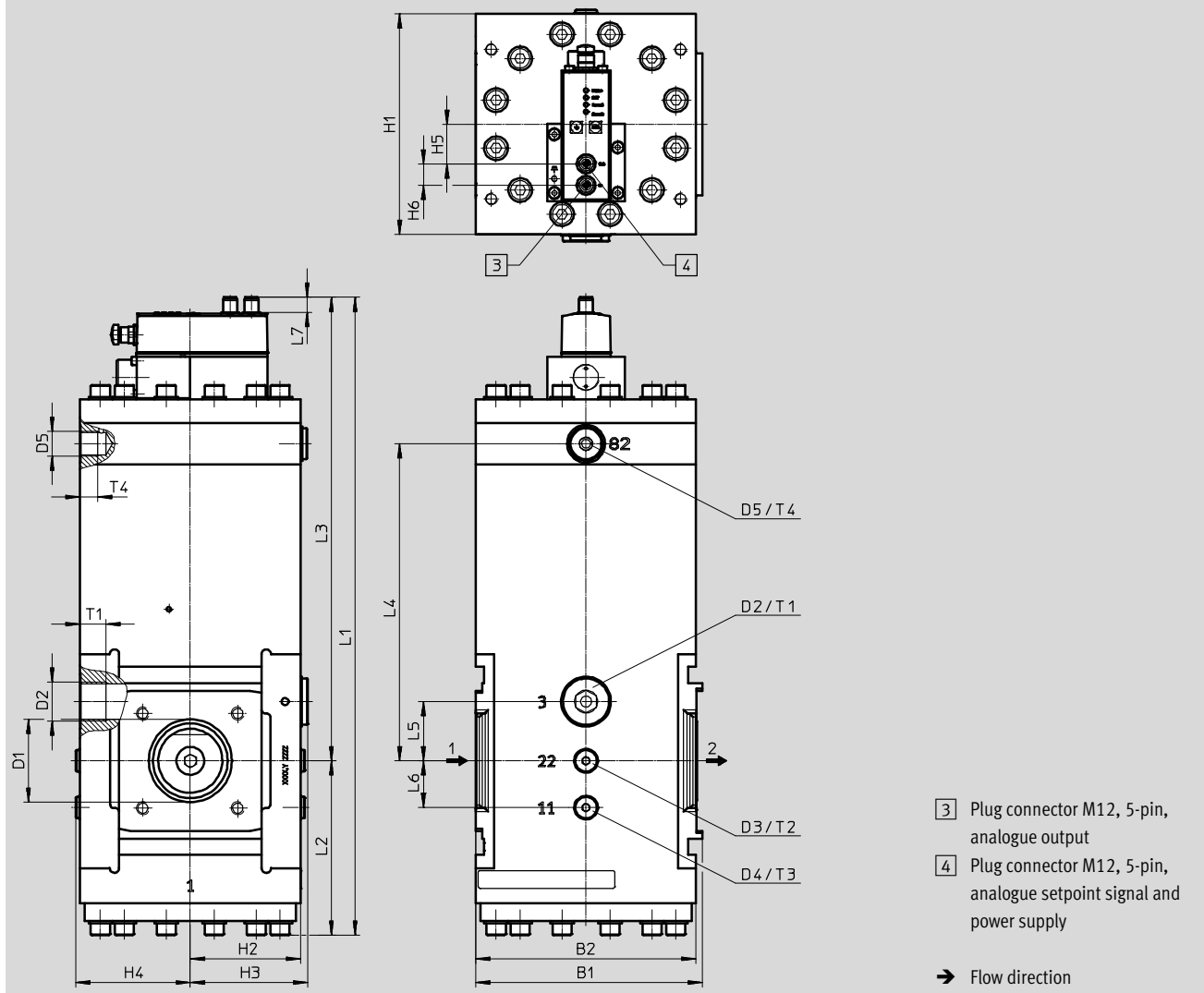
Electric pressure regulators PREL, series L

Technical data

FESTO

Dimensions – Size 186

Download CAD data → www.festo.com



Type	B1	B2	D1 Ø	D2	D3	D4	D5	H1	H2	H3	H4	H5	H6
PREL-186-...-40CFX-1	191	186	70	G1	G¼	G¼	G½	186	93	99	96.5	33.5	18

Type	L1	L2	L3	L4	L5	L6	L7	T1	T2	T3	T4
PREL-186-...-40CFX-1	~537	~147	~390	267.5	50	39.5	~12.6	18	12	12	14

Electric pressure regulators PREL, series L

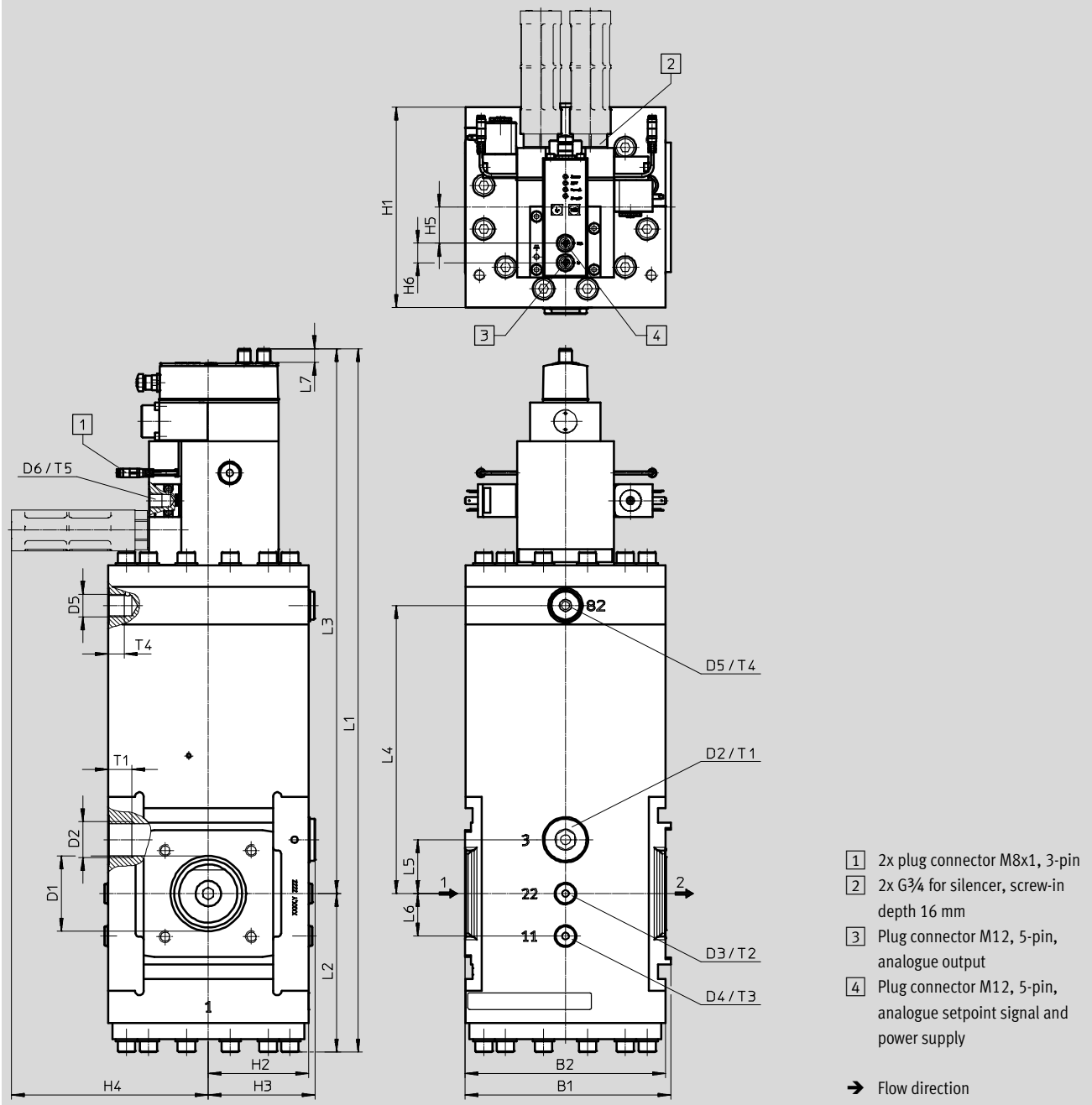
Technical data

FESTO

Dimensions – Size 186

With shut-off valve PAHL

Download CAD data → www.festo.com



Type	B1	B2	D1 Ø	D2	D3	D4	D5	D6	H1	H2	H3	H4	H5	H6
PREL-186-...-40CFX2-1	191	186	70	G1	G1/4	G1/4	G1/2	G1/4	186	93	99	~183	33.5	18

Type	L1	L2	L3	L4	L5	L6	L7	T1	T2	T3	T4	T5
PREL-186-...-40CFX2-1	~652	~147	~505	267.5	50	39.5	~12.6	18	12	12	14	12

Electric pressure regulators PREL, series L

FESTO

Technical data

Ordering data – Size 90				
With proportional pressure regulator VPPL				
Pressure regulation range [bar]	Setpoint specification (input)	Actual value (output)	Part No.	Type
Without external auxiliary pilot air				
0.2 ... 18	0 ... 10 V	4 ... 20 mA	1709128	PREL-90-HP3-V1-A-20CFX-S1-2
		0 ... 10 V	1709129	PREL-90-HP3-V1-V-20CFX-S1-2
	4 ... 20 mA	4 ... 20 mA	1709130	PREL-90-HP3-A4-A-20CFX-S1-2
With external auxiliary pilot air				
0.2 ... 18	0 ... 10 V	4 ... 20 mA	1709134	PREL-90-HP3-V1-A-20CFX-S1-4
		0 ... 10 V	1709135	PREL-90-HP3-V1-V-20CFX-S1-4
	4 ... 20 mA	4 ... 20 mA	1709136	PREL-90-HP3-A4-A-20CFX-S1-4
With external auxiliary pilot air, with 2 bar offset in setpoint input				
2 ... 40	0 ... 10 V	4 ... 20 mA	1709137	PREL-90-HP3-V1-A-40CFX-S1-5
With external auxiliary pilot air				
0.4 ... 40	0 ... 10 V	4 ... 20 mA	1910439	PREL-90-HP3-V1-A-40CFX-S1-8

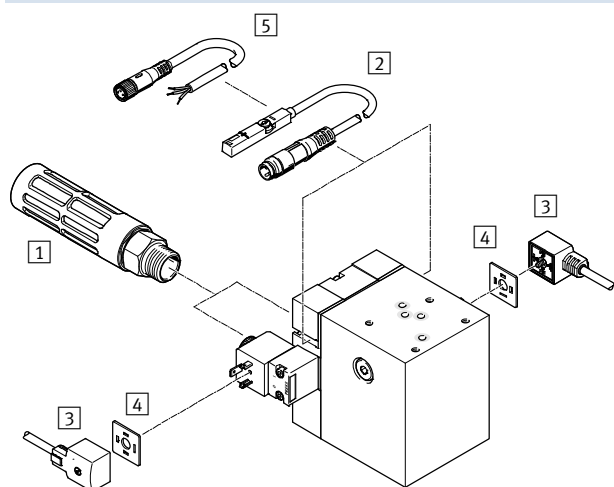
Ordering data – Size 186				
With proportional pressure regulator VPPL				
Pressure regulation range [bar]	Setpoint specification (input)	Actual value (output)	Part No.	Type
Without external auxiliary pilot air				
0.4 ... 40	0 ... 10 V	4 ... 20 mA	1709211	PREL-186-HP3-V1-A-40CFX-1
		0 ... 10 V	1709212	PREL-186-HP3-V1-V-40CFX-1
	4 ... 20 mA	4 ... 20 mA	1709213	PREL-186-HP3-A4-A-40CFX-1
Without external auxiliary pilot air, with shut-off valve PAHL				
0.4 ... 40	0 ... 10 V	4 ... 20 mA	1709208	PREL-186-HP3-V1-A-40CFX2-1
		0 ... 10 V	1709209	PREL-186-HP3-V1-V-40CFX2-1
	4 ... 20 mA	4 ... 20 mA	1709210	PREL-186-HP3-A4-A-40CFX2-1

Shut-off valves PAHL, series L

Peripherals overview and type codes

FESTO

Accessories



Mounting components and accessories

		→ Page/Internet
1	Silencer (included in the scope of delivery) U-3/4-B	51
2	Proximity switch (included in the scope of delivery) SME-8	51
3	Connecting cable KMC	51
4	Illuminating seal MC-LD	51
5	Connecting cable NEBU-M8	51

Type codes

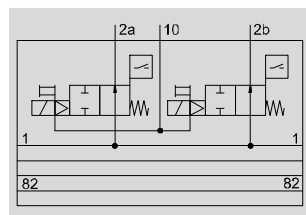
	PAHL	–	SM	–	RE
Service function					
PAHL	Shut-off valve, series L				
Product type					
SM	Two-channel				
Designation					
RE	For electric pressure regulator PREL				

Shut-off valves PAHL, series L

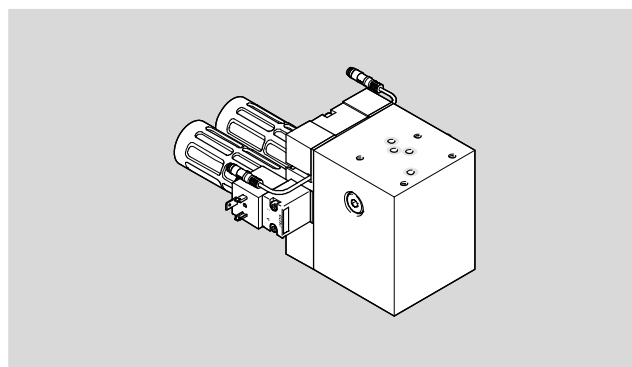
Technical data

FESTO

Function



-  Temperature range
+5 ... +50 °C
-  Operating pressure
0 ... 50 bar



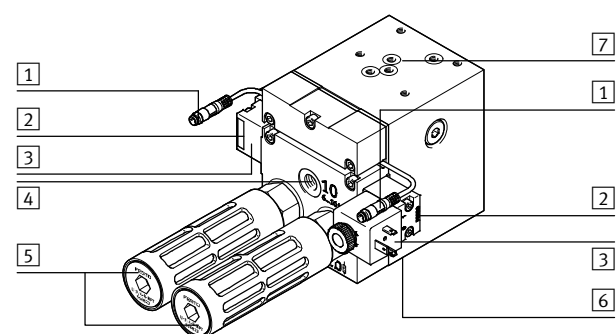
The two-channel shut-off valve PAHL is intended for shutting off the pilot air to the pneumatically piloted electric pressure regulator PREL-186. The PAHL is equipped with two 2/2-way poppet valves, which are actuated by means of pilot solenoid valves. Proximity switches are integrated for monitoring the switching position of the poppet valves. The safety function is achieved through two-channel

venting of the pilot pressure. The shut-off valve can be used in combination with the pressure regulator PREL-186 to implement the safety function "Exhausting the control chamber". The safety function can only be achieved through appropriate activation and evaluation of the sensor signals. In combination with connecting plates, the shut-off valve PAHL can

also be used for other applications, such as between the pilot valve and control chamber of a pressure regulator. A safety function can only be achieved through appropriate activation and evaluation of the sensor signals and must be checked by the operator. The valve is not suitable for safe switch-off of an inlet pressure in any application case.

The shut-off valve PAHL may only be retrofitted in the following electric pressure regulators PREL-186:

- PREL-186-HP3-V1-A-40CFX-1 (part no. 1709211)
- PREL-186-HP3-V1-V-40CFX-1 (part no. 1709212)
- PREL-186-HP3-A4-A-40CFX-1 (part no. 1709213)



- 1 Electrical connection for proximity switch (M8x1, 3-pin)
- 2 Manual override
- 3 Solenoid valve
- 4 Pneumatic connection G $\frac{1}{4}$ [10] – Auxiliary pilot air
- 5 2x Connection G $\frac{3}{4}$ [2a/2b] for silencer (included in scope of delivery)
- 6 Interface to electric pressure regulator PREL-186
- 7 Interface to proportional pressure regulator VPPL

- 7 Interface to proportional pressure regulator VPPL

 Note
A proportional pressure regulator VPPL with external auxiliary pilot air must not be used with the shut-off valve PAHL in any circumstances.

Safety data	
Conforms to standard	EN ISO 13849-1
Safety function	Exhausting the control chamber
Performance Level (PL)	Exhausting the control chamber: category 3, PL d
CCF measures	Safely keep operating pressure within the limits of the technical specifications
	Maintain operating voltage limits
	Observe compressed air quality
	Comply with maximum vibration and shock loads
	Use of approved silencer
	Adhere to pulse pattern at timed safety outputs
	Comply with pilot pressure with external pilot air supply within the limits of the technical specifications
	Comply with ambient temperature and temperature of medium
	Adhere to permissible magnetic fields
CE marking (see declaration of conformity) ¹⁾	To EC Machinery Directive
Shock resistance	Shock test with severity level 2 to FN 942017-5 and EN 60068-2-27
Vibration resistance	Transport application test with severity level 2 to FN 942017-4 and EN 60068-2-6

1) Additional information www.festo.com/sp → Certificates.

Shut-off valves PAHL, series L

FESTO

Technical data

General technical data	
Pneumatic connection 10	G $\frac{1}{4}$
Pneumatic connection 2a	G $\frac{3}{4}$
Pneumatic connection 2b	G $\frac{3}{4}$
Type of actuation	Electric
Design	Piloted piston poppet valve
Type of mounting	In-line installation
Mounting position	Any, preferably vertical
Valve function	2x 2/2 poppet valves, open, single-solenoid
Manual override (on the solenoid valve)	Detenting
	Non-detenting
Reset method	Mechanical spring
Type of piloting	Piloted
Pilot air supply port	External
Sealing principle	Soft

Electrical data	
Nominal operating voltage [V DC]	24
Switching position sensing	Normal position with sensor
Solenoid valve	
Operating voltage range [V DC]	21.6 ... 26.4
Electrical connection	To EN 175301-803, type A
Signal status display	LED
Duty cycle [%]	100
Sensor	
Operating voltage range, sensor [V DC]	10 ... 30
Sensor connection	Cable with plug M8x1, 3-pin
Switching status display sensor	LED
Switching element function	N/O contact

Operating and environmental conditions	
Operating pressure [bar]	0 ... 50
Pilot pressure [bar]	6 ... 10
Operating/pilot medium	Compressed air to ISO 8573-1:2010 [7:4:4]
	Inert gases
Ambient temperature [°C]	5 ... +50
Temperature of medium [°C]	5 ... +50
Storage temperature [°C]	-10 ... +60
Corrosion resistance class CRC ¹⁾	2
CE marking (see declaration of conformity) ²⁾	To EC Machinery Directive

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.

2) Additional information www.festo.com/sp → Certificates.

Weight [g]	
Shut-off valve	3500

Materials	
Housing	Anodised aluminium
Note on materials	RoHS compliant
	Contains paint-wetting impairment substances

Shut-off valves PAHL, series L

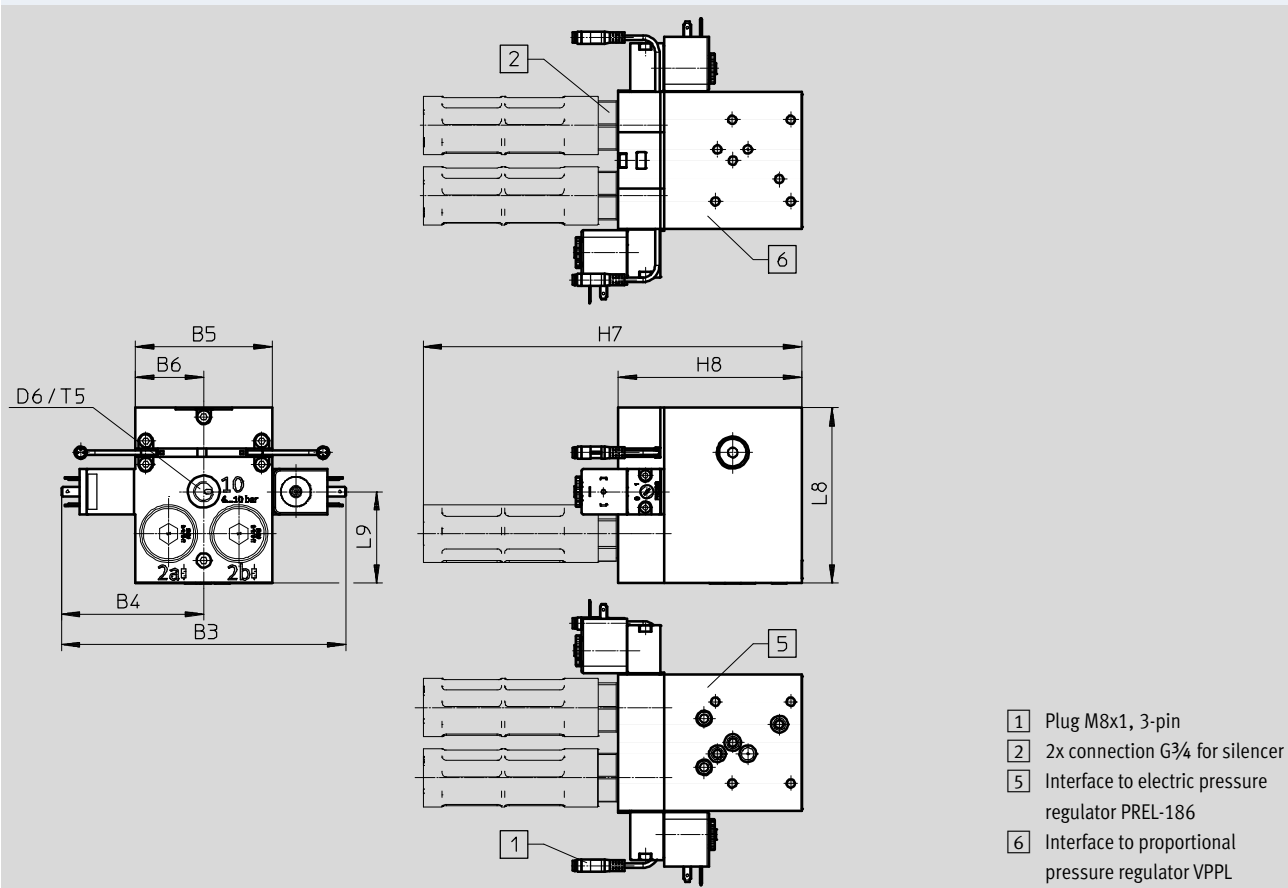
Technical data

FESTO

Dimensions

Download CAD data → www.festo.com

PAHL-SM-RE



Type	B3	B4	B5	B6	D6	H7	H8	L8	L9	T5
PAHL-SM-RE	~186	~94	~90	~45	G $\frac{1}{4}$	~248	120	115	60	12

Ordering data

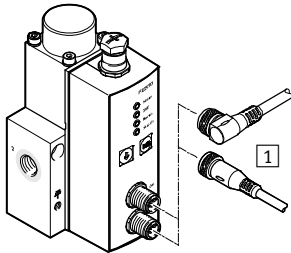
Type of actuation	Part No.	Type
Electrical	1709707	PAHL-SM-RE

Proportional pressure regulators VPPL, series L

Peripherals overview and type codes

FESTO

Accessories



	→ Page/Internet
1 Connecting cable NEBU-M12	51

Type codes

VPPL - 3 Q - 3 - - OL 40H - V1 - V - S1 - 1

Type	
VPPL	Proportional pressure regulator for electric pressure regulator PREL, series L

Nominal width	
3	3 mm

Design	
Q	Flanged valve
L	In-line valve

Valve function	
3	3/3-way valve, closed

Pneumatic connection	
-	Flange
G14	ISO thread G $\frac{1}{4}$
Z	Flange/thread combination for connection 1 (external pilot air)

Lower pressure value of control range	
0L	0 bar
2L	2 bar

Upper pressure value of control range	
20H	20 bar
40H	40 bar

Setpoint value (input), valve	
A4	4 ... 20 mA
V1	0 ... 10 V

Actual value (output), valve	
A	4 ... 20 mA
V	0 ... 10 V

Accuracy	
S1	1 %

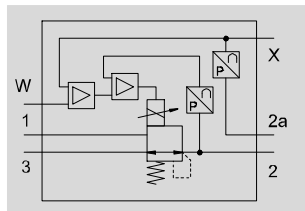
Valve variant	
1 ... 20	Variant 1 ... 20

Proportional pressure regulators VPPL, series L

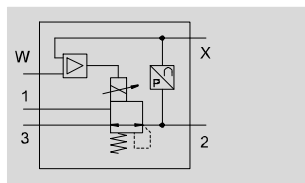
FESTO

Technical data

Function
Flanged valve



In-line valve



-  - Temperature range
+5 ... +50 °C
-  - Operating pressure
0 ... 50 bar



The outlet pressure of the electric pressure regulator PREL is determined by the proportional pressure regulator VPPL via an integrated pressure sensor and compared internally to the setpoint value. In case of deviations, the VPPL actuates the regulator of the PREL until the outlet pressure reaches the setpoint value. In initial position

(no setpoint specification), the outlet pressure is reduced with the vent seat fully open.

The proportional pressure regulator VPPL is available in three versions:

- Flanged valve VPPL-3Q-3
- Flanged valve with external pilot air supply VPPL-3Q-3-Z
- In-line valve VPPL-3L-3

-  - Note

The flanged valve with and without external pilot air supply can only be operated together with the electric pressure regulator PREL.

-  - Safety instructions

Safety position for VPPL: if the power supply cable is interrupted, the outlet pressure drops to 0 bar.

General technical data							
Design	Flanged valve VPPL-3Q-3		Flanged valve with external pilot air supply VPPL-3Q-3-Z			In-line valve VPPL-3L-3	
Type	-0L20H	-0L40H	-0L20H	-0L40H	-2L40H	-G14-0L20H	-G14-0L40H
Nominal size [mm]	2.5						
pressurisation/exhaust							
Pneumatic connection 1	Flange	Flange	Flange, G $\frac{1}{4}$	Flange, G $\frac{1}{4}$	Flange, G $\frac{1}{4}$	G $\frac{1}{4}$	G $\frac{1}{4}$
Pneumatic connection 2, 3	Flange	Flange	Flange	Flange	Flange	G $\frac{1}{4}$	G $\frac{1}{4}$
Type of actuation	Electric						
Design	Directly actuated piston regulator						
Type of mounting	With through-hole						
Mounting position	Any, preferably vertical						
Pressure regulation range [bar]	0.2 ... 20	0.4 ... 40	0.2 ... 20	0.4 ... 40	2 ... 40	0.2 ... 20	0.4 ... 40
Max. pressure hysteresis [bar]	0.1	0.3	0.1	0.3	0.3	0.1	0.3
Valve function	3-way proportional pressure regulator, closed						
Exhaust air function	No flow control						
Reset method	Mechanical spring						
Type of piloting	Direct						
Sealing principle	Soft						

Flow rate characteristics	
Standard nominal flow rate $q_{nN}^{1)}$ [l/min]	
In main flow direction 1 $\rightarrow$ 2	300
C value [l/s*bar]	
In main flow direction 1 $\rightarrow$ 2	0.8
b value	
In main flow direction 1 $\rightarrow$ 2	0.25

1) Measured at $p_1 = 6$ bar and $p_2 = 5$ bar, $\Delta p = 1$ bar

Proportional pressure regulators VPPL, series L

FESTO

Technical data

Electrical data				
Type		VPPL-...-V1-A	VPPL-...-V1-V	VPPL-...-A4-A
Electrical connection	IN	Plug, M12, 5-pin, A-coded		
	OUT	Plug, M12, 5-pin, A-coded		
Electrical connection, diagnostic interface ¹⁾		Socket, M12, 5-pin, A-coded		
Operating voltage range	[V DC]	21.6 ... 27.6		
Analogue input signal range	[V]	0 ... 10	0 ... 10	–
	[mA]	–	–	4 ... 20
Analogue output signal range	[V]	–	0 ... 10	–
	[mA]	4 ... 20	–	4 ... 20
Setpoint/actual values	[V]	Voltage type 0 ... 10		–
	[A]	–		Current type 4 ... 20
Degree of protection		IP65		
Duty cycle	[%]	100		
Switching time off	[ms]	550		
Switching time on	[ms]	300		
Protection against incorrect polarity		For all electrical connections		
Protection against short circuit		No		
Display type		LED display		
Max. electrical power consumption	[W]	26.7		
Residual ripple	[%]	10		

1) Diagnostics interface covered with a tamper-proof cap, for use only by Festo service staff.

Accuracy			
Type		VPPL-...-0L20H	VPPL-...-0L40H
Linearity error	[% FS]	±0.5	±1
Temperature coefficient	[%/K]	0.04	
Repetition accuracy	[% FS]	±0.5	±1

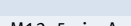
Operating and environmental conditions		
Operating pressure	[bar]	0 ... 50
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]	
	Inert gases	
Note on operating/pilot medium		Lubricated operation not possible
Ambient temperature	[°C]	+5 ... +50
Temperature of medium	[°C]	+5 ... +50
Storage temperature	[°C]	–10 ... +60
Corrosion resistance class CRC ¹⁾	2	
CE mark (see declaration of conformity) ²⁾	To EU EMC Directive	

- 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.
- 2) 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.

Weight [g]	
Proportional pressure regulator	1100

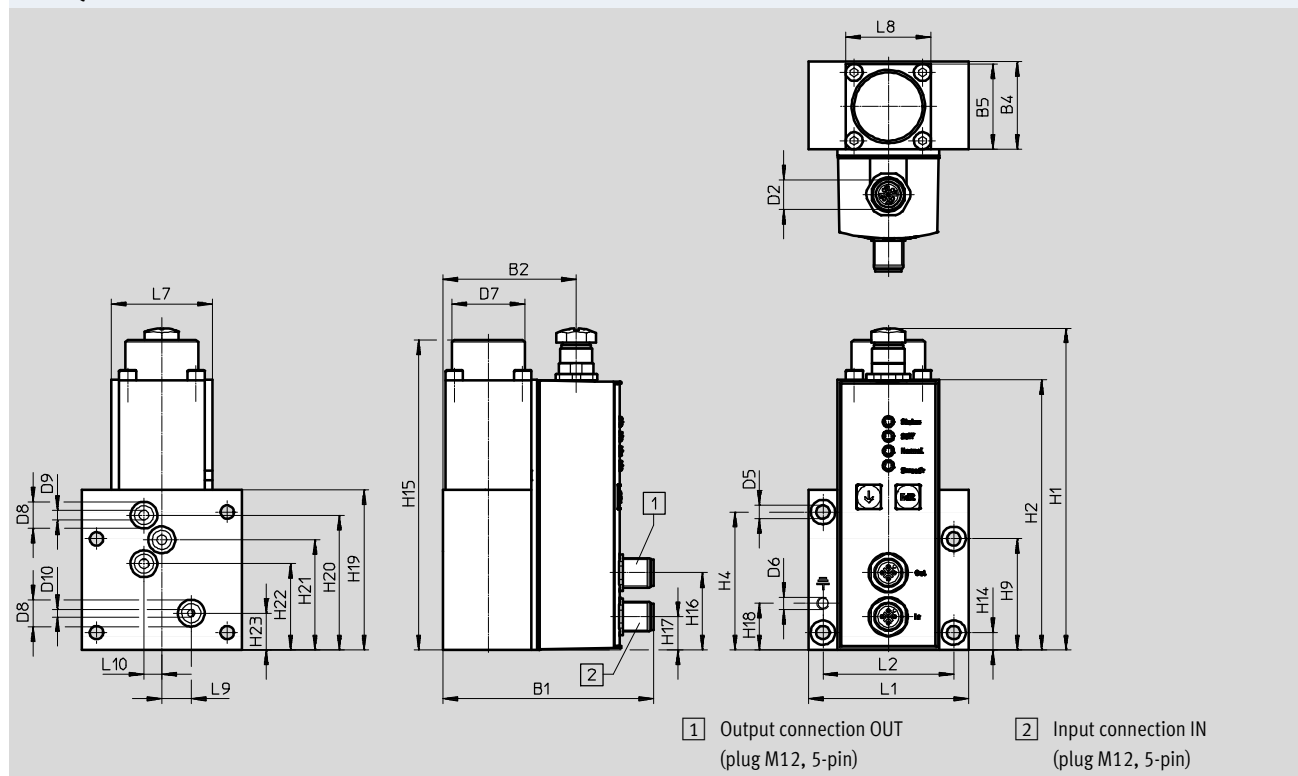
Technical data

Materials	
Housing	Anodised wrought aluminium alloy
Note on materials	RoHS compliant
	Contains paint-wetting impairment substances

Pin allocation			
Plug connector M12, 5-pin, A-coded	Pin	Output connection OUT Actual value	Input connection IN Setpoint value/power supply
	1	Not assigned	24 V DC
	2	Analogue OUT+ (actual value)	Analogue IN+ (setpoint value)
	3	Not assigned	0 V
	4	Analogue OUT- (actual value)	Analogue IN- (setpoint value)
	5	Functional earth	Functional earth

Download CAD data → www.festo.com

Download CAD data → www.festo.com



Type	B1	B2	B4	B5	D2	D5 Ø	D6	D7 Ø	D8 Ø	D9 Ø	D10 Ø
VPPL-3Q-3	86.1	54.5	36	35	M12	5.5	M5	30	11	4	3

Type	H1	H2	H4	H9	H14	H15	H16	H17	H18	H19
VPPL-3Q-3	132	110.5	56.5	45.5	7.1	127	31.5	13.5	19.1	65.5

Type	H20	H21	H22	H23	L1	L2	L7	L8	L9	L10
VPPL-3Q-3	55.2	45.1	35.3	15.05	65.5	53.5	41.5	35	12.05	7.3

Proportional pressure regulators VPPL, series L

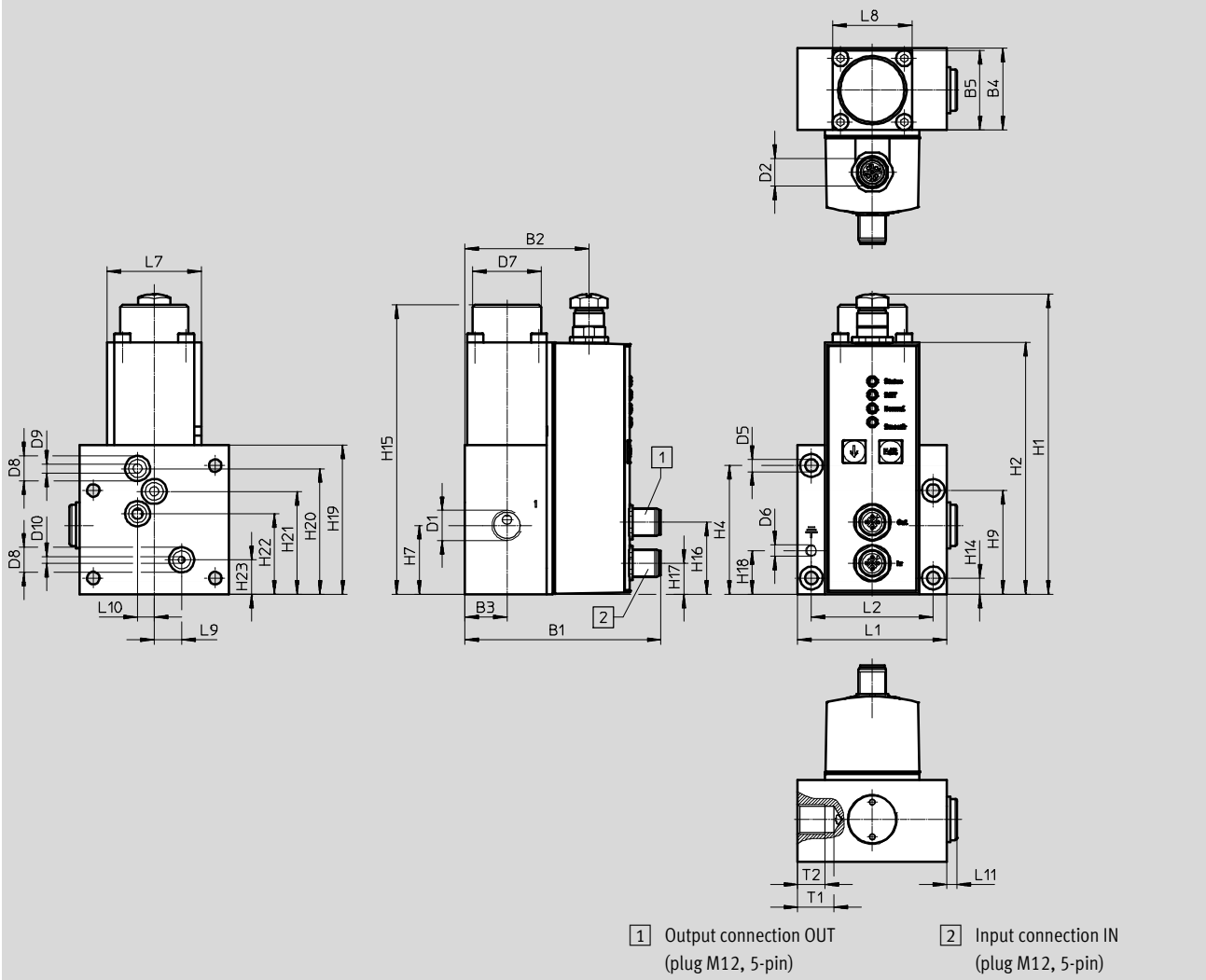
Technical data

FESTO

Dimensions – Flanged valve with external pilot air

Download CAD data → www.festo.com

VPPL-3Q-3-Z



Type	B1	B2	B3	B4	B5	D1	D2	D5 Ø	D6	D7 Ø	D8 Ø	D9 Ø	D10 Ø
VPPL-3Q-3-Z	86.1	54.5	18.5	36	35	G $\frac{1}{4}$	M12	5.5	M5	30	11	4	3

Type	H1	H2	H4	H7	H9	H14	H15	H16	H17	H18	H19	H20
VPPL-3Q-3-Z	132	110.5	56.5	30.2	45.5	7.1	127	31.5	13.5	19.1	65.5	55.2

Type	H21	H22	H23	L1	L2	L7	L8	L9	L10	L11	T1	T2
VPPL-3Q-3-Z	45.1	35.3	15.05	65.5	53.5	41.5	35	12.05	7.3	4.5	16	12

Proportional pressure regulators VPPL, series L

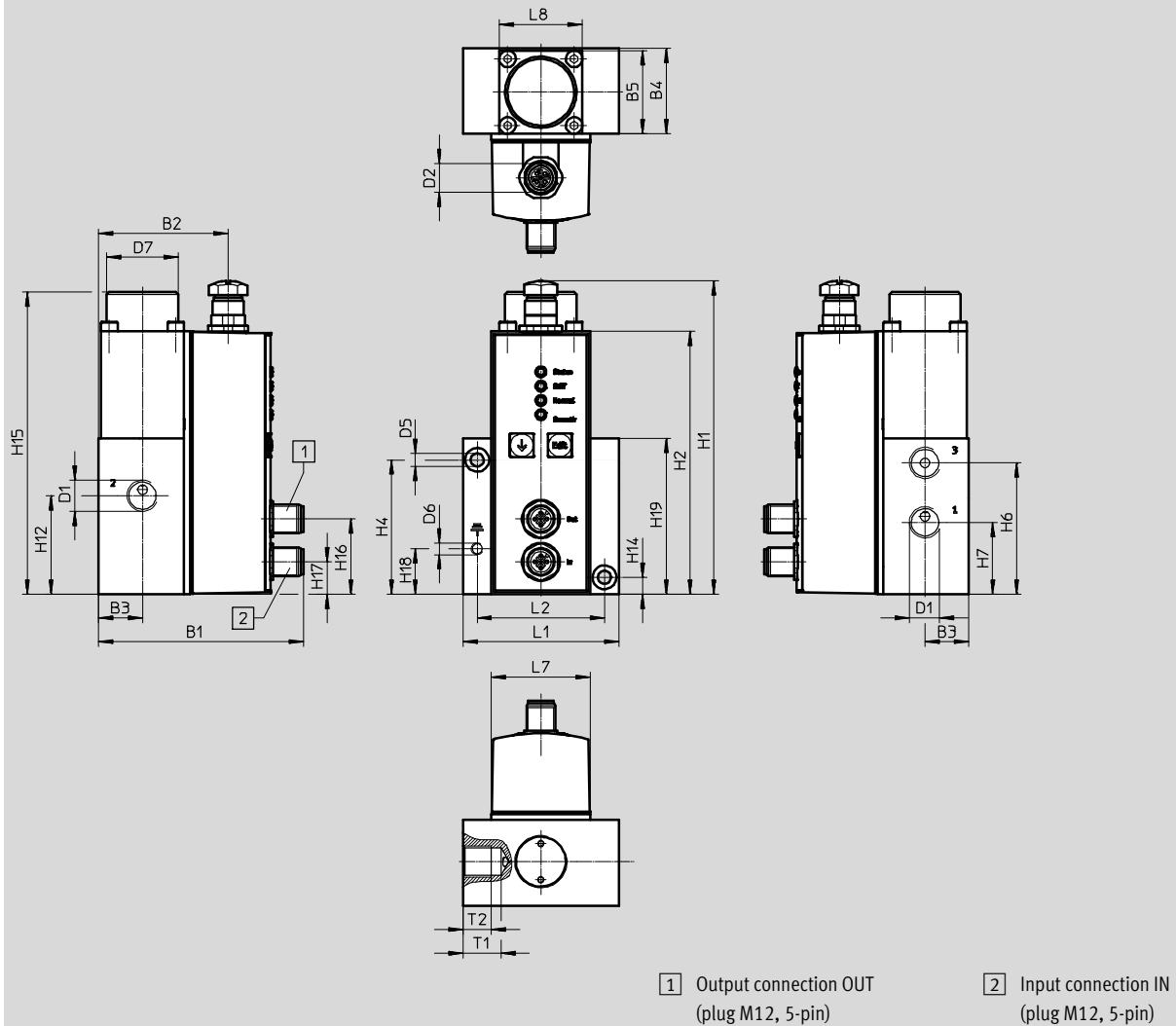
Technical data

FESTO

Dimensions – In-line valve

Download CAD data → www.festo.com

VPPL-3L-3-G14



Type	B1	B2	B3	B4	B5	D1	D2	D5 Ø	D6	D7 Ø
VPPL-3L-3-G14	86.1	54.5	18.5	36	35	G $\frac{1}{4}$	M12	5.5	M5	30

Type	H1	H2	H4	H6	H7	H12	H14	H15	H16
VPPL-3L-3-G14	132	110.5	56.5	55.2	30.2	41.4	7.1	127	31.5

Type	H17	H18	H19	L1	L2	L7	L8	T1	T2
VPPL-3L-3-G14	13.5	19.1	65.5	65.5	53.5	41.5	35	16	12

Proportional pressure regulators VPPL, series L



Technical data

Ordering data					
Pneumatic connection 1	Pressure regulation range [bar]	Setpoint value (input)	Actual value (output)	Part No.	Type
Flanged valve					
Flange	0.2 ... 20	0 ... 10 V	4 ... 20 mA	1635984	VPPL-3Q-3-0L20H-V1-A-S1-2
			0 ... 10 V	1635987	VPPL-3Q-3-0L20H-V1-V-S1-2
		4 ... 20 mA	4 ... 20 mA	1635990	VPPL-3Q-3-0L20H-A4-A-S1-2
	0.4 ... 40	0 ... 10 V	4 ... 20 mA	1635973	VPPL-3Q-3-0L40H-V1-A-S1-1
			0 ... 10 V	1635978	VPPL-3Q-3-0L40H-V1-V-S1-1
		4 ... 20 mA	4 ... 20 mA	1635981	VPPL-3Q-3-0L40H-A4-A-S1-1
Flanged valve with external pilot air					
Flange, G $\frac{1}{4}$	0.2 ... 20	0 ... 10 V	4 ... 20 mA	1635975	VPPL-3Q-3-Z-0L20H-V1-A-S1-4
			0 ... 10 V	1635988	VPPL-3Q-3-Z-0L20H-V1-V-S1-4
		4 ... 20 mA	4 ... 20 mA	1635991	VPPL-3Q-3-Z-0L20H-A4-A-S1-4
	0.4 ... 40	0 ... 10 V	4 ... 20 mA	1910709	VPPL-3Q-3-Z-0L40H-V1-A-S1-8
		2 ... 40	0 ... 10 V	4 ... 20 mA	1635982
	In-line valve				
G $\frac{1}{4}$	0.2 ... 20	0 ... 10 V	4 ... 20 mA	1635986	VPPL-3L-3-G14-0L20H-V1-A-S1-6
			0 ... 10 V	1635989	VPPL-3L-3-G14-0L20H-V1-V-S1-6
		4 ... 20 mA	4 ... 20 mA	1635992	VPPL-3L-3-G14-0L20H-A4-A-S1-6
	0.4 ... 40	0 ... 10 V	4 ... 20 mA	1635977	VPPL-3L-3-G14-0L40H-V1-A-S1-7
			0 ... 10 V	1635980	VPPL-3L-3-G14-0L40H-V1-V-S1-7
		4 ... 20 mA	4 ... 20 mA	1635983	VPPL-3L-3-G14-0L40H-A4-A-S1-7

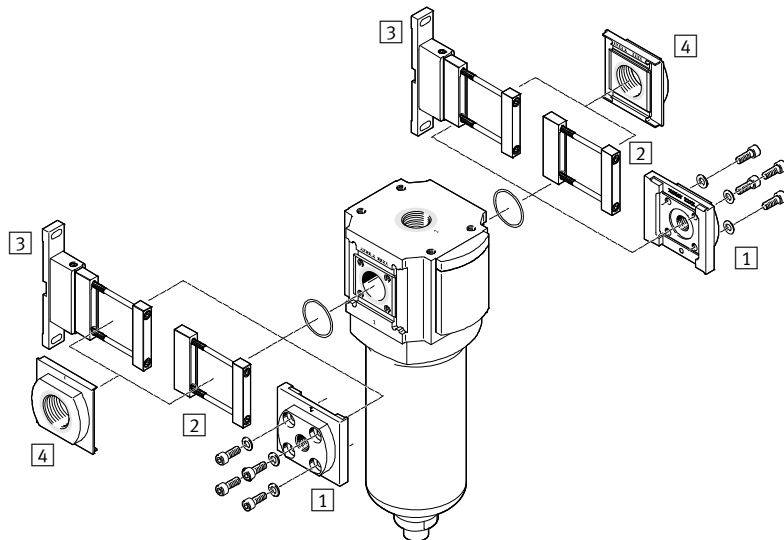
Micro filter PFML, series L

Peripherals overview

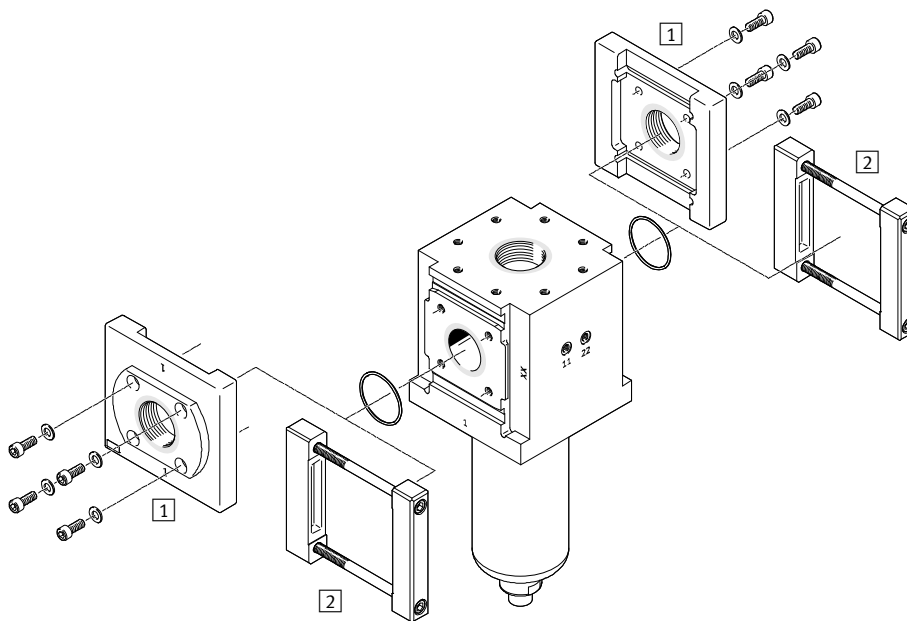
FESTO

Accessories

Size 90



Size 186



Mounting components and accessories

		→ Page/Internet
1	Connecting plate PAML-CP	42
2	Module connector PAML-MK	45
3	Mounting bracket PAML-MB	47
4	Connecting plate PAML-CP-...-G114	42

Micro filter PFML, series L

Type codes

FESTO

		PFML	-	90	-	HP3	-		-	A	ST
Service function											
PFML	Micro filter, series L										
Size											
90	90 mm										
186	186 mm										
Pressure range											
HP3	0 ... 50 bar										
Flow range											
	Standard										
H	High flow rate (size 186 only)										
Grade of filtration											
A	0.01 µm										
Material of bowl											
ST	Steel										

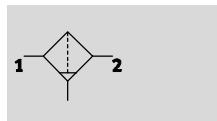
Micro filter PFML, series L

FESTO

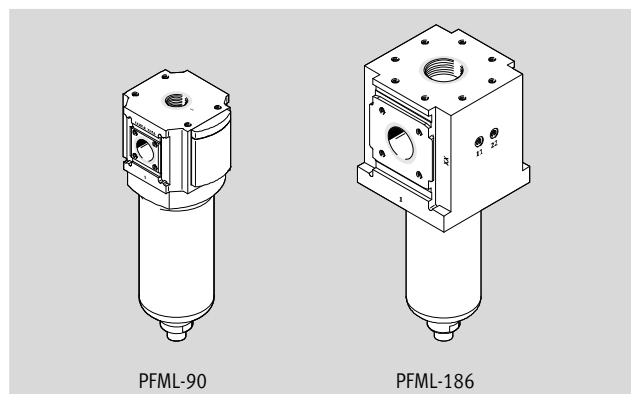
Technical data

Function

Manual condensate drain



- Flow rate
3406 ... 138233 l/min
- Temperature range
+5 ... +60 °C
- Operating pressure
0 ... 50 bar



PFML-90

PFML-186

Micro filter with filter cartridges made from thermally fused microfine borosilicate and stable polyester fibres. Direction of flow through the filter cartridges is from the inside to the outside.

Condensate drain via connecting thread G $\frac{1}{2}$ on the underside of the filter bowl, differential pressure sensing via two connecting threads G $\frac{1}{8}$ each on the front and rear side.

Alternative pneumatic connection 1 on the upper side of the housing via an internal thread.

On/off valves PVEL can be connected to the alternative connection 1 on the upper side of the micro filter via double nipples or directly using special connection plates.

General technical data			
Size	90	186	
Type	PFML-90-HP3-AST	PFML-186-HP3-AST	PFML-186-HP3-H-AST
Design	Fibre filter		
Type of mounting	In-line installation		
Mounting position	Vertical $\pm 5^\circ$		
Grade of filtration [μ m]	0.01		
Filter efficiency [%]	99.99998		
Air quality class at the outlet port	Compressed air to ISO 8573-1:2010 [1:4:2]		
Condensate drain	Manual		
Max. condensate volume [cm ³]	200	400	
Volume	3	6.7	

Operating and environmental conditions			
Size	90	186	
Type	PFML-90-HP3-AST	PFML-186-HP3-AST	PFML-186-HP3-H-AST
Operating pressure [bar]	0 ... 50		
Operating medium	Compressed air to ISO 8573-1:2010 [2:4:4]		
	–	Inert gases	
Note on operating/pilot medium	Lubricated operation not possible		
Ambient temperature [°C]	+5 ... +60		
Temperature of medium [°C]	+5 ... +60		
Storage temperature [°C]	–10 ... +60		
Corrosion resistance class CRC ¹⁾	2		
CE marking (see declaration of conformity) ²⁾	To EU Pressure Equipment Directive		
Food-safe ²⁾	See Supplementary material information		

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.

2) Additional information www.festo.com/sp → Certificates.

Micro filter PFML, series L

Technical data

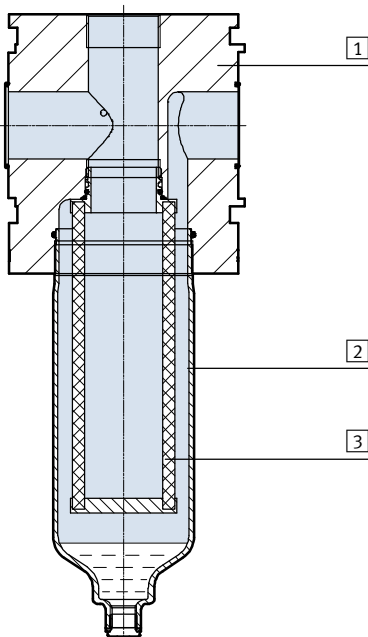
FESTO

Standard flow rate q_n [l/min]				
Size		90	186	
Type		PFML-90-HP3-AST	PFML-186-HP3-AST	PFML-186-HP3-H-AST
Max. standard flow rate $q_{n \max}$ for air quality class	At $p_1 = 6$ bar	10220	10220	18980
	At $p_1 = 20$ bar	30683	30683	56983
	At $p_1 = 25$ bar	37916	37916	70416
	At $p_1 = 30$ bar	45266	45266	84066
	At $p_1 = 35$ bar	52500	52500	97500
	At $p_1 = 40$ bar	59850	59850	111150
	At $p_1 = 45$ bar	67083	67083	124583
Min. standard flow rate $q_{n \min}$ for air quality class	At $p_1 = 50$ bar	74433	74433	138233
	At $p_1 = 6$ bar	3406	3406	6326
	At $p_1 = 20$ bar	10227	10227	18994
	At $p_1 = 25$ bar	12638	12638	23472
	At $p_1 = 30$ bar	15088	15088	28022
	At $p_1 = 35$ bar	17500	17500	32500
	At $p_1 = 40$ bar	19950	19950	37050
	At $p_1 = 45$ bar	22361	22361	41527
	At $p_1 = 50$ bar	24811	24811	46077

Weight [g]			
Size		90	186
Type		PFML-90-HP3-AST	PFML-186-HP3-AST
Micro filters		7700	17900
			21000

Materials

Sectional view



Micro filters		
1	Housing	Wrought aluminium alloy
2	Bowl	High-alloy stainless steel
3	Filter	Borosilicate fibre
–	Seals	Nitrile rubber
Note on materials		RoHS compliant
		Contains paint-wetting impairment substances

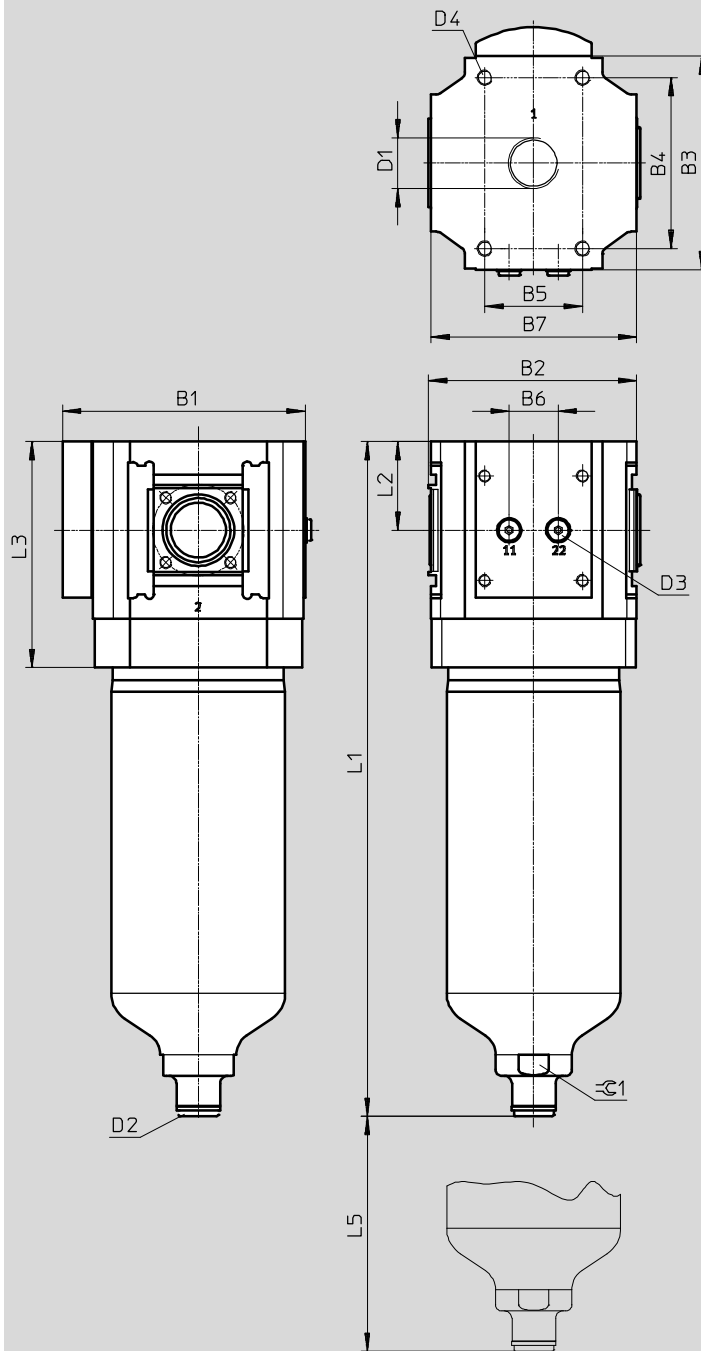
Micro filter PFML, series L

Technical data

FESTO

Dimensions – Size 90

Download CAD data → www.festo.com



Type	B1	B2	B3	B4	B5	B6	B7	D1	D2	D3	D4	L1	L2	L3	L5 Min.	≈ 1
PFML-90-HP3-AST	159	137	140	112	64	32	135	G1	G ¹ / ₂	G ¹ / ₈	M10	442	58	148	210	46

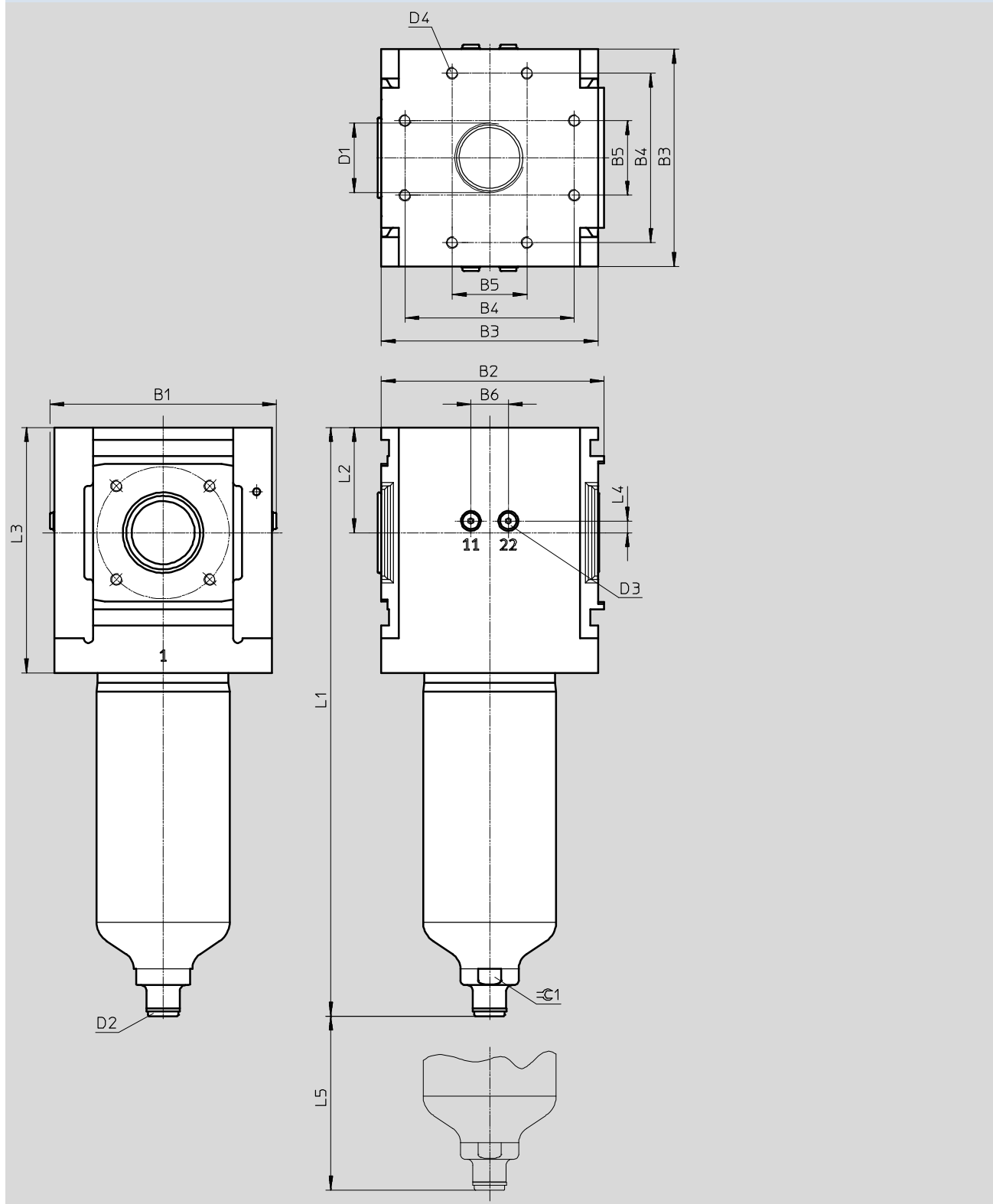
Micro filter PFML, series L

Technical data

FESTO

Dimensions – Size 186

Download CAD data → www.festo.com



Type	B1	B2	B3	B4	B5	B6	D1	D2	D3	D4	L1	L2	L3	L4	L5	≈ 1
PFML-186-HP3-AST	194	191	186	145	64	32	G2	G1/2	G1/8	M10	504	90	210	10	210	46
PFML-186-HP3-H-AST											522		236		200	

Micro filter PFML, series L

FESTO

Technical data

Ordering data			
Flow	Size 90		Size 186
	Part No.	Type	Part No. Type
Standard	1612487	PFML-90-HP3-AST	1364705 PFML-186-HP3-AST
High flow rate	–		1624062 PFML-186-HP3-H-AST

Ordering data for accessories		
Flow	Part No.	Type
Filter cartridges		
Standard	1334716	PFEL-G2-A
High flow rate	1471578	PFEL-G212-H-A

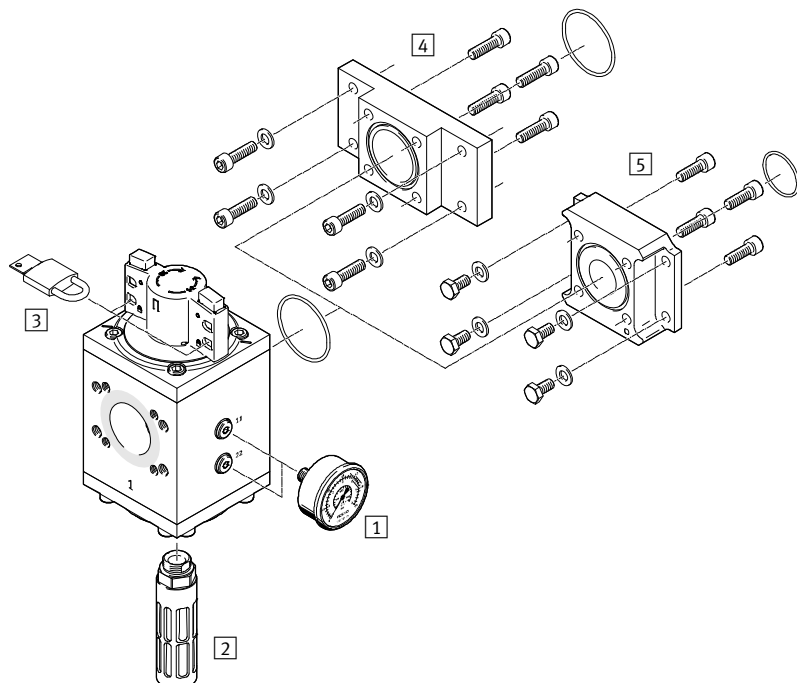
On/off valves PVEL, series L

Peripherals overview and type codes

FESTO

Accessories

Size 124



Mounting components and accessories

		→ Page/Internet
1	Pressure gauge PAGL	49
2	Silencer U-1/2-B	51
3	Padlock (only for PVEL-H-124-HP3) LRVS-D	51
4	Connecting plate kit (for alternative connection on the upper side of the micro filter PFML-186) PAML-CP-186-HP3-E1	On request
5	Connecting plate assembly (for alternative connection on the upper side of the micro filter PFML-90) PAML-CP-90-HP3-E1	On request

Type codes

		PVEL	-	H	-	124	-	HP3
Service function								
PVEL	On/off valve, series L							
Type of actuation								
H	Manually actuated							
P	Pneumatically actuated							
Size								
124	124 mm							
Pressure range								
HP3	0 ... 50 bar							

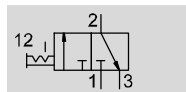
On/off valves PVEL, series L

FESTO

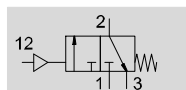
Technical data

Function

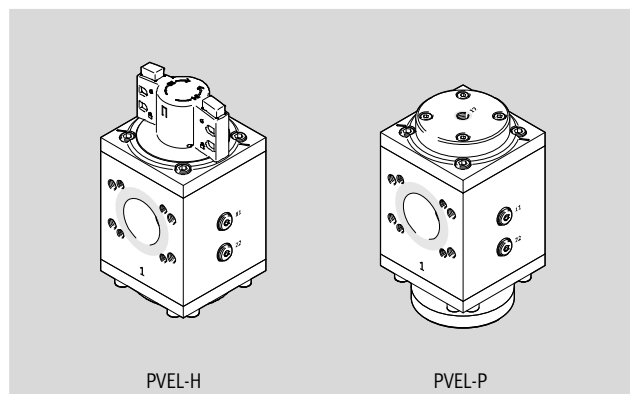
PVEL-H, manually actuated



PVEL-P, pneumatically actuated



-  - Temperature range
-10 ... +60 °C
-  - Operating pressure
0 ... 50 bar



The PVEL-H has a detenting intermediate position which enables slow pressurisation (slow start) of the system. A marking on the top cover indicates the position of the rotating dial for the

slow start. In the closed state, the PVEL-H can be locked using up to 4 padlocks. The PVEL-P is switched by an external

pneumatic signal and has a throttle point on the inside. A slow switch-on can be achieved by restricting the pilot air build-up.

- Connection options for pressure gauge on the front and rear side, one each for the operating and outlet pressure
- Interface for SAE flange 2 1/2"

General technical data		
Type	PVEL-H	PVEL-P
Nominal width DN	54	
Pneumatic connection 3	G1/2	
Pilot air port 12	-	G1/4
Type of actuation	Manual	Pneumatic
Design	Piston spool	
Type of mounting	In-line installation	
Mounting position	Any	
Actuator lock	Rotating dial with detent, can be locked using accessories	-
Valve function	3/2-way valve, bistable	3/2-way valve, closed, monostable
Exhaust function	No flow control	
Type of reset	Forced	Mechanical spring
Type of piloting	Direct	
Pilot air supply port	-	External
Sealing principle	Soft	

Operating and environmental conditions		
Type	PVEL-H	PVEL-P
Operating pressure [bar]	0 ... 50	
Pilot pressure [bar]	-	9 ... 50
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4] Inert gases	
Note on operating/pilot medium	Lubricated operation possible (in which case lubricated operation will always be required)	
Ambient temperature [°C]	-10 ... +60	
Temperature of medium [°C]	-10 ... +60	
Storage temperature [°C]	-10 ... +60	
Corrosion resistance class CRC ¹⁾	2	
CE marking (see declaration of conformity) ²⁾	To EU Pressure Equipment Directive	
Food-safe ²⁾	See Supplementary material information	

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.

2) Additional information www.festo.com/sp → Certificates.

On/off valves PVEL, series L

FESTO

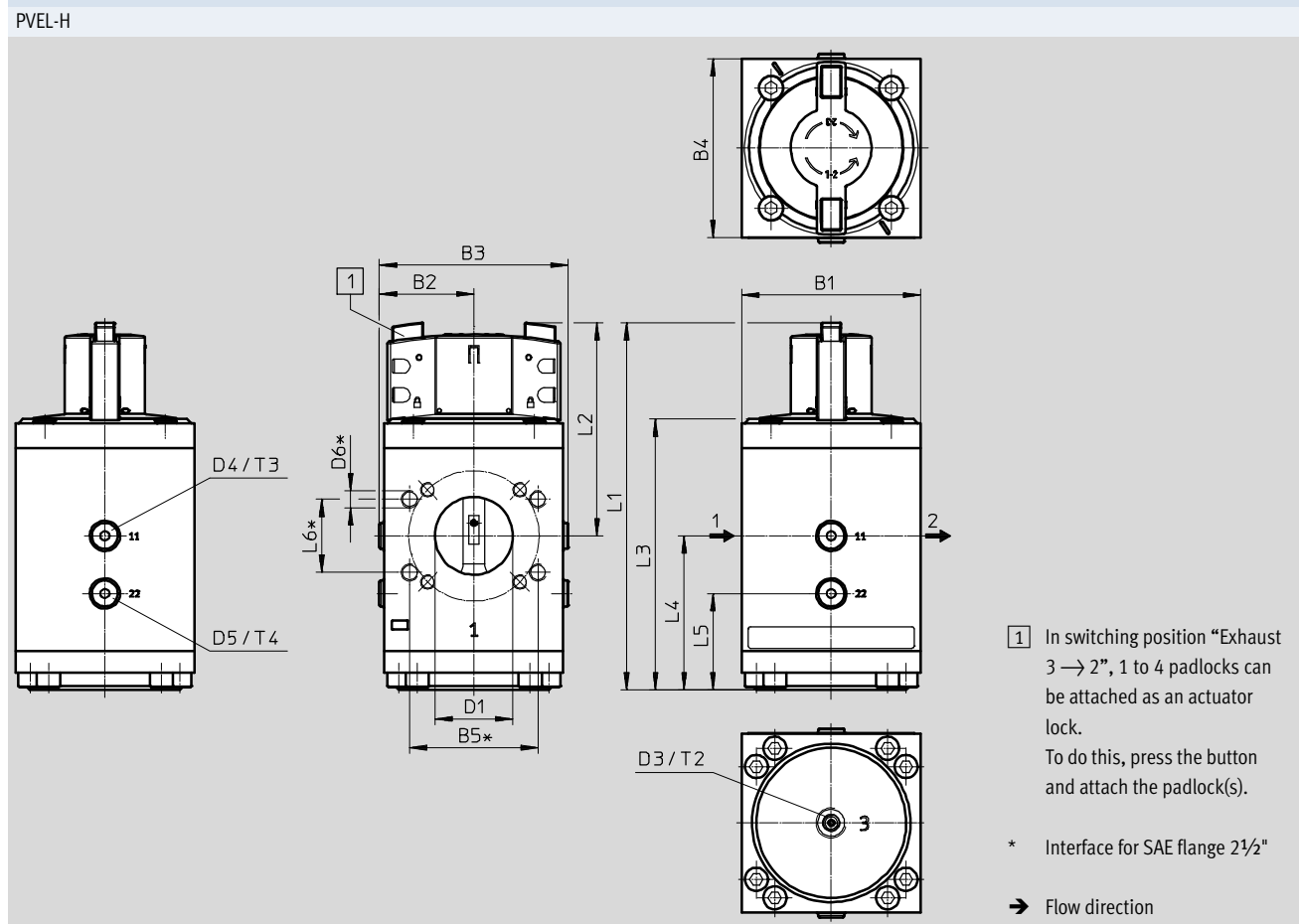
Technical data

Weight [g]		
Type	PVEL-H	PVEL-P
On/off valve	5900	6900

Materials	
Housing	Wrought aluminium alloy
Piston spool	Wrought aluminum alloy
Rotating dial	POM
Seals	NBR
	PE
Note on materials	RoHS compliant
	Contains paint-wetting impairment substances

Dimensions – Size 124

Download CAD data → www.festo.com



Type	B1	B2	B3	B4	B5	D1 Ø	D3	D4	D5	D6
PVEL-H	124	65.5	131	124	88.9	54	G 1/2	G 1/4	G 1/4	M12x18

Type	L1	L2	L3	L4	L5	L6	T2	T3	T4
PVEL-H	~255	148	188	107	67	50.8	14	12	12

On/off valves PVEL, series L

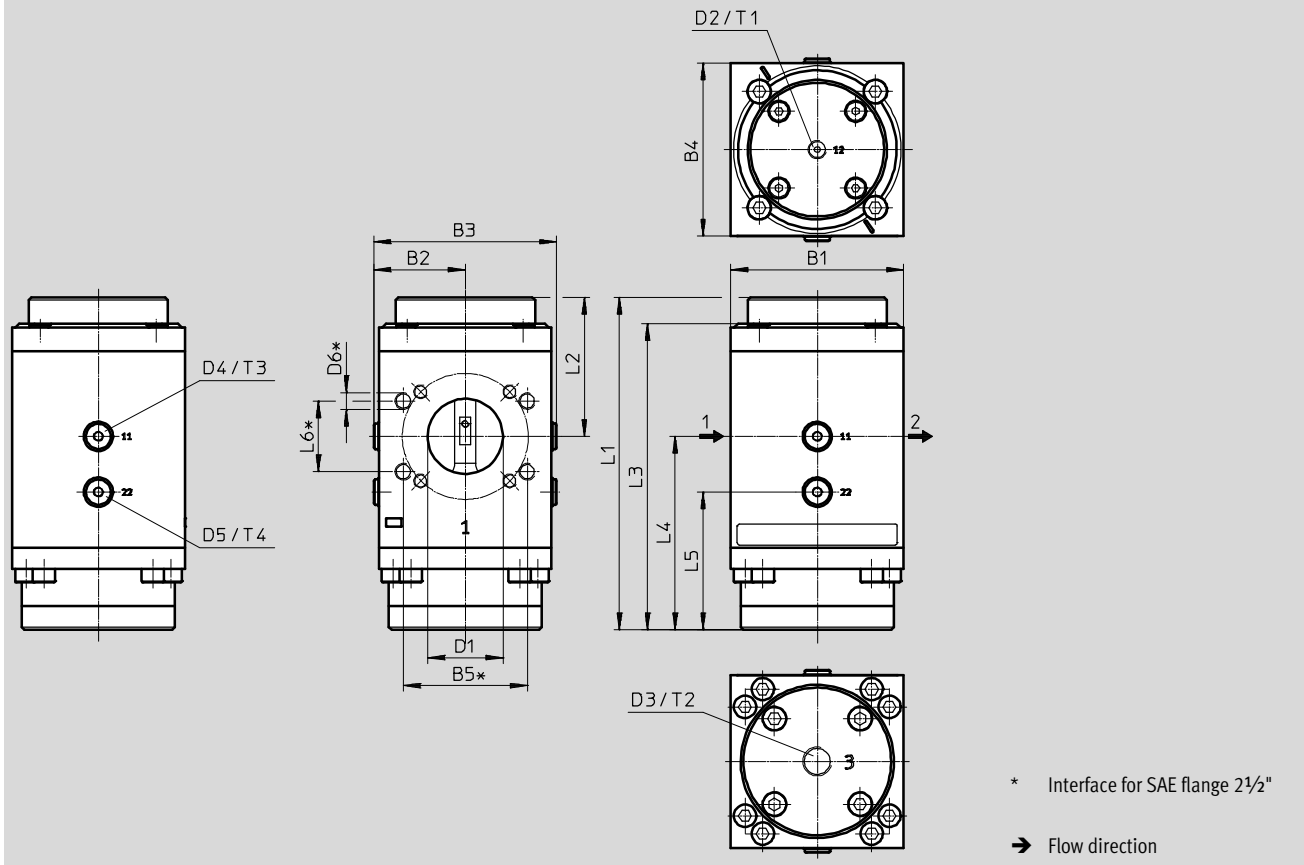
Technical data

FESTO

Dimensions – Size 124

Download CAD data → www.festo.com

PVEL-P



Type	B1	B2	B3	B4	B5	D1 Ø	D2	D3	D4	D5	D6
PVEL-P	124	65.5	131	124	88.9	54	G1/4	G1/2	G1/4	G1/4	M12x18

Type	L1	L2	L3	L4	L5	L6	T1	T2	T3	T4
PVEL-P	~239	100	220	139	99	50.8	12	17	12	12

Ordering data

Type of actuation	Part No.	Type
Manual	1629207	PVEL-H-124-HP3
Pneumatic	1629205	PVEL-P-124-HP3

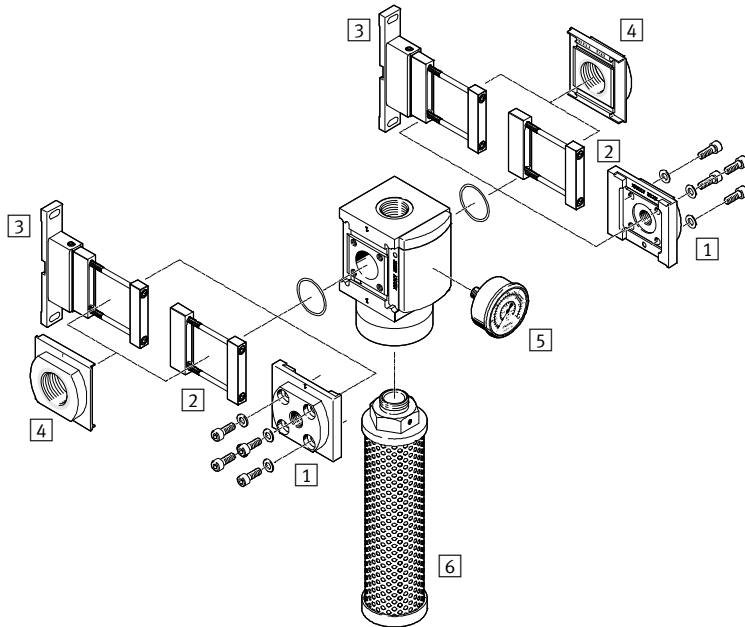
Branching modules PMBL, series L

Peripherals overview

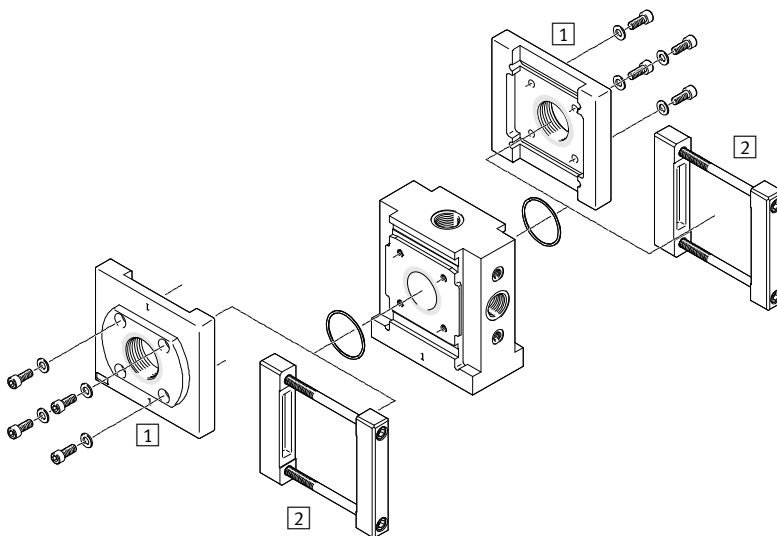
FESTO

Accessories

Size 90



Size 186



Mounting components and accessories

		→ Page/Internet
[1]	Connecting plate PAML-CP	42
[2]	Module connector PAML-MK	45
[3]	Mounting bracket PAML-MB	47
[4]	Connecting plate PAML-CP-...-G114	42
[5]	Pressure gauge PAGL	49
[6]	Silencer (for PMBL-90-HP3-E only) U-G1-HD-SA	On request

Branching modules PMBL, series L

FESTO

Type codes

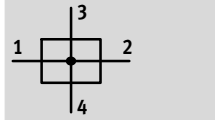
		PMBL	-	90	-	HP3	-		-	
Service function										
PMBL	Branching module, series L									
Size										
90	90 mm									
186	186 mm									
Pressure range										
HP3	0 ... 50 bar									
Exhaust function (size 90 mm only)										
	No exhaust function									
E	Exhaust function									
Width (size 186 mm only)										
H	Half width									

Branching modules PMBL, series L

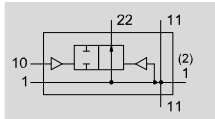
FESTO

Technical data

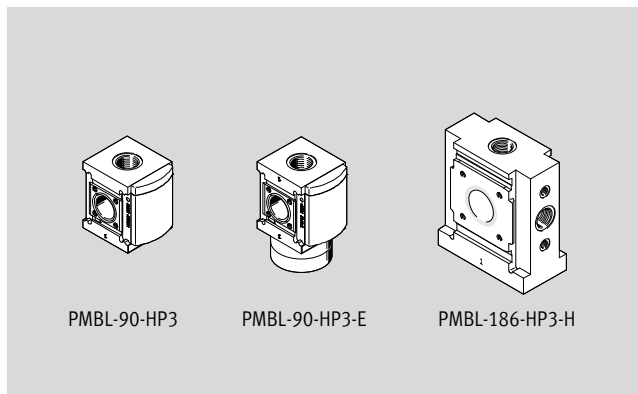
Function
Standard



With exhaust function
(PFML-90-HP3-E)



- - Temperature range
+5 ... +60 °C
- - Operating pressure
0 ... 50 bar



PMBL-90-HP3

PMBL-90-HP3-E

PMBL-186-HP3-H

- Compressed air distributor with various connections
- Can be used as an intermediate distributor for varying compressed air qualities
- Attachment facility for auxiliary modules

Outlets PMBL-90-HP3

- Female thread G1 at top and bottom
- Female thread G $\frac{1}{4}$ at the rear and front (rear cover plate), sealed with blanking plug

Outlets PMBL-90-HP3-E

- Female thread G1 at top, rear and bottom (exhaust port)
- Female thread G $\frac{1}{4}$ at the front (rear cover plate), sealed with blanking plug

Outlets PMBL-186-HP3-H

- Female thread G1 at top, bottom and front
- Female thread G $\frac{1}{4}$ at front (2x) and rear

General technical data			
Size	90		186
Type	PMBL-90-HP3	PMBL-90-HP3-E	PMBL-186-HP3-H
Nominal width DN	36	36	54
Pneumatic connection 3, 4	G1	–	G1
Pneumatic connection 11	–	G1	–
Pilot air port, exhaust function 10	–	G $\frac{1}{4}$	–
Silencer connection, exhaust function 22	–	G1	–
Design	Branching module	Branching module with exhaust function via integrated 2/2-way valve	Branching module
Type of mounting	In-line installation		
Mounting position	Any		

Operating and environmental conditions			
Size	90		186
Type	PMBL-90-HP3	PMBL-90-HP3-E	PMBL-186-HP3-H
Operating pressure [bar]	0 ... 50		
Pilot pressure [bar]	–	0 ... 50	–
Operating medium	Compressed air to ISO 8573-1:2010 [–:–:–]	Compressed air to ISO 8573-1:2010 [7:4:4]	Compressed air to ISO 8573-1:2010 [–:–:–]
Note on operating/pilot medium	Lubricated operation not possible		
Ambient temperature [°C]	+5 ... +60		
Temperature of medium [°C]	+5 ... +60		
Storage temperature [°C]	–10 ... +60		
Corrosion resistance class CRC ¹⁾	2		
CE marking (see declaration of conformity) ²⁾	To EU Pressure Equipment Directive		
Food-safe ²⁾	See Supplementary material information		

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.

2) Additional information www.festo.com/sp ➔ Certificates.

Branching modules PMBL, series L

FESTO

Technical data

Flow rate characteristics			
Size	90		186
Type	PMBL-90-HP3	PMBL-90-HP3-E	PMBL-186-HP3-H
Standard nominal flow rate $q_{nN}^{1)}$ [l/min]			
In main flow direction 1 → 2	49000	49000	117240
In exhaust direction 2 → 3	–	13000	–

1) Measured at $p_1 = 6$ bar and $p_2 = 5$ bar, $\Delta p = 1$ bar

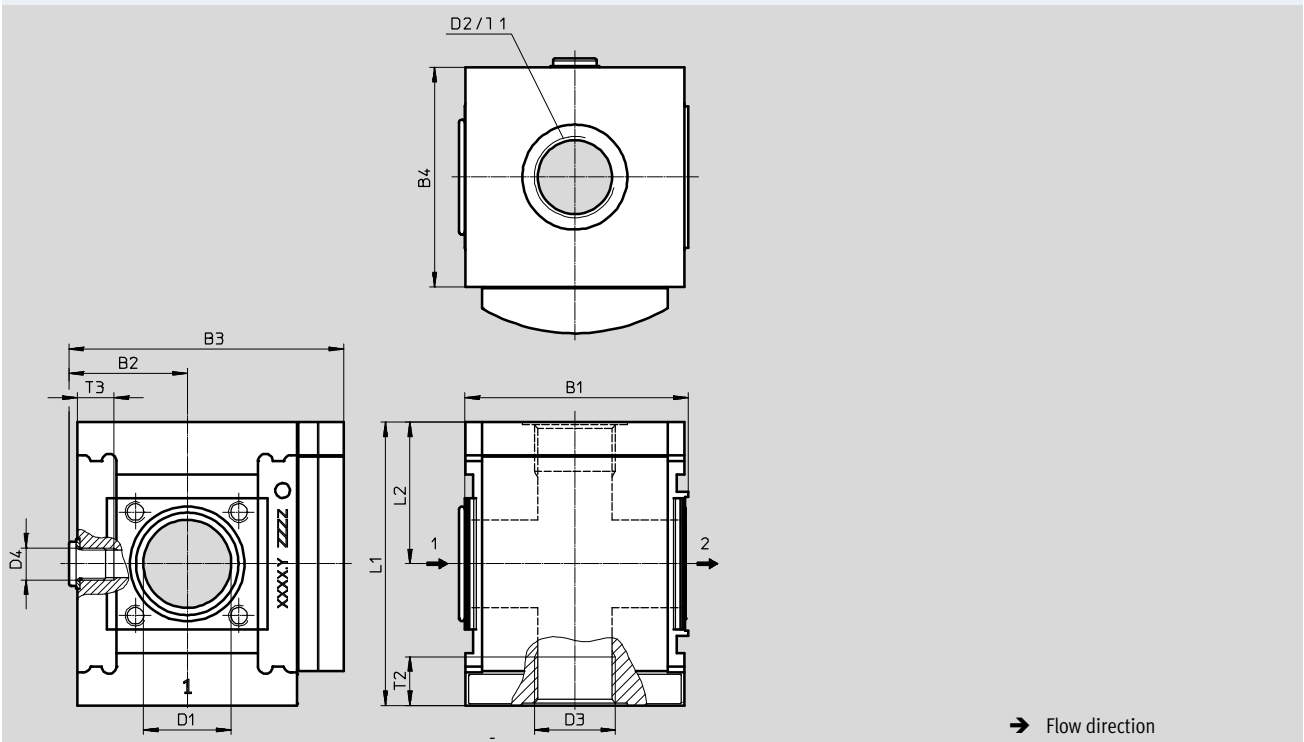
Weight [g]			
Size	90		186
Type	PMBL-90-HP3	PMBL-90-HP3-E	PMBL-186-HP3-H
Branching module	2000	2600	7500

Materials			
Size	90		186
Type	PMBL-90-HP3	PMBL-90-HP3-E	PMBL-186-HP3-H
Housing	Wrought aluminium alloy		
Seals	NBR		
	–	PE	–
Note on materials	RoHS compliant		
	Contains paint-wetting impairment substances		

Dimensions – Size 90

Download CAD data → www.festo.com

PMBL-90-HP3



Type	B1	B2	B3	B4	D1 Ø	D2	D3	D4	L1	L2	T1	T2	T3
PMBL-90-HP3	~92	~49	~113	90	36	G1	G1	G¼	116	58	20	20	15

Branching modules PMBL, series L

Technical data

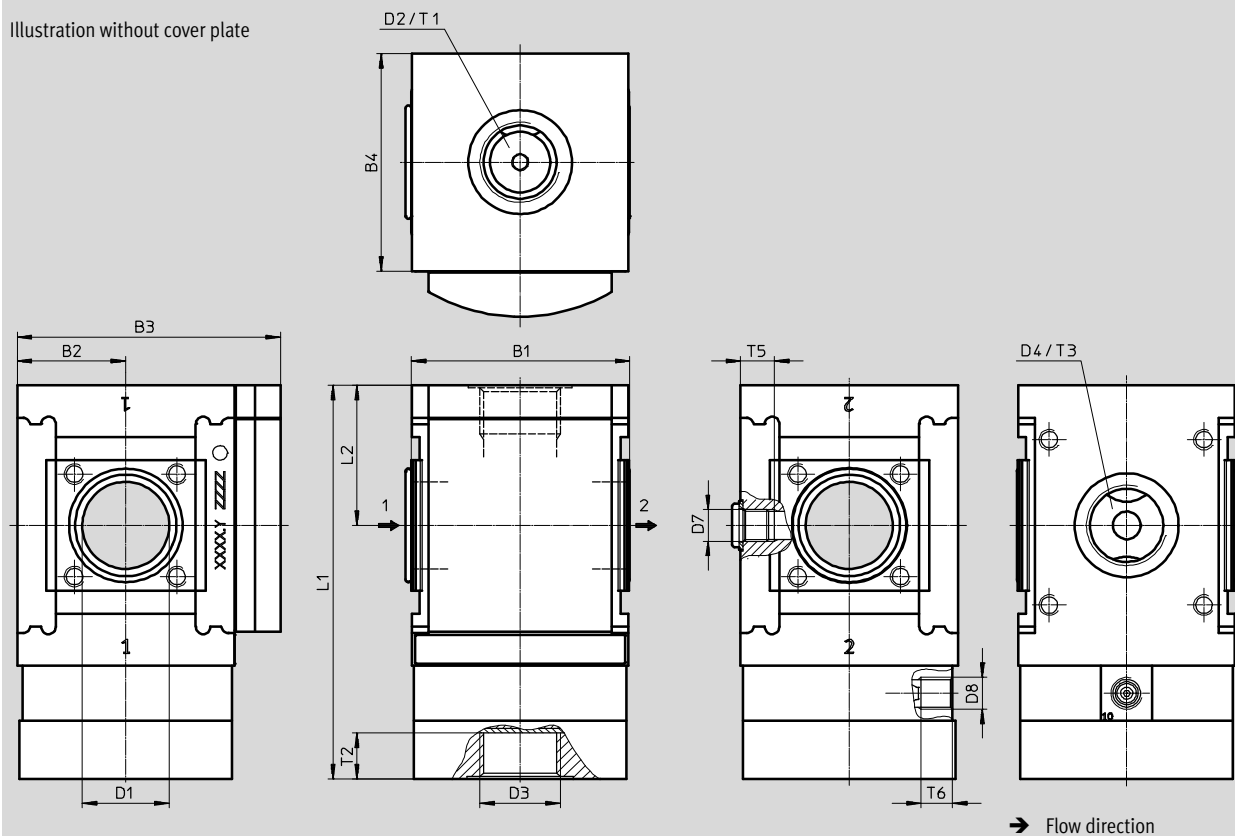
FESTO

Dimensions – Size 90

Download CAD data → www.festo.com

PMBL-90-HP3-E

Illustration without cover plate



Type	B1	B2	B3	B4	D1 Ø	D2	D3	D4	D7	D8	L1	L2	T1	T2	T3	T5	T6
PMBL-90-HP3-E	90	45	109	90	36	G1	G1	G1	G¼	G¼	163	58	20	19	20	14	13

Branching modules PMBL, series L

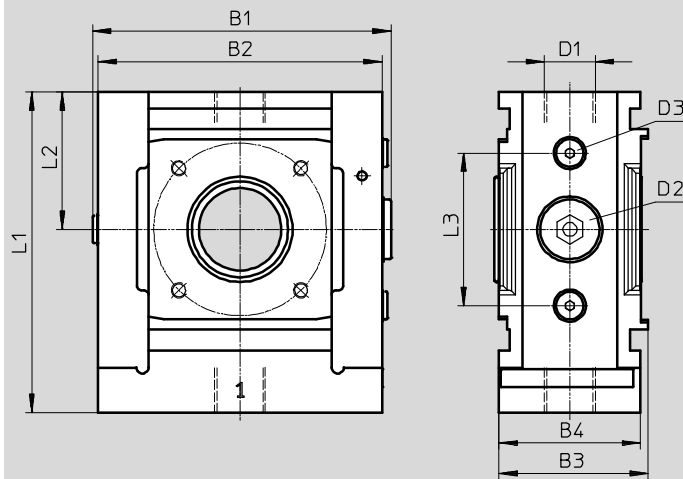
FESTO

Technical data

Dimensions – Size 186

Download CAD data → www.festo.com

PMBL-186-HP3-H



Type	B1	B2	B3	B4	D1	D2	D3	L1	L2	L3
PMBL-186-HP3-H	196	186	98	93	G1	G1	G¼	210	90	100

Ordering data

Function	Size 90		Size 186	
	Part No.	Type	Part No.	Type
Standard	1401366	PMBL-90-HP3	1609073	PMBL-186-HP3-H
With exhaust function	2663892	PMBL-90-HP3-E	–	–

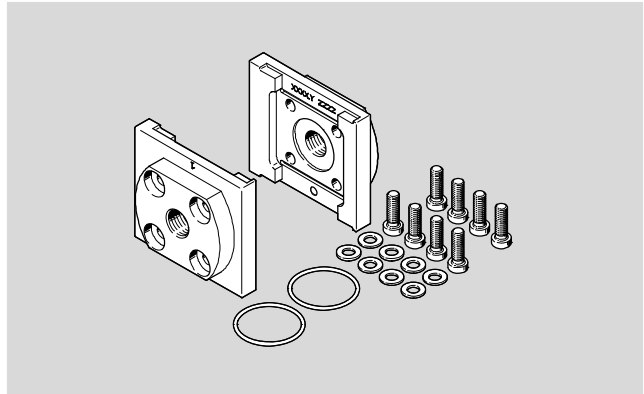
Pneumatic components for high-pressure applications, series L

FESTO

Accessories

Connecting plate PAML-CP
with internal thread for connecting
fittings/pipes

-  - Temperature range
+5 ... +60 °C
-  - Operating pressure
0 ... 50 bar



General technical data										
Size	90					186				
Nominal width DN	36					54				
Pneumatic connection 1, 2	G1/4	G1/2	G3/4	G1	G1 1/4	G1/4	G1 1/4	G1 1/2	G2	G2 1/2

Operating and environmental conditions	
Operating pressure [bar]	0 ... 50
Operating medium	Compressed air to ISO 8573-1:2010 [–:–:–]
Ambient temperature [°C]	+5 ... +60
Temperature of medium [°C]	+5 ... +60
Storage temperature [°C]	–10 ... +60
Corrosion resistance class CRC ¹⁾	2
CE marking (see declaration of conformity) ²⁾	To EU Pressure Equipment Directive
Food-safe ²⁾	See Supplementary material information

- 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.
- 2) Additional information www.festo.com/sp → Certificates.

Materials	
Connecting plate	Wrought aluminium alloy
Screws	Stainless steel
Seals	Nitrile rubber
Note on materials	RoHS compliant

Pneumatic components for high-pressure applications, series L

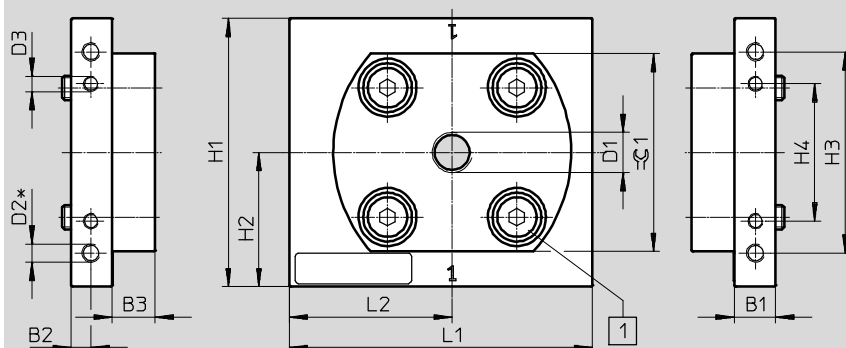
FESTO

Accessories

Dimensions – Size 90

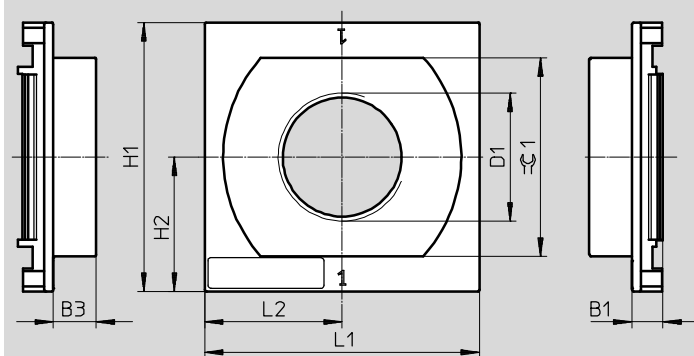
Download CAD data → www.festo.com

PAML-CP-90-HP3-G14/G12/G34/G1



1) Socket head screw M8x25

PAML-CP-90-HP3-G114



1) Note

A module connector
PAML-MK-90-HP3 or mounting
bracket PAML-MB-90-HP3 is
required for mounting.

Type	B1	B2	B3	D1	D2 ¹⁾	D3	H1	H2	H3	H4	L1	L2	±0.1
PAML-CP-90-HP3-G14	13.5	6.5	14	G1/4	M6x10	M5x9	88	44	66	45	~99	~53	65
PAML-CP-90-HP3-G12				G1/2									
PAML-CP-90-HP3-G34				G3/4									
PAML-CP-90-HP3-G1				G1									
PAML-CP-90-HP3-G114	10	–	–	G1 1/4	–	–	–	–	–	–	90	45	–

1) Thread for mounting the service unit on a wall without mounting bracket

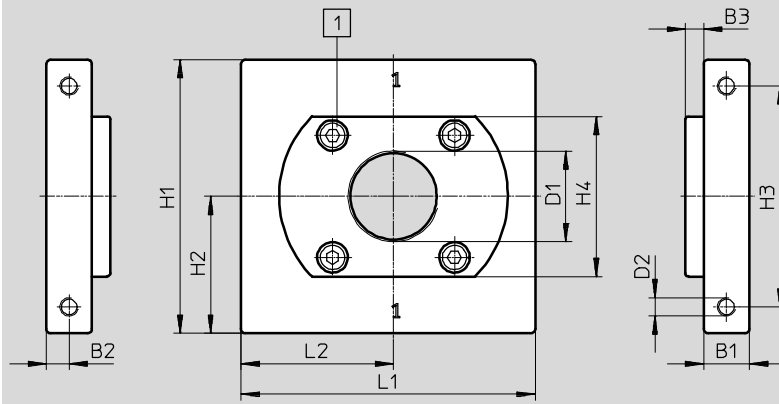
Pneumatic components for high-pressure applications, series L

Accessories

FESTO

Dimensions – Size 186

Download CAD data → www.festo.com



1 Socket head screw M10x30

Type	B1	B2	B3	D1	D2	H1	H2	H3	H4	L1	L2
PAML-CP-186-HP3-G14	30	15	12	G1/4	M12	180	90	145	105	193	100
PAML-CP-186-HP3-G114				G1 1/4							
PAML-CP-186-HP3-G112				G1 1/2							
PAML-CP-186-HP3-G2				G2							
PAML-CP-186-HP3-G212			25	G2 1/2							

Ordering data				
Size	Pneumatic connection	Weight [g]	Part No.	Type
90	G1/4	800	1651540	PAML-CP-90-HP3-G14
	G1/2	770	1651541	PAML-CP-90-HP3-G12
	G3/4	750	1651542	PAML-CP-90-HP3-G34
	G1	730	1651543	PAML-CP-90-HP3-G1
	G1 1/4	500	1448978	PAML-CP-90-HP3-G114
186	G1/4	4700	1629300	PAML-CP-186-HP3-G14
	G1 1/4	4600	1629296	PAML-CP-186-HP3-G114
	G1 1/2	4500	1629297	PAML-CP-186-HP3-G112
	G2	4400	1629298	PAML-CP-186-HP3-G2
	G2 1/2	4900	1629299	PAML-CP-186-HP3-G212

Pneumatic components for high-pressure applications, series L

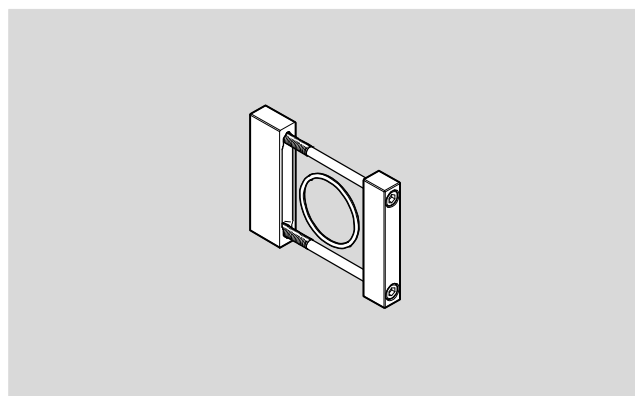
FESTO

Accessories

Module connector PAML-MK

For connecting individual service units to form service unit combinations

-  - Temperature range
+5 ... +60 °C
-  - Operating pressure
0 ... 50 bar



General technical data		
Size	90	186
Nominal width DN	36	54

Operating and environmental conditions		
Operating pressure	[bar]	0 ... 50
Operating medium		Compressed air to ISO 8573-1:2010 [–:–:–]
Ambient temperature	[°C]	+5 ... +60
Temperature of medium	[°C]	+5 ... +60
Storage temperature	[°C]	–10 ... +60
Corrosion resistance class CRC ¹⁾		2
CE marking (see declaration of conformity) ²⁾		To EU Pressure Equipment Directive
Food-safe ²⁾		See Supplementary material information

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.

2) Additional information www.festo.com/sp → Certificates.

Materials	
Module connector	Wrought aluminium alloy
Screws	Stainless steel
Seals	Nitrile rubber
Note on materials	RoHS compliant

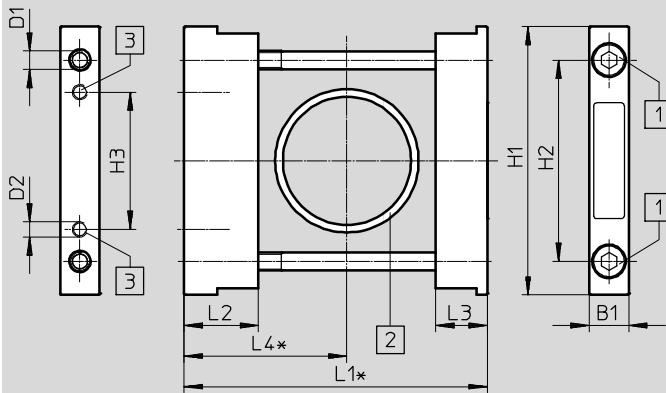
Pneumatic components for high-pressure applications, series L

Accessories

FESTO

Dimensions – Size 90

Download CAD data → www.festo.com



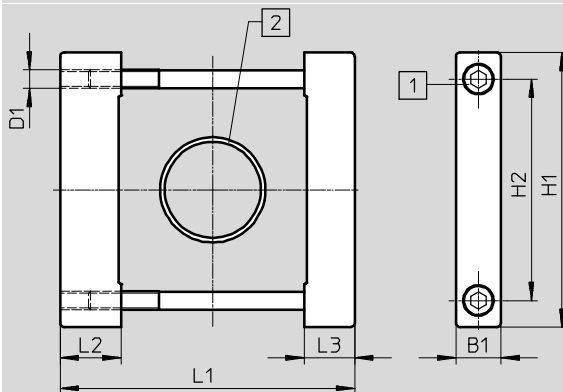
- 1 Socket head screw M6x85
- 2 O-ring, 42x2.5
- 3 Thread for mounting the service unit on a wall

Type	B1	D1	D2	H1	H2	H3	L1 ¹⁾	L2	L3	L4 ¹⁾
PAML-MK-90-HP3	13	M6	M5x9	88	66	45	99	24.4	17	~53

1) Dimension in mounted state

Dimensions – Size 186

Download CAD data → www.festo.com



- 1 Socket head screw M12x160
- 2 O-ring, 63x3

Type	B1	D1	H1	H2	L1 ¹⁾	L2	L3
PAML-MK-186-HP3	29.5	M12	180	145	193	40	33

1) Dimension in mounted state

Ordering data

Size	Weight [g]	Part No.	Type
90	150	1367005	PAML-MK-90-HP3
186	1300	1629377	PAML-MK-186-HP3

Pneumatic components for high-pressure applications, series L

FESTO

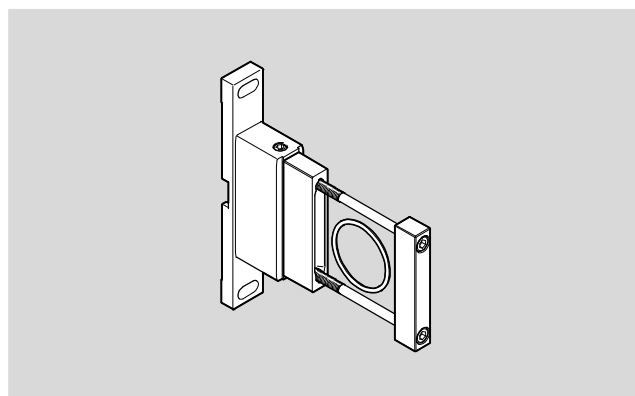
Accessories

Mounting bracket PAML-MB

For mounting service unit combinations on a wall and for connecting individual service units to form service unit combinations

- Quick to mount and dismount

-  - Temperature range
+5 ... +60 °C
-  - Operating pressure
0 ... 50 bar



General technical data	
Size	90
Nominal width DN	36

Operating and environmental conditions	
Operating pressure [bar]	0 ... 50
Operating medium	Compressed air to ISO 8573-1:2010 [–:–:–]
Ambient temperature [°C]	+5 ... +60
Temperature of medium [°C]	+5 ... +60
Storage temperature [°C]	–10 ... +60
Corrosion resistance class CRC ¹⁾	2
CE marking (see declaration of conformity) ²⁾	To EU Pressure Equipment Directive
Food-safe ²⁾	See Supplementary material information

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.

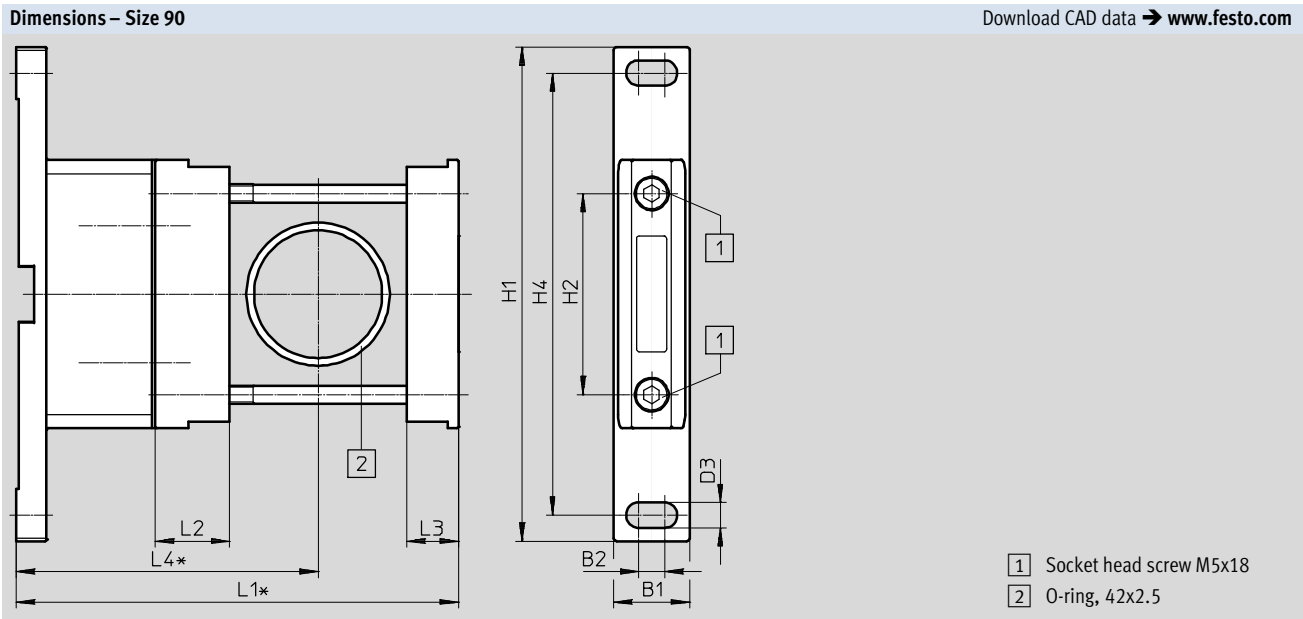
2) Additional information www.festo.com/sp → Certificates.

Materials	
Bracket	Wrought aluminium alloy
Module connector	Wrought aluminium alloy
Screws	Stainless steel
Seals	Nitrile rubber
Note on materials	RoHS compliant

Pneumatic components for high-pressure applications, series L

FESTO

Accessories



Type	B1	B2	D3	H1	H2	H4	L1 ¹⁾	L2	L3	L4 ¹⁾
PAML-MB-90-HP3	25	8.5	8.3	162	66	145	~145	24.4	17	~99

1) Dimension in mounted state

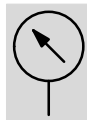
Ordering data			
Size	Weight [g]	Part No.	Type
90	300	1367323	PAML-MB-90-HP3

Pneumatic components for high-pressure applications, series L

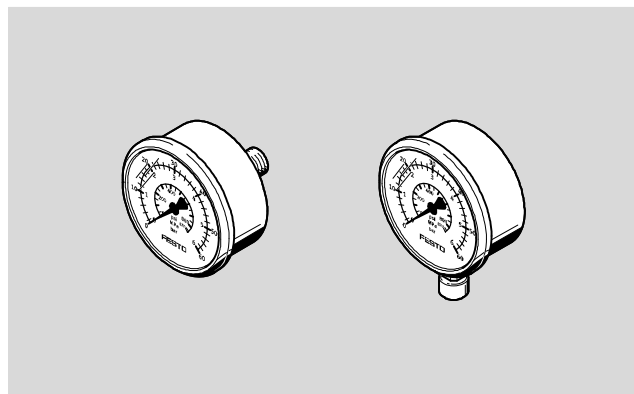
FESTO

Accessories

Pressure gauge PAGL



-  - Temperature range
0 ... +60 °C
-  - Operating pressure
0 ... 60 bar



Technical data	
Nominal size	63
Pneumatic connection	G $\frac{1}{4}$
Operating medium	Inert gases Neutral liquids
Note on operating/pilot medium	No oxygen No acetylene
Design	Bourdon tube pressure gauge
Conforms to standard	EN 837-1
Type of mounting	In-line installation
Connection position	Centred, rear side Radial underneath
Ambient temperature [°C]	0 ... +60
Temperature of medium [°C]	0 ... +60
Storage temperature [°C]	-40 ... +70
Measurement accuracy class	1.6
Continuous load factor	0.75
Intermittent load factor	0.66
Degree of protection	IP65
Weight [g]	80

Materials	
Nominal size	63
Pneumatic connection	G $\frac{1}{4}$
Housing	Steel (colour: silver)
Inspection window	PS
Threaded plug/ Materials in contact with the medium	Brass
Note on materials	RoHS compliant

Pneumatic components for high-pressure applications, series L

Accessories

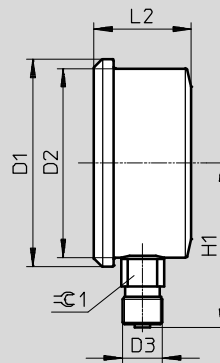
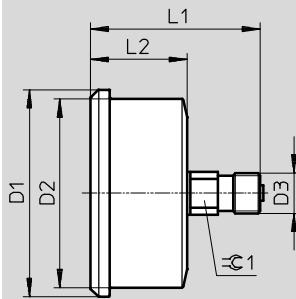
FESTO

Dimensions

Download CAD data → www.festo.com

PAGL-HP3-63-60-G14

PAGL-HP3-63-60-G14-RC



Type	D1 Ø	D2 Ø	D3	H1 ±0.5	L1 ±0.5	L2 ±0.5	⌀ 1
PAGL-HP3-63-60-G14	68	62	G1/4	–	56	32	14
PAGL-HP3-63-60-G14-RC				54	–		

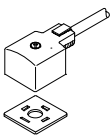
Ordering data							
Nominal size	Pneumatic connection	Operating pressure	Indicating range		Connection position	Part No.	Type
			Outer scale	Inner scale			
63	G1/4	0 ... 60 bar	0 ... 60 bar and 0 ... 6 MPa	0 ... 870 psi	Centred, rear side	1166938	PAGL-HP3-63-60-G14
					Radial underneath	1908519	PAGL-HP3-63-60-G14-RC

Pneumatic components for high-pressure applications, series L

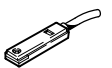
FESTO

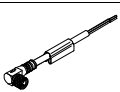
Accessories

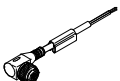
Ordering data – Silencers U			Technical data → Internet: u	
	Description	Pneumatic connection	Part No.	Type
	For PREL-90	G $\frac{3}{8}$	6843	U-$\frac{3}{8}$-B
	For PREL-186	G $\frac{1}{2}$	6844	U-$\frac{1}{2}$-B
	For PAHL	G $\frac{3}{4}$	6845	U-$\frac{3}{4}$-B
	For PVEL	G1	151990	U-1-B

Ordering data – Connecting cables KMC						Technical data → Internet: kmc	
	Description	Operating voltage	Electrical connection	Switching status indication	Cable length [m]	Part No.	Type
	for PAHL	24 V DC	3-pin	LED	2.5	30931	KMC-1-24DC-2,5-LED
					5	30933	KMC-1-24DC-5-LED
					10	193459	KMC-1-24-10-LED

Ordering data – Illuminating seal MC-LD			Technical data → Internet: mc	
	Description	Operating voltage range	Part No.	Type
	For connecting cable KMC	12 ... 24 V DC	19145	MC-LD-12-24DC

Ordering data – Proximity sensor SME-8						Technical data → Internet: sme-8	
	Description	Electrical connection	Operating voltage range	Switching element function	Switching output	Cable length [m]	Part No. Type
	for PAHL	Cable with plug M8x1, 3-pin	12 ... 30 V DC	N/O contact	Contacting, bipolar	0.3	150857 SME-8-S-LED-24

Ordering data – Connecting cable NEBU-M8				Technical data → Internet: nebu	
	Electrical connection	Number of wires	Cable length [m]	Part No.	Type
	M8x1, straight socket	3	2.5	541333	NEBU-M8G3-K-2.5-LE3
			5	541334	NEBU-M8G3-K-5-LE3
			10	541332	NEBU-M8G3-K-10-LE3
	M8x1, angled socket	3	2.5	541338	NEBU-M8W3-K-2.5-LE3
			5	541341	NEBU-M8W3-K-5-LE3
			10	541335	NEBU-M8W3-K-10-LE3

Ordering data – Connecting cable NEBU-M12				Technical data → Internet: nebu	
	Electrical connection	Number of wires	Cable length [m]	Part No.	Type
	M12x1, straight socket	5	2.5	541330	NEBU-M12G5-K-2.5-LE5
			5	541331	NEBU-M12G5-K-5-LE5
			10	554038	NEBU-M12G5-K-10-LE5
	M12x1, angled socket	5	2.5	567843	NEBU-M12W5-K-2.5-LE5
			5	567844	NEBU-M12W5-K-5-LE5

Ordering data – Padlock LRV5-D		
	Weight [g]	Part No. Type
	120	193786 LRV5-D

Festo North America



**1 Festo Canada
Headquarters**
Festo Inc.
5300 Explorer Drive
Mississauga, ON
L4W 5G4

2 Montréal
5600, Trans-Canada
Pointe-Claire, QC
H9R 1B6

3 Québec City
2930, rue Watt#117
Québec, QC
G1X 4G3



**4 Festo United States
Headquarters**
Festo Corporation
395 Moreland Road
Hauppauge, NY
11788

5 Appleton
North 922 Tower View Drive, Suite N
Greenville, WI
54942

7 Detroit
1441 West Long Lake Road
Troy, MI
48098

6 Chicago
85 W Algonquin - Suite 340
Arlington Heights, IL
60005

8 Silicon Valley
4935 Southfront Road, Suite F
Livermore, CA
94550

Festo Regional Contact Center

Canadian Customers

Commercial Support:

Tel: 1 877 GO FESTO (1 877 463 3786)

Fax: 1 877 FX FESTO (1 877 393 3786)

Email: festo.canada@ca.festo.com

Technical Support:

Tel: 1 866 GO FESTO (1 866 463 3786)

Fax: 1 877 FX FESTO (1 877 393 3786)

Email: technical.support@ca.festo.com

USA Customers

Commercial Support:

Tel: 1 800 99 FESTO (1 800 993 3786)

Fax: 1 800 96 FESTO (1 800 963 3786)

Email: customer.service@us.festo.com

Technical Support:

Tel: 1 866 GO FESTO (1 866 463 3786)

Fax: 1 800 96 FESTO (1 800 963 3786)

Email: product.support@us.festo.com

Subject to change

Internet: www.festo.com/us