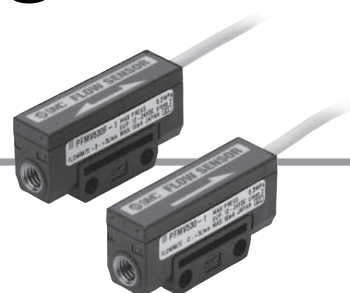


Flow Sensor

PFMV5 Series



How to Order



PFMV5 **05** - 1 - [] []

Measurement flow range

05	0.0 to 0.5 L/min
10	0.0 to 1.0 L/min
30	0.0 to 3.0 L/min
05F	-0.5 to 0.5 L/min
10F	-1.0 to 1.0 L/min
30F	-3.0 to 3.0 L/min

Output specifications

1	Analog output (1 to 5 V)
---	--------------------------

Option (shipped together)

Nil	None
A	With L-type bracket

* 2 L-type brackets (with 2 mounting screws) are included.

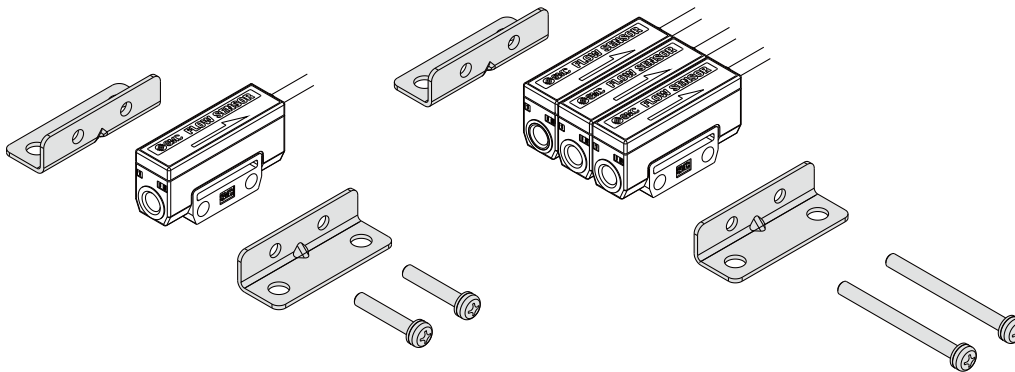
Operation manual

Nil	With operation manual (Japanese and English)
N	None

Option/Part No.

If a single option or manifold mounting are required, order sensors with the part numbers below separately.

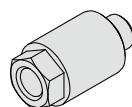
Part no.	Stations	Note
ZS-36-A1	For 1 station (for single unit)	2 L-type brackets, 2 mounting screws M3 x 15L
ZS-36-A2	For 2 stations	2 L-type brackets, 2 mounting screws M3 x 25L
ZS-36-A3	For 3 stations	2 L-type brackets, 2 mounting screws M3 x 35L
ZS-36-A4	For 4 stations	2 L-type brackets, 2 mounting screws M3 x 45L
ZS-36-A5	For 5 stations	2 L-type brackets, 2 mounting screws M3 x 55L



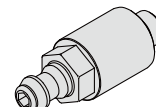
- PFM
- PFMB
- PFMC
- PFMV**
- PF2A
- PF3W
- LFE
- PF2D
- IF

Compact Suction Filter

Part no.	Connection type
ZFC050-M5X68	IN/OUT: M5
ZFC050-AU6X68	IN: ø6 Barb fitting OUT: M5
ZFC-EL013-A	Element (10 pcs.)



ZFC050-M5X68



ZFC050-AU6X68



PFMV5 Series

Refer to pages 202 and 203 for Flow Switch Precautions. For details about the Specific Product Precautions, refer to the Operation Manual on the SMC website, <http://www.smcworld.com> Click [here](#) for details.

Specifications

Model	PFMV505	PFMV510	PFMV530	PFMV505F	PFMV510F	PFMV530F	
Applicable fluid	Dry air, N ₂ (JIS B 8392-1 1.1.2 to 1.6.2: 2003, ISO 8573-1 1.1.2 to 1.6.2)						
Rated flow range (Flow rate range) ^{Note 1)}	0 to 0.5 L/min	0 to 1 L/min	0 to 3 L/min	-0.5 to 0.5 L/min ^{Note 2)}	-1 to 1 L/min ^{Note 2)}	-3 to 3 L/min ^{Note 2)}	
Accuracy	±5% F.S. ^{Note 3)}						
Repeatability	±2 F.S. ^{Note 3)}						
Pressure characteristics (0 kPa reference ^{Note 4)})	±2% F.S. (0 to 300 kPa) ±5% F.S. (-70 to 0 kPa)						
Temperature characteristics (25°C reference)	±2% F.S. (15 to 35°C) ±5% F.S. (0 to 50°C)						
Rated pressure range ^{Note 5)}	-70 kPa to 300 kPa						
Operating pressure range ^{Note 6)}	-100 kPa to 400 kPa						
Proof pressure	500 kPa						
Analog output (Non-linear output)	Voltage output: 1 to 5 V, Output impedance: Approx. 1 kΩ						
Response time	5 ms or less (90% response)						
Power supply voltage	12 to 24 VDC ± 10% (with polarity protection)						
Current consumption	16 mA or less						
Environment	Enclosure	IP40					
	Fluid temperature	0 to 50°C (No freezing and condensation)					
	Operating temperature range	0 to 50°C (No freezing and condensation)					
	Stored temperature range	-10 to 60°C (No freezing and condensation)					
	Operating humidity range	35 to 85% R.H. (No condensation)					
	Stored humidity range	35 to 85% R.H. (No condensation)					
	Withstand voltage	1000 VAC for 1 minute between terminals and housing					
	Insulation resistance	50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing					
	Port size	M5 x 0.8 (Tightening torque: 1 to 1.5 N·m)					
	Wetted parts material	PPS, Si, Au, Stainless steel 316, C3604 (Electroless nickel plating)					
Standards	CE UL, CSA RoHS						
Lead wire	Vinyl cabtire cord, 3 cores ø2.6, 0.15 mm ² , 2 m						
Weight	10 g (excluding lead wire)						

Note 1) Flow rate in the specification is the value at standard condition.

Note 2) Analog output indicates 3 V when the flow rate is 0. When the flow direction is from IN to OUT, the output is changed to 5 V, and when it's from OUT to IN, the output is changed to 1 V.

Note 3) The unit % F.S. is based on the full scale of analog 4 V (1-5 V).

Note 4) 0 kPa indicates the atmospheric release.

Note 5) Pressure range that satisfies the product specifications

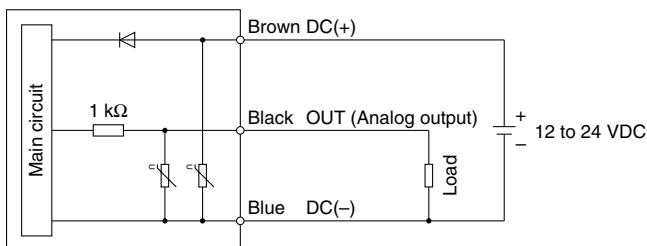
Note 6) Applicable pressure range

Note 7) For details about wiring, refer to the Operation Manual that can be downloaded from SMC website (<http://www.smcworld.com>).

Note 8) Any products with tiny scratches, smears, or display color variation or brightness which does not affect the performance are verified as conforming products.

Internal Circuits and Wiring Examples

-1 Analog voltage output

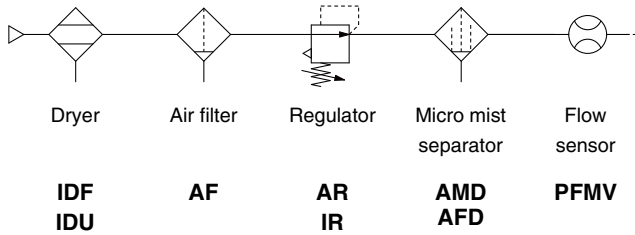


Lead Wire Specifications

Conductor	Nominal cross section area	AWG26
	External diameter	0.58 mm
Insulator	External diameter	0.88 mm
	Colors	Brown, Blue, Black
Sheath	Material	Oil-resistant/Heat-resistant PVC
Finished external diameter		2.6

Recommended Pneumatic Circuits

Compressed air line



Recommended Fittings

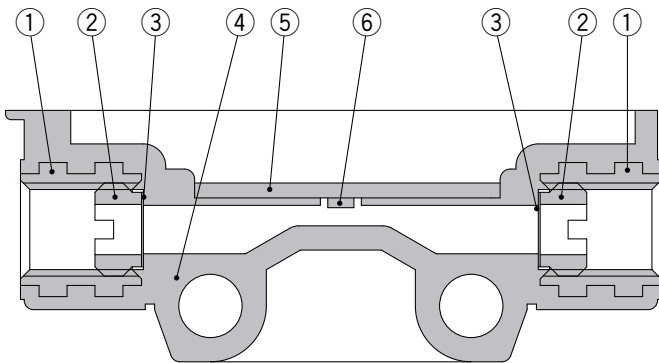
One-touch Fitting/KQ2 Series

Type	Tubing O.D. (mm)	Port size	Model
Male connector	4	M5 x 0.8	KQ2H04-M5A
Male elbow			KQ2L04-M5A

Miniature Fitting/M Series

Type	Tubing O.D. (mm)	Port size	Model
Barb fitting for nylon tube	4	M5 x 0.8	M-5AN-4
	6		M-5AN-6

Wetted Parts Construction



Component Parts

No.	Description	Material
1	Fitting for piping	C3604 (Electroless nickel plating)
2	Mesh holding screw	
3	Mesh	Stainless steel 316
4	Body	PPS
5	Print circuit board	GE4F
6	Sensor chip	Si, Au

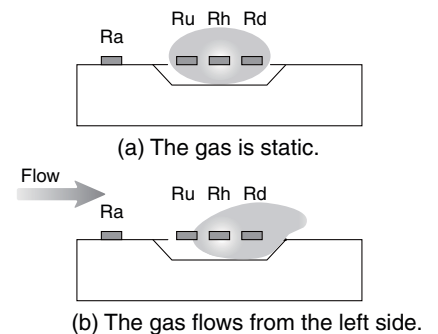
Detection Principle

This MEMS sensor chip consists of upstream temperature measuring sensor (Ru) and downstream temperature measuring sensor (Rd), which are placed symmetrically from the center of a platinum thin film coated heater (Rh) mounted on a membrane, and an ambient temperature sensor (Ra) for measuring gas temperature.

The principle is shown as the diagram on the right. (a) When the gas is static, the temperature distribution of heated gas centered around Rh is uniform, and Ru and Rd have the same resistance. (b) When the gas flows from the left side, it upsets the balance of the temperature distribution of heated gas, and the resistance of Rd becomes greater than that of Ru.

The difference in resistance between Ru and Rd is proportional to the flow velocity, so measurement and analysis of the resistance can show the flow direction and velocity of the gas.

Ra is used to compensate the gas and/or ambient temperature.



PFM

PFMB

PFMC

PFMV

PF2A

PF3W

LFE

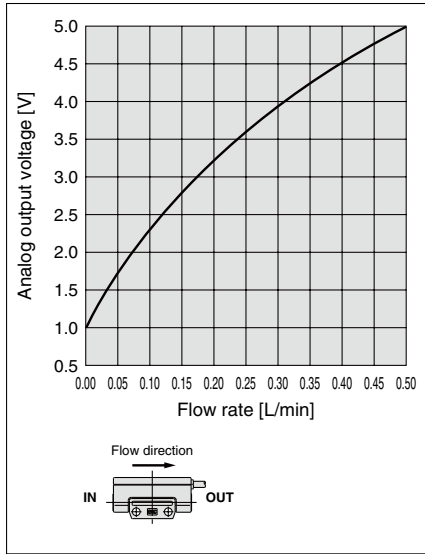
PF2D

IF

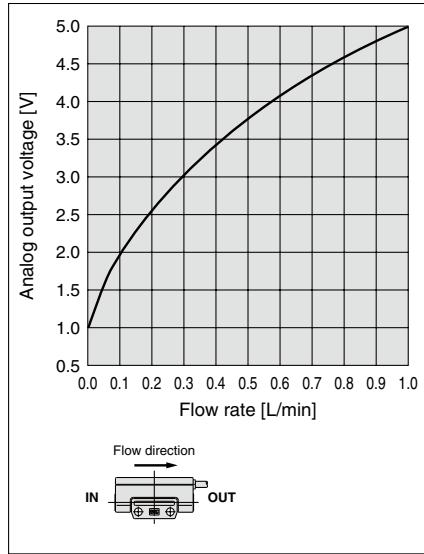
PFMV5 Series

Analog Output (Non-linear output)

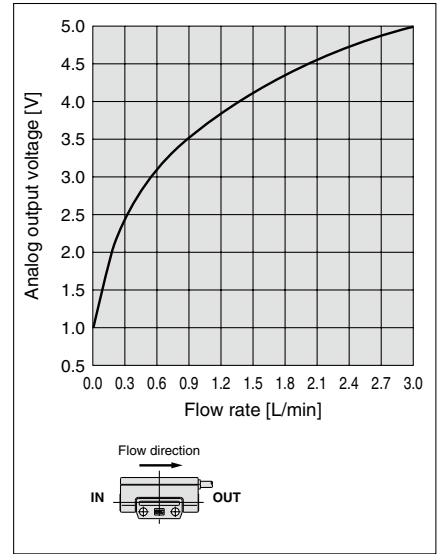
PFMV505-1



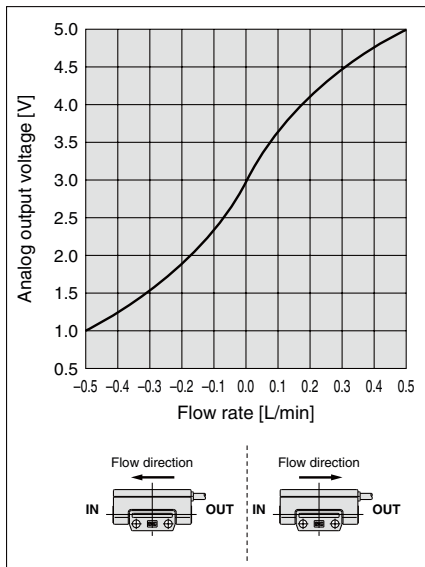
PFMV510-1



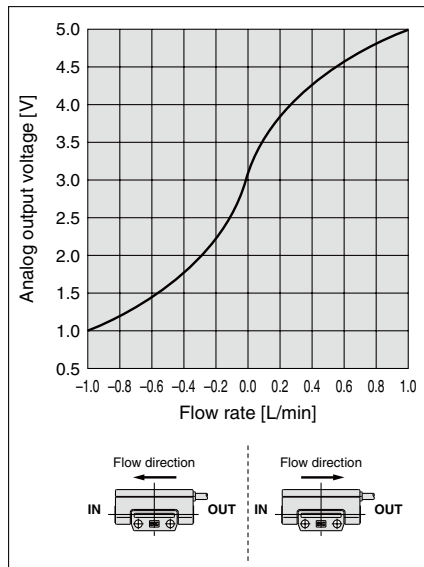
PFMV530-1



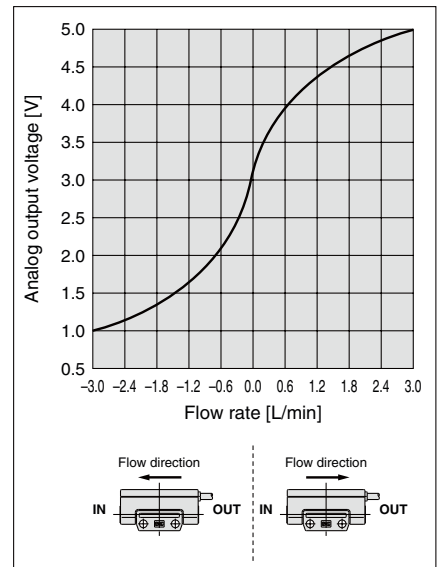
PFMV505F-1



PFMV510F-1

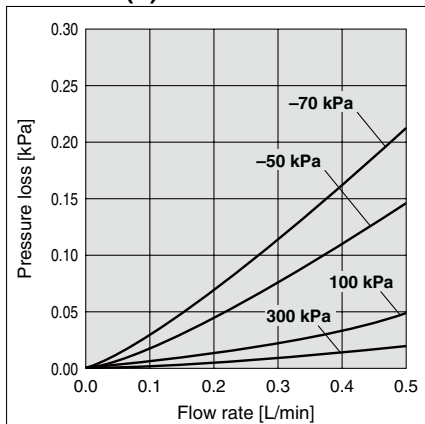


PFMV530F-1

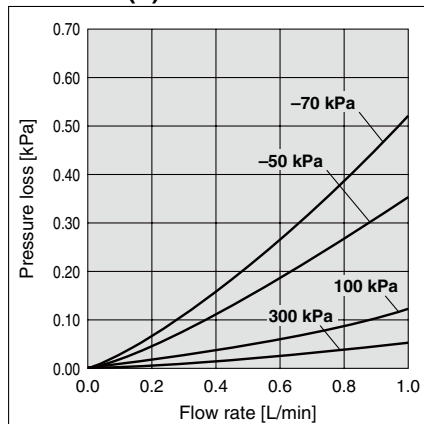


Pressure Loss

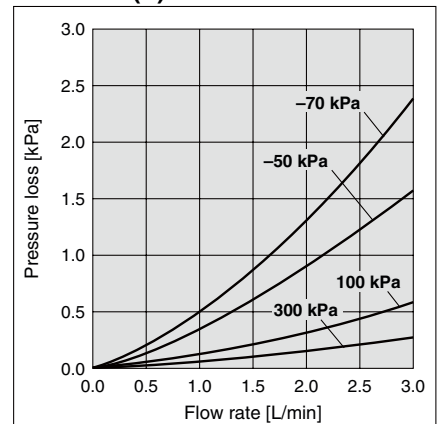
PFMV505(F)-1



PFMV510(F)-1

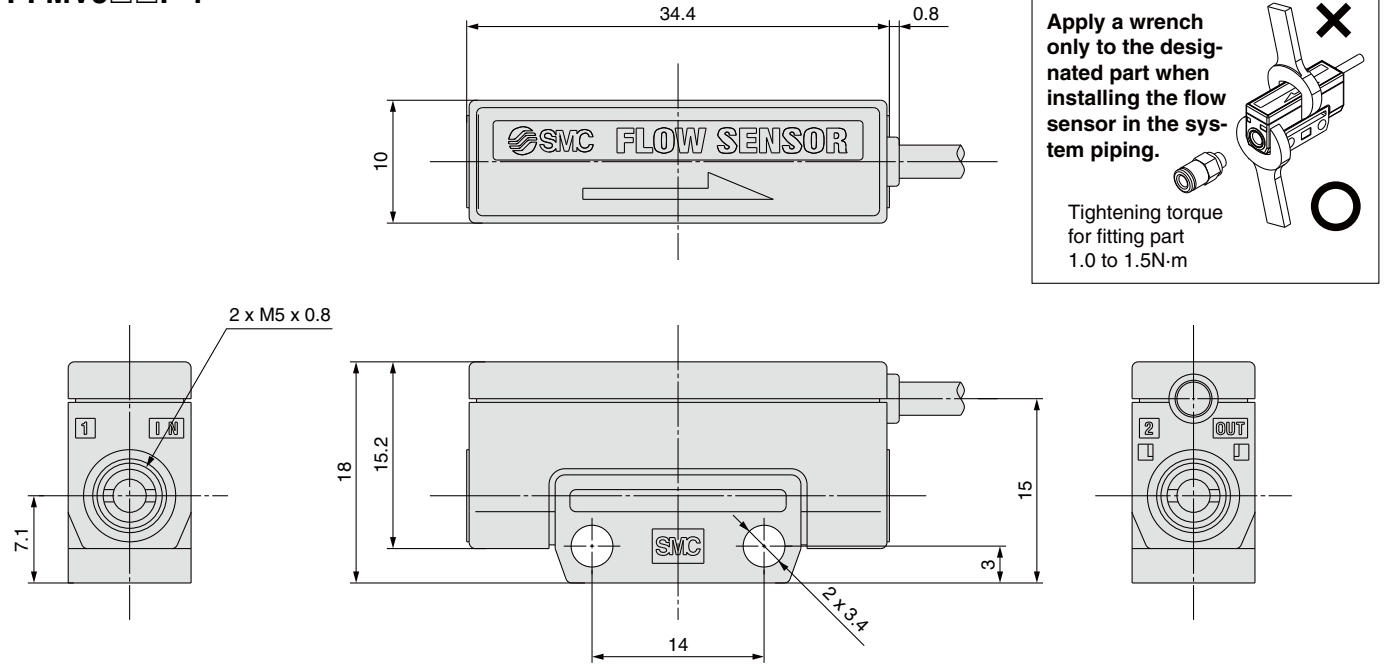


PFMV530(F)-1

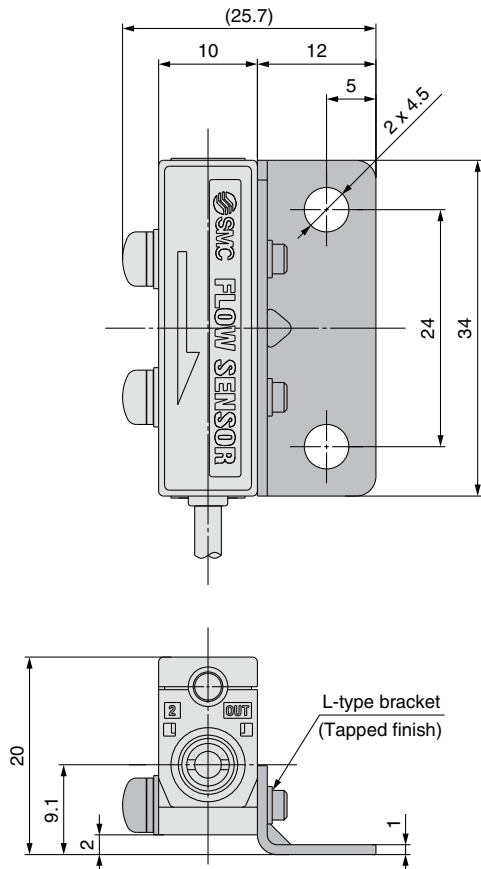


Dimensions

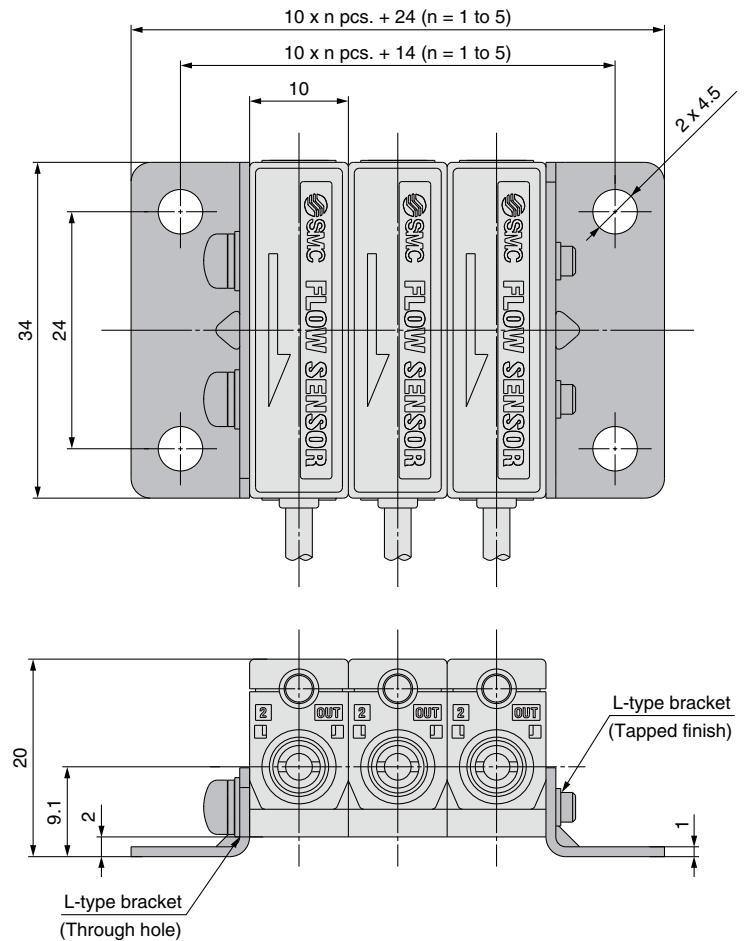
PFMV5□□-1
PFMV5□□F-1



One-side bracket



Both-side bracket



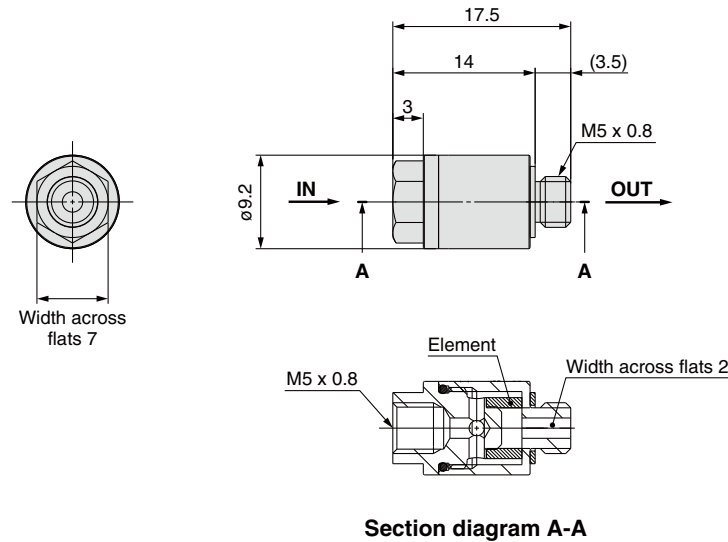
PFM
PFMB
PFMC
PFMV
PF2A
PF3W
LFE
PF2D
IF

The dimensions show the PFMV5□□-1. The PFMV5□□F-1 has the same dimensions.

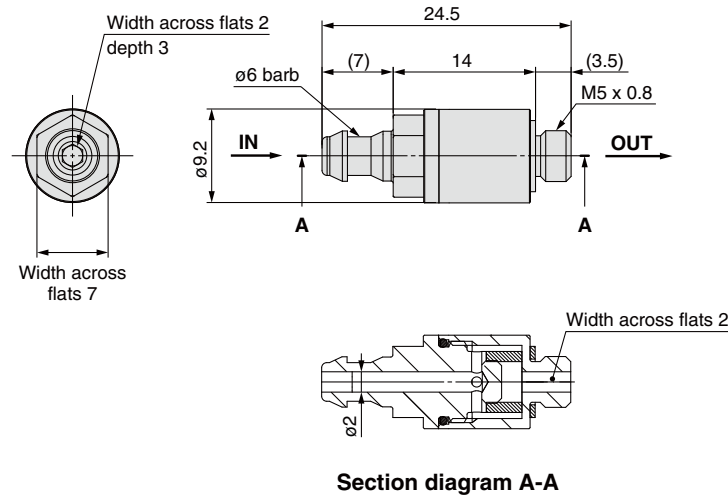
PFMV5 Series

Suction Filter

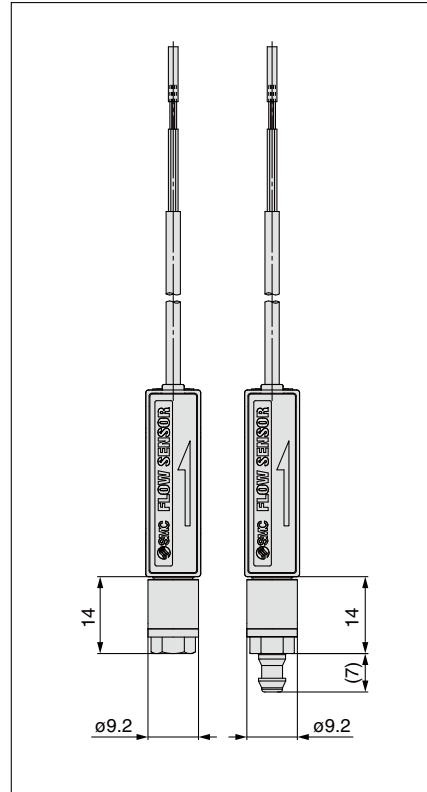
ZFC050-M5X68



ZFC050-AU6X68



Example of mounting to the flow sensor PFMV series (For suction verification)



Specifications

Filtration degree	3 μm (Nominal)
Fluid	Air
Operating pressure range	-100 to 600 kPa
Ambient temperature	0 to 60°C (No freezing)
Applicable tubing material	soft nylon, Polyurethane
Applicable tubing O.D./I.D.	$\phi 6/\phi 4$

Replacement element part no...ZFC-EL013-A

Caution

1. To screw in OUT side port (M5 male thread), tighten by hand before giving it an additional 1/4 turn with a tightening tool.
2. When replacing the element, remove the IN side body using the hexagon surface on the IN side, then replace the element. After replacing the element, tighten the IN side body with the tightening torque 0.5 to 0.7 N·m.
3. As a rule, replace the element when the pressure drops by 20 kPa.
4. The response time of the single flow sensor is 5 msec. However, take great care since the response may be delayed depending on the element clogged conditions.