Flow Sensor
Series PFMV5

How to Order

PFMV5 [05] – [1] – [ ][ ]

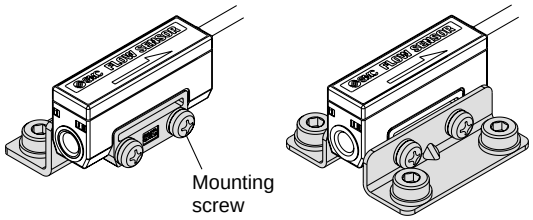
Measurement flow range

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 specification

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.

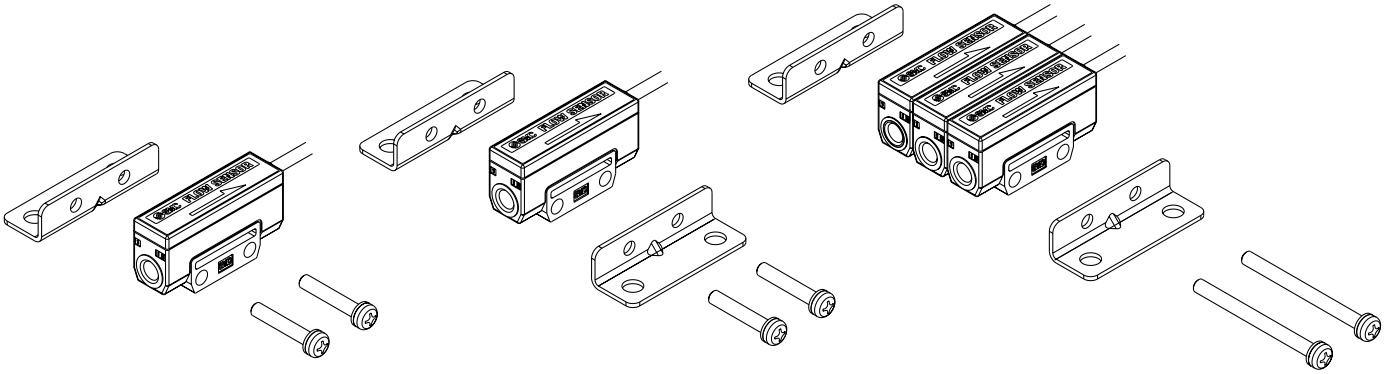
Instruction manual

Nil	With instruction manual (Leaflet: 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	Remarks
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

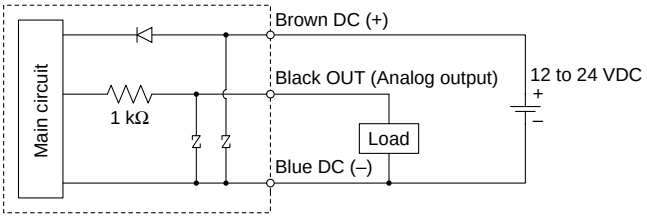


Specifications

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)					
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)
Repeatability		±2 F.S. or less Note 3)					
Pressure characteristics (Based on 0 kPa Note 4)**)**		±2% F.S. or less (0 to 300 kPa) ±5% F.S. or less (–70 to 0 kPa)					
Temperature characteristics (Based on 25°C)		±2% F.S. or less (15 to 35°C) ±5% F.S. or less (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%, Ripple (p-p) ± 10% or less (with polarity protection)					
Current consumption		16 mA or less					
Environ-mental resistance	**Enclosure**	IP40					
	Fluid temperature	0 to 50°C (with no freezing and condensation)					
	Operating temperature range	0 to 50°C (with no freezing and condensation)					
	Stored temperature range	–10 to 60°C (with no freezing and condensation)					
	Operating humidity range	35 to 85% R.H. (with no condensation)					
	Stored humidity range	35 to 85% R.H. (with no condensation)					
	Withstand voltage	1000 VAC for 1 min. between whole charging part and case					
	Insulation resistance	50 MΩ or more (500 VDC Mega) between whole charging part and case					
	Vibration resistance	10 to 150 Hz with a 1.5 mm amplitude, max. 98 m/s^2, in each X, Y, Z direction for 2 hrs (De-energized)					
	Impact resistance	980 m/s^2 in X, Y, Z directions 3 times each (De-energized)					
	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 plated)					
Lead wire		Vinyl cabtire cord, 3 cores ø2.6, 0.15 mm^2, 2 m					
Weight		10 g (excluding lead wire)					

Note 1) Volume flow converted value under standard conditions (ANR) of 20°C, 101.3 kPa and 65% RH
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

Internal Circuits and Wiring Examples

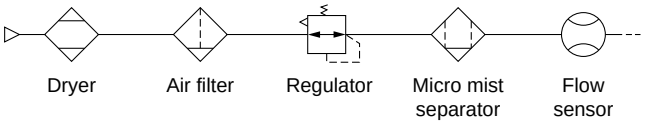


Lead Wire Specifications

Rated temperature		80°C
Rated voltage		1000 V
Number of wires		3
Conductor	**Material**	Copper alloy wire
	Construction	7/11/0.05 mm
	External diameter	0.58 mm
Insulator	**Material**	Cross-linked vinyl chloride (XL-PVC)
	External diameter	0.88 mm
	Standard thickness	0.15 mm
	Colors	Brown, Blue, Black
Sheath	**Material**	Oil-resistant/Heat resistant vinyl
	Standard thickness	0.35 mm
	Color	Light gray (Munsell N7 equivalent)
Finished external diameter		$2.6^{+0.1}_{-0.15}$

Recommended Pneumatic Circuits

Compressed air line



IDF
IDU
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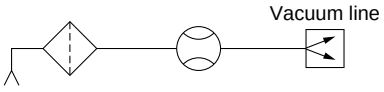
PFMV

Vacuum line



ZF
PFMV

Recommended Fittings

One-touch Fitting/Series KQ2

Type	Tubing O.D. (mm)	Port size	Model
Male connector	4	M5 x 0.8	KQ2H04-M5
Hex. socket head male connector			KQ2S04-M5
Male elbow			KQ2L04-M5

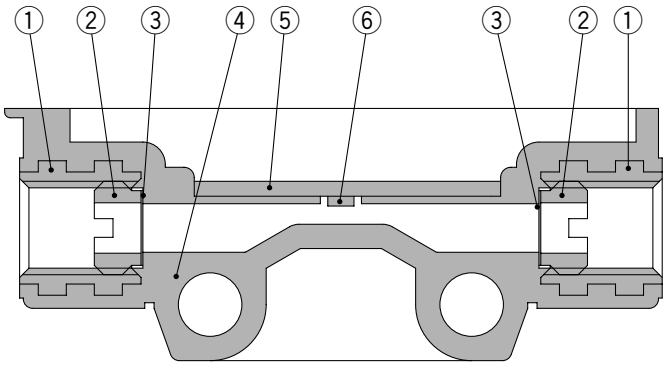
One-touch Mini/Series KJ

Type	Tubing O.D. (mm)	Port size	Model
Male connector	4	M5 x 0.8	KJH04-M5
Hex. socket head male connector			KJS04-M5
Male elbow			KJL04-M5

Miniature Fitting/Series M

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

Internal Construction

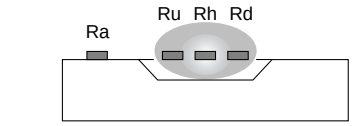


Component Parts

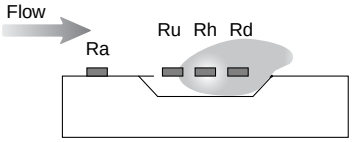
No.	Description	Material
1	**Fitting for piping**	C3604 (Electroless nickel plated)
2	**Mesh holding screw**	
3	**Mesh**	Stainless steel 316
4	**Body**	PPS
5	**Print circuit board**	GE4F
6	**Sensor chip**	Si, Au

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 as shown in 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 gas 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.



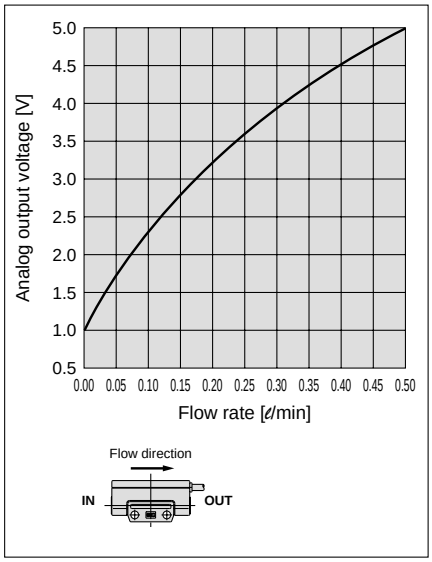
(a) The gas is static.



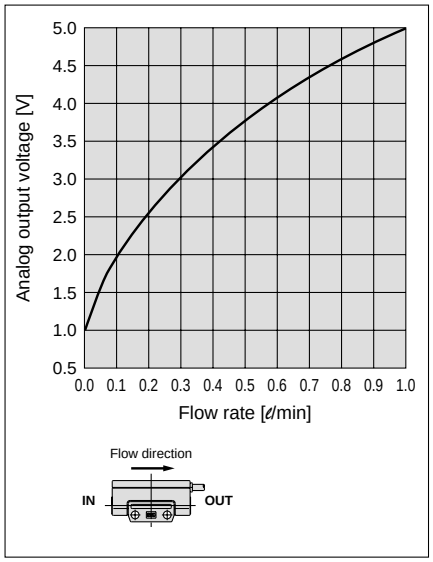
(b) The gas flows from the left side.

Analog Output (Non-linear output)

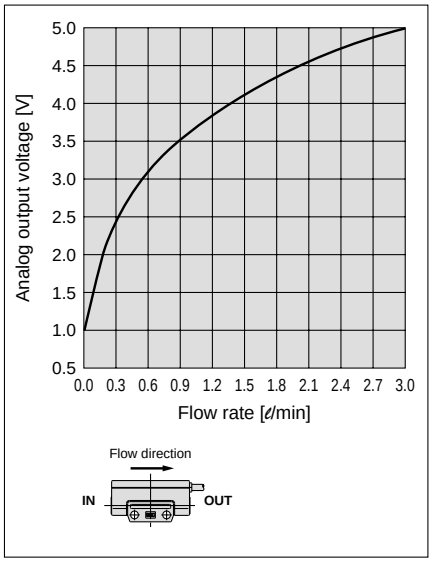
PFMV505-1



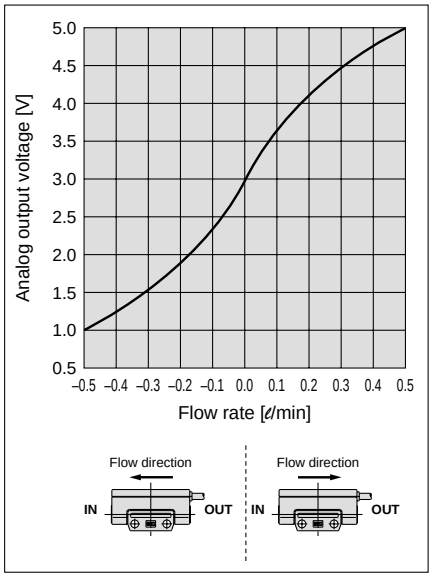
PFMV510-1



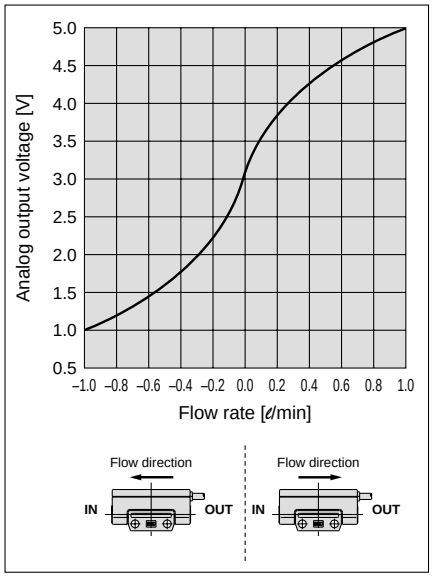
PFMV530-1



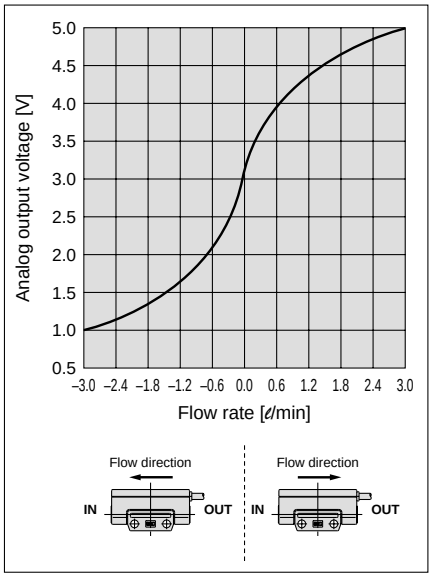
PFMV505F-1



PFMV510F-1

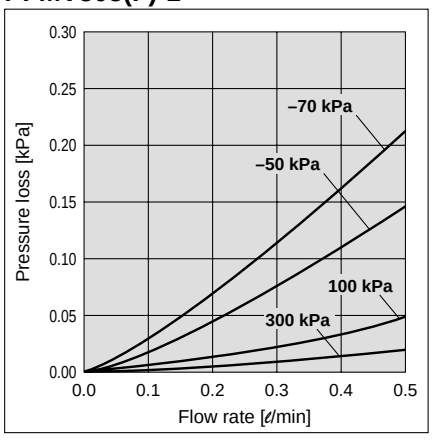


PFMV530F-1

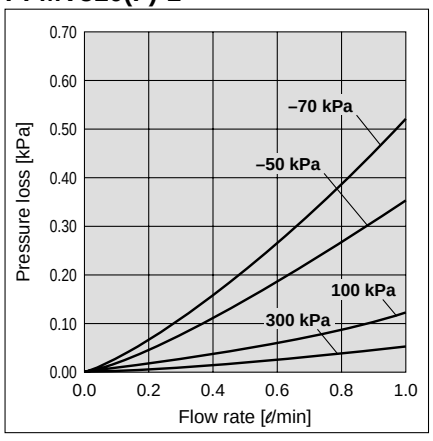


Pressure Loss

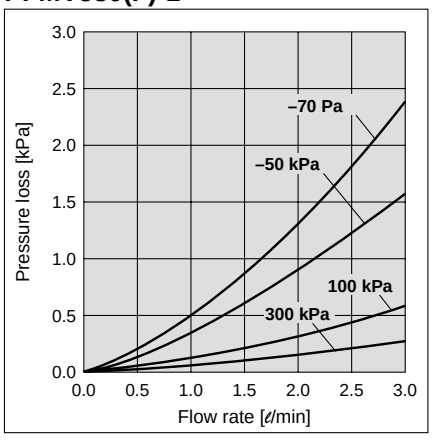
PFMV505(F)-1



PFMV510(F)-1

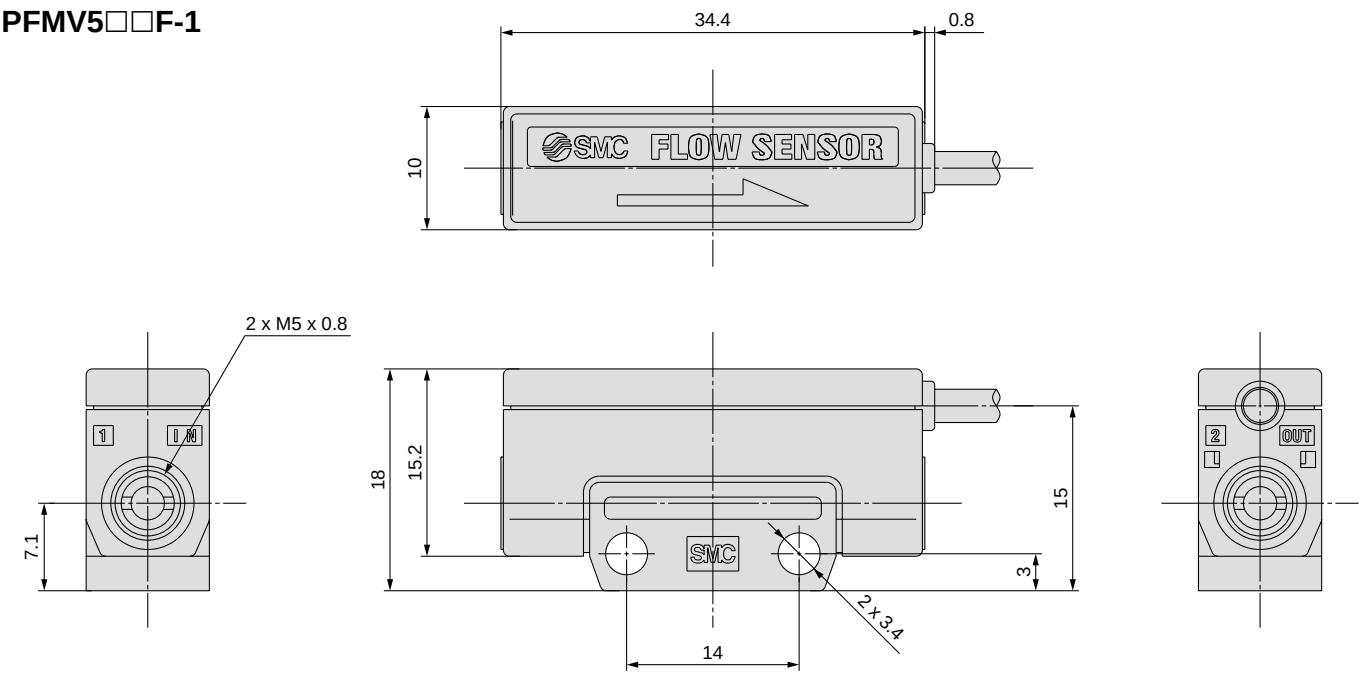


PFMV530(F)-1

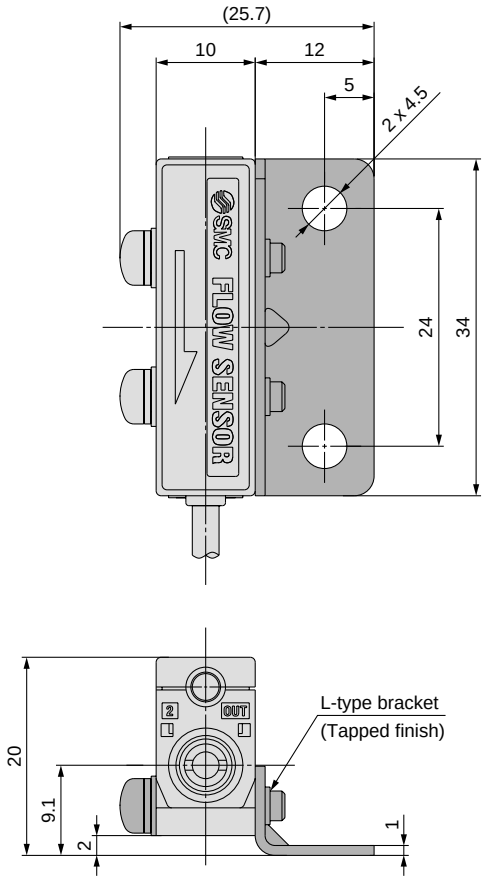


Dimensions

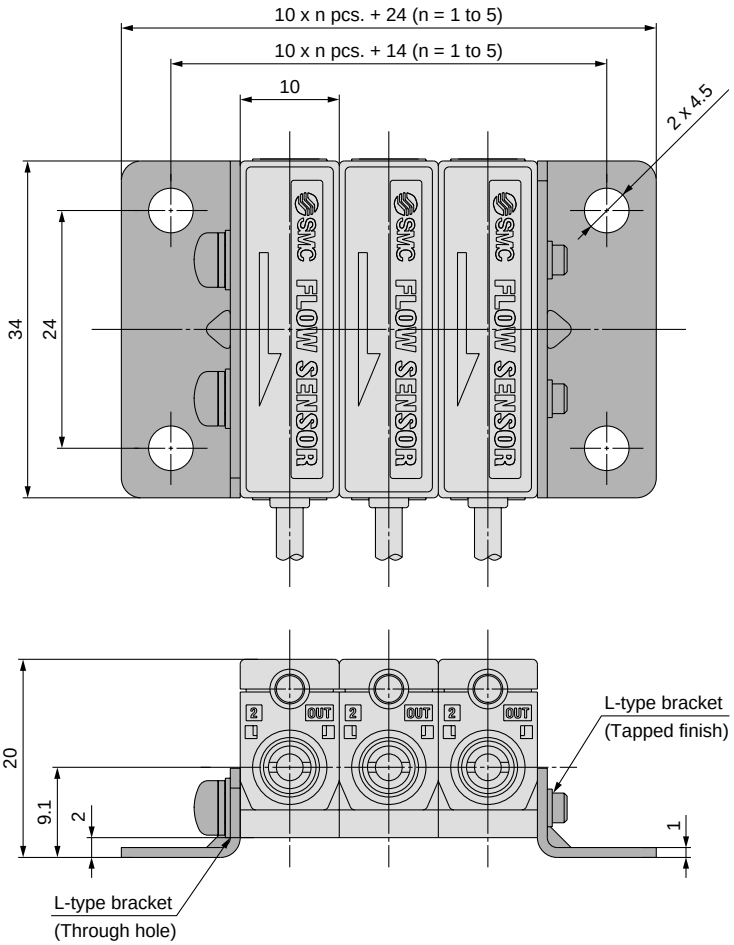
PFMV5□□-1
PFMV5□□F-1



One-side bracket



Both-side bracket



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