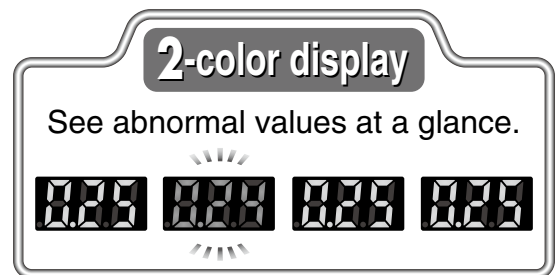
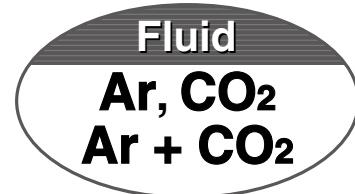
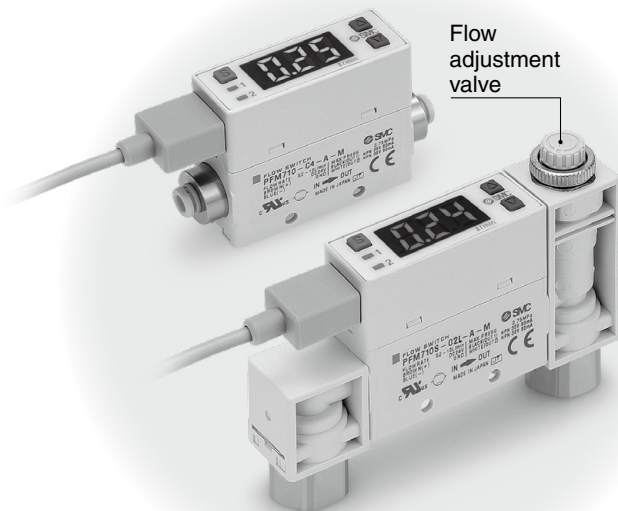


Compatible with Argon (Ar), Carbon Dioxide (CO<sub>2</sub>) and the Mixed Gas (Ar+CO<sub>2</sub>)

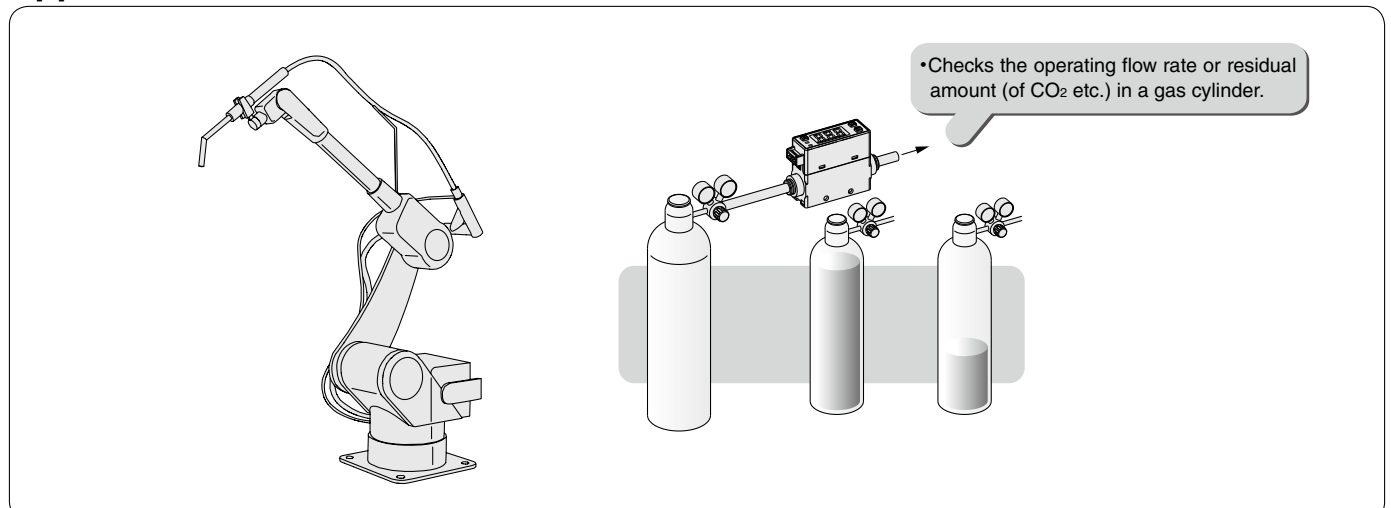
# Digital Flow Switch

## Series PFM7



- Allows flow rate control and value management of shielding gas
- Compatible with the mixed gas (Ar + CO<sub>2</sub>) (Gas ratio can be selected with -X731.)
- Flow rate range: 10, 25, 50, 100 L/min
- Minimum unit setting: 0.01 L/min (0.1 L/min when the flow rate range is 25, 50, 100 L/min.)
- Repeatability:  $\pm 1\%$ F.S.
- Grease-free
- Flow adjustment valve is integrated. (Reduced piping and space saving)
- Response time: Either 50 ms, 0.5 s, 1 s or 2 s can be chosen.

### Applications



# Comparison with Float Type Flow Meter

Spatter Resistant Cylinders for Arc Welding

Clamp Cylinders

Gas/Air Switching Valve

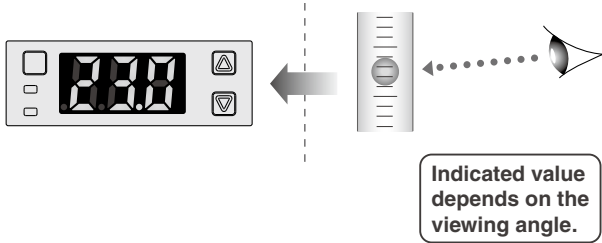
Detection Switches

Tubing

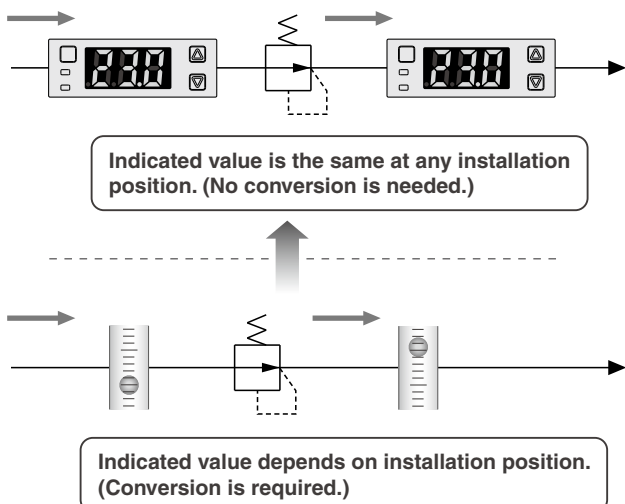
Fittings

Flow Control Equipment

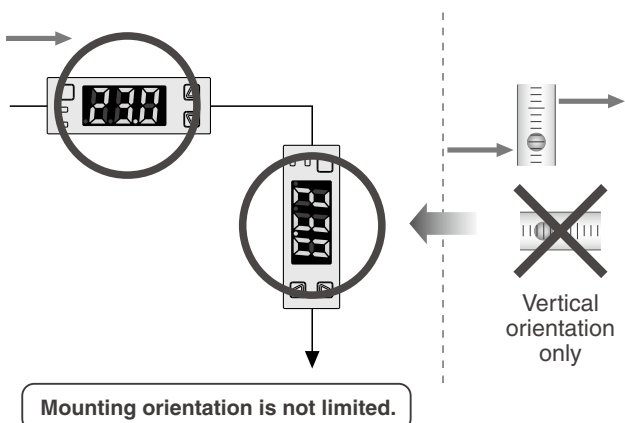
## Digital display



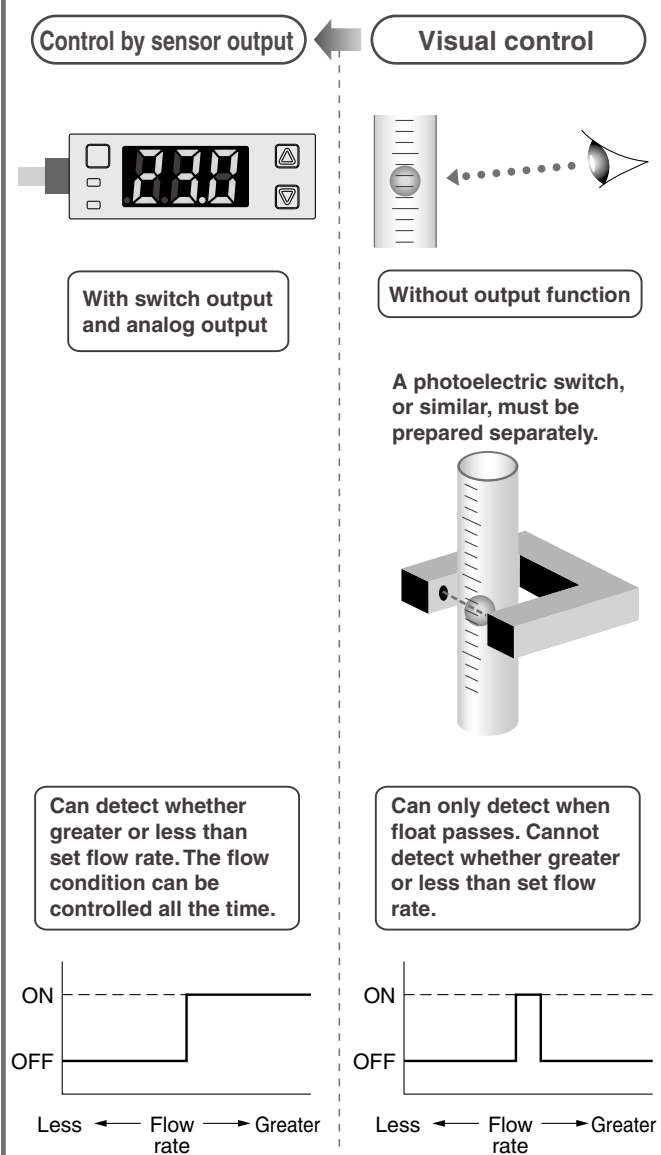
## Not subject to pressure variations



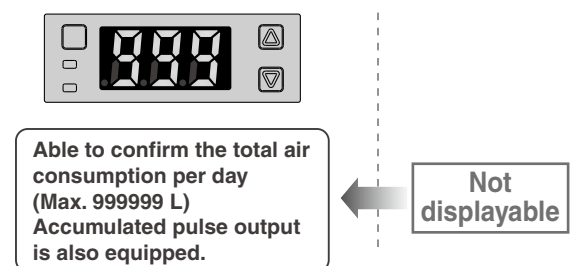
## Free mounting orientation



## With switch output and analog output



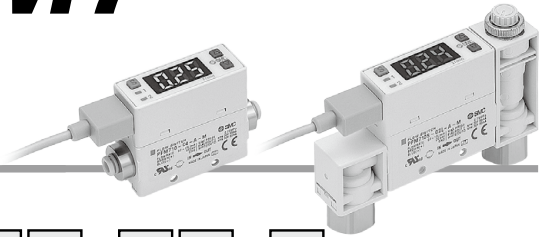
## Accumulated flow display



# Compatible with Argon (Ar), Carbon Dioxide (CO<sub>2</sub>) and the Mixed Gas (Ar + CO<sub>2</sub>)

## Digital Flow Switch

# Series PFM7



### How to Order

**PFM7** **10** **C4** **A** **M** **7** **25** **11**

#### Type

7	Integrated display
---	--------------------

#### Rated flow range (Flow rate range)

10	0.2 to 10 (5) L/min
25	0.5 to 25 (12.5) L/min
50	1 to 50 (25) L/min
11	2 to 100 (50) L/min

\* ( ): Fluid: CO<sub>2</sub>  
 \* When using argon (Ar), carbon dioxide (CO<sub>2</sub>) and the mixed gas (Ar + CO<sub>2</sub>), refer to page 101.

#### Flow adjustment valve

Nil	None
S	Yes

#### Port size

Symbol	Description	Flow rate range			
		10	25	50	11
01	Rc1/8	●	●	●	
02	Rc1/4				●
N01	NPT1/8	●	●	●	
N02	NPT1/4				●
F01	G1/8	●	●	●	
F02	G1/4				●
C4	ø4 (5/32") One-touch fitting	●			
C6	ø6 One-touch fitting	●	●	●	●
C8	ø8 (5/16") One-touch fitting		●	●	●
N7	ø1/4" One-touch fitting		●	●	●

#### Piping entry direction

Nil	Straight
L	Bottom

\* Different combinations of piping entry directions for IN and OUT side are available as made-to-order.

• **Option 2**  
(Refer to page 98.)

• **Option 1**  
(Refer to page 98.)

#### Made to Order

X731	Compatible with argon (Ar) and carbon dioxide (CO <sub>2</sub> ) mixed gas (Refer to page 101.)
------	--

#### Calibration certificate

Nil	None
A	With calibration certificate

\* The certificate is written in English and Japanese. Other languages are available as specials.

#### Operation manual

Nil	With operation manual (Japanese and English)
N	None

#### Unit specifications

M	Fixed SI unit <small>Note 1)</small>
Nil	With unit switching function <small>Note 2)</small>

Note 1) Fixed unit: Instantaneous flow rate: L/min  
 Accumulated flow: L

Note 2) Since the unit for Japan is fixed to SI due to new measurement law, this option is for overseas.

#### Output specifications

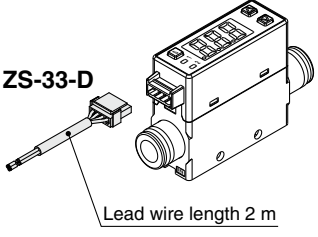
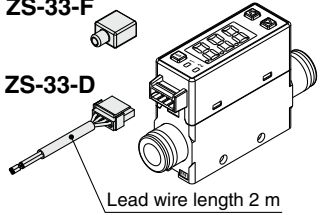
A	2 NPN outputs
B	2 PNP outputs
C	1 NPN output + Analog (1 to 5 V)
D	1 NPN output + Analog (4 to 20 mA)
E	1 PNP output + Analog (1 to 5 V)
F	1 PNP output + Analog (4 to 20 mA)
G	1 NPN output + External input <small>Note 3)</small>
H	1 PNP output + External input <small>Note 3)</small>

Note 3) User can select from accumulated value external reset, auto-shift and auto-shift zero.

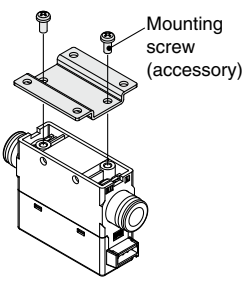
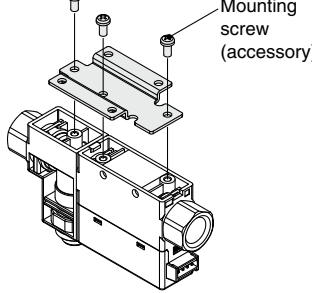
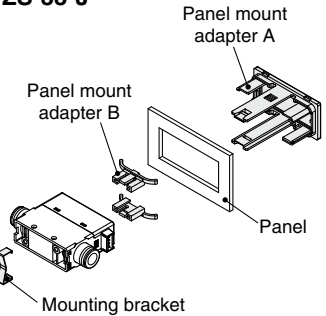
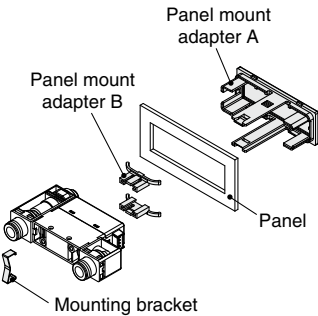
### Piping Variations

	With One-touch fittings (C4, C6, C8, N7)		Female thread (01, 02, N01, N02, F01, F02)	
	Straight (Nil)	Bottom (L)	Straight (Nil)	Bottom (L)
Without flow adjustment valve (Nil)				
With flow adjustment valve (S)				

**Option 1**

Nil	W	Z
With lead wire with connector (2 m)	With lead wire with connector (2 m) + Rubber cover for connector (silicon rubber)	Without lead wire with connector
 <p><b>ZS-33-D</b> Lead wire length 2 m</p>	 <p><b>ZS-33-F</b> <b>ZS-33-D</b> Lead wire length 2 m</p>	

**Option 2**

Nil	R	S	T
None	Bracket (For without flow adjustment valve) <b>ZS-33-M</b>	Bracket (For with flow adjustment valve) <b>ZS-33-MS</b>	Panel mount adapter (For without flow adjustment valve) <b>ZS-33-J</b>
	 <p>Mounting screw (accessory)</p>	 <p>Mounting screw (accessory)</p> <p>Piping direction: Cannot be mounted with bottom piping type.</p>	 <p>Panel mount adapter A Panel mount adapter B Panel Mounting bracket</p>
<b>V</b>	<p>Panel mount adapter (For with flow adjustment valve) <b>ZS-33-JS</b></p>  <p>Panel mount adapter A Panel mount adapter B Panel Mounting bracket</p>		

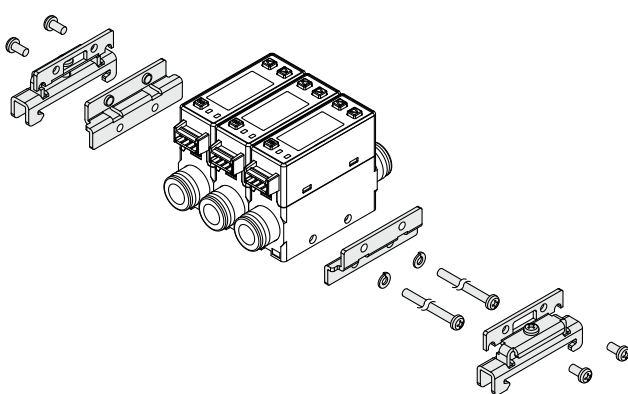
Each option is not assembled with the product, but shipped together.

**DIN Rail Mounting Bracket (Order Separately)**

**ZS-33-R**

Stations

1	1 station
2	2 stations
3	3 stations
4	4 stations
5	5 stations



- DIN rail (supplied by customers)
- Port size F02: G1/4 cannot be mounted on the DIN rail.

# Series PFM7

## Specifications

For details about the Flow Switch Precautions, refer to "Handling Precautions for SMC Products".  
For details about the Specific Product Precautions, refer to the Operation Manual at SMC website.

Model		PFM710	PFM725	PFM750	PFM711
<b>Applicable fluid</b>		Dry air, N <sub>2</sub> , Ar, CO <sub>2</sub> (Air quality grade is JIS B8392-1, 1.1.2 to 1.6.2 and ISO8573-1, 1.1.2 to 1.6.2.)			
<b>Rated flow range</b> <small>Note 8)</small> (Flow rate range)	Dry air, N <sub>2</sub> , Ar	0.2 to 10 L/min	0.5 to 25 L/min	1 to 50 L/min	2 to 100 L/min
	CO <sub>2</sub>	0.2 to 5 L/min	0.5 to 12.5 L/min	1 to 25 L/min	2 to 50 L/min
<b>Displayable range</b> <small>Note 1) Note 8)</small>	Dry air, N <sub>2</sub> , Ar	0.2 to 10.5 L/min	0.5 to 26.3 L/min	1 to 52.5 L/min	2 to 105 L/min
	CO <sub>2</sub>	0.2 to 5.2 L/min	0.5 to 13.1 L/min	1 to 26.2 L/min	2 to 52 L/min
<b>Settable range</b> <small>Note 1) Note 8)</small>	Dry air, N <sub>2</sub> , Ar	0 to 10.5 L/min	0 to 26.3 L/min	0 to 52.5 L/min	0 to 105 L/min
	CO <sub>2</sub>	0 to 5.2 L/min	0 to 13.1 L/min	0 to 26.2 L/min	0 to 52 L/min
<b>Minimum unit setting</b> <small>Note 2)</small>		0.01 L/min	0.1 L/min	0.1 L/min	0.1 L/min
<b>Accumulated pulse flow rate exchange value</b>		0.1 L/pulse	0.1 L/pulse	0.1 L/pulse	1 L/pulse
<b>Indication unit</b> <small>Note 3)</small>		Instantaneous flow rate L/min, CFM x 10 <sup>-2</sup> Accumulated flow L, ft <sup>3</sup> x 10 <sup>-1</sup>			
<b>Linearity</b>		Display accuracy: ±3%F.S. (Fluid: Dry air) Analog output accuracy: ±5%F.S. (Fluid: Dry air)			
<b>Repeatability</b>		±1%F.S. (Fluid: Dry air) Analog output accuracy: ±3%F.S. (Fluid: Dry air)			
<b>Pressure characteristics</b>		±5%F.S. (0.35 MPa reference)			
<b>Temperature characteristics</b>		±2%F.S. (15 to 35°C) ±5%F.S. (0 to 50°C)			
<b>Operating pressure range</b>		-100 kPa to 750 kPa			
<b>Rated pressure range</b>		-70 kPa to 750 kPa			
<b>Proof pressure</b>		1 MPa			
<b>Accumulated flow range</b>		Max. 999999 L <small>Note 4)</small>			
<b>Switch output</b>		NPN or PNP open collector output			
		Maximum load current 80 mA			
		Maximum applied voltage 28 VDC (at NPN output)			
		Internal voltage drop NPN output: 1 V or less (at 80 mA) PNP output: 1.5 V or less (at 80 mA)			
		Response time 1 s (50 ms, 0.5 s, 2 s can be selected.)			
		Output protection Short-circuit protection			
<b>Accumulated pulse output</b>		NPN or PNP open collector output (Same as switch output)			
<b>Analog output</b> <small>Note 5) Note 8)</small>		<b>Response time</b> 1.5 s or less (90% response)			
		<b>Voltage output</b> Voltage output: 1 to 5 V Output impedance: 1 kΩ			
		<b>Current output</b> Current output: 4 to 20 mA Max. load impedance: 600 Ω, Min. load impedance: 50 Ω			
<b>Hysteresis</b> <small>Note 6)</small>		<b>Hysteresis mode</b> Variable			
		<b>Window comparator mode</b> Variable			
<b>External input</b>		No-voltage input (Reed or Solid state) Input 30 ms or more			
<b>Display method</b>		3-digit, 7-segment LED 2-color display (Red/Green) Renewed cycle: 10 times/sec			
<b>Status LED's</b>		OUT1: Lights up when output is turned ON (Green). OUT2: Lights up when output is turned ON (Red).			
<b>Power supply voltage</b>		24 VDC ±10%			
<b>Current consumption</b>		55 mA or less			
<b>Environment</b>		<b>Enclosure</b> IP40			
		<b>Operating fluid temperature</b> 0 to 50°C (with no freezing and condensation)			
		<b>Operating temperature range</b> Operating: 0 to 50°C Stored: -10 to 60°C (with no freezing and condensation)			
		<b>Operating humidity range</b> Operating, Stored: 35 to 85%R.H. (with no condensation)			
		<b>Withstand voltage</b> 1000 VAC for 1 minute between terminals and housing			
		<b>Insulation resistance</b> 50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing			

Note 1) When the minimum unit setting 0.01 L/min is selected for 10 L/min type, the indication upper limit will be [9.99 L/min].

When the minimum unit setting 0.1 L/min is selected for 100 L/min type, the indication upper limit will be [99.9 L/min].

Note 2) User can select between 0.01 L/min and 0.1 L/min for the PFM710, and between 0.1 L/min and 1 L/min for the PFM711 respectively.

If the indication unit is selected to "CFM", the minimum unit setting cannot be changed.

At the time of shipment from the factory, the minimum unit setting is set to 0.1 L/min for the PFM710 and 1 L/min for the PFM711 respectively.

Note 3) Set to "ANR" at the time of shipment from the factory.

"ANR" is used for standard conditions: 20°C, 1 atm and 65%R.H.

"NL/min" is used for normal conditions: 0°C and 1 atm.

When equipped with a unit switching function. (The SI unit (L/min or L) is fixed for types with no unit switching function.)

Note 4) Cleared when the power supply is turned off. Hold function can be selected. (Interval of 2 min or 5 min can be selected).

If the 5 min interval is selected, the life of the memory element (electronic part) is limited to 1 million cycles. (If energized for 24 hours, life is calculated as 5 min x 1 million = 5 million min = 9.5 years). Therefore, if using the hold function, calculate the memory life for your operating conditions, and use within this life.

Note 5) Set to 1.5 s (90%), can be changed to 100 ms.

Note 6) Set to hysteresis mode at the time of shipment from the factory. Can be changed to window comparator mode using push-buttons.

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

Note 8) When using argon (Ar), carbon dioxide (CO<sub>2</sub>) and the mixed gas (Ar + CO<sub>2</sub>), refer to page 101.

## Settable Range and Rated Flow Range

### Set the flow rate within the rated flow range.

The settable rate range is the range of flow rate that can be set in the switch.

The rated flow range is the range that satisfies the switch specifications (accuracy, linearity etc.).

It is possible to set a value outside of the rated flow range if it is within the settable range, however, the specification is not be guaranteed.

The flow range if using CO<sub>2</sub> is given in brackets.

When using argon (Ar), carbon dioxide (CO<sub>2</sub>) and the mixed gas (Ar + CO<sub>2</sub>), refer to page 101.

Sensor	Flow range								
	0.2 L/min	0.5 L/min	1 L/min	2 L/min	10 L/min	25 L/min	50 L/min	100 L/min	
PFM710 PFM510	0.2 L/min ————— 10 L/min (5 L/min)								
	0.2 L/min ————— 10.5 L/min (5.2 L/min)								
	0 ————— 10.5 L/min (5.2 L/min)								
PFM725 PFM525	0.5 L/min ————— 25 L/min (12.5 L/min)								
	0.5 L/min ————— 26.3 L/min (13.1 L/min)								
	0 ————— 26.3 L/min (13.1 L/min)								
PFM750 PFM550	1 L/min ————— 50 L/min (25 L/min)								
	1 L/min ————— 52.5 L/min (26.2 L/min)								
	0 ————— 52.5 L/min (26.2 L/min)								
PFM711 PFM511	2 L/min ————— 100 L/min (50 L/min)								
	2 L/min ————— 105 L/min (52 L/min)								
	0 ————— 105 L/min (52 L/min)								

Rated flow range  
 Displayable range  
 Settable range

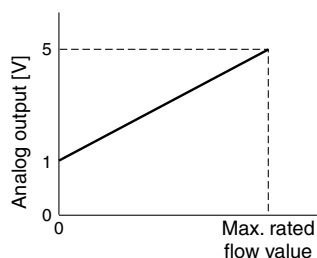
In the case of the PFM5 series, the displayable and settable ranges are the same as the PFM3 series flow monitor.

## Piping Specifications/Weight

Part no.	01	02	N01	N02	F01	F02	C4	C6	C6	N7		
Port size	Rc 1/8	Rc 1/4	NPT 1/8	NPT 1/4	G1/8	G1/4	ø4 (5/32") One-touch fitting	ø6 One-touch fitting	ø8 (5/16") One-touch fitting	ø1/4" One-touch fitting		
Weight	Straight Bottom		Without orifice: 95 g Without orifice: 105 g		Straight Bottom		Without orifice: 125 g Without orifice: 135 g		Straight Bottom		Without orifice: 55 g Without orifice: 65 g	
	Straight Bottom		With orifice: 135 g With orifice: 145 g		Straight Bottom		With orifice: 165 g With orifice: 175 g		Straight Bottom		With orifice: 95 g With orifice: 105 g	
Wetted parts material	LCP, PBT, Brass (Electroless nickel plating), HNBR (+ Fluoro coated), FKM (+ Fluoro coated), Silicon, Au, Stainless steel 304											

## Analog Output

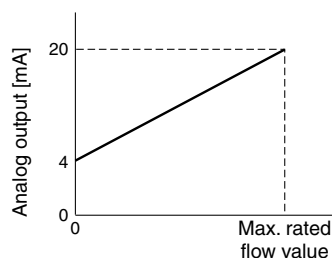
Note) Analog output at maximum rated flow rate when CO<sub>2</sub> is selected is 3 [V] for the voltage output type and 12 [mA] for the current output type.  
Note) When using argon (Ar), carbon dioxide (CO<sub>2</sub>) and the mixed gas (Ar + CO<sub>2</sub>), refer to page 101.



Analog Voltage Output (1 to 5 V)

Model	Max. rated flow value [L/min]
PFM710-□-C/E	10 (5)
PFM725-□-C/E	25 (12.5)
PFM750-□-C/E	50 (25)
PFM711-□-C/E	100 (50)

\* ( ): Fluid: CO<sub>2</sub>



Analog Current Output (4 to 20 mA)

Model	Max. rated flow value [L/min]
PFM710-□-D/F	10 (5)
PFM725-□-D/F	25 (12.5)
PFM750-□-D/F	50 (25)
PFM711-□-D/F	100 (50)

\* ( ): Fluid: CO<sub>2</sub>



# PFM7-X731

## Digital Flow Switch

# Made to Order Specifications



Please contact SMC for detailed specifications, lead times and prices.

Symbol

### 1 Compatible with Argon (Ar) and Carbon Dioxide (CO<sub>2</sub>) Mixed Gas

**X731**

The argon-carbon dioxide gas ratio (Ar: CO<sub>2</sub>) can be selected using the push-buttons from among the following: 92 : 8, 90 : 10, 80 : 20, 70 : 30, and 60 : 40. Dimensions are same as those of standard models.

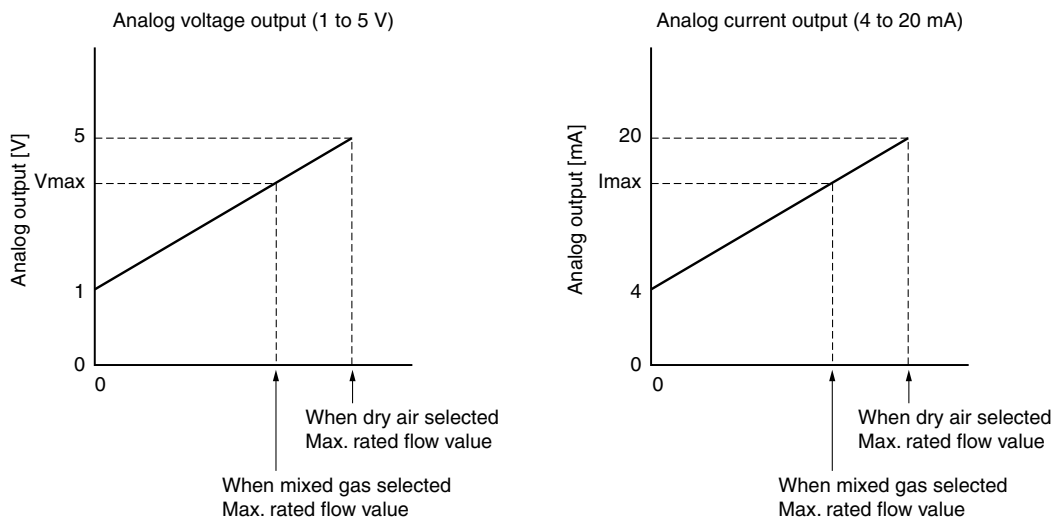
PFM 7   -   -     - X731



For details of How to Order, refer to page 97.

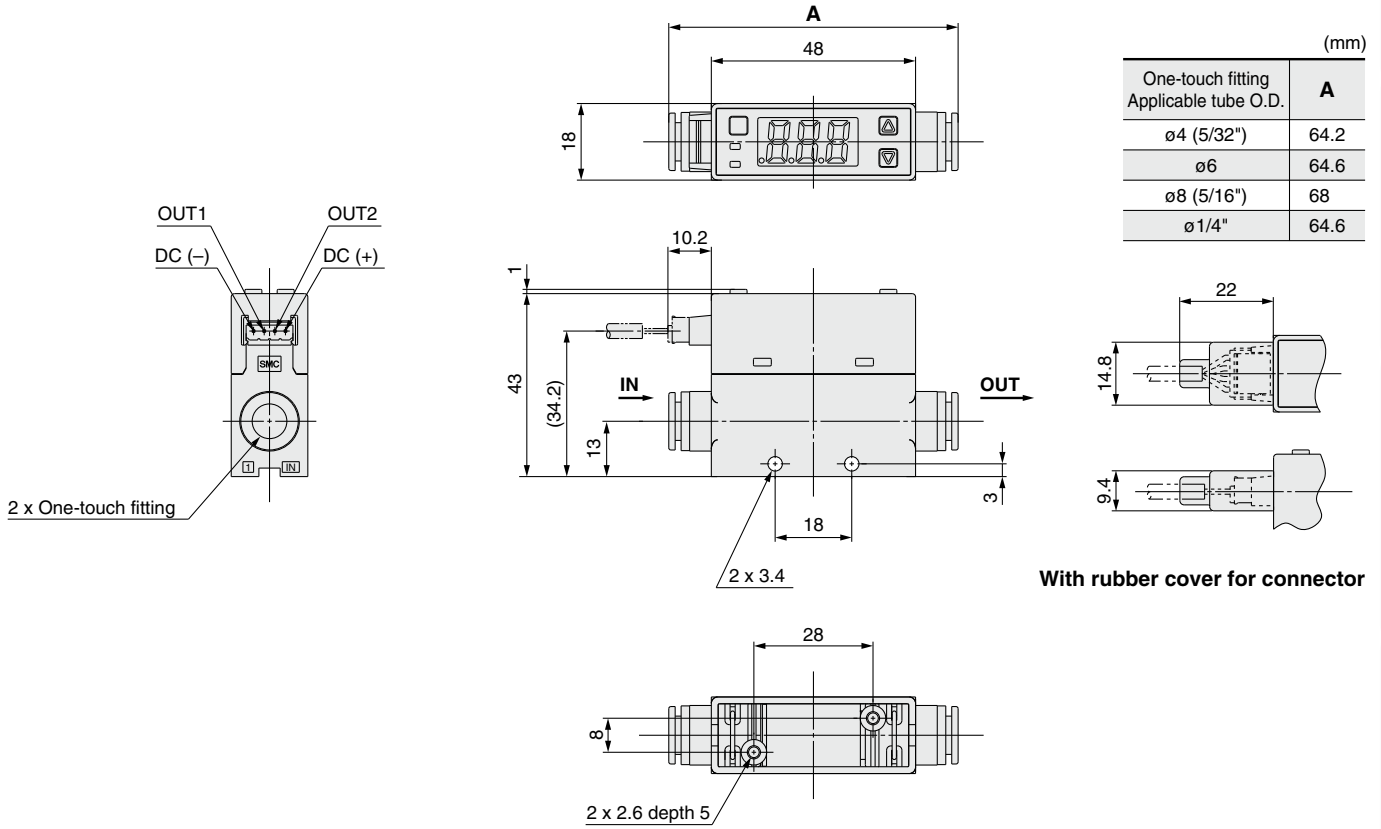
Model	Gas ratio		Rated flow range	Displayable range	Settable range	Max. analog output	
	Ar	CO <sub>2</sub>				Voltage (Vmax)	Current (Imax)
PFM710	92%	8%	0.2 to 7.0 L/min	0.2 to 7.4 L/min	0 to 7.4 L/min	3.80 V	15.2 mA
	90%	10%					
	80%	20%					
	70%	30%					
	60%	40%					
PFM725	92%	8%	0.5 to 25.0 L/min	0.5 to 26.3 L/min	0 to 26.3 L/min	5.00 V	20.0 mA
	90%	10%	0.5 to 20.0 L/min	0.5 to 21.0 L/min	0 to 21.0 L/min	4.20 V	16.8 mA
	80%	20%					
	70%	30%					
	60%	40%					
PFM750	92%	8%	1.0 to 50.0 L/min	1.0 to 52.5 L/min	0 to 52.5 L/min	5.00 V	20.0 mA
	90%	10%	1.0 to 40.0 L/min	1.0 to 42.0 L/min	0 to 42.0 L/min	4.20 V	16.8 mA
	80%	20%					
	70%	30%					
	60%	40%					
PFM711	92%	8%	2 to 100 L/min	2 to 105 L/min	0 to 105 L/min	5.00 V	20.0 mA
	90%	10%	2 to 90 L/min	2 to 95 L/min	0 to 95 L/min	4.60 V	18.4 mA
	80%	20%					
	70%	30%					
	60%	40%					

### Output characteristics using mixed gas

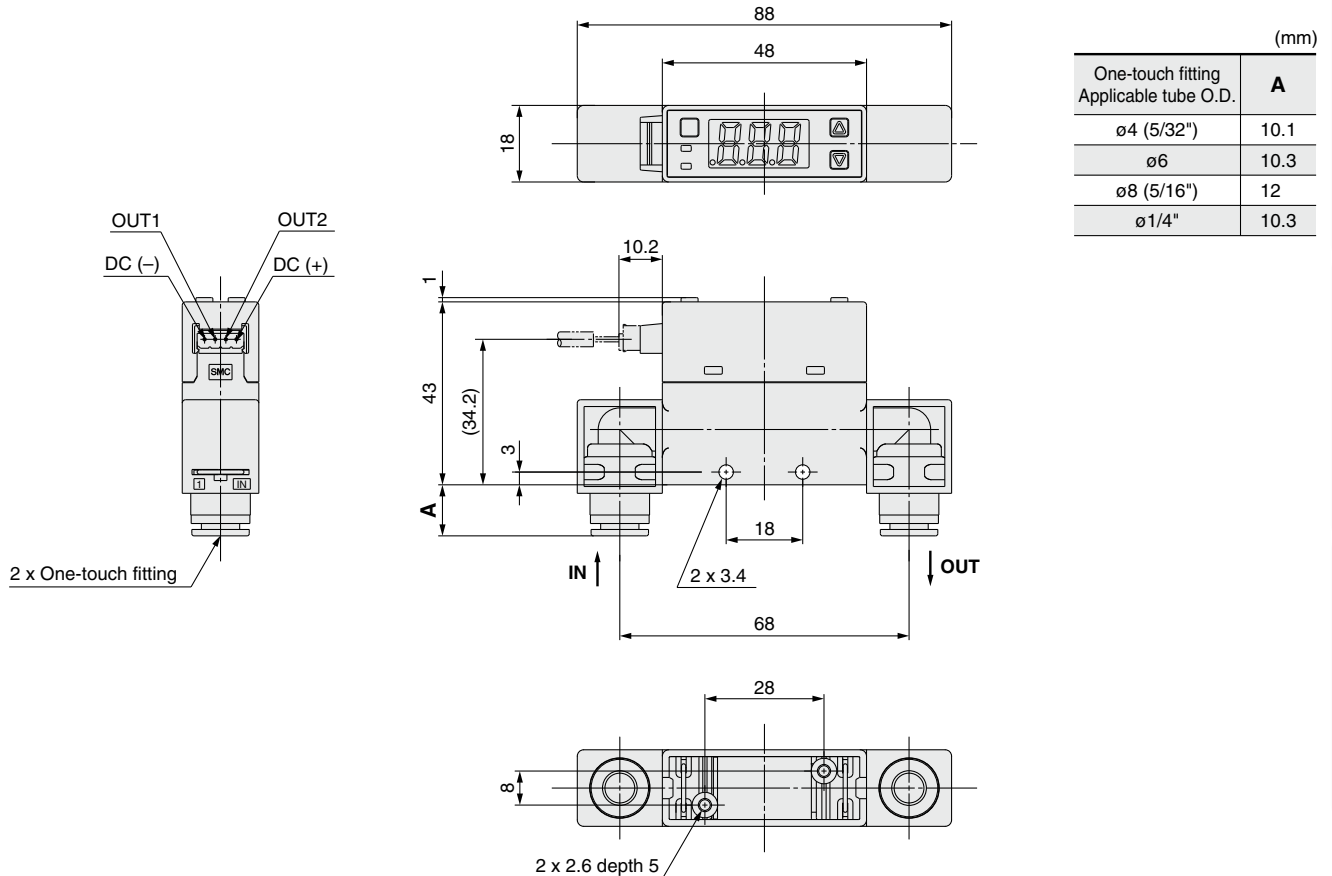


**Dimensions**

**PFM7□□-C4/C6/C8/N7**



**PFM7□□-C4L/C6L/C8L/N7L**

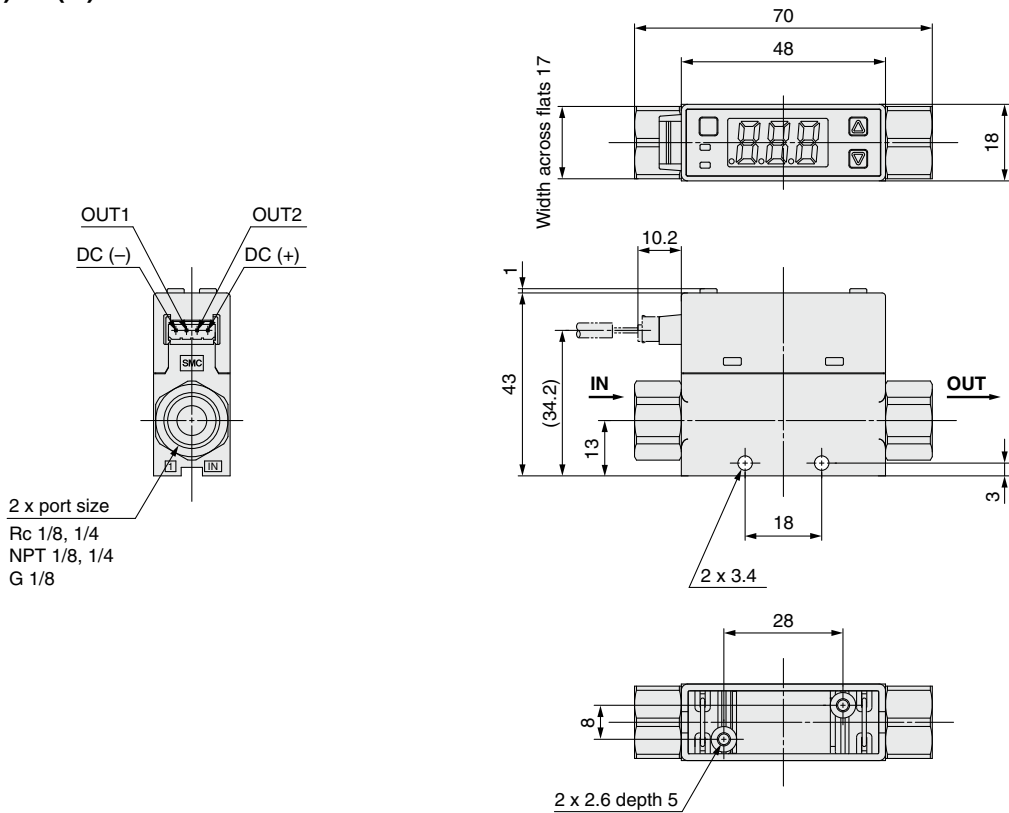




# Series PFM7

## Dimensions

### PFM7□□-(N)01/(N)02/F01



### PFM7□□-(N)01L/(N)02L/F01L

