

2-Color Display Digital Flow Switch

New



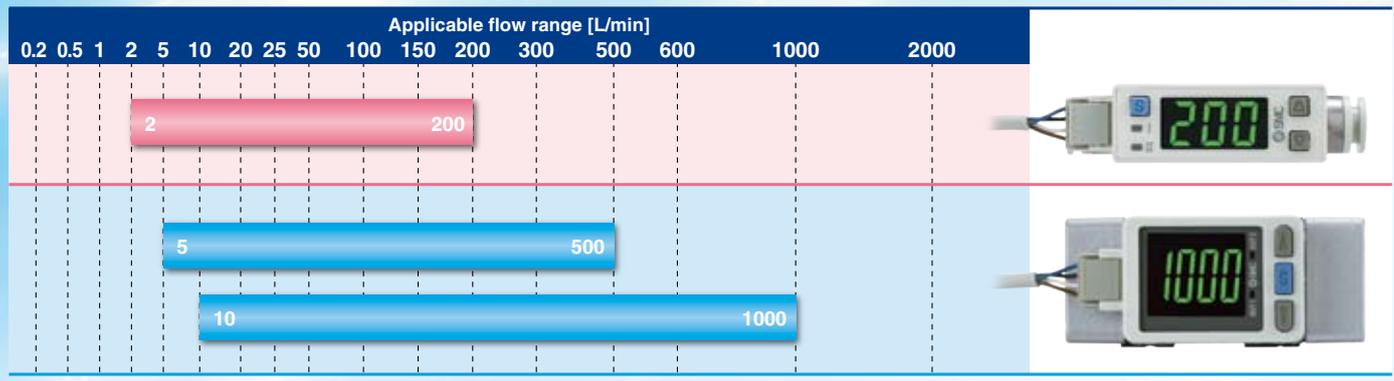
Applicable fluid **Air, N₂**

Expanded flow range! Wide range of flow measurement with one product

Flow ratio* **(100: 1)**

* Flow ratio is 10: 1 for current PF2A.

Setting resolution: **1 L/min**
Current PF2A: 5 L/min (200 L: 2 L/min)



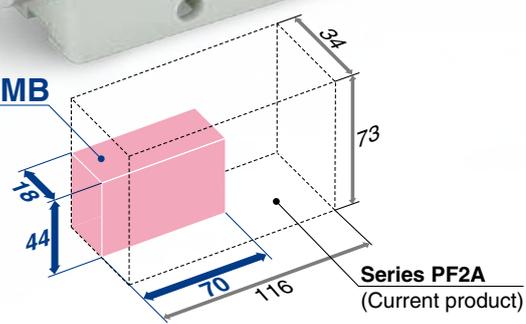
Compact, Space saving **500 L/1000 L type**

Approx. **1/3** the volume of the current product (200 L type)

200 L type

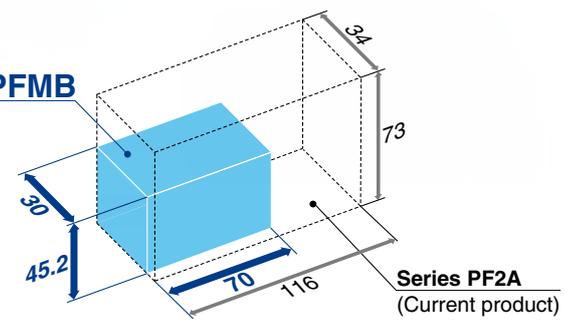


New PFMB



Comparison with PFMB7201 and PF2A721-03

New PFMB



Comparison with PFMB7501-04 and PF2A751-04

Series **PFMB**



CAT.ES100-95A

2-Color Display Digital Flow Switch

Flow adjustment valve is integrated.

200 L type

Reduces piping installation work and space requirements. Special design provides smooth adjustment to match needle rotations.

Flow adjustment valve

500 L/1000 L type

200 L type



Response time

Can be selected from

50 msec.(0.05 sec.)/ **0.1** sec./
0.5 sec./ **1.0** sec./ **2.0** sec.

Response time can be set depending on application.

Grease-free

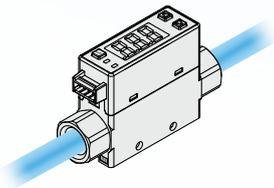
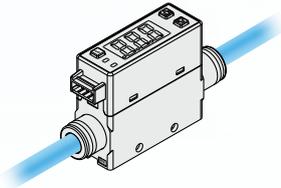
Piping variations

200 L type

Straight

One-touch fitting $\varnothing 8$

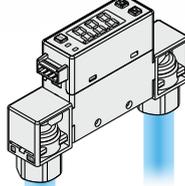
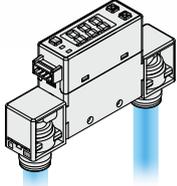
Female thread Rc, NPT, G 1/4



Bottom

One-touch fitting $\varnothing 8$

Female thread Rc, NPT, G 1/4



Reversed display mode

When the switch is used upside down, the orientation of the display can be rotated to make it easier to read.

No display rotating function Display is upside down.



With display rotating function

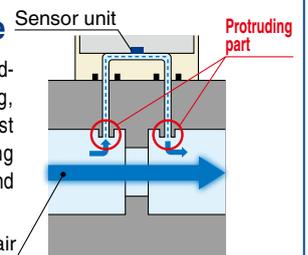


Functions (Refer to page 15 and 16 for details.)

- Output operation
- Display color
- Reference condition
- Response time
- Display mode
- External input function
- Accumulated value hold
- Analog output hold
- Forced output function
- Analog output free range function
- Power-saving mode
- Peak/Bottom value display
- Keylock function
- Error display function
- Orientation correction function
- Reversed display mode
- Reset to the default settings.
- Setting of security code

Bypass structure

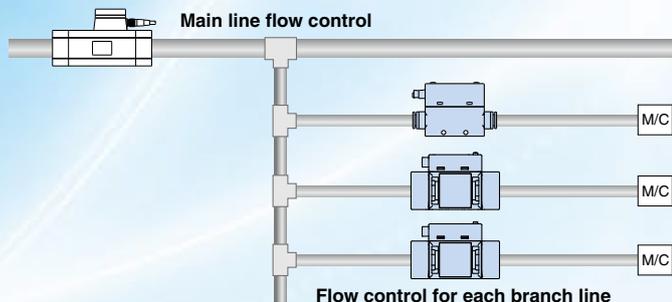
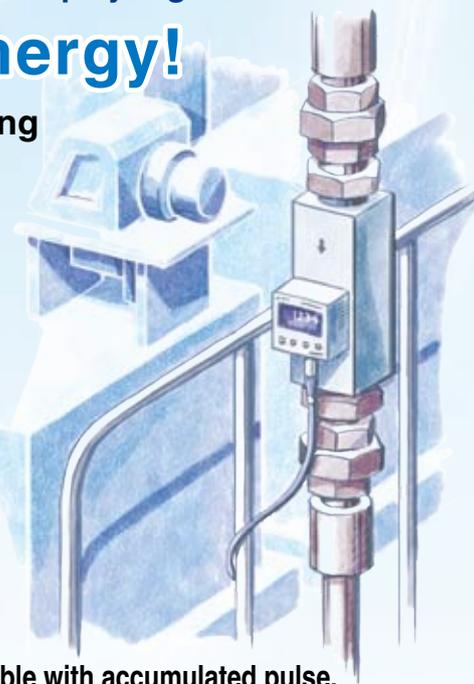
Bypass structure with protruding part at the main piping, reduces the contact of moist air with the sensor, reducing degradation of the sensor and maintaining accuracy.



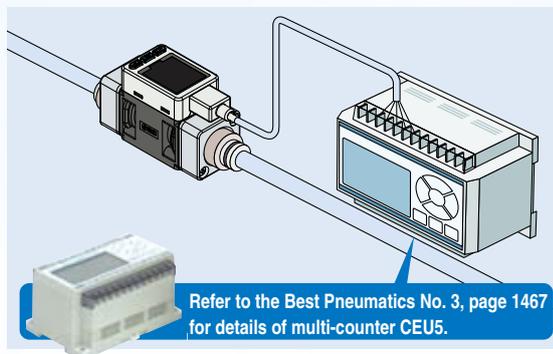
Digital flow switch to save energy!

Flow control is necessary for promoting energy saving in any application.

Saving energy starts from numerical control of the flow consumption of equipment and lines and clarification of the purpose and effect.



- Digital display allows visualization of flow rate.
- Remote control is possible with accumulated pulse.
- 2-color display Improved visibility

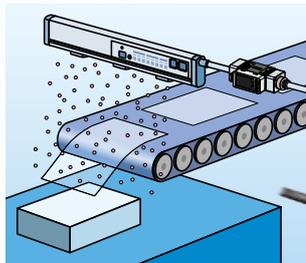


Applications

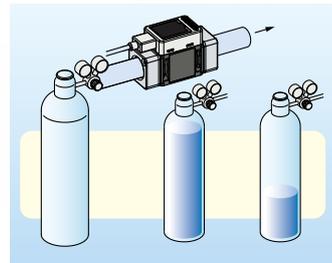
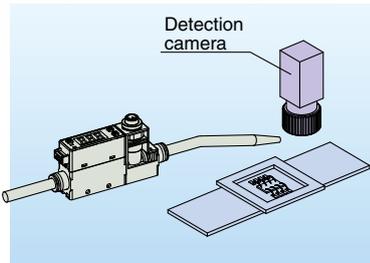
Control of purge air flow of ionizer

Flow control of the air for spray painting

- Flow control of N₂ gas to prevent lead frame oxidation
- Accumulated indication shows the operating flow rate or residual amount (of N₂ etc.) in a gas cylinder.
- N₂ blow prevents distortion of camera image due to air turbulence.



(Note) The product is not designed to be explosion proof.



Mounting

200 L type

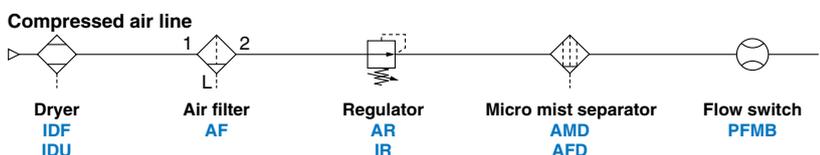
- Through-hole mounting
- DIN rail
- Bracket
- Panel mount

500 L/1000 L type

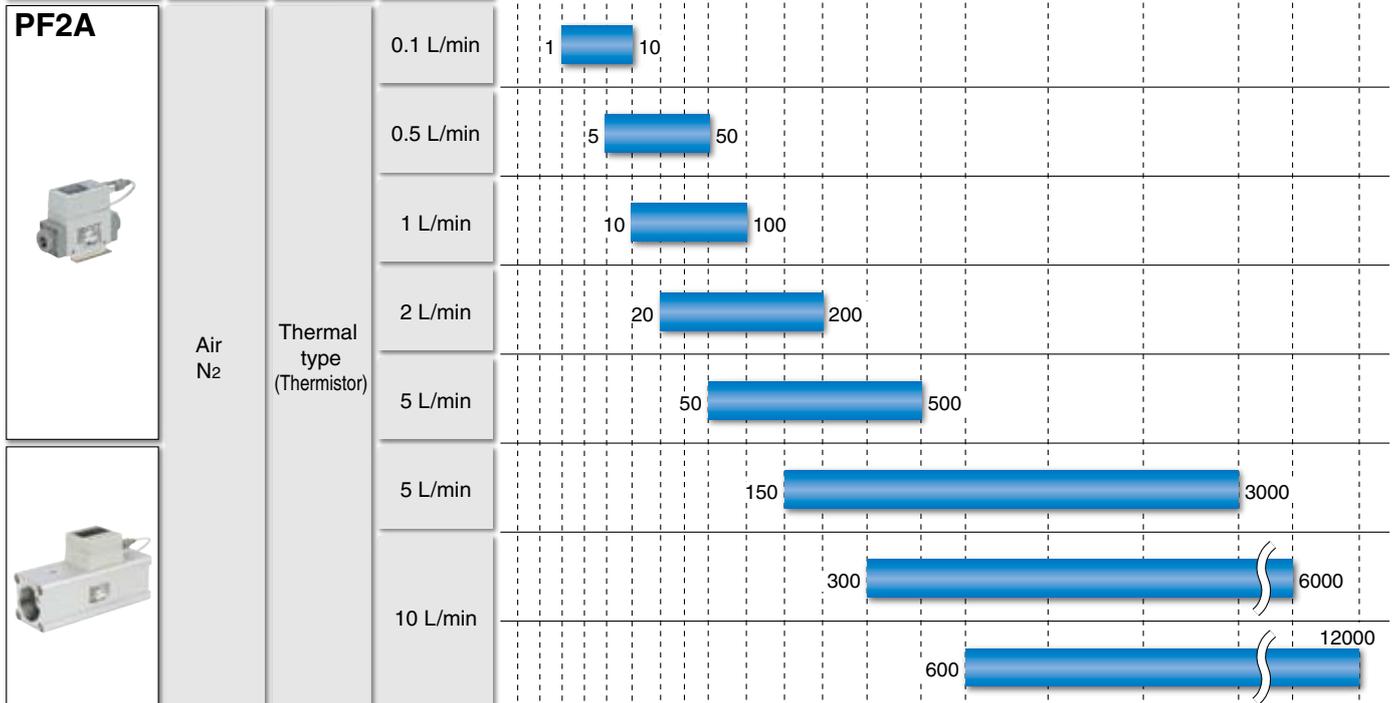
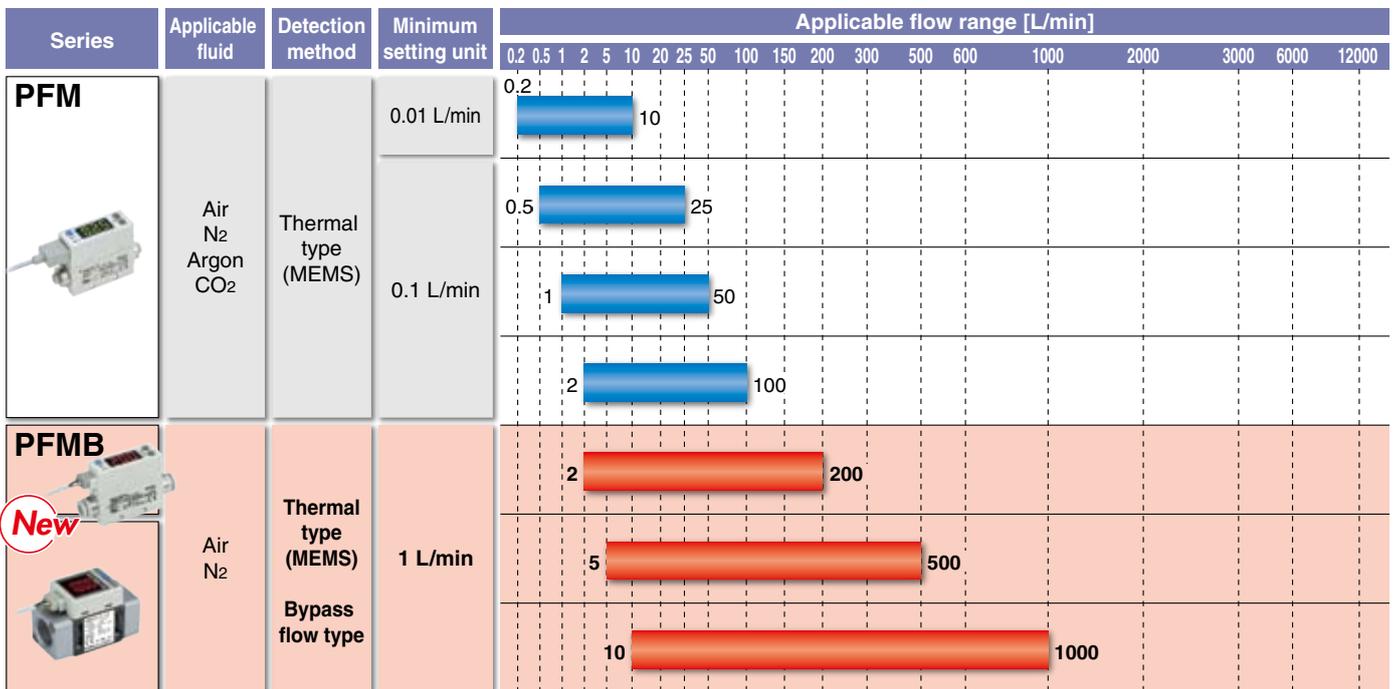
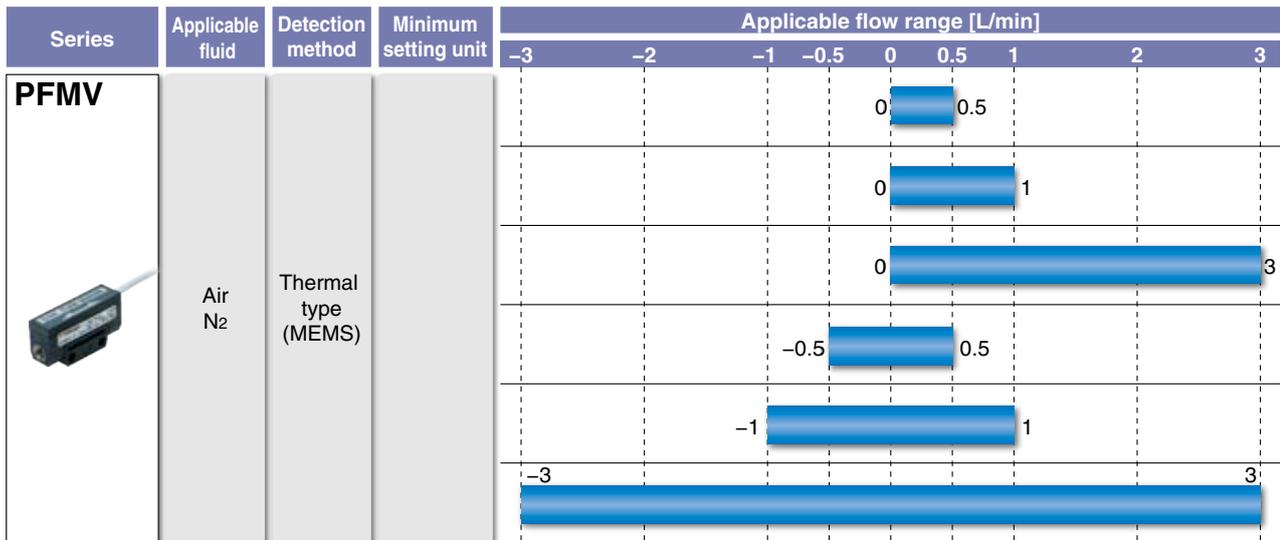
- Bracket

Example of Recommended Pneumatic Circuit

Air quality in the product specification can be satisfied by using this pneumatic circuit.



Flow Switch Flow Rate Variations



Flow Switch Variations/Basic Performance Table

Series	PFMV	PFM	New PFMB	PF2A
Enclosure	IP40	IP40	IP40	IP65
Fluid	Dry air, N ₂	Dry air, N ₂ , Ar, CO ₂	Dry air, N ₂	Dry air, N ₂
Setting	Digital	Digital	Digital	Digital
Rated flow range	0 to 0.5 L/min 0 to 1 L/min 0 to 3 L/min -0.5 to 0.5 L/min -1 to 1 L/min -3 to 3 L/min	0.2 to 10 L/min 0.5 to 25 L/min 1 to 50 L/min 2 to 100 L/min	2 to 200 L/min 5 to 500 L/min 10 to 1000 L/min	1 to 10 L/min 5 to 50 L/min 10 to 100 L/min 20 to 200 L/min 50 to 500 L/min 150 to 3000 L/min 300 to 6000 L/min 600 to 12000 L/min
Power supply voltage	24 VDC±10%	24 VDC±10%	12 to 24 VDC±10%	12 to 24 VDC±10%
Temperature characteristics (25°C reference)	±2%F.S. (15 to 35°C) ±5%F.S. (0 to 50°C) Monitor unit ±0.5%F.S. (0 to 50°C)	±2%F.S. (15 to 35°C) ±5%F.S. (0 to 50°C)	±2%F.S. (15 to 35°C) ±5%F.S. (0 to 50°C)	±3%F.S. (15 to 35°C) ±5%F.S. (0 to 50°C) ±2%F.S. (PF2A7□□H: 0 to 50°C)
Repeatability	±1%F.S. (Fluid: Dry air) Analog output: ±5%F.S. Monitor unit ±0.1%F.S. Analog output: ±0.5%F.S.	±1%F.S. (Fluid: Dry air) Analog output: ±3%F.S.	±1%F.S. (Fluid: Dry air)	±1%F.S. (PF2A7□□0, PF2A7□□□H) ±2%F.S. (PF2A7□□1)
Hysteresis	Hysteresis mode: Variable Window comparator mode: Variable	Hysteresis mode: Variable Window comparator mode: Variable	Hysteresis mode: Variable Window comparator mode: Variable	Hysteresis mode: Variable Window comparator mode: Fixed (3 digits)
Output	NPN/PNP Open collector Analog voltage output Analog current output	NPN/PNP Open collector Accumulated pulse output Analog voltage output Analog current output	NPN/PNP Open collector Accumulated pulse output Analog voltage output Analog current output	NPN/PNP Open collector Accumulated pulse output
Display	2-color LCD display	2-color LED display	2-color LED display 2-color LCD display	LED display

2-Color Display

Digital Flow Switch

Series PFMB7



RoHS



How to Order

PFMB7 201 [] - C8 [] - A [] - M [] []

Type

7 Integrated display

Rated flow range (Flow rate range)

201 2 to 200 L/min

Flow adjustment valve

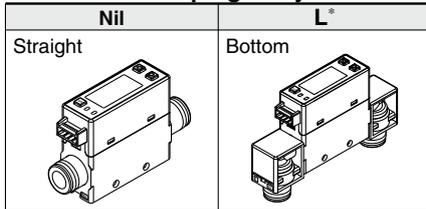
Nil	None
S	Yes

Port size

C8	ø8 (5/16") One-touch fitting
O2*	Rc1/4
N02*	NPT1/4
F02*	G1/4 (Note 4)

Note 4) ISO1179-1 compliant
*Made to Order

Piping entry direction



*Made to Order

Output specifications

	OUT1	OUT2
A	NPN	NPN
B	PNP	PNP
C	NPN	Analog 1 to 5 V
D	NPN	Analog 4 to 20 mA
E*	PNP	Analog 1 to 5 V
F*	PNP	Analog 4 to 20 mA
G*	NPN	External input (Note)
H*	PNP	External input (Note)

Note) Accumulated flow, peak flow and minimum flow can be reset by external signal input.

*Made to Order

Option 1

Nil	W
With lead wire with connector (2 m)  ZS-33-D	With lead wire with connector (2 m) + Connector cover (Silicone rubber) ZS-33-F  ZS-33-D
N No lead wire	Note) If an accessory is required, order separately using "ZS" part numbers.

Calibration certificate (Note 1)

Nil	None
A*	With calibration certificate

Note 1) Certificate in both English and Japanese
*Made to Order

Unit specifications

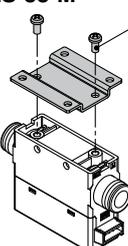
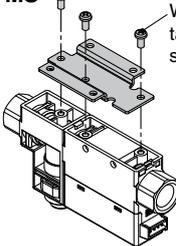
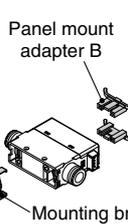
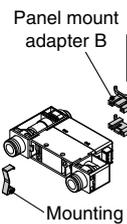
M	SI unit only (Note 2)
Nil	Unit selection function (Note 3)

Note 2) Fixed unit: Instantaneous flow: L/min
Accumulated flow: L

Note 3) Since the unit for Japan is fixed to SI due to new measurement law, this option is for overseas.

Unit can be changed. Instantaneous flow: L/min ↔ cfm
Accumulated flow: L ↔ ft³

Option 2

Nil	R	S
No bracket	With bracket (For without flow adjustment valve) ZS-33-M  With 2 self-tapping screws	With bracket (For with straight type flow adjustment valve) ZS-33-MS  With 3 self-tapping screws
	T	V
	With panel mount adapter (For without flow adjustment valve) ZS-33-J  Panel mount adapter A Panel mount adapter B Panel Mounting bracket	With panel mount adapter (For with flow adjustment valve) ZS-33-JS  Panel mount adapter A Panel mount adapter B Panel Mounting bracket

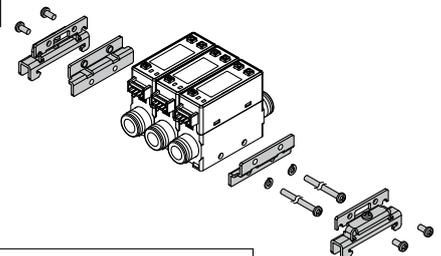
Note) Each option is not assembled with the product, but shipped together. If an accessory is required, order separately using "ZS" part numbers.

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 is prepared by customer.
- DIN rail is not suitable for port size F02 (G1/4).



How to Order

PFMB7 **501** - **04** - **A** - **M**

Type

7	Integrated display
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Rated flow range (Flow rate range)

501	5 to 500 L/min
102	10 to 1000 L/min

Thread type

Nil	Rc
N	NPT
F	G (Note)

Note) ISO228 compliant

Port size

	Port size	Rated flow range	
		501	102
04	1/2	●	●

Output specifications

	OUT1	OUT2
A	NPN	NPN
B	PNP	PNP
C	NPN	Analog 1 to 5 V
D	NPN	Analog 4 to 20 mA
E*	PNP	Analog 1 to 5 V
F*	PNP	Analog 4 to 20 mA
G*	NPN	External input (Note 4)
H*	PNP	External input (Note 4)

Note 4) Accumulated flow, peak flow and minimum flow can be reset by external signal input.

*Made to Order

Calibration certificate (Note 1)

Nil	None
A*	With calibration certificate

Note 1) Certificate in both English and Japanese

*Made to Order

Option 2

Nil	R
	With bracket
	With 4 self-tapping screws
No bracket	

Note) Each option is not assembled with the product, but shipped together. If an accessory is required, order separately using "ZS" part numbers.

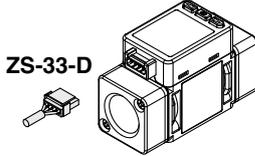
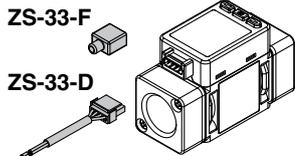
Unit specifications

M	SI unit only (Note 2)
Nil	Unit selection function (Note 3)

Note 2) Fixed unit: Instantaneous flow: L/min
Accumulated flow: L

Note 3) Since the unit for Japan is fixed to SI due to new measurement law, this option is for overseas.
Unit can be changed. Instantaneous flow: L/min ↔ cfm
Accumulated flow: L ↔ ft³

Option 1

Nil	W
With lead wire with connector (2 m)	With lead wire with connector (2 m) + Connector cover (Silicone rubber)
	
N	Note) If an accessory is required, order separately using "ZS" part numbers.
No lead wire	

Option 2/Part No.

Option	Part no.	Qty.	Note
Bracket	ZS-42-C	1	PFMB 7501/7102 with self-tapping screw (3 x 6), 4 pcs.

Series PFMB7

Refer to "Handling Precautions for SMC Products" for Flow Switch Precautions and the Operation Manual in our website for Specific Product Precautions.

Specifications

Model		PFMB7201	PFMB7501	PFMB7102	
Fluid	Applicable fluid ^{Note 1)}	Air, N ₂ (Air quality grade is JIS B 8392-1 1.1.2 to 1.6.2, ISO8573-1 1.1.2 to 1.6.2.)			
	Fluid temperature range	0 to 50°C			
Flow	Detection method	Thermal type			
	Rated flow range	2 to 200 L/min	5 to 500 L/min	10 to 1000 L/min	
	Set flow rate range	Instantaneous flow	2 to 210 L/min	5 to 525 L/min	10 to 1050 L/min
		Accumulated flow	0 to 999,999,999 L	0 to 999,999,990 L	
	Minimum setting unit	1 L/min			
	Accumulated volume per pulse (Pulse width = 50 msec.)	Instantaneous flow	1 L	10 L	
		Accumulated flow	1 L/pulse		
Accumulated value hold function ^{Note 2)}	Interval of 2 or 5 minutes can be selected.				
Pressure	Rated pressure range	0 to 0.75 MPa	0 to 0.8 MPa		
	Proof pressure	1.0 MPa			
	Pressure loss	Refer to "Pressure Loss" graph.			
	Pressure characteristics ^{Note 3)}	±5%F.S. (0 to 0.75 MPa, 0.35 MPa reference)	±5%F.S. (0 to 0.8 MPa, 0.6 MPa reference)		
Electrical	Power supply voltage	12 to 24 VDC ±10%			
	Current consumption	55 mA or less			
^{Note 11)} Accuracy	Protection	Polarity protection			
	Display accuracy	±3%F.S.			
	Analog output accuracy	±3%F.S.			
	Repeatability	±1%F.S. (±2%F.S. when response time is set to 0.05 seconds.)			
	Temperature characteristics	±5%F.S. (0 to 50°C, 25°C reference)			
	Output type	NPN open collector PNP open collector			
	Output mode	Select from Hysteresis, Window comparator, Accumulated output or Accumulated pulse output modes.			
Switch output	Switch operation	Select from Normal or Reversed output.			
	Maximum load current	80 mA			
	Maximum applied voltage (NPN only)	28 VDC			
	Internal voltage drop (Residual voltage)	NPN output type: 1 V or less (at load current 80 mA) PNP output type: 2 V or less (at load current 80 mA)			
	Response time ^{Note 4)}	Select from 0.05 sec., 0.1 sec., 0.5 sec., 1 sec., or 2 sec.			
	Hysteresis ^{Note 5)}	Variable from 0			
	Protection	Short circuit protection			
Analog output ^{Note 6)}	Output type	Voltage output: 1 to 5 V, Current output: 4 to 20 mA			
	Impedance	Voltage output	Output impedance: Approx. 1 kΩ		
		Current output	Max. load impedance at power supply voltage 24 V: 600 Ω, at power supply voltage 12 V: 300 Ω		
Response time ^{Note 7)}	Linked with the response time of the switch output.				
External input ^{Note 8)}	External input	Input voltage: 0.4 V or less (reed or solid state) for 30 msec. or longer			
	Input mode	Select from Accumulated flow external reset or Peak/Bottom reset.			
Display	Reference condition ^{Note 9)}	Select from Standard condition or Normal condition.			
	Display mode	Select from Instantaneous flow or Accumulated flow.			
	Unit ^{Note 10)}	Instantaneous flow	L/min or cf ³ can be selected.		
		Accumulated flow	L or ft ³ can be selected.		
	Displayable range	Instantaneous flow	-10 to 210 L/min (Displays [0] when the value is within the -1 to 1 L/min range.)	-25 to 525 L/min (Displays [0] when the value is within the -4 to 4 L/min range.)	-50 to 1050 L/min (Displays [0] when the value is within the -9 to 9 L/min range.)
		Accumulated flow	0 to 999,999,999 L		
	Minimum display unit	Instantaneous flow	1 L/min	10 L	
Display	Accumulated flow	1 L			
Indicator LED	Display method: LED Display color: Red/Green Display: 3 digit 7 segment LED ON when switch output is ON. (OUT1: Green, OUT2: Red)	Display method: LCD Display color: Red/Green Display: 4 digit 7 segment LED ON when switch output is ON. (OUT1/OUT2: Orange)			
Environmental	Enclosure	IP40			
	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			
	Operating temperature range	Operation: 0 to 50°C, Storage: -10 to 60°C (No condensation or freezing)			
Operating humidity range	Operation, Storage: 35 to 85%RH (No condensation or freezing)				
Standard	CE, UL (CSA), RoHS				
Piping	Piping specifications	Rc1/4, NPT1/4, G1/4, ø8 One-touch fitting	CE, RoHS		
	Piping entry direction	Straight, Bottom			
Main materials of parts in contact with fluid ^{Note 12)}	FKM, Stainless steel 304, PPS, PBT, Brass (Electroless nickel plating), HNBR, Si, Au, GE4F		ADC, PPS, Stainless steel 304, Au HNBR, Si, GE4F		
Weight	Body	Rc1/4, NPT1/4/Straight: 70 g Bottom: 85 g G1/4/Straight: 115 g Bottom: 130 g ø8 One-touch fitting/Straight: 50 g Bottom: 65 g	100 g		
	Flow adjustment valve	+45 g			
	Lead wire	+35 g			
	Bracket	+20 g			
	Panel mount adapter	+15 g			
DIN rail mounting bracket	+65 g				

Note 1) Refer to "Example of Recommended Pneumatic Circuit" on Features 2.

Note 2) When using the accumulated value hold function, use the operating conditions to calculate the product life, and do not exceed it. The maximum access limit of the memory device is 1 million cycles. If the product is operated 24 hours per day, the product life will be as follows:
 • 5 min interval: life is calculated as 5 min x 1 million = 5 million min = 9.5 years
 • 2 min interval: life is calculated as 2 min x 1 million = 2 million min = 3.8 years
 If the accumulated flow external reset is repeatedly used, the product life will be shorter than calculated life.

Note 3) Do not release the OUT side piping port of the product directly to the atmosphere without connecting piping. If the product is used with the piping port released to atmosphere, accuracy may vary.

Note 4) The time from when the flow is changed by a step input (when the flow rate changes from 0 to the maximum flow instantaneously) until the switch output turns ON (or OFF) when set at 90% of the rated flow rate.

Note 5) If the flow fluctuates around the set value, the width for setting more than the fluctuating width needs to be set. Otherwise, chattering will occur.

Note 6) When using a product with an analog output

Note 7) The time from when the flow is changed as a step input (when the flow rate changes from 0 to the maximum flow instantaneously) until the analog output reaches 90% of the rated flow rate.

Note 8) When using a product with an external input

Note 9) The flow rate given in the specification is the value at standard condition. To convert the units from standard condition to normal condition, use the following conversion calculation:
Flow rate at standard condition x 0.927 = Flow rate at normal condition

Note 10) Setting is only possible for models with the unit selection function.

Note 11) Refer to "Straight Piping Length and Accuracy" on page 4 for details.

Note 12) Refer to "Construction/Fluid Contact Parts" on page 5 for details.

Flow Range

Model	Flow range					
	-100 L/min	0 L/min	200 L/min	500 L/min	1000 L/min	2000 L/min
PFMB7201		2 L/min	200 L/min			
		2 L/min	210 L/min			
		-10 L/min	210 L/min			
PFMB7501		5 L/min	500 L/min			
		5 L/min	525 L/min			
		-25 L/min	525 L/min			
PFMB7102		10 L/min	1000 L/min			
		10 L/min	1050 L/min			
		-50 L/min	1050 L/min			

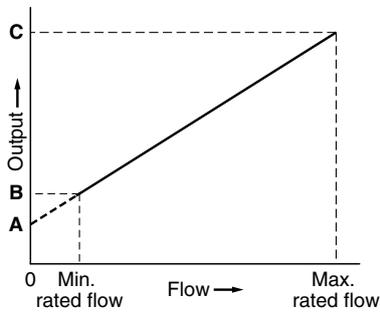
Rated flow range
 Set flow rate range
 Displayable range

Analog Output

Flow/Analog Output

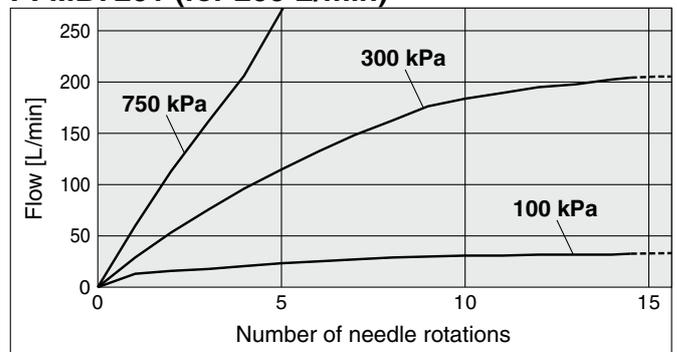
	A	B	C
Voltage output	1 V	1.04 V	5 V
Current output	4 mA	4.16 mA	20 mA

Model	Rated flow [L/min]	
	Min.	Max.
PFMB7201	2	200
PFMB7501	5	500
PFMB7102	10	1000



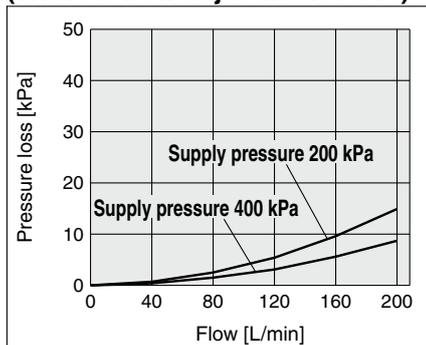
Flow Adjustment Valve Flow-rate Characteristics

PFMB7201 (for 200 L/min)

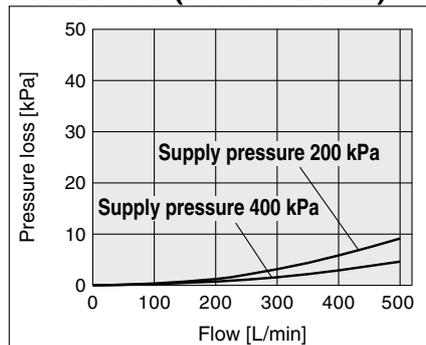


Pressure Loss

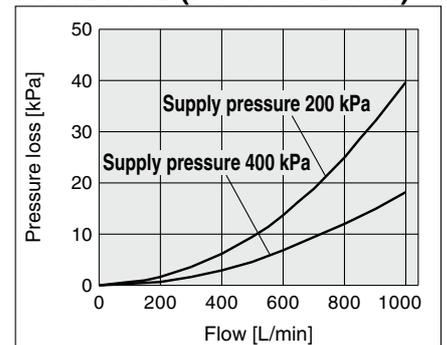
PFMB7201 (for 200 L/min) (Without flow adjustment valve)



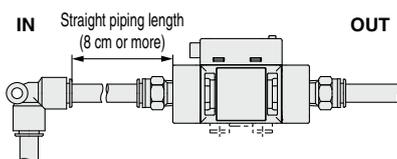
PFMB7501 (for 500 L/min)



PFMB7102 (for 1000 L/min)

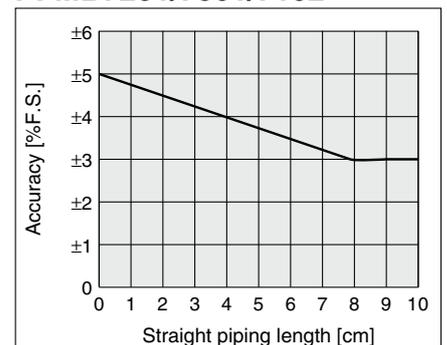


Straight Piping Length and Accuracy



- The piping on the IN side must have a straight section of piping with a length of 8 cm or more. If a straight section of piping is not installed, the accuracy can vary by approximately $\pm 2\%$ F.S.
 - * "Straight section" means a part of the piping without any bends or rapid changes in the cross sectional area.
 - When the PFMB7201 is connected to tubing, use a tube I.D. 5 mm just before the product.
 - When the PFMB7501 or 7102 is connected to tubing, use a tube I.D. 9 mm or more just before the product.
- The accuracy can vary by approximately $\pm 2\%$ F.S. when such tubing is not used.

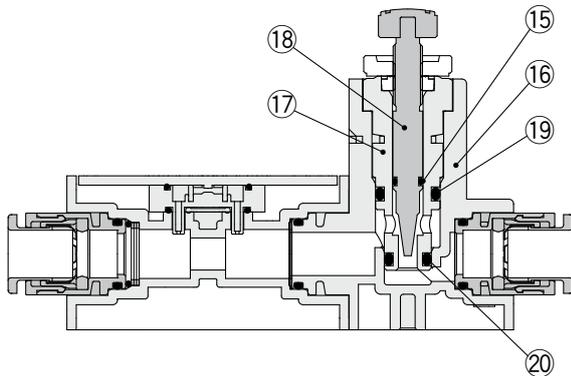
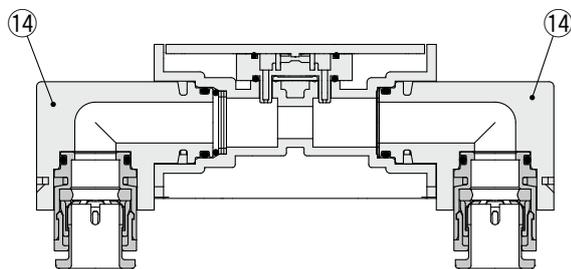
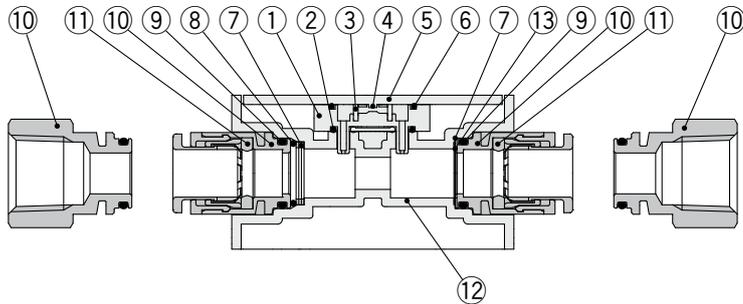
PFMB7201/7501/7102



Series PFMB7

Construction/Fluid Contact Parts

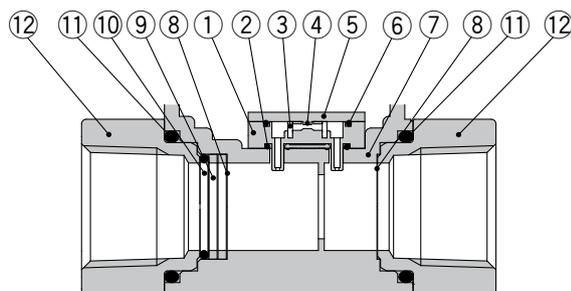
PFMB7201



Component Parts

No.	Description	Material	Note
1	Sensor body	PPS	
2	Gasket	HNBR	
3	Flow rectifier	Stainless steel 304	
4	Sensor chip	Silicone	
5	Printed circuit board	GE4F	
6	Gasket	HNBR	
7	Flow rectifier	Stainless steel 304	
8	O-ring	FKM	Fluoro coating
9	O-ring	FKM	Fluoro coating
10	Fitting for piping	Brass	Electroless nickel plating
11	O-ring	FKM	Fluoro coating
12	Body	PBT	
13	Gasket	HNBR	
14	Bottom piping adapter	PBT	
15	O-ring	HNBR	Fluoro coating
16	Flow adjustment valve body	PBT	
17	Body	Brass	Electroless nickel plating
18	Needle	Brass	Electroless nickel plating
19	O-ring	HNBR	Fluoro coating
20	O-ring	HNBR	Fluoro coating

PFMB7501/7102

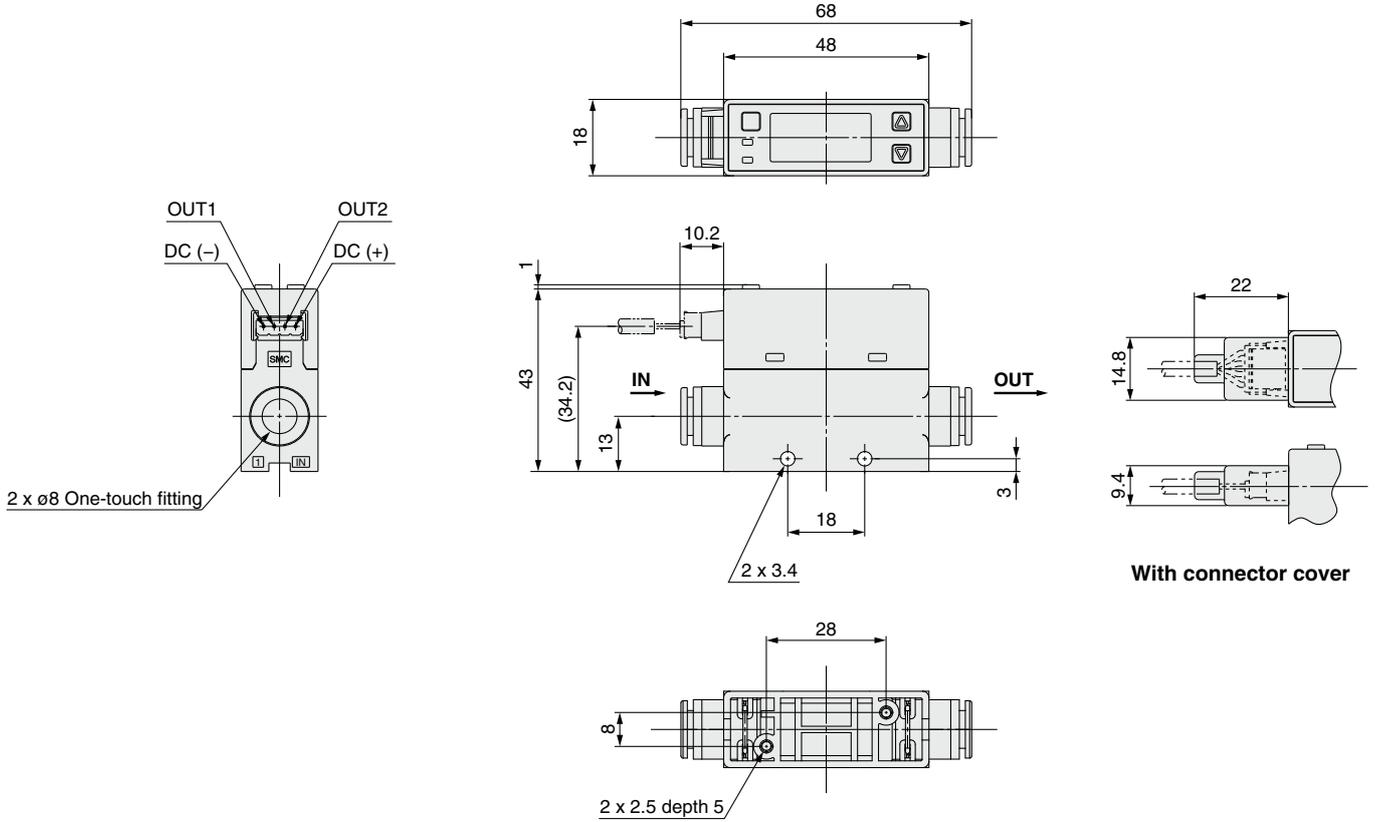


Component Parts

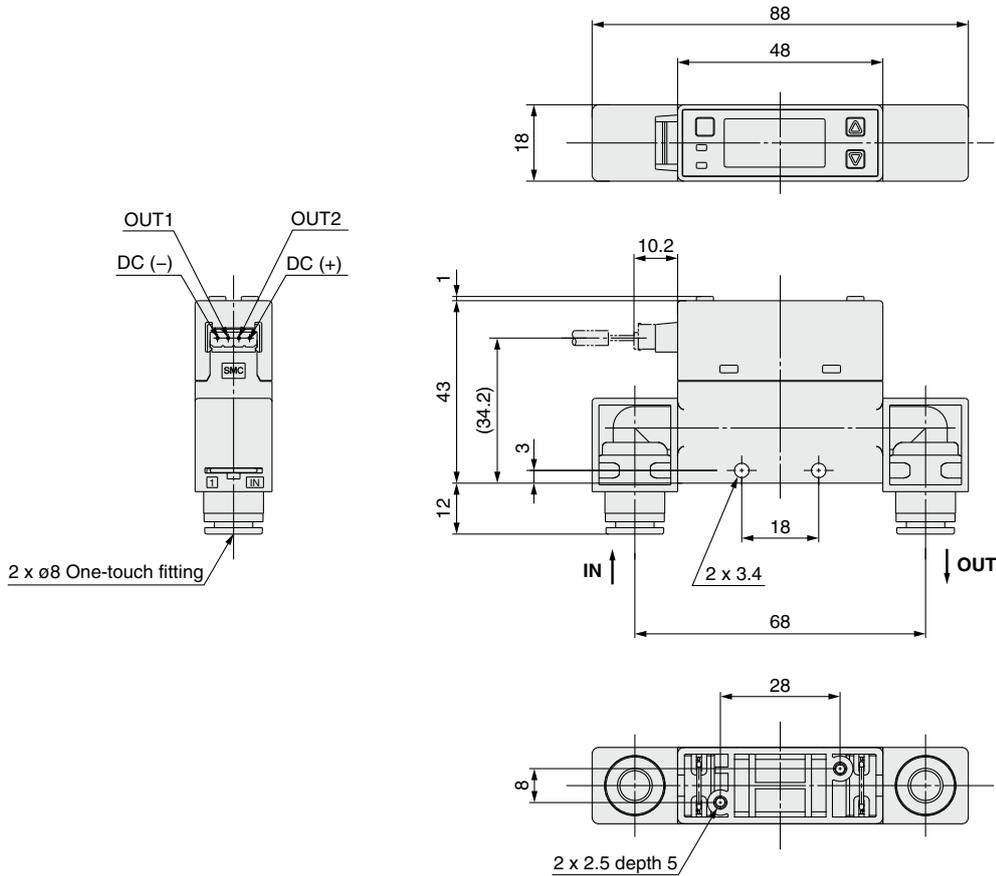
No.	Description	Material	Note
1	Sensor body	PPS	
2	Gasket	HNBR	
3	Flow rectifier	Stainless steel 304	
4	Sensor chip	Silicone	
5	Printed circuit board	GE4F	
6	Gasket	HNBR	
7	Body	PPS	
8	Mesh	Stainless steel 304	
9	Spacer	PPS	
10	O-ring	HNBR	
11	O-ring	HNBR	
12	Attachment	ADC	Coating

Dimensions

PFMB7201-C8



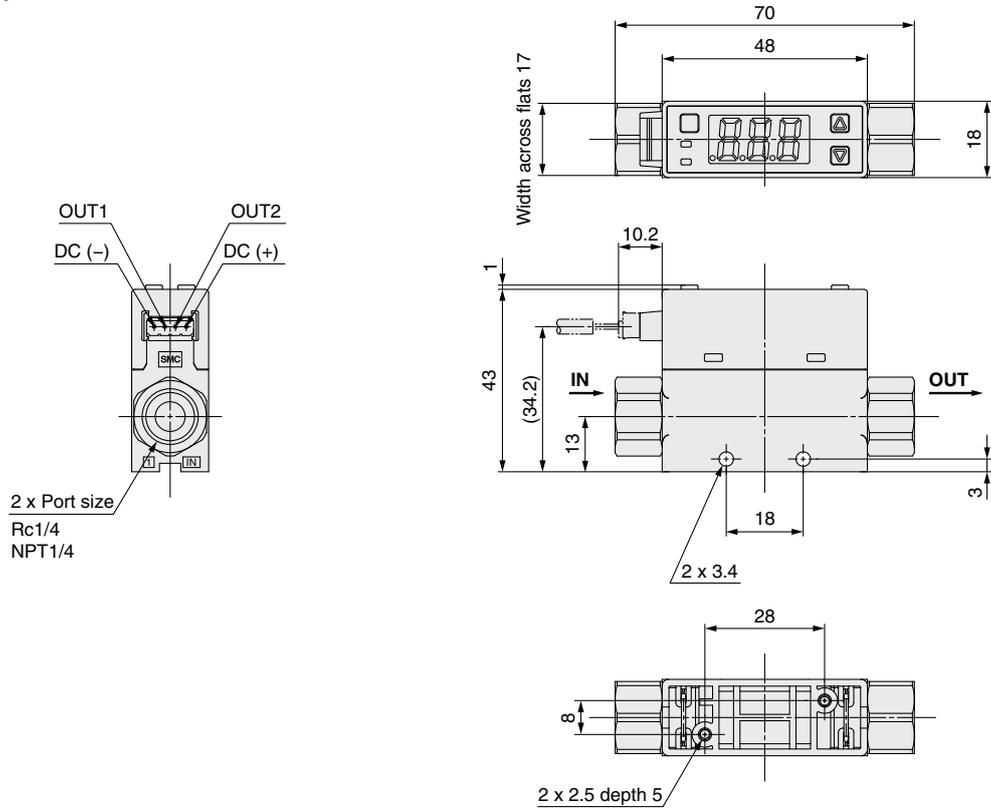
PFMB7201-C8L



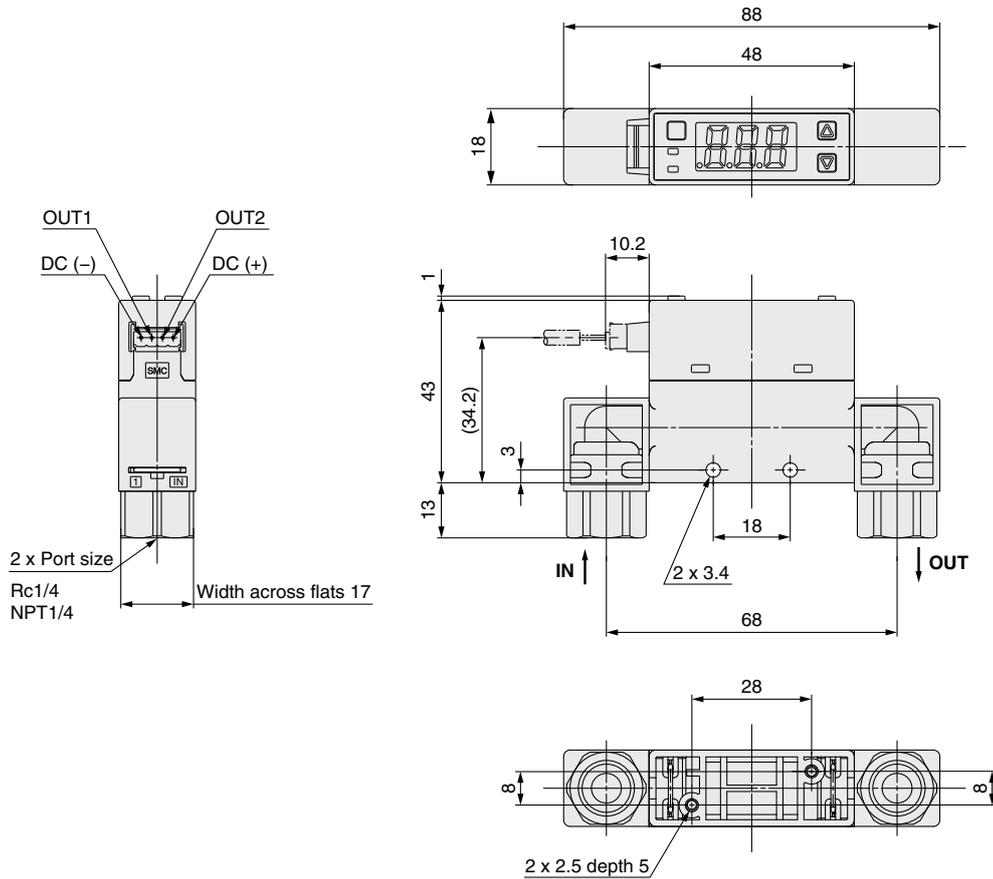
Series PFMB7

Dimensions

PFMB7201-(N)02

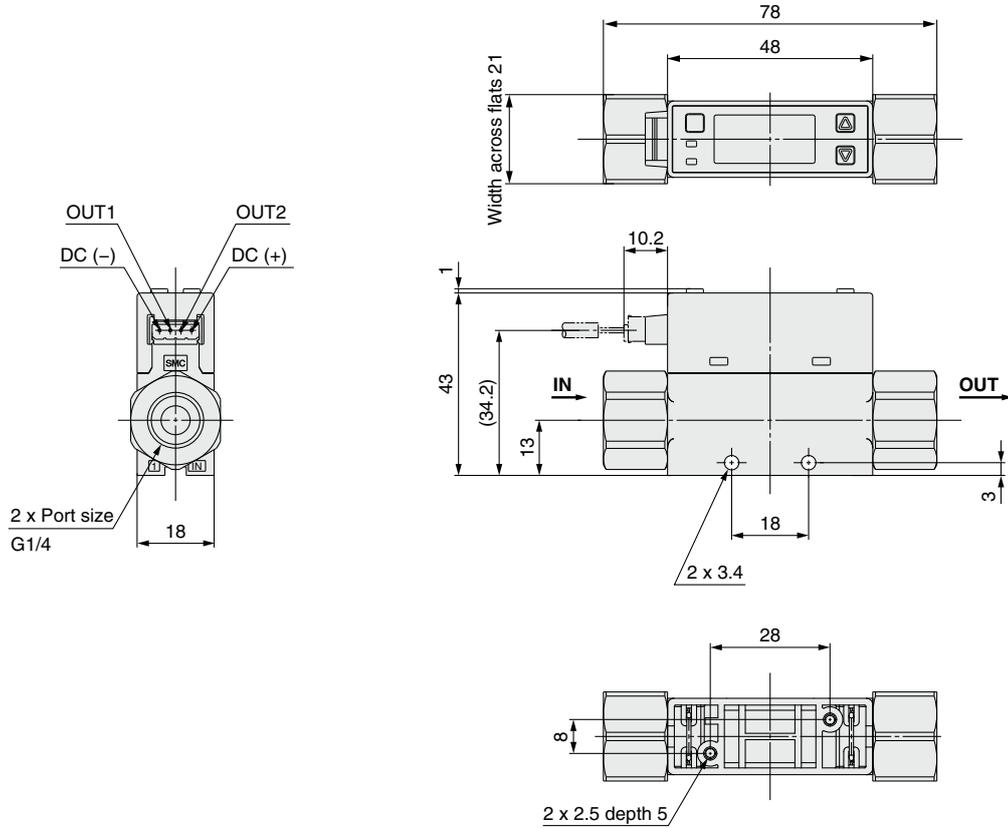


PFMB7201-(N)02L

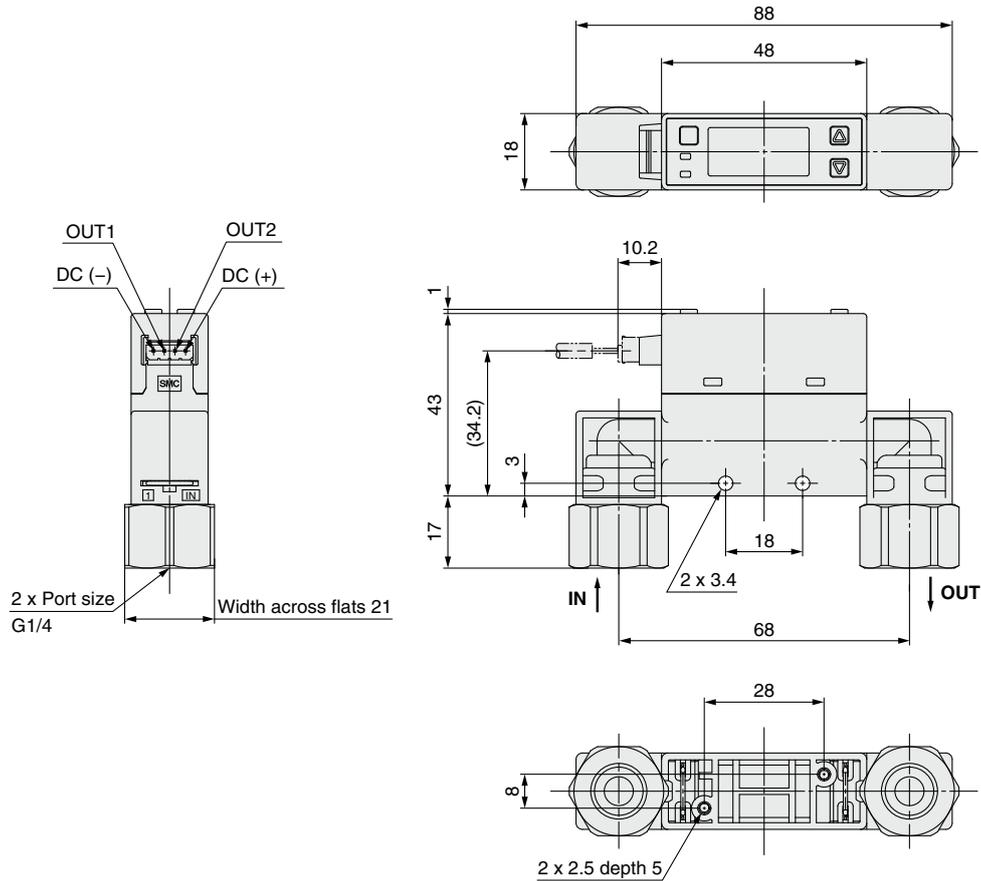


Dimensions

PFMB7201-F02



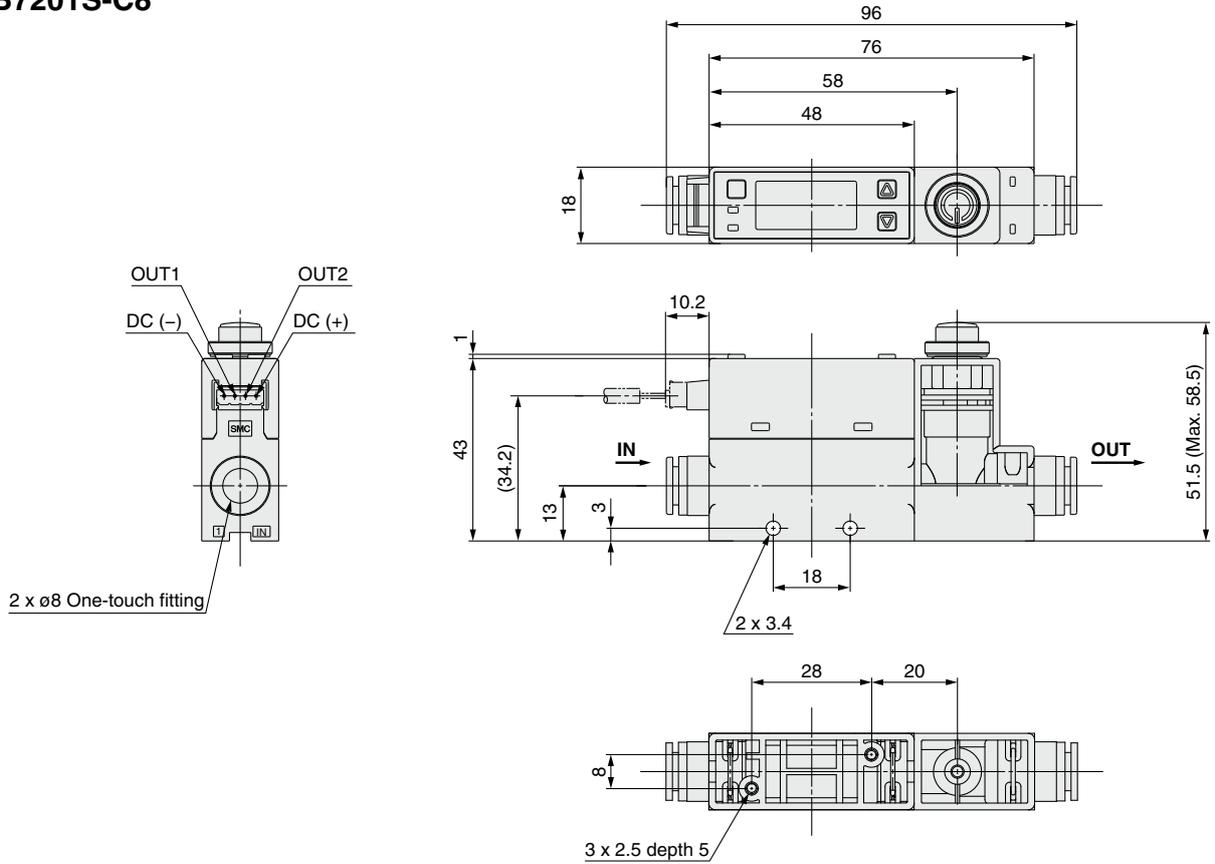
PFMB7201-F02L



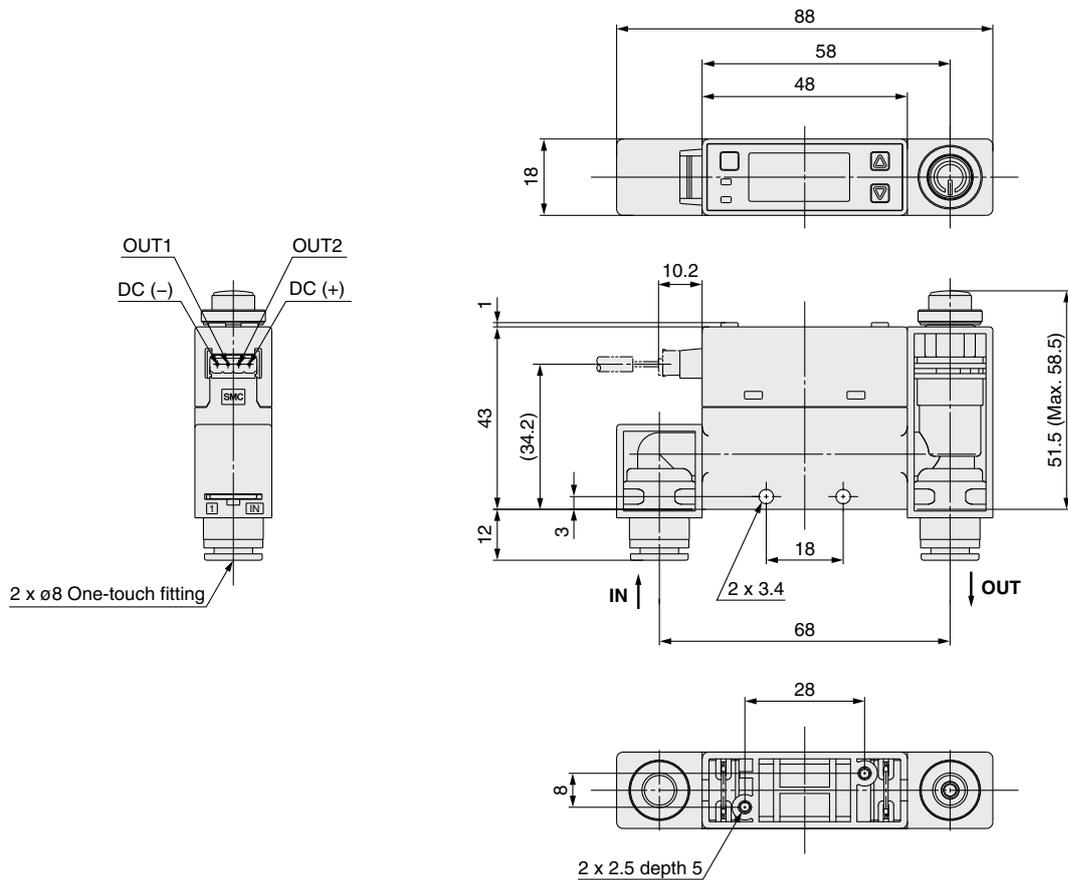
Series PFMB7

Dimensions

PFMB7201S-C8

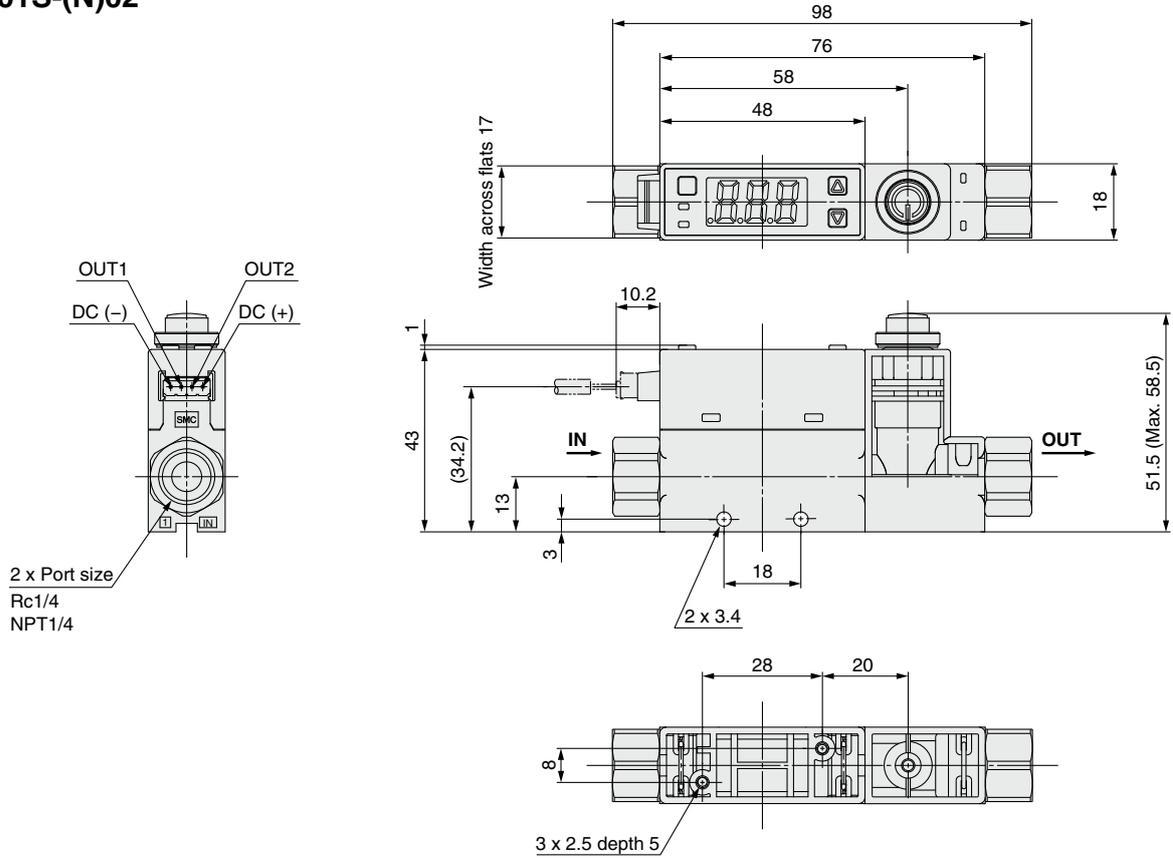


PFMB7201S-C8L

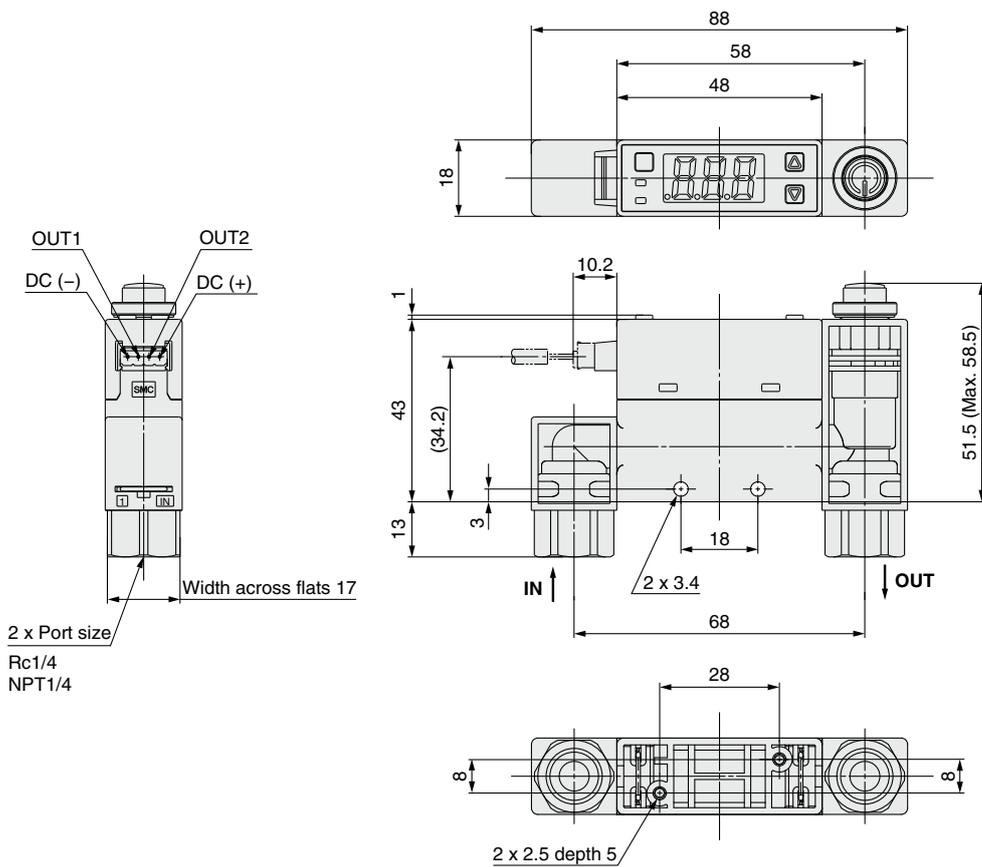


Dimensions

PFMB7201S-(N)02



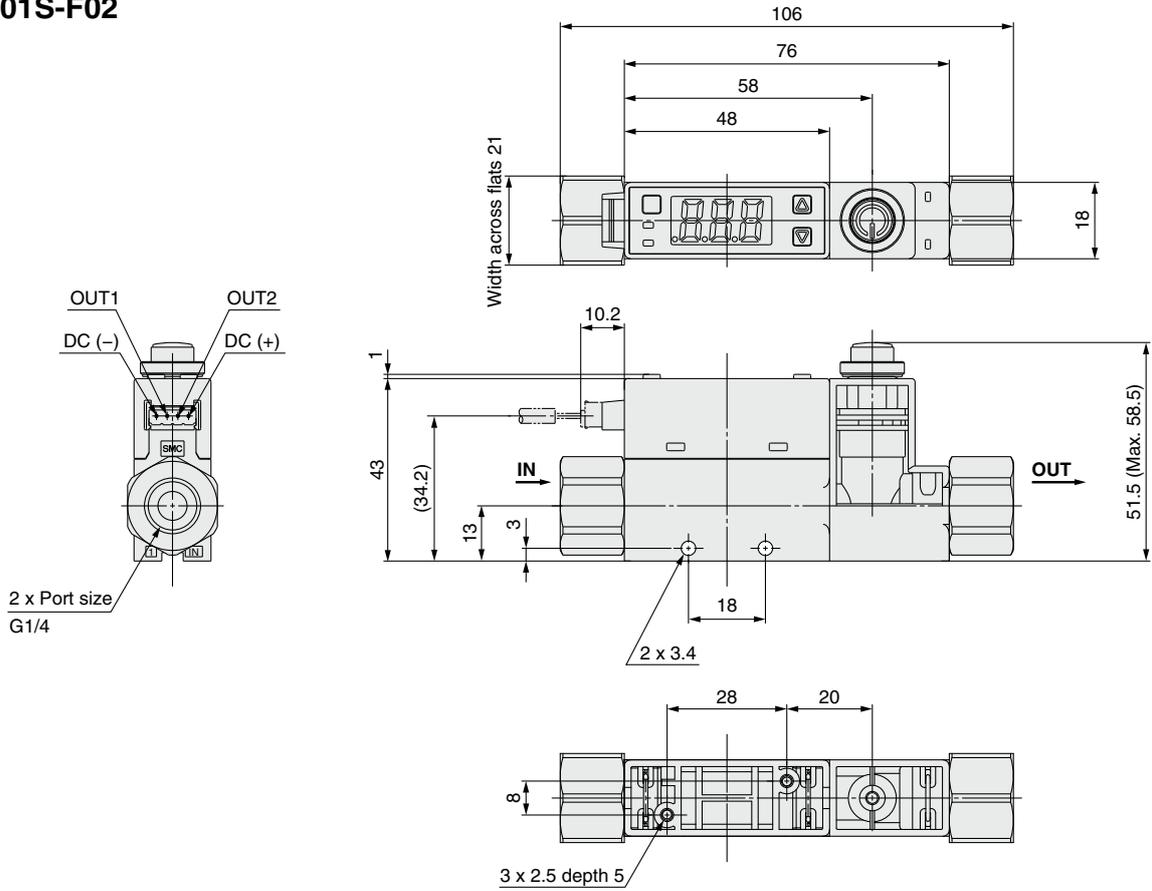
PFMB7201S-(N)02L



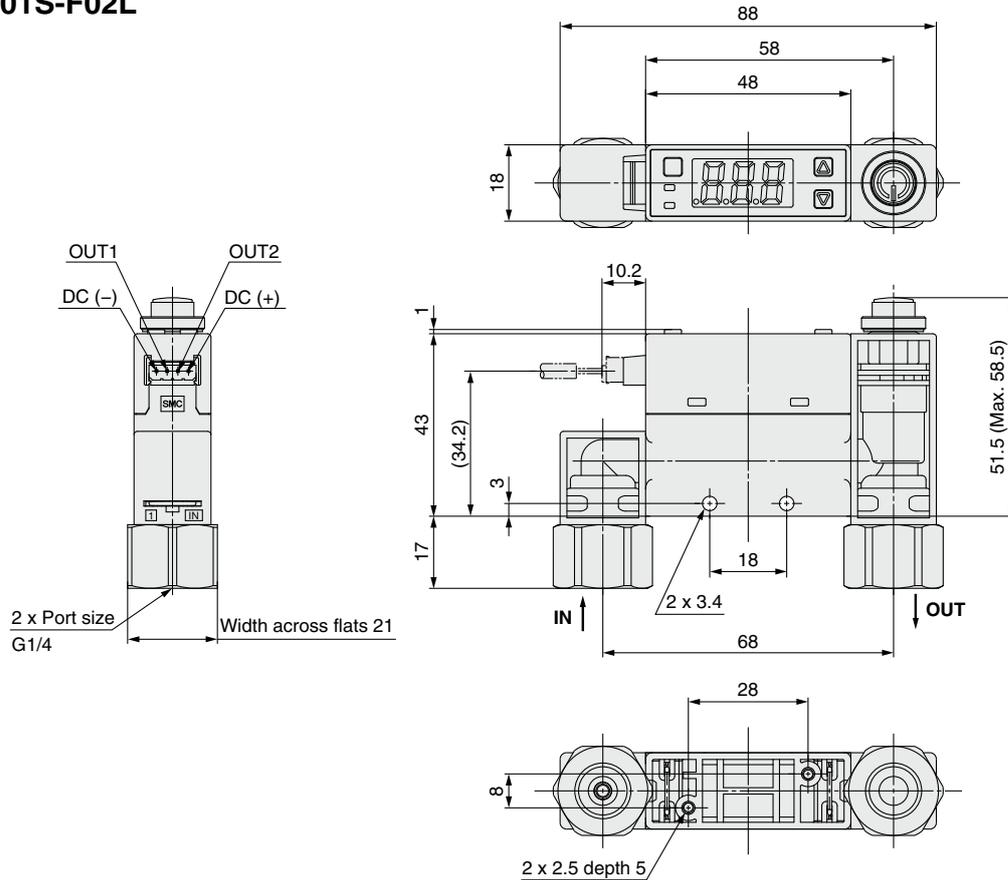
Series PFMB7

Dimensions

PFMB7201S-F02



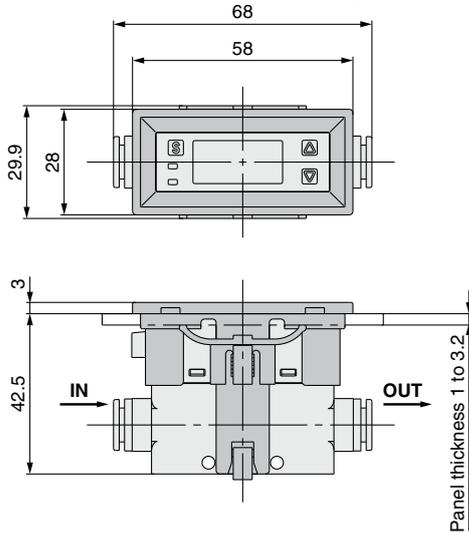
PFMB7201S-F02L



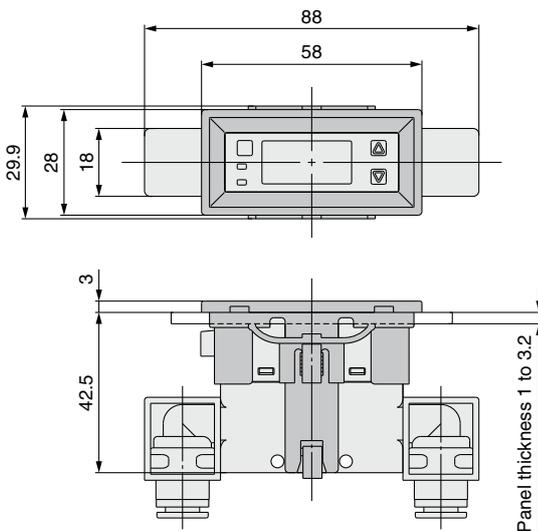
Dimensions

PFMB7201

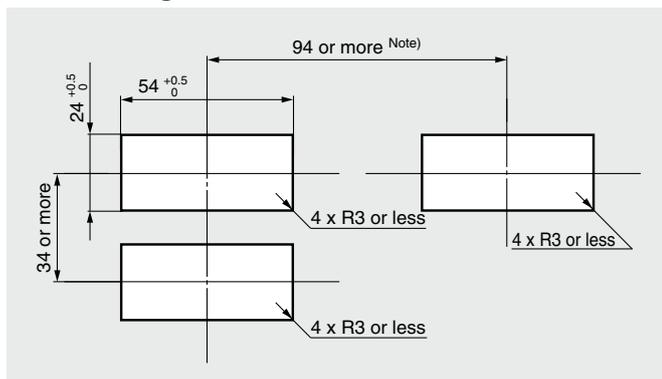
Panel mount/ Without flow adjustment valve/Straight



Panel mount/ Without flow adjustment valve/Bottom



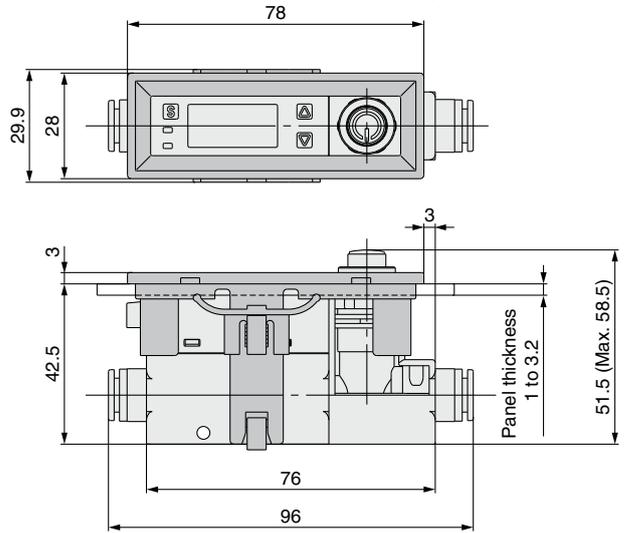
Panel Fitting Dimensions



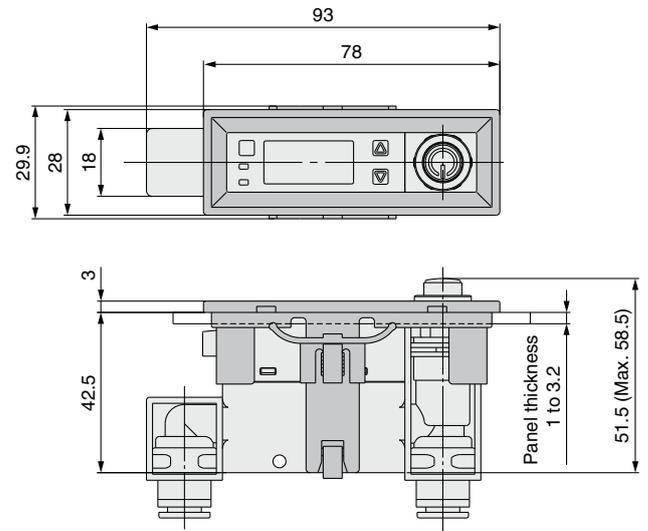
Panel thickness 1 to 3.2 mm

Note) Piping entry direction: Minimum dimensions for bottom piping. If using straight piping, the piping material and tubing need to be taken into consideration when designing the system. If a bend (R) is used, limit it to R3 or less.

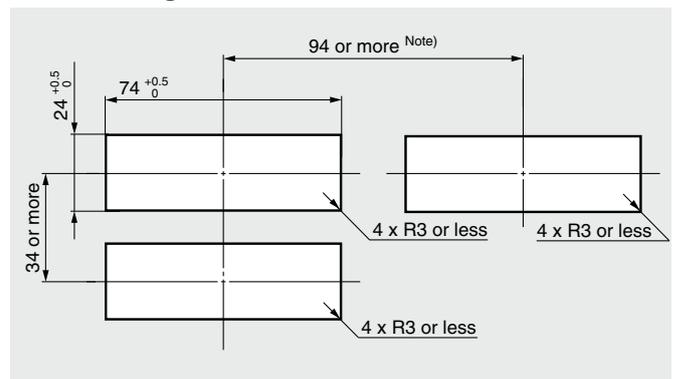
Panel mount/ With flow adjustment valve/Straight



Panel mount/ With flow adjustment valve/Bottom



Panel Fitting Dimensions



Panel thickness 1 to 3.2 mm

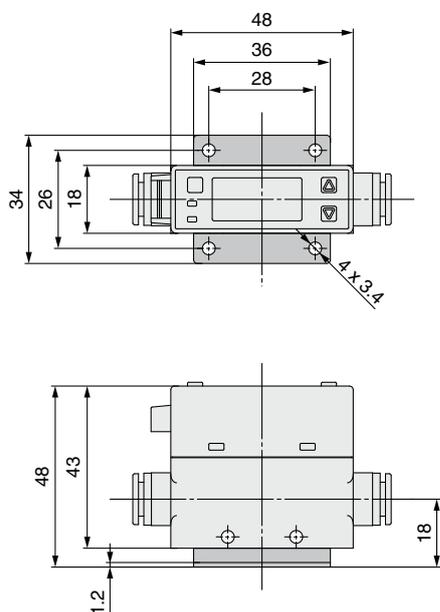
Note) Piping entry direction: Minimum dimensions for bottom piping. If using straight piping, the piping material and tubing need to be taken into consideration when designing the system. If a bend (R) is used, limit it to R3 or less.

Series PFMB7

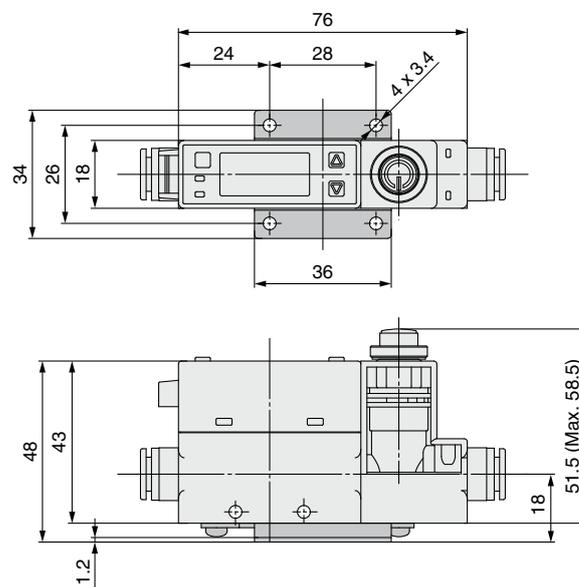
Dimensions

PFMB7201

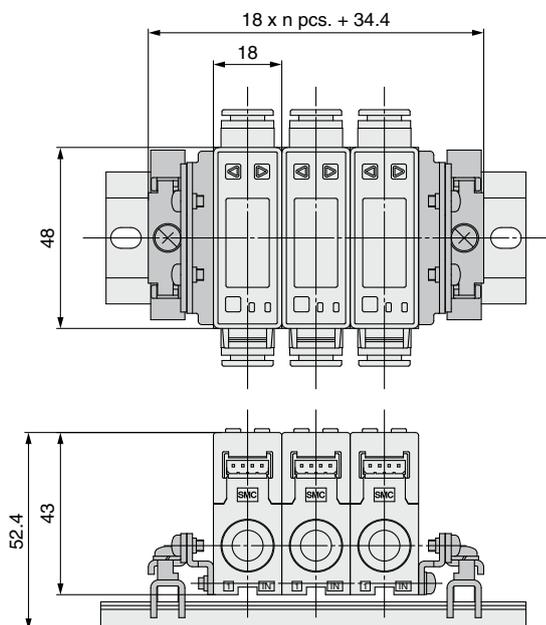
With bracket/Without flow adjustment valve



With bracket/With flow adjustment valve



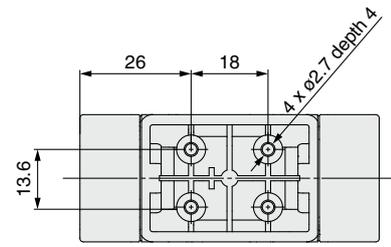
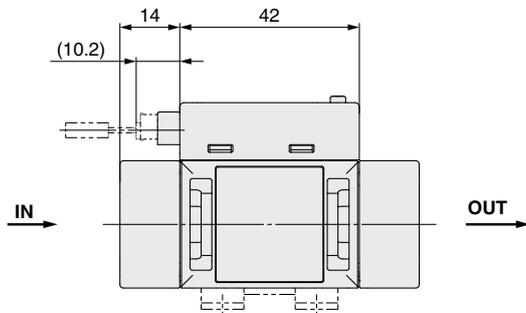
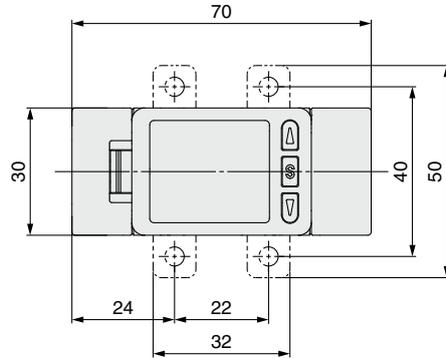
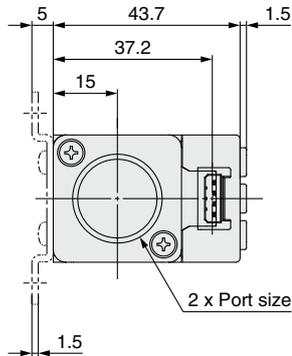
DIN rail mounting



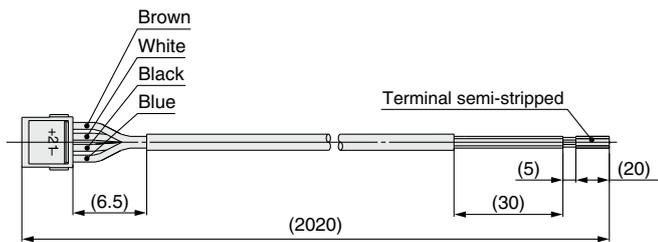
- DIN rail is prepared by customer.
- DIN rail is not suitable for port size F02 (G1/4).

Dimensions

PFMB7501/7102



Lead wire with connector ZS-33-D



Cable Specifications

Conductor	Nominal cross section area	AWG26
	External diameter	Approx. 0.50 mm
Insulation	External diameter	Approx. 1.00 mm
	Colors	Brown, White, Black, Blue
Sheath	Material	Oil-resistant PVC
Finished external diameter		ø3.5

Note) For wiring, refer to the Operation Manual from the SMC website Documents/Download-->Instruction Manuals.

Series PFMB

Function Details

Output operation

The output operation can be selected from the following:
Output (hysteresis mode and window comparator mode) corresponding to instantaneous flow, or output (accumulated output and pulse output) corresponding to accumulated flow.

Note) At the time of shipment from the factory, it is set to hysteresis mode and normal output.

Display color

The display color can be selected for each output condition. The selection of the display color provides visual identification of abnormal values. (The display color depends on OUT1 setting.)

Green for ON, Red for OFF
Red for ON, Green for OFF
Red all the time
Green all the time

Reference condition

The display unit can be selected from standard condition or normal condition.

Standard condition: Flow rate converted to a volume at 20°C and 1 atm (atmosphere)
Normal condition: Flow rate converted to a volume at 0°C and 1 atm (atmosphere)

Display mode

The display mode can be selected from instantaneous flow or accumulated flow.

Instantaneous flow display
Accumulated flow display

Response time

The response time can be selected to suit the application. (default setting is 1 second.)

Abnormalities can be detected more quickly by setting the response time to 0.05 seconds.

The effect of fluctuation and flickering of the display can be reduced by setting the response time to 2 seconds.

0.05 sec.
0.1 sec.
0.5 sec.
1 sec.
2 sec.

Power-saving mode

The display can be turned off to reduce the power consumption.

In this power-saving mode, decimal points flash on the main screen.

If any button is pressed during power-saving mode, the display is reverts to normal for 30 seconds to allow checking of the flow etc.

Setting of security code

The user can select whether a security code must be entered to release key lock. At the time of shipment from the factory, it is set such that the security code is not required.

External input function

This function can be used only when the optional external input is present. The accumulated flow, peak value and bottom value can be reset remotely.

Accumulated flow external reset: A function to reset the accumulated flow value when an external input signal is applied.
In accumulated increment mode, the accumulated value will reset to, and increase from zero.
In accumulated decrement mode, the accumulated value will reset to, and decrease from the set value.

* When the accumulated value is memorized, every time the accumulated flow external reset is activated, the memory device (EEPROM) will be accessed. Take into consideration the maximum number of times the memory device can be accessed, 1 million times. The total of external input times and accumulated value memorizing time interval should not exceed 1 million times.

Peak/Bottom reset: Peak and bottom value are reset.

Forced output function

The output is turned on/off in a fixed state when starting the system or during maintenance. This enables confirmation of the wiring and prevents system errors due to unexpected output.

For the analog output type, when ON the output will be 5 V or 20 mA, and when OFF, it will be 1 V or 4 mA.

* Also, the increase or decrease of the flow and temperature will not change the on/off status of the output while the forced output function is activated.

Accumulated value hold

Accumulated value is not cleared even when the power supply is turned off.

The accumulated value is memorized every 2 or 5 minutes during measurement, and continues from the last memorized value when the power supply is turned on again.

The life time of the memory element is 1 million access cycles. Take this into consideration before using this function.

Peak/Bottom value display

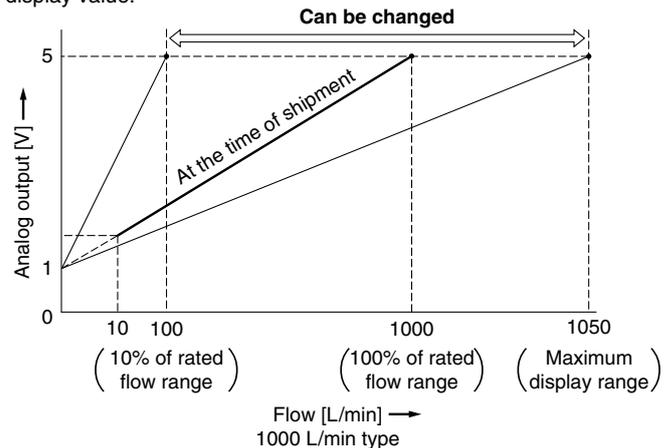
The maximum (minimum) flow rate is detected and updated from when the power supply is turned on. In peak (bottom) value display mode, this maximum (minimum) flow rate is displayed.

Keylock function

Prevents operation errors such as accidentally changing setting values.

Analog output free range function

Allows the flow that generates an output of 5 V or 20 mA to be changed. The value can be changed 10% of maximum rated flow to maximum display value.



Reversed display mode

When the switch is used upside down, the orientation of the display can be rotated to make it easier to read by using the display rotating function.



Display is upside down.

With display rotating function



Reset to the default settings.

The product can be returned to its factory default settings.

■ **Error display function**

When an error or abnormality arises, the location and contents are displayed.

Display	Description	Contents	Action	
<i>Er 1</i>	OUT1 over current error	Load current of 80 mA or more is applied to the switch output (OUT1).	Eliminate the cause of the overcurrent by turning off the power supply and then turn on it again.	
<i>Er 2</i>	OUT2 over current error	Load current of 80 mA or more is applied to the switch output (OUT2).		
<i>HHH</i>	Instantaneous flow error	The flow rate exceeds the upper limit of indicated flow rate range.	Decrease the flow rate.	
<i>LLL</i>	Reverse flow error	There is a reverse flow equivalent to -5% or more.	Turn the flow to correct direction.	
<i>999999999</i> (“999” will flash in any of upper, middle, lower 3-digit displays.)	PFMB7201 PFMB7501 PFMB7102	Accumulated flow error	The flow rate exceeds the accumulated flow rate range.	Clear the accumulated flow rate.
<i>Er 0</i>	System error	Displayed if an internal error has occurred.	Turn the power off and on again.	
<i>Er 4</i>				
<i>Er 6</i>				
<i>Er 8</i>				

If the failure cannot be solved after the above instructions are performed, please contact SMC for investigation.

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1, and other safety regulations.

 **Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

 **Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

 **Danger :** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

- *1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*2) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Safety Instructions

Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.

SMC Corporation

Akihabara UDX 15F,
4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN
Phone: 03-5207-8249 Fax: 03-5298-5362
<http://www.smcworld.com>
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D-DN

1st printing RO printing RO 8150SZ Printed in Japan.