2-Colour Display
Digital Flow Switch

New

(Only 200 L type)

Applicable fluid Dry air, N_2

New **Added 2000 L type.**

RoHS

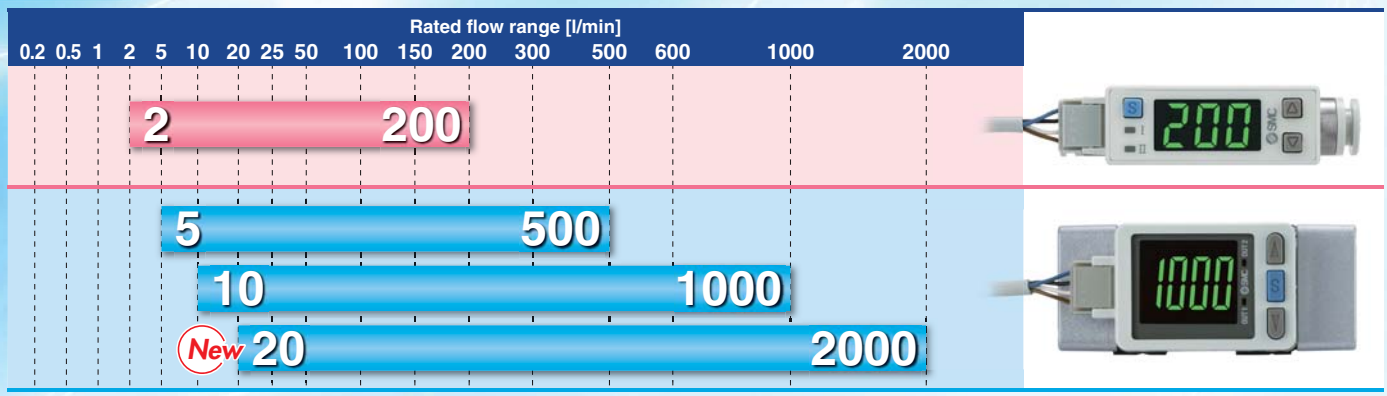
Expanded flow range! Wide range of flow measurement with one product

Flow ratio* **100 : 1**

* Rated flow ratio is 10 : 1 for current PF2A.

Setting resolution: 1 l/min

Current PF2A: 5 l/min (200 L: 2 l/min)



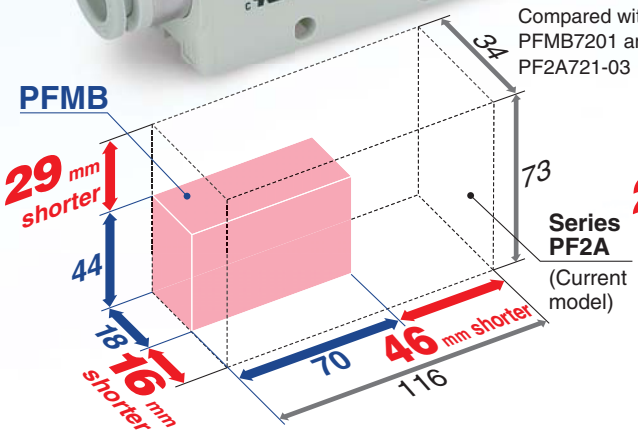
Compact, Space saving

Compared with the current PF2A,

Weight Approx. **76 % reduction** 290 g ➡ **70 g**

Mounting space Approx. **81 % reduction**

200 L type

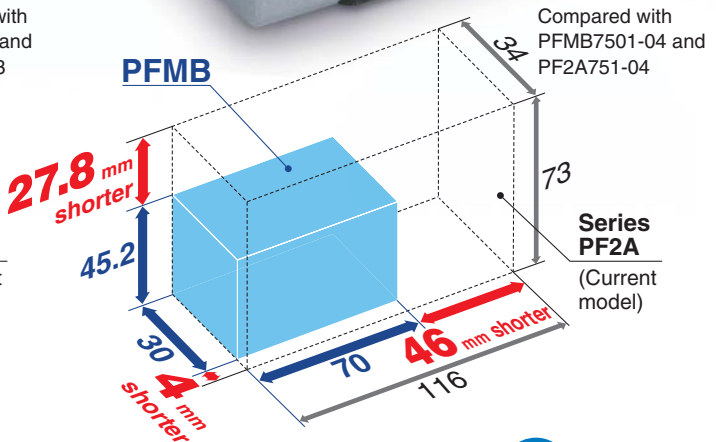


Compared with the current PF2A,

Weight Approx. **66 % reduction** 290 g ➡ **100 g**

Mounting space Approx. **67 % reduction**

500 L/1000 L/ 2000 L type



Series PFMB

SMC

CAT.EUS100-95B-UK

Series PFMB

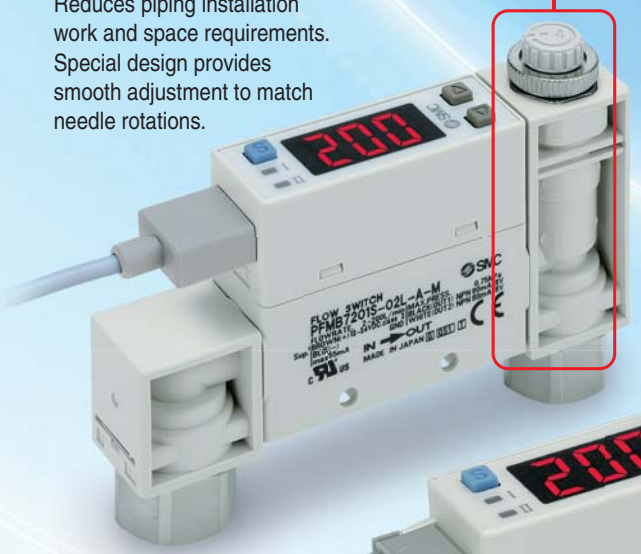
2-Colour Display Digital Flow Switch

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/2000 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.

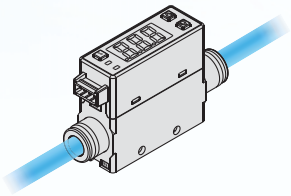
Grease-free

Piping variations

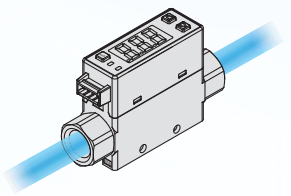
200 L type

Straight

One-touch fitting Ø 8

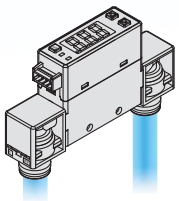


Female thread Rc, NPT, G 1/4

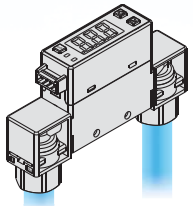


Bottom

One-touch fitting Ø 8



Female thread Rc, NPT, G 1/4



Reverse display

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

When display is upside down.

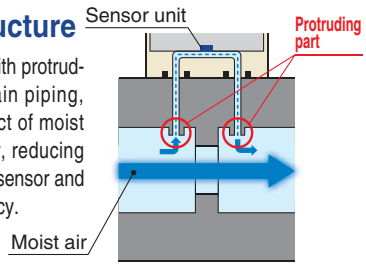
With reverse display function
(Can be set with the reverse display mode.)

Functions (▶Refer to pages 20 and 21 for details.)

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

Bypass structure

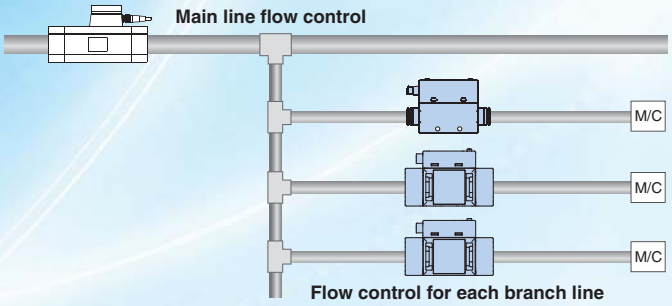
Bypass structure with protruding part at the main piping, reduces the contact of moist air with the sensor, reducing degradation of the sensor and maintaining accuracy.

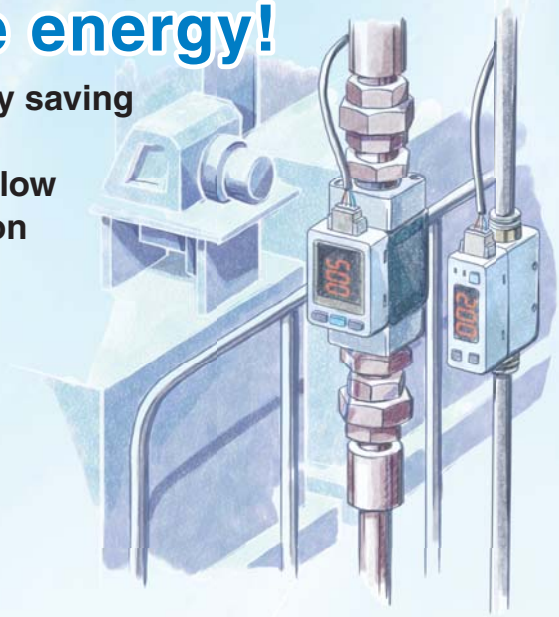


SMC

Digital flow switch to save energy!

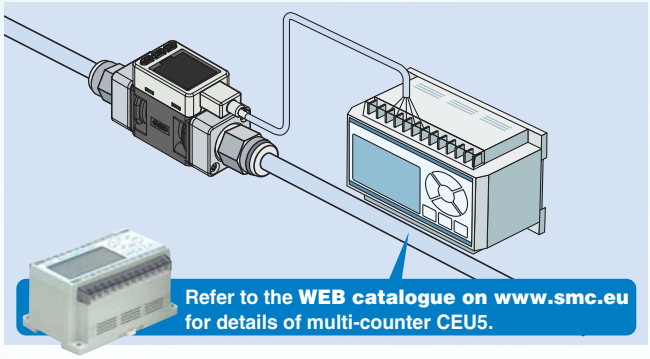
Flow control is necessary for promoting energy saving in any application.
Saving energy starts from numerical control of the flow consumption of equipment and lines and clarification of the purpose and effect.





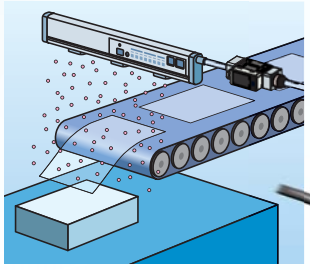
- Digital display allows visualisation of flow rate.
- 2-colour display, Improved visibility

- Remote control is possible with accumulated pulse.



Applications

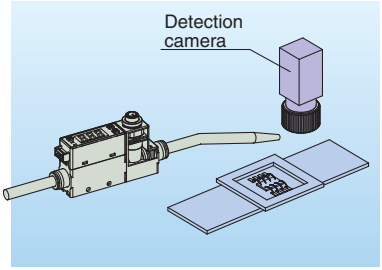
- Control of purge air flow of ionizer



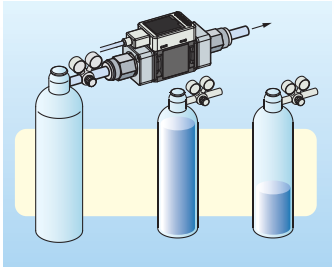
- Flow control of the air for spray painting

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

- Flow control of N_2 gas to prevent lead frame oxidation
- N_2 blow prevents distortion of camera image due to air turbulence.



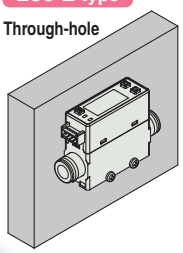
- Accumulated indication shows the operating flow rate or residual amount (of N_2 etc.) in a gas cylinder.



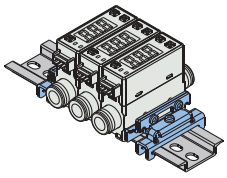
Mounting

200 L type

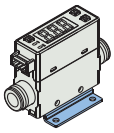
Through-hole



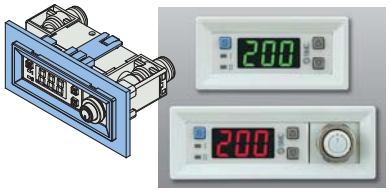
DIN rail



Bracket

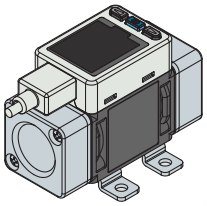


Panel mount



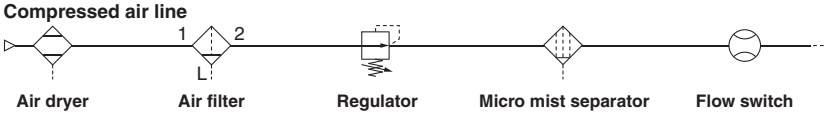
500 L/1000 L/2000 L type

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

Series	Applicable fluid	Detection method	Minimum setting unit	Rated flow range [l/min]
PFMV 	Air N_2	Thermal type (MEMS)		–3 –2 –1 –0.5 0 0.5 1 2 3 0 – 0.5 0 – 1 0 – 3 –0.5 – 0.5 –1 – 1 –3 – 3

Series	Applicable fluid	Detection method	Minimum setting unit	Rated flow range [l/min]
				0.2 0.5 1 2 5 10 20 25 50 100 150 200 300 500 600 1000 2000 3000 6000 12000
PFM 	Air N_2 Argon CO_2	Thermal type (MEMS)	0.01 l/min	0.2 – 10
			0.1 l/min	0.5 – 25 1 – 50 2 – 100
PFMB 	**Dry air** **N_2**	**Thermal type (MEMS)** **Bypass flow type**	**1 l/min**	**2 – 200** **5 – 500** **10 – 1000** **20 – 2000**
PFMC 	Dry air N_2	Thermal type (MEMS) Bypass flow type	1 l/min	5 – 500 10 – 1000 20 – 2000
PF2A 	Air N_2	Thermal type (Thermistor)	0.1 l/min	1 – 10
			0.5 l/min	5 – 50
			1 l/min	10 – 100
			2 l/min	20 – 200
			5 l/min	50 – 500
			5 l/min	150 – 3000
			10 l/min	300 – 6000 600 – 12000

Flow Switch Variations/Basic Performance Table

	PFMV	PFM	PFMB	PFMC	PF2A
Series					
Enclosure	IP40	IP40	**IP40**	IP65	IP65
Fluid	Air, N_2	Air, N_2, Ar, CO_2	**Dry air, N_2**	Dry air, N_2	Air, N_2
Setting	Digital	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** **20 to 2000 l/min**	5 to 500 l/min 10 to 1000 l/min 20 to 2000 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 V DC ±10 %	24 V DC ±10 %	**12 to 24 V DC ±10 %**	12 to 24 V DC ±10 %	12 to 24 V DC ±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)**	±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) Analogue output: ±5 % F.S. **Monitor unit** ±0.1 % F.S. Analogue output: ±0.5 % F.S.	±1 % F.S. (Fluid: Dry air) Analogue output: ±3 % F.S.	**±1 % F.S.** **(Fluid: Dry air)**	±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: Variable	Hysteresis mode: Variable Window comparator mode: Fixed (3 digits)
Output	NPN/PNP open collector Analogue voltage output Analogue current output	NPN/PNP open collector Accumulated pulse output Analogue voltage output Analogue current output	**NPN/PNP open collector** **Accumulated pulse output** **Analogue voltage output** **Analogue current output**	NPN/PNP open collector Accumulated pulse output Analogue voltage output Analogue current output	NPN/PNP open collector Accumulated pulse output
Display	2-colour LCD display	2-colour LED display	**2-colour LED display** **2-colour LCD display**	3-colour LCD display	LED display

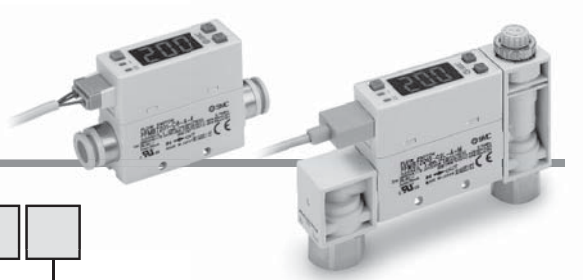
2-Colour Display

Digital Flow Switch

Series PFMB7

(Only 200 L type)

RoHS



How to Order

PFMB7201 □ – C8 □ – B □ – M □ □

Rated flow range (Flow rate range)

201	2 to 200 l/min

Flow adjustment valve

—	None
S	Yes

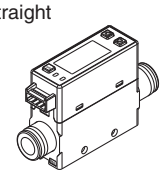
Port size

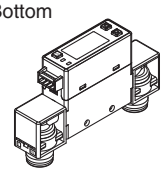
C8	Ø 8 (5/16") One-touch fitting
02*	Rc 1/4
N02*	NPT 1/4
F02*	G 1/4 Note 4)

Note 4) ISO 1179-1 compliant
* Made to Order

Piping entry direction

—	L*
Straight	Bottom





* Made to Order

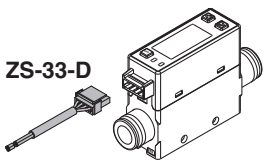
Output specifications

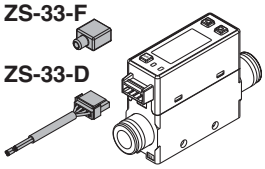
	OUT1	OUT2
A	NPN	NPN
B	PNP	PNP
C	NPN	Analogue 1 to 5 V
D	NPN	Analogue 4 to 20 mA
E*	PNP	Analogue 1 to 5 V
F*	PNP	Analogue 4 to 20 mA
G*	NPN	External input Note)
H*	PNP	External input Note)

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

Option 1

—	W
With lead wire with connector (2 m)	With lead wire with connector (2 m) + Connector cover (Silicone rubber)
ZS-33-D	ZS-33-F, ZS-33-D





N
Without lead wire with connector

Note) If an accessory is required, refer to "Option 1/Part No." on page 6.

Calibration certificate Note 1)

—	None
A*	With calibration certificate

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

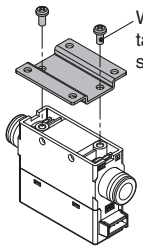
Unit specifications

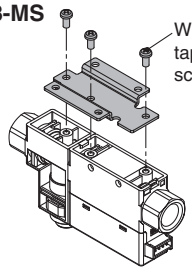
M	SI unit only Note 2)
—	Unit selection function Note 3)

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

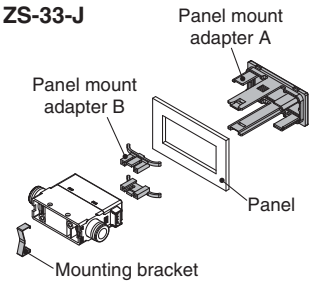
Option 2

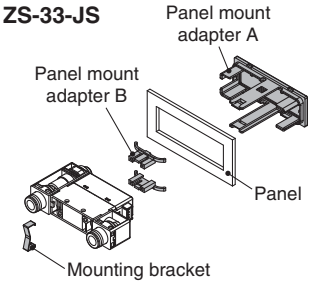
—	R	S
No bracket	With bracket (For without flow adjustment valve) ZS-33-M, With 2 self-tapping screws	With bracket (For with straight type flow adjustment valve) ZS-33-MS, With 3 self-tapping screws





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





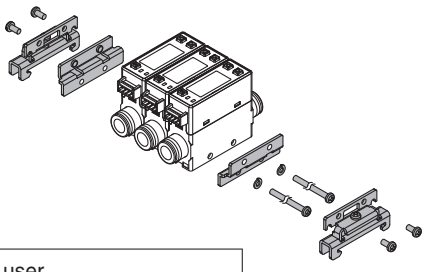
Note) Each option is not assembled with the product, but shipped together. If an accessory is required, refer to "Option 2/Part No." on page 6.

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 user.
• DIN rail is not suitable for port size F02 (G 1/4).

How to Order

PFMB7 501 – F 04 – B □ – M □ □

Rated flow range (Flow rate range)

501	5 to 500 l/min
102	10 to 1000 l/min
202	20 to 2000 l/min

Thread type

—	Rc
N	NPT
F	G Note)

Note) ISO228 compliant

Port size

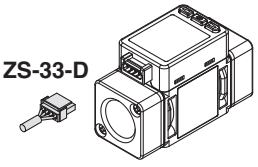
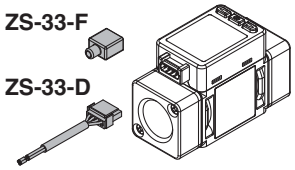
	Port size	Rated flow range		
		501	**102**	**202**
04	1/2	●	●	—
06	3/4	—	—	●

Output specifications

	OUT1	OUT2
A	NPN	NPN
B	PNP	PNP
C	NPN	Analogue 1 to 5 V
D	NPN	Analogue 4 to 20 mA
E*	PNP	Analogue 1 to 5 V
F*	PNP	Analogue 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

Option 1

—	**W**
With lead wire with connector (2 m)	With lead wire with connector (2 m) + Connector cover (Silicone rubber)
	
N	
Without lead wire with connector	

Note) If an accessory is required, refer to "Option 1/Part No." below.

Unit specifications

M	SI unit only Note 2)
—	Unit selection function Note 3)

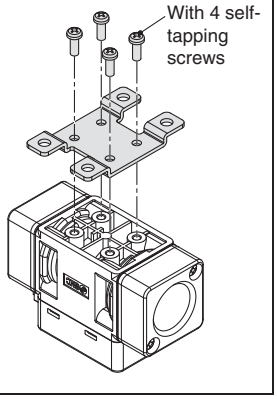
Note 2) Fixed unit: Instantaneous flow: l/min
Accumulated flow: L
Note 3) Since the unit for Japan is fixed to SI due to new measurement law, this option is for overseas.
Unit can be changed. Instantaneous flow: L/min⇔cfm
Accumulated flow: L⇔ft^3

Calibration certificate Note 1)

—	None
A*	With calibration certificate

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

Option 2

—	**R**
No bracket	With bracket 

Note) Each option is not assembled with the product, but shipped together. If an accessory is required, refer to "Option 2/Part No." below.

Option 1/Part No.

Option	Part no.	Q'ty	Note
Lead wire with connector	**ZS-33-D**	1	Lead wire: 2 m
Connector cover (Silicone rubber)	**ZS-33-F**	1	For connector

Option 2/Part No.

Option	Part no.	Q'ty	Note
Bracket (for PFMB7201)	**ZS-33-M**	1	With 2 self-tapping screws (3 x 6)
Bracket (for PFMB7201S)	**ZS-33-MS**	1	With 3 self-tapping screws (3 x 6)
Panel mount adapter (for PFMB7201)	**ZS-33-J**	1	
Panel mount adapter (for PFMB7201S)	**ZS-33-JS**	1	
Bracket (for PFMB7501/7102)	**ZS-42-C**	1	With 4 self-tapping screws (3 x 6)
Bracket (for PFMB7202)	**ZS-42-D**	1	With 4 self-tapping screws (3 x 6)

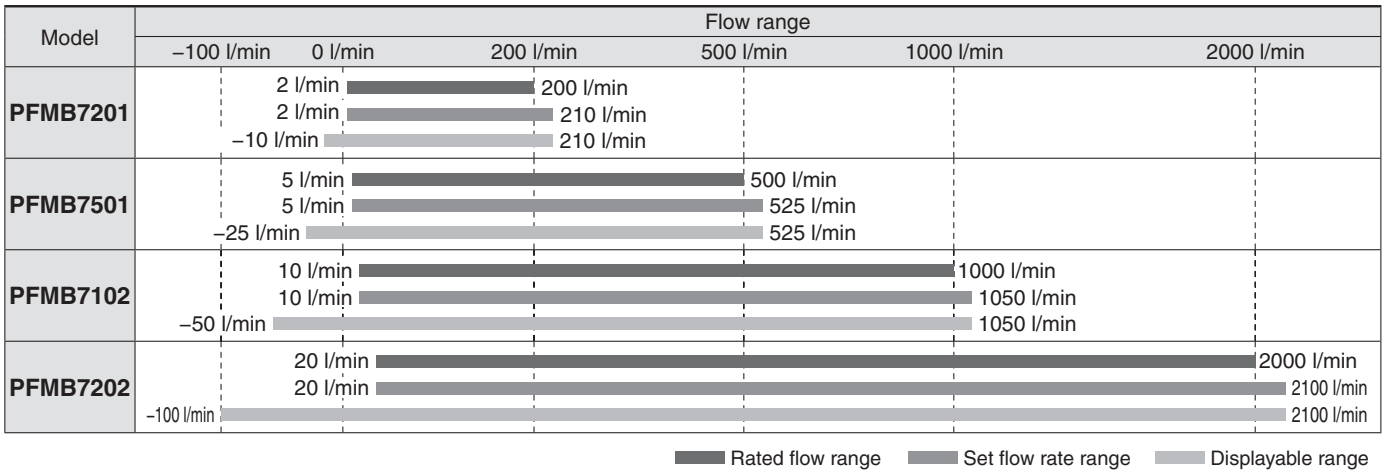
Specifications

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

Model			PFMB7201	PFMB7501	PFMB7102	PFMB7202
Fluid	Applicable fluid Note 1)		Dry air, N_2 (Air quality grade is JIS B 8392-1 1.1.2 to 1.6.2, ISO 8573-1 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	20 to 2000 l/min
	Set flow rate range	Instantaneous flow	2 to 210 l/min	5 to 525 l/min	10 to 1050 l/min	20 to 2100 l/min
		Accumulated flow	0 to 999,999,999 L	0 to 999,999,990 L		
	Minimum setting unit	Instantaneous flow	1 l/min			
		Accumulated flow	1 L	10 L		
	Accumulated volume per pulse (Pulse width = 50 msec.)		1 L/pulse		10 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	1.2 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 V DC ±10 %			
	Current consumption		55 mA or less			
	Protection		Polarity protection			
Note 11) Accuracy	Display accuracy		±3 % F.S.			
	Analogue 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)			
Switch output	Output type		NPN open collector PNP open collector			
	Output mode		Select from Hysteresis, Window comparator, Accumulated output or Accumulated pulse output modes.			
	Switch operation		Select from Normal output or Reversed output.			
	Maximum load current		80 mA			
	Maximum applied voltage (NPN only)		28 V DC			
	Internal voltage drop (Residual voltage)		NPN output type: 1 V or less (at load current 80 mA) PNP output type: 1.5 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			
Note 6) Analogue output	Output type		Voltage output: 1 to 5 V, Current output: 4 to 20 mA			
	Impedance	Voltage output	Output impedance: Approx. 1 kΩ			
		Current output	Maximum 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 cfm can be selected.			
		Accumulated flow	L or ft^3 can be selected.	L or ft^3 can be selected.		
	Displayable range	Instantaneous flow	−10 to 210 l/min (Displays [0] when value is within −1 to 1 l/min range.)	−25 to 525 l/min (Displays [0] when value is within −4 to 4 l/min range.)	−50 to 1050 l/min (Displays [0] when value is within −9 to 9 l/min range.)	−100 to 2100 l/min (Displays [0] when value is within −19 to 19 l/min range.)
		Accumulated flow	0 to 999,999,999 L			
	Minimum display unit	Instantaneous flow	1 l/min			
		Accumulated flow	1 L	10 L		
	Display		LED, Colour: Red/Green, 3 digits, 7 segment	LCD, Colour: Red/Green, 4 digits, 7 segment		
	Indicator LED		LED ON when switch output is ON. (OUT1: Green, OUT2: Red)	LED ON when switch output is ON. (OUT1/OUT2: Orange)		
Environmental	Enclosure		IP40			
	Withstand voltage		1000 V AC for 1 minute between terminals and housing			
	Insulation resistance		50 MΩ or more (500 V DC 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	CE, RoHS		
Piping	Piping specifications		Rc 1/4, NPT 1/4, G 1/4, Ø 8 One-touch fitting	Rc 1/2, NPT 1/2, G 1/2		Rc 3/4, NPT 3/4, G 3/4
	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		Rc 1/4, NPT 1/4/Straight: 70 g, Bottom: 85 g G 1/4/Straight: 115 g, Bottom: 130 g Ø 8 One-touch fitting/Straight: 50 g, Bottom: 65 g	100 g		155 g
	Flow adjustment valve		+45 g	—		
	Lead wire		+35 g			
	Bracket		+20 g	+25 g		+30 g
	Panel mount adapter		+15 g	—		
	DIN rail mounting bracket		+65 g	—		

Note 1) Refer to "Example of recommended pneumatic circuit" on page 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 analogue 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 analogue 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.
Note 10) Setting is only possible for models with the unit selection function.
Note 11) Refer to "Straight Piping Length and Accuracy" on page 8 for details.
Note 12) Refer to "Construction/Fluid Contact Parts" on page 9 for details.

Flow Range

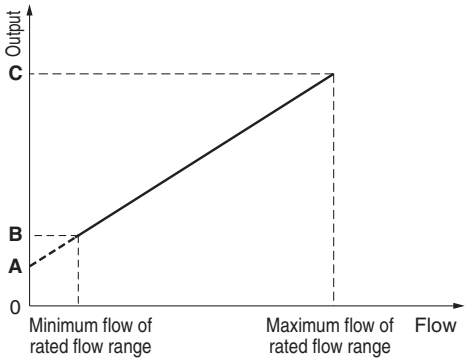


Analogue Output

Flow/Analogue Output

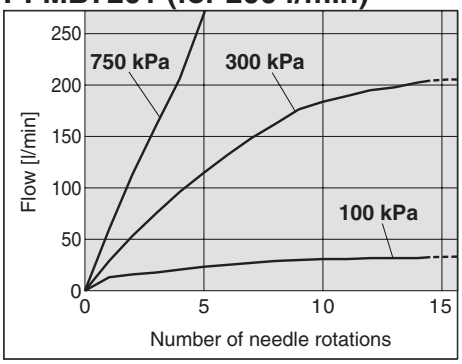
	A	B	C
Voltage output	1 V	1.04 V	5 V
Current output	4 mA	4.16 mA	20 mA

Model	Minimum flow of rated flow range	Maximum flow of rated flow range
PFMB7201	2 l/min	200 l/min
PFMB7501	5 l/min	500 l/min
PFMB7102	10 l/min	1000 l/min
PFMB7202	20 l/min	2000 l/min



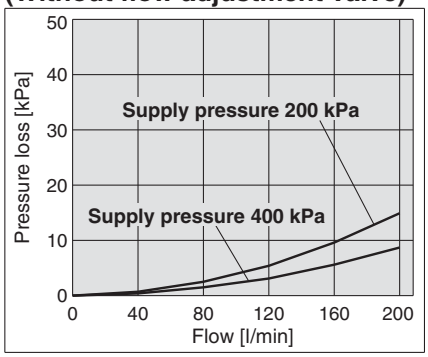
Flow Adjustment Valve Flow-rate Characteristics

PFMB7201 (for 200 l/min)

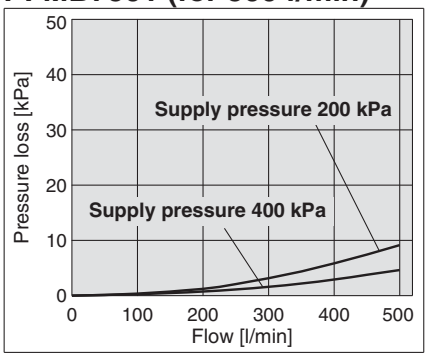


Pressure Loss (Reference Data)

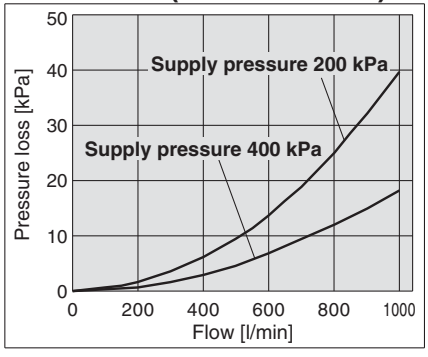
PFMB7201 (for 200 l/min)
(Without flow adjustment valve)



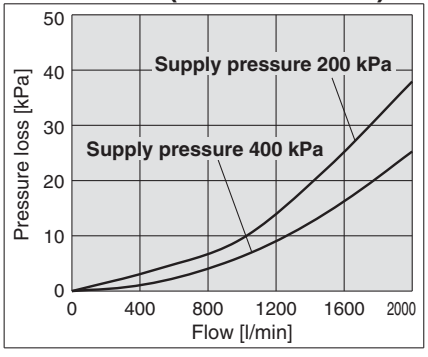
PFMB7501 (for 500 l/min)



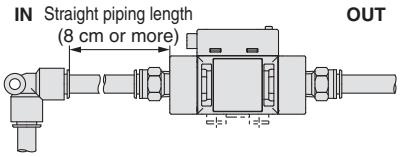
PFMB7102 (for 1000 l/min)



PFMB7202 (for 2000 l/min)

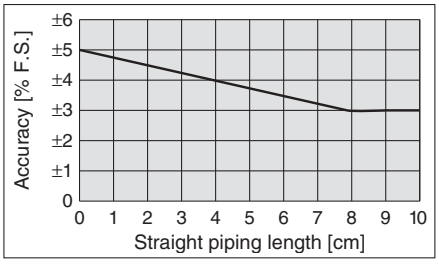


Straight Piping Length and Accuracy



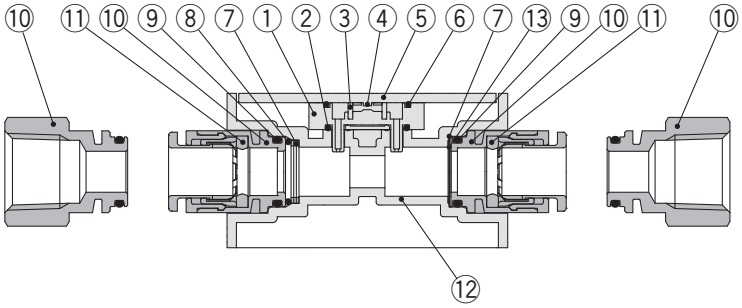
- The piping on the IN side must have a straight section of piping with a length of 8 cm or more. If a straight section of piping is not installed, the accuracy can vary by approximately ±2 % F.S.
  * "Straight section" means a part of the piping without any bends or rapid changes in the cross sectional 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 ±2 % F.S. when such tubing is not used.

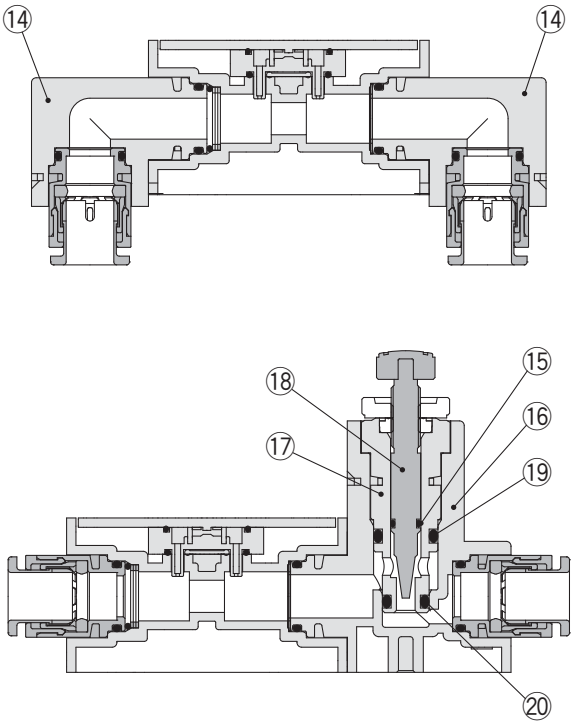
PFMB7201/7501/7102/7202



Construction/Fluid Contact Parts

PFMB7201

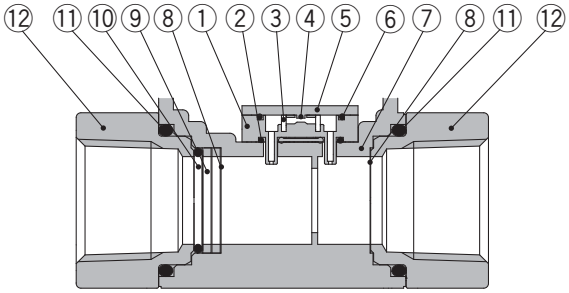




Component Parts

No.	Description	Material	Note
1	**Sensor body**	PPS	
2	**Gasket**	HNBR	
3	**Flow rectifier**	Stainless steel 304	
4	**Sensor chip**	Silicon	
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

PFMB7501/7102/7202

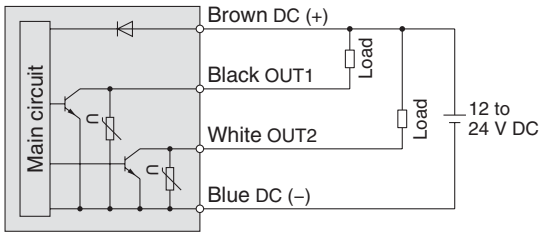


Component Parts

No.	Description	Material	Note
1	**Sensor body**	PPS	
2	**Gasket**	HNBR	
3	**Flow rectifier**	Stainless steel 304	
4	**Sensor chip**	Silicon	
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

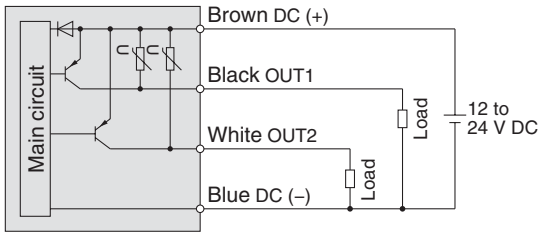
Internal Circuits and Wiring Examples

NPN (2 outputs) type
PFMB7□□□-□□-A□-□□□



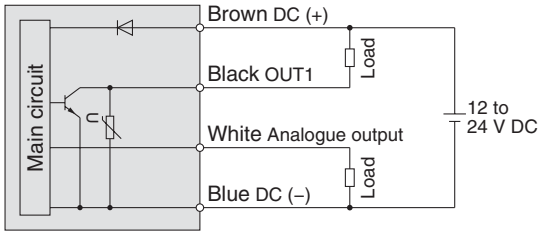
Max. applied voltage: 28 V, Max. load current: 80 mA, Internal voltage drop: 1 V or less

PNP (2 outputs) type
PFMB7□□□-□□-B□-□□□



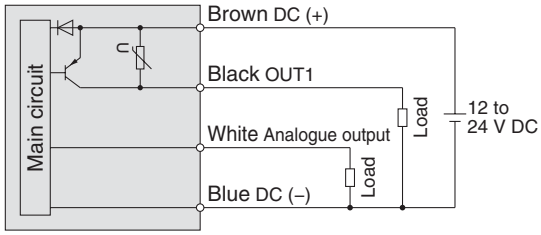
Max. load current: 80 mA, Internal voltage drop: 1.5 V or less

NPN (1 output) + Analogue (1 to 5 V) output type
PFMB7□□□-□□-C□-□□□
NPN (1 output) + Analogue (4 to 20 mA) output type
PFMB7□□□-□□-D□-□□□



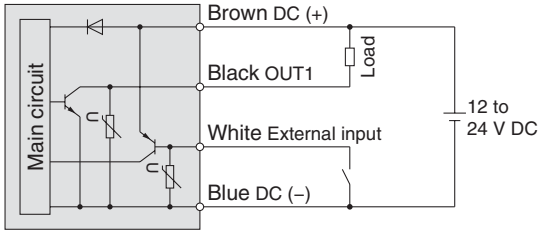
Max. applied voltage: 28 V, Max. load current: 80 mA, Internal voltage drop: 1 V or less
C: Analogue output: 1 to 5 V
Output impedance: 1 kΩ
D: Analogue output: 4 to 20 mA
Max. load impedance: 600 Ω

PNP (1 output) + Analogue (1 to 5 V) output type
PFMB7□□□-□□-E□-□□□
PNP (1 output) + Analogue (4 to 20 mA) output type
PFMB7□□□-□□-F□-□□□



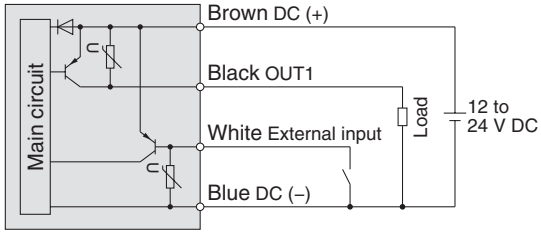
Max. load current: 80 mA, Internal voltage drop: 1.5 V or less
E: Analogue output: 1 to 5 V
Output impedance: 1 kΩ
F: Analogue output: 4 to 20 mA
Max. load impedance: 600 Ω

NPN (1 output) + External input type
PFMB7□□□-□□-G□-□□□



Max. applied voltage: 28 V, Max. load current: 80 mA, Internal voltage drop: 1 V or less
External input: input voltage 0.4 V or less (reed or solid state input) for 30 msec. or longer

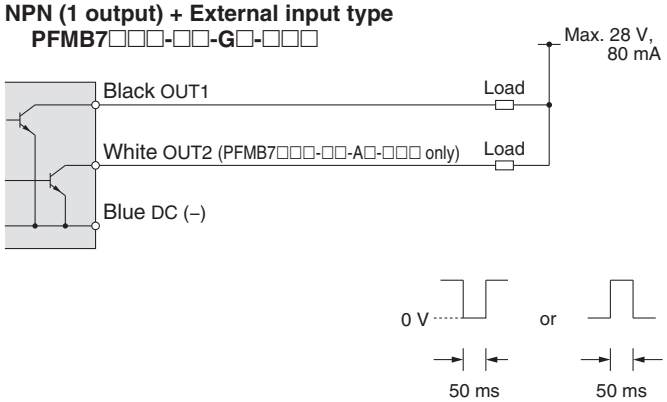
PNP (1 output) + External input type
PFMB7□□□-□□-H□-□□□



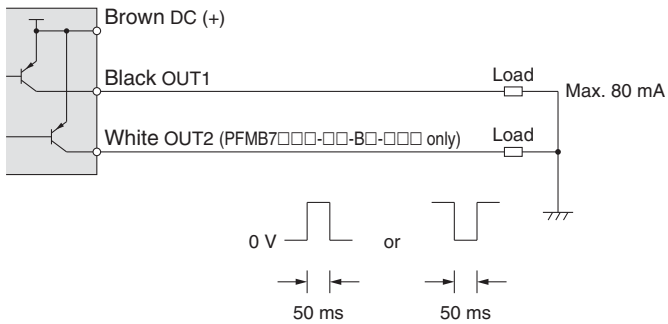
Max. load current: 80 mA, Internal voltage drop: 1.5 V or less
External input: input voltage 0.4 V or less (reed or solid state input) for 30 msec. or longer

Accumulated pulse output wiring examples

NPN (2 outputs) type
PFMB7□□□-□□-A□-□□□
NPN (1 output) + Analogue output type
PFMB7□□□-□□-C□-□□□
PFMB7□□□-□□-D□-□□□
NPN (1 output) + External input type
PFMB7□□□-□□-G□-□□□

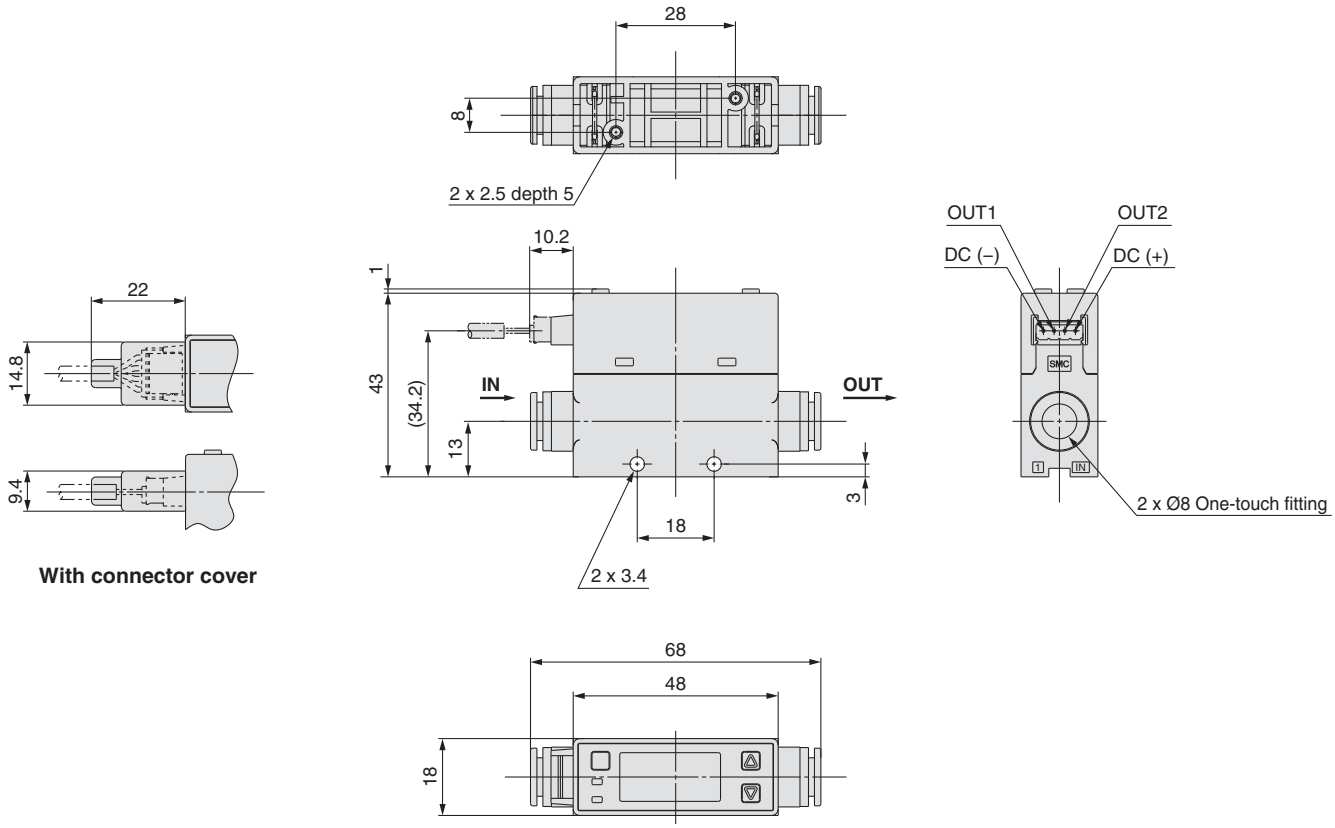


PNP (2 outputs) type
PFMB7□□□-□□-B□-□□□
PNP (1 output) + Analogue output type
PFMB7□□□-□□-E□-□□□
PFMB7□□□-□□-F□-□□□
PNP (1 output) + External input type
PFMB7□□□-□□-H□-□□□

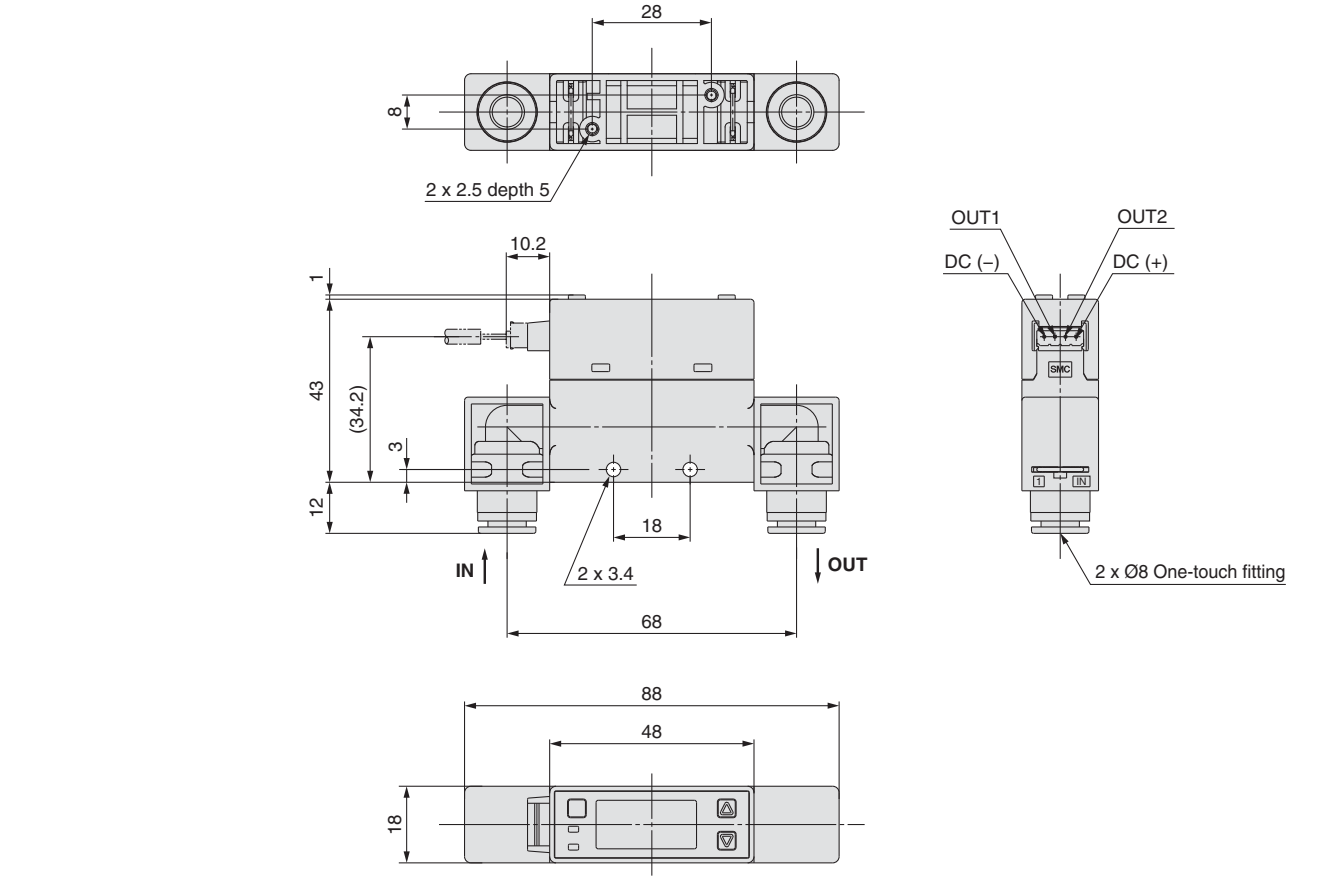


Dimensions

PFMB7201-C8

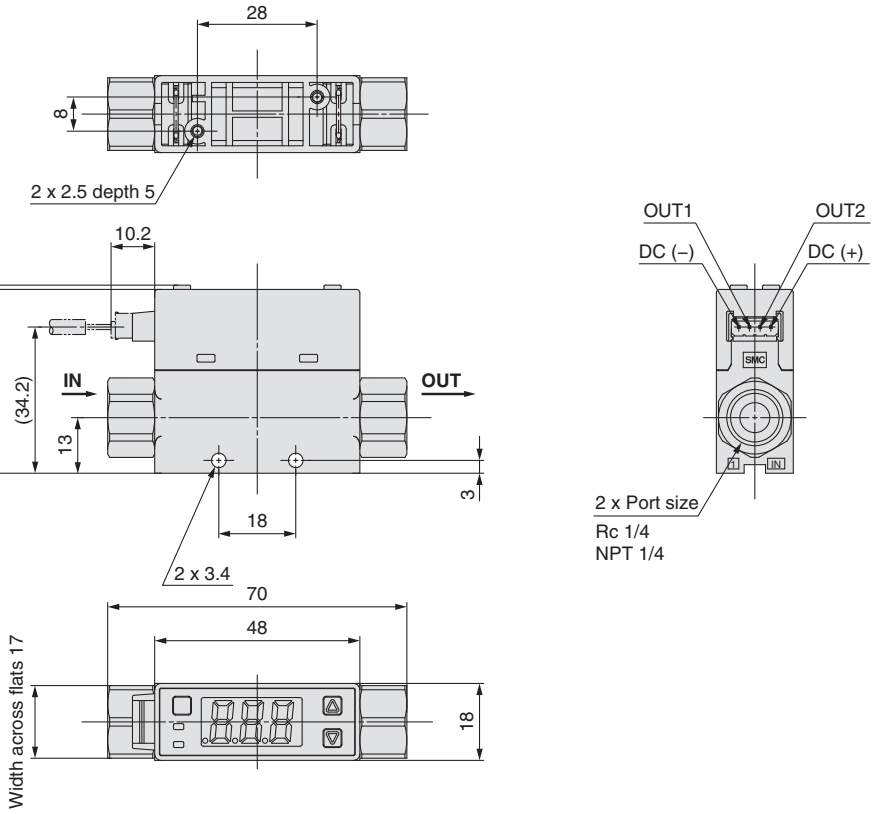


PFMB7201-C8L

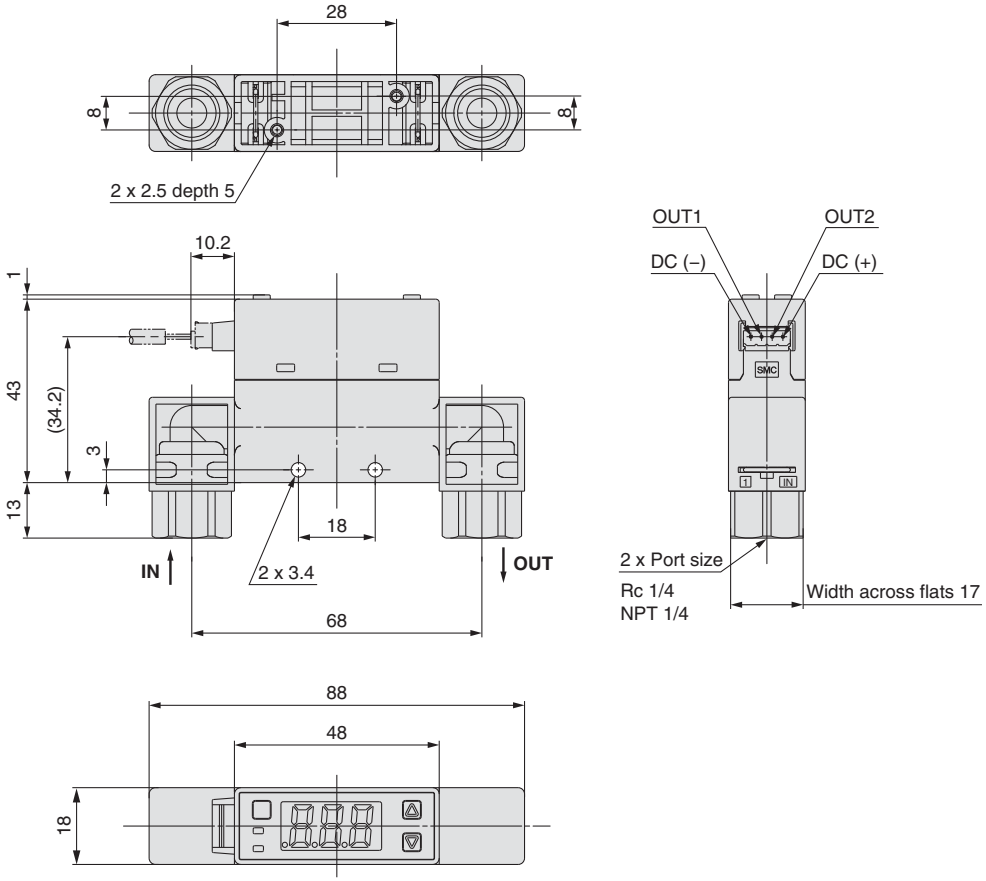


Dimensions

PFMB7201-(N)02

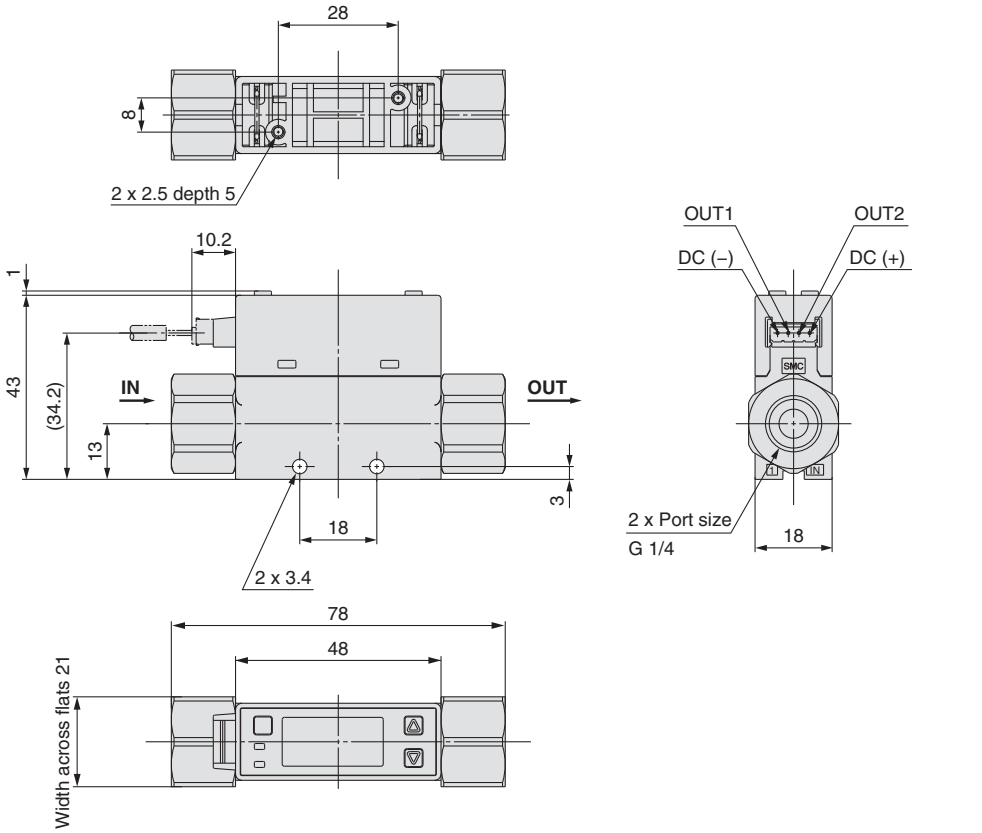


PFMB7201-(N)02L

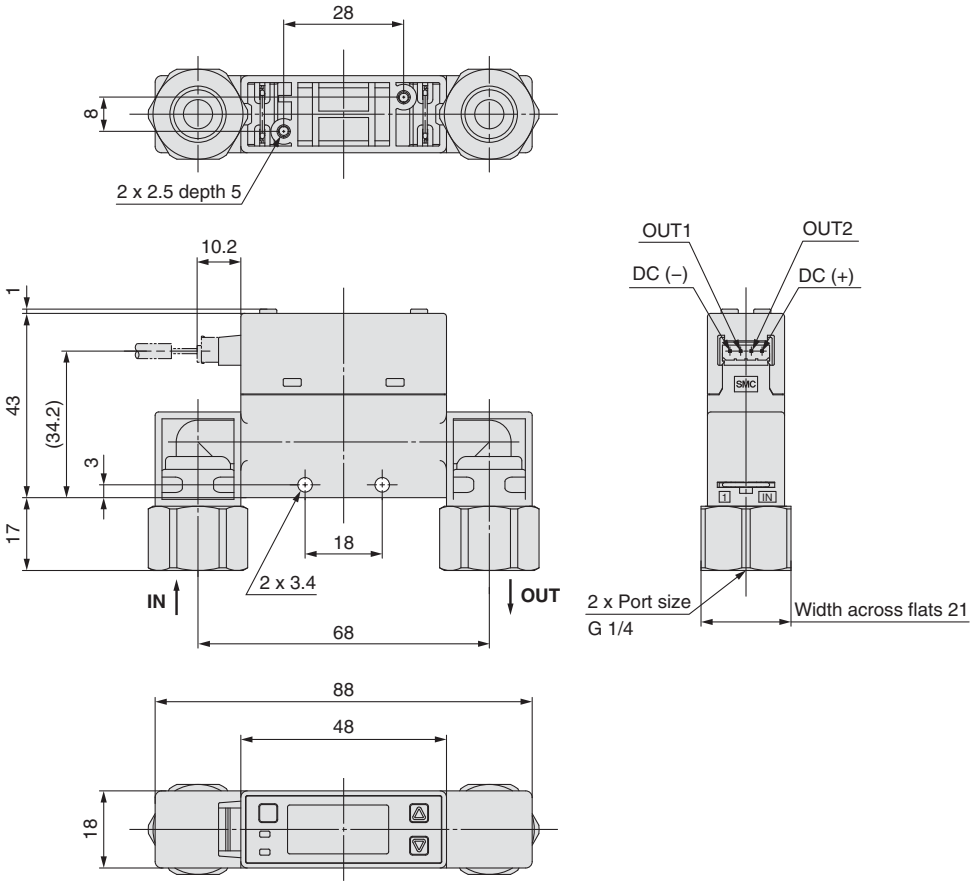


Dimensions

PFMB7201-F02

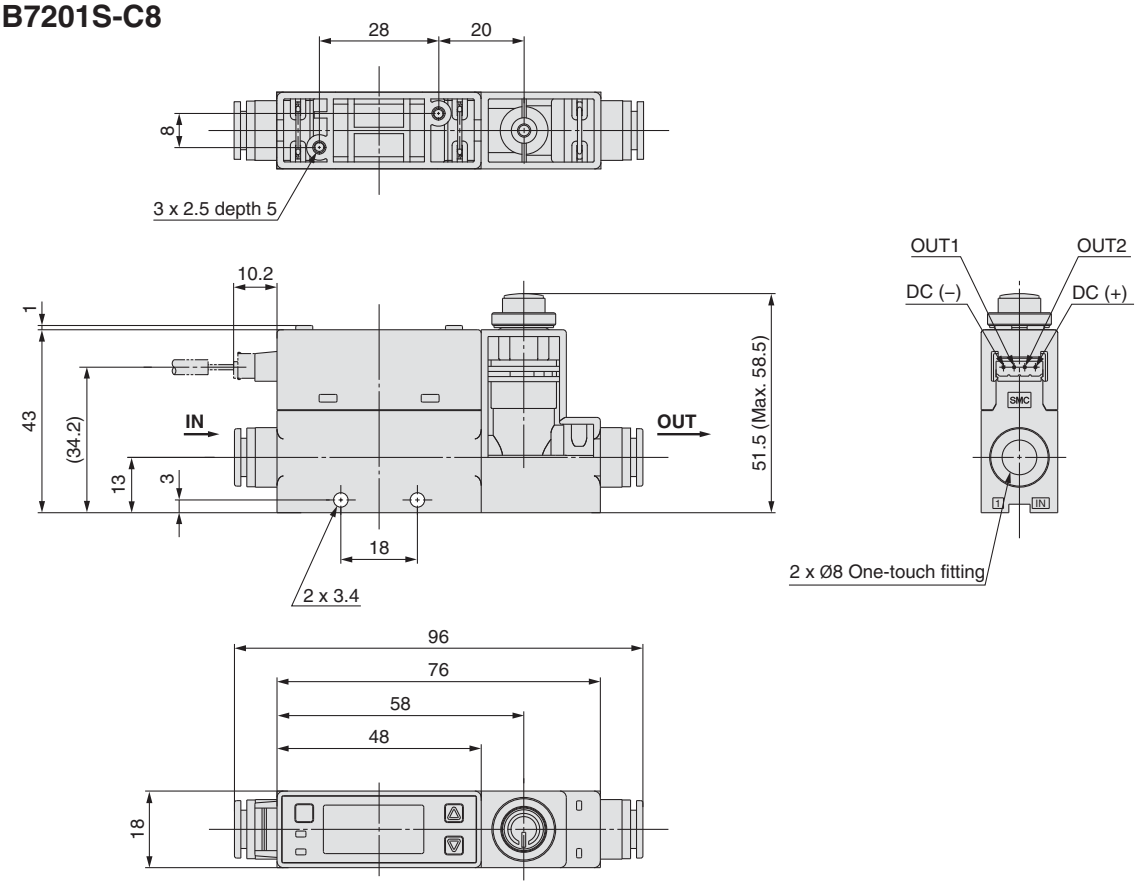


PFMB7201-F02L

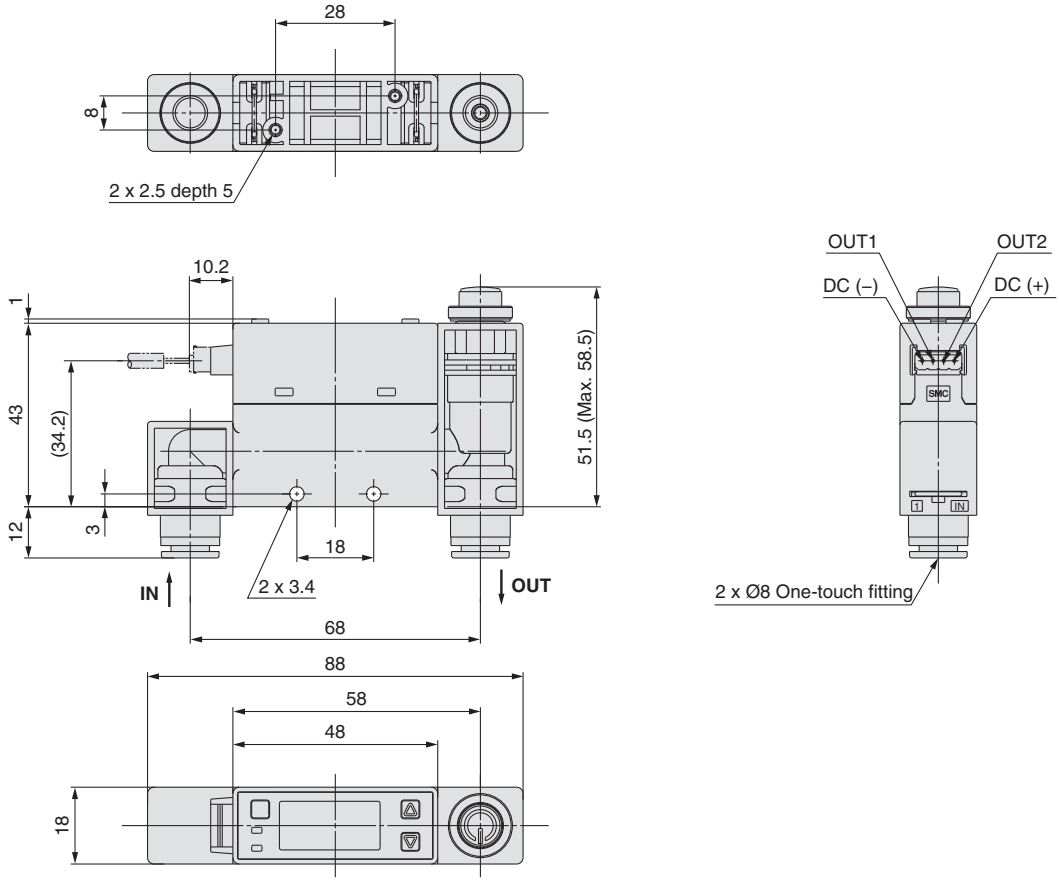


Dimensions

PFMB7201S-C8

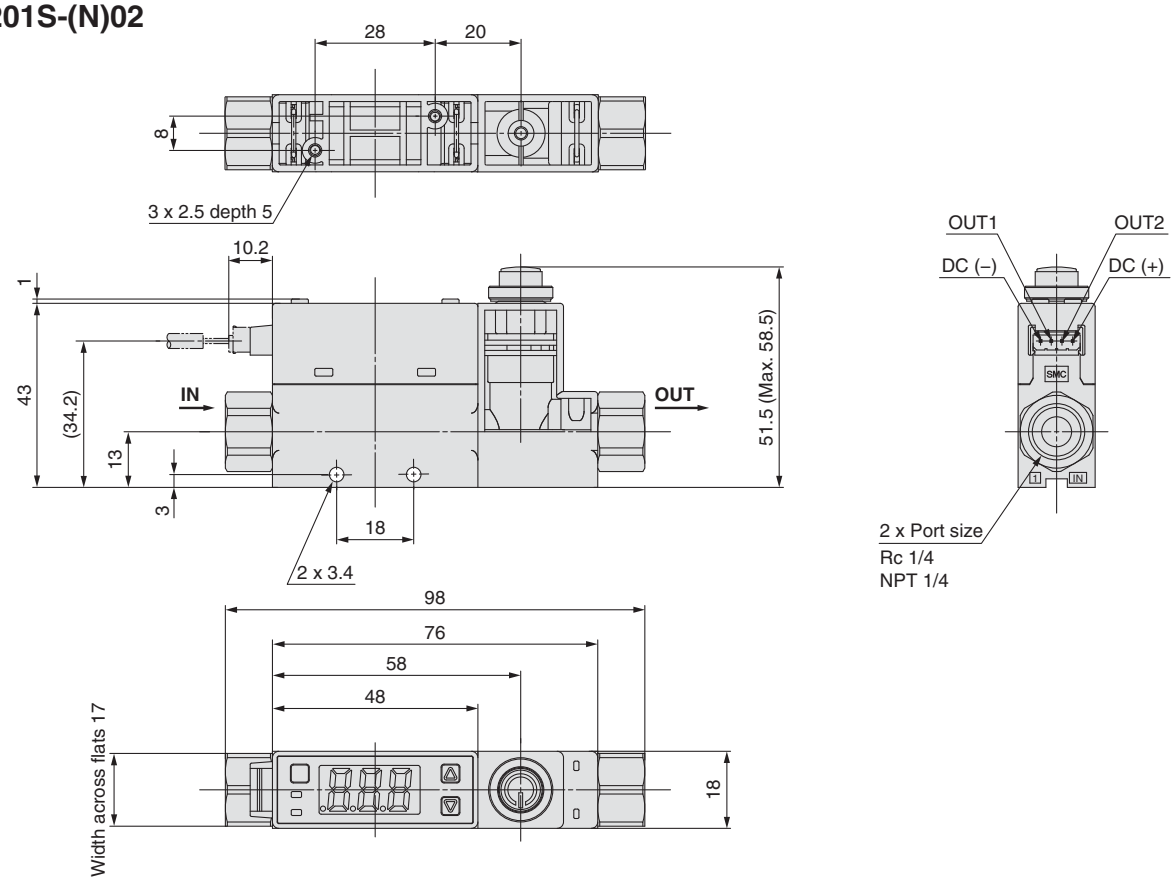


PFMB7201S-C8L

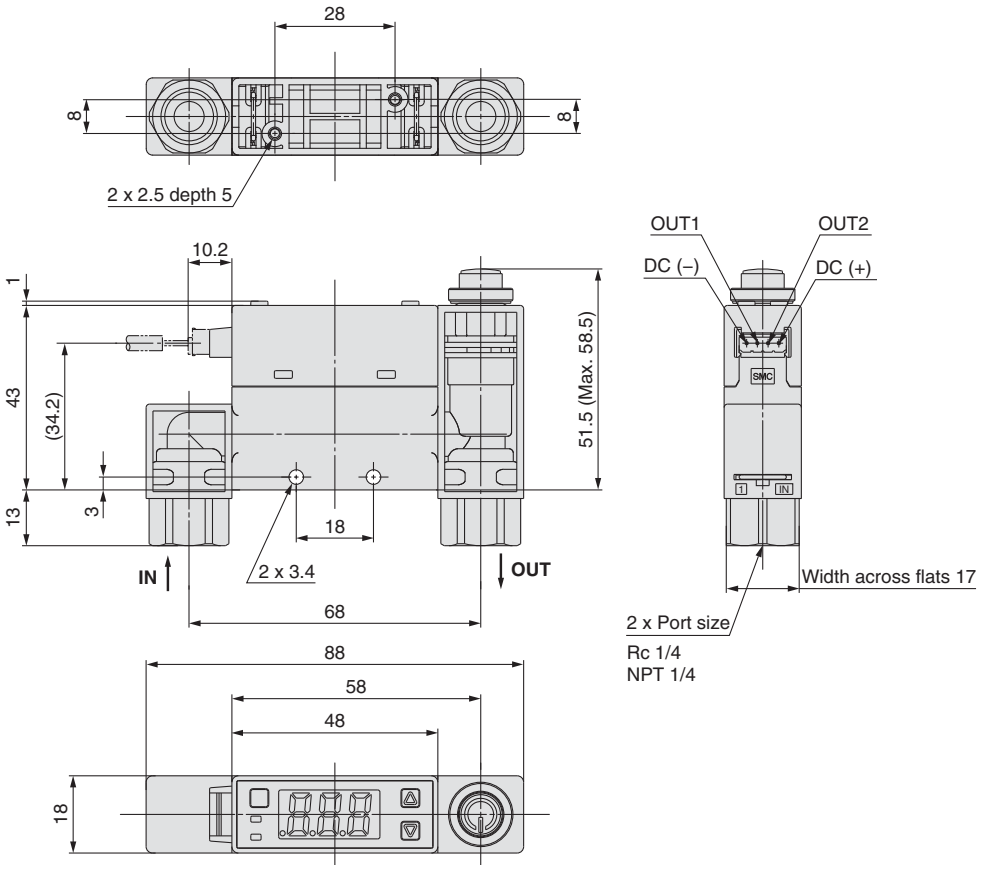


Dimensions

PFMB7201S-(N)02

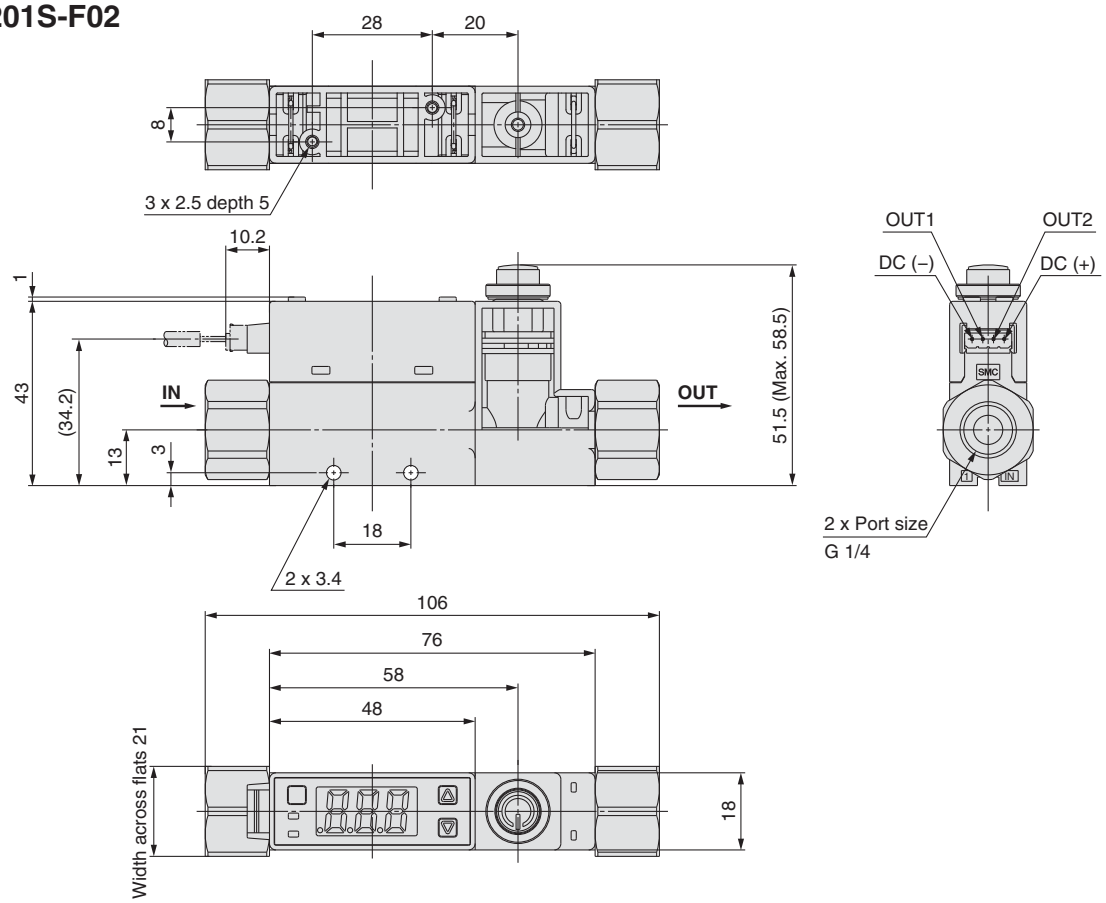


PFMB7201S-(N)02L

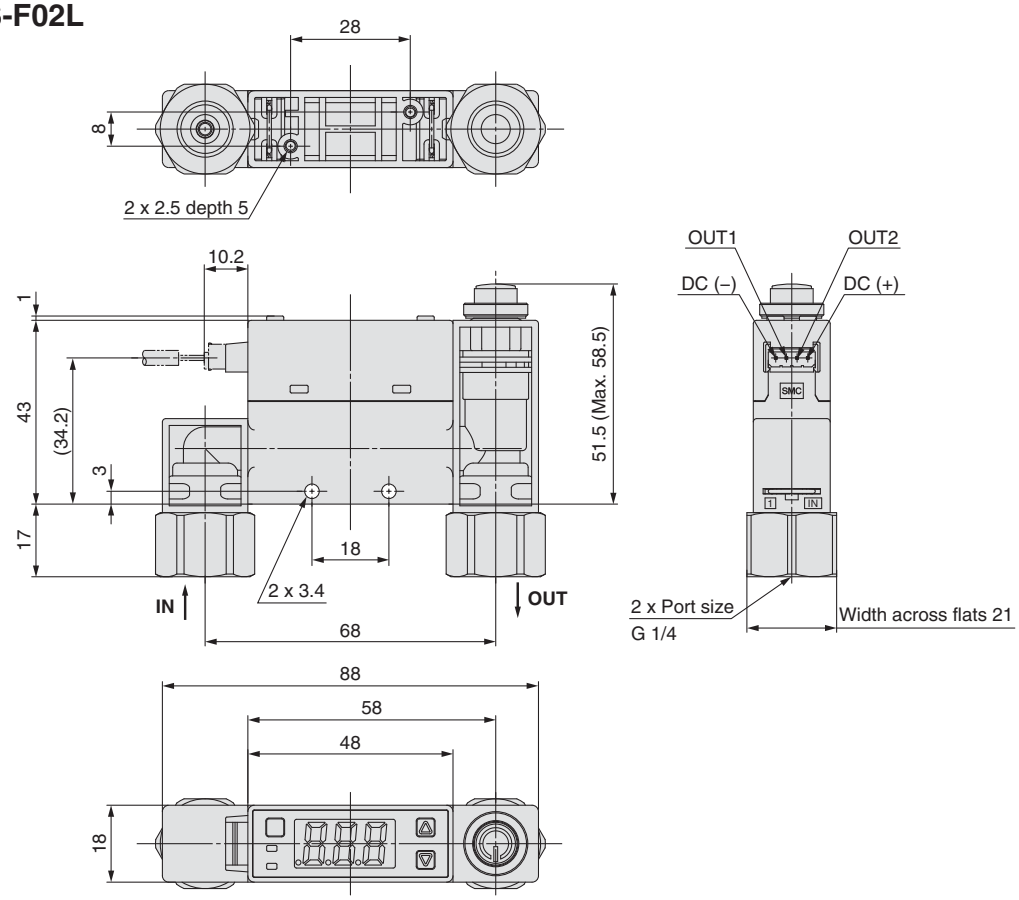


Dimensions

PFMB7201S-F02



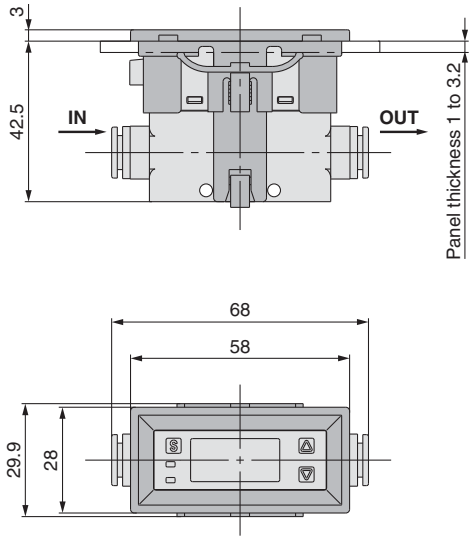
PFMB7201S-F02L



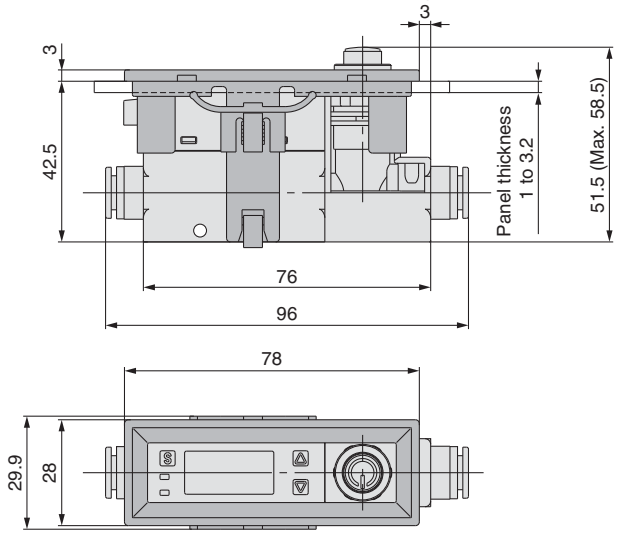
Dimensions

PFMB7201

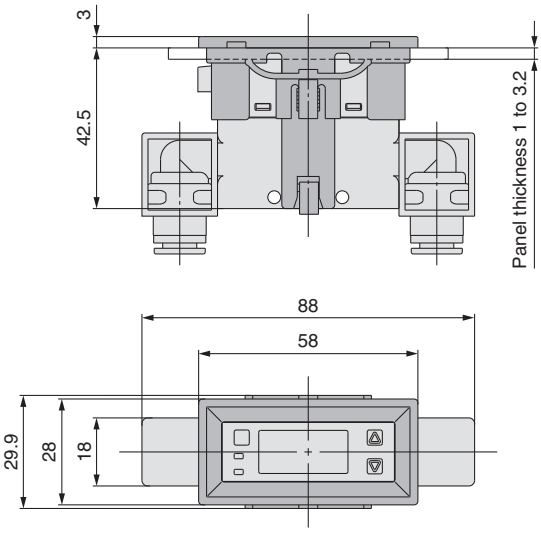
Panel mount/ Without flow adjustment valve/Straight



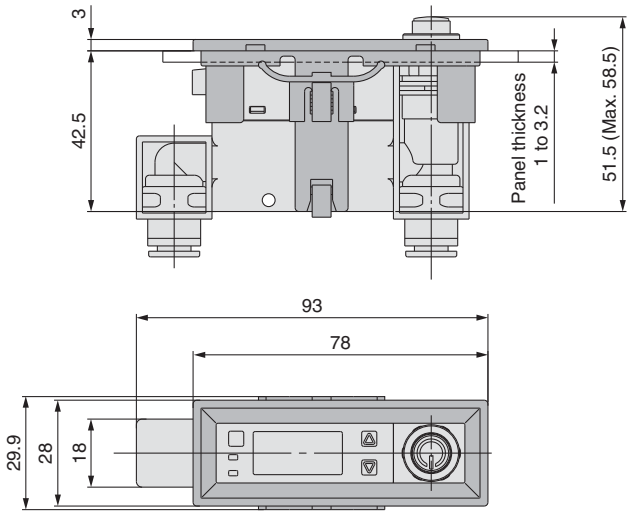
Panel mount/ With flow adjustment valve/Straight



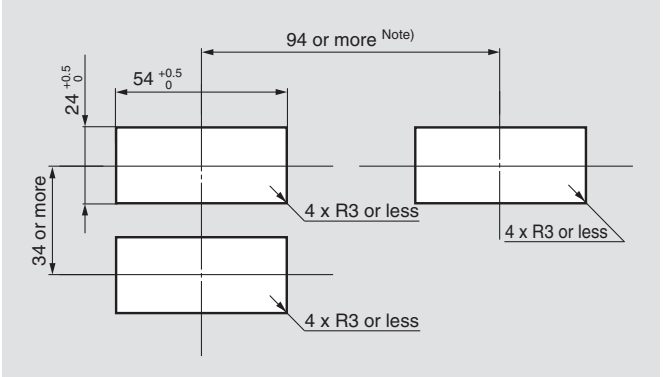
Panel mount/ Without flow adjustment valve/Bottom



Panel mount/ With flow adjustment valve/Bottom



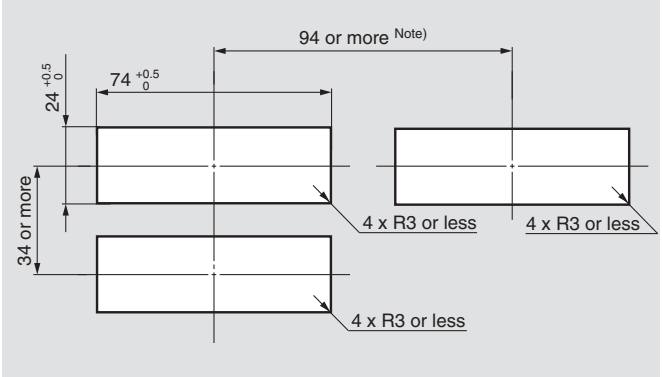
Panel Fitting Dimensions



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.

Panel Fitting Dimensions



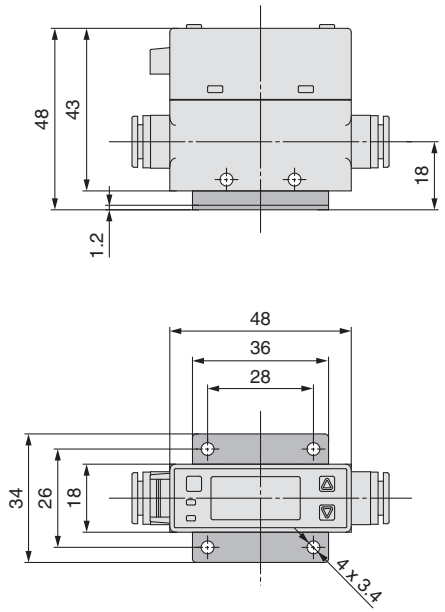
Panel thickness 1 to 3.2 mm

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.

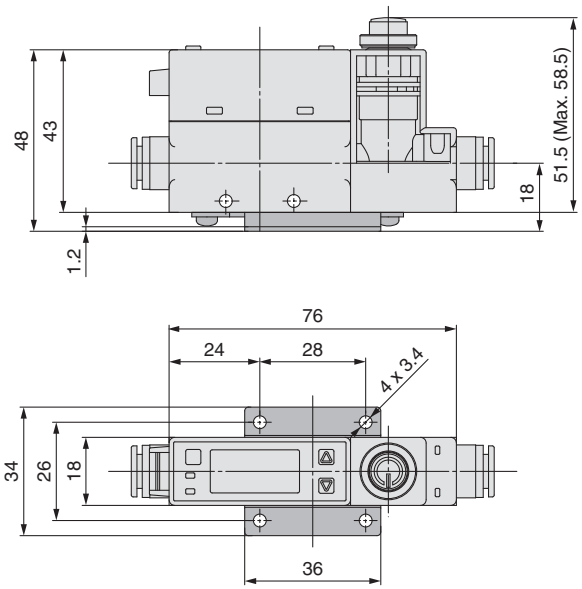
Dimensions

PFMB7201

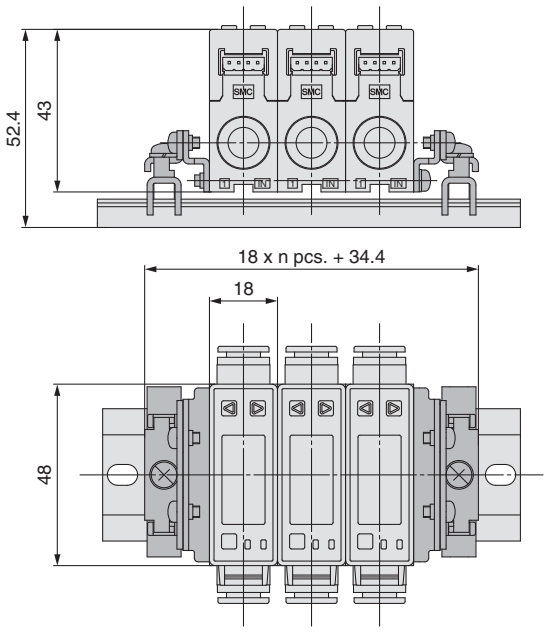
With bracket/Without flow adjustment valve



With bracket/With flow adjustment valve



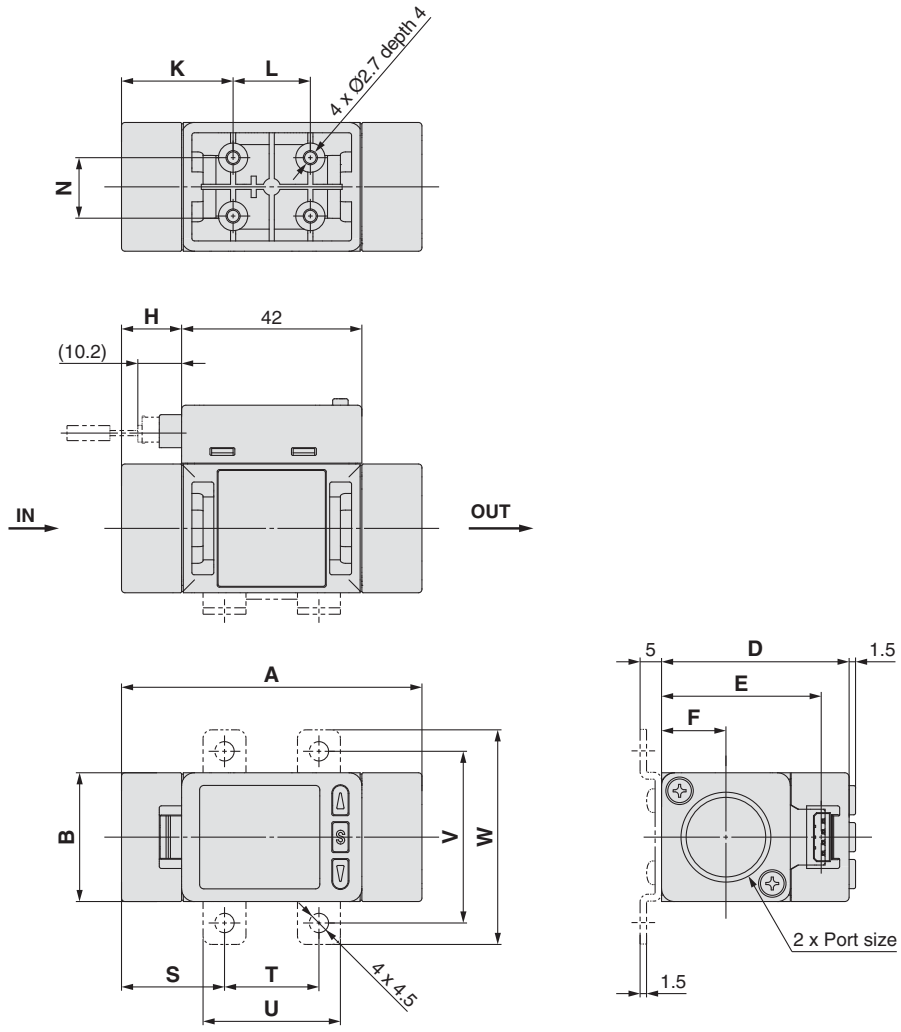
DIN rail mounting



- DIN rail is prepared by user.
- DIN rail is not suitable for port size F02 (G 1/4).

Dimensions

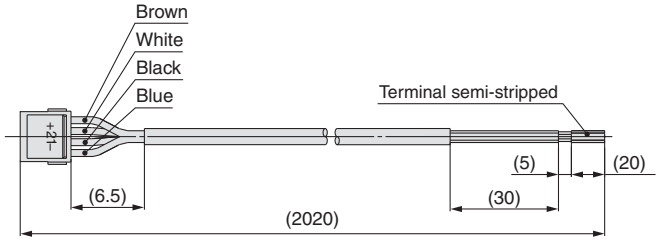
PFMB7501/7102/7202



Model \ Symbol	A	B	D	E	F	H	K	L	N
PFMB7501/7102	70	30	43.7	37.2	15	14	26	18	13.6
PFMB7202	90	35	49.2	42.7	17.5	24	31	28	16.8

Model \ Symbol	Bracket dimensions				
	S	**T**	**U**	**V**	**W**
PFMB7501/7102	24	22	32	40	50
PFMB7202	30	30	42	48	58

Lead wire with connector
ZS-33-D



Cable Specifications

Conductor	**Nominal cross section**	AWG26
	Outside diameter	Approx. 0.50 mm
Insulator	**Outside diameter**	Approx. 1.00 mm
	Colour	Brown, White, Black, Blue
Sheath	**Material**	Oil resistant PVC
Finished outside diameter		Ø 3.5

Note) Refer to the Operation Manual on www.smc.eu for wiring.

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 colour

The display colour can be selected for each output condition. The selection of the display colour provides visual identification of abnormal values. (The display colour 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.

■ Display OFF mode

This function will turn the display OFF. In this mode, decimal points flash on the main screen. If any button is pressed during this mode, the display 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 memorised, 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 memorising 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 analogue 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 memorised every 2 or 5 minutes during measurement, and continues from the last memorised 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

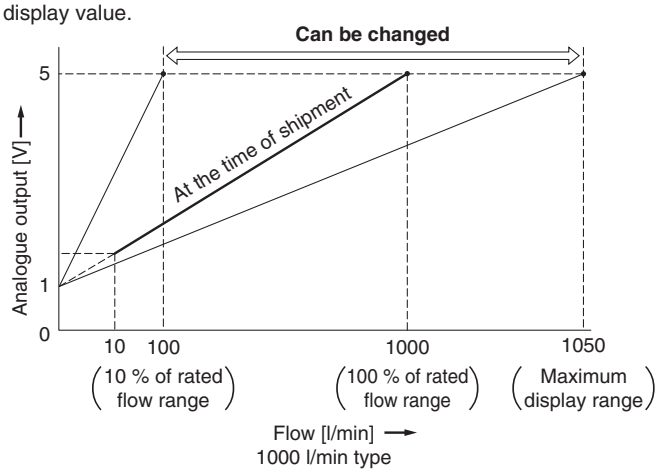
The maximum (minimum) flow rate is detected and updated from when the power supply is turned on. In peak (bottom) value display mode, this maximum (minimum) flow rate is displayed.

■ Keylock function

Prevents operation errors such as accidentally changing setting values.

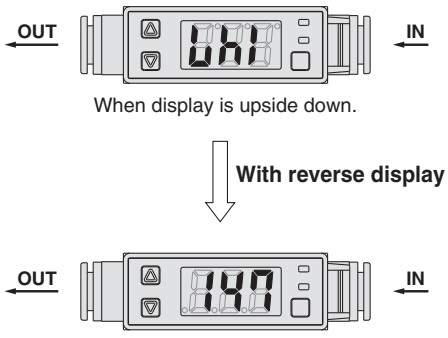
■ Analogue output free range function

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.



■ Reverse 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 reverse display 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.

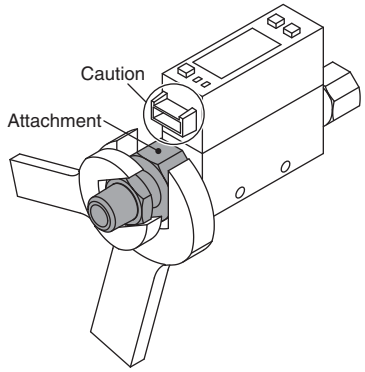
Display		Description	Contents	Action
Er1		OUT1 over current error	Load current of 80 mA or more is applied to the switch output (OUT1).	Eliminate the cause of the over current by turning off the power supply and then turn on it again.
Er2		OUT2 over current error	Load current of 80 mA or more is applied to the switch output (OUT2).	
HHH		Instantaneous flow error	The flow rate exceeds the upper limit of indicated flow rate range.	Decrease the flow rate.
LLL		Reverse flow error	There is a reverse flow equivalent to –5 % or more.	Turn the flow to correct direction.
999999999 ("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.
Er0		System error	Displayed if an internal error has occurred.	Turn the power off and on again.
Er4				
Er6				
Er8				

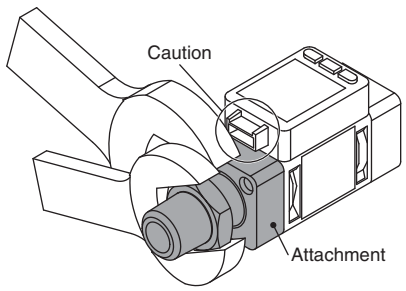
If the failure cannot be solved after the above instructions are performed, please contact SMC for investigation.

■ Precautions on piping

Piping for the metal attachment

- Tighten to the specified torque. Refer to the table below for the required torque values.
- Use a wrench suited for the required torque. Do not use an extremely large wrench (Total length of 40 cm or more).
- If the tightening torque is exceeded, the product can be broken.
  If the tightening torque is insufficient, the fitting may become loose.
- Avoid any sealant tape getting inside the flow path.
- Ensure there is no leakage after piping.
- When mounting the fitting, a wrench should be used on the metal part (attachment) of the fitting only.
  Holding other parts of the product with a wrench may damage the product.
  Specifically, make sure that the wrench does not damage the connector.





Model	Required torque
PFMB7201	12 to 14 N·m
PFMB7501	28 to 30 N·m
PFMB7102	
PFMB7202	

Model	Nominal thread size	Width across flats of attachment
PFMB7201	Rc 1/4, NPT 1/4	17 mm
	G 1/4	21 mm
PFMB7501	1/2	30 mm
PFMB7102		
PFMB7202	3/4	35 mm

⚠ 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 catalogue 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 catalogue.
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, wichever 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 catalogue 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.

⚠ Caution

SMC products are not intended for use as instruments for legal metrology.
Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

⚠ Safety Instructions Be sure to read "Handling Precautions for SMC Products" (M-E03-3) before using.

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1st printing TT printing TT 00 Printed in Spain