2-Color Display

Digital Flow Switch

Applicable fluid Dry air, N_2, Ar, CO_2

CE UKCA cULus ＊ Excluding the PFGM302

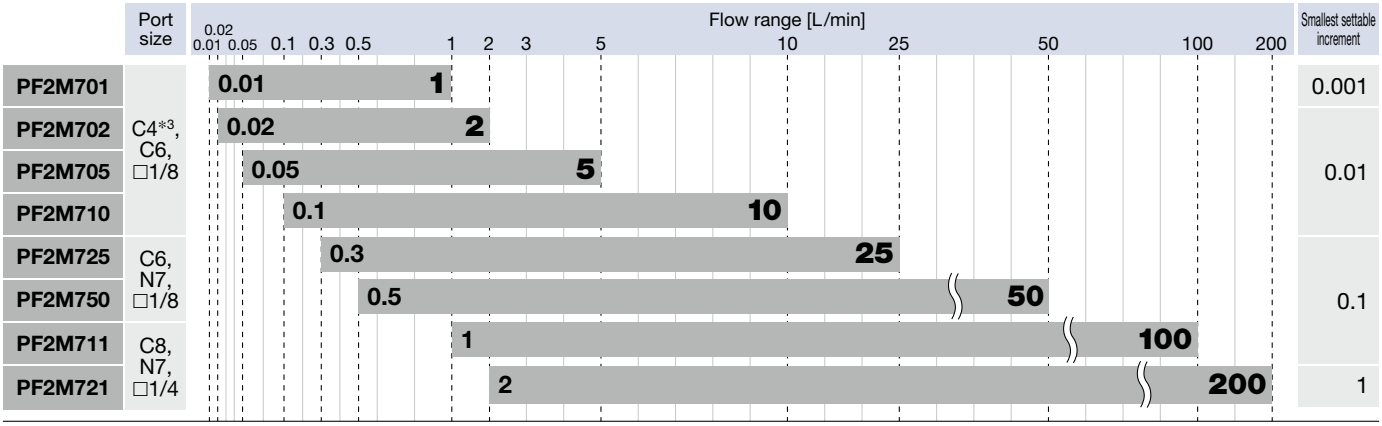
RoHS

IO-Link ＊ For the PF2M7-L

A wide range of flow measurement is possible with 1 product.

Flow ratio*2 100:1

*2 Excludes the PF2M725 *3 Made to order (Produced upon receipt of order)



IO-Link Compatible

The flow rate value and the device status can be figured out easily via the process data.

PF2M7-L Series p. 4

Diagnosis items	Over current error, Outside of rated flow range, Accumulated flow error, Internal product malfunction
Made to order	Compatible with argon (Ar) and carbon dioxide (CO_2) mixed gas p. 28

Improved resistance to moisture and foreign matter p. 1

The bypass construction reduces sensor accuracy deterioration and damage.

＊ There is no bypass construction for the 1 and 2 L ranges.

New

3-Screen Display

Digital Flow Monitor
(Dedicated for the PF2M7)

Allows for the monitoring of remote lines

PFGM302 Series p. 29

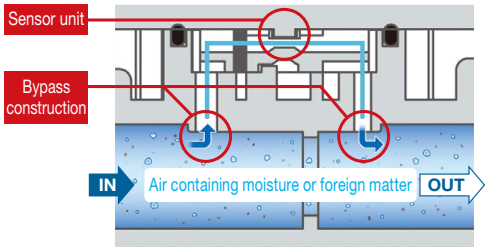
PF2M7(-L) Series

SMC

CAT.ES100-127D

Improved resistance to moisture and foreign matter

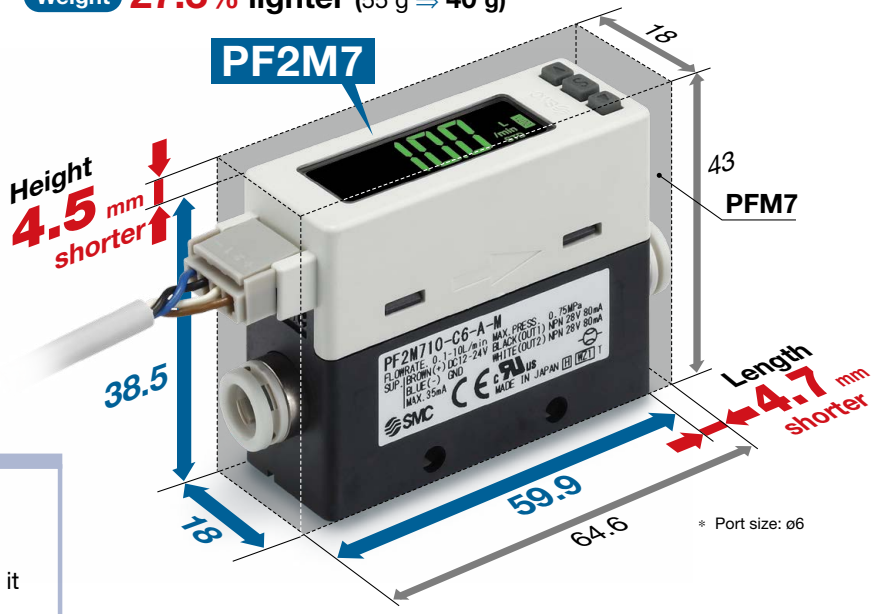
The bypass construction reduces the moist air or foreign matter in contact with the sensor, reducing sensor accuracy deterioration and damage.



* There is no bypass construction for the 1 and 2 L ranges.

Compact, Lightweight

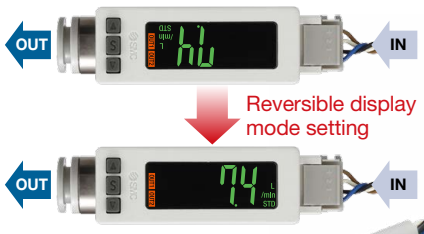
Weight **27.3% lighter** (55 g ⇒ **40 g**)



* Port size: ø6

Reversible display mode

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



A flow adjustment valve is integrated into the product.

- **Space-saving design**
- **Reduced piping labor**

Piping variations

- **One-touch fitting**

Straight	ø4*, ø6, ø8, ø1/4"
Rear ported	

- **Female thread**

Straight	(Rc, NPT, G) 1/8, 1/4
Rear ported	

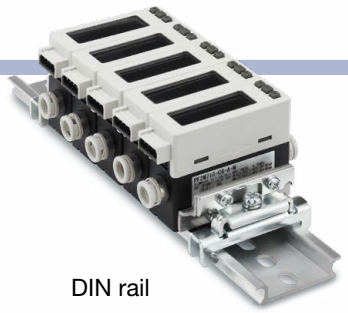
* Made to order
(Produced upon receipt of order)

Display OFF mode

LEDs can be turned off and checked when necessary. The product can also be used as a remote sensor.

Mounting variations

Bracket



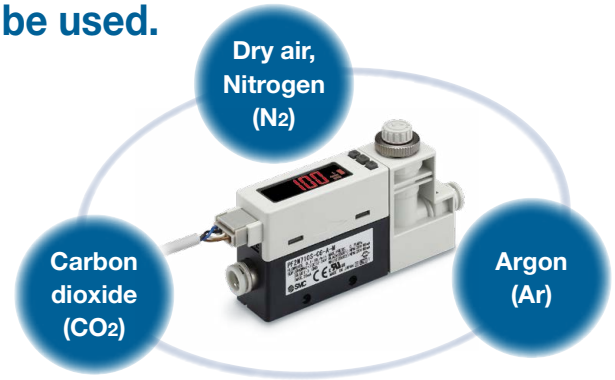
DIN rail

Panel mounting

The digital display allows for the visualization of the flow rate.

2-color display, Improved visibility

Select a model according to the fluid to be used.



Recommended pneumatic circuit examples

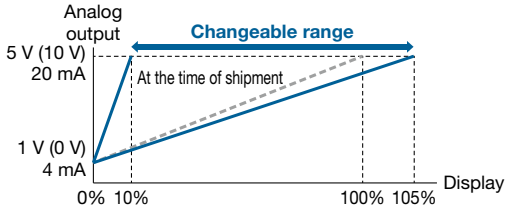
Compressed air line						Vacuum line	
Air dryer	Air filter	Regulator	Mist separator	Micro mist separator	Flow switch	Suction filter	Flow switch
IDF IDU	AF	AR IR	AFM AM	AFD AMD	PF2M	ZF SFD100	PF2M

Vacuum line

* Recommended air quality class: JIS B 8392-1 1.1.2 to 1.6.2 (ISO 8753-1 1.1.2 to 1.6.2)

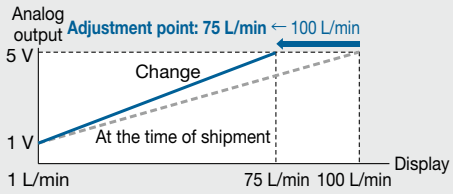
Analog free span function

The analog span point (5 V (10 V), 20 mA) can be changed within 10 to 105% of the rated flow rate with respect to the displayed value.



Application example

When 5 V output is required from the flow switch at 75 L/min, use a sensor that outputs 1 to 5 V at 1 to 100 L/min.



Selectable analog output function

1 to 5 V or 0 to 10 V can be selected.

Delay time setting

Can be set between 0 and 60 s

The delay time can be set according to the application.

Grease-free

Functions

(▶ For details, refer to the "Operation Manual" on the SMC website.)

Output operation	Key-lock function
Forced output function	Reset to the default settings
Analog free span function	Delay time setting
Display color	Error display function
Display OFF mode	Setting of a security code
Selectable analog output function	Display mode
Reference condition	Zero cut-off function
Peak/Bottom value display	Accumulated value hold
Reversible display mode	Simple setting mode
Digital filter setting	Zero-clear function

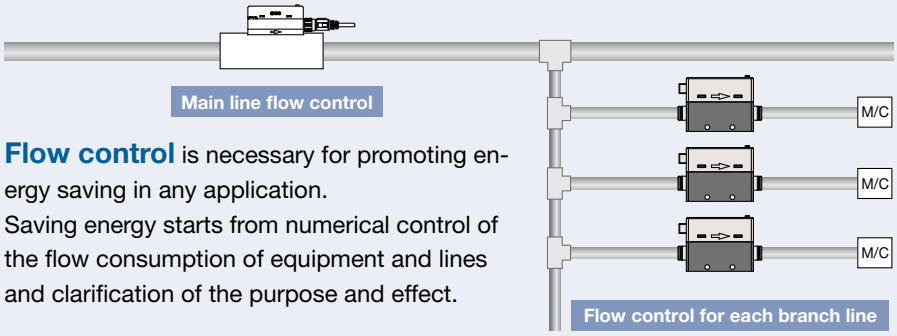
Low current consumption: 35 mA*1 or less

*1 PFM7: 55 mA or less

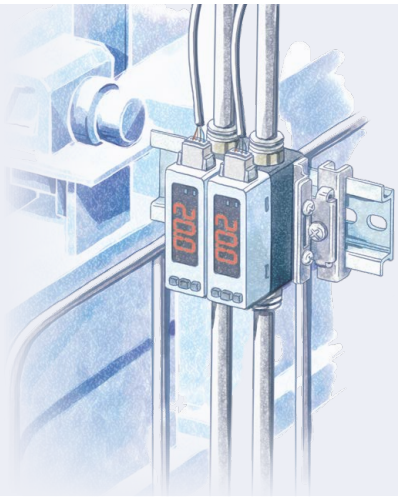
Power supply voltage: 12 to 24 V

* For the IO-Link device: 18 to 30 V

Select a digital flow switch to increase energy savings!

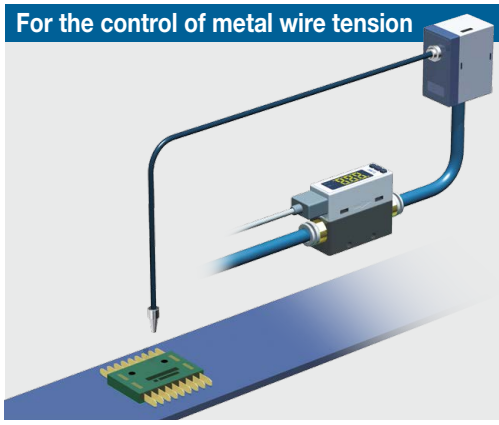


Flow control is necessary for promoting energy saving in any application.
Saving energy starts from numerical control of the flow consumption of equipment and lines and clarification of the purpose and effect.



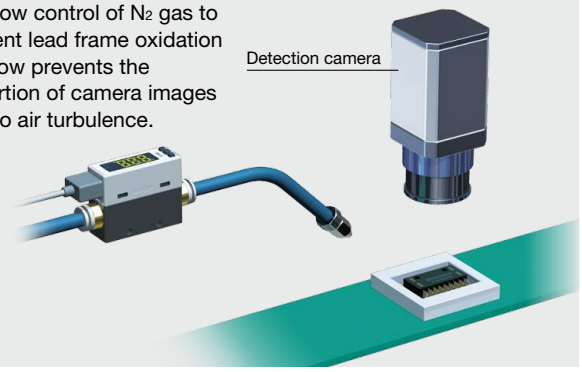
Applications

For the control of metal wire tension

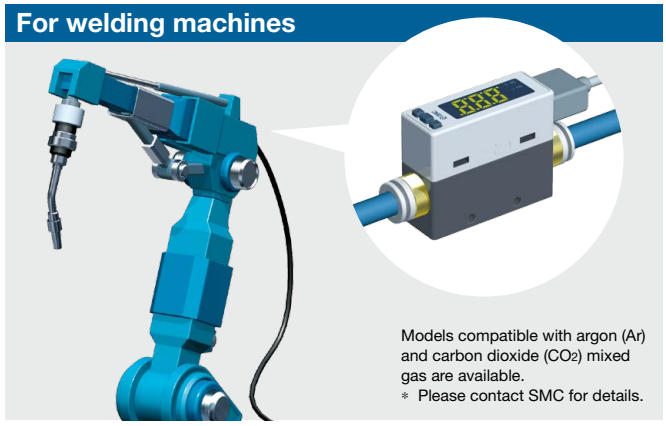


For air blow

- For flow control of N_2 gas to prevent lead frame oxidation
- N_2 blow prevents the distortion of camera images due to air turbulence.

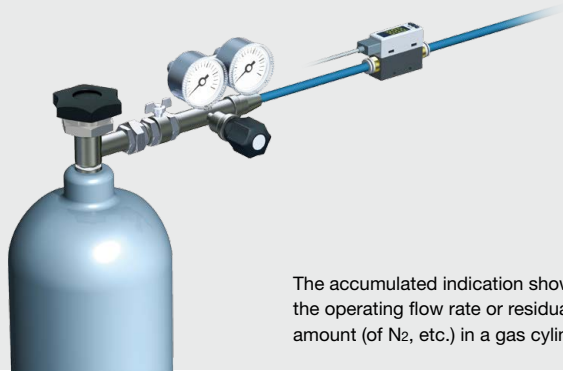


For welding machines



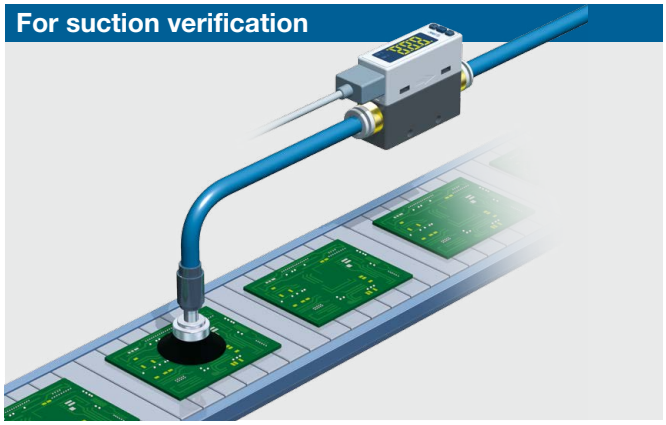
Models compatible with argon (Ar) and carbon dioxide (CO_2) mixed gas are available.
* Please contact SMC for details.

For N_2 gas cylinder peripheral equipment

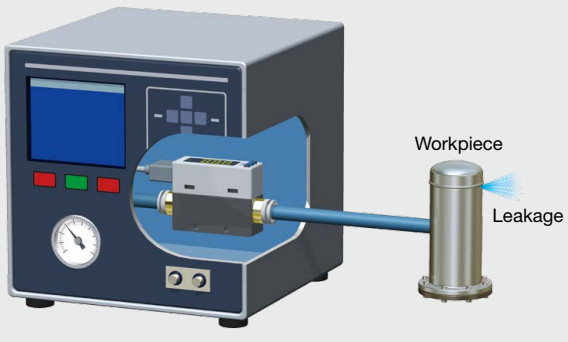


The accumulated indication shows the operating flow rate or residual amount (of N_2, etc.) in a gas cylinder.

For suction verification



For leak testers

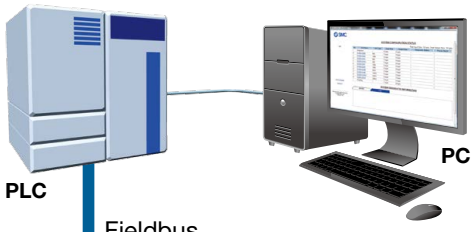


IO-Link Compatible PF2M7□□-□-L□-□□□

p. 12

Supports the IO-Link communication protocol

IO-Link is an open communication interface technology between the sensor/actuator and the I/O terminal that is an international standard: IEC 61131-9.



Configuration File (IODD File*1)
· Manufacturer · Product part no.
· Set value

*1 **IODD File:**
IODD is an abbreviation of IO Device Description. This file is necessary for setting the device and connecting it to a master. Save the IODD file on the PC to be used to set the device prior to use.

Device settings can be set by the master.
- Threshold value
- Operation mode, etc.

Read the device data.
- Switch ON/OFF signal and analog value
- Device information: Manufacturer, Product part number, Serial number, etc.
- Normal or abnormal device status
- Cable breakage

IO-Link Master

IO-Link Compatible Device: Digital Flow Switch

Implement diagnostic bits in the process data.

The diagnostic bit in the cyclic process data makes it easy to find problems with the equipment.
It is possible to find problems with the equipment in real time using the cyclic (periodic) data and to monitor such problems in detail with the noncyclic (aperiodic) data.

Process Data

Bit offset	Item	Note
0	OUT1 output	0: OFF 1: ON
1	OUT2 output	0: OFF 1: ON
8	Diagnosis (flow rate)	0: OFF 1: ON
14	Fixed output	0: OFF 1: ON
15	Diagnosis (error)	0: OFF 1: ON
16 to 31	Measured flow rate value	Signed 16 bit

Diagnosis items
· Over current error · Outside of rated flow range · Accumulated flow error · Internal product malfunction

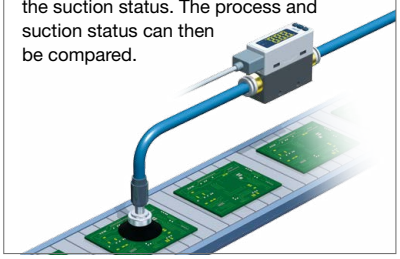
Bit offset	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Item	Measured flow rate value (PD)															

Bit offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Item	Error	Fixed	Reservation					Flow rate	Reservation						OUT2	OUT1
	Diagnosis	Output						Diagnosis							Switch output	

Application Example

For the predictive maintenance of suction verification

The flow rate "switch ON/OFF signals" and "analog values" are monitored to determine the suction status. The process and suction status can then be compared.



Operation and Display

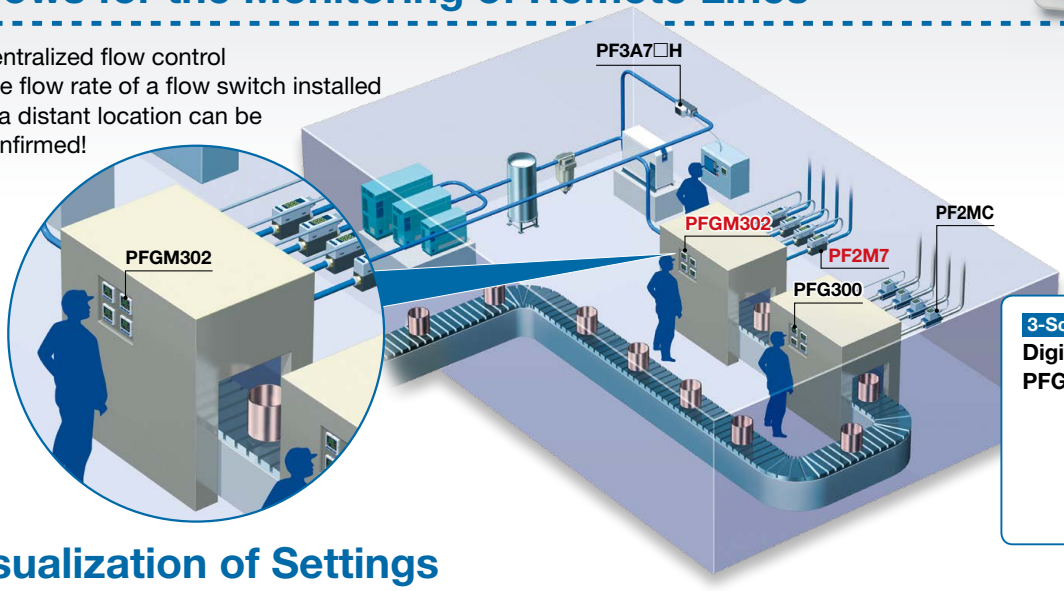
Communication with master	IO-Link status indicator light	Status			Screen display*2	Description
Yes	*1	IO-Link mode	Normal	Operate	oPE	Normal communication status (readout of measured value)
	(Flashing)*1			Start up	Strt	At the start of communication
				Preoperate	PrE	
			Abnormal	Version does not match	Er 15	The IO-Link version does not match that of the master. The master uses version 1.0.
No				Communication disconnection	oPE / Strt / PrE	Normal communication was not received for 1 s or longer.
	OFF	SIO mode			SIO	General switch output

*1 In IO-Link mode, the IO-Link indicator is ON or flashing.
*2 "LoC" is displayed when the data storage lock is enabled. (Except for when the version does not match or when in SIO mode)
The display color can be set to red or green.

3-Screen Display Digital Flow Monitor
PFGM302 Series p. 29

Allows for the Monitoring of Remote Lines

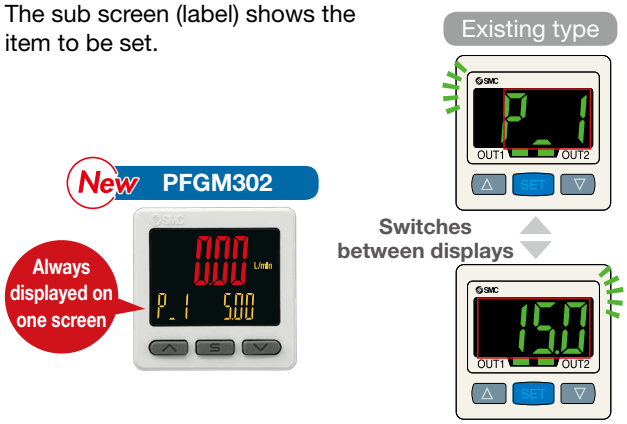
- Centralized flow control
- The flow rate of a flow switch installed in a distant location can be confirmed!



3-Screen Display
Digital Flow Monitor
PFG300 Series

Visualization of Settings

The sub screen (label) shows the item to be set.



Mode Examples

Hysteresis mode

Normal output	Set value (Threshold value)	Reversed output	Set value (Threshold value)	Hysteresis	Set hysteresis value
P_1	5.00	n_1	5.00	H_1	0.50

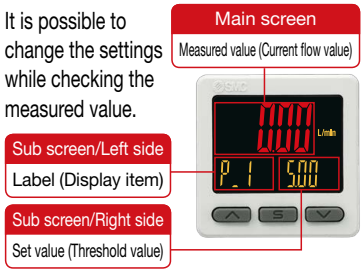
Window comparator mode

Normal output/ Lo side	Set value (Threshold value)	Normal output/ Hi side	Set value (Threshold value)
P_L	3.00	P_H	6.00

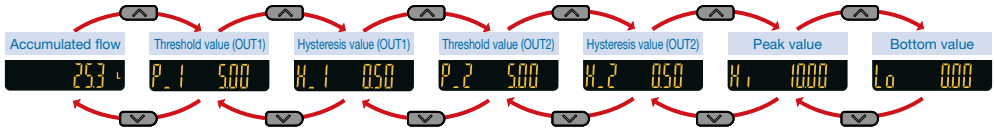
Reversed output/ Lo side	Set value (Threshold value)	Reversed output/Hi side	Set value (Threshold value)
n_L	3.00	n_H	6.00

Easy Screen Switching

It is possible to change the settings while checking the measured value.



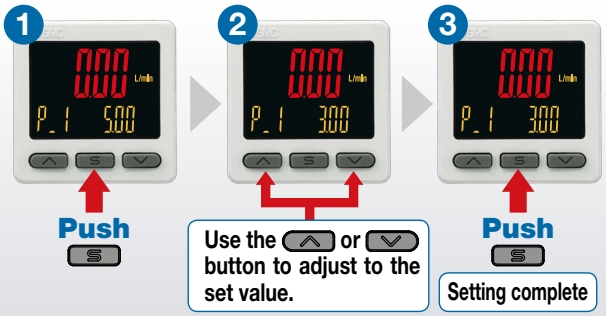
The sub screen can be switched by pressing the up/down buttons.



* Either “Input of line name” or “Display OFF” can be added via the function settings.

Simple 3-Step Setting

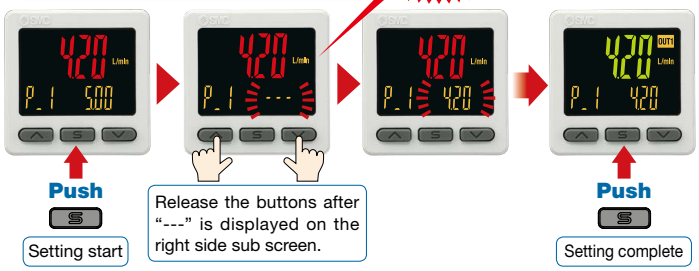
When the S button is pressed and the set value (P_1) is being displayed, the set value (threshold value) can be set. When the S button is pressed and the hysteresis (H_1) is being displayed, the hysteresis value can be set.



With a snap shot function for set value reading

Pressing the ▲ and ▼ buttons simultaneously for a minimum of 1 second will make the set value (threshold value) the same as the current flow value.

Snap shot function



NPN/PNP Switch Function

The number of stock items can be reduced.

NPN PNP

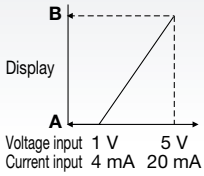
Analog output of 0 to 10 V is also available.

Voltage output	1 to 5 V	Switchable
	0 to 10 V	
Current output	4 to 20 mA	Fixed

Input Range Selection (for Pressure/Flow rate)

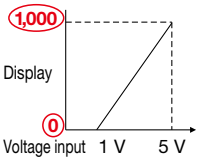
The displayed value to the sensor input can be set as required.
(Voltage input: 1 to 5 V/Current input: 4 to 20 mA)

Pressure switch/Flow switch can be displayed.



A is displayed for 1 V (or 4 mA).
B is displayed for 5 V (or 20 mA).
The range can be set as required.

■ Pressure Sensor for General Fluids/PSE570



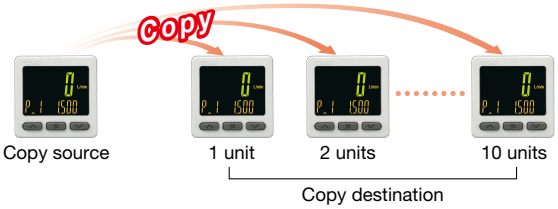
	A	B
PSE570	0	1,000
PSE573	−100	100
PSE574	0	500

Set A and B to the values shown in the table above.

Convenient Functions

Copy function

The set values of the monitor can be copied.



Security code

The key locking function keeps unauthorized persons from tampering with the settings.

Power saving mode

Power consumption is reduced by turning off the monitor.

Current consumption*1	Reduction rate*2
25 mA or less	Approx. 50% reduction

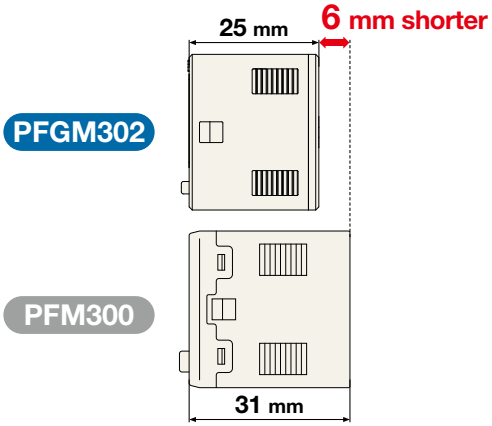
*1 During normal operation *2 In power saving mode

External input function

The accumulated value, peak value, and bottom value can be reset remotely.

Compact & Lightweight

- **Compact: Max. 6 mm shorter**
- **Lightweight: Max. 5 g lighter (30 g → 25 g)**



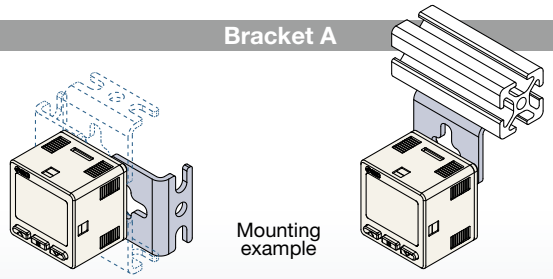
Functions (▶ For details, refer to the "Operation Manual" on the SMC website.)

- Output operation
- Simple setting mode
- Display color
- Delay time setting
- Digital filter setting
- FUNC output switching function
- Selectable analog output function
- External input function
- Forced output function
- Accumulated value hold
- Peak/Bottom value display
- Setting of security code
- Keylock function
- Reset to the default settings
- Display with zero cut-off setting
- Selection of display on sub screen
- Analog output free range function
- Error display function
- Copy function
- Selection of power saving mode
- Fluid selection

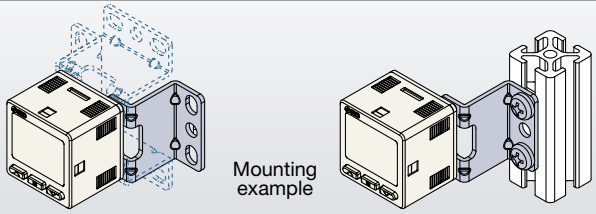
Mounting

The bracket configuration allows for mounting in four orientations.

Bracket A



Bracket B

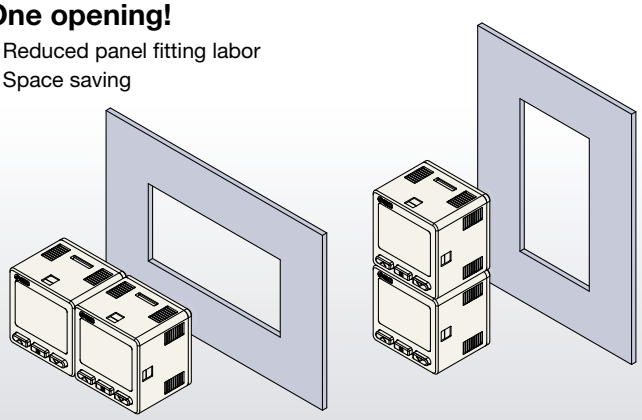


Panel mount

Mountable side by side without clearance

One opening!

- Reduced panel fitting labor
- Space saving



Flow Switch Flow Rate Variations

Series	Applicable fluid	Detection method	Rated flow range [L/min]
PFMV  PFGV301	Dry air N_2	Thermal type (MEMS)	0 – 0.5 0 – 1 0 – 3 −0.5 – 0.5 −1 – 1 −3 – 3

Series	Compatibility with the PFG300 digital flow monitor	Applicable fluid	Detection method	Smallest settable increment	Rated flow range [L/min]
PF2M7(-L)  New PFGM302		Dry air N_2 Ar CO_2	Thermal type (MEMS)	0.001 L/min 0.01 L/min 0.1 L/min 1 L/min	0.01 – 1 0.02 – 2 0.05 – 5 0.1 – 10 0.3 – 25 0.5 – 50 1 – 100 2 – 200
PFMB 	PFG300	Dry air N_2	Thermal type (MEMS) Bypass flow type	1 L/min	5 – 500 10 – 1000 20 – 2000
PF2MC(-L) 	PFG300	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 0.5 L/min 1 L/min 2 L/min 5 L/min	1 – 10 5 – 50 10 – 100 20 – 200 50 – 500
PF3A□H(-L)  Body ported type  Modular type	PFG300	Air N_2	Thermal type (Platinum sensor) Bypass flow type	2 L/min 5 L/min 10 L/min 1 L/min 2 L/min	30 – Body ported type – 3000 60 – Body ported type – 6000 120 – Body ported type – 12000 10 – Modular type – 1000 20 – Modular type – 2000

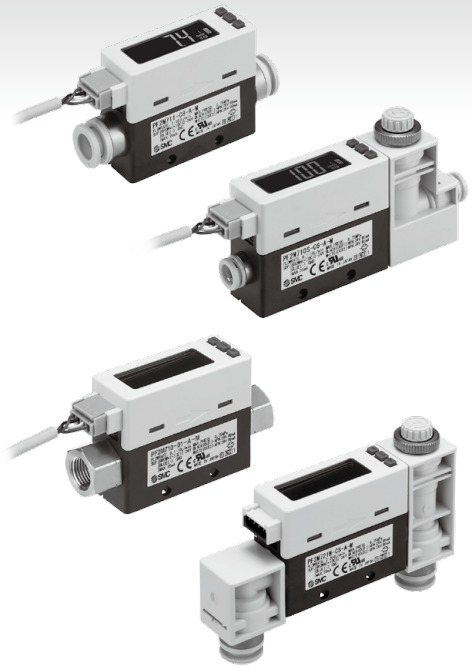
Flow Switch Variations / Basic Performance Table

Series	PFMV	PF2M7(-L)	PFMB	PF2MC(-L)	PF2A	PF3A7□H(-L)
	 PFGV301	 New PFGM302	 PFG300	 PFG300		 PFG300
Enclosure	IP40	**IP40**	IP40	IP65 [**Monitor unit** IP40]	IP65	IP65 [**Monitor unit** IP40]
Fluid	Dry air, N_2	**Dry air, N_2, Ar, CO_2**	Dry air, N_2	Dry air, N_2	Air, N_2	Air, N_2
Setting	Digital	**Digital**	Digital	Digital	Digital	Digital
Rated flow range [L/min]	0 to 0.5 −0.5 to 0.5 0 to 1 −1 to 1 0 to 3 −3 to 3	**0.01 to 1 0.02 to 2 0.05 to 5 0.1 to 10 0.3 to 25 0.5 to 50 1 to 100 2 to 200**	5 to 500 10 to 1000 20 to 2000	5 to 500 10 to 1000 20 to 2000	1 to 10 5 to 50 10 to 100 20 to 200 50 to 500	30 to 3000 60 to 6000 120 to 12000 — 10 to 1000 20 to 2000
Power supply voltage	12 to 24 VDC ±10%	**PF2M7** 12 to 24 VDC ±10% **PF2M7-L** 18 to 30 VDC ±10%	12 to 24 VDC ±10%	PF2MC 12 to 24 VDC ±10% PF2MC-L 18 to 30 VDC ±10%	12 to 24 VDC ±10%	PF3A7□H 24 VDC ±10% PF3A7□H-L 18 to 30 VDC ±10% PF3A701H/702H-L 21.6 to 30 VDC PF3A8□H-L 21.6 to 30 VDC
Temperature characteristics (25°C standard)	±2% F.S. (15 to 35°C) ±5% F.S. (0 to 50°C) [**Monitor unit** ±0.5% F.S. (0 to 50°C)]	**±3% F.S. ±1 digit (15 to 35°C) ±5% F.S. ±1 digit (0 to 50°C)**	±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) [**Monitor unit** ±0.5% F.S. (0 to 50°C)]	±3% F.S. (15 to 35°C) ±5% F.S. (0 to 50°C)	±5% F.S. (0 to 50°C) [**Monitor unit** ±0.5% F.S. (0 to 50°C)]
Repeatability	±2% F.S. (Fluid: Dry air) Analog output: ±5% F.S. [**Monitor unit** ±0.1% F.S. Analog output: ±0.3% F.S.]	**±1% F.S. ±1 digit (Fluid: Dry air)**	±1% F.S. (Fluid: Dry air) [**Monitor unit** ±0.1% F.S.]	±1% F.S. (Fluid: Dry air) [**Monitor unit** ±0.1% F.S.]	±1% F.S. (PF2A7□0) ±2% F.S. (PF2A7□1)	±1% F.S. [**Monitor unit** ±0.1% F.S.]
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)	Hysteresis mode: Variable Window comparator mode: Variable
Output	NPN/PNP open collector Analog voltage output Analog current output	**NPN/PNP open collector Accumulated pulse output Analog voltage output Analog current output IO-Link**	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 IO-Link	NPN/PNP open collector Accumulated pulse output	NPN/PNP open collector Accumulated pulse output Analog voltage output Analog current output IO-Link
Display	[**Monitor unit** 2-color LCD display]	**2-color LCD display** [**Monitor unit** 3-color LCD display]	2-color LED display — 2-color LCD display [**Monitor unit** 3-color LCD display]	3-color LCD display [**Monitor unit** 3-color LCD display]	LED display	3-color LCD display [**Monitor unit** 3-color LCD display]

∗ The monitor unit values are for the PFG300, PFGV301, and PFGM302.

CONTENTS

2-Color Display Digital Flow Switch *PF2M7(-L)* Series
3-Screen Display Digital Flow Monitor *PFGM302* Series



2-Color Display **Digital Flow Switch**

PF2M7 Series

How to Order

PF2M 7 10 □ – C6 – A □ – M □ □

Integrated display ❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽

❶ Rated flow range

01	0.01 to 1 L/min	**25**	0.3 to 25 L/min
02	0.02 to 2 L/min	**50**	0.5 to 50 L/min
05	0.05 to 5 L/min	**11**	1 to 100 L/min
10	0.1 to 10 L/min	**21**	2 to 200 L/min

❷ Flow adjustment valve/Piping entry direction

Symbol	Flow adjustment valve	Piping entry direction	Rated flow range 1	2	5	10	25	50	100	200
Nil	None	Straight	●	●	●	●	●	●	●	●
S	Yes	Straight	–	–	●	●	●	●	●	●
L	None	Rear ported	●	●	●	●	●	●	●	●
W	Yes	Rear ported	–	–	●	●	●	●	●	●

∗ 1 and 2 L/min type products are not available with a flow adjustment valve.

❸ Port size

Symbol	Port size	Rated flow range 1	2	5	10	25	50	100	200
01	Rc1/8	●	●	●	●	●	●	–	–
N1	NPT1/8	●	●	●	●	●	●	–	–
F1	G1/8	●	●	●	●	●	●	–	–
02	Rc1/4	–	–	–	–	–	–	●	●
N2	NPT1/4	–	–	–	–	–	–	●	●
F2	G1/4	–	–	–	–	–	–	●	●
C4∗1	ø4	●	●	●	●	–	–	–	–
C6	ø6	●	●	●	●	●	●	–	–
C8	ø8	–	–	–	–	–	–	●	●
N7	ø1/4"	–	–	–	–	●	●	●	●

∗1 Made to order (Produced upon receipt of order)

Piping variations

With One-touch fitting	Female thread
C4∗2**, C6, C8, N7**	**01, 02, N1, N2, F1, F2**
Straight	Straight
Rear ported	Rear ported

∗2 Made to order (Produced upon receipt of order)

❹ Output specification

Symbol	OUT1	OUT2
A	NPN	NPN
B	PNP	PNP
C	NPN	Analog 1 to 5 V ⇔ Analog 0 to 10 V∗3
D	NPN	Analog 4 to 20 mA
E	PNP	Analog 1 to 5 V ⇔ Analog 0 to 10 V∗3
F	PNP	Analog 4 to 20 mA

∗3 1 to 5 V or 0 to 10 V can be selected by pressing the button. The default setting is 1 to 5 V.

❺ Option 1

Nil	**W**
Lead wire with connector (2 m)	Lead wire with connector (2 m) + Connector cover (Silicone rubber)
ZS-33-D	**ZS-33-F** + **ZS-33-D**
∗ Interchangeable with the existing PFM7 series	∗ Interchangeable with the existing PFM7 series

N
Without lead wire with connector

❻ Unit specification

M	SI unit only∗4
Nil	Unit selection function∗5

∗4 Fixed unit: Instantaneous flow: L/min
Accumulated flow: L

∗5 This product is for overseas use only.
(The SI unit type is provided for use in Japan in accordance with the New Measurement Act.)
The unit can be changed.
Instantaneous flow: L/min ⇔ cfm
Accumulated flow: L ⇔ ft³

❽ Calibration certificate∗6

Nil	None
A	Yes

∗6 Made to order
The certificate is in both English and Japanese.

❼ Option 2

Nil	**R**	**S**
Without bracket	Bracket (For the type without a flow adjustment valve) **ZS-33-M** With 2 tapping screws ∗ Interchangeable with the existing PFM series	Bracket (For the type with a flow adjustment valve) **ZS-33-MS** With 3 tapping screws ∗ Interchangeable with the existing PFM series
T	Panel mount adapter (For the type without a flow adjustment valve) **ZS-33-2J** Panel mount adapter, Panel mount adapter B, Panel, Mounting bracket	**V** Panel mount adapter (For the type with a flow adjustment valve) **ZS-33-2JS** Panel mount adapter S, Panel mount adapter B, Panel, Mounting bracket

∗ Options are shipped together with the product but do not come assembled.

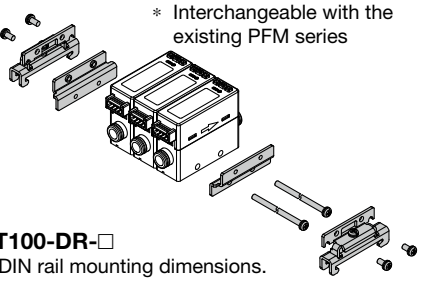
DIN Rail Mounting Bracket (To Be Ordered Separately)

ZS – 33 – R 3

Stations

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

∗ Interchangeable with the existing PFM series



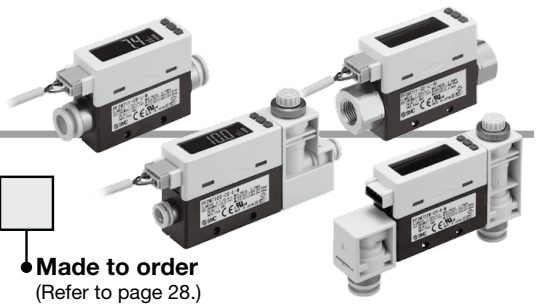
DIN rail part number: AXT100-DR-□

∗ Refer to page 27 for the DIN rail mounting dimensions.

IO-Link

2-Color Display **Digital Flow Switch**

PF2M7-L Series



How to Order

PF2M 7 10 ❶ ❷ – C6 ❸ – L ❹ ❺ – M ❻ ❼ ❽ – ●

- 7: Integrated display
- ●: Made to order (Refer to page 28.)

❶ Rated flow range

01	0.01 to 1 L/min	**25**	0.2 to 25 L/min
02	0.02 to 2 L/min	**50**	0.5 to 50 L/min
05	0.05 to 5 L/min	**11**	1 to 100 L/min
10	0.1 to 10 L/min	**21**	2 to 200 L/min

❷ Flow adjustment valve/Piping entry direction

Symbol	Flow adjustment valve	Piping entry direction	Rated flow range 1	2	5	10	25	50	100	200
Nil	None	Straight	●	●	●	●	●	●	●	●
S	Yes	Straight	–	–	●	●	●	●	●	●
L	None	Rear ported	●	●	●	●	●	●	●	●
W	Yes	Rear ported	–	–	●	●	●	●	●	●

∗ 1 and 2 L/min type products are not available with a flow adjustment valve.

❸ Port size

Symbol	Port size	Rated flow range 1	2	5	10	25	50	100	200
01	Rc1/8	●	●	●	●	●	●	–	–
N1	NPT1/8	●	●	●	●	●	●	–	–
F1	G1/8	●	●	●	●	●	●	–	–
02	Rc1/4	–	–	–	–	–	–	●	●
N2	NPT1/4	–	–	–	–	–	–	●	●
F2	G1/4	–	–	–	–	–	–	●	●
C4∗1	ø4	●	●	●	●	–	–	–	–
C6	ø6	●	●	●	●	●	●	–	–
C8	ø8	–	–	–	–	–	–	●	●
N7	ø1/4"	–	–	–	–	●	●	●	●

∗1 Made to order (Produced upon receipt of order)

Piping variations

With One-touch fitting	Female thread
C4∗2**, C6, C8, N7**	**01, 02, N1, N2, F1, F2**
Straight	Straight
Rear ported	Rear ported

∗2 Made to order (Produced upon receipt of order)

❹ Output specification

Symbol	OUT1	OUT2
L	IO-Link/ NPN/PNP	–
L2	IO-Link/ NPN/PNP	NPN/PNP/External input
L3	IO-Link/ NPN/PNP	Analog 1 to 5 V ⇔ Analog 0 to 10 V∗3
L4	IO-Link/ NPN/PNP	Analog 4 to 20 mA

∗3 1 to 5 V or 0 to 10 V can be selected by pressing the button. The default setting is 1 to 5 V.

❻ Unit specification

M	SI unit only∗4
Nil	Unit selection function∗5

∗4 Fixed unit: Instantaneous flow: L/min Accumulated flow: L

∗5 This product is for overseas use only. (The SI unit type is provided for use in Japan in accordance with the New Measurement Act.) The unit can be changed. Instantaneous flow: L/min ⇔ cfm Accumulated flow: L ⇔ ft³

❺ Option 1

Nil	W
Lead wire with connector (2 m)	Lead wire with connector (2 m) + Connector cover (Silicone rubber)
ZS-33-D	ZS-33-F + ZS-33-D
∗ Interchangeable with the existing PFM7 series	∗ Interchangeable with the existing PFM7 series
N	**Q**
Without lead wire with connector	M12 conversion lead wire (0.1 m)

❼ Option 2

Nil	R	S
Without bracket	Bracket (For the type without a flow adjustment valve) **ZS-33-M** With 2 tapping screws ∗ Interchangeable with the existing PFM series	Bracket (For the type with a flow adjustment valve) **ZS-33-MS** With 3 tapping screws ∗ Interchangeable with the existing PFM series

T	V
Panel mount adapter (For the type without a flow adjustment valve) **ZS-33-2J** Panel mount adapter, Panel mount adapter B, Panel, Mounting bracket	Panel mount adapter (For the type with a flow adjustment valve) **ZS-33-2JS** Panel mount adapter S, Panel mount adapter B, Panel, Mounting bracket

∗ Options are shipped together with the product but do not come assembled.

❽ Calibration certificate∗6

Nil	None
A	Yes

∗6 Made to order
The certificate is in both English and Japanese.

Made to Order

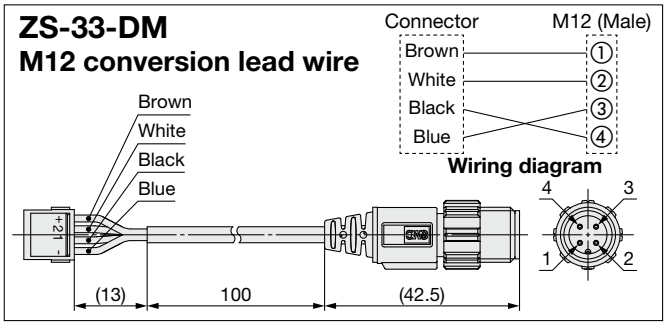
Symbol	Specification
X731	Compatible with argon (Ar) and carbon dioxide (CO_2) mixed gas

For details, refer to page 28.

DIN Rail Mounting Bracket (To Be Ordered Separately)

Refer to page 11.

ZS-33-DM
M12 conversion lead wire



For flow switch precautions and specific product precautions, refer to the “Operation Manual” on the SMC website.

Specifications

Model			PF2M701	PF2M702	PF2M705	PF2M710	PF2M725	PF2M750	PF2M711	PF2M721
Fluid	Applicable fluid*1		Dry air, N_2, Ar, CO_2 (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 (Main flow type)		Thermal type (Bypass flow type)					
	Rated flow range [L/min]	Dry air, N_2, Ar	0.01 to 1	0.02 to 2	0.05 to 5	0.1 to 10	0.3 to 25	0.5 to 50	1 to 100	2 to 200
		CO_2	0.01 to 0.5	0.02 to 1	0.05 to 2.5	0.1 to 5	0.3 to 12.5	0.5 to 25	1 to 50	2 to 100
	Set point range	Instantaneous flow [L/min]	–0.05 to 1.05	–0.1 to 2.1	–0.25 to 5.25	–0.5 to 10.5	–1.3 to 26.3	–2.5 to 52.5	–5 to 105	–10 to 210
		Accumulated flow [L]	0.00 to 9999999.99		0.0 to 99999999.9		0 to 999999999			
	Smallest settable increment	Instantaneous flow [L/min]	0.001	0.01			0.1			1
		Accumulated flow [L]	0.01		0.1		1			
	Accumulated volume per pulse [L/pulse]		0.01			0.1			1	
	Accumulated value hold function*2		Intervals of 2 or 5 minutes can be selected.							
Pressure	Operating pressure range		–0.1 to 0.75 MPa							
	Rated pressure range*3		–0.07 to 0.75 MPa							
	Proof pressure		1.0 MPa							
	Pressure loss		Refer to the “Pressure Loss” graph.							
	Pressure characteristics		±5% F.S. ±1 digit (0.35 MPa standard)							
Electrical	Power supply voltage*4	For the switch output device	12 to 24 VDC ±10%							
		For the IO-Link device	18 to 30 VDC ±10%							
	Current consumption		35 mA or less							
	Protection		Polarity protection							
Accuracy*5	Display accuracy		±3% F.S. ±1 digit							
	Analog output accuracy		±3% F.S.							
	Repeatability		±1% F.S. ±1 digit (±2% F.S. ±1 digit when the digital filter is set to 0.05 s)							
	Temperature characteristics		±3% F.S. ±1 digit (15 to 35°C: 25°C standard) ±5% F.S. ±1 digit (0 to 50°C: 25°C standard)							
Switch output	Output type		NPN/PNP open collector							
	Output mode		Select from Hysteresis, Window comparator, Accumulated output, Accumulated pulse output, Error output, or Switch output OFF modes.							
	Switch operation		Select from Normal or Reversed output.							
	Max. load current		80 mA							
	Max. applied voltage	Standard	28 VDC (NPN only)							
		IO-Link compatible	30 VDC (NPN only)							
	Internal voltage drop	Standard	NPN: 1 V or less (Load current: 80 mA) PNP: 1.5 V or less (Load current: 80 mA)							
		IO-Link compatible	1.5 V or less (Load current: 80 mA)							
	Response time*6		50 ms or less							
	Delay time*7		Select from 0 to 0.10 s (increment of 0.01 s), 0.1 to 1.0 s (increment of 0.1 s), 1 to 10 s (increment of 1 s), 20 s, 30 s, 40 s, 50 s, or 60 s.							
	Hysteresis*8		Variable from 0							
	Protection		Short circuit protection							
Analog output*9	Output type		Voltage output: 1 to 5 V, 0 to 10 V (only when the power supply voltage is 24 VDC)*10, Current output: 4 to 20 mA							
	Impedance	Voltage output	Output impedance: Approx. 1 kΩ							
		Current output	Maximum load impedance: 600 Ω at power supply voltage of 24 V, 300 Ω at power supply voltage of 12 V							
	Response time*6		50 ms ±40%							
Display	Reference condition*11		Select from Standard condition (STD) or Normal condition (NOR).							
	Display mode		Select from Instantaneous flow or Accumulated flow.							
	Unit*12	Instantaneous flow	L/min, cfm							
		Accumulated flow	L, ft^3							
	Display range	Instantaneous flow [L/min]	–0.05 to 1.05	–0.1 to 2.1	–0.25 to 5.25	–0.5 to 10.5	–1.3 to 26.3	–2.5 to 52.5	–5 to 105	–10 to 210
		Zero cut-off range	0 to ±10% F.S. (Select per 1% F.S. for the maximum rated flow rate.)							
		Accumulated flow [L]*13	0.00 to 9999999.99		0.0 to 99999999.9		0 to 999999999			
	Display		LCD, Color: Red/Green, 4 digits, 7 segments							
	Indicator LED		LED ON when switch output is ON (OUT1/2: Orange)							
Digital filter*14			Select from 0.05 s, 0.1 s, 0.5 s, 1 s, 2 s, or 5 s.							
Environmental resistance	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		Operating: 0 to 50°C, Stored: –10 to 60°C (No condensation or freezing)							
	Operating humidity range		Operating/Stored: 35 to 85% RH (No condensation or freezing)							
Standards			CE/UKCA marking, UL (CSA)							
Piping*15	Piping specification	One-touch fitting	C4 (ø4)/C6 (ø6)				C6 (ø6)/N7 (ø1/4")		C8 (ø8)/N7 (ø1/4")	
		Screw-in (Rc, NPT, G)	01 (Rc1/8)/N1 (NPT1/8)/F1 (G1/8)						02 (Rc1/4)/N2 (NPT1/4)/F2 (G1/4)	
	Piping entry direction		Straight, Rear							
Main materials of parts in contact with fluid			PPS, PBT, FKM, Stainless steel 304, Brass (Electroless nickel plating), Si, Au, GE4F							
Weight	Body	One-touch fitting	Straight: 40 g Rear: 55 g						Straight: 48 g Rear: 63 g	
		Screw-in	Straight: 60 g Rear: 75 g						Straight: 72 g (G1/4: 117 g) Rear: 87 g (G1/4: 132 g)	
	Flow adjustment valve		—		+34 g					
	Lead wire		+35 g							
	Bracket		+20 g							
	Panel mount adapter		+15 g							
	DIN rail mounting bracket		+65 g							

∗1 Refer to the “Recommended pneumatic circuit examples” on page 2.
∗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 3.7 million times. 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 3.7 million = 18.5 million min = 35 years
- 2 min interval: life is calculated as 2 min x 3.7 million = 7.4 million min = 14 years

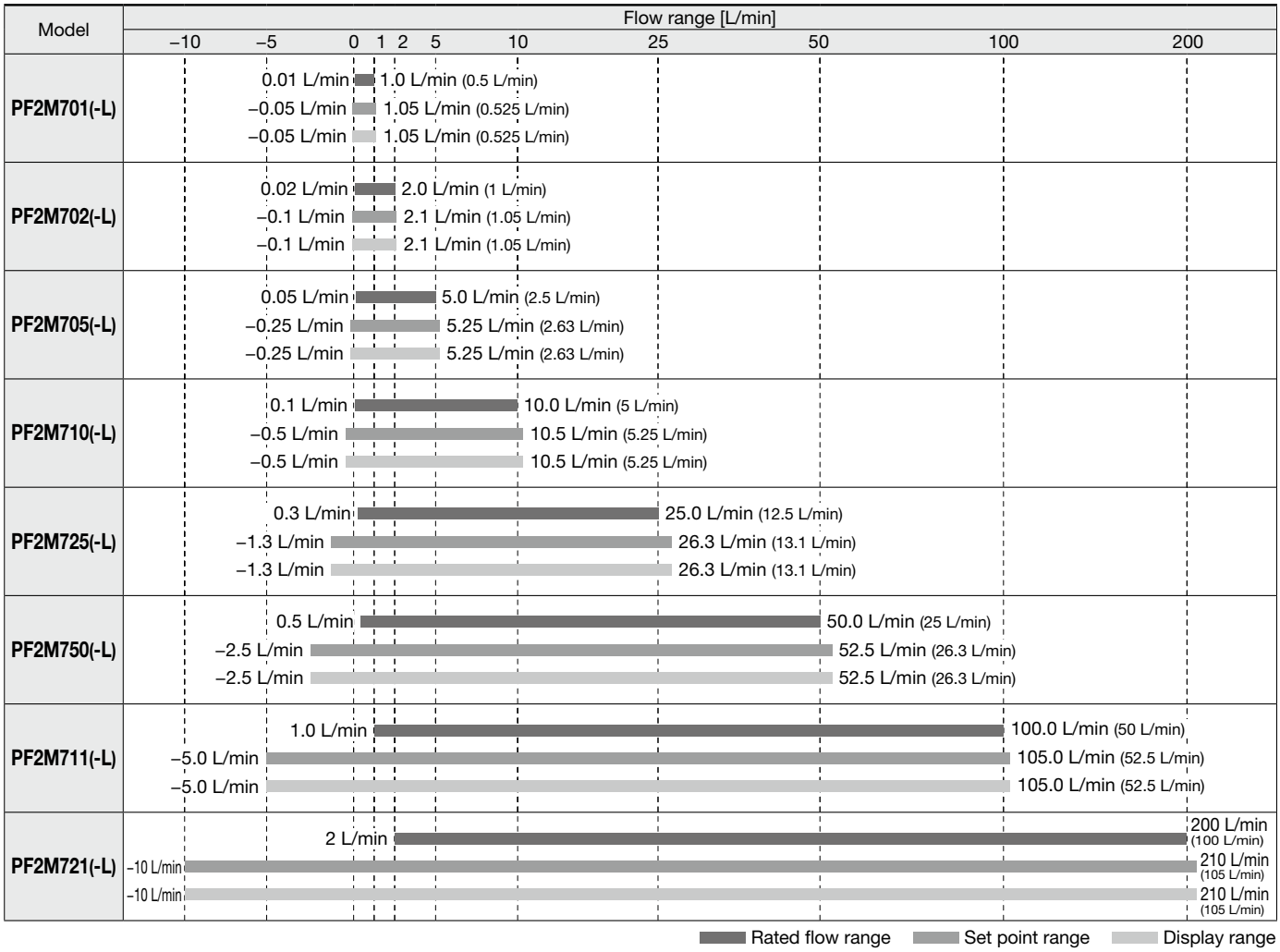
∗3 Negative pressure indicates the pressure value on the IN side (inlet side).
∗4 When multiple products are installed closely, the upper limit of the power supply voltage is 24 VDC.
∗5 The accuracy value is based on dry air as a fluid. For other fluids, it is a reference value.
∗6 Value when the digital filter is set at 0.05 s
∗7 The time from when the instantaneous flow reaches the set value to when the switch output operates can be set.
∗8 If the flow fluctuates around the set value, the hysteresis must be set to a value more than the fluctuating width. Otherwise, chattering will occur.
∗9 When using a product with an analog output
∗10 When selecting 0 to 10 V, refer to the analog output graph for the allowable load current.
∗11 Standard condition (STD): 20 [°C], 101.3 [kPa] (Absolute pressure), 65 [% RH] (The flow rate given in the specifications is the value under standard conditions.)
Normal condition (NOR): 0 [°C], 101.3 [kPa] (Absolute pressure), 0 [% RH]
∗12 Setting is only possible for models with the unit selection function.
∗13 Power value is displayed for accumulated flow. The first 4 digits of the measurement value are always displayed.
∗14 The time for the digital filter can be set to the sensor input. The response time indicates when the set value is 90% in relation to the step input.
∗15 Check the precautions for One-touch fitting before use. When the piping condition is changed, for example due to piping on the back of the product, use a general purpose fitting (KQ□L series). Some piping conditions may have negative effects on the flow accuracy.
∗ Products with tiny scratches, marks, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Communication Specifications (IO-Link mode)

IO-Link type	Device
IO-Link version	V1.1
Communication speed	COM2 (38.4 kbps)
Minimum cycle time	3.4 ms
Process data length	Input data: 4 bytes, Output data: 0 byte
On request data communication	Yes
Data storage function	Yes
Event function	Yes
Vendor ID	131 (0 x 0083)
Device ID	PF2M701-□-L□-□□□ : 0 x 00016D (365) PF2M701-□-L2□-□□□: 0 x 00016E (366) PF2M701-□-L3□-□□□: 0 x 00016F (367) PF2M701-□-L4□-□□□: 0 x 000170 (368) PF2M702-□-L□-□□□ : 0 x 000171 (369) PF2M702-□-L2□-□□□: 0 x 000172 (370) PF2M702-□-L3□-□□□: 0 x 000173 (371) PF2M702-□-L4□-□□□: 0 x 000174 (372) PF2M705-□-L□-□□□ : 0 x 000175 (373) PF2M705-□-L2□-□□□: 0 x 000176 (374) PF2M705-□-L3□-□□□: 0 x 000177 (375) PF2M705-□-L4□-□□□: 0 x 000178 (376) PF2M710-□-L□-□□□ : 0 x 000179 (377) PF2M710-□-L2□-□□□: 0 x 00017A (378) PF2M710-□-L3□-□□□: 0 x 00017B (379) PF2M710-□-L4□-□□□: 0 x 00017C (380) PF2M725-□-L□-□□□ : 0 x 00017D (381) PF2M725-□-L2□-□□□: 0 x 00017E (382) PF2M725-□-L3□-□□□: 0 x 00017F (383) PF2M725-□-L4□-□□□: 0 x 000180 (384) PF2M750-□-L□-□□□ : 0 x 000181 (385) PF2M750-□-L2□-□□□: 0 x 000182 (386) PF2M750-□-L3□-□□□: 0 x 000183 (387) PF2M750-□-L4□-□□□: 0 x 000184 (388) PF2M711-□-L□-□□□ : 0 x 000185 (389) PF2M711-□-L2□-□□□: 0 x 000186 (390) PF2M711-□-L3□-□□□: 0 x 000187 (391) PF2M711-□-L4□-□□□: 0 x 000188 (392) PF2M721-□-L□-□□□ : 0 x 00023B (571) PF2M721-□-L2□-□□□ : 0 x 00023C (572) PF2M721-□-L3□-□□□ : 0 x 00023D (573) PF2M721-□-L4□-□□□ : 0 x 00023E (574)

Set Point Range and Rated Flow Range

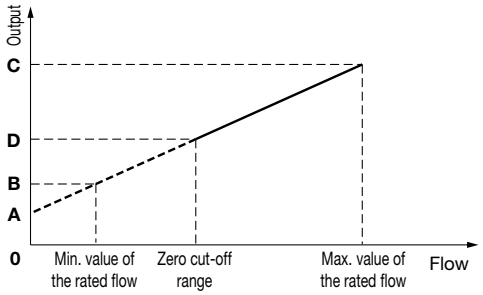
Set the flow rate within the rated flow range.
The set point range is the range of flow rate that can be set in the switch.
The rated flow range is the range that satisfies the switch specifications (accuracy, linearity, etc.).
It is possible to set a value outside of the rated flow range if it is within the set point range, however, the satisfaction of specifications can not be guaranteed. The flow range if using CO_2 is given in brackets.

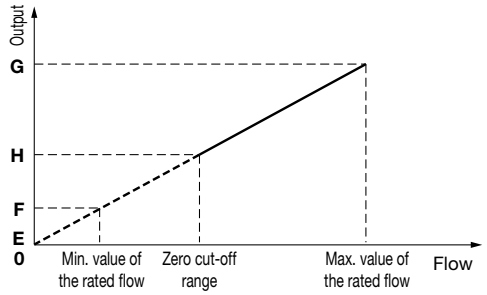


Flow/Analog Output

	A	B		C
		PF2M701/02/05/10/50/11/21(-L)	PF2M725(-L)	
Voltage output (1 to 5 V)	1 V	1.04 V	1.05 V	5 V
Current output (4 to 20 mA)	4 mA	4.16 mA	4.19 mA	20 mA

	E	F		G
		PF2M701/02/05/10/50/11/21(-L)	PF2M725(-L)	
Voltage output (0 to 10 V)*1	0 V	0.10 V	0.12 V	10 V





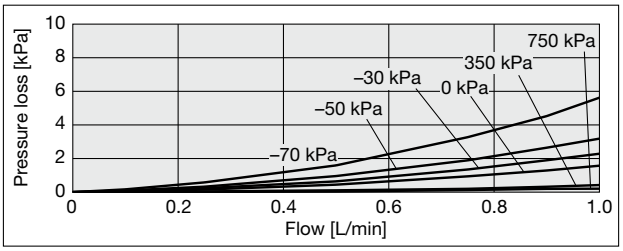
*1 The analog output current from the connected equipment should be 20 μA or less when selecting 0 to 10 V.
When 20 μA or more current flows, it is possible that the accuracy is not satisfied at less than or equal to 0.5 V.

* D or H fluctuates depending on the setting of the zero cut-off function.
When the zero cut-off function is set to "0," the flow rate display value starts from 0 L/min., but in conditions other than horizontal installation and supply pressure of 0.35 MPa, the output may not be 0 L/min.

Pressure Loss (Reference Data): Without Flow Adjustment Valve

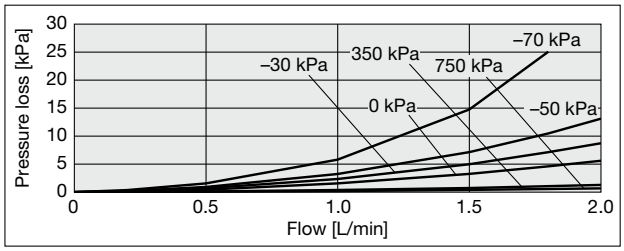
PF2M701(-L)

1 L/min



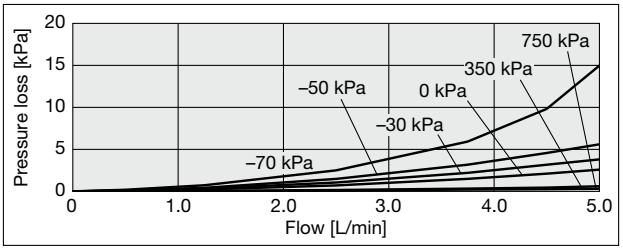
PF2M702(-L)

2 L/min



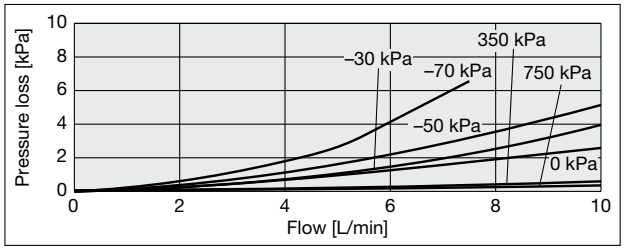
PF2M705(-L)

5 L/min



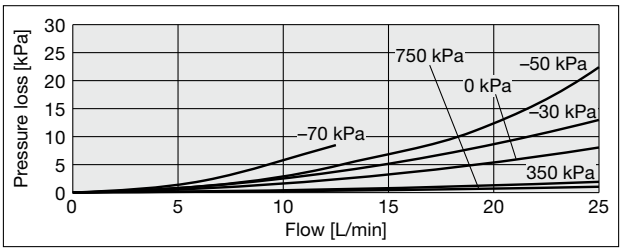
PF2M710(-L)

10 L/min



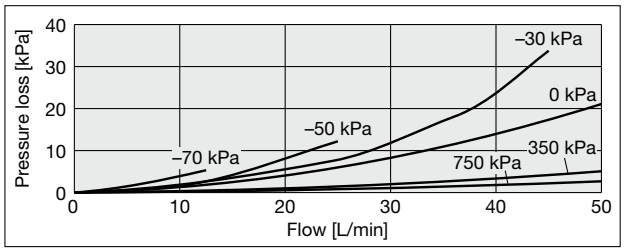
PF2M725(-L)

25 L/min



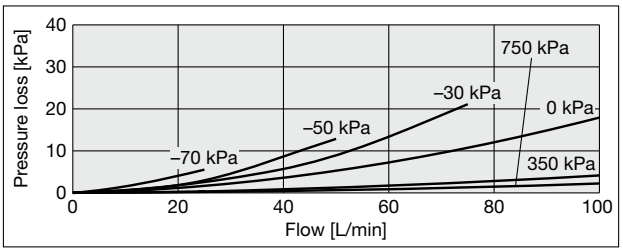
PF2M750(-L)

50 L/min



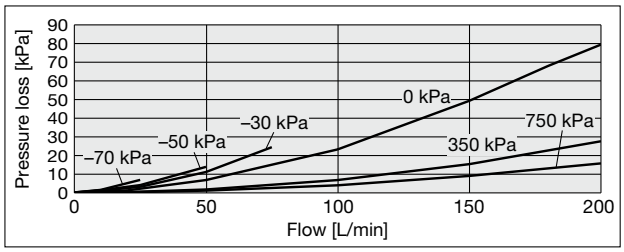
PF2M711(-L)

100 L/min



PF2M721(-L)

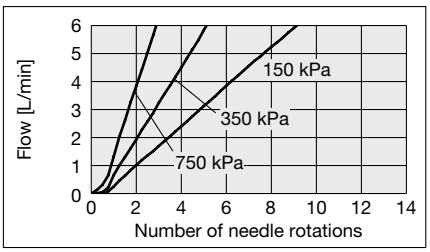
200 L/min



Flow Rate Characteristics (Reference Data)

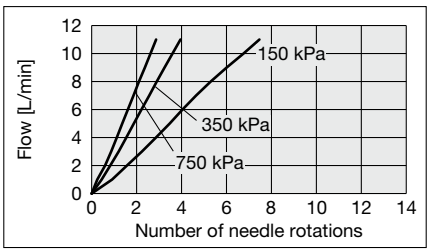
PF2M705(-L)

5 L/min



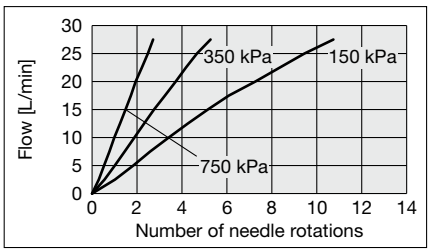
PF2M710(-L)

10 L/min



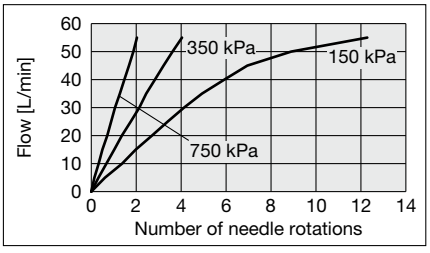
PF2M725(-L)

25 L/min



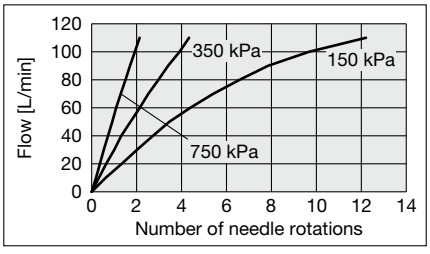
PF2M750(-L)

50 L/min



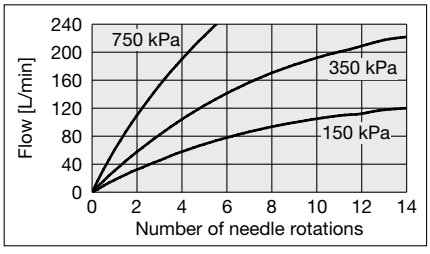
PF2M711(-L)

100 L/min



PF2M721(-L)

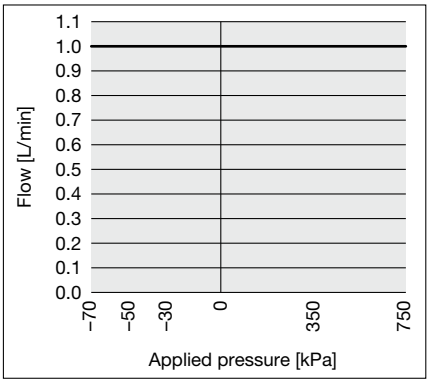
200 L/min



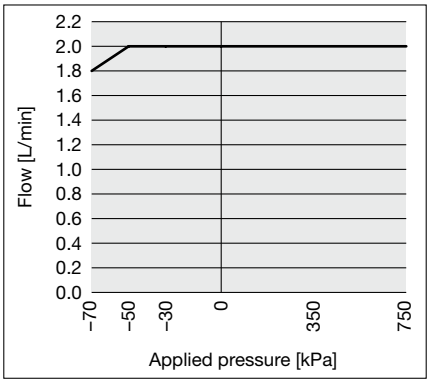
Flow Rate Characteristics at Negative Pressure (Reference Data)

When the PF2M series is used with negative pressure (–70 to 0 kPa), the measurable range (warranty range of the specifications including pressure characteristics) varies depending on the flow range.
Select the flow range referring to the graph below.

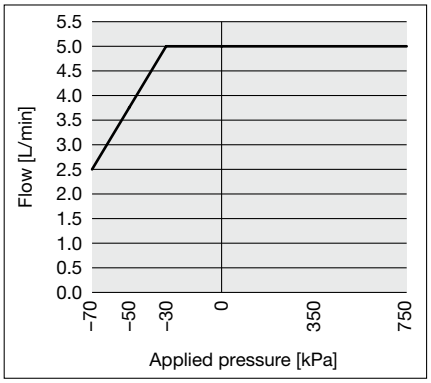
PF2M701(-L) 1 L/min



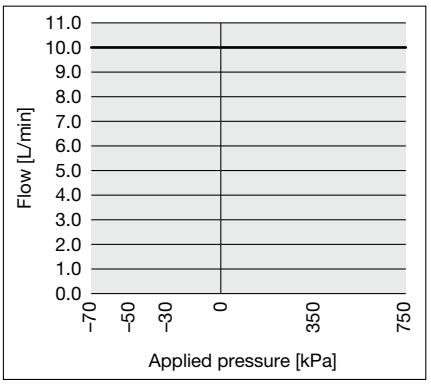
PF2M702(-L) 2 L/min



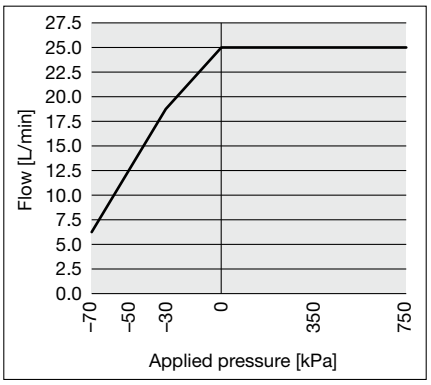
PF2M705(-L) 5 L/min



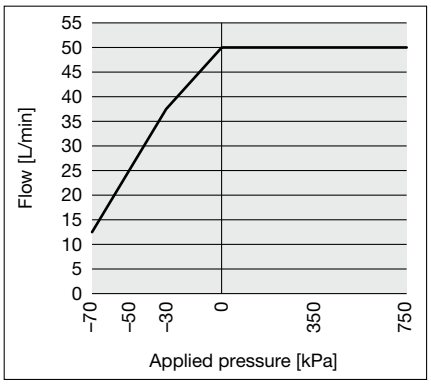
PF2M710(-L) 10 L/min



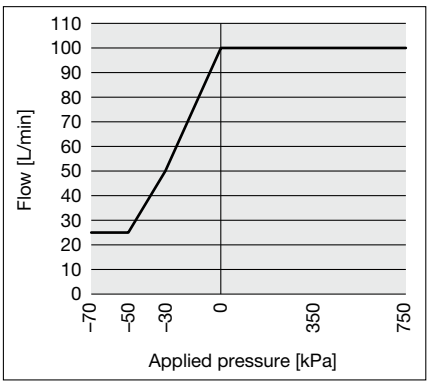
PF2M725(-L) 25 L/min



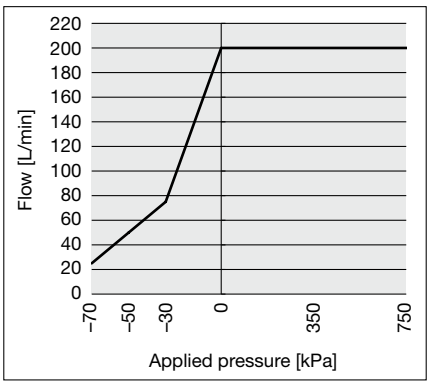
PF2M750(-L) 50 L/min



PF2M711(-L) 100 L/min

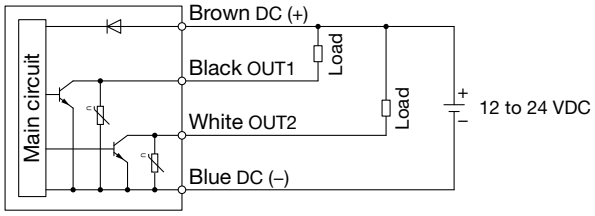


PF2M721(-L) 200 L/min



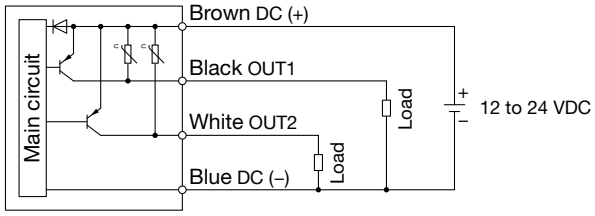
Internal Circuits and Wiring Examples

NPN + NPN output type
PF2M7□□-□-A□-□□□



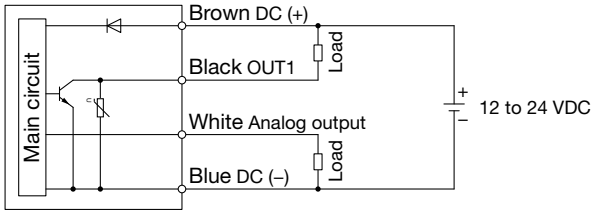
Max. applied voltage: 28 V, Max. load current: 80 mA,
Internal voltage drop: 1 V or less

PNP + PNP output type
PF2M7□□-□-B□-□□□



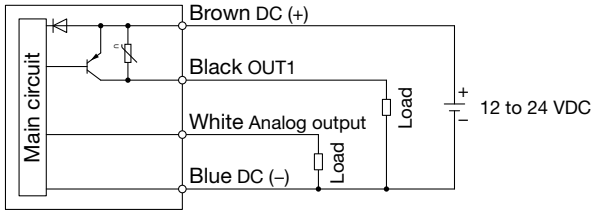
Max. load current: 80 mA, Internal voltage drop: 1.5 V or less

NPN + Analog output type
PF2M7□□-□-C/D□-□□□



Max. applied voltage: 28 V, Max. load current: 80 mA,
Internal voltage drop: 1 V or less
C: Analog output: 1 to 5 V or 0 to 10 V can be selected.
Output impedance: 1 kΩ
D: Analog output: 4 to 20 mA
Load impedance: 50 to 600 Ω

PNP + Analog output type
PF2M7□□-□-E/F□-□□□

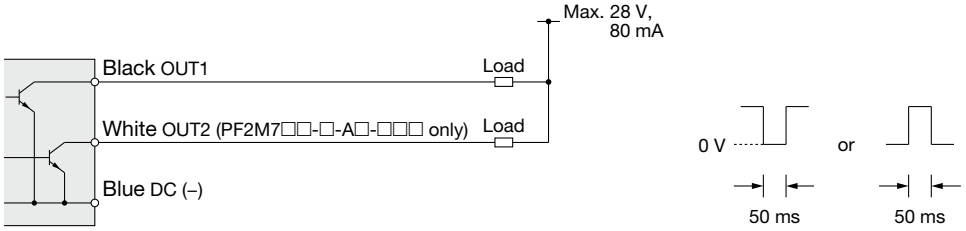


Max. load current: 80 mA, Internal voltage drop: 1.5 V or less
E: Analog output: 1 to 5 V or 0 to 10 V can be selected.
Output impedance: 1 kΩ
F: Analog output: 4 to 20 mA
Load impedance: 50 to 600 Ω

Accumulated pulse output wiring examples

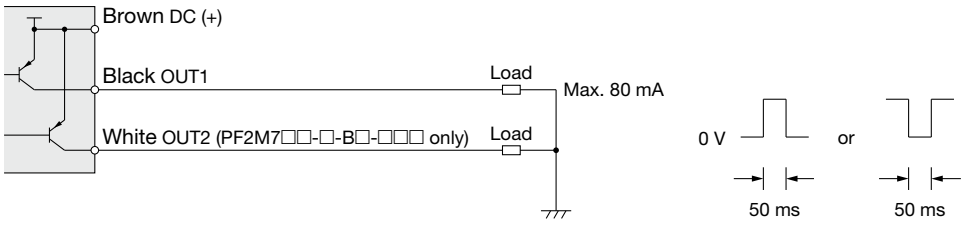
NPN + NPN output type
PF2M7□□-□-A□-□□□

NPN + Analog output type
PF2M7□□-□-C□-□□□
PF2M7□□-□-D□-□□□



PNP + PNP output type
PF2M7□□-□-B□-□□□

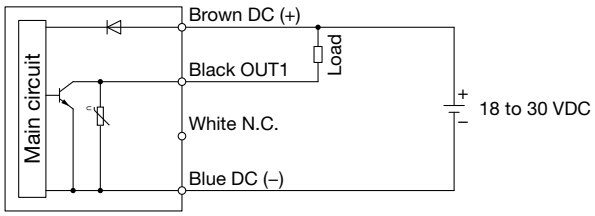
PNP + Analog output type
PF2M7□□-□-E□-□□□
PF2M7□□-□-F□-□□□



Internal Circuits and Wiring Examples

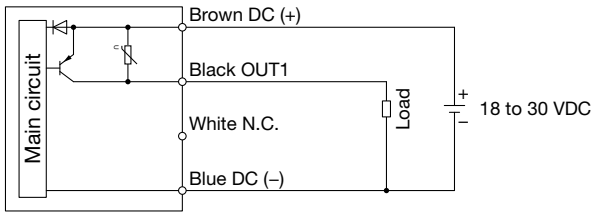
PF2M7□□-□-L□-□□□

NPN output type



Max. applied voltage: 30 V, Max. load current: 80 mA,
Internal voltage drop: 1.5 V or less

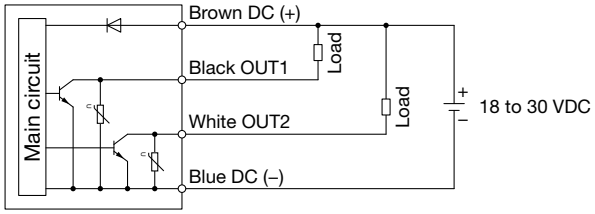
PNP output type



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

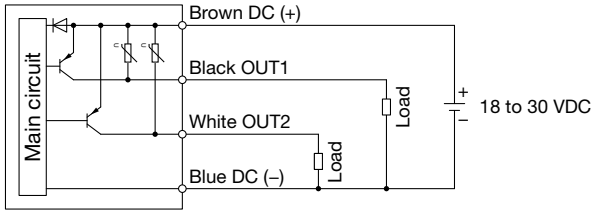
PF2M7□□-□-L2□-□□□

NPN 2 output type



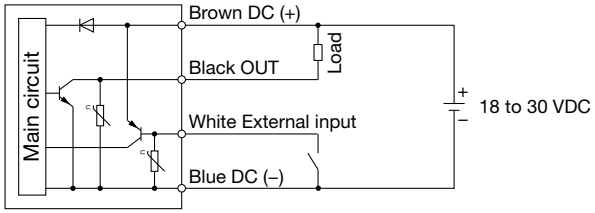
Max. applied voltage: 30 V, Max. load current: 80 mA,
Internal voltage drop: 1.5 V or less

PNP 2 output type



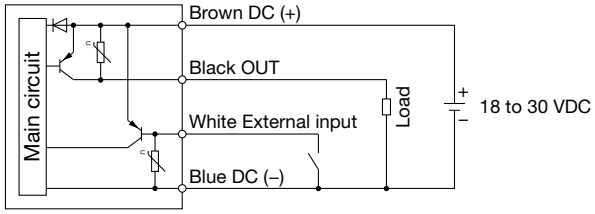
Max. load current: 80 mA, Internal voltage drop: 1.5 V or less

NPN + External input type



Max. applied voltage: 30 V, Max. load current: 80 mA,
Internal voltage drop: 1.5 V or less

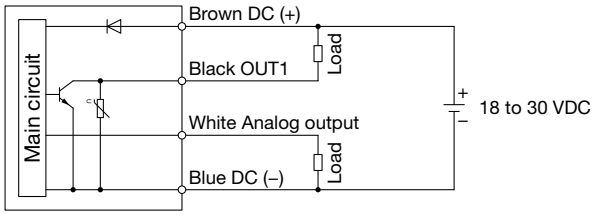
PNP + External input type



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

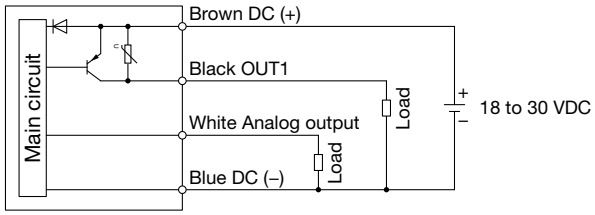
PF2M7□□-□-L3/4□-□□□

L3: NPN + Analog voltage output type
L4: NPN + Analog current output type



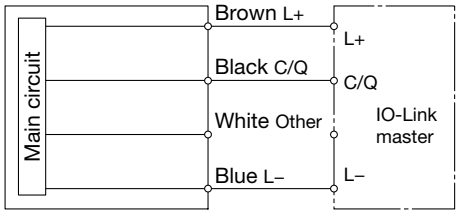
Max. applied voltage: 30 V, Max. load current: 80 mA,
Internal voltage drop: 1.5 V or less
L3: Analog output: 1 to 5 V or 0 to 10 V can be selected.
Output impedance: 1 kΩ
L4: Analog output: 4 to 20 mA
Load impedance: 50 to 600 Ω

L3: PNP + Analog voltage output type
L4: PNP + Analog current output type



Max. load current: 80 mA, Internal voltage drop: 1.5 V or less
L3: Analog output: 1 to 5 V or 0 to 10 V can be selected.
Output impedance: 1 kΩ
L4: Analog output: 4 to 20 mA
Load impedance: 50 to 600 Ω

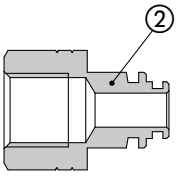
When used as an IO-Link device

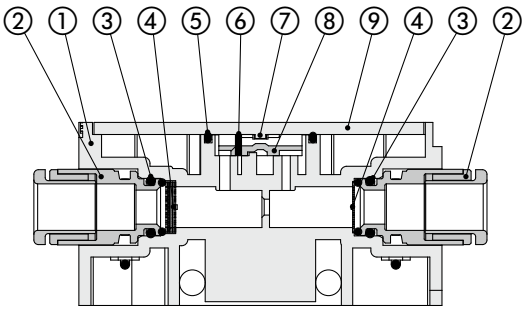


Construction: Parts in Contact with Fluid

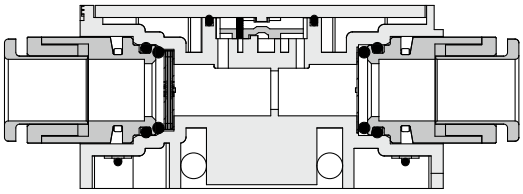
PF2M701/702/705/710/725/750/711(-L)

Female thread



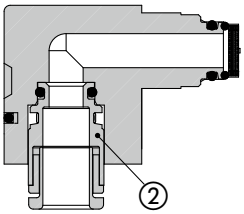


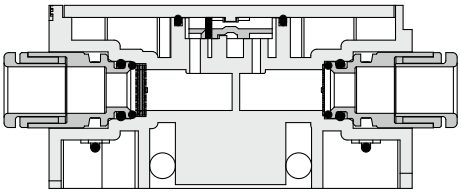
PF2M705/710/725/750-C4/C6(-L)



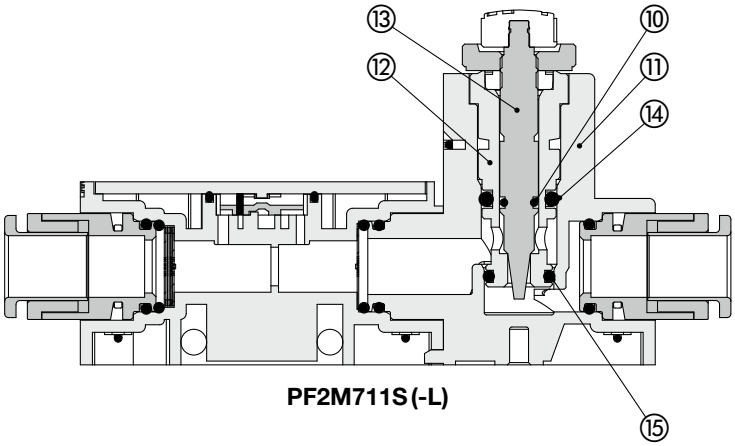
PF2M711/721-C8(-L)

Rear ported





PF2M701/702(-L)



PF2M711S(-L)

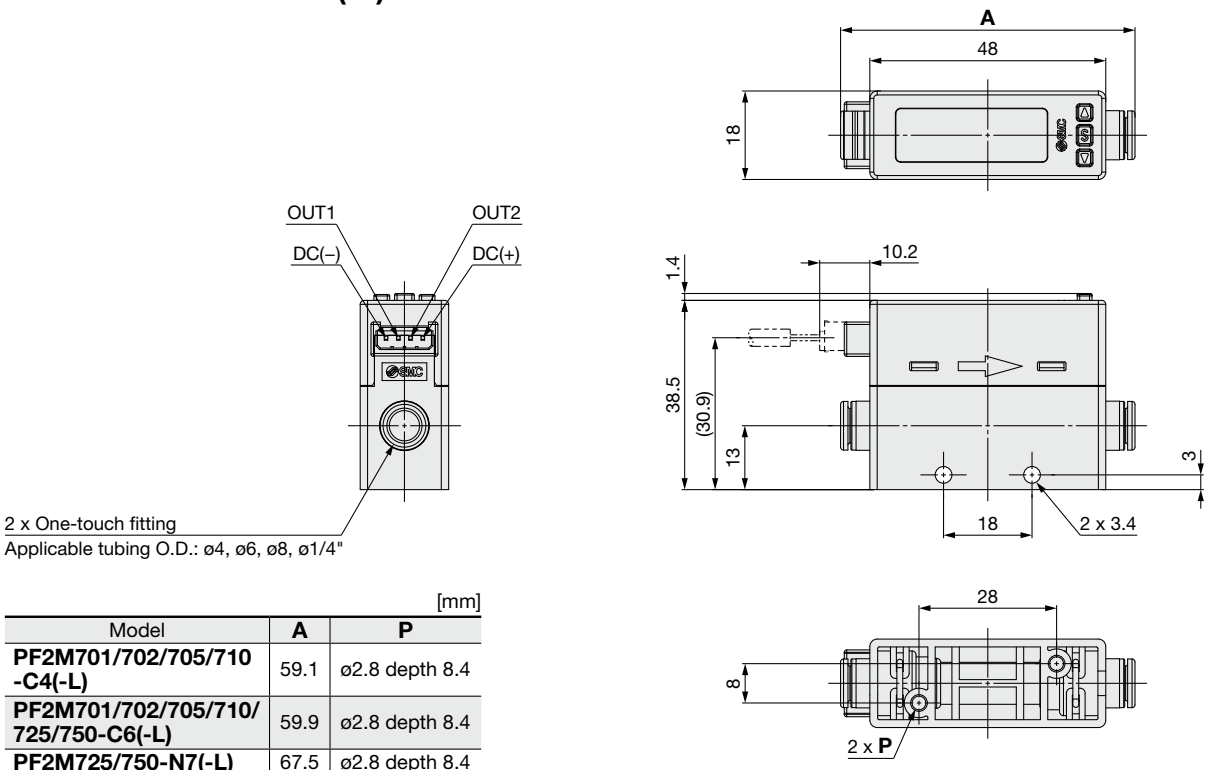
∗ There is no bypass construction for the 1 and 2 L ranges.

Component Parts

No.	Description	Material	Note
1	**Body**	PPS	
2	**Fitting for piping**	Brass	Electroless nickel plating
3	**O-ring**	FKM	
4	**Flow rectifier**	Stainless steel 304	
5	**Seal**	FKM	
6	**Flow rectifier**	Stainless steel 304	
7	**Sensor chip**	Silicon	
8	**Body B**	PPS	
9	**Printed circuit board**	GE4F	
10	**O-ring**	FKM	Fluoro coating
11	**Flow adjustment valve body**	PBT	
12	**Body**	Brass	Electroless nickel plating
13	**Needle**	Brass	Electroless nickel plating
14	**O-ring**	FKM	Fluoro coating
15	**O-ring**	FKM	Fluoro coating

Dimensions

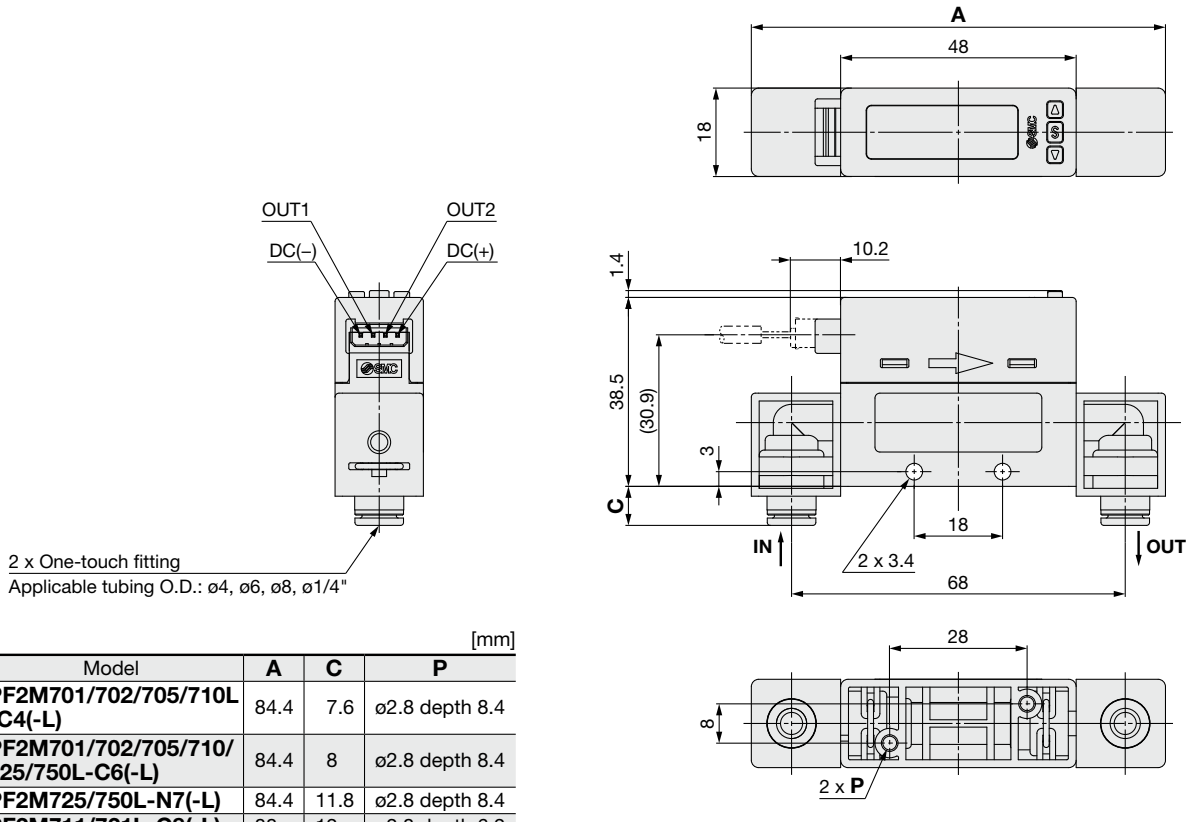
PF2M7□-C4/C6/C8/N7(-L)



[mm]

Model	A	P
PF2M701/702/705/710 -C4(-L)	59.1	ø2.8 depth 8.4
PF2M701/702/705/710/ 725/750-C6(-L)	59.9	ø2.8 depth 8.4
PF2M725/750-N7(-L)	67.5	ø2.8 depth 8.4
PF2M711/721-C8(-L)	68	ø2.8 depth 6.2
PF2M711/721-N7(-L)	64.6	ø2.8 depth 6.2

PF2M7□L-C4/C6/C8/N7(-L)

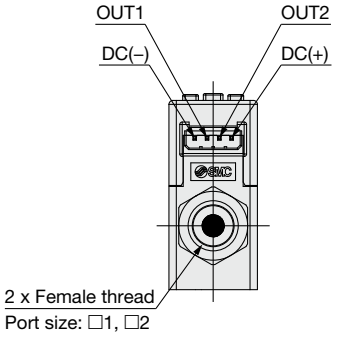


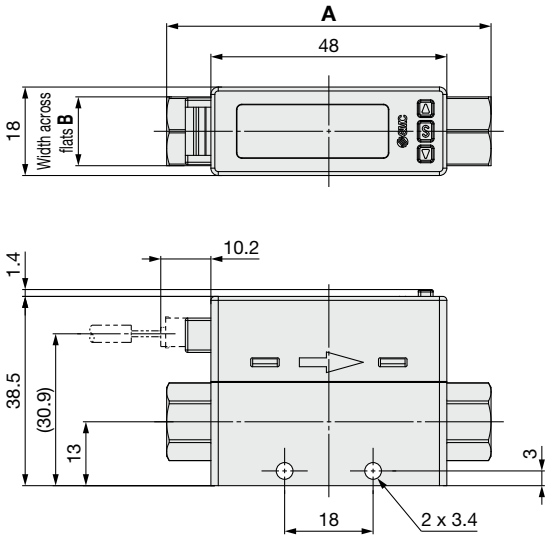
[mm]

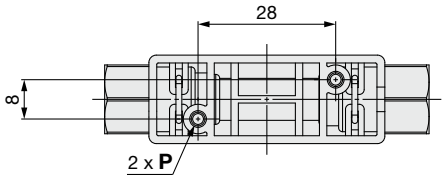
Model	A	C	P
PF2M701/702/705/710L -C4(-L)	84.4	7.6	ø2.8 depth 8.4
PF2M701/702/705/710/ 725/750L-C6(-L)	84.4	8	ø2.8 depth 8.4
PF2M725/750L-N7(-L)	84.4	11.8	ø2.8 depth 8.4
PF2M711/721L-C8(-L)	88	12	ø2.8 depth 6.2
PF2M711/721L-N7(-L)	88	10.3	ø2.8 depth 6.2

Dimensions

PF2M7□-□1/2(-L)



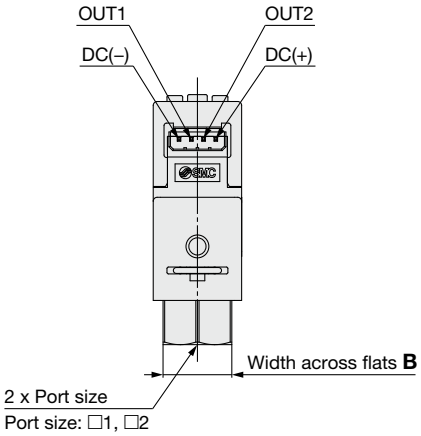


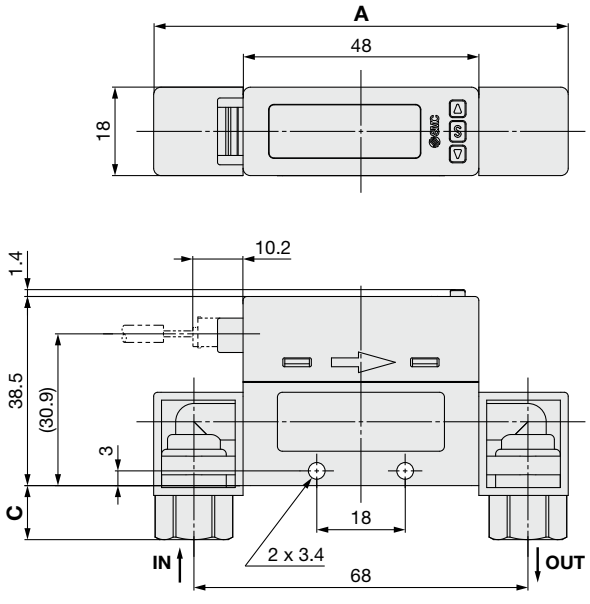


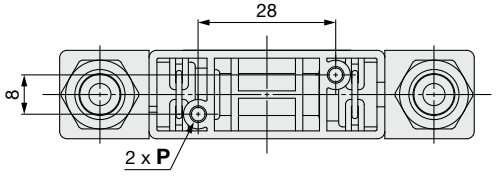
[mm]

Model	A	B	P
PF2M701/702/705/710/725/750-01(-L)	66	14	ø2.8 depth 8.4
PF2M701/702/705/710/725/750-N1(-L)	68	14	ø2.8 depth 8.4
PF2M701/702/705/710/725/750-F1(-L)	70	14	ø2.8 depth 8.4
PF2M711/721-02(-L)	70	17	ø2.8 depth 6.2
PF2M711/721-N2(-L)	70	17	ø2.8 depth 6.2
PF2M711/721-F2(-L)	78	21	ø2.8 depth 6.2

PF2M□L-□1/2(-L)





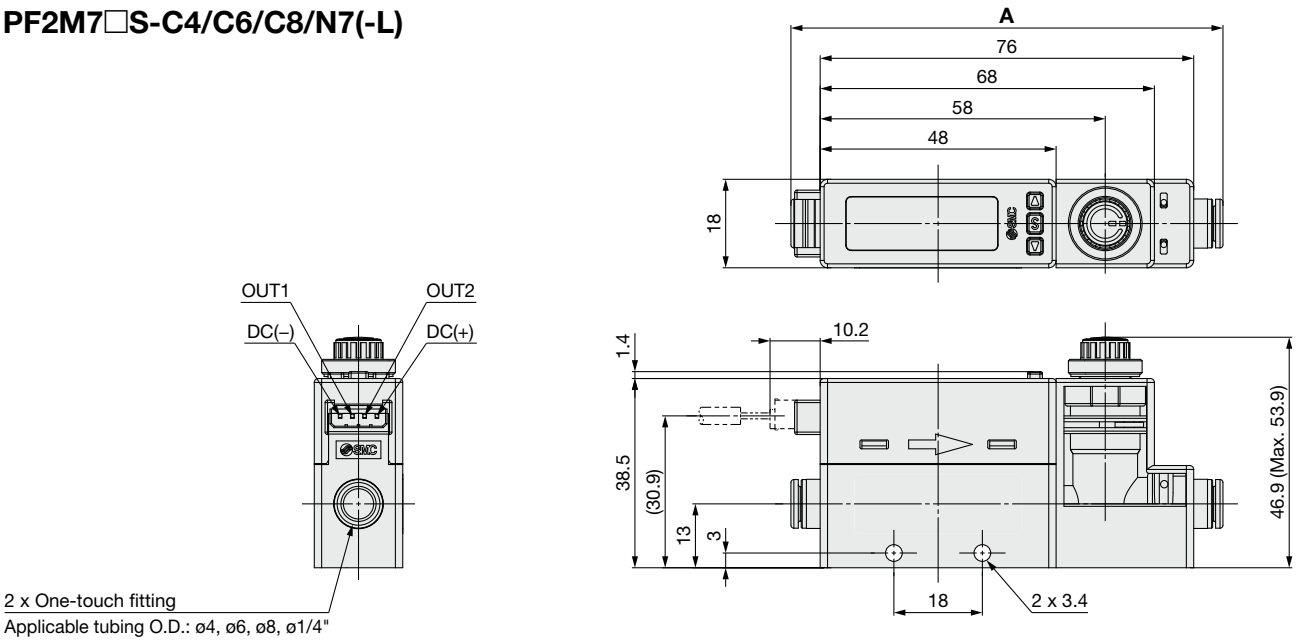


[mm]

Model	A	C	B	P
PF2M701/702/705/710/725/750L-01(-L)	84.4	11	14	ø2.8 depth 8.4
PF2M701/702/705/710/725/750L-N1(-L)	84.4	12	14	ø2.8 depth 8.4
PF2M701/702/705/710/725/750L-F1(-L)	84.4	13	14	ø2.8 depth 8.4
PF2M711/721L-02(-L)	88	13	17	ø2.8 depth 6.2
PF2M711/721L-N2(-L)	88	13	17	ø2.8 depth 6.2
PF2M711/721L-F2(-L)	88	17	21	ø2.8 depth 6.2

Dimensions

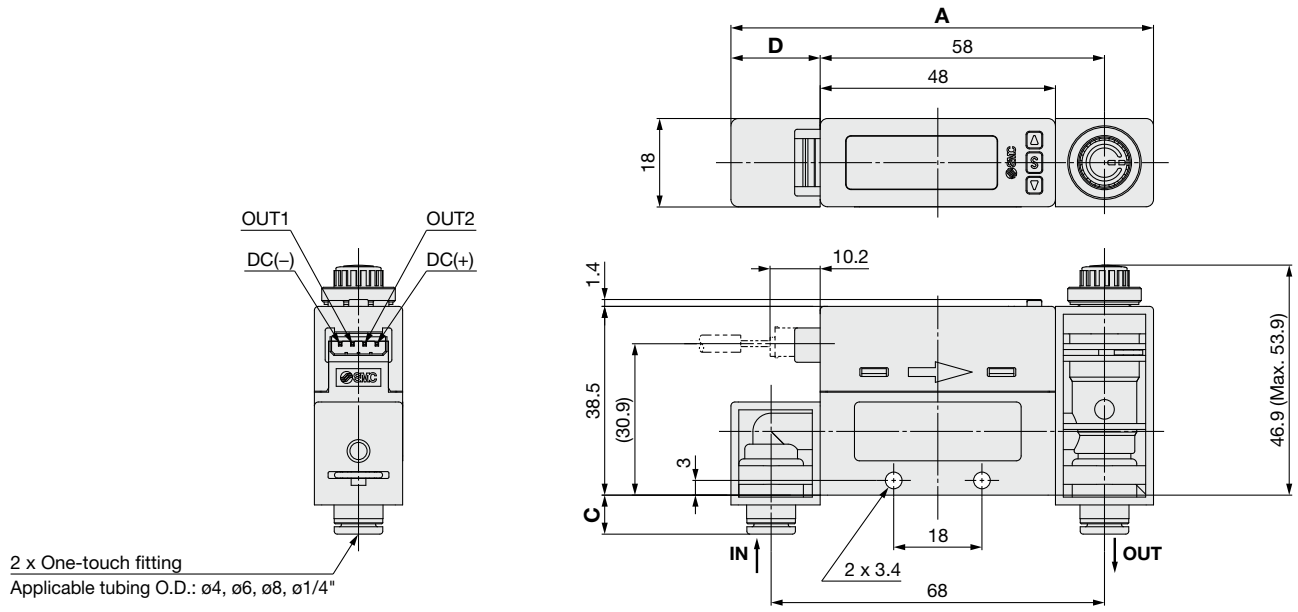
PF2M7□S-C4/C6/C8/N7(-L)



[mm]

Model	A	P	Q
PF2M705/710S-C4(-L)	87.1	ø2.8 depth 8.4	ø2.5 depth 6
PF2M705/710/725/750S-C6(-L)	87.9	ø2.8 depth 8.4	ø2.5 depth 6
PF2M725/750S-N7(-L)	95.5	ø2.8 depth 8.4	ø2.5 depth 6
PF2M711/721S-C8(-L)	96	ø2.8 depth 6.2	ø2.5 depth 5
PF2M711/721S-N7(-L)	92.6	ø2.8 depth 6.2	ø2.5 depth 5

PF2M7□W-C4/C6/C8/N7(-L)

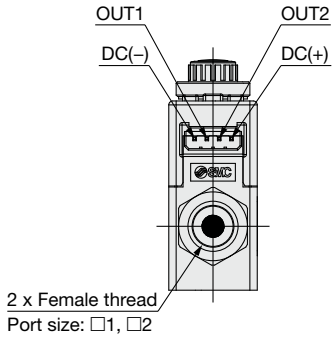


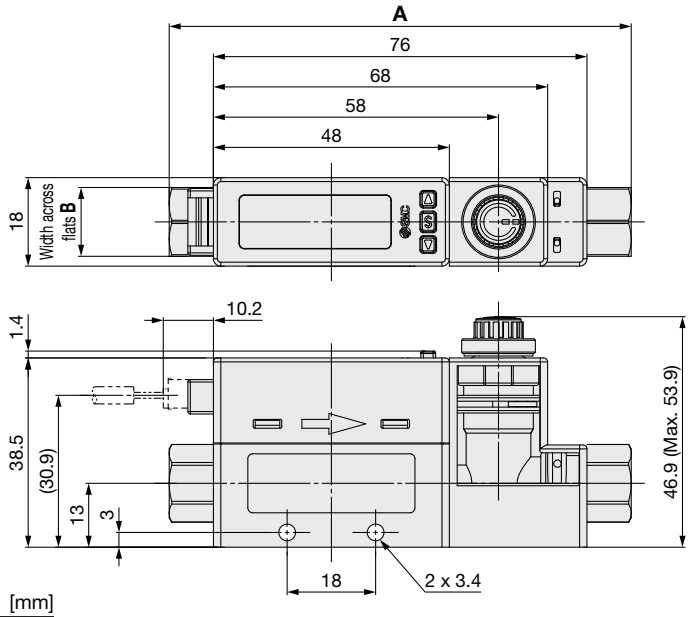
[mm]

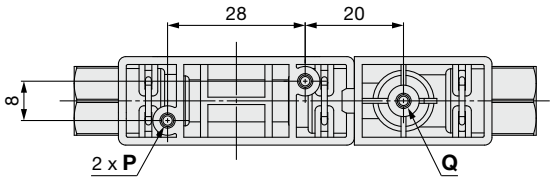
Model	A	C	D	P
PF2M705/710W-C4(-L)	86.2	7.6	18.2	ø2.8 depth 8.4
PF2M705/710/725/750W-C6(-L)	86.2	8	18.2	ø2.8 depth 8.4
PF2M725/750W-N7(-L)	86.2	11.8	18.2	ø2.8 depth 8.4
PF2M711/721W-C8(-L)	88	12	20	ø2.8 depth 6.2
PF2M711/721W-N7(-L)	88	10.3	20	ø2.8 depth 6.2

Dimensions

PF2M7□S-□1/2(-L)



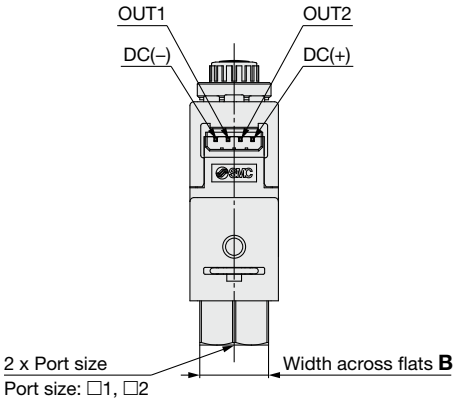


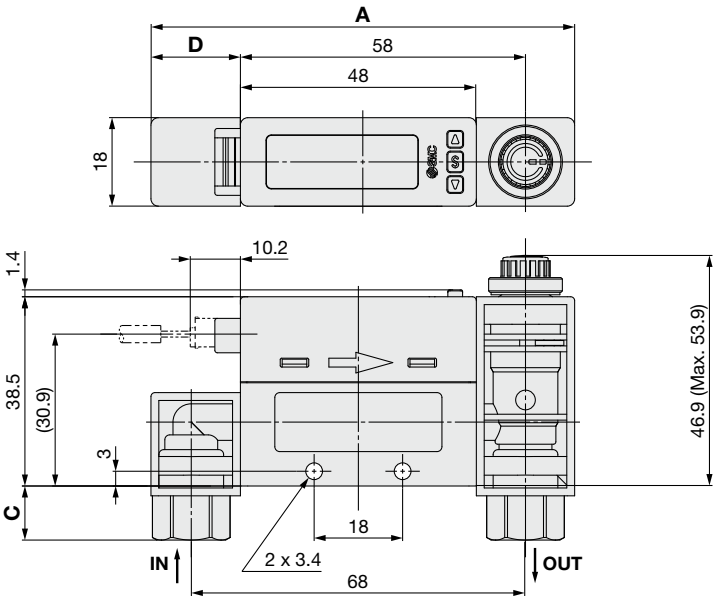


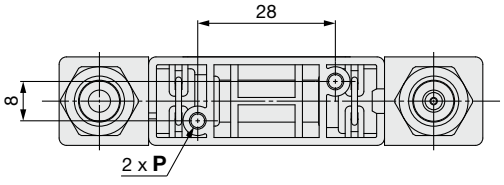
[mm]

Model	A	B	P	Q
PF2M705/710/725/750S-01(-L)	94	14	ø2.8 depth 8.4	ø2.5 depth 6
PF2M705/710/725/750S-N1(-L)	96	14	ø2.8 depth 8.4	ø2.5 depth 6
PF2M705/710/725/750S-F1(-L)	98	14	ø2.8 depth 8.4	ø2.5 depth 6
PF2M711/721S-02(-L)	98	17	ø2.8 depth 6.2	ø2.5 depth 5
PF2M711/721S-N2(-L)	98	17	ø2.8 depth 6.2	ø2.5 depth 5
PF2M711/721S-F2(-L)	106	21	ø2.8 depth 6.2	ø2.5 depth 5

PF2M7□W-□1/2(-L)







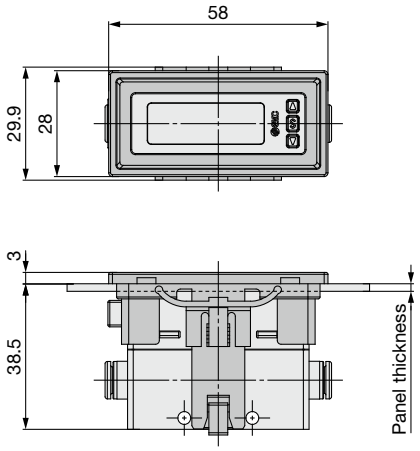
[mm]

Model	A	C	B	D	P
PF2M705/710/725/750W-01(-L)	86.2	11	14	18.2	ø2.8 depth 8.4
PF2M705/710/725/750W-N1(-L)	86.2	12	14	18.2	ø2.8 depth 8.4
PF2M705/710/725/750W-F1(-L)	86.2	13	14	18.2	ø2.8 depth 8.4
PF2M711/721W-02(-L)	88	13	17	20	ø2.8 depth 6.2
PF2M711/721W-N2(-L)	88	13	17	20	ø2.8 depth 6.2
PF2M711/721W-F2(-L)	88	17	21	20	ø2.8 depth 6.2

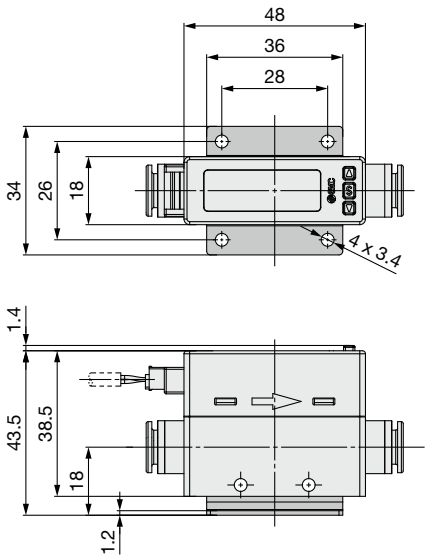
Dimensions

PF2M701/702/705/710/725/750/711/721(-L)

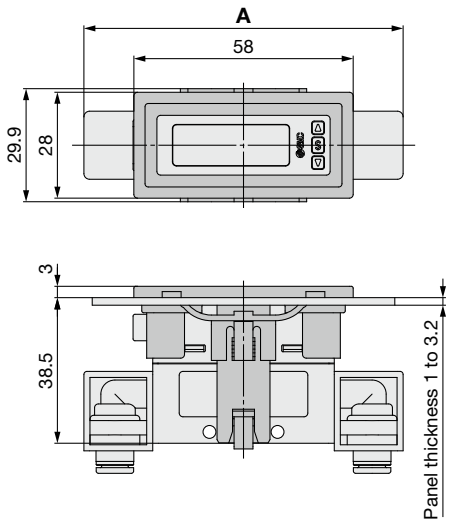
Panel mounting/Without flow adjustment valve/Straight



With bracket/Without flow adjustment valve



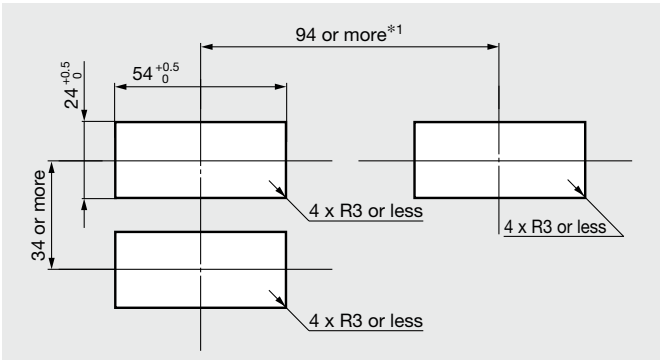
Panel mount adapter/Without flow adjustment valve



[mm]

Model	A
PF2M701/702/705/710/725/750L-□(-L)	84.4
PF2M711/721L-□(-L)	88

Panel Fitting Dimensions



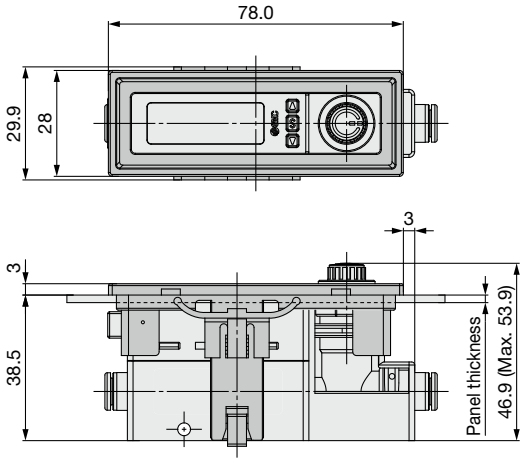
Panel thickness 1 to 3.2 mm

*1 This is the minimum value when the rear ported type is selected for the piping entry direction. For the straight type, please design the layout with consideration to the piping material and tubing length. If a bend (R) is used, limit it to R3 or less.

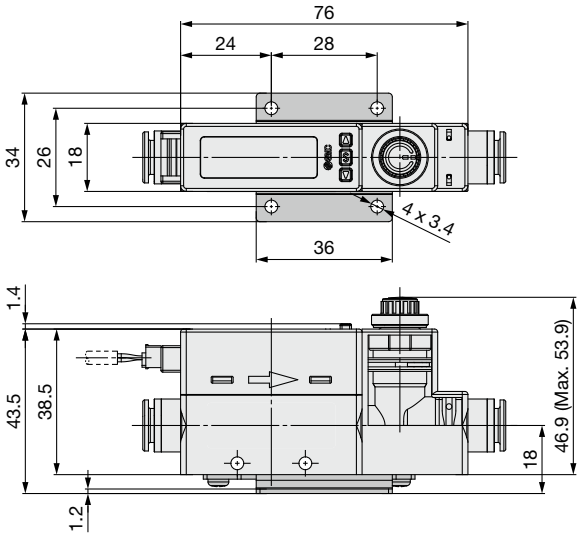
Dimensions

PF2M705/710/725/750/711/721(-L)

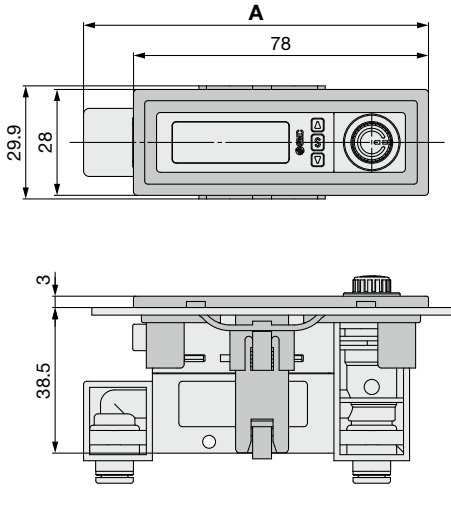
Panel mounting/With flow adjustment valve/Straight



With bracket/With flow adjustment valve



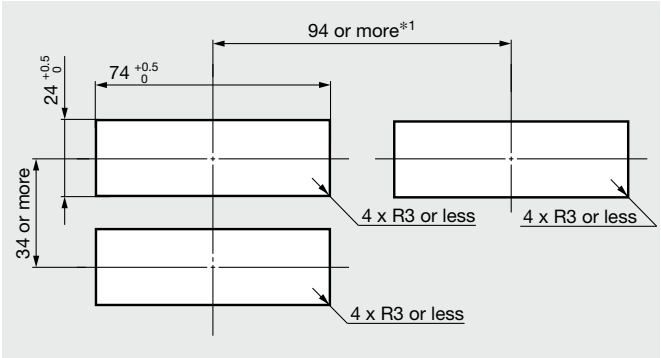
Panel mount adapter/With flow adjustment valve



[mm]

Model	A
PF2M705/710/725/750W-□(-L)	91.2
PF2M711/721W-□(-L)	93

Panel Fitting Dimensions



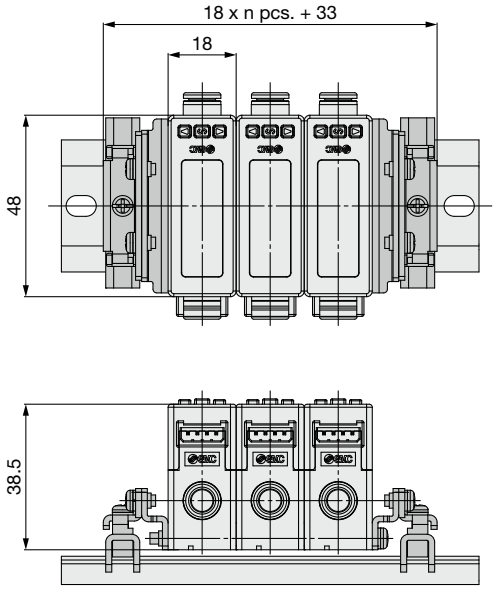
Panel thickness 1 to 3.2 mm

*1 This is the minimum value when the rear ported type is selected for the piping entry direction. For the straight type, please design the layout with consideration to the piping material and tubing length. If a bend (R) is used, limit it to R3 or less.

Dimensions

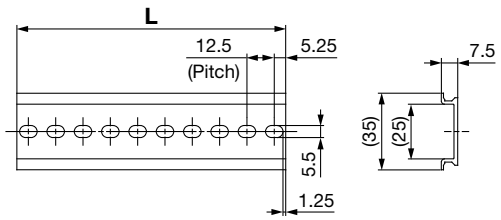
PF2M701/702/705/710/725/750/711/721(-L)

DIN rail mounting bracket
ZS-33-R□



DIN rail
AXT100-DR-□

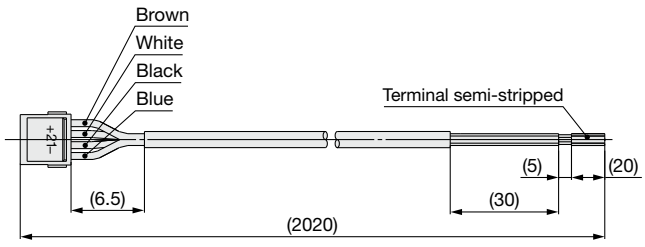
∗ For □, enter a number from the No. line in the table below.



L Dimensions [mm]

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
L	23	35.5	48	60.5	73	85.5	98	110.5	123	135.5	148	160.5	173	185.5	198	210.5	223	235.5	248	260.5

Lead wire with connector
ZS-33-D



Cable Specifications

Conductor	**Nominal cross section**	AWG 26
	Outside diameter	Approx. 0.50 mm
Insulator	**Outside diameter**	Approx. 1.00 mm
	Color	Brown, White, Black, Blue
Sheath	**Material**	Oil-resistant PVC
Finished outside diameter		ø3.5

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

PF2M7-L Series IO-Link Compatible Products

Made to Order

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

Made to Order

Compatible with Argon (Ar) and Carbon Dioxide (CO_2) Mixed Gas

Symbol **X731**

The argon–carbon dioxide gas ratio (Ar : CO_2) can be selected using the push-buttons from among the following: 92 : 8, 90 : 10, 80 : 20, 70 : 30, 60 : 40, 40 : 60, and 30 : 70. The dimensions are the same as those of the standard model.

PF2M 7 □□-□-L□-□□□-X731

7 Integrated display

Output specification

Symbol	OUT1	OUT2
L	IO-Link/NPN/PNP	—
L2	IO-Link/NPN/PNP	NPN/PNP/External input
L3	IO-Link/NPN/PNP	Analog 1 to 5 V ⇔ Analog 0 to 10 V
L4	IO-Link/NPN/PNP	Analog 4 to 20 mA

∗ Only applicable to the IO-Link output specification

For “How to Order,” refer to page 12.

Model	Gas ratio		Rated flow range	Display/Set point range	Max. analog output	
	Ar	CO_2			Voltage (Vmax)	Current (Imax)
PF2M701	92%	8%	0.01 to 1 L/min	–0.05 to 1.05 L/min	5 V	20 mA
	90%	10%				
	80%	20%				
	70%	30%				
	60%	40%				
	40%	60%	0.01 to 0.6 L/min	–0.03 to 0.63 L/min	5 V	20 mA
	30%	70%				
PF2M702	92%	8%	0.02 to 2 L/min	–0.1 to 2.1 L/min	5 V	20 mA
	90%	10%				
	80%	20%				
	70%	30%				
	60%	40%				
	40%	60%	0.02 to 1.2 L/min	–0.06 to 1.26 L/min	5 V	20 mA
	30%	70%				
PF2M705	92%	8%	0.05 to 5 L/min	–0.25 to 5.25 L/min	5 V	20 mA
	90%	10%				
	80%	20%				
	70%	30%				
	60%	40%				
	40%	60%	0.05 to 3 L/min	–0.15 to 3.15 L/min	5 V	20 mA
	30%	70%				
PF2M710	92%	8%	0.1 to 10 L/min	–0.5 to 10.5 L/min	5 V	20 mA
	90%	10%				
	80%	20%				
	70%	30%				
	60%	40%				
	40%	60%	0.1 to 6 L/min	–0.3 to 6.3 L/min	5 V	20 mA
	30%	70%				
PF2M725	92%	8%	0.3 to 25 L/min	–1.3 to 26.3 L/min	5 V	20 mA
	90%	10%				
	80%	20%				
	70%	30%				
	60%	40%				
	40%	60%	0.3 to 15 L/min	–0.8 to 15.8 L/min	5 V	20 mA
	30%	70%				
PF2M750	92%	8%	0.5 to 50 L/min	–2.5 to 52.5 L/min	5 V	20 mA
	90%	10%				
	80%	20%				
	70%	30%				
	60%	40%				
	40%	60%	0.5 to 30 L/min	–1.5 to 31.5 L/min	5 V	20 mA
	30%	70%				
PF2M711	92%	8%	1 to 100 L/min	–5 to 105 L/min	5 V	20 mA
	90%	10%				
	80%	20%				
	70%	30%				
	60%	40%				
	40%	60%	1 to 60 L/min	–3 to 63 L/min	5 V	20 mA
	30%	70%				

∗ When changing the max. analog output, use the analog free span function in the operation manual on the SMC website.

3-Screen Display

Digital Flow Monitor

PFGM302 Series

How to Order

PFGM 3 0 2 – RT – M – L □□ □ □

Type

3	Remote type monitor unit

Input specification

Symbol	Description	Applicable flow switch model
0	Voltage input	PF2M7□-C/E series
1	Current input	PF2M7□-D/F series

Output specification

RT	2 outputs (NPN/PNP switching type) + Analog voltage output*1, 2
SV	2 outputs (NPN/PNP switching type) + Analog current output*2
XY	2 outputs (NPN/PNP switching type) + Copy function

*1 Can switch between 1 to 5 V and 0 to 10 V

*2 Can be switched to external input or copy function

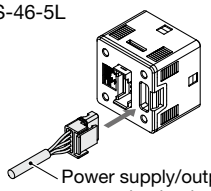
Unit specification

Nil	Units selection function*3
M	SI unit only*4

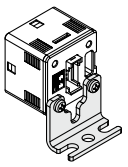
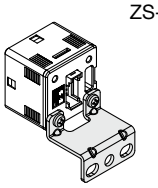
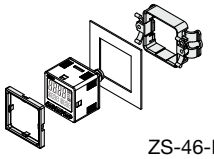
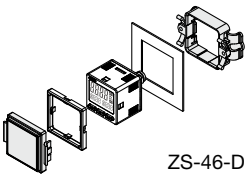
*3 This product is for overseas use only according to the New Measurement Act. (The SI unit type is provided for use in Japan.)

*4 Fixed unit: Instantaneous flow: L/min
Accumulated flow: L

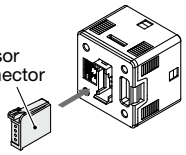
Option 1

Symbol	Description	
Nil	Without lead wire	
L	Power supply/output connection lead wire (Lead wire length: 2 m)	ZS-46-5L  Power supply/output connection lead wire

Option 2

Symbol	Description	
Nil	None	
A1	Bracket A (Vertical mounting)	ZS-46-A1 
A2	Bracket B (Horizontal mounting)	ZS-46-A2 
B	Panel mount adapter	 ZS-46-B
D	Panel mount adapter + Front protection cover	 ZS-46-D

Option 3

Nil	None
C	ZS-28-C-1  Sensor connector

Option 4

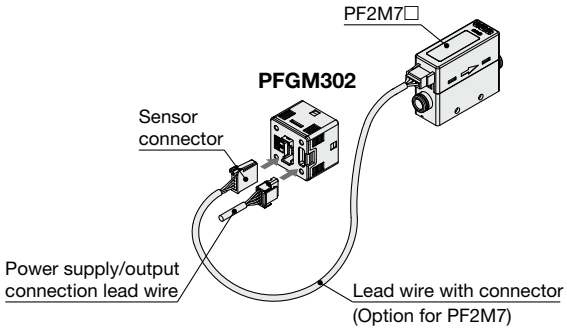
	Operation manual	Calibration certificate
Nil	○	–
Y	–	–
K	○	○
T	–	○

Options/Part Nos.

When only optional parts are required, order with the part numbers listed below.

Part no.	Option	Note
ZS-28-C-1	Sensor connector	For PF2M7
ZS-46-A1	Bracket A	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
ZS-46-A2	Bracket B	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
ZS-46-B	Panel mount adapter	
ZS-46-D	Panel mount adapter + Front protection cover	
ZS-46-5L	Power supply/output connection lead wire	5-core, 2 m
ZS-27-01	Front protection cover	

Connection Example



SMC

For flow switch precautions and specific product precautions, refer to the "Operation Manual" on the SMC website.

Specifications

Model			PFGM302 series							
Applicable SMC flow sensor	Model		PF2M701	PF2M702	PF2M705	PF2M710	PF2M725	PF2M750	PF2M711	PF2M721
	Rated flow range*1 [L/min]	Dry air, N_2, Ar	0.01 to 1	0.02 to 2	0.05 to 5	0.1 to 10	0.3 to 25	0.5 to 50	1 to 100	2 to 200
		CO_2	0.01 to 0.5	0.02 to 1	0.05 to 2.5	0.1 to 5	0.3 to 12.5	0.5 to 25	1 to 50	2 to 100
Flow	Set point range	Instantaneous flow [L/min]	−0.05 to 1.05	−0.1 to 2.1	−0.25 to 5.25	−0.5 to 10.5	−1.3 to 26.3	−2.5 to 52.5	−5 to 105	−10 to 210
		Accumulated flow [L]	0.00 to 9999999.99		0.0 to 99999999.9		0 to 999999999			
	Smallest settable increment	Instantaneous flow [L/min]	0.001	0.01			0.1			1
		Accumulated flow [L]	0.01		0.1		1			
	Accumulated volume per pulse [L/pulse]		0.01			0.1			1	
	Accumulated value hold function*2		Intervals of 2 or 5 minutes can be selected.							
Electrical	Power supply voltage		12 to 24 VDC ±10% or less							
	Current consumption		25 mA or less							
	Protection		Polarity protection							
Accuracy	Display accuracy		±0.5% F.S. ± Minimum display unit (Ambient temperature of 25°C)							
	Analog output accuracy		±0.5% F.S. (Ambient temperature of 25°C)							
	Repeatability		±0.1% F.S. ±1 digit							
	Temperature characteristics		±0.5% F.S. (Ambient temperature: 0 to 50°C, 25°C standard)							
Switch output	Output type		Select from PNP or NPN open collector output.							
	Output mode		Select from Hysteresis, Window comparator, Error output, Accumulated output, Accumulated pulse output, or Switch output OFF modes.							
	Switch operation		Select from Normal or Reversed output.							
	Max. load current		80 mA							
	Max. applied voltage		30 V (NPN output)							
	Internal voltage drop		NPN output: 1 V or less (at load current of 80 mA), PNP output: 1.5 V or less (at load current of 80 mA)							
	Response time*3		3 ms or less							
	Delay time*3		Select from 0.00, 0.05 to 0.10 s (increment of 0.01 s), 0.1 to 1.0 s (increment of 0.1 s), 1 to 10 s (increment of 1 s), 20 s, 30 s, 40 s, 50 s, or 60 s							
	Hysteresis*4		Variable from 0							
	Protection		Short circuit protection							
Analog output*5	Output type		Voltage output: 1 to 5 V (0 to 10 V can be selected only when the power supply voltage is 24 VDC.) Current output: 4 to 20 mA							
	Impedance	Voltage output	Output impedance: Approx. 1 kΩ							
		Current output	Maximum load impedance: 300 Ω (at power supply voltage of 12 VDC), 600 Ω (at power supply voltage of 24 VDC)							
	Response time*2		50 ms or less							
External input*6	External input type		Input voltage: 0.4 V or less (Reed or Solid state) for 30 ms or longer							
	Input mode		Select from Accumulated value external reset or Peak/Bottom value reset.							
Sensor input	Input type		Voltage input: 1 to 5 VDC (Input impedance: 1 MΩ), Current input: 4 to 20 mA DC (Input impedance: 51 Ω) (0 L/min to maximum value of the rated flow)							
	Connection method		Connector (e-CON)							
	Protection		Over voltage protection (Up to 26.4 VDC)							
Display	Display mode		Select from Instantaneous flow or Accumulated flow.							
	Unit*7	Instantaneous flow	L/min, cfm (ft^3/min)							
		Accumulated flow	L, ft^3							
	Display range	Instantaneous flow [L/min]	−0.05 to 1.05	−0.1 to 2.1	−0.25 to 5.25	−0.5 to 10.5	−1.3 to 26.3	−2.5 to 52.5	−5 to 105	−10 to 210
		Accumulated flow [L]	0.00 to 9999999.99		0.0 to 99999999.9		0 to 999999999			
	Minimum display unit	Instantaneous flow [L/min]	0.001	0.01			0.1			1
		Accumulated flow [L]	0.01		0.1		1			
	Display type		LCD							
	Number of displays		3-screen display (Main screen, Sub screen)							
	Display color		1) Main screen: Red/Green, 2) Sub screen: Orange							
	Number of display digits		1) Main screen: 5 digits (7 segments), 2) Sub screen: 9 digits (7 segments)							
	Indicator LED		LED ON when switch output is ON OUT1/2: Orange							
Digital filter*8			Select from 0, 0.05 to 0.10 s (increment of 0.01 s), 0.1 to 1.0 s (increment of 0.1 s), 1 to 10 s (increment of 1 s), 20 s, or 30 s							
Environmental resistance	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		Operating: 0 to 50°C, Stored: −10 to 60°C (No condensation or freezing)							
	Operating humidity range		Operating/Stored: 35 to 85% RH (No condensation or freezing)							
Standards			CE/UKCA marking							
Weight	Body		25 g (Excluding the power supply/output connection lead wire)							
	Lead wire with connector		+39 g							

∗1 Rated flow range of the applicable flow sensor

∗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 1.5 million times. 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 1.5 million = 7.5 million min = 14.3 years
- 2 min interval: life is calculated as 2 min x 1.5 million = 3 million min = 5.7 years

If the accumulated value external reset is repeatedly used, the product life will be shorter than the calculated life.

∗3 Value without digital filter (at 0 ms)

∗4 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.

∗5 Setting is only possible for models with analog output.

∗6 Setting is only possible for models with external input.

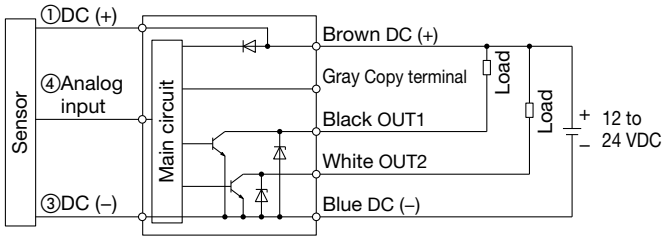
∗7 Setting is only possible for models with the units selection function.

∗8 The response time indicates when the set value is 90% in relation to the step input.

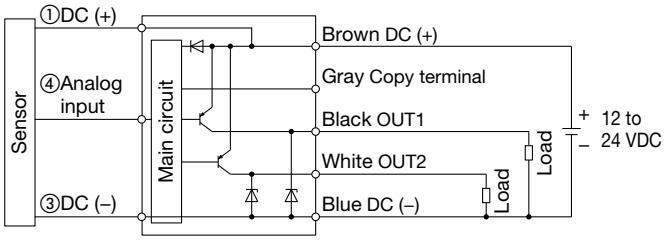
∗ Products with tiny scratches, marks, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Internal Circuits and Wiring Examples

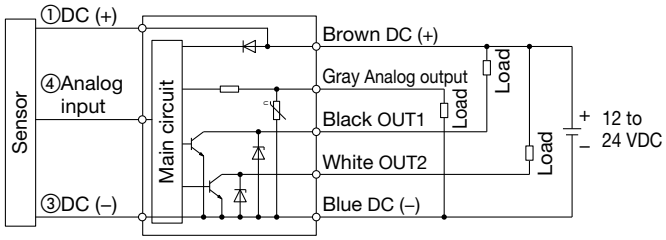
-XY
-RT
-SV
NPN (2 outputs) + Copy function



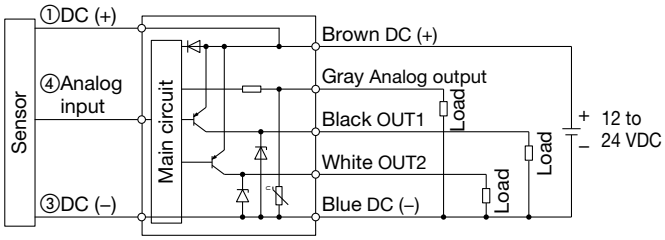
-XY
-RT
-SV
PNP (2 outputs) + Copy function



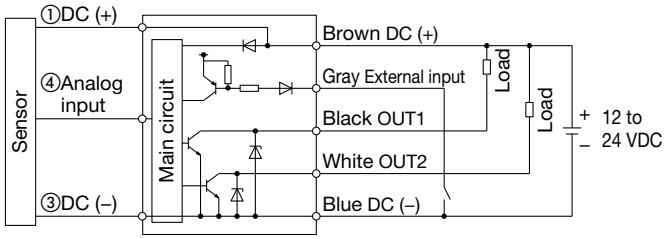
-RT: NPN (2 outputs) + Analog voltage output
-SV: NPN (2 outputs) + Analog current output



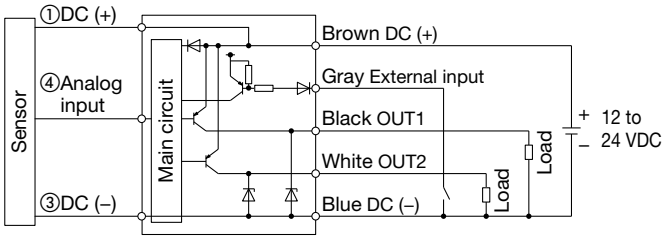
-RT: PNP (2 outputs) + Analog voltage output
-SV: PNP (2 outputs) + Analog current output



-RT: NPN (2 outputs) + External input
-SV: NPN (2 outputs) + External input

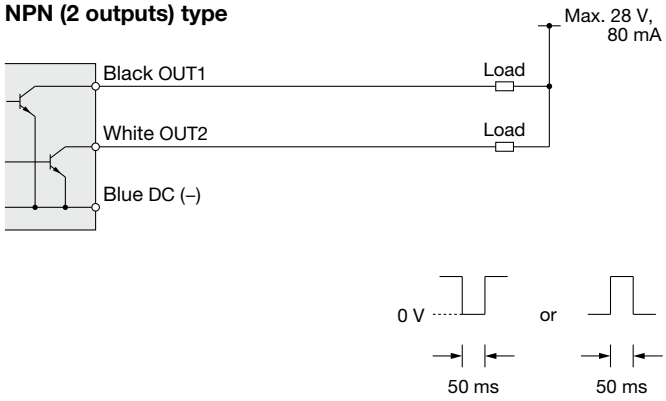


-RT: PNP (2 outputs) + External input
-SV: PNP (2 outputs) + External input

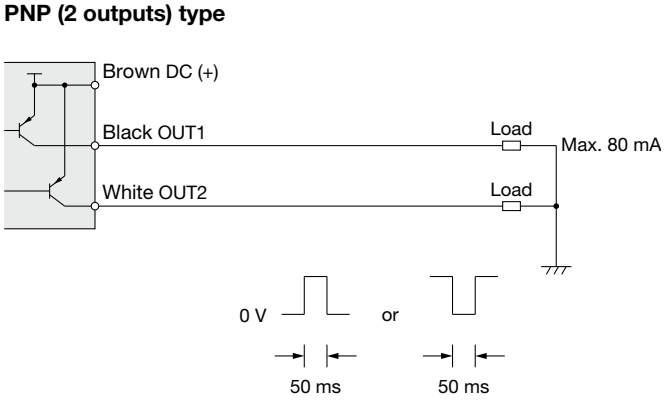


Accumulated pulse output wiring examples

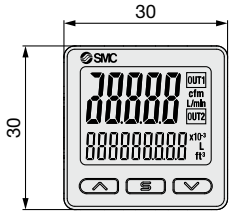
NPN (2 outputs) type

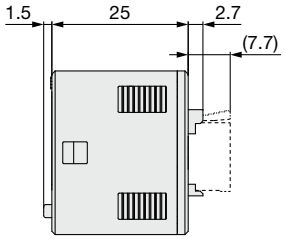


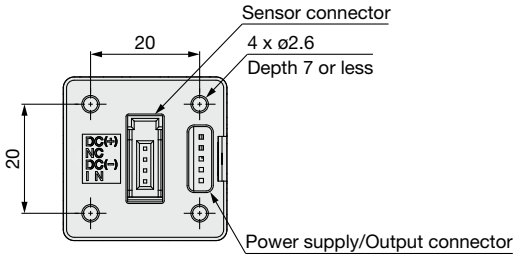
PNP (2 outputs) type



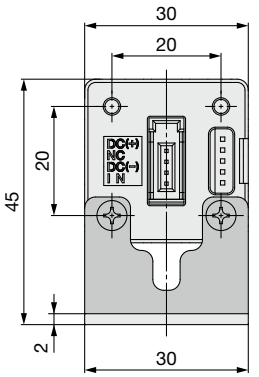
Dimensions

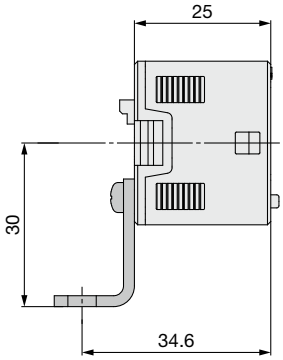


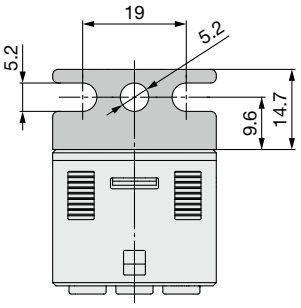


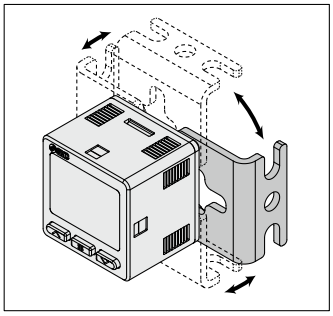


Bracket A
(Part no.: ZS-46-A1)



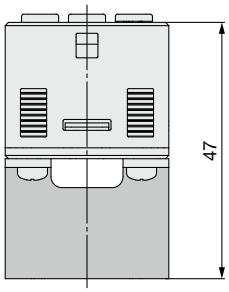


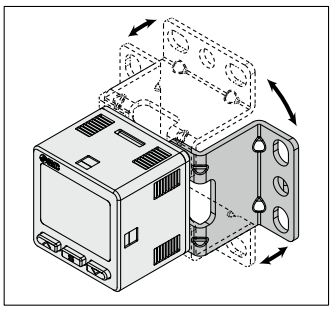




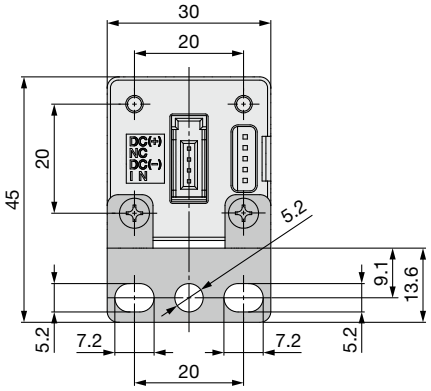
* Bracket configuration allows for mounting in four orientations.

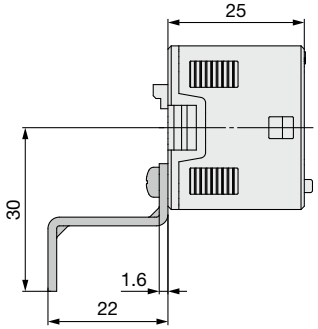
Bracket B
(Part no.: ZS-46-A2)





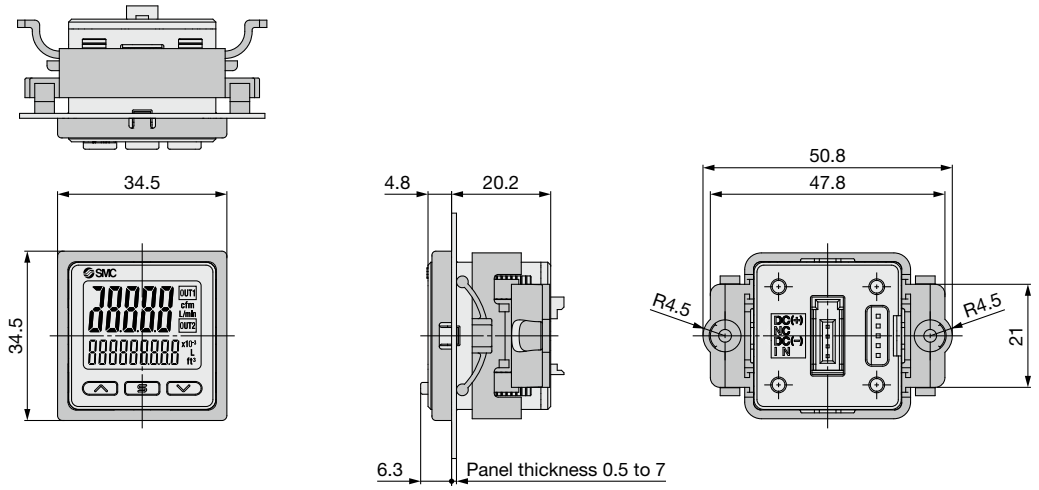
* Bracket configuration allows for mounting in four orientations.



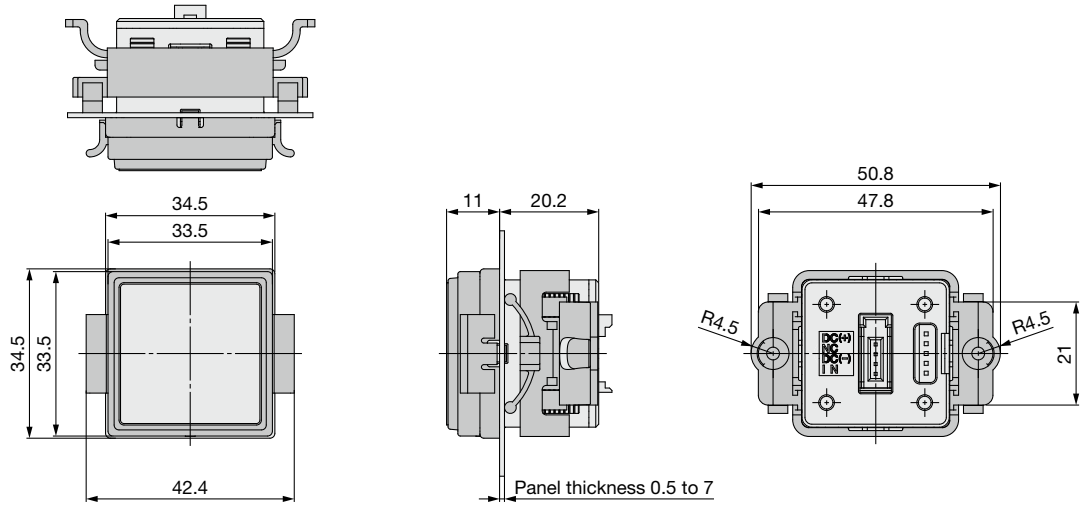


Dimensions

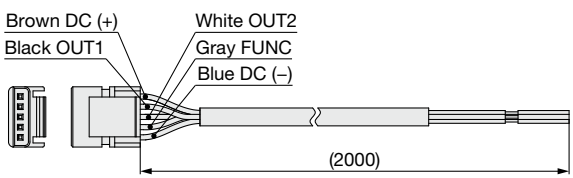
Panel mount adapter (Part no.: ZS-46-B)



Panel mount adapter + Front protection cover (Part no.: ZS-46-D)



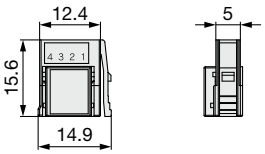
Power supply/output connection lead wire (Part no.: ZS-46-5L)



Sensor connector (Part no.: ZS-28-C-1)

Pin no.	Terminal
1	DC (+)
2	N.C.
3	DC (–)
4	IN*1

*1 1 to 5 V or 4 to 20 mA



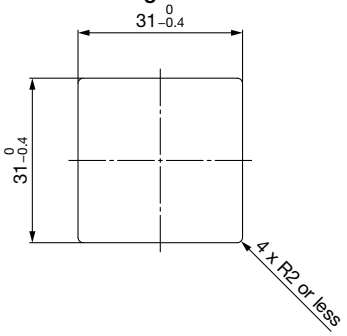
Cable Specifications

Conductor cross section		0.15 mm^2 (AWG26)
Insulator	**Outside diameter**	1.0 mm
	Color	Brown, Blue, Black, White, Gray (5-core)
Sheath	**Finished outside diameter**	ø3.5

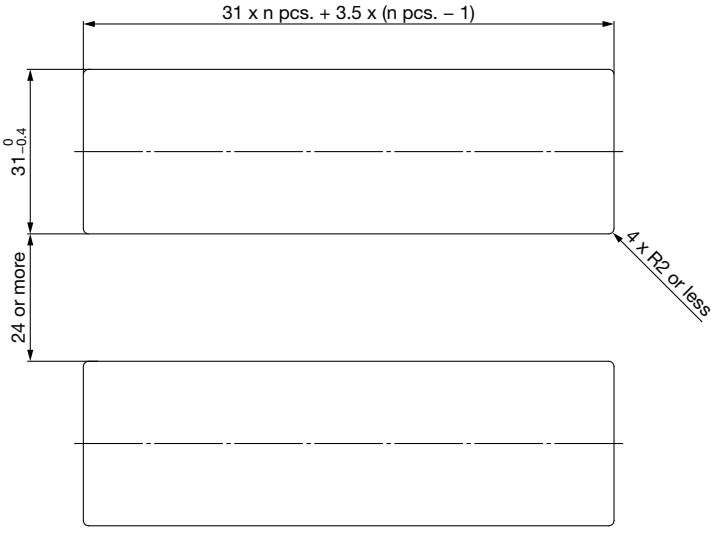
Dimensions

Panel fitting dimensions

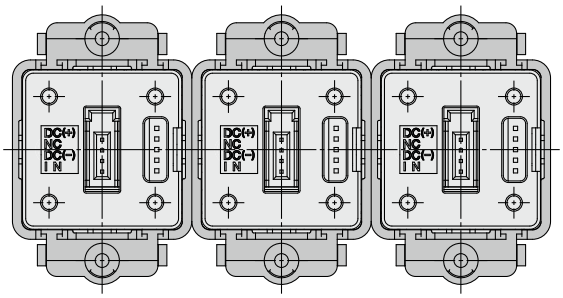
Individual mounting



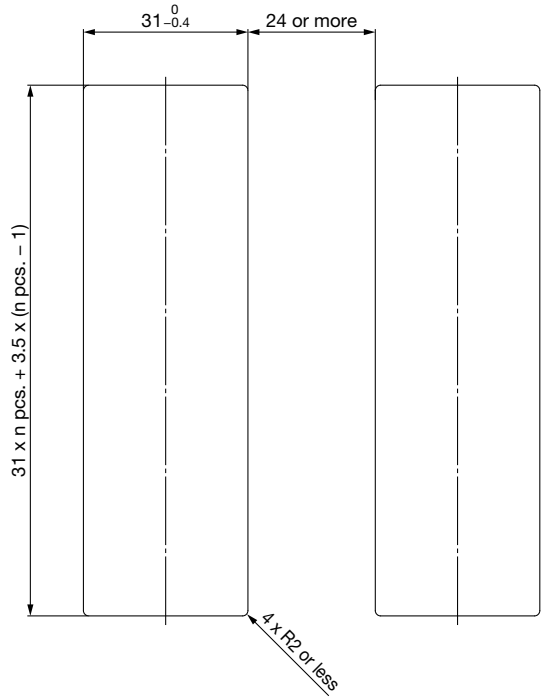
Multiple (2 pcs. or more) secure mounting
<Horizontal>



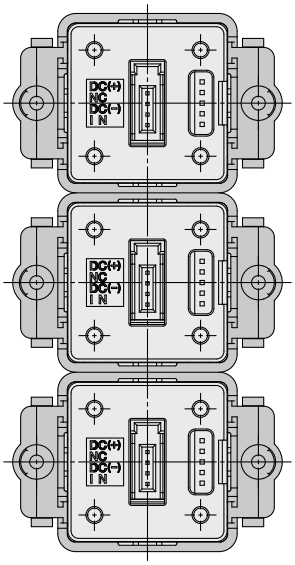
Panel mount example
<Horizontal>



<Vertical>



Panel mount example
<Vertical>



⚠ 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.

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

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

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

*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1:Robots
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. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

⚠ Caution

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not covered.
Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.
The new Measurement Act prohibits use of any unit other than SI units in Japan.

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.

Revision History

Edition B
* The PF2M701, 702, and 705 have been added.
* A female thread type has been added.
* The IO-Link compatible PF2M7-L series has been added.
* Internal circuits and wiring examples have been revised.
* A made-to-order option (Compatible with argon (Ar) and carbon dioxide (CO_2) mixed gas) has been added.
* The number of pages has been increased from 20 to 28. YU

Edition C
* A flow adjustment valve (0.05 to 5 L/min) has been added.
* A 2 to 200 L/min flow range option has been added.
* A rear ported type has been added.
* The number of pages has been increased from 28 to 32. ZV

Edition D
* The PFGM302 digital flow monitor (dedicated for the PF2M7) has been added.
* The number of pages has been increased from 32 to 36.

⚠ Safety Instructions	Be sure to read the "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" before use.

SMC Corporation