2-Color Display

Digital Flow Switch

New

CE RoHS

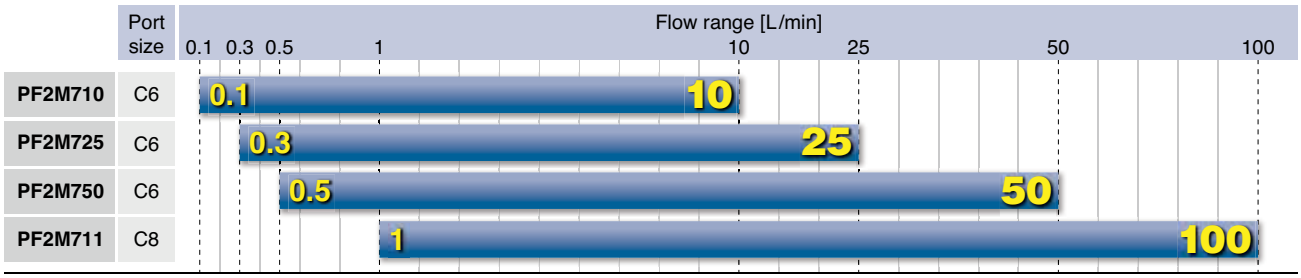
Applicable fluid Dry air, N_2, Ar, CO_2

Wide range of flow measurement with one product

Flow ratio[*1] **100:1** **Smallest settable increment: 0.01 L/min**

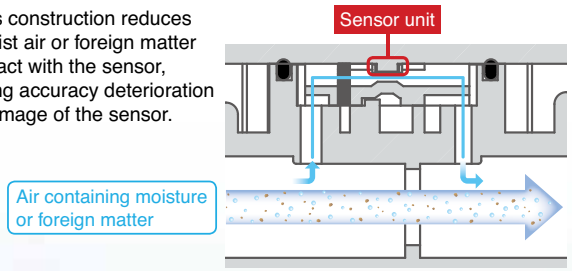
*1 Excludes the PF2M725

(0.1 L/min for the flow ranges of 25, 50, 100 L/min)



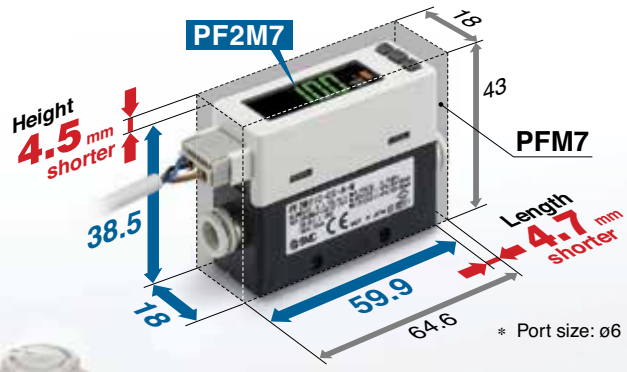
Improved drainage and resistance to foreign matter

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



Compact, Lightweight

Weight **27.3% reduction** (55 g → **40 g**)



* Port size: ø6

Low current consumption: 35 mA or less

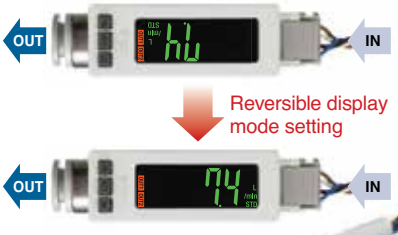
* PFM7: 55 mA or less

PF2M7 Series

SMC

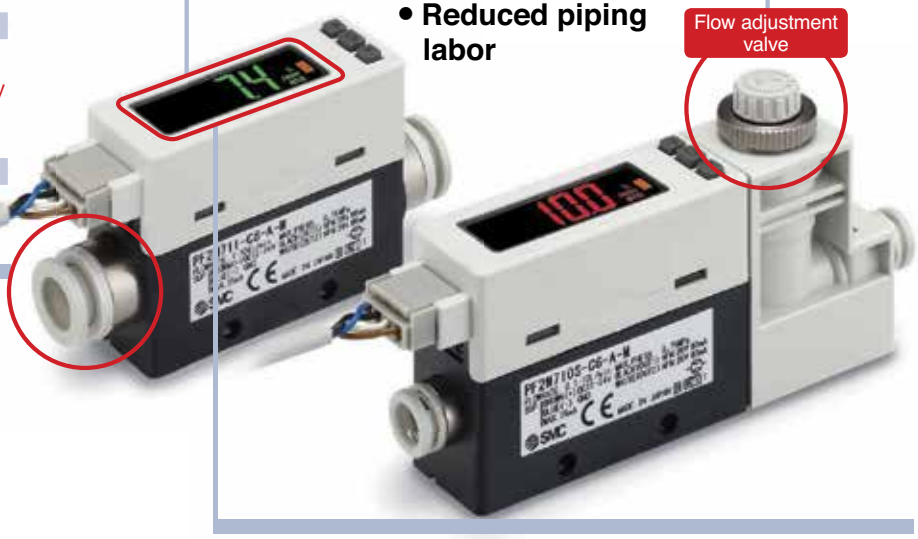
Reversible display mode

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



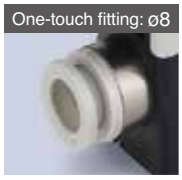
Flow adjustment valve is integrated.

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



Piping variations

(Straight)

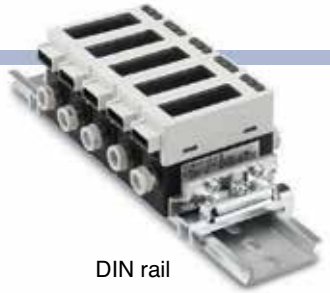


Display OFF mode

Unnecessary LEDs can be turned off and checked only when necessary. Can be used as a remote sensor

Mounting variations

Bracket

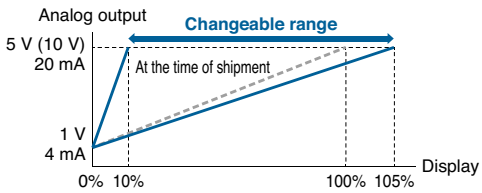


DIN rail

Panel mount

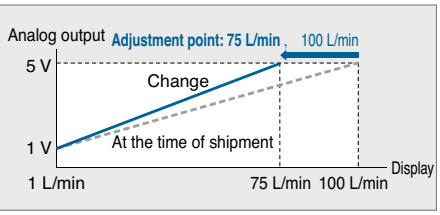
Analog free span function

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



Application example

When it is required to output 5 V from the flow switch at 75 L/min, using 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

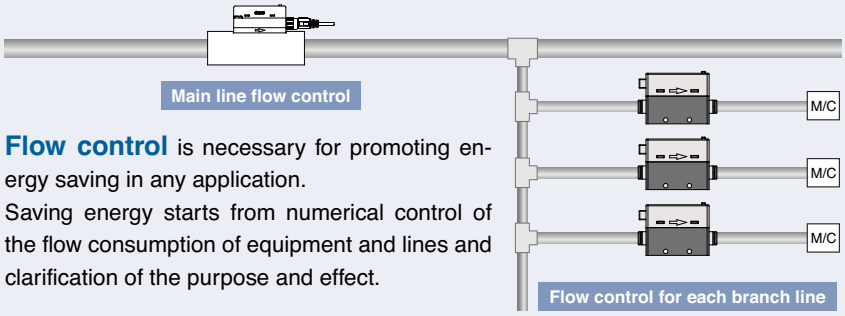
The delay time can be set according to the application.

Grease-free

Functions p. 16

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

Digital flow switch to save energy!

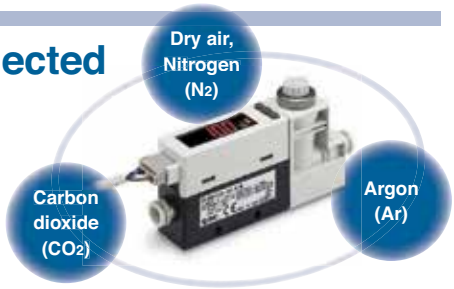


Flow control is necessary for promoting energy saving in any application.
Saving energy starts from numerical control of the flow consumption of equipment and lines and clarification of the purpose and effect.

Digital display allows visualization of flow rate.

2-color display, Improved visibility

Can be selected according to the fluid used

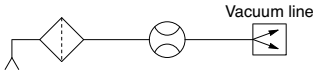


Recommended pneumatic circuit examples

Compressed air line

Air dryer	Air filter	Regulator	Micro mist separator	Flow switch
IDF IDU	AF	AR IR	AMD AFD	PF2M

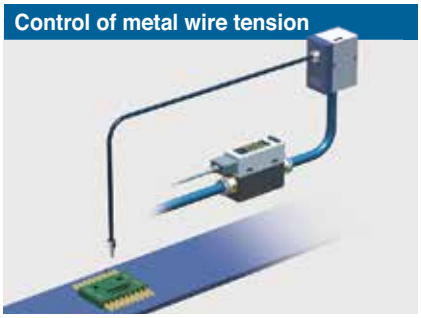
Vacuum line



Suction filter	Flow switch
ZF SFD100	PF2M

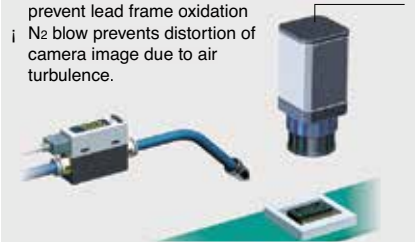
Applications

Control of metal wire tension

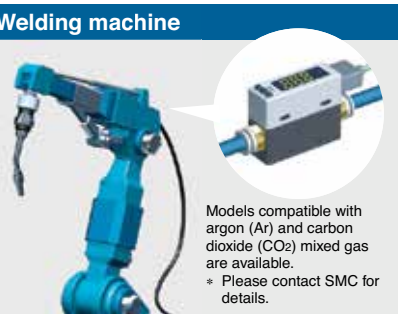


Air blow

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

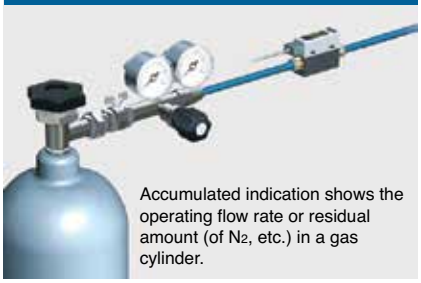


Welding machine



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

N_2 gas cylinder peripheral equipment



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

Suction verification

Unit conversion table is located inside back cover.

Flow Switch Flow Rate Variations

Series	Applicable fluid	Detection method	Rated flow range [L/min]
PFMV 	Dry air N_2	Thermal type (MEMS)	–3 –2 –1 –0.5 0 0.5 1 2 3 0 – 0.5 0 – 1 0 – 3 –0.5 – 0.5 –1 – 1 –3 – 3

Series	Availability of the digital flow monitor PFG300	Applicable fluid	Detection method	Smallest settable increment	Rated flow range [L/min]
					0.1 0.3 0.5 1 2 5 10 20 25 50 100 150 200 300 500 600 1000 2000 3000 6000 12000
PF2M7 	–	**Dry air N_2 Ar CO_2**	**Thermal type (MEMS)**	**0.01 L/min**	**0.1 – 10**
				0.1 L/min	**0.3 – 25** **0.5 – 50** **1 – 100**
PFMB  	**PFG300** 	Dry air N_2	Thermal type (MEMS) Bypass flow type	1 L/min	2 – 200 5 – 500 10 – 1000 20 – 2000
PFMC 	**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	1 – 10
				0.5 L/min	5 – 50
				1 L/min	10 – 100
				2 L/min	20 – 200
				5 L/min	50 – 500
PF3A7□H 	**PFG300** 	Air N_2	Thermal type (Platinum sensor) Bypass flow type	2 L/min	30 – 3000
				5 L/min	60 – 6000
				10 L/min	120 – 12000

Flow Switch Variations / Basic Performance Table

	PFMV	PF2M7	PFMB	PFMC	PF2A	PF3A7□H
Series	 PFMV3 		 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	0 to 0.5 L/min −0.5 to 0.5 L/min 0 to 1 L/min −1 to 1 L/min 0 to 3 L/min −3 to 3 L/min	**0.1 to 10 L/min 0.3 to 25 L/min 0.5 to 50 L/min 1 to 100 L/min**	2 to 200 L/min 5 to 500 L/min 10 to 1000 L/min 20 to 2000 L/min	5 to 500 L/min 10 to 1000 L/min 20 to 2000 L/min	1 to 10 L/min 5 to 50 L/min 10 to 100 L/min 20 to 200 L/min 50 to 500 L/min	30 to 3000 L/min 60 to 6000 L/min 120 to 12000 L/min
Power supply voltage	12 to 24 VDC ±10%	**12 to 24 VDC ±10%**	12 to 24 VDC ±10%	12 to 24 VDC ±10%	12 to 24 VDC ±10%	24 VDC ±10%
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	±1% F.S. (Fluid: Dry air) Analog output: ±5% F.S. [**Monitor unit** ±0.1% F.S. Analog output: ±0.5% F.S.]	**±1% F.S. ±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**	NPN/PNP open collector Accumulated pulse output Analog voltage output Analog current output	NPN/PNP open collector Accumulated pulse output Analog voltage output Analog current output	NPN/PNP open collector Accumulated pulse output	NPN/PNP open collector Accumulated pulse output Analog voltage output Analog current output
Display	[**Monitor unit** 2-color LCD display]	**2-color LCD display**	2-color LED display / 2-color LCD display [**Monitor unit** 3-color LCD display]	3-color LCD display	LED display	3-color LCD display

∗The monitor unit shows the PFG300 and PFMV3.

Unit conversion table is located inside back cover.

CONTENTS

2-Color Display Digital Flow Switch *PF2M7 Series*

2-Color Display

Digital Flow Switch

PF2M7 Series

How to Order

PF2M 7 10 □ – C6 – A □ – M □ □

Type

7	Integrated display

Rated flow range

10	0.1 to 10 L/min
25	0.3 to 25 L/min
50	0.5 to 50 L/min
11	1 to 100 L/min

Flow adjustment valve

Nil	None
S	Yes

Port size

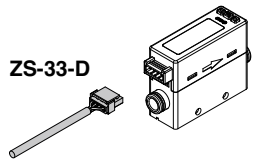
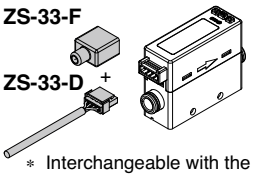
Symbol	Port size	Rated flow range			
		10	25	50	11
C6	ø6	●	●	●	
C8	ø8				●

Output specification

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

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

Option 1

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

N
Without lead wire with connector

Calibration certificate*4

Nil	None
A	Yes

*4 Made to order
Certificate in both English and Japanese

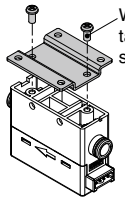
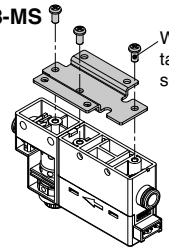
Unit specification

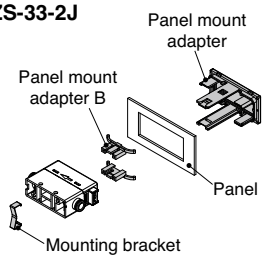
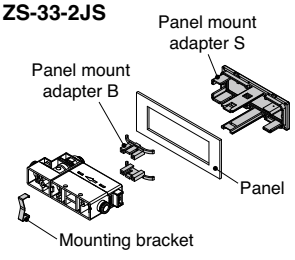
M	SI unit only*2
Nil	Unit selection function*3

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

*3 This product is for overseas use only according to the New Measurement Act. (The SI unit type is provided for use in Japan.) Unit can be changed. Instantaneous flow: L/min ⇔ cfm
Accumulated flow: L ⇔ ft³

Option 2

Nil	R	S
No bracket	Bracket (For without flow adjustment valve) **ZS-33-M**  With 2 tapping screws * Interchangeable with the existing PFM series	Bracket (For with flow adjustment valve) **ZS-33-MS**  With 3 tapping screws * Interchangeable with the existing PFM series

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

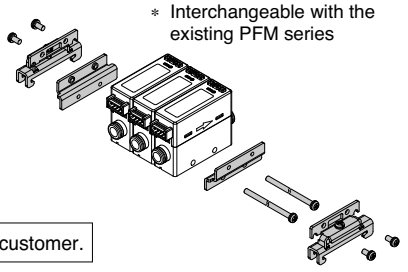
* Options are shipped together with the product but do not come assembled.

DIN Rail Mounting Bracket (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 is prepared by customer.

Unit conversion table is located inside back cover.

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

Specifications

Model			PF2M710	PF2M725	PF2M750	PF2M711
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 (Bypass flow type)			
	Rated flow range	Dry air, N_2, Ar	0.1 to 10 L/min	0.3 to 25 L/min	0.5 to 50 L/min	1 to 100 L/min
		CO_2	0.1 to 5 L/min	0.3 to 12.5 L/min	0.5 to 25 L/min	1 to 50 L/min
	Set point range	Instantaneous flow	–5 to 105% (For the maximum rated flow rate)			
		Accumulated flow	0.0 to 99999999.9 L	0 to 999999999 L		
	Smallest settable increment	Instantaneous flow	0.01 L/min	0.1 L/min		
		Accumulated flow	0.1 L	1 L		
	Accumulated volume per pulse		0.1 L/pulse			1 L/pulse
	Accumulated value hold function*2		Intervals of 2 or 5 minutes can be selected.			
Pressure	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		12 to 24 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.			
	Maximum load current		80 mA			
	Maximum applied voltage		28 VDC (NPN only)			
	Internal voltage drop		NPN: 1 V or less (Load current: 80 mA) PNP: 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 can be selected)*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	–0.5 to 10.5 L/min	–1.3 to 26.3 L/min	–2.5 to 52.5 L/min	–5 to 105 L/min
		Zero cut-off range	0 to ±10% F.S. (Select per 1% F.S. for the maximum rated flow rate.)			
		Accumulated flow*13	0.0 to 99999999.9 L	0 to 999999999 L		
	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 marking (EMC Directive, RoHS Directive)			
Piping*15	Piping specification		C6 (ø6)			C8 (ø8)
	Piping entry direction		Straight			
Main materials of parts in contact with fluid			PPS, PBT, FKM, Stainless steel 304, Brass (Electroless nickel plating), Si, Au, GE4F			
Weight	Body		40 g			48 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.

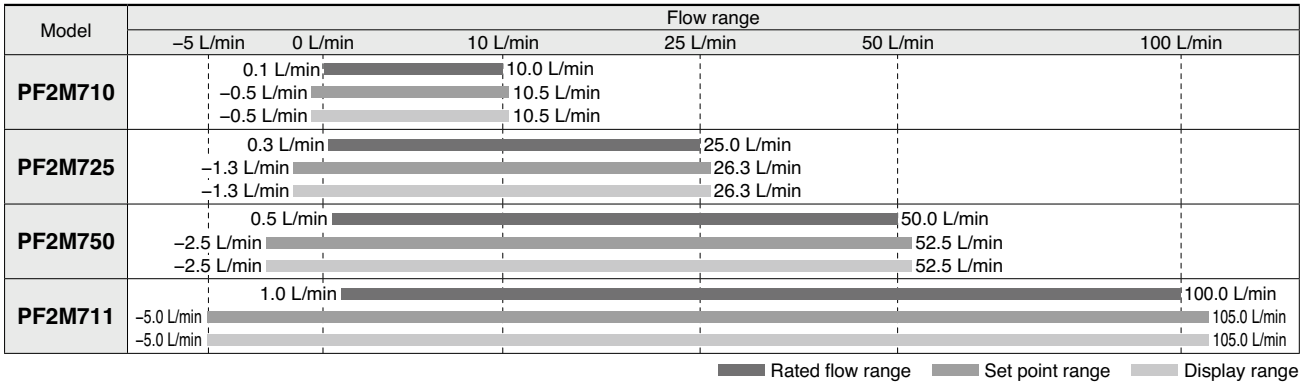
∗13 Power value is displayed for accumulated flow. The first 4 digits of the measurement value are always displayed.

∗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.

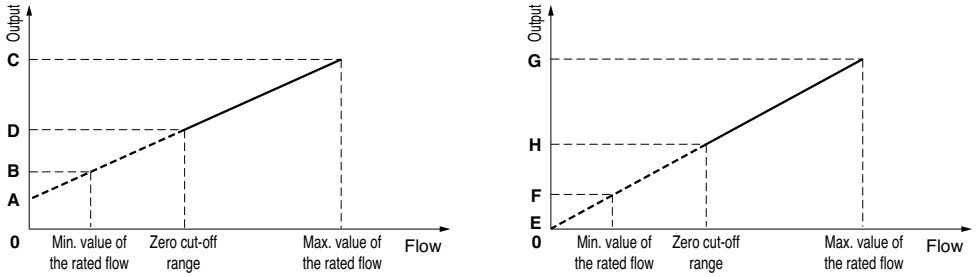
Flow Range



Flow/Analog Output

	A	B		C
		PF2M710/50/11	PF2M725	
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
		PF2M710/50/11	PF2M725	
Voltage output (0 to 10 V)*1	0 V	0.10 V	0.12 V	10 V

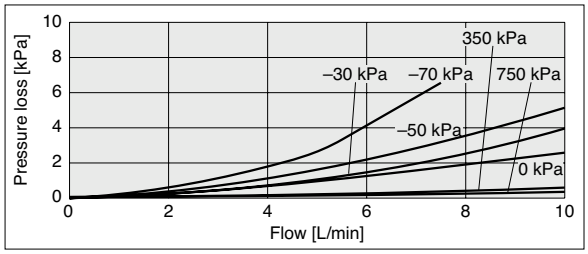


*1 The analog output current from the connected equipment should be 20 μA or less when selecting 0 to 10 V. When more than 20 μA current flows, it is possible that the accuracy is not satisfied at less than or equal to 0.5 V.

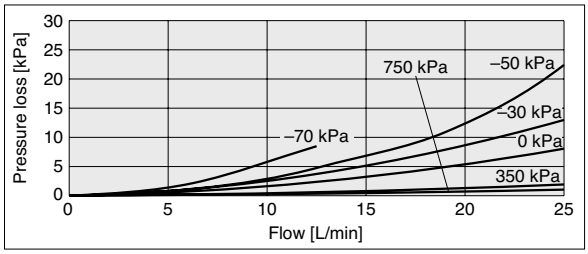
* D or H fluctuates depending on the setting of the zero cut-off function. When the zero cut-off function is set to "0," the flow rate display value starts from 0 L/min. but in conditions other than horizontal installation and supply pressure of 0.35 MPa, the output may not be 0 L/min.

Pressure Loss (Reference Data): Without Flow Adjustment Valve

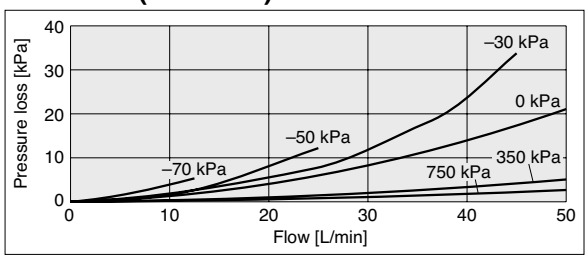
PF2M710 (10 L/min)



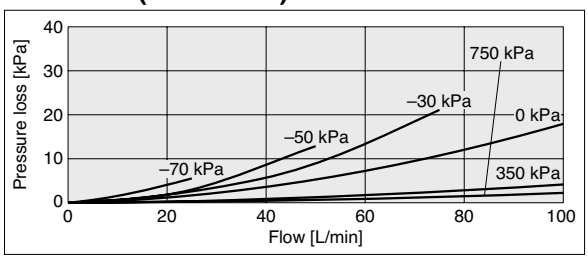
PF2M725 (25 L/min)



PF2M750 (50 L/min)



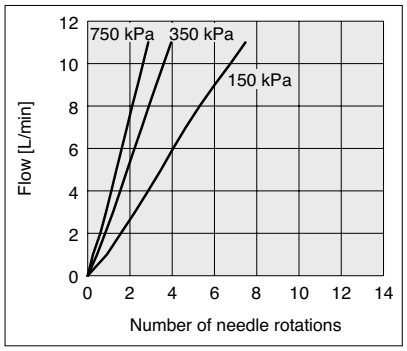
PF2M711 (100 L/min)



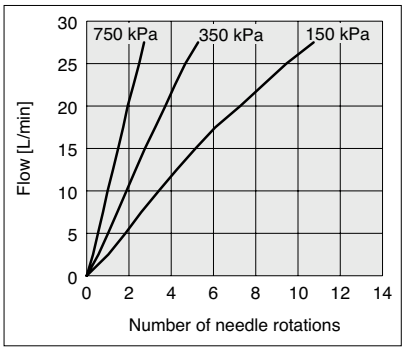
Unit conversion table is located inside back cover.

Flow Rate Characteristics (Reference Data)

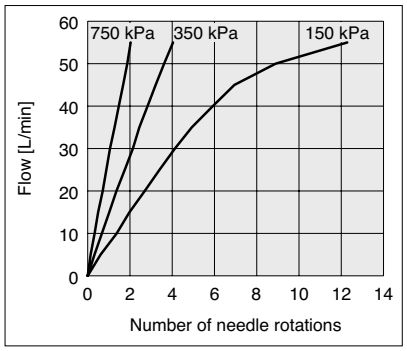
PF2M710 (10 L/min)



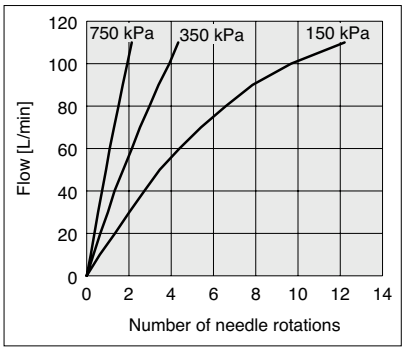
PF2M725 (25 L/min)



PF2M750 (50 L/min)



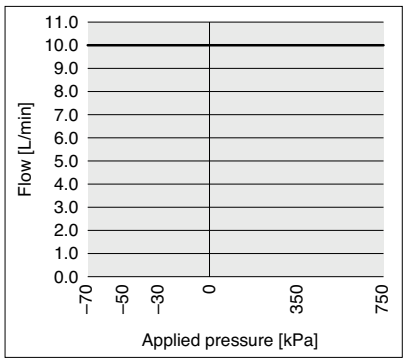
PF2M711 (100 L/min)



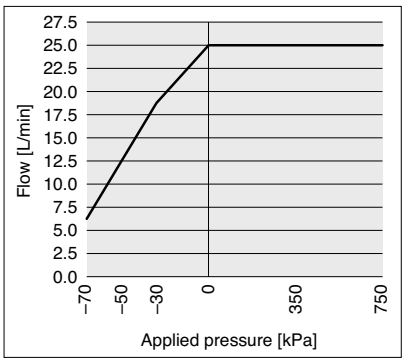
Flow Rate Characteristics at Negative Pressure (Reference Data)

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

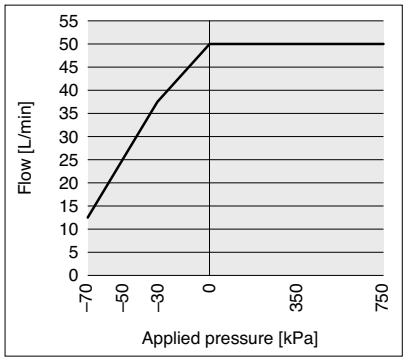
PF2M710 (10 L/min)



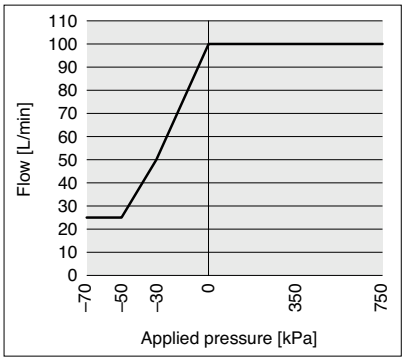
PF2M725 (25 L/min)



PF2M750 (50 L/min)

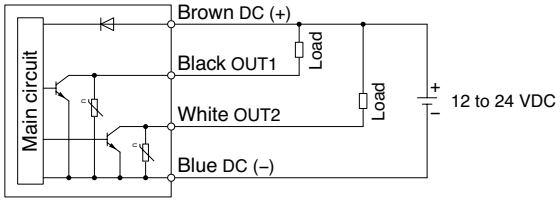


PF2M711 (100 L/min)



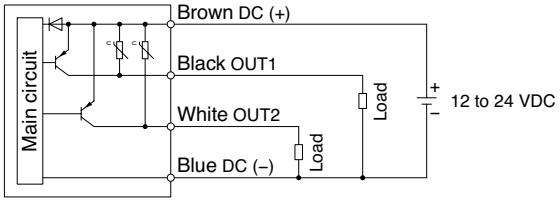
Internal Circuits and Wiring Examples

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



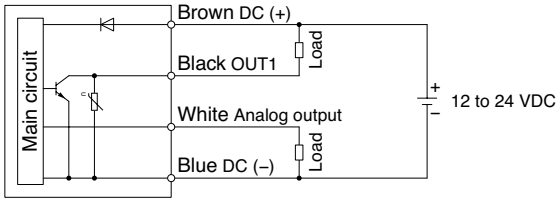
Max. applied voltage: 28 V, Max. load current: 80 mA,
Internal voltage drop: 1 V or less

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



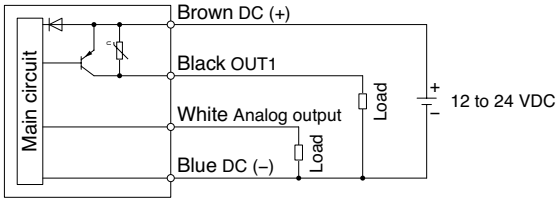
Max. load current: 80 mA, Internal voltage drop: 1.5 V or less

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□-□□□

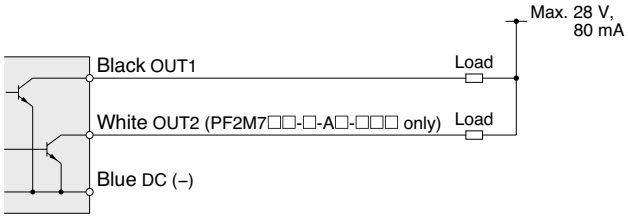


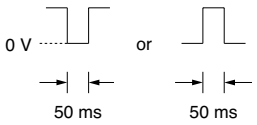
Max. load current: 80 mA, Internal voltage drop: 1.5 V or less
E: Analog output: 1 to 5 V or 0 to 10 V can be selected.
Output impedance: 1 kΩ
F: Analog output: 4 to 20 mA
Load impedance: 50 to 600 Ω

Accumulated pulse output wiring examples

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

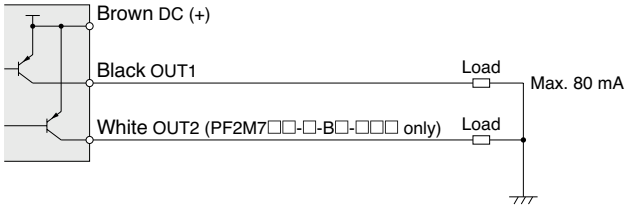
NPN + Analog output type
PF2M7□□-□-C□-□□□
PF2M7□□-□-D□-□□□

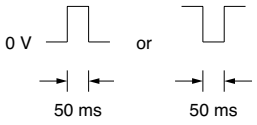




PNP + PNP output type
PF2M7□□-□-B□-□□□

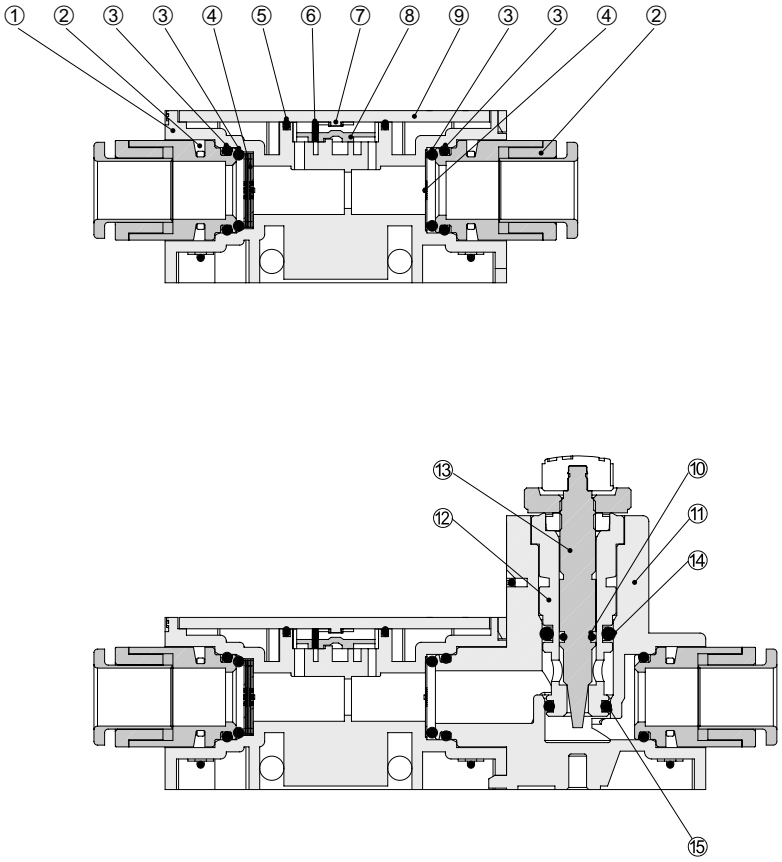
PNP + Analog output type
PF2M7□□-□-E□-□□□
PF2M7□□-□-F□-□□□





Construction: Parts in Contact with Fluid

PF2M710/725/750/711

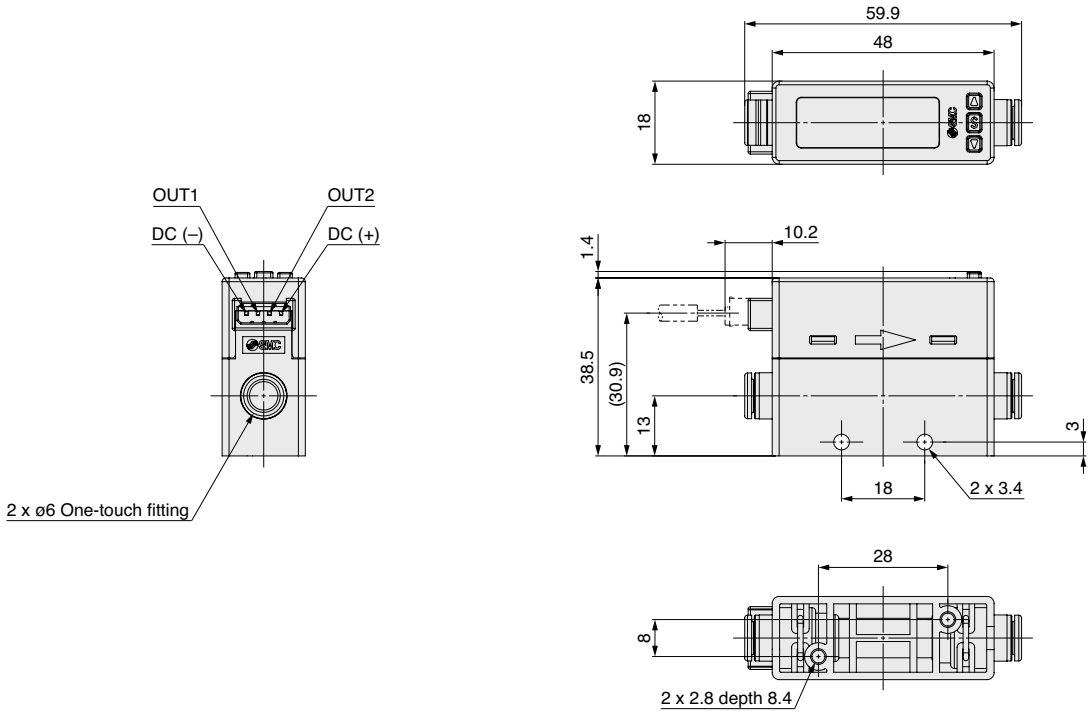


Component Parts

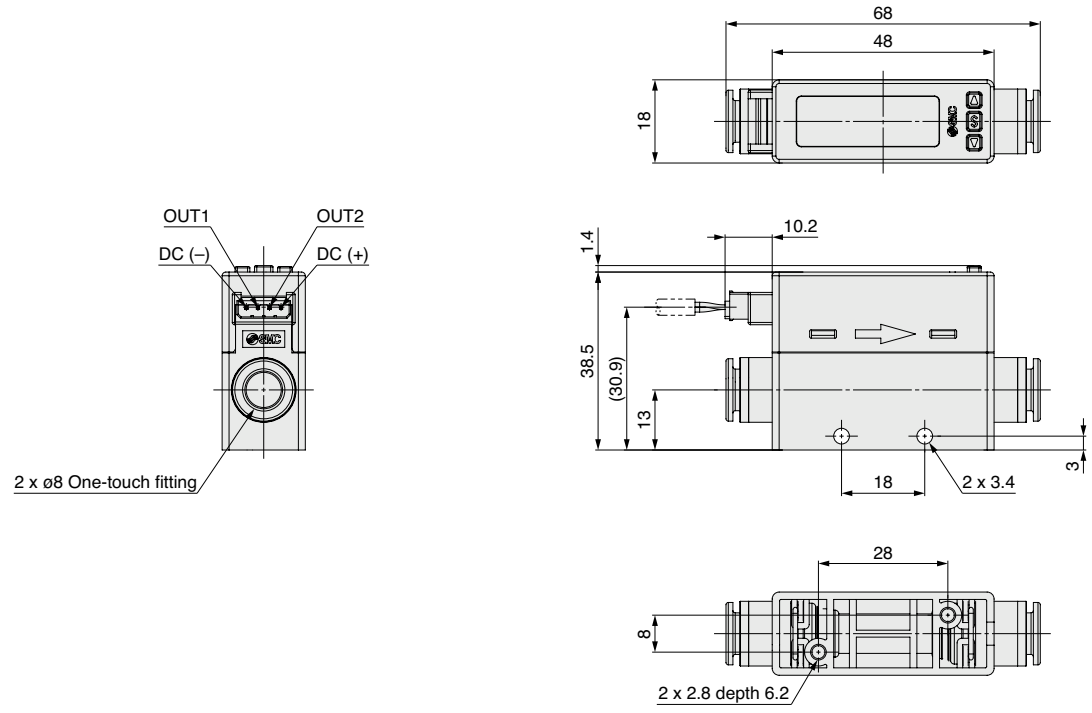
No.	Description	Material	Note
1	**Body**	PPS	
2	**Fitting for piping**	Brass	Electroless nickel plating
3	**O-ring**	FKM	
4	**Flow rectifier**	Stainless steel 304	
5	**Seal**	FKM	
6	**Flow rectifier**	Stainless steel 304	
7	**Sensor chip**	Silicon	
8	**Body B**	PPS	
9	**Printed circuit board**	GR4F	
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

PF2M710/25/50-C6



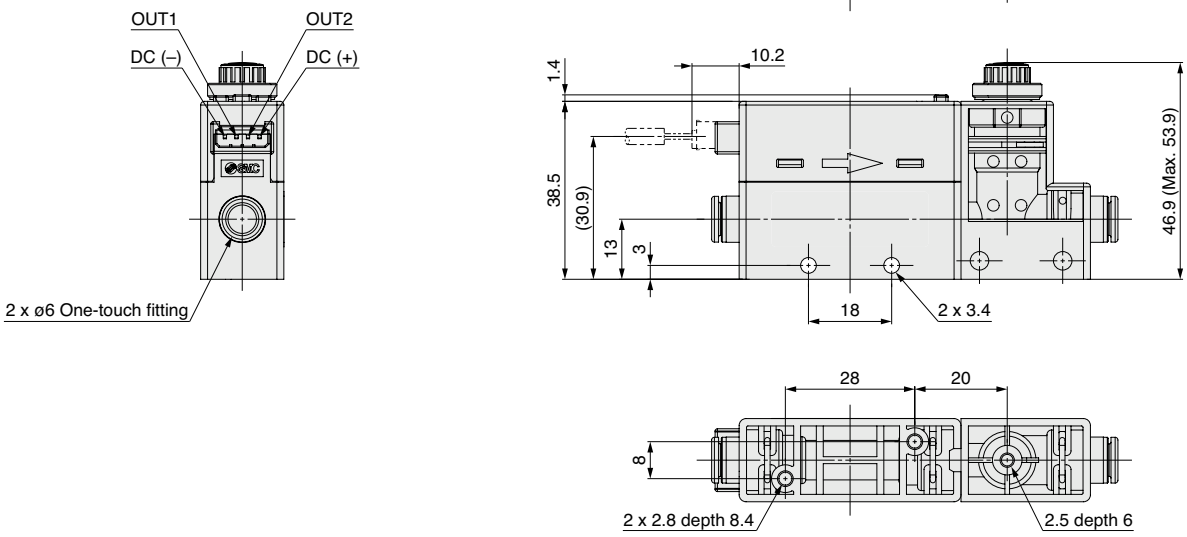
PF2M711-C8



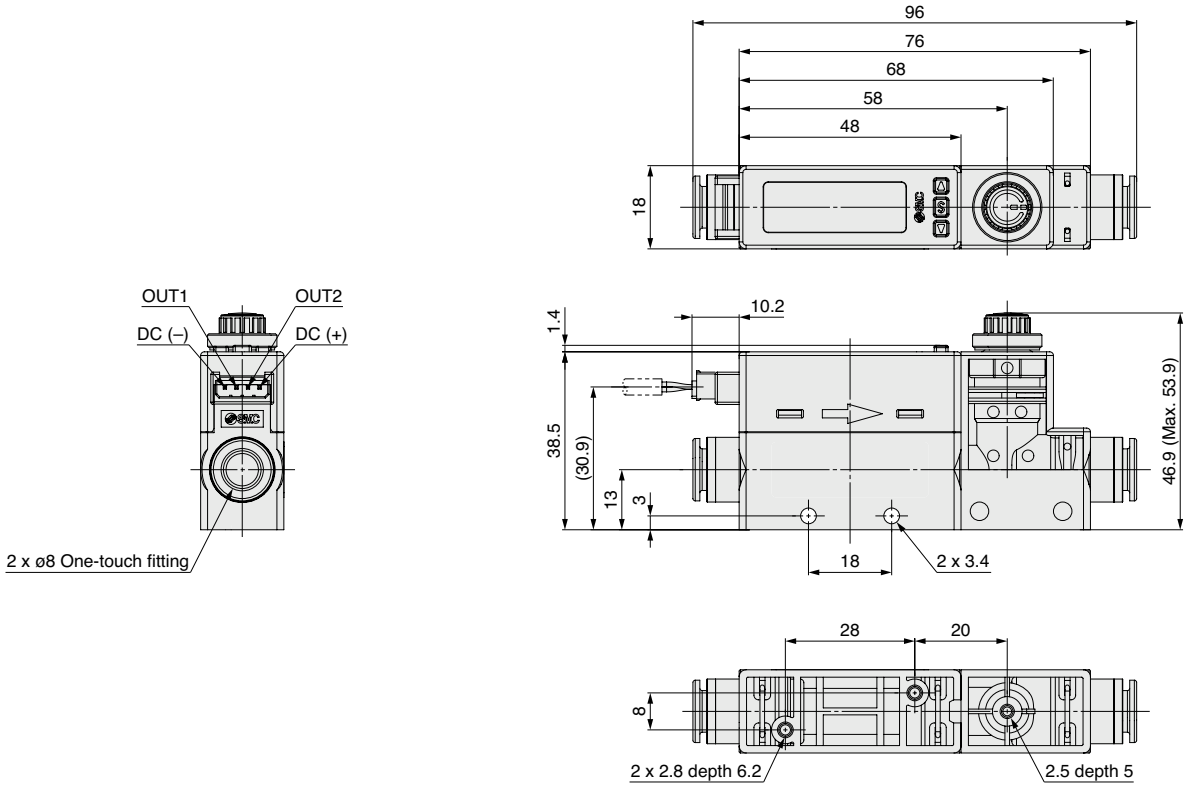
Unit conversion table is located inside back cover.

Dimensions

PF2M710/25/50S-C6



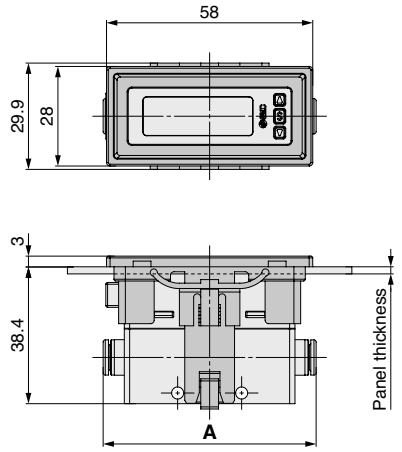
PF2M711S-C8



Dimensions

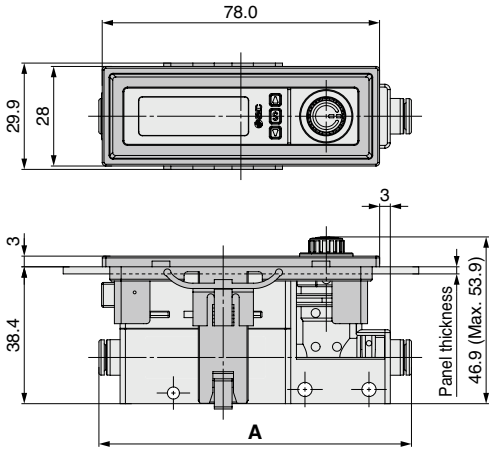
PF2M710/25/50/11

Panel mount/Without flow adjustment valve/Straight



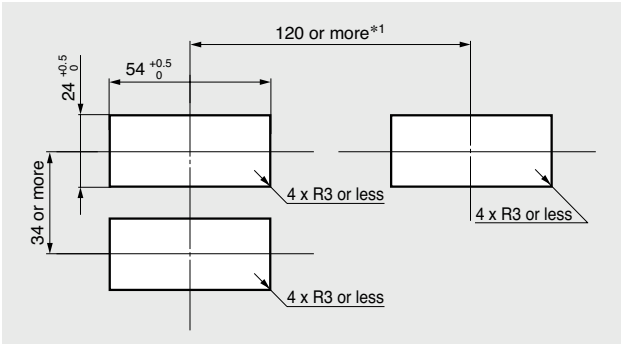
Applicable tubing O.D. for One-touch fittings	A
ø6	59.9
ø8	68

Panel mount/With flow adjustment valve/Straight



Applicable tubing O.D. for One-touch fittings	A
ø6	87.9
ø8	96

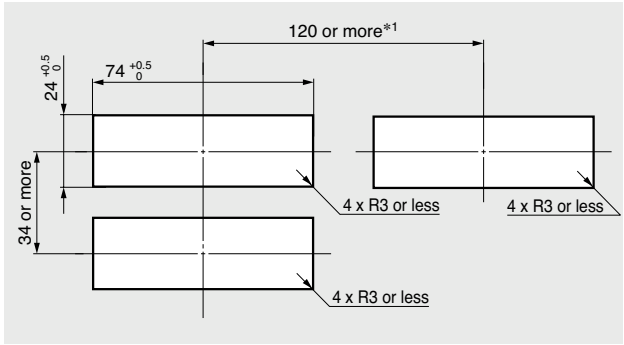
Panel Fitting Dimensions



Panel thickness 1 to 3.2 mm

∗1 Port direction: As the piping inlet is straight type, please design the layout with consideration to the tubing and piping materials. If a bend (R) is used, limit it to R3 or less.

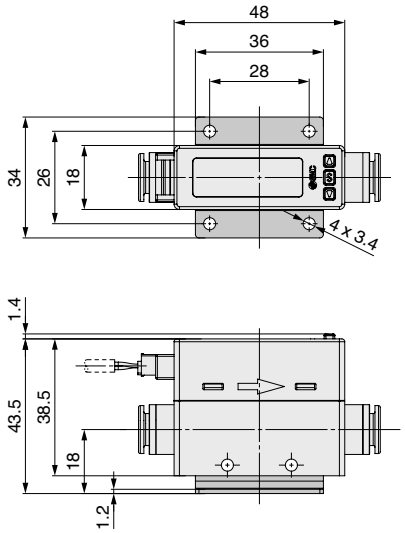
Panel Fitting Dimensions



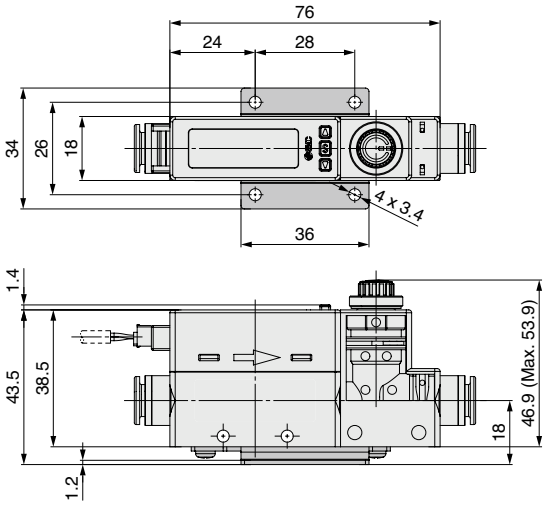
Panel thickness 1 to 3.2 mm

∗1 Port direction: As the piping inlet is straight type, please design the layout with consideration to the tubing and piping materials. If a bend (R) is used, limit it to R3 or less.

With bracket/Without flow adjustment valve



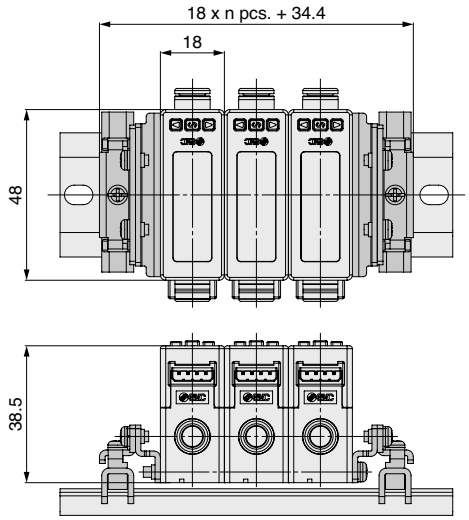
With bracket/With flow adjustment valve



Unit conversion table is located inside back cover.

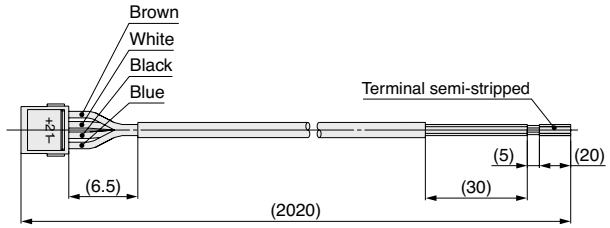
Dimensions

PF2M710/25/50/11
DIN rail mounting



· DIN rail is prepared by customer.

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 Series
Function Details

For setting of functions and operation method, refer to the Operation Manual from the SMC website Documents/Download --> Instruction Manuals.

■ Output operation

The output operation can be selected from the following:

Output corresponding to instantaneous flow (Hysteresis mode, Window comparator mode)

- Hysteresis mode is the mode where the switch output will turn ON when the flow is greater than the set value, and will turn OFF when the flow falls below the set value by the amount of hysteresis or more.
- Window comparator mode is the mode where an operating mode in which the switch output is turned on and off depending on whether the flow is inside or outside the range of two set values.

Output corresponding to accumulated flow (Accumulated output mode, Accumulated pulse output mode)

- In accumulated output mode, the switch output will start at the set accumulated flow rate value.
- Accumulated pulse output is a pulse signal which is output every time a predefined accumulated flow has passed.

Others (Error output, Switch output OFF)

- The error output function outputs the switch output when an error is displayed.
- The switch output off function turns off the switch output.

∗ Default setting: Hysteresis mode, Normal output

■ Simple setting mode

Only the set values for instantaneous flow and accumulated flow can be changed. Output mode, output type, display color, and accumulate pulse output cannot be changed.

■ Display color

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

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

■ Reference condition

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

Standard condition: Flow rate converted to a volume at 20°C, 101.3 kPa (absolute pressure), and 65% RH
Normal condition: Flow rate converted to a volume at 0°C, 101.3 kPa (absolute pressure), and 0% RH

■ Delay time setting

The time from when the instantaneous flow reaches the set value to when the switch output operates can be set. Setting the delay time can prevent the switch output from chattering.
The total switching time is the switch operation time and the set delay time.
(Default setting: 0 s)

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
60 s

■ Digital filter setting

The time for the digital filter can be set to the sensor input. Setting the digital filter can reduce chattering of the switch output and flickering of the analog output and the display.
The response time indicates when the set value is 90% in relation to the step input.
(Default setting: 1 s)

0.05 s
0.1 s
0.5 s
1 s
2 s
5 s

■ Selectable analog output function

1 to 5 V or 0 to 10 V can be selected for the analog voltage output type.
(Default setting: 1 to 5 V)

■ Forced output function

The output is turned on/off in a fixed state when starting the system or during maintenance. This enables the confirmation of wiring and prevents system errors due to unexpected output.
For the analog output type: When ON, the output will be 5 V (or 10 V when 0 to 10 V is selected) or 20 mA, and when OFF, 1 V (or 0 V when 0 to 10 V is selected) or 4 mA.

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

■ Accumulated value hold

The accumulated value will be stored even if the power supply is turned off. The accumulated value is memorized every 2 or 5 minutes during measurement and continues from the last memorized value when the power supply is turned on again.
The maximum writable limit of the memory device is 3.7 million times, which should be taken into consideration.

■ Peak/Bottom value display

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

■ Display OFF mode

This function will turn the display OFF. In this mode, "_ _ _" will flash on the main screen. If any button is pressed during this mode, the display reverts to normal for 30 seconds to allow checking of the flow, etc.

■ Setting of security code

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

■ Key-lock function

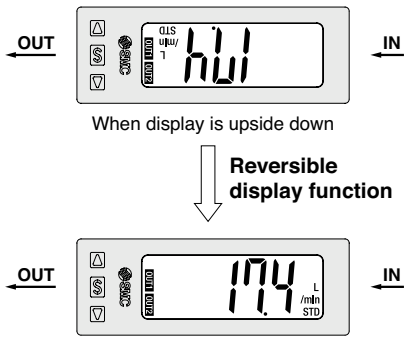
Prevents operation errors such as accidentally changing setting values

■ Reset to the default settings

The product can be returned to its factory default settings.

■ Reversible display mode

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



■ Zero cut-off function

When the flow is close to 0 L/min, the product will round the value down and zero will be displayed. A flow value may be displayed even when the flow rate is 0 L/min due to high pressure or depending on the installation. The zero cut-off function will force the display to zero.

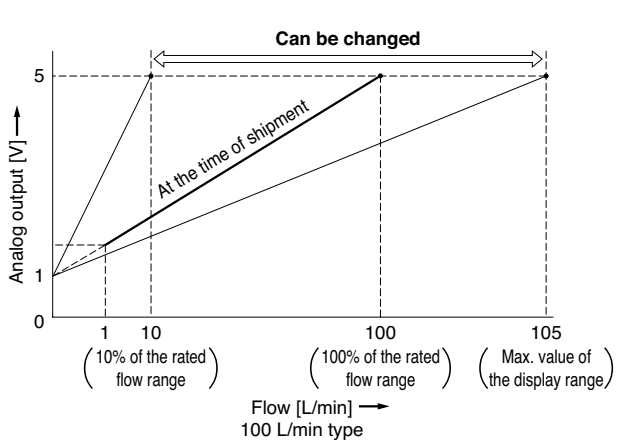
■ Zero-clear function

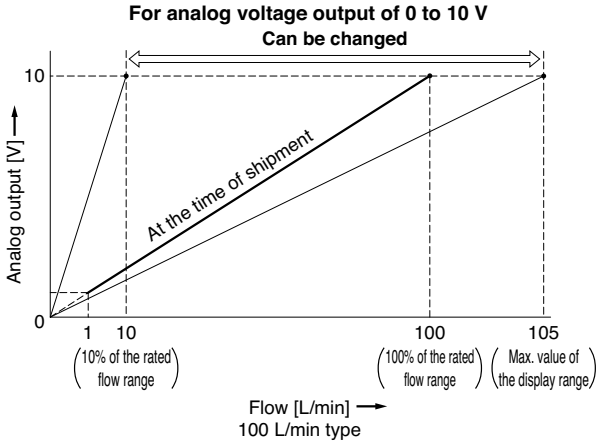
The measured flow rate indication can be adjusted to zero.

The adjustment range is ±5% F.S. of the initial factory setting.

■Analog free span function

This function allows a flow that generates an output of 5 V (or 10 V when 0 to 10 V is selected) or 20 mA to be changed.
The value can be changed between 10% of the maximum value of the rated flow and the maximum value of the display range.





■Error display function

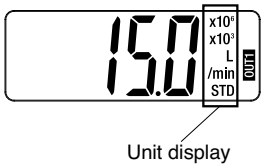
When an error or abnormality arises, the location and contents are displayed.

Display	Error name	Description	Action
Er 1	OUT1 over current error	The switch output (OUT1) load current of 80 mA or more flows.	Turn the power OFF and remove the cause of the over current. Then turn the power ON again.
Er 2	OUT2 over current error	The switch output (OUT2) load current of 80 mA or more flows.	
HHH	Instantaneous flow error	The flow has exceeded the upper limit of the flow display range.	Decrease the flow rate.
LLL		The flow has exceeded the lower limit of the flow display range.	Change the flow to the correct direction.
9999 (Accumulated flow is displayed. (Flashing))	Accumulated flow error*1	The accumulated flow has exceeded the accumulated flow range. (For accumulated increment) (The decimal point position varies depending on the flow range or measurement unit setting.)	Reset the accumulated flow. (Press the SET and DOWN buttons simultaneously for 1 second or longer.)
0 (Accumulated flow is displayed. (Flashing))		The accumulated flow has reached the set accumulated flow value. (For accumulated decrement) (The decimal point position varies depending on the flow range or measurement unit setting.)	
Er 3	Outside of zero-clear range	During zero-clear operation, the flow rate of ±5% F.S. or more is applied. (The mode is returned to measurement mode after 1 second.)	Retry the zero-clear operation without applying fluid.
Er 0	System error	An internal data error has occurred.	Turn the power OFF and turn it ON again.
Er 4			
Er 6			
Er 7			
Er 8			
Er 14			
Er 16			
Er 40			

*1 A decimal point will be displayed depending on the flow range or measurement unit setting.
* If the error cannot be solved after the instructions above are performed, please contact SMC for investigation.

■Unit display function

The unit displayed on the screen differs depending on the unit setting in measurement mode.



Standard condition (STD)	Instantaneous flow unit L/min	Accumulated flow unit L
 [STD] turns on.	 [L] and [/min] turn on.	 [L] turns on. At the upper right of the display, the index [x10³] or [x10⁶] will turn on based on the accumulated flow.
Normal condition (nor)	**Instantaneous flow unit CFM**	**Accumulated flow unit ft³**
 [STD] turns off.	 [L] turns off and [/min] turns on.	 [L] turns off. At the upper right of the display, the index [x10³] or [x10⁶] will turn on based on the accumulated flow.

⚠ Safety Instructions

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

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

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

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

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

⚠ Warning

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

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

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

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

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

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

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

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

⚠ Caution

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

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

Limited warranty and Disclaimer

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

***2) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

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

⚠ Caution

SMC products are not intended for use as instruments for legal metrology.

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

UNIT CONVERSIONS

	unit	conversion	result		unit	conversion	result
length	m	x 3.28	psi	pressure	MPa	x 145	psi
	mm	x 0.04	psi		kPa	÷ 6.895	psi
mass	g	x 0.04	°F	temperature	°C	x1.8 then add 32	°F
volume	cm^3	÷ 16.387	ft-lb	torque	N·m	x 0.738	ft-lb
	L	x 61.024	lbf	force	N	÷ 4.448	lbf
speed	mm/s	÷ 25.4	cfm	flow	L/min	÷ 28.317	cfm

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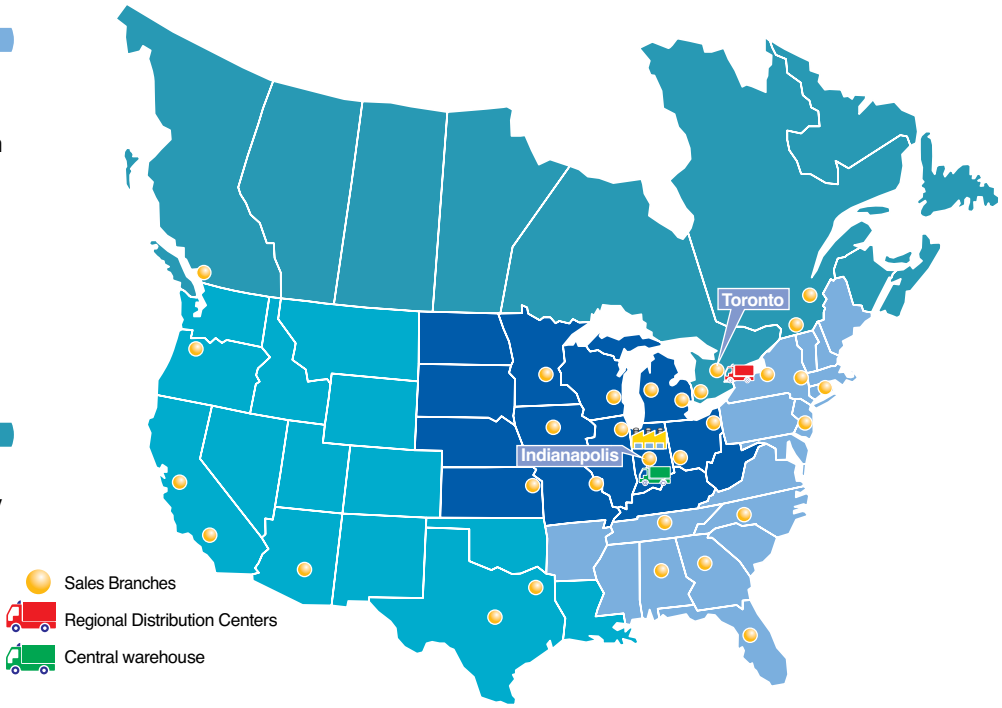

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