Digital Flow Switch for Air

PF2A Series

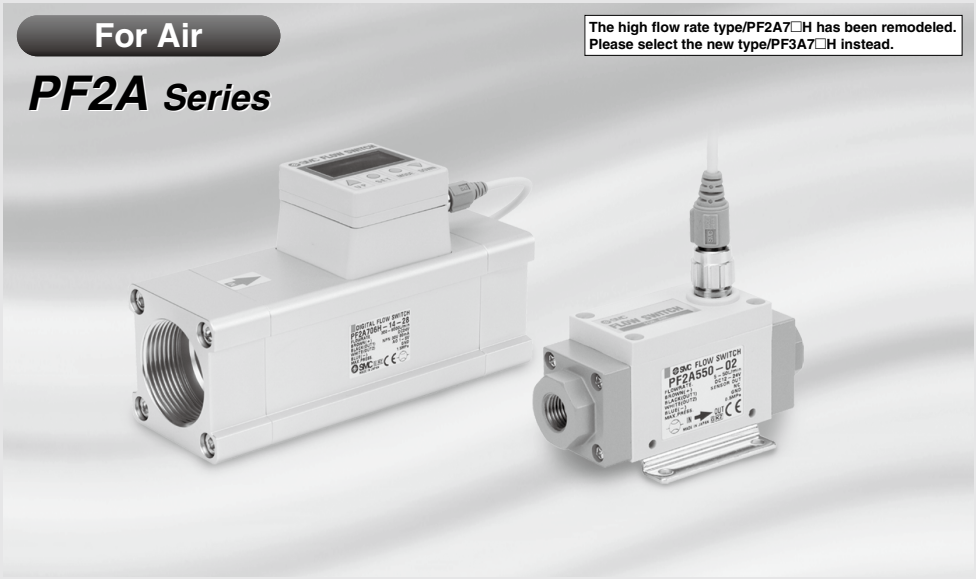
CE

RoHS

For Air

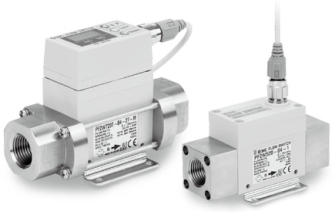
***PF2A* Series**

The high flow rate type/PF2A7□H has been remodeled. Please select the new type/PF3A7□H instead.



4-channel Flow Monitor

***PF2□200* Series**



For Water ***PF2W* Series**

New digital flow switch product, **PF3W series**, with the **compact design and expanded flow rate range** has been launched. Please examine to use **PF3W series (page 329)**. For details about PF2W series, refer to the catalog at SMC website.

1 *Flow rate setting and monitoring are possible with the digital display.*

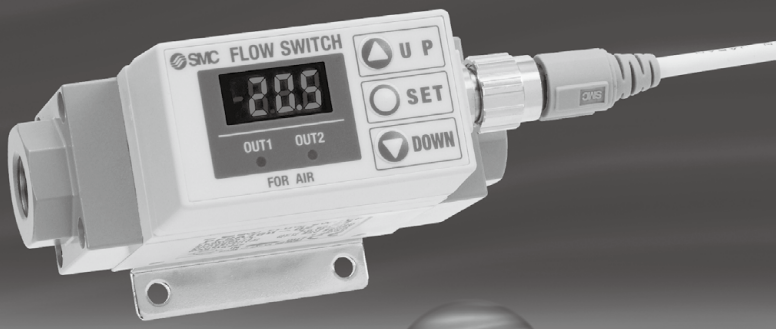
2 *Two types are available: Integrated and Remote type.*

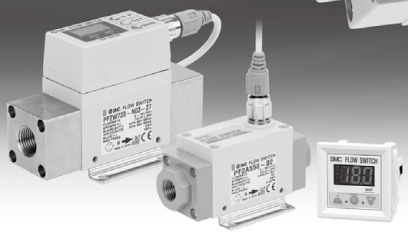
3 *Three types of output: Switch, accumulated pulse, and analog outputs.*

4 *Switching from instantaneous flow rate to accumulated flow is possible.*
(Accumulated flow rate is reset when the power supply turns OFF.)

5 *Two independent flow rate settings are possible.*

6 *Water resistant construction conforming to IP65*



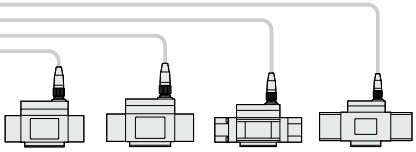


For Air
PF2A Series

A single controller can monitor the flow rate of 4 different sensors.

4 independent flow rate ranges can be monitored by a single controller.

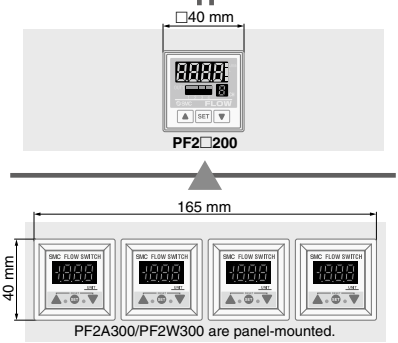
4-channel Flow Monitor
PF2□200 Series



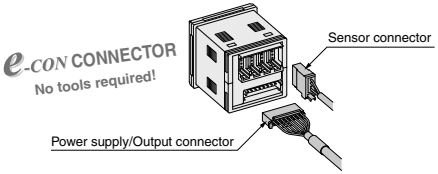
76% reduced intallation space

(Compared with a PF2A3□□ and PF2W3□□, when panel mounted.)

Reduced panel fitting labor



Connection

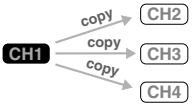


Function

Copy function

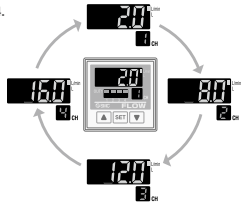
Possible to copy information from one channel to one or more other channels.

Copying CH1 setting to CH2, 3 and 4.



Channel scan function

Allows constant monitoring of the displayed pressure value for each channel.

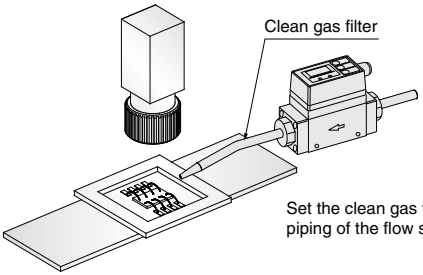


- **Keylock function**
- **Unit switching function**
- **Peak value and lowest value holding**

SMC

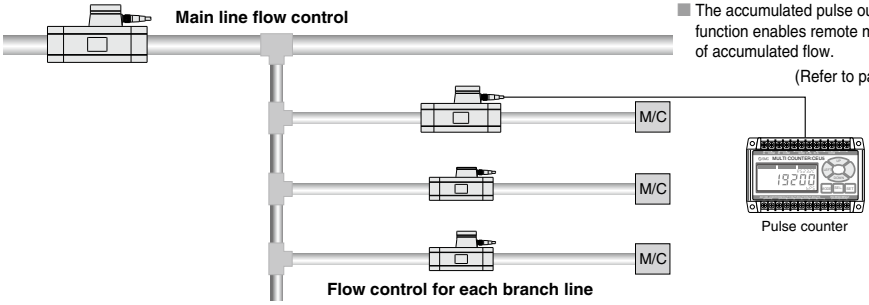
Application Examples

Flow control of N_2 gas to prevent detection camera shimmering and lead frame oxidation



Set the clean gas filter on the outlet side piping of the flow switch.

Makes it possible to monitor the air flow from the main line to each branch line.



■ The accumulated pulse output function enables remote monitoring of accumulated flow.

(Refer to page 327.)

For Air
Digital Flow Switch
PF2A Series

CE RoHS

How to Order

Integrated Display Type **PF2A7 10 – □ 01 – 27 □ – M**

Flow rate range

10	1 to 10 L/min
50	5 to 50 L/min
11	10 to 100 L/min
21	20 to 200 L/min
51	50 to 500 L/min

Thread type

Nil	Rc
N	NPT
F	G*

* Conforming to ISO228-1.

Port size

Symbol	Port size	Flow rate (L/min) 10	50	100	200	500	Applicable model
01	1/8	●	●				PF2A710/750
02	1/4	●	●				
03	3/8			●	●		PF2A711/721
04	1/2					●	PF2A751

Output specifications

Symbol	Output specification
27	NPN open collector 2 outputs
67	PNP open collector 2 outputs

Lead wire (Refer to page 326.)

Symbol	Lead wire with M12 connector (3 m)
N	Without lead wire

Unit specifications

Nil	With unit switching function Note1)
M	Fixed SI unit Note2)

Note1) Under Japan's new Measurement Act, this is only for overseas sales (SI units are to be used inside Japan).

Note2) Fixed units: Instantaneous flow rate: L/min Accumulated flow: L

Specifications

Refer to pages 202 and 203 for Flow Switch Precautions. For details about the Specific Product Precautions, refer to the Operation Manual on the SMC website, http://www.smcworld.com Click here for details.

Model		PF2A710	PF2A750	PF2A711	PF2A721	PF2A751
Measured fluid		Air, Nitrogen				
Flow rate measurement range		0.5 to 10.5 L/min	2.5 to 52.5 L/min	5 to 105 L/min	10 to 210 L/min	25 to 525 L/min
Set flow rate range		0.5 to 10.5 L/min	2.5 to 52.5 L/min	5 to 105 L/min	10 to 210 L/min	25 to 525 L/min
Rated flow range		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
Minimum set unit		0.1 L/min	0.5 L/min	1 L/min	2 L/min	5 L/min
Accumulated pulse flow rate exchange value (Pulse width: 50 ms)		0.1 L/pulse	0.5 L/pulse	1 L/pulse	2 L/pulse	5 L/pulse
Display units (Note 1, 2)	Instantaneous flow rate	L/min, CFM x 10^{-2}		L/min, CFM x 10^{-1}		
	Accumulated flow	L, ft^3 x 10^{-1}				
Operating fluid temperature		0 to 50°C				
Accuracy Note 3)		±5% F.S.				
Repeatability		±1% F.S.		±2% F.S.		
Temperature characteristics		±3% F.S. (15 to 35°C, 25°C reference), ±5% F.S. (0 to 50°C, 25°C reference)				
Current consumption		150 mA or less		160 mA or less		170 mA or less
Weight Note 4)		250 g		290 g		
Port size (Rc, NPT, G)		1/8, 1/4		3/8		1/2
Detection type		Heater type				
Indicator light		3-digit, 7-segment LED				
Operating pressure range		–50 kPa to 0.5 MPa		–50 kPa to 0.75 MPa		
Proof pressure		1.0 MPa				
Accumulated flow range Note 5)		0 to 999999 L				
Output specifications (Note 6)	Switch output	NPN open collector	Maximum load current: 80 mA; Internal voltage drop: 1 V or less (with load current of 80 mA) Maximum applied voltage: 30 V; 2 outputs			
		PNP open collector	Maximum load current: 80 mA Internal voltage drop: 1.5 V or less (with load current of 80 mA); 2 outputs			
	Accumulated pulse output	NPN or PNP open collector (same as switch output)				
Status LED's		Lights up when output is turned ON OUT1: Green; OUT2: Red				
Response time		1 sec. or less				
Hysteresis		Hysteresis mode: Variable (can be set from 0), Window comparator mode Note 7): 3-digit fixed				
Power supply voltage		12 to 24 VDC ±10%				
Environment	Enclosure	IP65				
	Operating temperature range	Operating: 0 to 50°C, Stored: –25 to 85°C (with no freezing and condensation)				
	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				
Standards and regulations		CE, RoHS				

Note 1) For digital flow switch with unit switching function. (Fixed SI unit [(L/min, or L, m^3 or m^3 x 10^3)] will be set for switch type without the unit switching function.)
Note 2) Flow rate display can be switched between the basic condition of 0°C, 101.3 kPa and the standard condition (ANR) of 20°C, 101.3 kPa, and 65% RH.
Note 3) The piping on the IN side must have a straight section of piping whose length is 8 times the piping diameter or more. If a straight section of piping is not installed, the accuracy may vary by ±5% F.S. or more.
Note 4) Without lead wire.
Note 5) Accumulated flow rate is reset when the power supply turns OFF.
Note 6) Switch output and accumulated pulse output can be selected during initial setting.
Note 7) Window comparator mode — Since hysteresis will reach 3 digits, keep P_1 and P_2 or n_1 and n_2 apart by 7 digits or more. (In case of output OUT2, n_1, 2 to be n_3, 4 and P_1, 2 to be P_3, 4.)
Note 8) The flow switch conforms to the CE marking.
Note 9) For details about wiring and thread type, refer to the Operation Manual that can be downloaded from SMC website (http://www.smcworld.com).
Note 10) Any products with tiny scratches, smears, or display color variation or brightness which does not affect the performance are verified as conforming products.

Set Flow Rate Range and Rated Flow Range

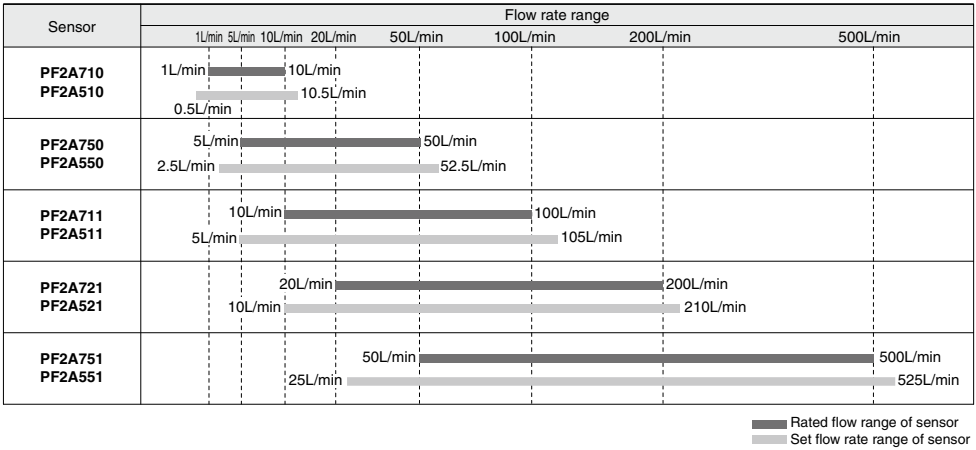
Set the flow rate within the rated flow range.

The set flow range is the range of flow rate that is possible in setting.

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

It is possible to set a value outside off the rated flow range, however, the specification is not be guaranteed.

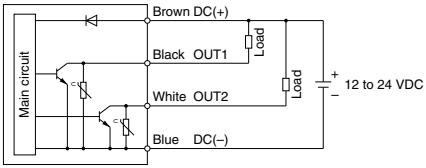
<For Air/PF2A>



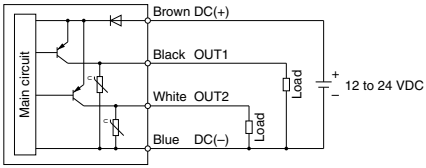
Internal Circuits and Wiring Examples

PF2A7□□

-27
NPN (2 outputs)



-67
PNP (2 outputs)



How to Order

Remote Type Sensor Unit **PF2A5 10 – □ 01 □ – □ – C**

Flow rate range

10	1 to 10 L/min
50	5 to 50 L/min
11	10 to 100 L/min
21	20 to 200 L/min
51	50 to 500 L/min

Thread type

Nil	Rc
N	NPT
F	G*

* Conforming to ISO228-1.

Port size

Symbol	Port size	Flow rate (L/min) 10	50	100	200	500	Applicable model
01	1/8	●	●				PF2A510/550
02	1/4	●	●				
03	3/8			●	●		PF2A511/521
04	1/2					●	PF2A551

Lead wire (Refer to page 326.)

Nil	Lead wire with M12 connector (3 m)
N	Without lead wire

Option (Only for output specifications "1")
(Refer to page 326.)

Nil	None
C	e-con connector (1 pc.)

The cable and connector are shipped unassembled.

Output specifications

Symbol	Specification	Applicable monitor unit model
Nil	Output for monitor unit	PF2A300 series
1	Output for monitor unit + analog output (1 to 5 V)	PF2A200/300 series
2	Output for monitor unit + analog output (4 to 20 mA)	PF2A300 series

Specifications

Refer to pages 202 and 203 for Flow Switch Precautions. For details about the Specific Product Precautions, refer to the Operation Manual on the SMC website, http://www.smcworld.com Click here for details.

Model		PF2A510	PF2A550	PF2A511	PF2A521	PF2A551
Measured fluid		Air, Nitrogen				
Detection type		Heater type				
Rated flow range		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
Operating pressure range		–50 kPa to 0.5 MPa		–50 kPa to 0.75 MPa		
Proof pressure		1.0 MPa				
Operating fluid temperature		0 to 50°C				
Accuracy Note 1, 2)		±5% F.S.				
Repeatability Note 1)		±1% F.S. (Connected with PF2A3□□), ±3%F.S. (Connected with PF2A2□□)				
Temperature characteristics		±2% F.S. (15 to 35°C, 25°C reference) ±3% F.S. (0 to 50°C, 25°C reference)				
Output specifications Note 3)	Output for monitor unit	Analog voltage output (non-linear) output impedance 1 kΩ output for monitor unit PF2A3□□				
	Analog output	Voltage output 1 to 5 V (within the flow rate range) Accuracy: ±5%F.S., Min. load impedance: 100 kΩ (Output impedance: 1 kΩ)				
		Current output 4 to 20 mA (within the flow rate range) Accuracy: ±5%F.S., Max. load impedance: 300 Ω or less (at 12 VDC), 600 Ω or less (at 24 VDC)				
Power supply voltage		12 to 24 VDC ±10%				
Current consumption		100 mA or less				110 mA or less
Environment	Enclosure	IP65				
	Operating temperature range	Operating: 0 to 50°C, Stored: –25 to 85°C (with no freezing and condensation)				
	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				
Standards and regulations		CE, RoHS				
Weight Note 4)		200 g		240 g		
Port size (Rc, NPT, G)		1/8, 1/4		3/8		1/2

Note 1) The system accuracy when combined with PF2A2□□/3□□.
Note 2) The piping on the IN side must have a straight section of piping whose length is 8 times the piping diameter or more. If a straight section of piping is not installed, the accuracy may vary by ±5% F.S. or more.
Note 3) Output system can be selected during initial setting.
Note 4) Without lead wire. (Add 20 g for the types of analog output whether voltage or current output selected.)
Note 5) Flow rate unit measured under the following conditions: 0°C and 101.3 kPa.
Note 6) The sensor unit conforms to the CE marking.
Note 7) For details about wiring and thread type, refer to the Operation Manual that can be downloaded from SMC website (http://www.smcworld.com).
Note 8) Any products with tiny scratches, smears, or display color variation or brightness which does not affect the performance are verified as conforming products.

How to Order

Remote Type Monitor Unit

PF2A3 [0] [0] – A – [M]

Flow rate range

Symbol	Flow rate range	Type for sensor unit
0	1 to 10 L/min	PF2A510
	5 to 50 L/min	PF2A550
1	10 to 100 L/min	PF2A511
	20 to 200 L/min	PF2A521
	50 to 500 L/min	PF2A551

Output specifications

Symbol	Output specification	Applicable model
0	NPN open collector 2 outputs	PF2A300, 310
1	PNP open collector 2 outputs	PF2A301, 311

Mounting

A	Panel mounting

Unit specifications

Nil	With unit switching function Note1)
M	Fixed SI unit Note2)

Note1) Since the unit for Japan is fixed to SI due to new measurement law, this option is for overseas.

Note2) Fixed units:
Instantaneous flow rate: L/min
Accumulated flow: L

Specifications

Refer to pages 202 and 203 for Flow Switch Precautions. For details about the Specific Product Precautions, refer to the Operation Manual on the SMC website, http://www.smcworld.com Click here for details.

Model		PF2A300/301		PF2A310/311		
Flow rate measurement range Note 1)		0.5 to 10.5 L/min	2.5 to 52.5 L/min	5 to 105 L/min	10 to 210 L/min	25 to 525 L/min
Set flow rate range Note 1)		0.5 to 10.5 L/min	2.5 to 52.5 L/min	5 to 105 L/min	10 to 210 L/min	25 to 525 L/min
Minimum set unit Note 1)		0.1 L/min	0.5 L/min	1 L/min	2 L/min	5 L/min
Accumulated pulse flow rate exchange value (Pulse width: 50 ms) Note 1)		0.1 L/pulse	0.5 L/pulse	1 L/pulse	2 L/pulse	5 L/pulse
Note 2, 3) Display units	Instantaneous flow rate	L/min, CFM x 10^{-2}		L/min, CFM x 10^{-1}		
	Accumulated flow	L, ft^3 x 10^{-1}				
Accumulated flow range Note 4)		0 to 999999 L				
Accuracy Note 5)		±5% F.S.				
Repeatability Note 5)		±1% F.S.				
Temperature characteristics		±1% F.S. (15 to 35°C, 25°C reference) ±2% F.S. (0 to 50°C, 25°C reference)				
Current consumption		50 mA or less		60 mA or less		
Weight		45 g				
Output specifications Note 6)	Switch output	NPN open collector (PF2A300, PF2A310)		Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA) Maximum applied voltage: 30 V 2 outputs		
		PNP open collector (PF2A301, PF2A311)		Maximum load current: 80 mA Internal voltage drop: 1.5 V or less (with load current of 80 mA) 2 outputs		
	Accumulated pulse output	NPN or PNP open collector (same as switch output)				
Indicator light		3-digit, 7-segment LED				
Status LED's		Lights up when output is turned ON OUT1: Green; OUT2: Red				
Power supply voltage		12 to 24 VDC ±10%				
Response time		1 sec. or less				
Hysteresis		Hysteresis mode: Variable (can be set from 0), Window comparator mode Note 7): Fixed (3-digits)				
Environment	Enclosure	IP40				
	Operating temperature range	Operating: 0 to 50°C, Stored: –25 to 85°C (with no freezing and condensation)				
	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				
Standards and regulations		CE, RoHS				

Note 1) The flow rate measurement range can be modified depending on the setting.
Note 2) For digital flow switch with unit switching function. (Fixed SI unit [L/min or L] will be set for switch types without the unit switching function.)
Note 3) Flow rate display can be switched between the basic condition of 0°C, 101.3 kPa and the standard condition (ANR) of 20°C, 101.3 kPa, and 65% RH.
Note 4) Accumulated flow rate is reset when the power supply turns OFF.
Note 5) The system accuracy when combined with PF2A5□□.
Note 6) Switch output and accumulated pulse output can be selected during initial setting.
Note 7) Window comparator mode — Since hysteresis will reach 3 digits, keep P_1 and P_2 or n_1 and n_2 apart by 7 digits or more. (In case of output OUT2, n_1, 2 to be n_3, 4 and P_1, 2 to be P_3, 4.)
Note 8) The monitor unit conforms to the CE marking.
Note 9) For details about wiring, refer to the Operation Manual that can be downloaded from SMC website (http://www.smcworld.com).
Note 10) Any products with tiny scratches, smears, or display color variation or brightness which does not affect the performance are verified as conforming products.

How to Order

CE RoHS

4-channel Flow Monitor
Remote Type Monitor Unit

PF2A20 0 – M □ □

Output specifications

0	NPN 4 outputs
1	PNP 4 outputs

Unit specifications

Nil	With unit switch function Note 1)
M	Fixed SI unit Note 2)

Note1) Under the new Measurement Act, devices with unit switching functions cannot be used inside Japan.
Note2) Fixed units:
Instantaneous flow rate: L/min
Accumulated flow: L

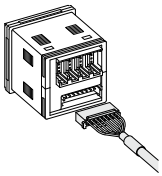
Option 2 (Refer to page 326.)

Nil	None
4C	Sensor connector (4 pc.)

Option 1 (Refer to page 326.)

Nil	None
A	Panel mounting
B	Front protective cover + Panel mounting

Accessory/Power supply output cable (2 m)



Connectable remote type sensor unit is PF2A5□□-□-1 (with analog output 1 to 5 V).

Specifications

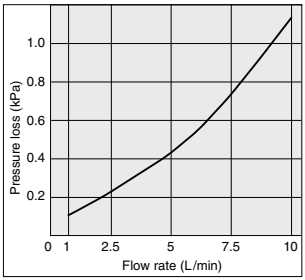
Refer to pages 202 and 203 for Flow Switch Precautions. For details about the Specific Product Precautions, refer to the Operation Manual on the SMC website, http://www.smcworld.com Click here for details.

Model		PF2A200/201				
Applicable flow rate sensor		PF2A510-□-1	PF2A550-□-1	PF2A511-□-1	PF2A521-□-1	PF2A551-□-1
Flow rate measurement range Note 1)		0.5 to 10.5 L/min	2.5 to 52.5 L/min	5 to 105 L/min	10 to 210 L/min	25 to 525 L/min
Set flow rate range Note 1)		0.5 to 10.5 L/min	2.5 to 52.5 L/min	5 to 105 L/min	10 to 210 L/min	25 to 525 L/min
Minimum set unit Note 1)		0.1 L/min	0.5 L/min	1 L/min	2 L/min	5 L/min
Accumulated pulse flow rate exchange value (Pulse width: 50 ms) Note 1)		0.1 L/pulse	0.5 L/pulse	1 L/pulse	2 L/pulse	5 L/pulse
Note 1, 2) Display units	Instantaneous flow rate	L/min, CFM x 10^{-2}		L/min, CFM x 10^{-1}		
	Accumulated flow	L, ft^3 x 10^{-2}		L, ft^3 x 10^{-1}		
Accumulated flow range Note 1)		0 to 999999 L, 0 to 999999 ft^3 x 10^{-2}		0 to 999999 L, 0 to 999999 ft^3 x 10^{-1}		
Power supply voltage		24 VDC ±10% (With power supply polarity protection)				
Current consumption		55 mA or less (Not including the current consumption of the sensor)				
Power supply voltage for sensor		Same as [Power supply voltage]				
Power supply current for sensor Note 3)		Max. 110 mA (However, the total current for the 4 inputs is 440 mA maximum or less.)				
Sensor input		1 to 5 VDC (Input impedance: Approx. 800K Ω)				
	No. of inputs	4 inputs				
	Input protection	Excess voltage protection				
Output specifications Note 4)	Switch output (Real-time switch output, Accumulated switch output)	NPN open collector (PF2A200)	Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA) Maximum applied voltage: 30 V			
		PNP open collector (PF2A201)	Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA)			
	Accumulated pulse output	NPN open collector or PNP open collector (same as switch output)				
	No. of outputs	4 outputs (1 output per 1 sensor input)				
	Output protection	With short circuit protection				
Hysteresis		Hysteresis mode: Variable (can be set from 0), Window comparator mode: Fixed (3-digits)				
Response time Note 5)		1s or less				
Accuracy Note 5)		±5% F.S.				
Repeatability Note 5)		±3% F.S.				
Temperature characteristics		±2% F.S. (0 to 50°C, 25°C reference)				
Display method		For measured value display: 4-digits, 7-segment LED (Orange) For channel display: 1-digit, 7-segment LED (Red)				
Status LED's		Lights up when output is turned ON OUT1: Red				
Environment	Enclosure	IP65 for the front face only, and IP40 for the remaining parts.				
	Operating temperature range	Operating: 0 to 50°C, Stored: –10 to 60°C (with no freezing and condensation)				
	Operating humidity range	Operating or Stored: 35 to 85%RH (with no condensation)				
Standards and regulations		CE, RoHS				
Connection		Power supply/Output connection: 8P connector, Sensor connection: 4P connector (e-con)				
Material		Housing: PBT, Monitor: PET, Backside rubber: CR				
Weight		60 g (Except for any accessories that are shipped together)				

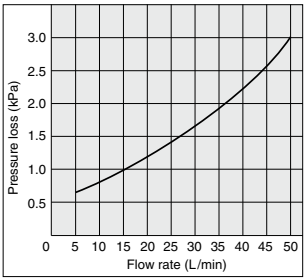
Note 1) Fixed SI unit [L/min or L] will be set for switch types without the unit switching function. ("-M" is suffixed at the end of part number.) Accumulated flow is reset when the power supply turns OFF.
Note 2) Flow rate display can be switched between the basic condition of 0°C, 101.3 kPa and the standard condition (ANR) of 20°C, 101.3 kPa, and 65% RH.
Note 3) If Vcc side on sensor input connector part is short-circuited with the 0V side, the flow monitor inside will be damaged.
Note 4) Switch output and accumulated pulse output can be selected during initial setting.
Note 5) The system accuracy when combined with an applicable flow sensor.
Note 6) This product conforms to the CE marking.
Note 7) For details about wiring, refer to the Operation Manual that can be downloaded from SMC website (http://www.smcworld.com).
Note 8) Any products with tiny scratches, smears, or display color variation or brightness which does not affect the performance are verified as conforming products.

Flow Rate Characteristics (Pressure Loss)

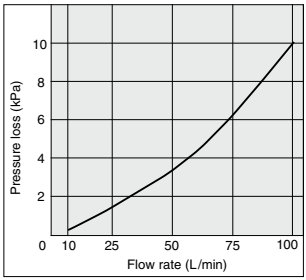
PF2A710, 510



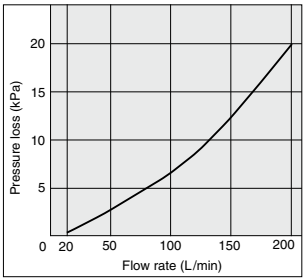
PF2A750, 550



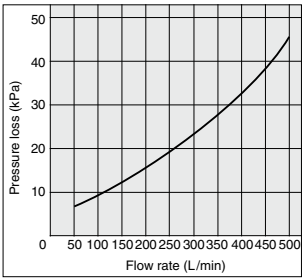
PF2A711, 511



PF2A721, 521

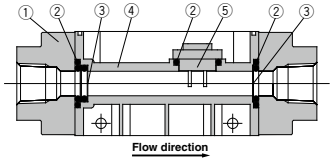


PF2A751, 551

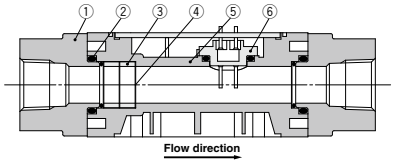


Wetted Parts Construction/Sensor Unit

PF2A710/750
PF2A510/550



PF2A711/721/751
PF2A511/521/551



Parts list

No.	Description	Material
1	**Attachment**	ADC
2	**Seal**	NBR
3	**Mesh**	Stainless steel
4	**Body**	PBT
5	**Sensor**	PBT

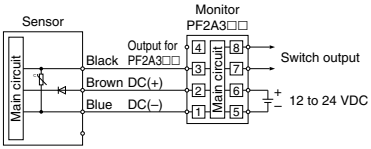
Parts list

No.	Description	Material
1	**Attachment**	ADC
2	**Seal**	NBR
3	**Spacer**	PBT
4	**Mesh**	Stainless steel
5	**Body**	PBT
6	**Sensor**	PBT

Internal Circuits and Wiring Examples

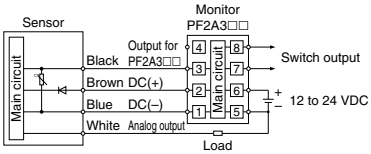
For PF2A5□□/PF2A3

Nil



-1/2

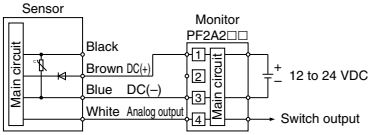
Analog voltage output
Analog current output



For PF2A5□□/PF2A2

-1

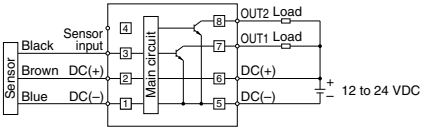
Analog voltage output



PF2A3□

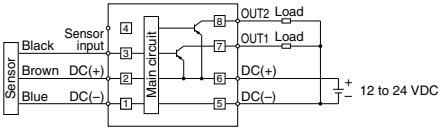
-0

NPN (2 outputs)



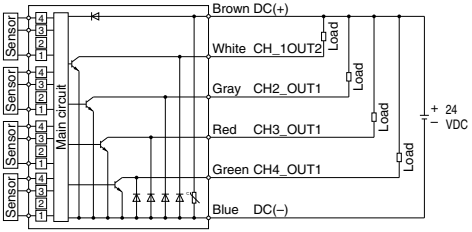
-1

PNP (2 outputs)



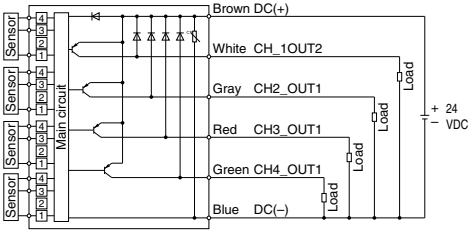
PF2A200

NPN (4 outputs)



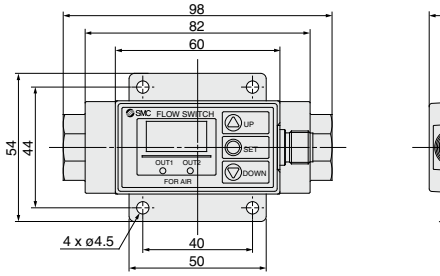
PF2A201

PNP (4 outputs)

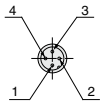


Dimensions: Integrated Display Type For Air

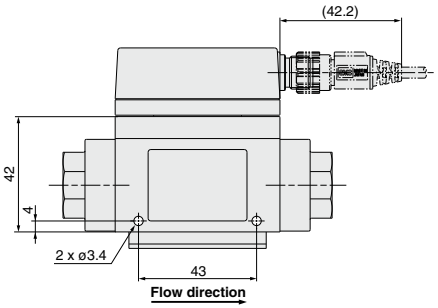
PF2A710, 750



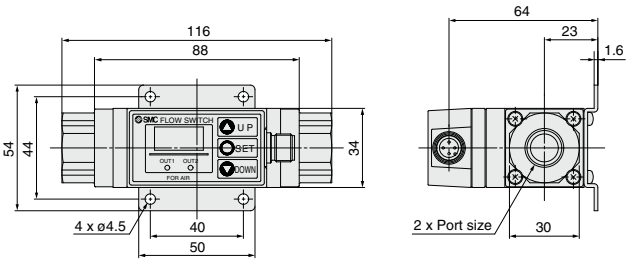
Connector pin numbers

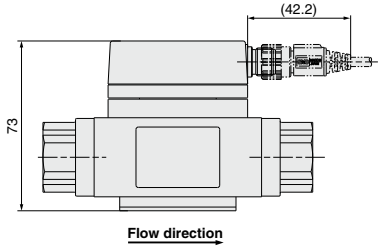


Pin no.	Pin description
1	DC(+)
2	OUT2
3	DC(–)
4	OUT1



PF2A711, 721, 751

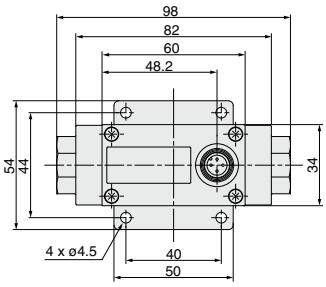


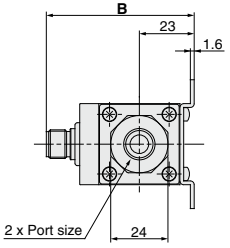


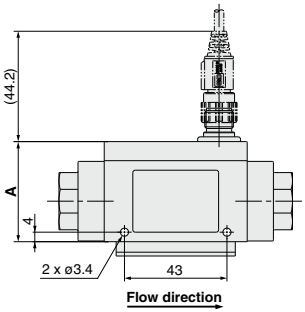
Be sure to allow straight pipe length that is minimum 8 times the port size upstream and downstream of the switch piping.

Dimensions: Remote Type Sensor Unit **For Air**

PF2A510, 550







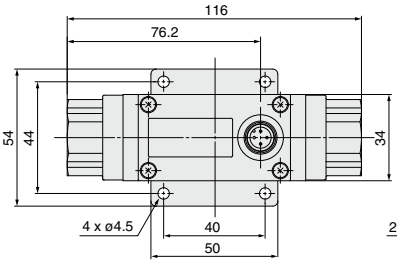
(mm)

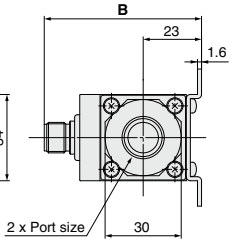
Output specifications	A	B
Output for monitor unit only	42	62
Output for monitor unit + Analog output	52	72

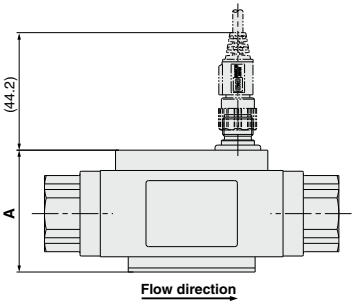
Connector pin numbers

Pin no.	Pin description
1	DC(+)
2	NC/Analog output
3	DC(–)
4	OUT

PF2A511, 521, 551





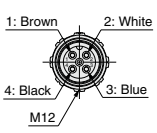


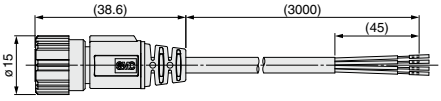
(mm)

Output specifications	A	B
Output for monitor unit only	48	62
Output for monitor unit + Analog output	58	72

Be sure to allow straight pipe length that is minimum 8 times the port size upstream and downstream of the switch piping.

ZS-37-A
Lead wire with M12 connector



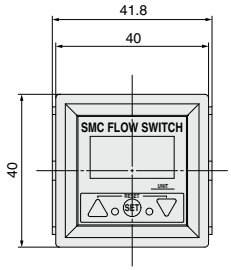


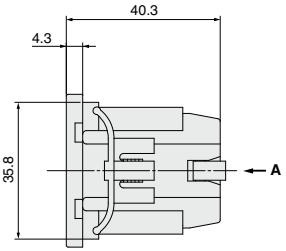
Lead Wire Specifications

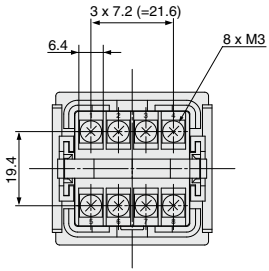
Conductor	Nominal cross section	AWG23
	O.D.	Approx. 0.7 mm
Insulator	Material	Cross-linked vinyl
	O.D.	Approx. 1.1 mm
	Color	Brown, White, Black, Blue
Sheath	Material	Oil-resistant vinyl
Finished O.D.	ø4	

Dimensions: Remote Type Monitor Unit For Air

PF2A3□□-A
Panel mount adapter type

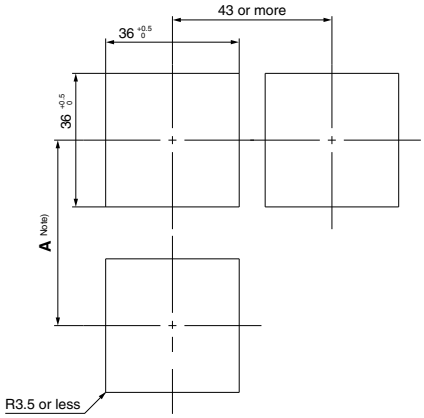






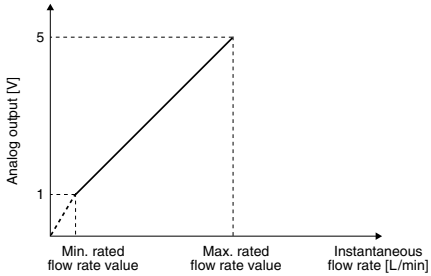
View A

Panel fitting dimensions



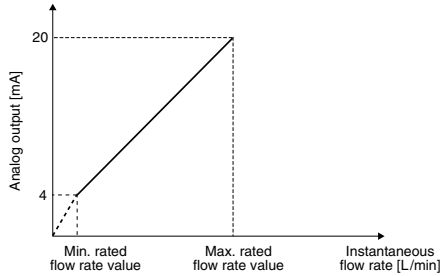
Note) Decide the length of A taking into account the size of terminal you use.
∗ The applicable panel thickness is 1 to 3.2 mm.

Analog output
1 to 5 VDC



Part no.	Normal condition		Standard condition	
	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2A510-□-1	1	10	1.1	10.7
PF2A550-□-1	5	50	5.4	53.5
PF2A511-□-1	10	100	11	107
PF2A521-□-1	20	200	21	214
PF2A551-□-1	50	500	54	535

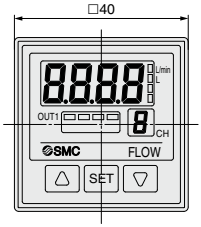
4 to 20 mA DC

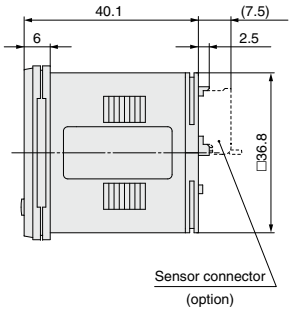


Part no.	Normal condition		Standard condition	
	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2A510-□-2	1	10	1.1	10.7
PF2A550-□-2	5	50	5.4	53.5
PF2A511-□-2	10	100	11	107
PF2A521-□-2	20	200	21	214
PF2A551-□-2	50	500	54	535

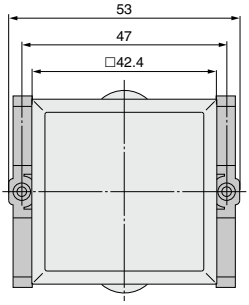
Dimensions: Remote Type Monitor Unit For Air (4-channel Flow Monitor)

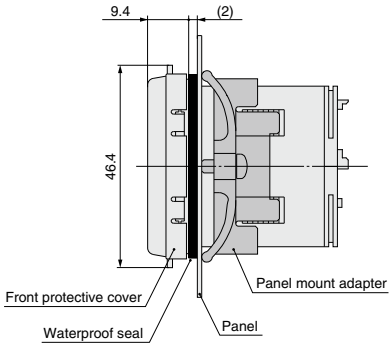
PF2A200, 201



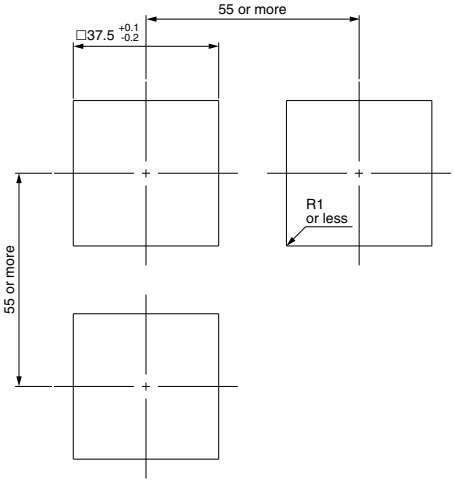


Front protective cover + Panel mount adapter



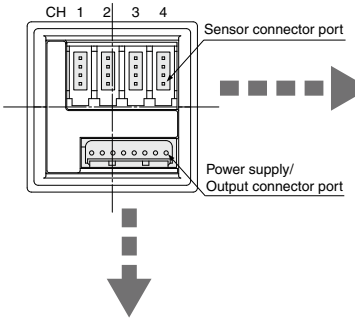


Panel fitting dimensions



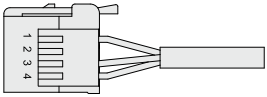
∗ Applicable panel thickness: 0.5 to 8 mm

Dimensions: Remote Type Monitor Unit **For Air** (4-channel Flow Monitor)



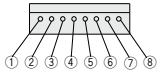
Sensor connector (4P x 4)

Connector (option)



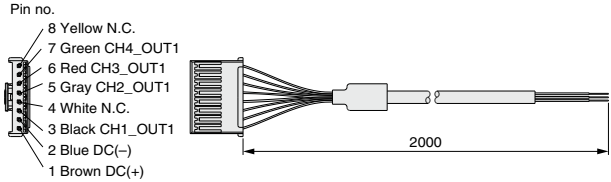
Pin no.	Terminal	Connector no.	Cable wire color
①	DC+	1	Brown
②	N.C.	2	Not used
③	DC–	3	Blue
④	IN: 1 to 5 V	4	White

Power supply/Output connector (8P)



Pin no.	Terminal
①	DC (+)
②	DC (–)
③	CH1_OUT1
④	N.C.
⑤	CH2_OUT1
⑥	CH3_OUT1
⑦	CH4_OUT1
⑧	N.C.

Power supply/Output connector (accessory)



Cable Specifications

No. of cable wire		8
Conductor	**Nominal cross-sectional area**	0.15 mm^2
	Dimension	Approx. 0.5 mm
Insulator	**Dimension**	Approx. 0.9 mm Brown, White, Blue, Black, Gray, Red, Green, Yellow
Sheath	**Material**	Heat-resistant polyethylene
	O.D.	4.8 mm

For Air

Digital Flow Switch/High Flow Rate Type

PF2A Series

CE RoHS

The high flow rate type/PF2A7□H has been remodeled. Please select the new type/PF3A7□H instead.

How to Order

Integrated Display Type **PF2A7 □H - □□ - □□ - M - □**

Flow rate range

03	150 to 3000 L/min
06	300 to 6000 L/min
12	600 to 12000 L/min

High flow rate type

Port specifications

Nil	Rc
N	NPT
F	G*

* Conforming to ISO228-1.

Port size

Symbol	Port size	Flow rate (L/min) 3000	6000	12000	Applicable model
10	1	●			PF2A703H
14	1 1/2		●		PF2A706H
20	2			●	PF2A712H

Output specifications

28	NPN open collector 1 output + Analog output (1 to 5 V)
29	NPN open collector 1 output + Analog output (4 to 20 mA)
68	PNP open collector 1 output + Analog output (1 to 5 V)
69	PNP open collector 1 output + Analog output (4 to 20 mA)

Switching of switch output and accumulated pulse output is possible with NPN or PNP open collector outputs.

Lead wire (Refer to page 326.)

Nil	Lead wire with M12 connector (3 m)
N	Without lead wire

Made to Order

X795	Wide range

Refer to page 323 for details.

Unit specifications

Nil	With unit switching function Note1)
M	Fixed SI unit Note2)

Note1) Under Japan's new Measurement Act, this is only for overseas sales (SI units are to be used inside Japan).

Note2) Fixed units:
Instantaneous flow rate: L/min
Accumulated flow: L, m^3, $m^3 \times 10^3$

Specifications

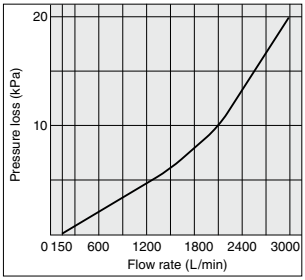
Refer to pages 202 and 203 for Flow Switch Precautions. For details about the Specific Product Precautions, refer to the Operation Manual on the SMC website, http://www.smcworld.com Click here for details.

Model		PF2A703H	PF2A706H	PF2A712H
Measured fluid		Dry air, Nitrogen		
Detection type		Heater type		
Rated flow range Note 1)		150 to 3000 L/min	300 to 6000 L/min	600 to 12000 L/min
Minimum set unit Note 1)		5 L/min	10 L/min	
Display units Note 2)	Instantaneous flow rate	L/min, CFM		
	Accumulated flow	L, m^3, $m^3 \times 10^3$, ft^3, $ft^3 \times 10^3$, $ft^3 \times 10^6$		
Operating pressure range		0.1 to 1.5 MPa		
Proof pressure		2.25 MPa		
Pressure loss		20 kPa (at maximum flow rate)		
Accumulated flow range Note 3)		0 to 9,999,999,999 L		
Accuracy Note 4, 5)		±1.5% F.S. (0.7 MPa, at 20°C)		
Repeatability		±1.0% F.S. (0.7 MPa, at 20°C), ±3.0% of F.S. in case of analog output		
Pressure characteristics		±1.5% F.S. (0.1 to 1.5 MPa, 0.7 MPa reference)		
Temperature characteristics		±2.0% F.S. (0 to 50°C, 25°C reference)		
Output specifications	Switch output Note 6)	NPN open collector Max. load current: 80 mA; Max. applied voltage: 30 V; Internal voltage drop: 1 V or less (with load current of 80 mA)		
		PNP open collector Max. load current: 80 mA; Internal voltage drop: 1.5 V or less (with load current of 80 mA)		
	Accumulated pulse output Note 6)	NPN or PNP open collector	Flow rate per pulse: 100 L/pulse, 10.0 ft^3/pulse ON time per pulse width: 50 msec	
	Analog output Note 7)	Output voltage: 1 to 5 V; Min. load impedance: 100 kΩ (Output impedance: 1 kΩ)		
		Output current: 4 to 20 mA; Max. load impedance: 250 Ω		
Response time		1 sec. or less		
Hysteresis		Hysteresis mode: Variable (can be set from 0); Window comparator mode: (can be set from 0 to 3% F.S.)		
Power supply voltage		24 VDC ±10%		
Current consumption		150 mA or less		
Environment	Enclosure	IP65		
	Operating temperature range	0 to 50°C (with no freezing and condensation)		
	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		
	Noise resistance	1000 Vp-p, Pulse width 1 μs, Rise time 1 ns		
Standards and regulations		CE, RoHS		
Weight		1.1 kg (without lead wire)	1.3 kg (without lead wire)	2.0 kg (without lead wire)
Port size (Rc, NPT, G)		1	1 1/2	2

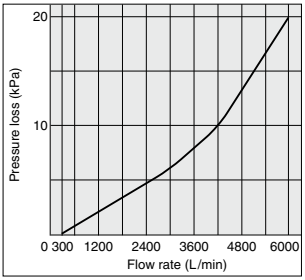
Note 1) Flow rate display can be switched between the basic condition of 0°C, 101.3 kPa and the standard condition (ANR) of 20°C, 101.3 kPa, and 65% RH.
Note 2) For digital flow switch with unit switching function. (Fixed SI unit [(L/min, or L, m^3 or $m^3 \times 10^3$)] will be set for switch type without the unit switching function.)
Note 3) Accumulated flow rate is reset when the power supply turns OFF. It is possible to select a function that holds the accumulated value so it is not reset. In such cases, data is written on EEPROM (electrically erasable programmable read-only memory) at approximately four-minute intervals. When using, please take into consideration that the EEPROM writing is guaranteed up to 1 million times (four minutes x 1 million = 4 million ≅ 7.9 years).
Note 4) The piping on the IN side must have a straight section of piping whose length is 8 times the piping diameter or more. If a straight section of piping is not installed, the accuracy may vary by ±1.5% F.S. or more.
Note 5) The high flow rate type is CE marking compatible; however, the linearity with applied noise is ±5% F.S. or less.
Note 6) Switch output and accumulated pulse output selections are made using the button controls. Note 7) The analog output operates only for instantaneous flow rate, and does not operate for accumulated flow.
Note 8) For details about wiring and thread type, refer to the Operation Manual that can be downloaded from SMC website (http://www.smcworld.com).
Note 9) Any products with tiny scratches, smears, or display color variation or brightness which does not affect the performance are verified as conforming products.

Flow Rate Characteristics (Pressure Loss)

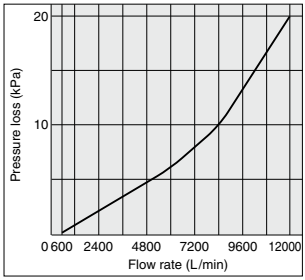
PF2A703H



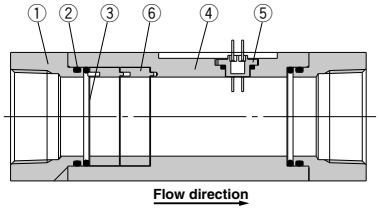
PF2A706H



PF2A712H



Wetted Parts Construction

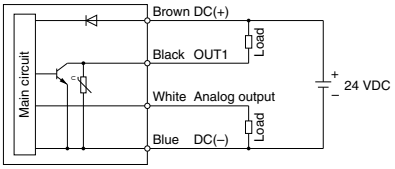


Parts list

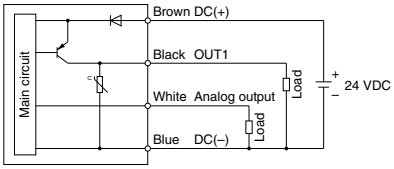
No.	Description	Material	Note
1	**Attachment**	Aluminum alloy	Anodized
2	**Seal**	HNBR	—
3	**Mesh**	Stainless steel	—
4	**Body**	Aluminum alloy	Anodized
5	**Sensor**	PPS	—
6	**Spacer**	PBT	—

Internal Circuits and Wiring Examples

-28/29
28: NPN (1 output) + Analog voltage output
29: NPN (1 output) + Analog current output

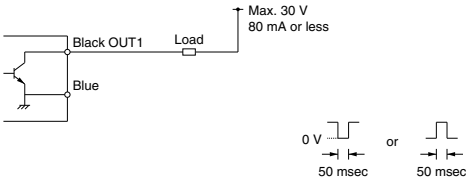


-68/69
68: PNP (1 output) + Analog voltage output
69: PNP (1 output) + Analog current output

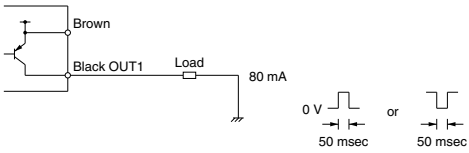


Accumulated pulse output wiring examples

-28/29

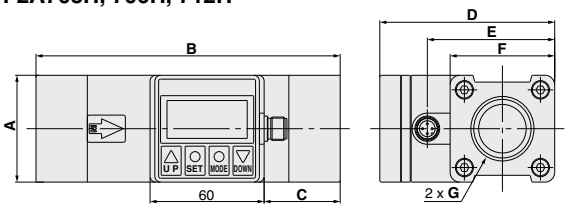


-68/69



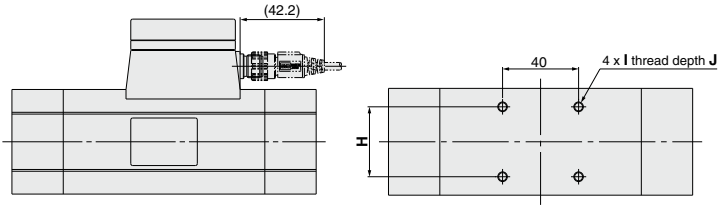
Dimensions

PF2A703H, 706H, 712H



Connector pin numbers

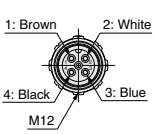
Pin no.	Pin description
1	DC(+)
2	Analog output
3	DC(–)
4	OUT1

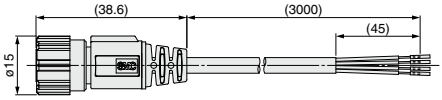


Be sure to allow straight pipe length that is minimum 8 times the port size upstream and downstream of the switch piping.

Model	A	B	C	D	E	F	G	H	I	J
PF2A703H	55	160	40	92	67	55	Rc1, NPT1, G1	36	M5 x 0.8	8
PF2A706H	65	180	45	104	79	65	Rc1 1/2, NPT1 1/2, G1 1/2	46	M6 x 1	9
PF2A712H	75	220	55	114	89	75	Rc2, NPT2, G2	56	M6 x 1	9

ZS-37-A
Lead wire with M12 connector

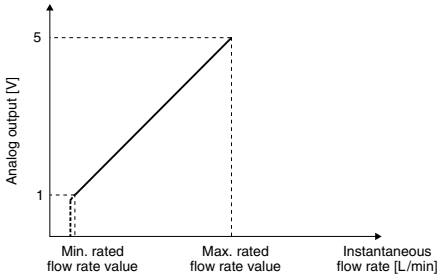




Lead Wire Specifications

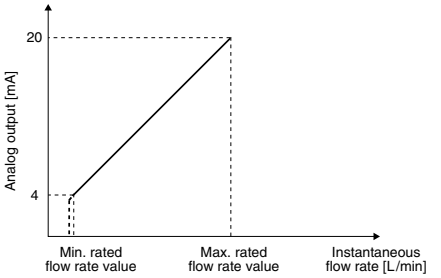
Conductor	Nominal cross section	AWG23
	O.D.	Approx. 0.7 mm
Insulator	Material	Cross-linked vinyl
	O.D.	Approx. 1.1 mm
	Color	Brown, White, Black, Blue
Sheath	Material	Oil-resistant vinyl
Finished O.D.	ø4	

Analog output
1 to 5 VDC



Part no.	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2A703H-□-28 **PF2A703H-□-68**	150	3000
PF2A706H-□-28 **PF2A706H-□-68**	300	6000
PF2A712H-□-28 **PF2A712H-□-68**	600	12000

4 to 20 mA DC



Part no.	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2A703H-□-29 **PF2A703H-□-69**	150	3000
PF2A706H-□-29 **PF2A706H-□-69**	300	6000
PF2A712H-□-29 **PF2A712H-□-69**	600	12000

PF2A7 Series
Made to Order

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

Made to Order

1 Wide Range Specifications -X795

One flow switch can measure small flows to large flows by enlarging the lower limit of the flow rate measurement range.
Dynamic range 1:100 (Lower limit of the flow rate measurement: Upper limit of the flow rate measurement)

How to Order

Integrated Display Type

PF2A7 [03] H – [ ] [10] – [28] [ ] – [M] – X795

Flow rate range

03	30 to 3000 L/min
06	60 to 6000 L/min
12	120 to 12000 L/min

High flow rate type

Port specifications

Nil	Rc

Port size

Symbol	Port size	Flow rate (L/min) 3000	6000	12000	Applicable model
10	1	●			PF2A703H
14	1 1/2		●		PF2A706H
20	2			●	PF2A712H

Output specifications

28	NPN open collector 1 output + Analog output (1 to 5 V)

Switching of switch output and accumulated pulse output is possible with NPN outputs.

Lead wire (Refer to page 326.)

Nil	Lead wire with M12 connector (3 m)
N	Without lead wire

Unit specifications

M	Fixed SI unit(Note)

Note) Fixed units:
Instantaneous flow rate: L/min
Accumulated flow: L, m^3, $m^3 \times 10^3$

Specifications

Model	Rated flow range	Displayable range	Settable range
PF2A703H	30 to 3000 L/min	20 to 3025 L/min	0 to 3025 L/min
PF2A706H	60 to 6000 L/min	40 to 6050 L/min	0 to 6050 L/min
PF2A712H	120 to 12000 L/min	80 to 12050 L/min	0 to 12050 L/min

Dimensions

The PF2A7□□H series dimensions are the same as the standard models. Refer to page 322.

Functions

Refer to the operation manual for information on setting and operating.

Flow rate measurement selection

Instantaneous flow rate and accumulated flow rate can be selected. A flow rate of up to 999999 can be accumulated. The accumulated flow rate is reset when the power supply turns OFF. (With PF2A7□H, it is possible to select a holding function.)

Unit switching

For Air

Display	Instantaneous flow rate	Accumulated flow
U-1	L/min	L
U-2	CFM x 10^{-2}, CFM x 10^{-1}	ft^3 x 10^{-1}

CFM = ft^3/min

High Flow Rate Type (For Air)

Display	Instantaneous flow rate	Accumulated flow
U-1	L/min	L, m^3, m^3 x 10^3
U-2	CFM	ft^3, ft^3 x 10^3, ft^3 x 10^6

For Water/High Temperature Fluid Type (For Water)

Display	Instantaneous flow rate	Accumulated flow
U-1	L/min	L
U-2	GPM	gal (US)

GPM = gal (US)/min

Note) Fixed SI unit (L/min, or L, m^3, m^3 x 10^3) will be set for the type without the display unit switching function.

Flow rate conversion

Normal condition: 0°C, 101.3 kPa, dry air
Standard condition: 20°C, 101.3 kPa, 65%RH (ANR)
Switchable between these conditions.

Flow rate measuring unit confirmation

This function allows for the confirmation of the accumulated flow rate when instantaneous flow rate is selected and to confirm the instantaneous flow rate when accumulated flow rate is selected.

Keylock

This function prevents accidental operations such as changing the set value.

Accumulation clearance

This function clears the accumulated value.

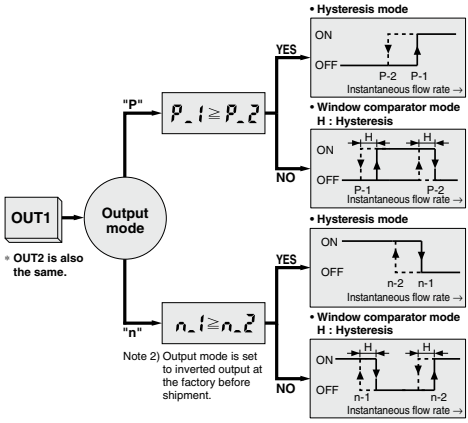
Initialization of setting (only for PF2A7□□H series)

This function restores the setting to the original state, just as it had been shipped from the factory.

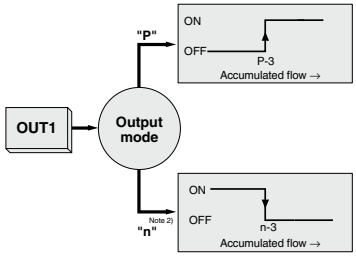
Output types

Real-time switch output, accumulated switch output, or accumulated pulse output can be selected as an output type.

Real-time switch output

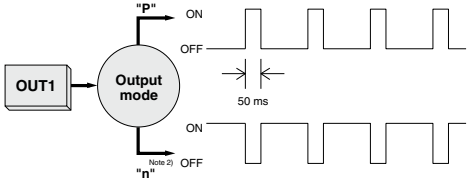


Accumulated switch output



Note 2) Output mode is set to inverted output at the factory before shipment.

Accumulated pulse output



Note1) For a digital flow switch with an unit switching function. (Fixed SI unit [L/min, or L, m^3 or m^3 x 10^3] will be set for switch types without an unit switching function.)
Refer to the specifications of the display unit for the flow rate value per pulse.

Functions

Copy function (PF2□200, 201 only)

Information to be copied is:
① **Flow rate range**
② **Display mode**
③ **Display unit (Only available when the unit specification is nil.)**
④ **Output method**
⑤ **Output mode**
⑥ **Flow rate display unit (available with PF2A20□ only)**
⑦ **Flow rate value**

Peak hold, Bottom hold display function (PF2□200, 201 only)

The maximum or minimum value can be held in the case where the instantaneous flow rate display mode is selected during the initial setting. The hold value is reset when the power supply turns OFF or the hold is released.

Error correction

LED display	Contents	Action
Er1 Note 1) Err_1 Note 2)	A current of more than 80 mA is flowing to OUT1.	Check the load and the wiring for OUT1.
Er2 Note 1)	A current of more than 80 mA is flowing to OUT2.	Check the load and the wiring for OUT2.
Err_3 Note 2)	The set data has changed for some reason.	Perform the RESET operation, and reset all the data again.
Er4 Note 1)		
--- Note 1) ----- Note 2)	The flow rate is over the flow rate measurement range.	Use an adjustment valve, etc. to reduce the flow rate until it is within the flow rate range.

Note 1) Applicable to monitor integrated type and remote type except the PF2A7□□H series.
Note 2) Applicable to the PF2A7□□H series only.

For PF2A200, 201

LED display	Contents	Action
Er1	Over current is flowing to the load of a switch output.	Eliminate the cause of the over current by turning off the power supply, and then turn on it again.
Er0	Internal data error.	Please contact SMC for investigation.
Er7	Internal data error.	
Er10	Internal data error.	
Er5	Internal data error.	Turn off the power supply and then turn on it again.
Er6	Internal data error.	
---	The flow rate is over the flow rate measurement range.	Use an adjustment valve, etc. to reduce the flow rate until it is within the flow rate range.

Channel select function (PF2□200, 201 only)

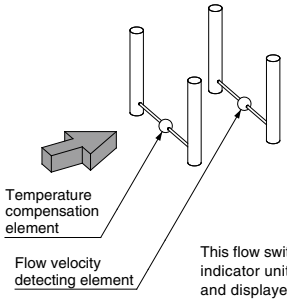
Every pushing the △ button, channel selection "1→2→3→4→1..." is available. The flow rate measurement of each selected channel is shown in the monitor unit.

Channel scan function (PF2□200, 201 only)

Changes displaying the channel shown every about 2 seconds and its detected flow rate.

Detection principle of digital flow switch for air

A heated thermistor is installed in the passage, and fluid absorbs heat from the thermistor as it is introduced to the passage. The thermistor's resistance value increases as it loses heat. Since the resistance value increase ratio has a uniform relationship to the flow velocity, the flow velocity can be detected by measuring the resistance value. To further compensate the fluid and ambient temperature, the temperature sensor is also built into the switch to allow stable measurement within the operating temperature range.



This flow switch uses L/min as the flow rate indicator unit. The mass flow is converted and displayed under the conditions of 0°C and 101.3 kPa and 20°C and 101.3 kPa.

Contact SMC regarding the specifications for clean environment.

Option

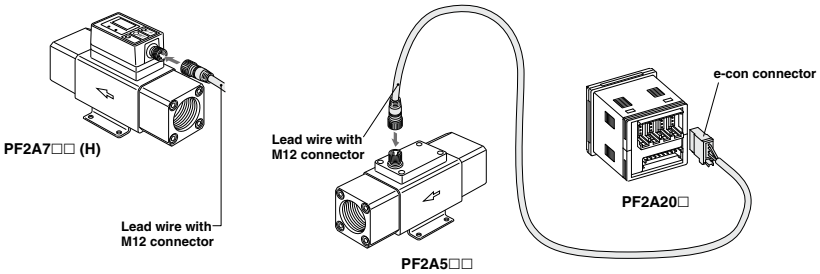
When only optional parts are required, order with the part numbers listed below.

Lead wire with M12 connector

Part no.	Qty.	Lead wire length
ZS-37-A	1	3 m

e-con connector

Part no.	Qty.
ZS-28-CA-4	1



In addition to the lead wire assembly shown above, those listed below (female contact) can be connected.
However, they cannot be connected with an e-con connector because the diameter of the core wire and its coverage diameter are different. For details, contact each manufacturer.
Contact each manufacturer for details including RoHS compliance.

Connector size	Pin no.	Manufacturer	Applicable series
M12	4	Correns Corp.	VA-4D
		OMRON Corp.	XS2
		Azbil Corp.	PA5-4I
		HIROSE ELECTRIC CO., LTD.	HR24
		DDK Ltd.	CM01-8DP4S

In addition to the connectors shown above, those listed below (e-con) can be connected.

Manufacturer	Model
3M Japan Limited	37104-3122-000FL
Tyco Electronics Japan G.K.	2-1473562-4
OMRON Corp.	XN2A-1430

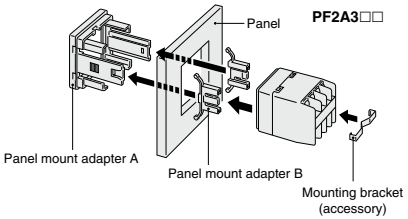
Cable Specifications

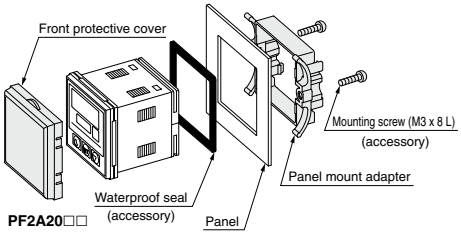
No. of cable wire		4
Conductor	**Nominal cross-sectional area**	AWG23
	Dimension	0.72 mm
Insulator	**Dimension**	1.14 mm Brown, White, Blue, Black
Sheath	**Material**	Heat-resistant and oil-resistant lead-free PVC
	O.D.	4.00 mm

Panel mounting

Pin no.	Description	Note
ZS-22-E	Panel mount adapter A, B	With mounting bracket

Part no.	Description	Note
ZS-26-B	Panel mount adapter	With waterproof seal, mounting screw
ZS-26-C	Front protective cover + Panel mount adapter	With waterproof seal, mounting screw





Related Product
Multi Counter/*CEU5 Series*

How to Order

CEU5 □ □ — □

Output transistor mode

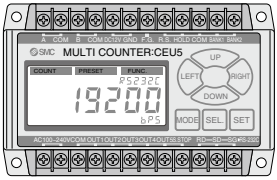
Nil	NPN open collector output
P	PNP open collector output

Power supply voltage

Nil	100 to 240 VAC
D	24 VDC

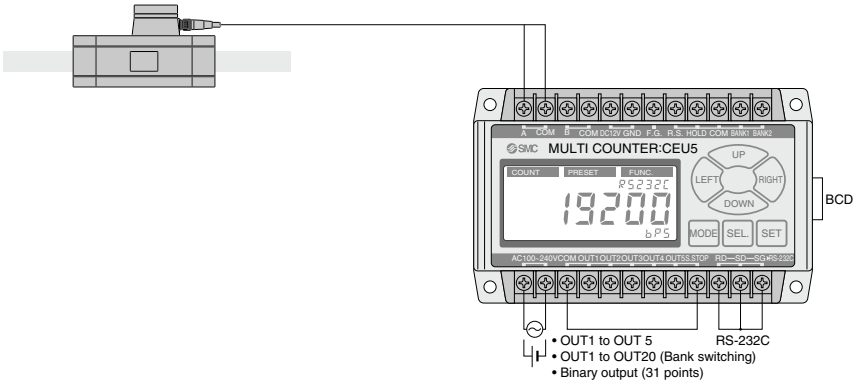
External output

Nil	RS-232C
B	RS-232C + BCD



Connection Method

Connection with the Digital Flow Switch (PF2 series)



- Possible to measure accumulated pulse output of a Digital Flow Switch by an unit of 100 L (litter) and 10 ft^3 (cube foot) using the pre-scaling function* of the multi counter (When inputting to the multi counter, Up or Down is selected as input method.)
- Possible to take advantage of all CEU5 functions using preset mode and function mode.

* The set value is calculated by selecting manual mode. By multiplication by 4, then, per pulse value is set.

<Connection with other manufacturers' encoders>

- Possible to switch multi counter side input method to 2-phase or Up/Down.
- Possible to connect to an encoder if the output method is Open Collector.
- When selecting UP or DOWN, phase A to COM input is counted toward addition direction, phase B to COM input is counted toward subtraction direction.

⚠Caution

When connecting the CEU5 with an encoder from another manufacturer, please thoroughly confirm the specification beforehand. Please note that the CEU5 may not count normally depending on the output method, output frequency and connecting cable length, etc. of the encoders.

For Water

Digital Flow Switch

Series PF2W

How to Order

Integrated Display Type

PF2W7 20 – □ 03 – 27 □ – M

Flow rate range

04	0.5 to 4 L/min
20	2 to 16 L/min
40	5 to 40 L/min
11	10 to 100 L/min

Thread type

Nil	Rc
N	NPT
F	G

Port size

Symbol	Port size	Flow rate (L/min) 4	16	40	100	Applicable model
03	3/8	●	●			PF2W704, PF2W720
04	1/2		●	●		PF2W720, PF2W740
06	3/4			●	●	PF2W740, PF2W711
10	1				●	PF2W711

Output specifications

27	NPN open collector 2 outputs
67	PNP open collector 2 outputs

Lead wire (Refer to page 322.)

Nil	Lead wire with M12 connector (3 m)
N	Without lead wire

Unit specifications

Nil	With unit switching function Note1)
M	Fixed SI unit Note2)

Note1) Under Japan's new Measurement Act, this is only for overseas sales (SI units are to be used inside Japan).

Note2) Fixed units:
Instantaneous flow rate: L/min
Accumulated flow: L

Specifications

Model		PF2W704	PF2W720	PF2W740	PF2W711
Measured fluid		Water			
Flow rate measurement range		0.35 to 4.5 L/min	1.7 to 17.0 L/min	3.5 to 45 L/min	7 to 110 L/min
Set flow rate range		0.35 to 4.5 L/min	1.7 to 17.0 L/min	3.5 to 45 L/min	7 to 110 L/min
Rated flow range		0.5 to 4 L/min	2 to 16 L/min	5 to 40 L/min	10 to 100 L/min
Minimum set unit		0.05 L/min	0.1 L/min	0.5 L/min	1 L/min
Accumulated pulse flow rate exchange value (Pulse width: 50 ms)		0.05 L/pulse	0.1 L/pulse	0.5 L/pulse	1 L/pulse
Operating fluid temperature		0 to 50°C			
Accuracy		±5% F.S.			±3% F.S.
Repeatability		±3% F.S.			±2% F.S.
Temperature characteristics Note 1)		±5% F.S. (0 to 50°C, 25°C reference)			
Current consumption (No load)		70 mA or less			80 mA or less
Weight Note 2)		460 g	520 g	700 g	1150 g
Port size (Rc, NPT, G)		3/8	3/8, 1/2	1/2, 3/4	3/4, 1
Detection type		Karman vortex			
Indicator light		3-digit, 7-segment LED			
Display units Note 3)	Instantaneous flow rate	L/min, gal(US)/min			
	Accumulated flow	L, gal(US)			
Operating pressure range		0 to 1 MPa			
Proof pressure		1.5 MPa			
Accumulated flow range Note 4)		0 to 999999 L			
Ambient temperature range		Operating: 0 to 50°C, Stored: –25 to 85°C (with no freezing and condensation)			
Output specifications Note 5)	Switch output	NPN open collector: Maximum load current: 80 mA; Internal voltage drop: 1 V or less (with load current of 80 mA); Maximum applied voltage: 30 V; 2 outputs			
		PNP open collector: Maximum load current: 80 mA; Internal voltage drop: 1.5 V or less (with load current of 80 mA); 2 outputs			
	Accumulated pulse output	NPN or PNP open collector (same as switch output)			
Status LED's		Lights up when output is ON, OUT1: Green; OUT2: Red			
Response time		1 sec. or less			
Hysteresis		Hysteresis mode: Variable (can be set from 0), Window comparator mode Note 6): 3-digit fixed			
Power supply voltage		12 to 24 VDC ±10%			
Environment	Enclosure	IP65			
	Operating temperature range	0 to 50°C			
	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			
	Noise resistance	1000 Vp-p, Pulse width 1 μs, Rise time 1 ns			

Note 1) In the case of PF2W711, ±3% of F.S. or less (15°C to 35°C, 25°C reference). Note 2) Without lead wire.
Note 3) For digital flow switch with unit switching function. (Fixed SI unit [L/min or L] will be set for switch type without the unit switching function.)
Note 4) Accumulated flow rate is reset when the power supply turns OFF. Note 5) Switch output and accumulated pulse output can be selected during initial setting.
Note 6) Window comparator mode — Since hysteresis will reach 3 digits, keep P_1 and P_2 or n_1 and n_2 apart by 7 digits or more.
(In case of output OUT2, n_1, 2 to be n_3, 4 and P_1, 2 to be P_3, 4.) Note 7) This product conforms to the CE marking.

How to Order

Remote Type Sensor Unit **PF2W5 20 – □ 03 □ – □ – C**

Flow rate range

04	0.5 to 4 L/min
20	2 to 16 L/min
40	5 to 40 L/min
11	10 to 100 L/min

Thread type

Nil	Rc
N	NPT
F	G

Port size

Symbol	Port size	Flow rate (L/min) 4	16	40	100	Applicable model
03	3/8	●	●			PF2W504, PF2W520
04	1/2		●	●		PF2W520, PF2W540
06	3/4			●	●	PF2W540, PF2W511
10	1				●	PF2W511

Lead wire (Refer to page 322.)

Nil	Lead wire with M12 connector (3 m)
N	Without lead wire

Option (Only for output specifications "1")
(Refer to page 322.)

Nil	None
C	e-con connector (1 pc.)

The cable and connector are shipped unassembled.

Output specifications

Symbol	Specification	Applicable monitor unit (monitor) model
Nil	Output for monitor unit	Series PF2W300
1	Output for monitor unit + Analog output (1 to 5 V)	Series PF2W200/300
2	Output for monitor unit + Analog output (4 to 20 mA)	Series PF2W300

Specifications

Model		PF2W504	PF2W520	PF2W540	PF2W511
Measured fluid		Water			
Detection type		Karman vortex			
Rated flow range		0.5 to 4 L/min	2 to 16 L/min	5 to 40 L/min	10 to 100 L/min
Operating pressure range		0 to 1 MPa			
Withstand pressure		1.5 MPa			
Operating fluid temperature		0 to 50°C			0 to 50°C
Accuracy Note 1)		±5% F.S.			±3% F.S.
Repeatability Note 1)		±3% F.S.			±1% F.S. (connected with PF2W33□) ±3% F.S. (connected with PF2W2□□)
Temperature characteristics		±2% F.S. (15 to 35°C, 25°C reference), ±3% F.S. (0 to 50°C, 25°C reference)			
Output specifications Note 2)	**Output for display unit**	Pulse output, N channel, open drain, output for monitor unit PF2W3□□. (Specifications: Maximum load current of 10 mA; Maximum applied voltage of 30 V)			
	Analog output	Voltage output 1 to 5 V Accuracy: ±5%F.S., Min. load impedance: 100 kΩ (Output impedance: 1 kΩ)			
		Current output 4 to 20 mA Accuracy: ±5%F.S., Max. load impedance: 300 Ω or less (at 12 VDC), 600 Ω or less (at 24 VDC)			
Power supply voltage		12 to 24 VDC ±10%			
Current consumption (No load)		20 mA or less			
Environment	**Enclosure**	IP65			
	Operating temperature range	Operating: 0 to 50°C, Stored: –25 to 85°C (with no freezing and condensation)			
	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			
	Noise resistance	1000 Vp-p, Pulse width 1 μs, Rise time 1 ns			
Weight Note 3)		410 g	470 g	650 g	1,100 g
Port size (Rc, NPT, G)		3/8	3/8, 1/2	1/2, 3/4	3/4, 1

Note 1) The system accuracy when combined with PF2W2□□/3□□.
Note 2) Output system can be selected during initial setting.
Note 3) Without lead wire. (Add 20 g for the types of analog output whether voltage or current output selected.)
Note 4) The sensor unitis conforms to the CE marking.

How to Order

Remote Type Monitor Unit **PF2W3 0 0 – A – M**

Flow rate range

Symbol	Flow rate range	Type for sensor unit
0	0.5 to 4 L/min	PF2W504
	2 to 16 L/min	PF2W520
	5 to 40 L/min	PF2W540
3	10 to 100 L/min	PF2W511

Output specifications

0	NPN open collector 2 outputs
1	PNP open collector 2 outputs

Mounting

A	Panel mounting

Unit specifications

Nil	With unit switching function Note1)
M	Fixed SI unit Note2)

Note1) Under Japan's new Measurement Act, this is only for overseas sales (SI units are to be used inside Japan).
Note2) Fixed units:
Instantaneous flow rate: L/min
Accumulated flow: L

Specifications

Model		PF2W300/301			PF2W330/331
Flow rate measurement range Note 1)		0.35 to 4.5 L/min	1.7 to 17.0 L/min	3.5 to 45 L/min	7 to 110 L/min
Set flow rate range Note 1)		0.35 to 4.5 L/min	1.7 to 17.0 L/min	3.5 to 45 L/min	7 to 110 L/min
Minimum set unit Note 1)		0.05 L/min	0.1 L/min	0.5 L/min	1 L/min
Accumulated pulse flow rate exchange value (Pulse width: 50 ms) Note 1)		0.05 L/pulse	0.1 L/pulse	0.5 L/pulse	1 L/pulse
Note 2) Display units	Instantaneous flow rate	L/min, gal(US)/min			
	Accumulated flow	L, gal(US)			
Accumulated flow range Note 3)		0 to 999999 L			
Accuracy Note 4)		±5% F.S.			±3% F.S.
Repeatability Note 4)		±3% F.S.			±1% F.S.
Temperature characteristics		±2% F.S. (0 to 50°C, 25°C reference), ±1% F.S. (15 to 35°C, 25°C reference)			
Current consumption (No load)		50 mA or less			60 mA or less
Weight		45 g			
Output specifications Note 5)	Switch output	NPN open collector (PF2W300, PF2W330)	Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA) Maximum applied voltage: 30 V 2 outputs		
		PNP open collector (PF2W301, PF2W331)	Maximum load current: 80 mA Internal voltage drop: 1.5 V or less (with load current of 80 mA) 2 outputs		
	Accumulated pulse output	NPN or PNP open collector (same as switch output)			
Environment	Enclosure	IP40			
	Operating temperature range	Operating: 0 to 50°C, Stored: –25 to 85°C (with no freezing and condensation)			
	Withstand voltage	1000 VAC for 1 minute between terminals and housing			
	Insulation resistance	50M Ω or more (500 VDC measured via megohmmeter) between terminals and housing			
	Noise resistance	1000 Vp-p, Pulse width 1 μs, Rise time 1 ns			
Indicator light		3-digit, 7-segment LED			
Status LED's		Lights up when output is ON, OUT1: Green; OUT2: Red			
Power supply voltage		12 to 24 VDC ±10%			
Response time		1 sec. or less			
Hysteresis		Hysteresis mode: Variable (can be set from 0) Window comparator mode: 3-digit fixed Note 6)			

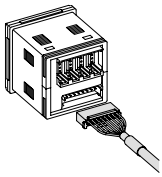
Note 1) Values vary depending on each set flow rate range.
Note 2) For digital flow switch with unit switching function. (Fixed SI unit [L/min or L] will be set for switch types without the unit switching function.)
Note 3) Accumulated flow rate is reset when the power supply turns OFF.
Note 4) The system accuracy when combined with PF2W5□□.
Note 5) Switch output and accumulated pulse output can be selected during initial setting.
Note 6) Window comparator mode — Since hysteresis (H) will reach 3 digits, keep P_1 and P_2 or n_1 and n_2 apart by 7 digits or more. (In case of output OUT2, n_1, 2 to be n_3, 4 and P_1, 2 to be P_3, 4.)
Note 7) The monitor unit conforms to the CE marking.

How to Order

4-channel Flow Monitor
Remote Type
Monitor Unit

PF2W20 □ – M □ □

Accessory/Power supply output cable (2 m)



Output specifications

0	NPN 4 outputs
1	PNP 4 outputs

Unit specifications

Nil	With unit switching function Note1)
M	Fixed SI unit Note2)

Note 1) Under the new Measurement Act, devices with unit switching functions cannot be used inside Japan.
Note2) Fixed units:
Instantaneous flow rate: L/min
Accumulated flow: L

Option 1 (Refer to page 322.)

Nil	None
A	Panel mounting
B	Front protective cover + Panel mounting

Option 2 (Refer to page 322.)

Nil	None
4C	Sensor connector (4 pc.)

Connectable remote type sensor unit is PF2W5□□-□-1 (with analog output 1 to 5 V).

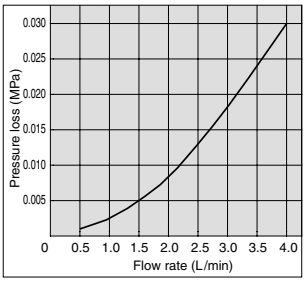
Specifications

Model		PF2W200/201			
Applicable flow rate sensor		PF2W504/504T-□-1	PF2W520/520T-□-1	PF2W540/540T-□-1	PF2W511-□-1
Flow rate measurement range Note 1)		0.35 to 4.50 L/min	1.7 to 17.0 L/min	3.5 to 45.0 L/min	7 to 110 L/min
Set flow rate range Note 1)		0.35 to 4.50 L/min	1.7 to 17.0 L/min	3.5 to 45.0 L/min	7 to 110 L/min
Minimum set unit Note 1)		0.05 L/min	0.1 L/min	0.5 L/min	1 L/min
Accumulated pulse flow rate exchange value (Pulse width: 50 ms) Note 1)		0.05 L/pulse	0.1 L/pulse	0.5 L/pulse	1 L/pulse
Display units Note 1)	Instantaneous flow rate	L/min, gal(US)/min			
	Accumulated flow	L, gal(US)			
Accumulated flow range Note 1)		0 to 999999 L, 0 to 999999 gal(US)			
Power supply voltage		24 VDC ±10% (With power supply polarity protection)			
Current consumption		55 mA or less (Note including the current consumption of the sensor)			
Power supply voltage for sensor		Same as [Power supply voltage]			
Power supply current for sensor Note 2)		Max. 110 mA (However, the total current for the 4 inputs is 440 mA maximum or less.)			
Sensor input		1 to 5 VDC (Input impedance: Approx. 800K Ω)			
Output specifications Note 3)	No. of inputs	4 inputs			
	Input protection	Excess voltage protection			
	Switch output (Real-time switch output, accumulated switch output)	NPN open collector (PF2W200)	Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA) Maximum applied voltage: 30 V		
		PNP open collector (PF2W201)	Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA)		
	Accumulated pulse output	NPN open collector or PNP open collector (same as switch output)			
	No. of outputs	4 outputs (1 output per 1 sensor input)			
	Output protection	Short circuit protection			
Hysteresis		Hysteresis mode: Variable (can be set from 0), Window comparator mode: Fixed (3-digits)			
Response time Note 4)		1s or less			
Accuracy Note 4)		±5% F.S.			
Repeatability Note 4)		±3% F.S.			
Temperature characteristics		±2% F.S. (0 to 50°C, 25°C reference)			
Display method		For measured value display: 4-digits, 7-segment LED (Orange) For channel display: 1-digit, 7-segment LED (Red)			
Status LED's		Illuminates when output is ON OUT1: Red			
Environment	Enclosure	IP65 for the front face only, and IP40 for the remaining parts.			
	Operating temperature range	Operating: 0 to 50°C, Stored: −10 to 60°C (with no freezing and condensation)			
	Operating humidity range	Operating or Stored: 35 to 85%RH (with no condensation)			
	Noise resistance	500 Vp-p, Pulse width 1 μs, Rise time 1 ns			
Connection		Power supply/Output connection: 8P connector, Sensor connection: 4P connector (e-con)			
Material		Housing: PBT, Monitor: PET, Backside rubber: CR			
Weight		60 g (Except for any accessories that are shipped together)			

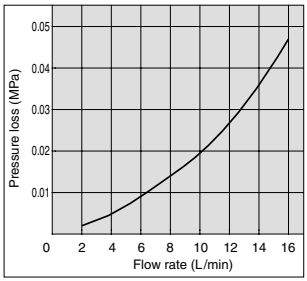
Note 1) Fixed SI unit [L/min or L] will be set for switch types without the unit switching function. ("-M" is suffixed at the end of part number.) Accumulated flow is reset when the power supply turns OFF.
Note 2) If Vcc side on sensor input connector part is short-circuited with 0V side, the flow monitor inside will be damaged.
Note 3) Switch output and accumulated pulse output can be selected during initial setting.
Note 4) The system accuracy when combined with applicable flow sensor.
Note 5) This product conforms to the CE marking.

Flow Characteristics (Pressure Loss)

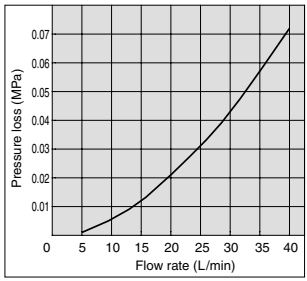
PF2W704, 504



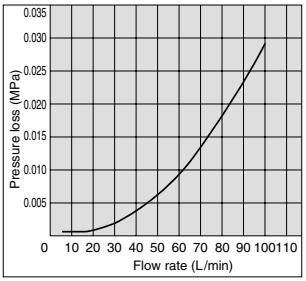
PF2W720, 520



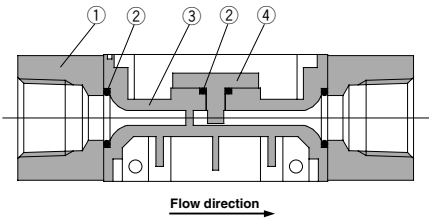
PF2W740, 540



PF2W711, 511



Wetted Parts Construction/Sensor Unit

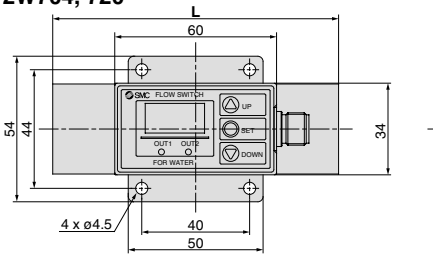


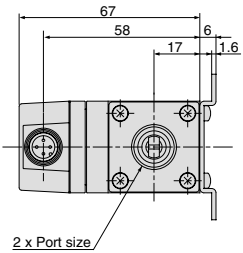
Parts list

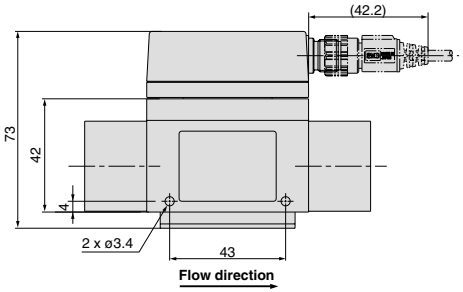
No.	Description	Material
1	**Attachment**	Stainless steel
2	**Seal**	NBR
3	**Body**	PPS
4	**Sensor**	PPS

Dimensions: Integrated Display Type **For Water**

PF2W704, 720

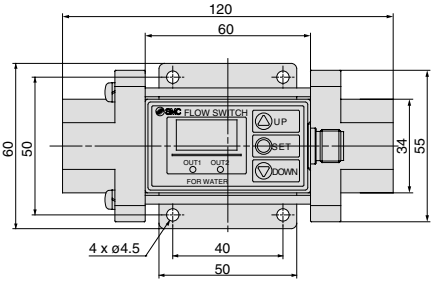


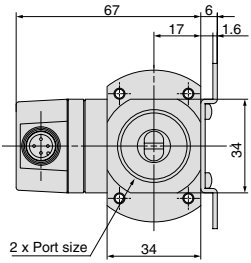


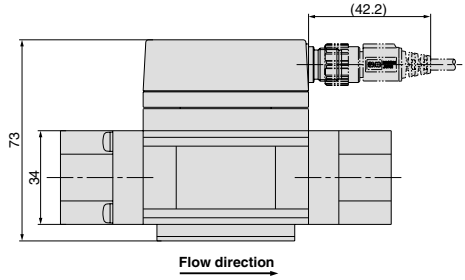


Model	**L** Dimension
PF2W704	100
PF2W720	106

PF2W740

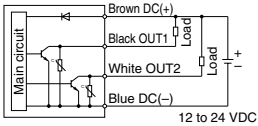




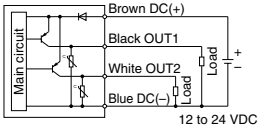


Internal Circuits and Wiring Examples

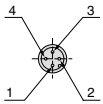
-27
NPN (2 outputs)



-67
PNP (2 outputs)



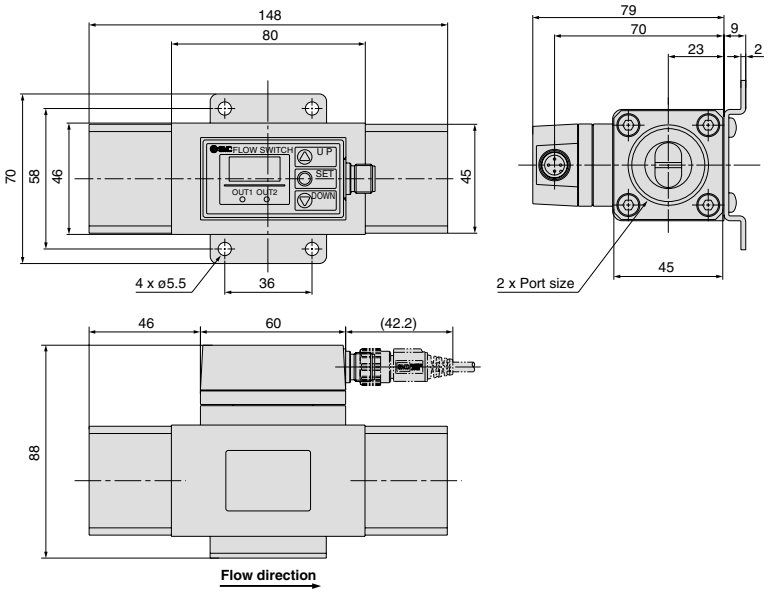
Connector pin numbers



Pin no.	Pin description
1	DC(+)
2	OUT2
3	DC(–)
4	OUT1

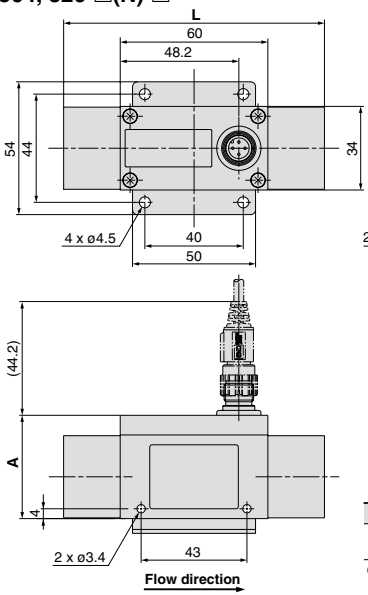
Dimensions: Integrated Display Type **For Water**

PF2W711



Dimensions: Remote Type Sensor Unit **For Water**

PF2W504, 520-□(N)-□

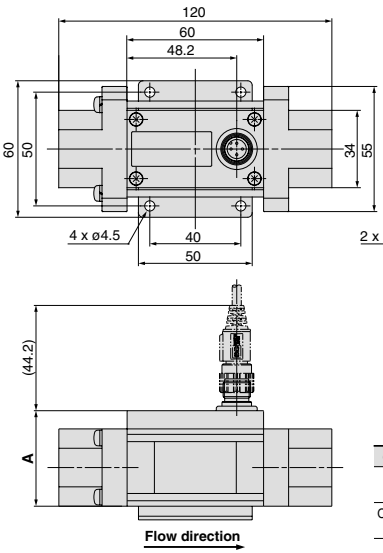


(mm)

Output specifications	A	B
Output for monitor unit only	42	62
Output for monitor unit + Analog output	52	72

Model	L dimension
PF2W504	100
PF2W520	106

PF2W540-□(N)-□

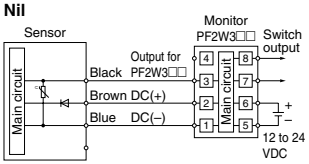


(mm)

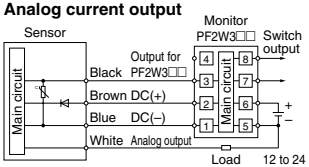
Output specification	A	B
Output for monitor unit only	42	62
Output for monitor unit + Analog output	52	72

Internal Circuits and Wiring Examples

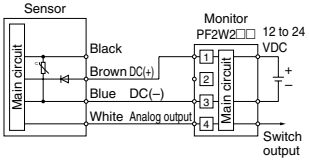
Nil



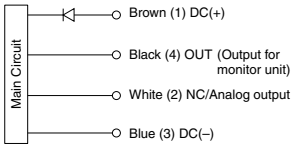
-1/2
Analog current output



-1
Analog voltage output



Wiring



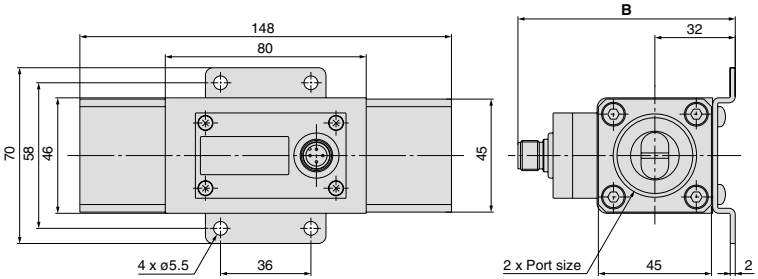
* Use this sensor by connecting it to a SMC remote type display unit, Series PF2W2□□/3□□.

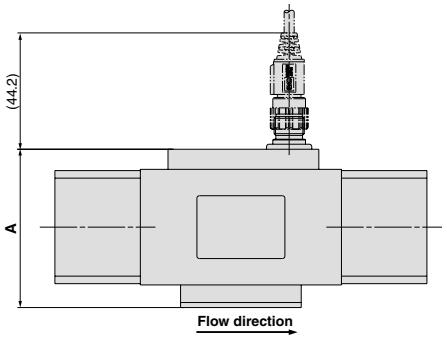
Connector pin numbers

Pin no.	Pin description
1	DC(+)
2	NC/Analog output
3	DC(–)
4	OUT

Dimensions: Remote Type Sensor Unit **For Water**

PF2W511-□(N)-□



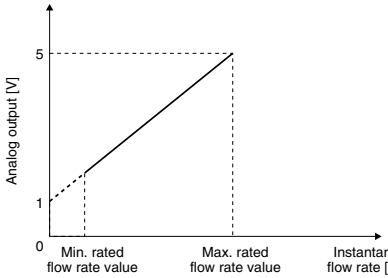


(mm)

Output specifications	A	B
Output for monitor unit only	63	77
Output for monitor unit + Analog output	73	87

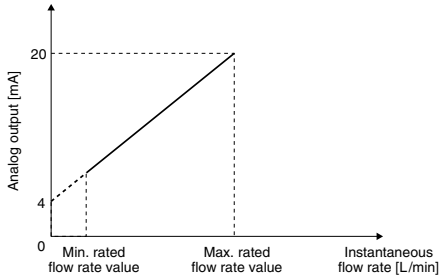
Analog output

1 to 5 VDC



Part no.	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2W504-□-1	0.5	4
PF2W520-□-1	2	16
PF2W540-□-1	5	40
PF2W511-□-1	10	100

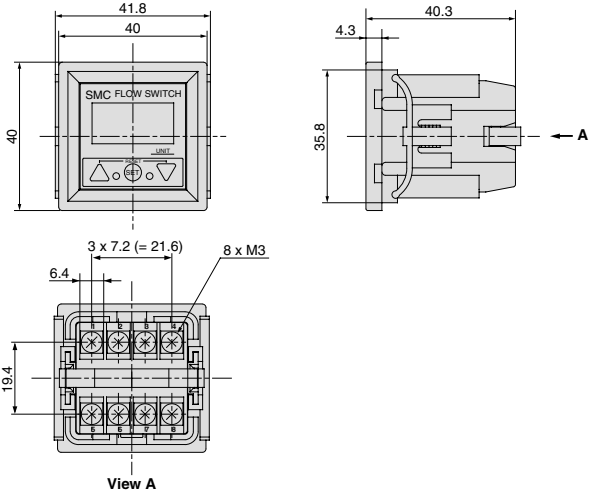
4 to 20 mA DC



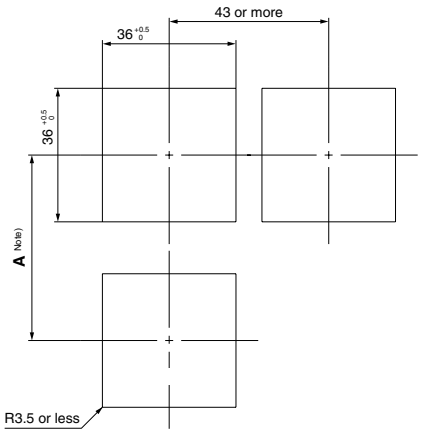
Part no.	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2W504-□-2	0.5	4
PF2W520-□-2	2	16
PF2W540-□-2	5	40
PF2W511-□-2	10	100

Dimensions: Remote Type Monitor Unit For Water

PF2W3□□-A
Panel mount adapter type



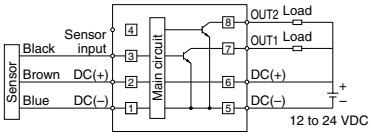
Panel fitting dimensions



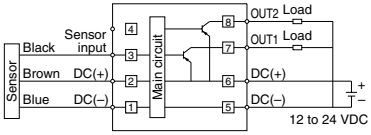
Note) Decide the length of A taking into account the size of terminal you use.
∗ The applicable panel thickness is 1 to 3.2 mm.
Corner: R3.5 or less

Internal Circuits and Wiring Examples

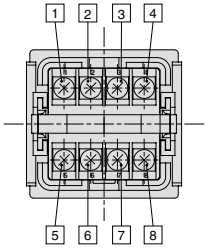
-0
NPN (2 outputs)



-1
PNP (2 outputs)

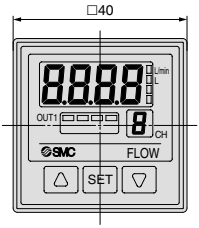


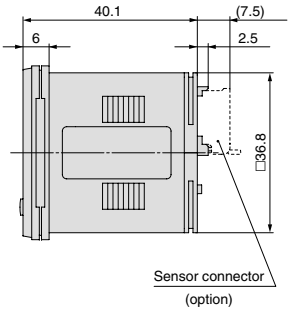
Terminal block numbers



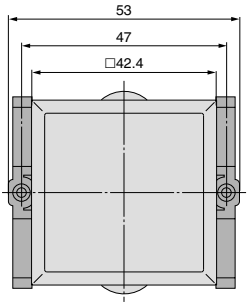
Dimensions: Remote Type Monitor Unit **For Water** (4-channel Flow Monitor)

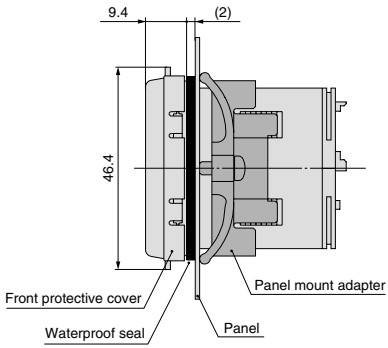
PF2W200, 201



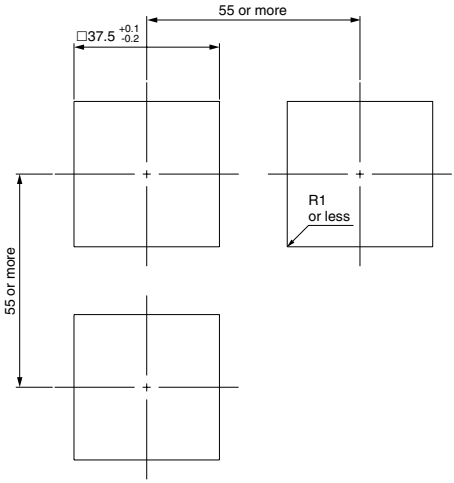


Front protective cover + Panel mount adapter



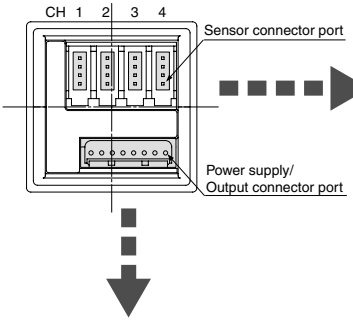


Panel fitting dimensions



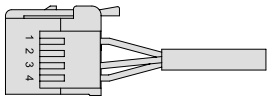
∗Applicable panel thickness: 0.5 to 8 mm

Dimensions: Remote Type Monitor Unit **For Water** (4-channel Flow Monitor)



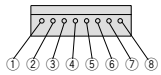
Sensor connector (4P x 4)

Connector (option)



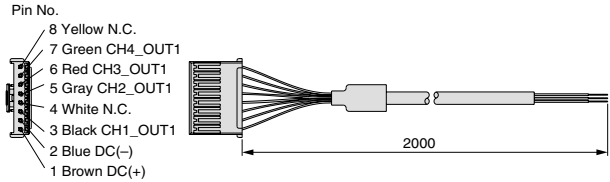
Pin no.	Terminal	Connector no.	Cable wire color
①	DC+	1	Brown
②	N.C.	2	Not used
③	DC–	3	Blue
④	IN: 1 to 5 V	4	White

Power supply/Output connector (8P)



Pin no.	Terminal
①	DC (+)
②	DC (–)
③	CH1_OUT1
④	N.C.
⑤	CH2_OUT1
⑥	CH3_OUT1
⑦	CH4_OUT1
⑧	N.C.

Power supply/Output connector (accessory)

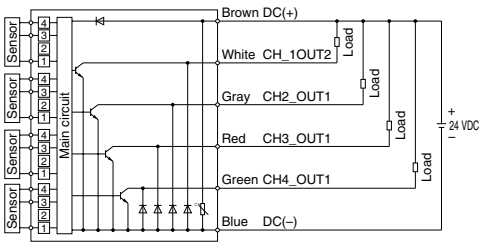


Cable Specifications

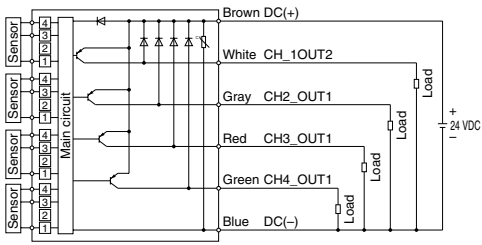
No. of cable wire		8
Conductor	**Nominal cross-sectional area**	0.15 mm^2
	Dimension	Approx. 0.5 mm
Insulator	**Dimension**	Approx. 0.9 mm Brown, White, Blue, Black, Gray, Red, Green, Yellow
Sheath	**Material**	Heat-resistant polyethylene
	O.D.	4.8 mm

Internal Circuits and Wiring Examples

PF2W200
NPN (4 outputs)



PF2W201
PNP (4 outputs)



For Water

Digital Flow Switch/High Temperature Fluid Type

Series PF2W

How to Order

Integrated Display Type

PF2W7 20 T – □ 03 – 27 □ – □

Flow rate range

04	0.5 to 4 L/min
20	2 to 16 L/min
40	5 to 40 L/min

Temperature range

T	0 to 90°C

Thread type

Nil	Rc
N	NPT
F	G

Port size

Symbol	Port size	Flow rate (L/min) 4	16	40	Applicable model
03	3/8	●	●		PF2W704T/PF2W720T
04	1/2		●	●	PF2W720T/PF2W740T
06	3/4			●	PF2W740T

Lead wire (Refer to page 322.)

Nil	Lead wire with M12 connector (3 m)
N	Without lead wire

Output specifications

27	NPN open collector 2 outputs
67	PNP open collector 2 outputs

Unit specifications

Nil	With unit switching function Note1)
M	Fixed SI unit Note2)

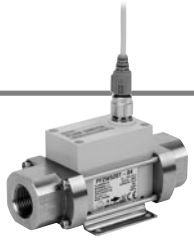
Note1) Under Japan's new Measurement Act, this is only for overseas sales (SI units are to be used inside Japan).

Note2) Fixed units: Instantaneous flow rate: L/min Accumulated flow: L

Specifications

Model			PF2W704T	PF2W720T	PF2W740T
Measured fluid			Water, Mixture of water (50%) and ethylene glycol (50%)		
Flow rate measurement range			0.35 to 4.5 L/min	1.7 to 17.0 L/min	3.5 to 45 L/min
Set flow rate range			0.35 to 4.5 L/min	1.7 to 17.0 L/min	3.5 to 45 L/min
Rated flow range			0.5 to 4 L/min	2 to 16 L/min	5 to 40 L/min
Minimum set unit			0.05 L/min	0.1 L/min	0.5 L/min
Accumulated pulse flow rate exchange value (Pulse width: 50 ms)			0.05 L/pulse	0.1 L/pulse	0.5 L/pulse
Operating fluid temperature			0 to 90°C (with no cavitation)		
Accuracy			±5% F.S.		
Repeatability			±3% F.S.		
Temperature characteristics Note 1)			±5% F.S. (0 to 90°C, 25°C reference)		
Current consumption (No load)			70 mA or less		
Weight Note 2)			710 g		
Port size (Rc, NPT, G)			3/8	3/8, 1/2	1/2, 3/4
Detection type			Karman vortex		
Indicator light			3-digit, 7-segment LED		
Display units Note 3)		Instantaneous flow rate	L/min, gal(US)/min		
		Accumulated flow	L, gal(US)		
Operating pressure range			0 to 1 MPa		
Withstand pressure			1.5 MPa		
Accumulated flow range Note 4)			0 to 999999 L		
Output specifications Note 5)	Switch output		NPN open collector	Maximum load current: 80 mA; Internal voltage drop: 1 V or less (with load current of 80 mA) Maximum applied voltage: 30 V; 2 outputs	
			PNP open collector	Maximum load current: 80 mA; Internal voltage drop: 1.5 V or less (with load current of 80 mA); 2 outputs	
	Accumulated pulse output		NPN or PNP open collector (same as switch output)		
Status LED's			Lights up when output is turned ON OUT1: Green; OUT2: Red		
Response time			1 sec. or less		
Hysteresis			Hysteresis mode: Variable (can be set from 0); Window comparator mode Note 6): 3-digit fixed		
Power supply voltage			12 to 24 VDC ±10%		
Environment	Enclosure		IP65		
	Operating temperature range		Operating: 0 to 50°C, Stored: –25 to 85°C (with no freezing and condensation)		
	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		
	Noise resistance		1000 Vp-p, Pulse width 1 μs, Rise time 1 ns		

Note 1) ±5% F.S. (0 to 50°C, 25°C reference), ±3% F.S. (15 to 35°C, 25°C reference)
Note 2) Without lead wire.
Note 3) For digital flow switch with unit switching function. (Fixed SI unit [L/min or L] will be set for switch type without the unit switching function.)
Note 4) Accumulated flow rate is reset when the power supply turns OFF.
Note 5) Switch output and accumulated pulse output can be selected during initial setting.
Note 6) Window comparator mode — Since hysteresis will reach 3 digits, keep P_1 and P_2 or n_1 and n_2 apart by 7 digits or more.
(In case of output OUT2, n_1, 2 to be n_3, 4 and P_1, 2 to be P_3, 4.)
Note 7) The flow switch conforms to the CE marking.



How to Order

Remote Type Sensor Unit **PF2W5 [20] [T] – [ ] [03] [ ] – [ ] – [C]**

Flow rate range

04	0.5 to 4 L/min
20	2 to 16 L/min
40	5 to 40 L/min

Temperature range

T	0 to 90°C

Thread type

Nil	Rc
N	NPT
F	G

Port size

Symbol	Port size	Flow rate (L/min) 4	16	40	Applicable model
03	3/8	●	●		PF2W504T/520T
04	1/2		●	●	PF2W520T/540T
06	3/4			●	PF2W540T

Lead wire (Refer to page 322.)

Nil	Lead wire with M12 connector (3 m)
N	Without lead wire

Output specifications

Symbol	Specification	Applicable monitor unit (monitor) model
Nil	Output for monitor unit	Series PF2W300
1	Output for monitor unit + Analog output (1 to 5 V)	Series PF2W200/300
2	Output for monitor unit + Analog output (4 to 20 mA)	Series PF2W300

Option (Only for output specifications "1") (Refer to page 322.)

Nil	None
C	e-con connector (1 pc.)

The cable and connector are shipped unassembled.

Specifications

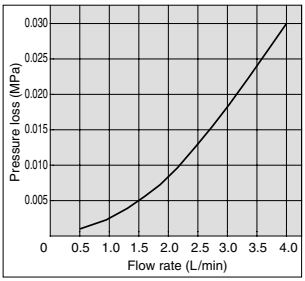
Model		PF2W504T	PF2W520T	PF2W540T
Measured fluid		Water, Mixture of water (50%) and ethylene glycol (50%)		
Detection type		Karman vortex		
Rated flow range		0.5 to 4 L/min	2 to 16 L/min	5 to 40 L/min
Operating pressure range		0 to 1 MPa		
Withstand pressure		1.5 MPa		
Operating fluid temperature		0 to 90°C (with no cavitation)		
Accuracy Note 1)		±5% F.S.		
Repeatability Note 1)		±2% F.S.		
Temperature characteristics		±2% F.S. (15 to 35°C, 25°C reference), ±3% F.S. (0 to 50°C, 25°C reference)		
Output specifications Note 2)	Output for monitor unit	Pulse output, N channel, open drain, output for monitor unit PF2W3□□. (Specifications: Maximum load current of 10 mA; Maximum applied voltage of 30 V)		
	Analog output	Voltage output 1 to 5 V Accuracy: ±5%F.S., Min. load impedance: 100 kΩ or more (Output impedance: 1 kΩ)		
		Current output 4 to 20 mA Accuracy: ±5%F.S., Max. load impedance: 300 Ω or less (at 12 VDC), 600 Ω or less (at 24 VDC)		
Power supply voltage		12 to 24 VDC ±10%		
Current consumption (No load)		20 mA or less		
Environment	Enclosure	IP65		
	Operating temperature range	Operating: 0 to 50°C, Stored: –25 to 85°C (with no freezing and condensation)		
	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		
	Noise resistance	1000 Vp-p, Pulse width 1μs, Rise time 1ns		
Weight Note 3)		660 g		
Port size (Rc, NPT, G)		3/8	3/8, 1/2	1/2, 3/4

Note 1) The system accuracy when combined with PF2W2□□/3□□.
Note 2) Output system can be selected during initial setting.
Note 3) Without lead wire. (Add 20g for the types of analog output whether voltage or current output selected.)
Note 4) The sensor unit conforms to the CE marking.

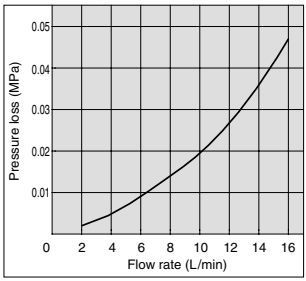
Monitor units are the same as those of remote type digital flow switch for water (Series PF2W3□□/PF2W20□). Refer to pages 304 and 305 for details.

Flow Characteristics (Pressure Loss)

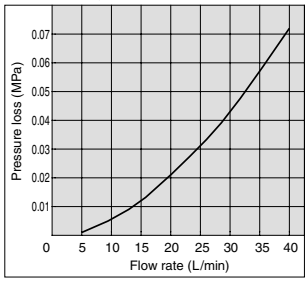
PF2W704T, 504T



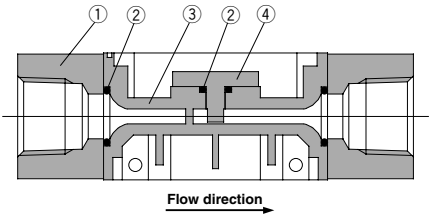
PF2W720T, 520T



PF2W740T, 540T



Wetted Parts Construction/Sensor Unit

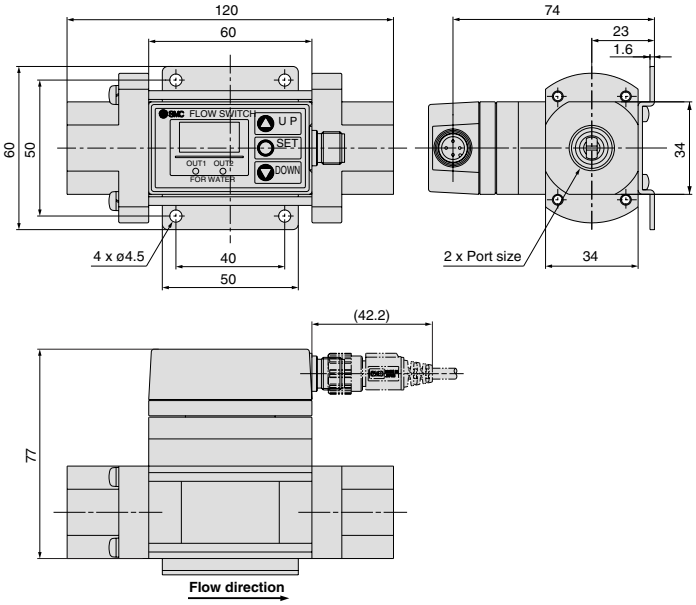


Parts list

No.	Description	Material
1	**Attachment**	Stainless steel
2	**Seal**	FKM
3	**Body**	PPS
4	**Sensor**	PPS

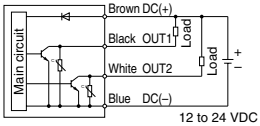
Dimensions: Integrated Display Type For Water

PF2W704T, 720T, 740T

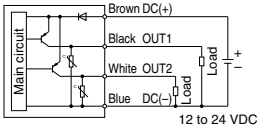


Internal Circuits and Wiring Examples

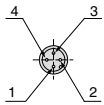
-27
NPN (2 outputs)



-67
PNP (2 outputs)



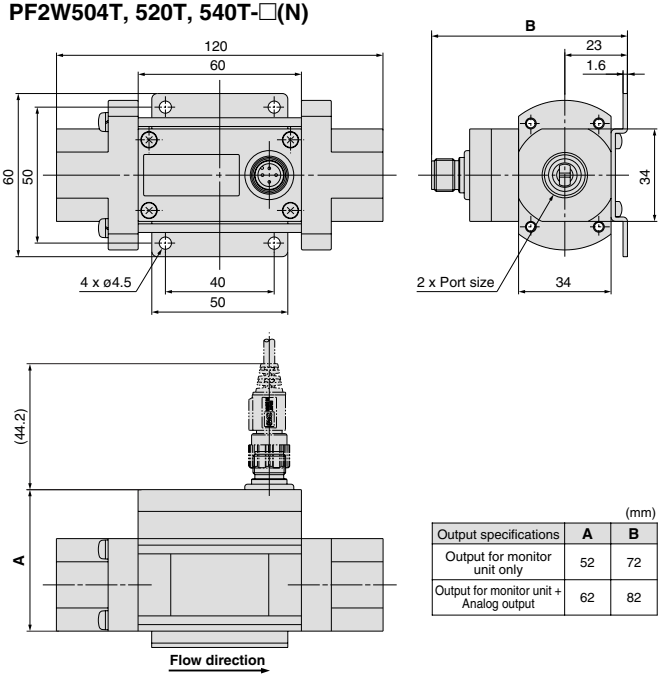
Connector pin numbers



Pin no.	Pin description
1	DC(+)
2	OUT2
3	DC(–)
4	OUT1

Dimensions: Remote Type Sensor Unit For Water

PF2W504T, 520T, 540T-□(N)

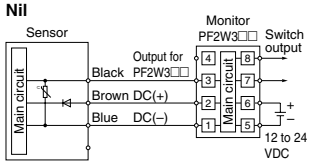


(mm)

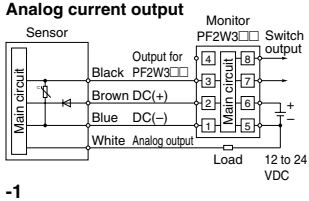
Output specifications	A	B
Output for monitor unit only	52	72
Output for monitor unit + Analog output	62	82

Internal Circuits and Wiring Examples

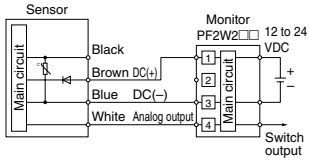
Nil



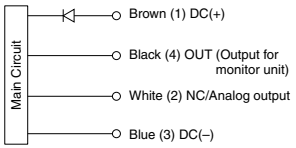
-1/2
Analog current output



-1
Analog voltage output

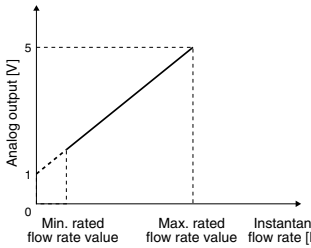


Wiring



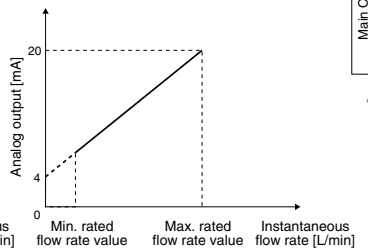
∗ Use this sensor by connecting it to a SMC remote type display unit, Series PF2W3□□.

Analog output
1 to 5 VDC



Part no.	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2W504T-□-1	0.5	4
PF2W520T-□-1	2	16
PF2W540T-□-1	5	40

4 to 20 mA DC



Part no.	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2W504T-□-2	0.5	4
PF2W520T-□-2	2	16
PF2W540T-□-2	5	40

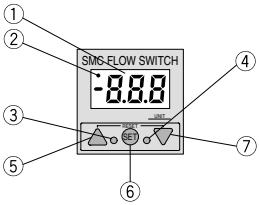
Connector pin numbers

Pin no.	Pin description
1	DC(+)
2	NC/Analog output
3	DC(–)
4	OUT

Description

Integrated Display Type
PF2A710, 750, 711, 721, 751
PF2W704(T), 720(T), 740(T), 711

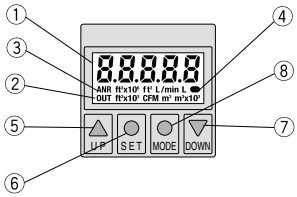
Remote Type/Monitor Unit
PF2A300, 301, 310, 311
PF2W300, 301, 330, 331



RESET button (▲ + ▼ button)
If the UP and DOWN buttons are pressed simultaneously, the RESET function will activate.
In case of an emergency, please clear the display. The display of the accumulated flow will be reset to zero.

①	LED display/Red	Displays the measured flow rate, each setting condition, and error code.
②	Indicator (PF2A7□□, PF2A3□□ for air only)	Illuminates when the normal condition (nor) is selected.
③	Output (OUT1) display/Green	Displays the output condition of OUT1. Lights up when output is turned ON.
④	Output (OUT2) display/Red	Displays the output condition of OUT2. Lights up when output is turned ON.
⑤	UP button (▲ button)	Use to change the mode or to increase the set value.
⑥	SET button (● button)	Use this button to set the valve or the set mode.
⑦	DOWN button (▼ button)	Use to change the mode or decrease the set value.

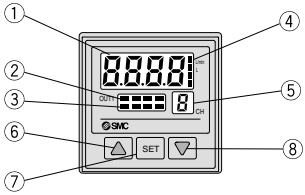
Integrated Display Type
PF2A703H, 706H, 712H



RESET button (▲ + ▼ button)
If the UP and DOWN buttons are pressed simultaneously, the RESET function will activate.
In case of an emergency, please clear the display. The display of the accumulated flow will be reset to zero.

①	LCD display/Orange	Displays the measured flow rate, each setting condition, and error code.
②	Output (OUT1) display/Red	Displays the output condition of OUT1. Lights up when output is turned ON.
③	Unit display/Red	Displays the selected unit. Type without unit switching function is fixed SI units (L/min, or L, m^3, m^3 x 10^3).
④	Flow rate confirmation display/Red	The blinking intervals change depending on the flow rate value.
⑤	UP button (▲ button)	Use to change the mode or to increase the set value.
⑥	SET button (● button)	Use to select the function.
⑦	DOWN button (▼ button)	Use to change the mode or decrease the set value.
⑧	MODE button (● button)	Use for changing the function.

4-channel Flow Monitor (Remote type/Monitor unit)
PF2A200, 201
PF2W200, 201



①	LCD display/Orange	Displays the measured flow rate, each setting condition, and error code.
②	Switch output display/Red	Displays the output condition of OUT1 (CH1 to 4). Lights up when output is turned ON.
③	Unit display of flow rate for air/ Red (PF2A200, 201 for air only)	CH1 to 4 will illuminate when the normal condition (nor) is selected.
④	Unit display/Orange	Illuminates the selected unit. Use after putting the unit label other than L/min, L.
⑤	Channel display/Red	Displays the selected channel.
⑥	UP button (▲ button)	Use to change the mode or to increase the set value.
⑦	SET button	Use this button to set the value or the set mode.
⑧	DOWN button (▼ button)	Use to change the mode or decrease the set value.

Functions

Refer to the operation manual for information on setting and operating.

Flow rate measurement selection

Instantaneous flow rate and accumulated flow rate can be selected. A flow rate of up to 999999 can be accumulated. The accumulated flow rate is reset when the power supply turns OFF. (With PF2A7□H, it is possible to select a holding function.)

Unit switching

For Air

Display	Instantaneous flow rate	Accumulated flow
U_1	L/min	L
U_2	CFM x 10^{-2}, CFM x 10^{-1}	ft^3 x 10^{-1}

CFM = ft^3/min

High Flow Rate Type (For Air)

Display	Instantaneous flow rate	Accumulated flow
U_1	L/min	L, m^3, m^3 x 10^3
U_2	CFM	ft^3, ft^3 x 10^3, ft^3 x 10^6

For Water/High Temperature Fluid Type (For Water)

Display	Instantaneous flow rate	Accumulated flow
U_1	L/min	L
U_2	GPM	gal (US)

GPM = gal (US)/min

Note) Fixed SI unit (L/min, or L, m^3, m^3 x 10^3) will be set for the type without the display unit switching function.

Flow rate conversion

Normal condition: 0°C, 101.3 kPa, dry air
Standard condition: 20°C, 101.3 kPa, 65%RH (ANR)
Switchable between these conditions.

Flow rate measuring unit confirmation

This function allows for the confirmation of the accumulated flow rate when instantaneous flow rate is selected and to confirm the instantaneous flow rate when accumulated flow rate is selected.

Keylock

This function prevents accidental operations such as changing the set value.

Accumulation clearance

This function clears the accumulated value.

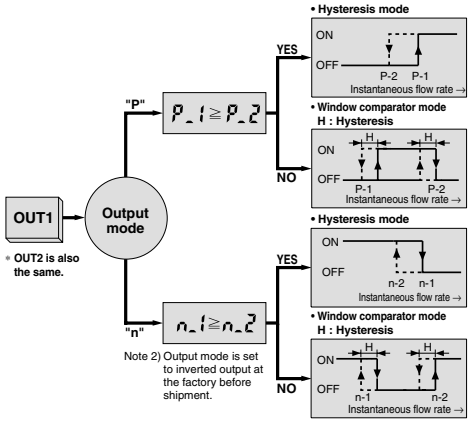
Initialization of setting (only for Series PF2A7□□H)

This function restores the setting to the original state, just as it had been shipped from the factory.

Output types

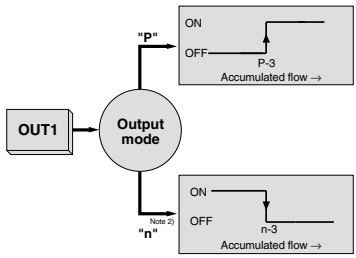
Real-time switch output, accumulated switch output, or accumulated pulse output can be selected as an output type.

Real-time switch output



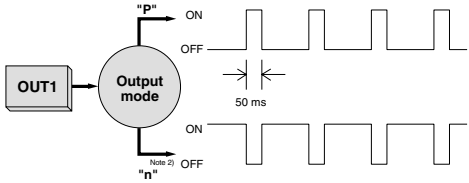
Note 2) Output mode is set to inverted output at the factory before shipment.

Accumulated switch output



Note 2) Output mode is set to inverted output at the factory before shipment.

Accumulated pulse output



Note1) For a digital flow switch with an unit switching function. (Fixed SI unit [L/min, or L, m^3 or m^3 x 10^3] will be set for switch types without an unit switching function.) Refer to the specifications of the display unit for the flow rate value per pulse.

Functions

Copy function (PF2□200, 201 only)

Information to be copied is:
① Flow rate range
② Display mode
③ Display unit (Only available when the unit specification is nil.)
④ Output method
⑤ Output mode
⑥ Flow rate display unit (available with PF2A20□ only)
⑦ Flow rate value

Peak hold, Bottom hold display function (PF2□200, 201 only)

The maximum or minimum value can be held in the case where the instantaneous flow rate display mode is selected during the initial setting. The hold value is reset when the power supply turns OFF or the hold is released.

Error correction

LED display	Contents	Action
Er1 Note 1) / Err_1 Note 2)	A current of more than 80 mA is flowing to OUT1.	Check the load and the wiring for OUT1.
Er2 Note 1)	A current of more than 80 mA is flowing to OUT2.	Check the load and the wiring for OUT2.
Err_3 Note 2) / Er4 Note 1)	The set data has changed for some reason.	Perform the RESET operation, and reset all the data again.
--- Note 1) / ----- Note 2)	The flow rate is over the flow rate measurement range.	Use an adjustment valve, etc. to reduce the flow rate until it is within the flow rate range.

Note 1) Applicable to monitor integrated type and remote type except the PF2A7□□H series.
Note 2) Applicable to the PF2A7□□H series only.

For PF2A/W200, 201

LED display	Contents	Action
Er1	Over current is flowing to the load of a switch output.	Eliminate the cause of the over current by turning off the power supply, and then turn on it again.
Er0	Internal data error.	Please contact SMC for investigation.
Er7	Internal data error.	
Er10	Internal data error.	
Er5	Internal data error.	Turn off the power supply and then turn on it again.
Er6	Internal data error.	
---	The flow rate is over the flow rate measurement range.	Use an adjustment valve, etc. to reduce the flow rate until it is within the flow rate range.

Channel select function (PF2□200, 201 only)

Every pushing the △ button, channel selection "1→2→3→4→1..." is available. The flow rate measurement of each selected channel is shown in the monitor unit.

Channel scan function (PF2□200, 201 only)

Changes displaying the channel shown every about 2 seconds and its detected flow rate.

Option

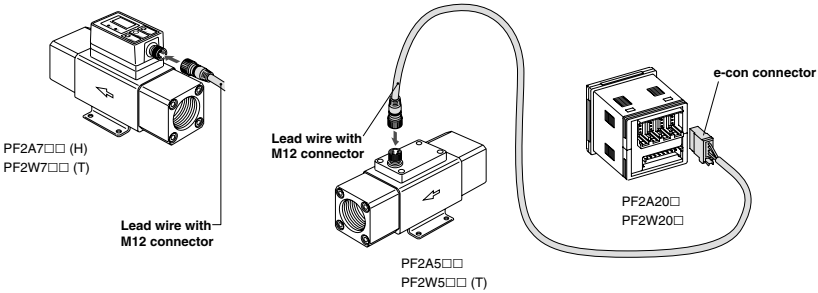
When only optional parts are required, order with the part numbers listed below.

Lead wire with M12 connector

Part no.	Qty.	Lead wire length
ZS-37-A	1	3 m

e-con connector

Part no.	Qty.
ZS-28-CA-4	1



In addition to the lead wire assembly shown above, those listed below (female contact) can be connected.
However, they cannot be connected with an e-con connector because the diameter of the core wire and its coverage diameter are different. For details, contact each manufacturer.
Contact each manufacturer for details including RoHS compliance.

Connector size	Pin no.	Manufacturer	Applicable series
M12	4	Correns Corp.	VA-4D
		OMRON Corp.	XS2
		Yamatake Corp.	PA5-4I
		HIROSE ELECTRIC CO., LTD.	HR24
		DDK Ltd.	CM01-8DP4S

In addition to the connectors shown above, those listed below (e-con) can be connected.

Manufacturer	Model
Sumitomo 3M Limited	37104-3122-000FL
Tyco Electronics Japan G.K.	2-1473562-4
OMRON Corp.	XN2A-1430

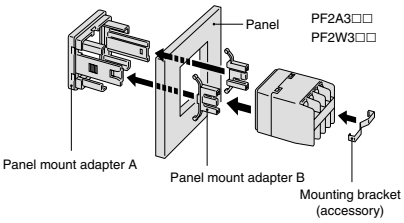
Cable Specifications

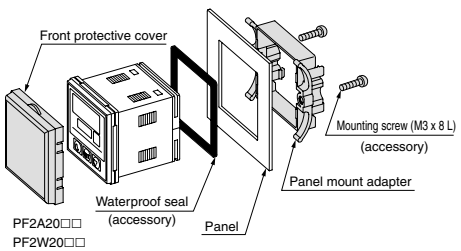
No. of cable wire		4
Conductor	**Nominal cross-sectional area**	AWG23
	Dimension	0.72 mm
Insulator	**Dimension**	1.14 mm Brown, White, Blue, Black
Sheath	**Material**	Heat-resistant and oil-resistant lead-free PVC
	O.D.	4.00 mm

Panel mounting

Pin no.	Description	Note
ZS-22-E	Panel mount adapter A, B	With mounting bracket

Part no.	Description	Note
ZS-26-B	Panel mount adapter	With waterproof seal, mounting screw
ZS-26-C	Front protective cover + Panel mount adapter	With waterproof seal, mounting screw





Related Product
Multi Counter
Series CEU5

How to Order

CEU5 □ □ □

Output transistor mode

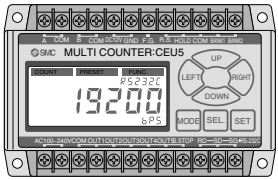
Nil	NPN open collector output
P	PNP open collector output

Power supply voltage

Nil	100 to 240 VAC
D	24 VDC

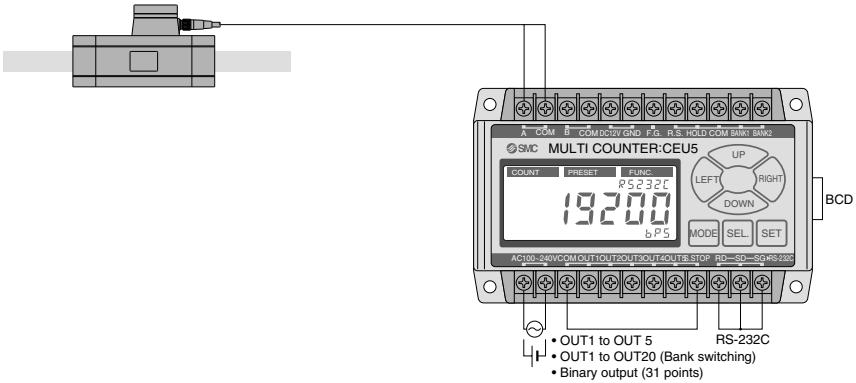
External output

Nil	RS-232C
B	RS-232C + BCD



Connection Method

Connection with the Digital Flow Switch (Series PF2)



- Possible to measure accumulated pulse output of a Digital Flow Switch by an unit of 100 L (litter) and 10 ft^3 (cube foot) using the pre-scaling function* of the multi counter (When inputting to the multi counter, Up or Down is selected as input method.)
- Possible to take advantage of all CEU5 functions using preset mode and function mode.

* The set value is calculated by selecting manual mode. By multiplication by 4, then, per pulse value is set.

<Connection with other manufacturers' encoders>

- Possible to switch multi counter side input method to 2-phase or Up/Down.
- Possible to connect to an encoder if the output method is Open Collector.
- When selecting UP or DOWN, phase A to COM input is counted toward addition direction, phase B to COM input is counted toward subtraction direction.

⚠Caution

When connecting the CEU5 with an encoder from another manufacturer, please thoroughly confirm the specification beforehand. Please note that the CEU5 may not count normally depending on the output method, output frequency and connecting cable length, etc. of the encoders.

Regarding connection with scale cylinder, refer to "Stroke Reading Cylinder and Counter Series CE" in the Best Pneumatics No. 3.

Series PF2A/PF2W
Specific Product Precautions 1

Be sure to read before handling. Refer to back page 1 for Safety Instructions and "Handling Precautions for SMC Products" (M-E03-3) for Flow Switch Precautions.

Design and Selection

⚠Warning

1. Operate the switch only within the specified voltage.

Use of the switch outside of the specified voltage range can cause not only a malfunction and damage to the switch, but it can also cause electrical shock and fire.

2. Do not exceed the maximum allowable load specification.

A load exceeding the maximum load specification can cause damage to the switch.

3. Do not use a load that generates a surge voltage.

Although the circuit at the output side of the switch is surge-protected, damage may still occur if a voltage surge is applied repeatedly. When a load which generates a surge, such as from a relay or solenoid valve, is directly driven, use a switch with a built-in surge absorbing element.

4. Since the type of fluid varies depending on the product, be sure to verify the specifications.

The switches do not have an explosion proof rating. To prevent a possible fire hazard, do not use with inflammable gases or fluids.

5. Monitor the internal voltage drop of the switch.

When operating below the specified voltage, it is possible that the load may be ineffective even though the pressure switch function is normal. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

Supply voltage	−	Internal voltage drop of switch	>	Minimum operating voltage of load

[For air]

6. Use the switch within the specified flow rate measurement and operating pressure.

Operating beyond the specified flow rate and operating pressure can damage the switch.

[For water]

7. Use the switch within the specified flow rate measurement and operating pressure.

Operating beyond the specified flow rate and operating pressure can damage the switch. Especially avoid the application of pressure through a water hammer, which is above the specification.

<Examples of pressure reduction measures>

a) Use a device such as a water hammer relief valve to slow the valve's closing speed.
b) Absorb impact pressure by using an accumulator or elastic piping material such as a rubber hose.
c) Keep the piping length as short as possible.

8. Design the system, so that the fluid always fills the detection passage.

Especially for vertical mounting, introduce the fluid from the bottom to the top.

9. Operate within the flow rate measurement range.

If operated outside of the flow rate measurement range, the Karman vortex will not be generated and normal measurement will not be possible.

[Series PF2A7□□H]

10. Sudden increase in flow rate may destroy the flow sensor. Ensure to open/close the flow control valve not to exceed the maximum flow rate measurement values.

Design and Selection

⚠Caution

1. Data from the flow switch is stored even after the power supply is turned off.

The input data is stored in EEPROM so that the data will not be lost after the flow switch is turned off. (The data can be rewritten for up to one million times, and stored for up to 20 years.)

2. Accumulated flow rate is reset when it is turned OFF.

However, only in the case of the PF2A7□□H series (for air) it is possible to select a holding function that maintains the accumulated flow rate, even though the power supply is off.

Mounting

⚠Warning

1. Mount the switch using the proper tightening torque.

When the switch is tightened beyond the specified tightening torque, it may be damaged. On the other hand, tightening below the specified tightening torque may cause the installation screws to loosen during operation.

Thread	Tightening torque N·m
Rc 1/8	7 to 9
Rc 1/4	12 to 14
Rc 3/8	22 to 24
Rc 1/2	28 to 30

Thread	Tightening torque N·m
Rc 3/4	28 to 30
Rc 1	36 to 38
Rc 1, 1/2	48 to 50
Rc 2	48 to 50

2. Apply a wrench only to the metal part of the piping when installing the flow switch onto the system piping.

Do not apply the wrench to any part other than the piping attachment or the switch may be damaged.

3. Monitor the flow direction of the fluid.

Install and connect piping so that fluid flows in the direction of the arrow indicated on the body.

4. Remove dirt and dust from inside of the piping by means of air blow, before attaching to the switch.

5. Do not drop or bump.

Do not drop, bump, or apply excessive impacts (490 m/s^2) while handling. Although the external body of the switch (switch case) may not be damaged, the switch inside could be damaged and cause a malfunction.

6. Hold the body of the switch when handling.

The tensile strength of the cord is 49N and applying a greater pulling force than this can cause a malfunction. When handling, hold the body of the switch.

7. Do not use until you can verify that equipment can operate properly.

Following mounting, repair, or retrofit, verify correct mounting by conducting suitable function and leakage tests after piping and power connections have been made.

8. Avoid the mounting orientation with the bottom of the body facing up.

The switch can be mounted in any way such as vertically or horizontally, however, avoid the mounting orientation with the bracket on the bottom of the body facing upward.

Series PF2A/PF2W
Specific Product Precautions 2

Be sure to read before handling. Refer to back page 1 for Safety Instructions and "Handling Precautions for SMC Products" (M-E03-3) for Flow Switch Precautions.

Mounting

⚠Warning

[For air]

9. Never mount a switch in a place that will be used as a step stool during piping.

Damage may occur if an excessive load is applied to the switch.

10. Be sure to allow straight pipe length that is minimum 8 times the port size upstream and downstream of the switch piping.

When abruptly reducing the size of piping or when there is a restriction such as a valve on the upstream side, the pressure distribution in the piping changes and makes accurate measurement impossible. Therefore, flow restriction measures such as these should be implemented on the downstream side of the switch.

[For water]

11. Never mount a switch in a place that will be used as a step stool during piping.

Damage may occur if an excessive load is applied to the switch. Especially when the switch supports the piping, do not apply a load of 15N·m or more to the metal part of the switch.

12. Be sure to allow straight pipe length that is minimum 8 times the port size upstream and downstream of the switch piping.

When abruptly reducing the size of piping or when there is a restriction such as a valve on the upstream side, the flow velocity distribution in the piping changes and makes accurate measurement impossible. Therefore, flow restriction measures such as these should be implemented on the downstream side of the switch.
Also, leaving the downstream side open or bringing about excessive flow volume will increase the risk of cavitation and may make accurate measurement impossible. Increasing the fluid pressure is one means of reducing cavitation. Try a procedure such as mounting a throttle on the downstream side of the switch. Check to make sure there is no malfunction before using.

Wiring

⚠Warning

1. Verify the color and the terminal number when wiring.

Incorrect wiring can cause the switch to be damaged and malfunction. Verify the color and the terminal number in the operation manual when wiring.

2. Avoid repeatedly bending or stretching of the lead wire.

Repeatedly applying bending stress or stretching force to the lead wire will cause it to break.

3. Confirm proper insulation of wiring.

Make sure that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.

4. Do not wire in conjunction with power lines or high voltage lines.

Wire separately from power lines and high voltage lines, and avoiding wiring in the same conduit with these lines. Control circuits including switches may malfunction due to noise from these lines.

5. Do not allow a load to short circuit.

Although a switch indicates excess current error if a load is short circuited, all incorrect wiring connections such as power supply polarity cannot be protected. Take precautions to avoid incorrect wiring.

Usage

⚠Warning

1. When using a switch for high temperature fluid, the switch itself also becomes hot due to the high temperature fluid. Avoid touching the switch directly as this may cause a burn.

Operating Environment

⚠Warning

1. Never use in the presence of explosive gases.

The switches do not have an explosion proof rating. Never use in the presence of an explosive gas as this may cause a serious explosion.

2. Mount the switch in a locations where there is no vibration greater than 98 m/s² or impact greater than 490 m/s².

3. Do not use in an area where surges are generated.

When there are units that generate a large amount of surge in the area around a pressure switch, (e.g., solenoid type lifters, high frequency induction furnaces, motors, etc.) this may cause deterioration or damage to the switch's internal circuitry. Avoid sources of surge generation and crossed lines.

4. Switches are not equipped with surge protection against lightning.

The flow switches are CE compliant, however they are not equipped with surge protection against lightning. Lightning surge protection measures should be applied directly to the system components as necessary.

5. Avoid using the switch in an environment where the likelihood of splashing or spraying of liquids exists.

The switches are dustproof and splashproof, however avoid using in an environment where the likelihood of heavy splashing or spraying of liquids exists. Since the monitor unit of the remote type switches featured here is not dust or splashproof, the use in an environment where liquid splashing or spraying exists must be avoided.

[For air]

6. Use the switch within the specified fluid and ambient temperature range.

The fluid and ambient temperature range is 0° to 50°C. Take measures to prevent the fluid from freezing when it is below 5°C, since this may damage the switch and lead to a malfunction. The installation of an air dryer is recommended for eliminating condensation and moisture. Never use the switch in an environment where there are drastic temperature changes even when these temperatures are within the specification.

[For water]

7. Use the switch within the specified fluid and ambient temperature range.

The fluid and ambient temperatures range for the switch is 0 to 50°C (and 0 to 90°C for high temperature fluid). Take measures to prevent the fluid from freezing when it is below 5°C, since this may cause damage to the switch and lead to a malfunction. Never use the switch in an environment where there are drastic temperature changes even when these temperatures fall within the specified temperature range.

Series PF2A/PF2W
Specific Product Precautions 3

Be sure to read before handling. Refer to back page 1 for Safety Instructions and "Handling Precautions for SMC Products" (M-E03-3) for Flow Switch Precautions.

Maintenance

⚠Warning

1. Perform periodical inspections to ensure proper operation of the switch.
Unexpected malfunctions may cause a possible danger.

2. Take precautions when using the switch for an interlock circuit.
When a pressure switch is used for the interlock circuit, devise a multiple interlock system to prevent trouble or malfunction, and verify the operation of the switch and interlock function on a regular basis.

3. Do not disassemble or perform any conversion work on flow switches.

Measured Fluid

⚠Warning

1. Check regulators and flow adjustment valves before introducing the fluid.
If pressure or flow rate beyond the specified range are applied to the switch, the sensor unit may be damaged.

[For air]

2. The fluids that the switch can measure accurately are nitrogen and dry air.
Please note that accuracy cannot be guaranteed when other fluids are used.

3. Never use inflammable fluids.
The flow velocity sensor heats up to approximately 150°C.

4. Install a filter or mist separator on the upstream side when there is a possibility of condensate and foreign matter being mixed in with the fluid.
The rectifying device built into the switch will be clogged up and accurate measurement will no longer be possible.

[For water]

5. The fluid that the switch can measure accurately is water. Also, combination of equal parts water/ethylene glycol (50/50%) can be used if its temperature is high.
Please note that accuracy cannot be guaranteed when other fluids are used.

Measured Fluid

⚠Warning

6. Never use inflammable fluids.

7. Install a filter on the inlet side when there is a possibility of condensation and foreign matter being mixed with the fluid.
If foreign matter adheres to the switch's vortex generator or vortex detector, accurate measurement will no longer be possible.

Others

⚠Warning

1. After the power is turned on, the switch's output remains off while a message is displayed. Therefore, start the measurement after a value is displayed.

2. Perform settings after stopping control systems.
When the switch's initial setting and flow rate setting are performed, output maintains the condition prior to the settings.

3. Do not apply excessive rotational force to the monitor unit.
The integrated type display unit can rotate 360°. Rotation is controlled by the stopper; however, the stopper may be damaged if the monitor unit is turned with excessive force.

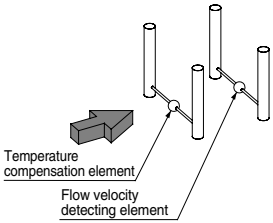
[For air]

4. Be certain to turn on the power supply when the flow rate is at zero.
Allow an interval of 10 minutes after turning on the power, as there are some changes in the display.

5. Flow rate unit
The switch measures at mass flow rates without being influenced by temperature and pressure. The switches use L/min as the flow rate indicator unit, in which the volumetric flow is substituted for mass flow at 0°C and 101.3 kPa (nor). The volumetric flow rate at 20°C, 101.3 kPa, and 65%RH (ANR) can be displayed with the high flow rate type switches for air.

Detection principle of digital flow switch for air

A heated thermistor is installed in the passage, and fluid absorbs heat from the thermistor as it is introduced to the passage. The thermistor's resistance value increases as it loses heat. Since the resistance value increase ratio has a uniform relationship to the flow velocity, the flow velocity can be detected by measuring the resistance value. To further compensate the fluid and ambient temperature, the temperature sensor is also built into the switch to allow stable measurement within the operating temperature range.



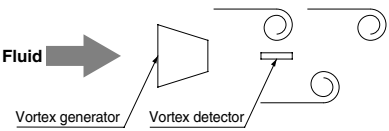
This flow switch uses L/min as the flow rate indicator unit. The mass flow is converted and displayed under the conditions of 0°C and 101.3 kPa and 20°C and 101.3 kPa.

Detection principle of digital flow switch for water

When an elongated object (vortex generator) is placed in the flow, reciprocal vortexes are generated on the downstream side. These vortexes are stable under certain conditions, and their frequency is proportional to the flow velocity, resulting the following formula.

$$f = k \times v$$

f: Frequency of vortex v: Flow velocity k: Proportional constant (determined by the vortex generator's dimensions and shape).
Therefore, the flow rate can be measured by detecting this frequency.



Contact SMC regarding the specifications for clean environment.

Specific Product Precautions 4

Be sure to read before handling. Refer to back page 1 for Safety Instructions and "Handling Precautions for SMC Products" (M-E03-3) for Flow Switch Precautions.

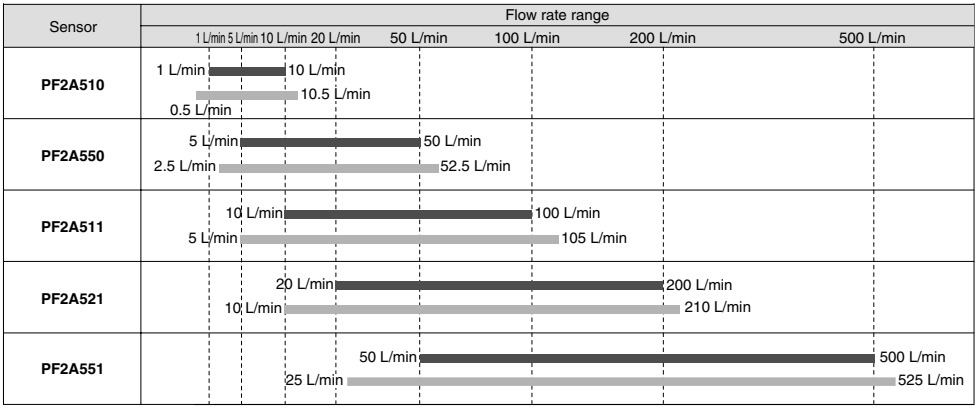
Set Flow Rate Range and Rated Flow Range

⚠ Caution

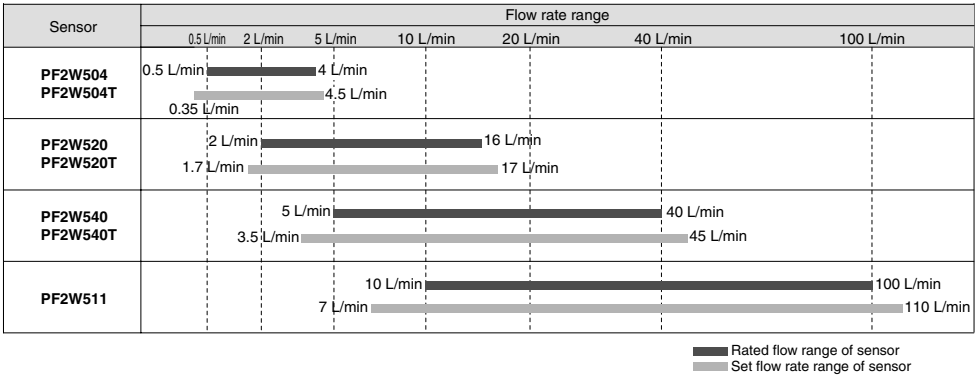
Set the flow rate within the rated flow range.

The set flow rate range is the range of flow rate that can be set on the controller.
The rated flow range is the range that satisfies the sensor's specifications (accuracy, linearity etc.).
It is possible to set a value outside of the rated flow range, however, the specification is not be guaranteed.

<For Air/PF2A>



<For Water/PF2W>



Series PF2A/PF2W
Specific Product Precautions 5

Be sure to read before handling. Refer to back page 1 for Safety Instructions and "Handling Precautions for SMC Products" (M-E03-3) for Flow Switch Precautions.

■ 4-channel Flow Monitor

Handling

⚠ Warning

1. Do not drop, bump, or apply excessive impacts (980 m/s²) while handling.
Although the body of the flow monitor case may not be damaged, the inside of the flow monitor could be damaged and lead to a malfunction.

2. The tensile strength of the power supply/output connection cable is 50N and the sensor lead wire with a connector is 25N.
Applying a greater pulling force than the applicable specified tensile strength to either of these components can lead to a malfunction. When handling, hold the body of the controller.

Connection

⚠ Warning

1. Incorrect wiring can damage the switch and cause a malfunction or erroneous switch output.
Connections should be done while the power is turned off.

2. Do not attempt to insert or pull the flow rate sensor or its connector when the power is on.
Switch output may malfunction.

3. Wire separately from power lines and high voltage lines, avoiding wiring in the same conduit with these lines.
Malfunctions may occur due to noise from these other lines.

4. If a commercial switching power supply is used, make sure that the F.G. terminal is grounded.

Operating Environment

⚠ Warning

1. Our 4-channel flow monitor is CE marked, however, it is not equipped with surge protection against lightning.
Lightning surge countermeasures should be applied directly to system components as necessary.

2. Our 4-channel flow monitor does not have an explosion proof rating.
Never use pressure sensors in the presence of inflammable or explosive gases.

3. Enclosure "IP65" applies only to the front face of the panel when mounting.
Do not use in an environment where oil splashing or spraying are anticipated.

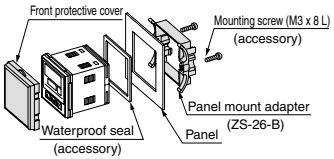
Mounting

⚠ Caution

The front face of the panel mount conforms to IP65, however there is a possibility of liquid infiltration if the panel mount adapter is not installed securely and properly. Securely fix the adapter with screws as shown below.

Front protective cover + Panel mounting

Tighten screws 1/4 to 1/2 turn after the heads are flush with the panel.

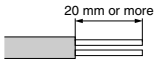


Wiring

⚠ Caution

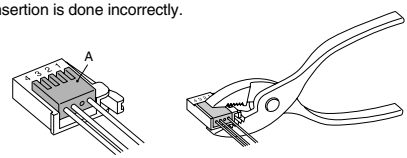
1. Connecting sensor cable and connector (ZS-28-CA-□)

- Cut the sensor cable as shown below.
- Insert each lead wire into the corresponding connector number by following the chart provided below.



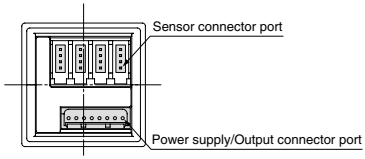
Connector no.	Cable wire color
1	Brown (DC+)
2	Not used
3	Blue (DC–)
4	White (IN: 1 to 5 V)

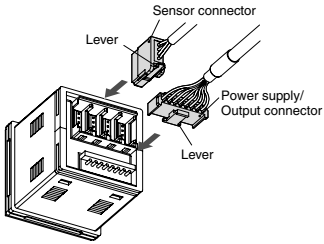
- Make sure that the numbers on the connector and the wire colors match. After verifying that the wires are fully inserted, temporarily hold A down by hand.
- Using pliers, press the center of A straight down.
- Note that that connector cannot be taken apart for reuse once it is crimped. Use a new sensor connector if wiring or cable insertion is done incorrectly.

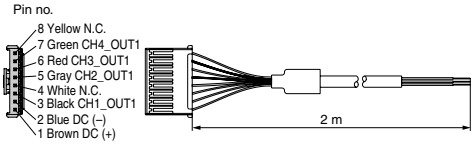


2. Inserting/Detaching of sensor connector, power supply/output connector

- Insert each connector straightforwardly until it clicks and locks onto the body.
- To remove the connector, pull it straight out while pushing the lever with your thumb.







Digital Flow Switch for Deionized Water and Chemical Liquids

PF2D Series

A single controller can monitor the flow rate of 4 different sensors.

Body and Sensor

New PFA

Tube

Super PFA

Three types of flow range

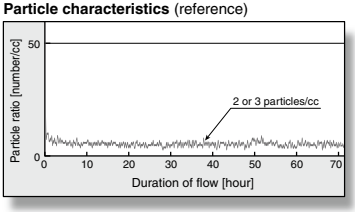
0.4 to 4 L/min (PF2D504)
1.8 to 20 L/min (PF2D520)
4.0 to 40 L/min (PF2D540)

4-channel Flow Monitor
PF2D200 series

Dust generation of 3 particles/cc or less (average number)

Karman vortex eliminates moving parts and allows low dust generation.

Particle characteristics (reference)

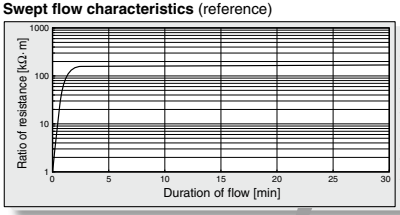


The data was obtained by performing an actual 10 minutes' supersonic cleaning using an average 16 MΩ·cm of deionized water at class 10000 clean room (1 L/min flow rate).
The diameter of the measured particles ranges from 0.1 to 0.5 μm. The flow rate used during measuring is 100 cc/min.

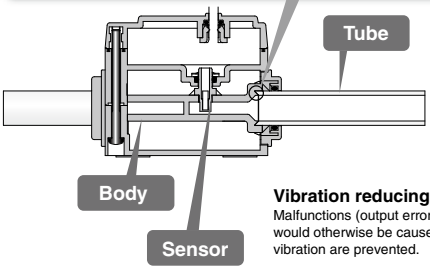
Swept flow characteristics

Tapered side seal minimizes dead volume to reduce accumulation of liquid pool.

Swept flow characteristics (reference)

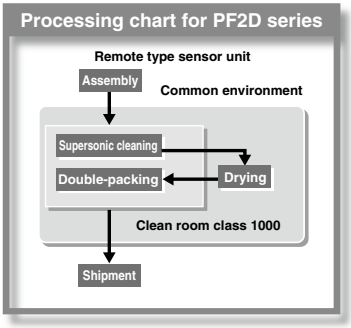


Fill the flow path with sulfuric acid and leave it for 30 minutes.
After disposing the sulfuric acid, flush the flow path out with deionized water and measure the resistance rate of the fluid that is discharged from the downstream side.
A quick recovery time indicates little liquid pool.



Vibration reducing seals
Malfunctions (output errors) that would otherwise be caused by vibration are prevented.

Processing chart for PF2D series



For Deionized Water and Chemical Liquids

Digital Flow Switch

PF2D Series

RoHS

How to Order

Remote Type Sensor Unit

PF2D5 20 – 13 – 1 – C

Flow rate range

04	0.4 to 4 L/min
20	1.8 to 20 L/min
40	4 to 40 L/min

Port size: (inch)

11	3/8	PF2D504
13	1/2	PF2D520
19	3/4	PF2D540

Output specification

Symbol	Specification	Applicable monitor unit (monitor) model
1	Output for monitor unit + analog output (1 to 5 V)	PF2D200/300 series
2	Output for monitor unit + analog output (4 to 20 mA)	PF2D300 series

Option (Refer to page 391.)

Nil	None
C	e-con connector x 1 pc.

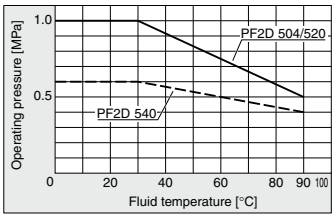
The cable and connector are shipped unassembled.

Specifications for Sensor Unit

Refer to pages 202 and 203 for Flow Switch Precautions. For details about the Specific Product Precautions, refer to the Operation Manual on the SMC website, http://www.smcworld.com Click here for details.

Model		PF2D504	PF2D520	PF2D540
Measured fluid		Liquid not to corrode nor erode deionized water and/or fluoropolymer. Viscosity: 3mPa·s (3cP) or less		
Detection style		Karman vortex		
Rated flow range		0.4 to 4 L/min	1.8 to 20 L/min Note 1)	4 to 40 L/min
Operating pressure range Note 2)		0 to 1 MPa		0 to 0.6 MPa
Proof pressure Note 3)		1.5 MPa		0.9 MPa
Operating fluid temperature		0 to 90°C		
Accuracy Note 4)		±2.5% F.S. (at 25°C water)		
Repeatability		±1% F.S. (at 25°C water)		
Temperature characteristics		±5% F.S. (0 to 50°C, based on 25°C)		
Output specifications	Pulse output	Pulse output, N channel, open drain, output for monitor unit PF2D 300/301 (Specifications: Maximum load current of 10 mA; Maximum applied voltage of 30 V)		
	Analog output	Voltage output Note 5) 1 to 5 V Accuracy: ±2% F.S., Min. load impedance: 100 kΩ (Output impedance: 1 kΩ)		
		Current output Note 6) 4 to 20 mA Accuracy: ±2% F.S.or less, Max. load impedance: 300 Ω or less with 12 VDC, 600 Ω or less with 24 VDC		
Power supply voltage		12 to 24 VDC ±10%		
Current consumption		20 mA or less (without load)		
Environmental resistance	Enclosure	IP65		
	Operating temperature range	Operating: 0 to 50°C, Stored: –25 to 85°C in stock (with no condensation and freezing)		
	Voltage resistance	1000 VAC for 1 min. between external terminals and case		
	Insulation resistance	50 MΩ or more (500 VDC measured via megohmmeter) between external terminals and case		
Standards		CE, RoHS		
Lead wire		Cabtire cord, 4 cores ø3.5, 3 m		
Weight		140 g (without lead wire)		225 g (without lead wire)
Port size		3/8 inch tube	1/2 inch tube	3/4 inch tube
Wetted material		Body: New PFA, Sensor: New PFA, Tube: Super PFA		

Note 1) 1.6 to 20 L/min (0.1 MPa) with viscosity of 1 mPa·s (1 cP) or less
Note 2) The operating pressure range drops according to the fluid temperature. See attached graph.
Note 3) 1.5 times of the maximum operating pressure and varying with fluid temperature.
Note 4) The system accuracy when combined with PF2D30□.
Note 5) When the voltage output is selected.
Note 6) When the current output is selected.
Note 7) The sensor unit conforms to the CE marking.
Note 8) For details about wiring, refer to the Operation Manual that can be downloaded from SMC website (http://www.smcworld.com).



Made to Order

LQ1 series fluoropolymer fittings mounting type is also available. Refer to page 392.

SMC

How to Order

Remote Type Monitor Unit

PF2D30 0 – A – M

Output specification

0	NPN open collector 2 outputs
1	PNP open collector 2 outputs

Mounting

A	Panel mounting

Unit specification

Nil	With unit switching function
M	Fixed SI unit Note)

Note) Fixed units: Real-time flow rate: L/min
Accumulated flow: L

Specifications for Monitor Unit

Refer to pages 202 and 203 for Flow Switch Precautions. For details about the Specific Product Precautions, refer to the Operation Manual on the SMC website, http://www.smcworld.com Click here for details.

Model		PF2D300/301		
Flow rate measurement range Note 1)		0.25 to 4.5 L/min	1.3 to 21.0 L/min	2.5 to 45 L/min
Set flow rate range Note 1)		0.25 to 4.5 L/min	1.3 to 21.0 L/min	2.5 to 45 L/min
Minimum set unit Note 1)		0.05 L/min	0.1 L/min	0.5 L/min
Accumulated pulse flow rate exchange value (Pulse width: 50ms) Note 1)		0.05 L/pulse	0.1 L/pulse	0.5 L/pulse
Note 2) Display units	Real-time flow rate	L/min, gal (US)/min		
	Accumulated flow	L, gal (US)		
Accumulated flow range Note 1)		0 to 999999 L		
Accuracy Note 3)		±2.5% F.S.		
Repeatability		±0.5% F.S.		
Temperature characteristics		±1% F.S. (15 to 35°C, based on 25°C) ±2% F.S. (0 to 50°C, based on 25°C)		
Current consumption (No load)		60 mA or less		
Weight		45 g		
Note 4) Output specifications	Switch output	NPN open collector (PF2D300)	Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA) Maximum applied voltage: 30 V 2 outputs	
		PNP open collector (PF2D301)	Maximum load current: 80 mA Internal voltage drop: 1.5 V or less (with load current of 80 mA) 2 outputs	
	Accumulated pulse output	NPN open collector or PNP open collector (same as switch output)		
Environmental resistance	Enclosure	IP40		
	Operating temperature range	Operating: 0 to 50°C, Stored: –25 to 85°C (with no condensation and freezing)		
	Voltage resistance	1000 VAC for 1 min. between external terminal and case		
	Insulation resistance	50 MΩ or more (500 VDC measured via megohmmeter) between external terminal and case		
Standards		CE, RoHS		
Indicator light		3-digits 7-segment LED		
Status LED's		ON: when light is on, OUT1: Green; OUT2: Red		
Power supply voltage		12 to 24 VDC ±10%		
Response time		1sec. or less		
Hysteresis		Hysteresis mode: adjustable (can be set from 0) Window comparator mode Note 5): fixed (3 digits)		

Note 1) The value varies depending on set flow range
Note 2) For digital flow switch with unit switching function. (Fixed SI unit [L/min or L] will be set for switch types without the unit switching function.)
Note 3) The system accuracy when combined with PF2D5□□.
Note 4) Switch output and accumulated pulse output can be selected using the control button operation during initial setting.

	1	2	3	4
Output 1	Switch output	Switch output	Accumulated pulse output	Accumulated pulse output
Output 2	Switch output	Accumulated pulse output	Switch output	Accumulated pulse output

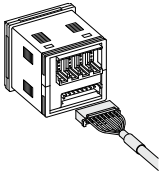
Note 5) Window comparator mode: Since hysteresis (H) will reach 3 digits, keep P_1 and P_2 or n_1 and n_2 apart by 7 digits more. (In case of output OUT2, n_1, 2 to be n_3, 4 and P_1, 2 to be P_3, 4.)
Note 6) The monitor unit conforms to the CE marking.
Note 7) Accumulated flow rate is reset when the power supply turns OFF.
Note 8) For details about wiring, refer to the Operation Manual that can be downloaded from SMC website (http://www.smcworld.com).

How to Order

4-channel Flow Monitor
Remote Type
Monitor Unit

PF2D20 □ – M □ □

Accessory / Power supply output cable (2 m)



Output specification

0	NPN4 outputs
1	PNP4 outputs

Unit specification

Nil	With unit switching function
M	Fixed SI unit Note)

Note) Fixed units:
Real-time flow rate: L/min
Accumulated flow: L

Option 2 (Refer to page 391.)

Nil	None
4C	Sensor connector (4 pc.)

Option 1 (Refer to page 391.)

Nil	None
A	Panel mounting
B	Front protective cover + Panel mounting

Connectable remote type sensor part is PF2D5□□-□-1 (with analog output 1 to 5 V).

Specifications

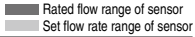
Refer to pages 202 and 203 for Flow Switch Precautions. For details about the Specific Product Precautions, refer to the Operation Manual on the SMC website, http://www.smcworld.com Click here for details.

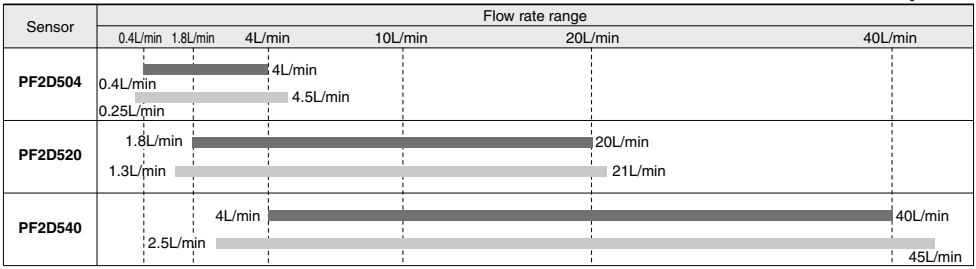
Model		PF2D200/201		
Applicable flow rate sensor		PF2D504-□-1	PF2D520-□-1	PF2D540-□-1
Flow rate measurement range Note 1)		0.25 to 4.50 L/min	1.3 to 21.0 L/min	2.5 to 45.0 L/min
Set flow rate range Note 1)		0.25 to 4.50 L/min	1.3 to 21.0 L/min	2.5 to 45.0 L/min
Minimum set unit Note 1)		0.05 L/min	0.1 L/min	0.5 L/min
Accumulated pulse flow rate exchange value (Pulse width: 50ms) Note 1)		0.05 L/pulse	0.1 L/pulse	0.5 L/pulse
Display units Note 1)	Real-time flow rate	L/min, gal (US)/min		
	Accumulated flow	L, gal (US)		
Accumulated flow range Note 1)		0 to 999999 L, 0 to 999999 gal (US)		
Power supply voltage		24 VDC ±10% (With power supply polarity protection)		
Current consumption		55 mA or less (Not including the current consumption of the sensor)		
Power supply voltage for sensor		Same as [Power supply voltage]		
Power supply current for sensor Note 2)		Max. 110 mA (However, the total current for the 4 inputs is 440 mA maximum or less.)		
Output specifications Note 3)	Sensor input	1 to 5 VDC (Input impedance: Approx. 800K Ω)		
	No. of inputs	4 inputs		
	Input protection	Excess voltage protection		
	Switch output (Real-time switch output, Accumulated switch output)	NPN open collector (PF2D200)	Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA) Maximum applied voltage: 30 V	
		PNP open collector (PF2D201)	Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA)	
	Accumulated pulse output	NPN open collector or PNP open collector (same as switch output)		
	No. of outputs	4 outputs (1 output per 1 sensor input)		
	Output protection	Short circuit protection		
Hysteresis		Hysteresis mode: Variable (can be set from 0), Window comparator mode: Fixed (3-digits)		
Response time Note 4)		1s or less		
Accuracy Note 4)		±5% F.S.		
Repeatability Note 4)		±3% F.S.		
Temperature characteristics		±2% F.S. (0 to 50°C, based on 25°C)		
Display method		For measured value display: 4-digits, 7-segment LED (Orange) For channel display: 1-digit, 7-segment LED (Red)		
Status LED's		Illuminates when output is ON OUT1: Red		
Resistance	Enclosure	IP65 for the front face only, the rest is IP40.		
	Operating temperature range	Operating: 0 to 50°C, Stored: –10 to 60°C (with no freezing and condensation)		
	Operating humidity range	Operating or Stored: 35 to 85%RH (with no condensation)		
Standards		CE, RoHS		
Connection		Power supply / Output connection: 8P connector, Sensor connection: 4P connector (e-con)		
Material		Housing: PBT, Monitor: PET, Backside rubber: CR		
Weight		60 g (Except for any accessories that are shipped together.		

Note 1) Fixed SI unit [L/min or L] will be set for switch types without the unit switching function. ("-M" is suffixed at the end of part number.) Accumulated flow is reset when the power supply turns OFF.
Note 2) If Vcc side on sensor input connector part is short-circuited with the 0V side, the flow monitor inside will be damaged.
Note 3) Switch output and accumulated pulse output can be selected during initial setting.
Note 4) The system accuracy when combined with an applicable flow sensor.
Note 5) This product conforms to the CE marking.
Note 6) For details about wiring, refer to the Operation Manual that can be downloaded from SMC website (http://www.smcworld.com).

Set Flow Rate Range and Rated Flow Range

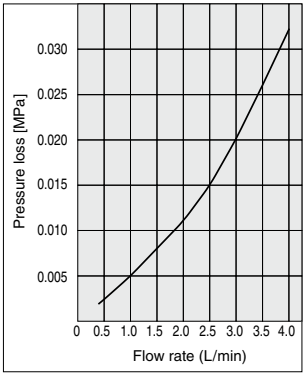
Set the flow rate within the rated flow range.
The set flow rate range is the range of flow rate that can be set on the controller
The rated flow range is the range that satisfies the sensor's specifications (accuracy, linearity etc.).
It is possible to set a value outside off the rated flow range, however, the specification is not be guaranteed.



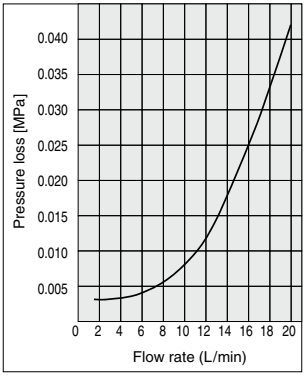


Flow Rate Characteristics (Pressure Characteristics)

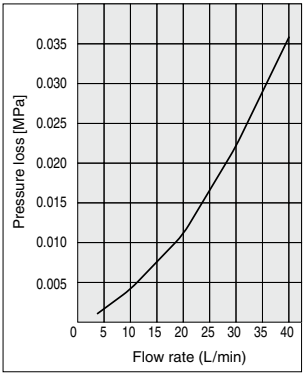
PF2D504



PF2D520

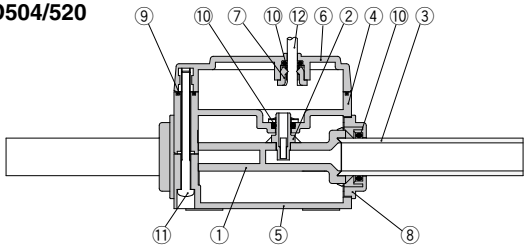


PF2D540

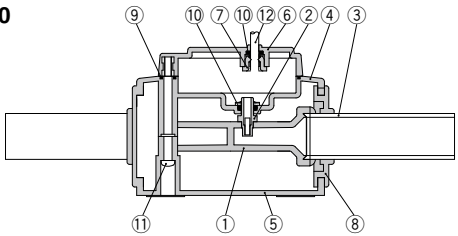


Construction

PF2D504/520



PF2D540

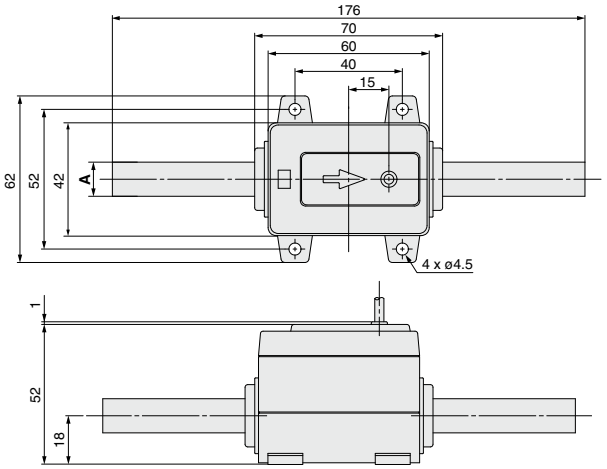


Parts list

Number	Parts	Material
1	**Body**	New PFA
2	**Sensor**	New PFA
3	**Tube**	Super PFA
4	**Housing A**	PPS
5	**Housing B**	PPS
6	**Housing C**	PPS
7	**Bushing**	POM
8	**Cap**	PPS
9	**Gasket**	FKM
10	**O-ring**	FKM
11	**Thread**	Stainless steel 304
12	**Lead wire**	PVC

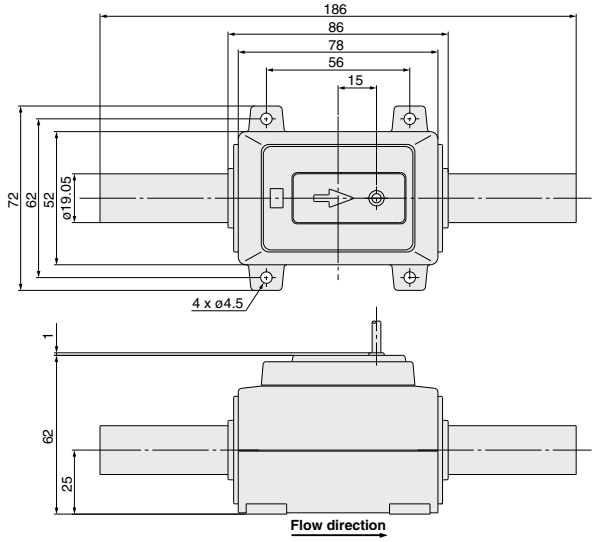
Dimensions: Remote Type Sensor Unit

PF2D504-11/520-13



Model	A
PF2D504	ø9.52
PF2D520	ø12.7

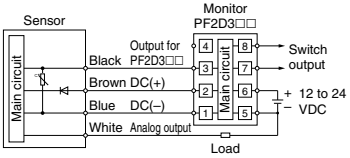
PF2D540-19



Internal Circuits and Wiring Examples

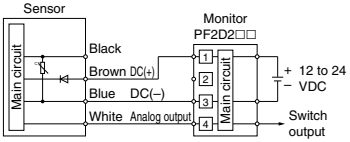
-1/2

Analog voltage output
Analog current output

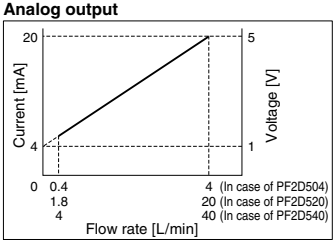


-1

Analog voltage output



Analog output

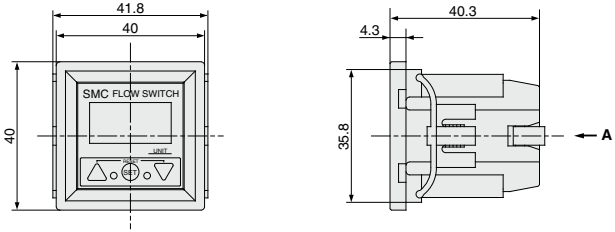


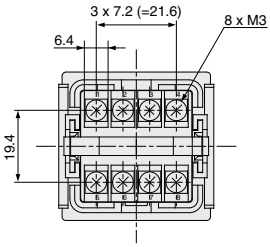
Cable Specifications

No. of cable wire		4
Conductor	**Nominal cross-sectional area**	0.15 mm^2
	Dimension	Approx. 0.5 mm
Insulator	**Dimension**	Approx. 0.9 mm Brown, White, Blue, Black
Sheath	**Material**	Oil-resistant PVC
	O.D.	3.5 mm

Dimensions: Remote Type Monitor Unit

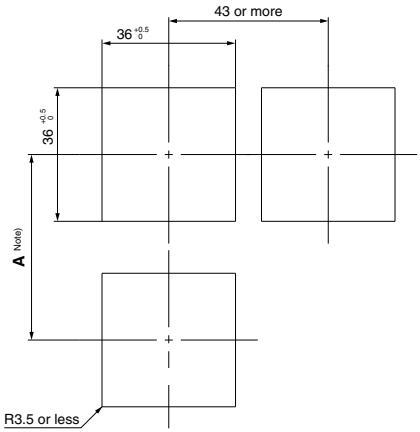
PF2D30⁰₁-A
Panel mounting type





View A

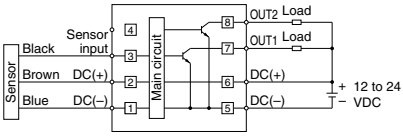
Panel fitting dimensions



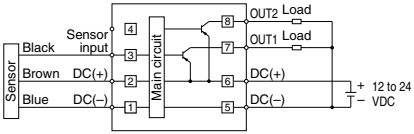
Note) Decide the length of A taking into account the size of terminal you use.
∗ The applicable panel thickness is 1 to 3.2 mm.
Corner: R3.5 or less

Internal Circuits and Wiring Examples

-0
NPN (2 outputs)

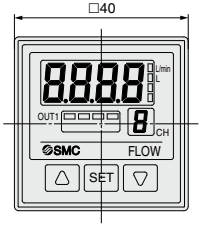


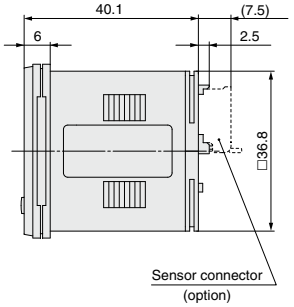
-1
PNP (2 outputs)



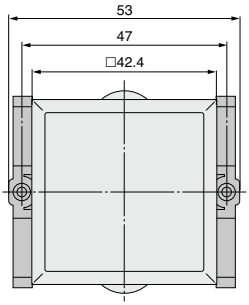
Dimensions: Remote Type Monitor Unit for Deionized Water and Chemical Liquids (4-channel Controller)

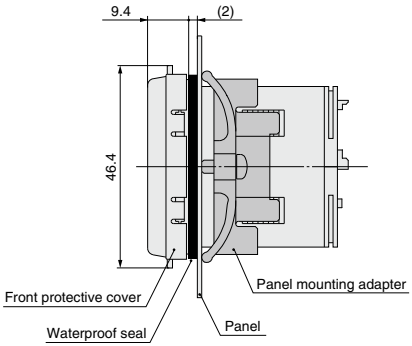
PF2D200/201



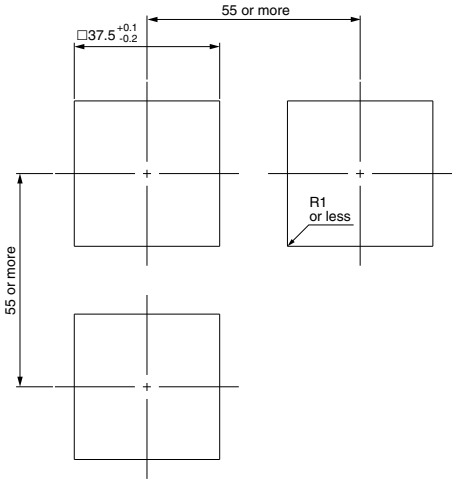


Front protective cover + Panel mounting



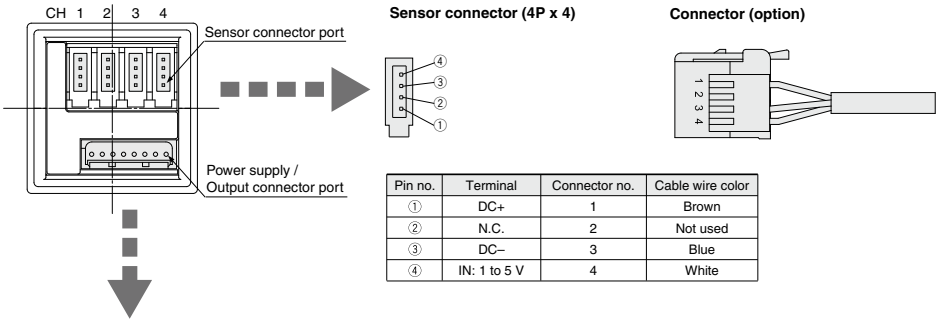


Panel fitting dimensions



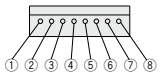
∗ Applicable panel thickness: 0.5 to 8 mm

Dimensions: Remote Type Monitor Unit for Deionized Water and Chemical Liquids (4-channel Controller)



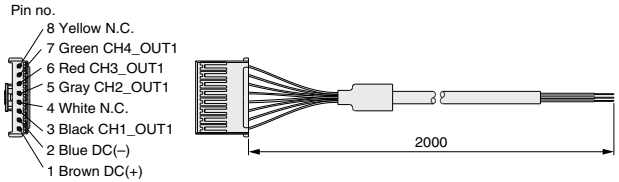
Pin no.	Terminal	Connector no.	Cable wire color
①	DC+	1	Brown
②	N.C.	2	Not used
③	DC–	3	Blue
④	IN: 1 to 5 V	4	White

Power supply / Output connector (8P)



Pin no.	Terminal
①	DC (+)
②	DC (–)
③	CH1_OUT1
④	N.C.
⑤	CH2_OUT1
⑥	CH3_OUT1
⑦	CH4_OUT1
⑧	N.C.

Power supply / Output connector (accessory)



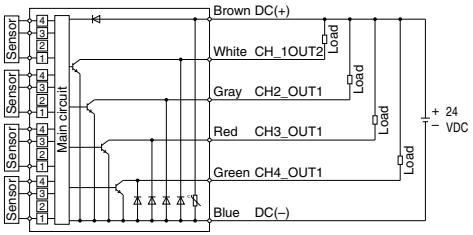
Cable Specifications

No. of cable wire		8
Conductor	**Nominal cross-sectional area**	0.15 mm^2
	Dimension	Approx. 0.5 mm
Insulator	**Dimension**	Approx. 0.9 mm Brown, White, Blue, Black, Gray, Red, Green, Yellow
Sheath	**Material**	Heat-resistant polyethylene
	O.D.	4.8 mm

Internal Circuits and Wiring Examples

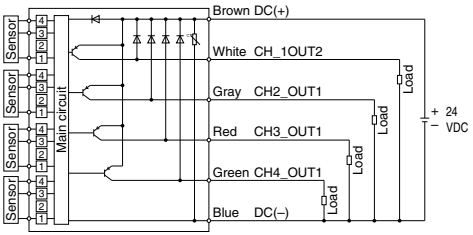
PF2D200

NPN (4 outputs)



PF2D201

PNP (4 outputs)



Functions/PF2D

Refer to the "Operation Manual" for information on setting and operating.

Flow rate measurement selection

Real-time flow rate and accumulated flow rate can be selected. A flow rate of up to 999999 can be accumulated. The accumulated flow rate is reset when the power supply turns OFF.

Unit switching

Display	Real-time flow rate	Accumulated flow
U_1	L/min	L
U_2	GPM	gal (US)

GPM = gal (US)/min

Note) Fixed SI unit (L/min, L, m^3 or m^3x10) will be set for the type without the unit switching function.

Flow rate measuring unit confirmation

This function allows to confirm the accumulated flow rate when real-time flow rate is selected and to confirm the real-time flow rate when accumulated flow rate is selected.

Error correction

For PF2D300/301

LED display	Contents	Solution
Er1	A current of more than 80 mA is flowing to OUT1.	Check the load and the wiring for OUT1.
Er2	A current of more than 80 mA is flowing to OUT2.	Check the load and the wiring for OUT2.
Er4	The set data has changed for some reason.	Perform the RESET operation, and reset all the data again.
---	The flow rate is over the flow rate measurement range.	Use an adjustment valve, etc. to reduce the flow rate until it is within the flow rate range.

For PF2D200/201

LED display	Contents	Solution
Er1	Over current is flowing to the load of a switch output.	Shut off the power supply. After eliminating the output factor that caused the excess current, turn the power supply back on.
Er0	Internal data error.	Contact SMC.
Er7	Internal data error.	
Er10	Internal data error.	
Er5	Internal data error.	Shut off the power supply and then reset the switch.
Er6	Internal data error.	
---	The flow rate is over the flow rate measurement range.	Use an adjustment valve, etc. to reduce the flow rate until it is within the flow rate range.

Key lock

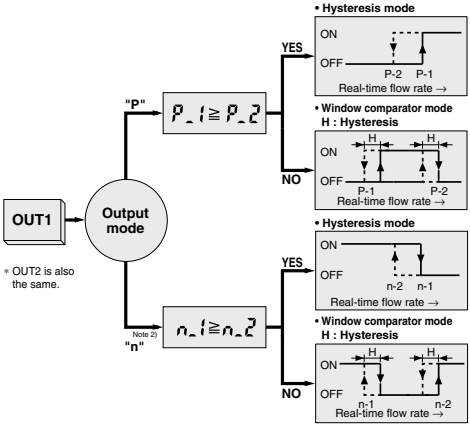
This function prevents incorrect operations such as changing the set value accidentally.

Accumulation clearance

This is to clear the accumulated value.

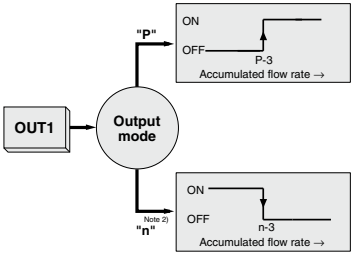
Output types

Real-time switch output



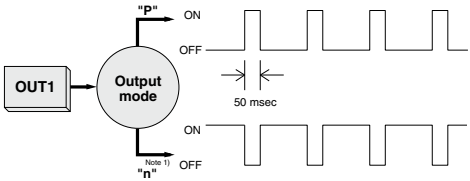
Note 2) Output mode is set to inverted output at the factory before shipment.

Accumulated switch output



Note 2) Output mode is set to inverted output at the factory before shipment.

Accumulated pulse output



Note1) Refer to the specifications of monitor unit for the flow rate value per pulse.

Functions

Copy function (PF2D200, 201 only)

Information to be copied is:
① **Flow rate range**
② **Display mode**
③ **Display unit (Only available when the unit specification is nil.)**
④ **Output method**
⑤ **Output mode**
⑥ **Flow rate value**

Peak hold, Bottom hold display function (PF2D200, 201 only)

The maximum or minimum value can be held in the case where the real-time flow rate display mode is selected during the initial setting. The hold value is reset when the power supply turns OFF or the hold is released.

Channel select function (PF2D200, 201 only)

Every pushing the △ button, channel selection "1→2→3→4→1..." is available. The flow rate measurement of each selected channel is shown in the monitor unit.

Channel scan function (PF2D200, 201 only)

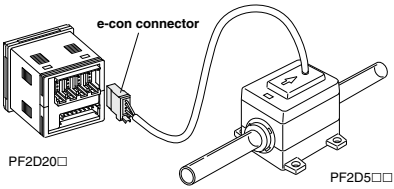
Changes displaying the channel shown every about 2 seconds and its detected flow rate.

Option

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

e-con connector

Part no.	Qty.
ZS-28-CA-2	1

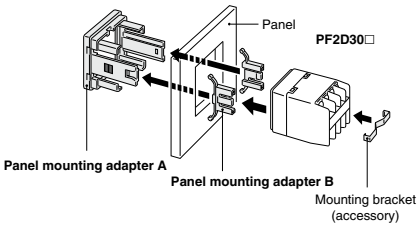


In addition to the connector shown above, those listed below (female contact) can be connected.

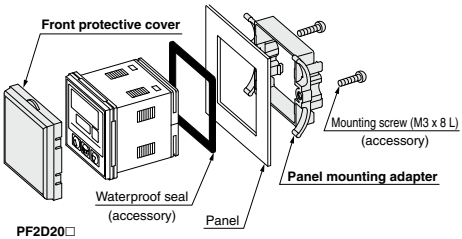
Manufacturer	Model
3M Japan Limited	37104-3101-000FL
Tyco Electronics Japan G.K.	1-1473562-4
OMRON Corp.	XN2A-1430

Panel mounting

Pin no.	Description	Note
ZS-22-E	Panel mounting adapter A, B	With mounting bracket



Part no.	Description	Note
ZS-26-B	Panel mounting adapter	With waterproof seal, mounting screw
ZS-26-C	Front protective cover + Panel mounting adapter	With waterproof seal, mounting screw



PF2D5 Series
Made to Order

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

Made to Order

1 Fluoropolymer fittings mounting type (Space saving type)

Attached insert bushings and nuts for LQ1 series fluoropolymer fittings on double end piping.

How to Order

Refer to page 382 for details about How to Order.

PF2D504 S – 11 – □ – □ – 1S □

With LQ1 fitting

Size

Model	IN side	OUT side
11	3	3
1113	3	4 (With reducer)
1311	4 (With reducer)	3
13	4 (With reducer)	4 (With reducer)

PF2D520 S – 13 – □ – □ – 1S □

With LQ1 fitting

Size

Model	IN side	OUT side
13	4	4
1319	4	5 (With reducer)
1913	5 (With reducer)	4
19	5 (With reducer)	5 (With reducer)

PF2D540 S – 19 – □ – □ – 1S □

With LQ1 fitting

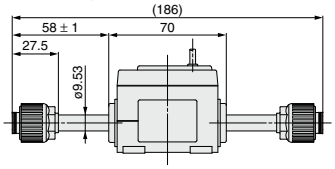
Size

Model	IN side	OUT side
19	5	5
1925	5	6 (With reducer)
2519	6 (With reducer)	5
25	6 (With reducer)	6 (With reducer)

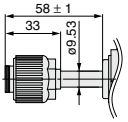
Dimensions

External dimensions of the body are the same as those of standard products. Refer to page 386.

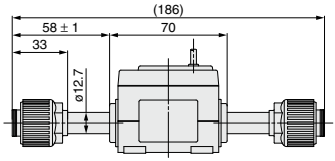
LQ1 fitting size: 3



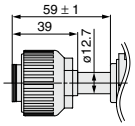
LQ1 fitting size: 4



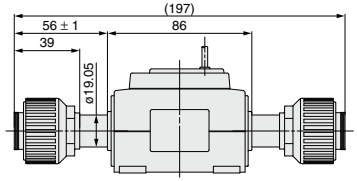
LQ1 fitting size: 4



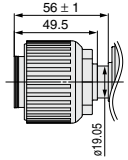
LQ1 fitting size: 5



LQ1 fitting size: 5



LQ1 fitting size: 6



SMC

Made to Order Related Products

Made to Order

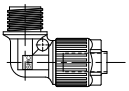
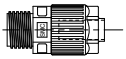
How to Order Fittings for a Product with Nuts

How to order a flow sensor, **PF2D5□S** series, etc. nut type fittings without a nut (including insert bushings) in one place.

LQ1 E 21 – SN

Fitting type

Nut type fittings without a nut (including insert bushings) in one place

E	T
Union elbow	Union tee
	
P	**U**
Panel mount union	Union
	

Applicable tubing size

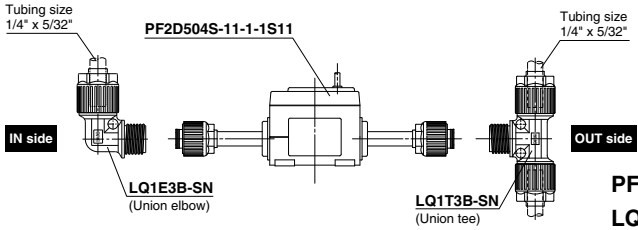
Class	No.	Applicable tubing size (mm)	Reducing
3	1	10 x 8	○
3	2	8 x 6	●
3	3	6 x 4	●
4	1	12 x 10	○
4	2	10 x 8	●
5	1	19 x 16	○
5	2	12 x 10	●
6	1	25 x 22	○
6	2	19 x 16	●

Class	No.	Applicable tubing size (inch)	Reducing
3	A	3/8" x 1/4"	○
3	B	1/4" x 5/32"	●
4	A	1/2" x 3/8"	○
4	B	3/8" x 1/4"	●
5	A	3/4" x 5/8"	○
5	B	1/2" x 3/8"	●
6	A	1" x 7/8"	○
6	B	3/4" x 5/8"	●

○: Basic size ●: With reducer

Note) Please select an isometric fitting with the same size as the fitting at the flow sensor.

Order example



PF2D504S-11-1-1S11 1
LQ1E3B-SN (Union elbow) 1
LQ1T3B-SN (Union tee) 1

Note) Flow sensors and fittings are shipped packed separately.

PF2D Series
Applicable Fluid

Compatibility checklist: Between the digital flow switch sensor material for deionized water and chemicals and the fluid selected.

Fluid		Compatibility
Acetone		○
Ammonium hydroxide	Concentration 30% or less	○
Isobutyl alcohol		×
Isopropyl alcohol		○
Hydrochloric acid	Concentration 38% or less	○
Ozone		×
Hydrogen peroxide	Concentration 50% or less 50°C or less	○
Ethyl acetate		○
Butyl acetate		○
Nitric acid (except fuming nitric acid)	Concentration 10% or less	○
Deionized water		○
Sodium hydroxide		×
Ultra deionized water		○
Toluene		○
Hydrofluoric acid	Concentration 50% or less	○
Sulfuric acid (except fuming sulfuric acid)	Concentration 20% or less	○
Phosphoric acid	Concentration 30% or less	○

Note 1) The material and fluid compatibility check list provides reference values as a guide only.
Note 2) It is possible that some fluids are permeable depending on the type of fluid, its density and temperature. Any permeated fluid may affect the products life.
Thus, when using these fluid types, verify the fluid in advance by testing it, prior to making a decision to use it.

Table symbols ○ : Can be used
: Can be used under certain conditions
× : Cannot be used

· Compatibility is indicated for fluid temperatures at 90°C or less.
· The product does not have an explosion proof construction. Be sure to take measures to prevent the area around the product from becoming filled with an explosive gas, when using an explosive fluid.

PF2D Series
Specific Product Precautions

Be sure to read this before handling the products.
Refer to back page 50 for Safety Instructions.

Return of Product

⚠Warning

If the product to be returned is contaminated or is possibly contaminated with substances that are harmful to humans, for safety reasons, please contact SMC beforehand and then employ a specialist cleaning company to decontaminate the product. After the decontamination prescribed above has been carried out, submit a Product Return Request Sheet or the Detoxification/Decontamination Certificate to SMC and await SMC's approval and further instructions before attempting to return the item.
Please refer to the International Chemical Safety Cards (ICSC) for a list of harmful substances.
If you have any further questions, please don't hesitate to contact your SMC sales representative.