

# Digital Flow Switch for Air/Water

## Series PF2A/PF2W



RoHS

For Air



Series PF2A

For Water



New digital flow switch product, **Series PF3W**, with the **compact design and expanded flow rate range** has been launched. Please examine to use **Series PF3W (page 1039)**. For details about Series PF2W, refer to the catalog at SMC website.

Series PF2W



4-channel Flow Monitor



Series PF2□200

PFM  
PFMV  
PF2A  
PF3W  
PF2D  
IF

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

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

**2** Integrated and Remote type.

**3** Three types of output:

**5** Two independent flow rate settings are possible.

**6** Water resistant construction conforming to IP65



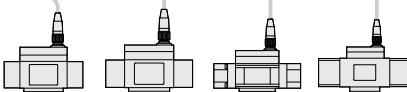
**A single controller can monitor the flow rate of 4 different sensors.**



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



**4-channel Flow Monitor  
Series PF2□200**



**76% reduced installation space**

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

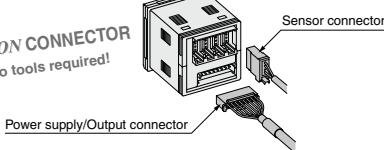
**Reduced panel fitting labor**



PF2A300/PF2W300 are panel-mounted.

#### ● Connection

e-CON CONNECTOR  
No tools required!

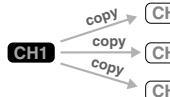


#### ● Function

##### ● Copy function

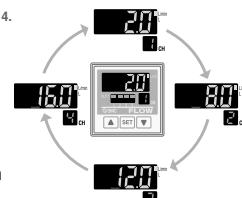
Possible to copy information from one channel to one or more other channels.

Copying CH1 setting to CH2, 3 and 4.



##### ● Channel scan function

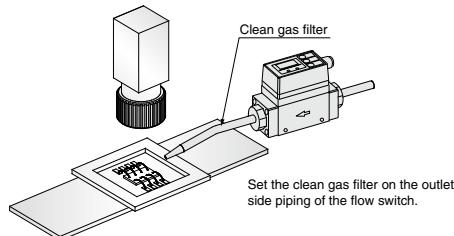
Allows constant monitoring of the displayed pressure value for each channel.



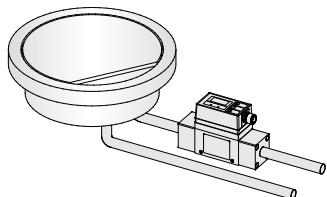
- Keylock function
- Unit switching function
- Peak value and lowest value holding

## Application Examples

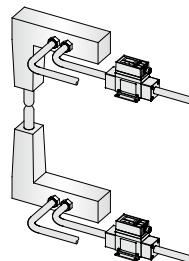
Flow control of N<sub>2</sub> gas to prevent detection camera  
shimmering and lead frame oxidation



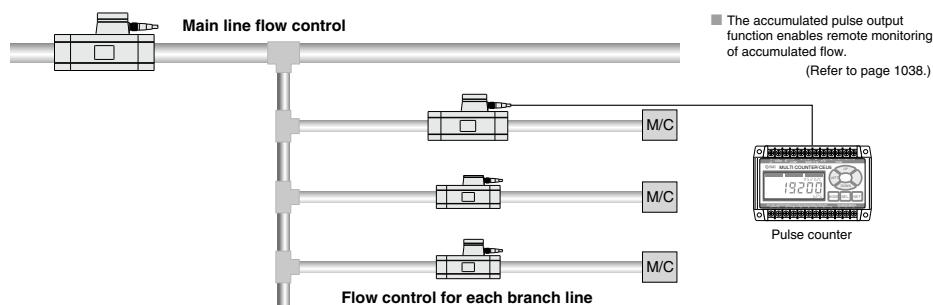
Flow control of cooling water for  
wafer temperature control and  
high frequency power supply



Flow control of pressurized  
cooling water for welding gun



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



PFM

PFMV

PF2A

PF3W

PF2D

IF

# For Air

## Digital Flow Switch

# Series PF2A



### 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

\* Conforming to ISO228-1.

Nil	Rc
N	NPT
F	G*

Port size

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

Unit specifications

Nil	With unit switching function <small>Note1)</small>
M	Fixed SI unit <small>Note2)</small>

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

Lead wire (Refer to page 1037.)

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

Output specifications

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

### Specifications

For details about the Flow Switch Precautions, refer to pages 952 and 953. For details about the Specific Product Precautions, refer to the Operation Manual at SMC website.

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
Note 1, 2)	Instantaneous flow rate	L/min, CFM $\times 10^{-2}$		L/min, CFM $\times 10^{-1}$	
Display units	Accumulated flow		L, ft <sup>3</sup> $\times 10^{-1}$		
Operating fluid temperature			0 to 50°C		
Accuracy			±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 3)	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 4)		0 to 999999 L			
Output Note 5) specifications	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%		
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) Digital flow switch with unit switching function. (Fixed SI unit (L/min, or L, m<sup>3</sup> or m<sup>3</sup> x 10<sup>3</sup>) 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) Without lead wire.

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<sub>1</sub> and P<sub>2</sub> or n<sub>1</sub> and n<sub>2</sub> apart by 7 digits or more. (In case of output OUT2, n<sub>1</sub>, 2 to be n<sub>3</sub>, 4 and P<sub>1</sub>, 2 to be P<sub>3</sub>, 4.)

Note 7) The flow switch conforms to the CE marking.

Note 8) For details about wiring and thread type, refer to the Operation Manual that can be downloaded from SMC website (<http://www.smeworld.com>).

## Set Flow Rate Range and Rated Flow Range

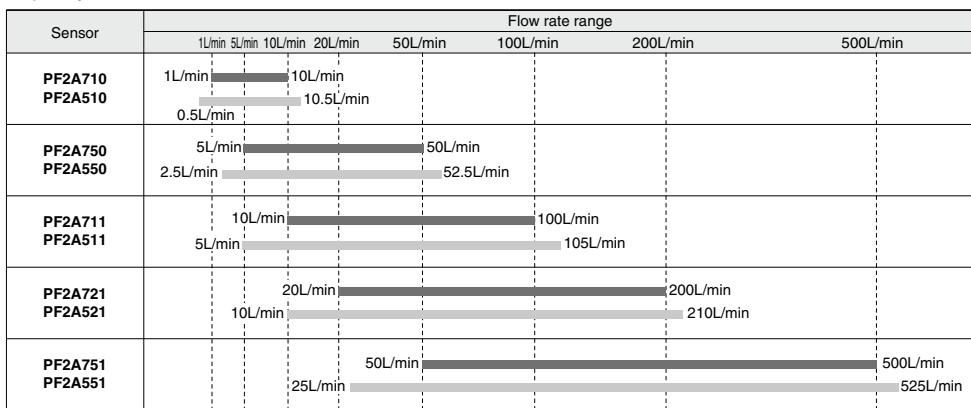
Set the flow rate within the rated flow range.

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>



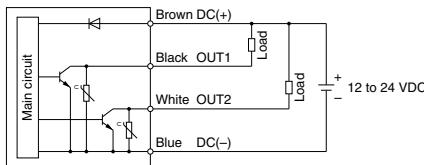
■ Rated flow range of sensor  
■ Set flow range of sensor

## Internal Circuits and Wiring Examples

**PF2A7□□**

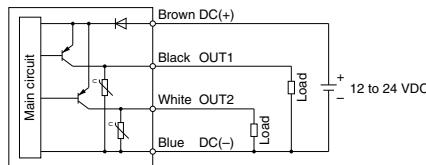
-27

NPN (2 outputs)



-67

PNP (2 outputs)



**PFM**

**PFMV**

**PF2A**

**PF3W**

**PF2D**

**IF**

# Series PF2A

## 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)					Applicable model
		10	50	100	200	500	
01	1/8	●	●				PF2A510/550
02	1/4	●	●				PF2A511/521
03	3/8			●	●		PF2A551
04	1/2					●	PF2A551

Option (Only for output specifications "1")  
(Refer to page 1037.)

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

The cable and connector are shipped unassembled.

Lead wire (Refer to page 1037.)

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

Output specifications

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

## Specifications

For details about the Flow Switch Precautions, refer to pages 952 and 953. For details about the Specific Product Precautions, refer to the Operation Manual at SMC website.

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)			±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 2)	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
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 3)	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) 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) Flow rate unit measured under the following conditions: 0°C and 101.3 kPa.

Note 5) The sensor unit conforms to the CE marking.

Note 6) For details about wiring and thread type, refer to the Operation Manual that can be downloaded from SMC website (<http://www.smeworld.com>).



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

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

Output specifications

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

Specifications

For details about the Flow Switch Precautions, refer to pages 952 and 953. For details about the Specific Product Precautions, refer to the Operation Manual at SMC website.

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		
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		
Minimum set unit Note 1)	0.1 L/min	0.5 L/min	1 L/min	2 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		
Note 2, 3) Instantaneous flow rate	L/min, CFM $\times 10^{-2}$		L/min, CFM $\times 10^{-1}$			
Display units	Accumulated flow					
Accumulated flow range Note 4)	0 to 999999 L					
Accuracy Note 5)	$\pm 5\%$ F.S.					
Repeatability Note 5)	$\pm 1\%$ F.S.					
Temperature characteristics	$\pm 1\%$ F.S. (15 to 35°C, 25°C reference) $\pm 2\%$ 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)	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 $\pm 10\%$					
Response time	1 sec. or less					
Hysteresis	Hysteresis mode: Variable (can be set from 0), Window comparator mode Note 7): Fixed (3-digits)					
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 M $\Omega$ 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.smeworld.com>).

PFM

PFMV

PF2A

PF3W

PF2D

IF

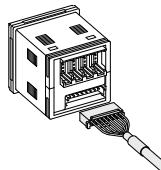
# Series PF2A

## How to Order



4-channel Flow Monitor  
Remote Type  
Monitor Unit

Accessory/Power supply output cable (2 m)



**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 1037.)

Nil	None
4C	Sensor connector (4 pc.)

### Option 1 (Refer to page 1037.)

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

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

## Specifications

For details about the Flow Switch Precautions, refer to pages 952 and 953. For details about the Specific Product Precautions, refer to the Operation Manual at SMC website.

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 $\times 10^{-2}$		L/min, CFM $\times 10^{-1}$												
	Accumulated flow	L, $\text{ft}^3 \times 10^{-2}$		L, $\text{ft}^3 \times 10^{-1}$												
Accumulated flow range (Note 1)	0 to 999999 L, 0 to 999999 $\text{ft}^3 \times 10^{-2}$		0 to 999999 L, 0 to 999999 $\text{ft}^3 \times 10^{-1}$													
Power supply voltage	24 VDC $\pm 10\%$ (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 $\Omega$ )															
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												
	Accumulated pulse output	PNP open collector (PF2A201)		Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA)												
	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)	$\pm 5\%$ F.S.															
Repeatability (Note 5)	$\pm 3\%$ F.S.															
Temperature characteristics	$\pm 2\%$ 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 OV 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.

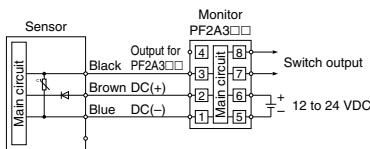
Note 7) For details about wiring, refer to the Operation Manual that can be downloaded from SMC website (<http://www.smeworld.com>).

# Series PF2A

## Internal Circuits and Wiring Examples

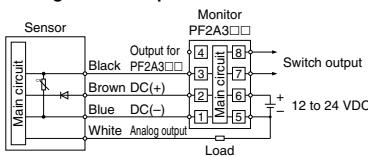
### For PF2A5□□/PF2A3

Nil



-1/2

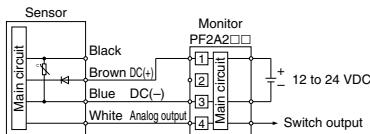
Analog voltage output  
Analog current output



### For PF2A5□□/PF2A2

-1

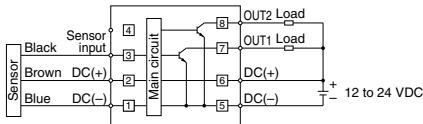
Analog voltage output



### PF2A3□

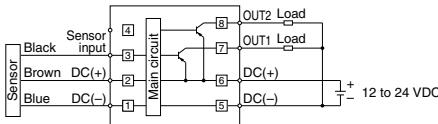
-0

NPN (2 outputs)



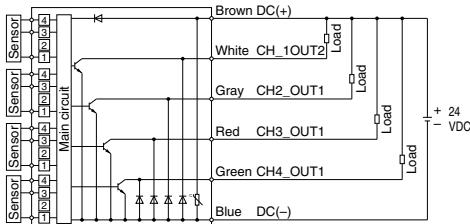
-1

PNP (2 outputs)



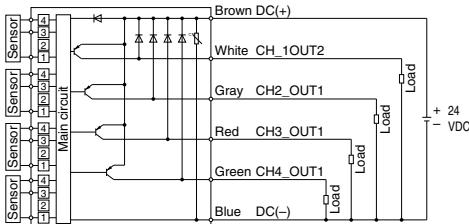
### PF2A200

NPN (4 outputs)



### PF2A201

PNP (4 outputs)



PFM

PFMV

PF2A

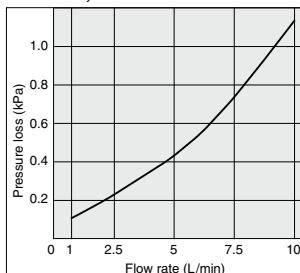
PF3W

PF2D

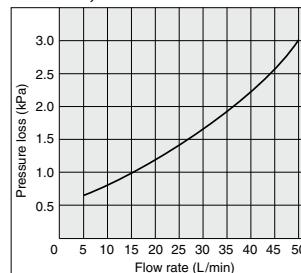
IF

### Flow Characteristics (Pressure Loss)

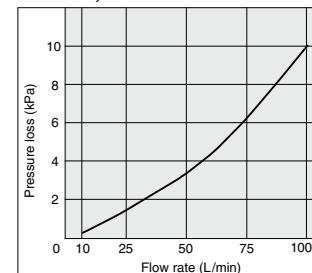
PF2A710, 510



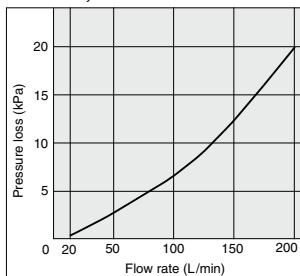
PF2A750, 550



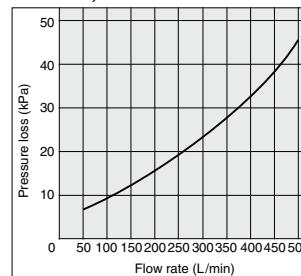
PF2A711, 511



PF2A721, 521

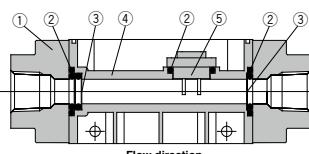


PF2A751, 551

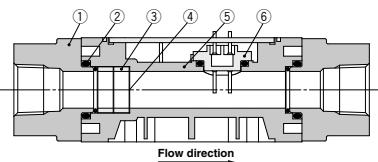


### Wetted Parts Construction/Sensor Unit

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

PFM

PFMV

PF2A

PF3W

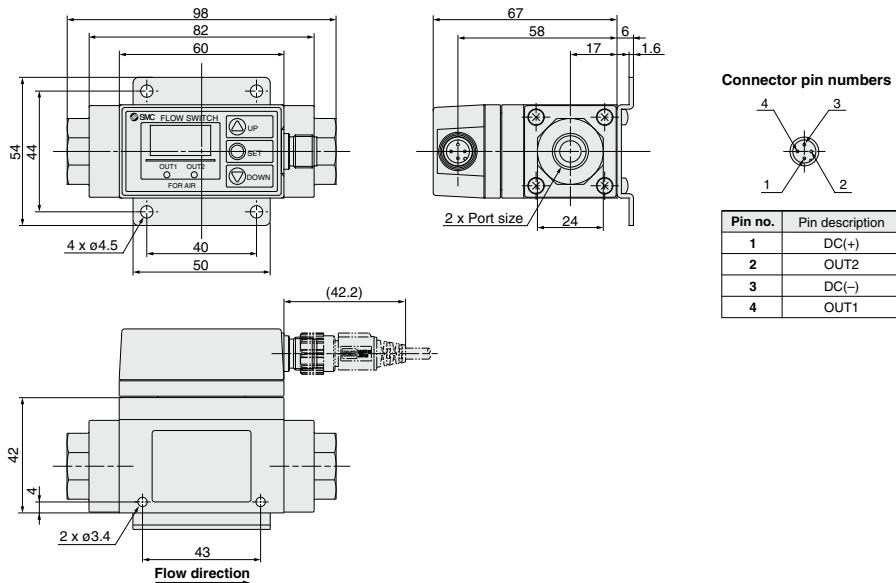
PF2D

IF

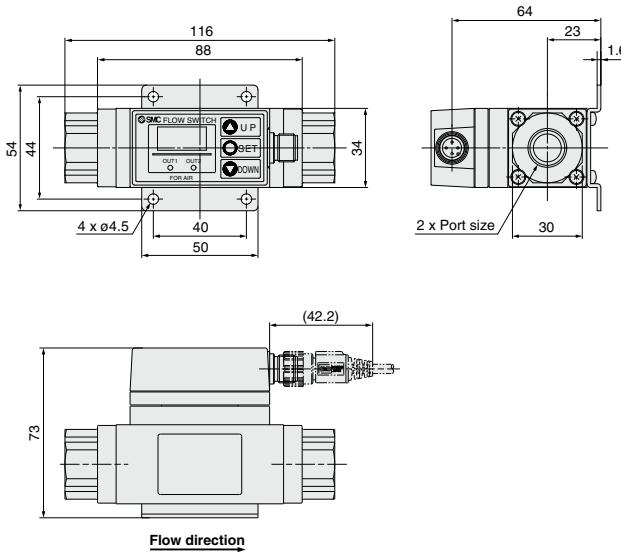
# Series PF2A

## Dimensions: Integrated Display Type For Air

### PF2A710, 750



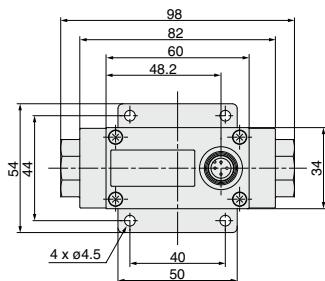
### PF2A711, 721, 751



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**

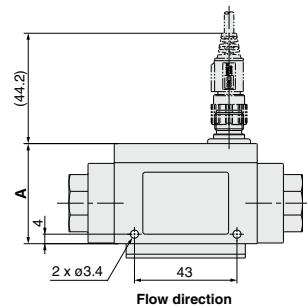
**PF2A510, 550**



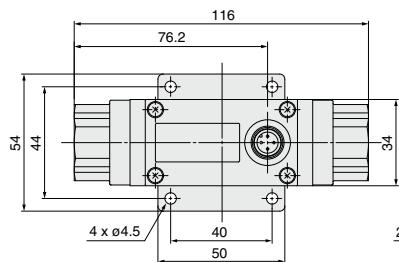
Connector pin numbers



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

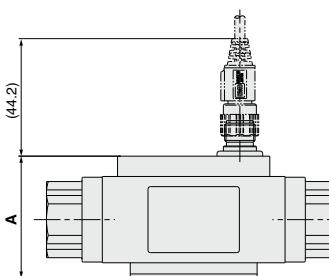
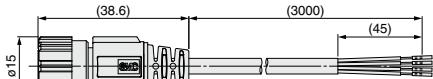
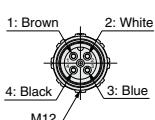


**PF2A511, 521, 551**



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



**PFM**  
**PFMV**  
**PF2A**  
**PF3W**  
**PF2D**  
**IF**

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

**Lead Wire Specifications**

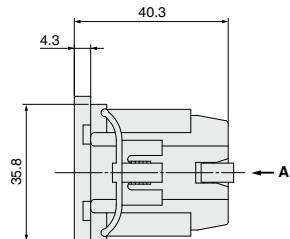
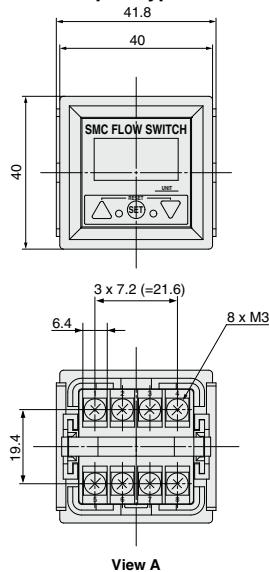
Conductor	Nominal cross section	AWG23
Insulator	O.D.	Approx. 0.7 mm
	Material	Cross-linked vinyl
	O.D.	Approx. 1.1 mm
	Color	Brown, White, Black, Blue
Sheath	Material	Oil-resistant vinyl
Finished O.D.		ø4

# Series PF2A

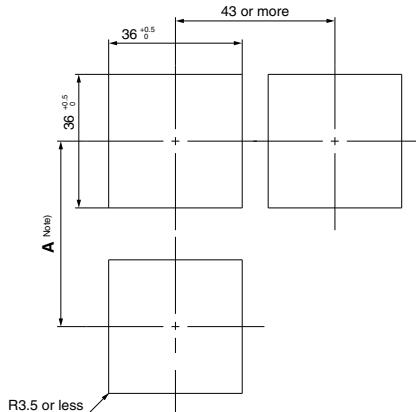
## Dimensions: Remote Type Monitor Unit For Air

### PF2A3□□-A

#### Panel mount adapter type



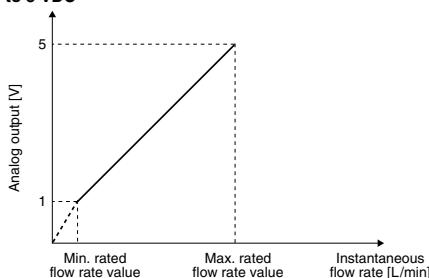
Panel fitting dimensions



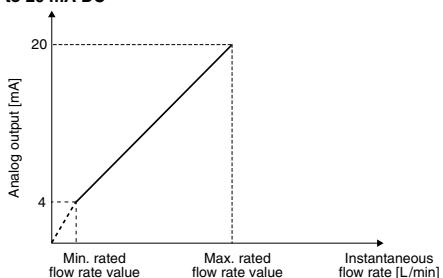
Note) Decide the length of A taking into account the size of terminal you use.  
◊ The applicable panel thickness is 1 to 3.2 mm.

#### Analog output

1 to 5 VDC



4 to 20 mA DC

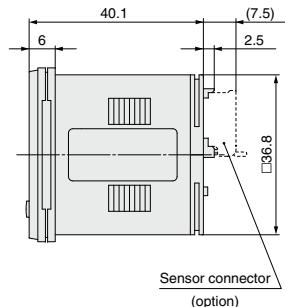
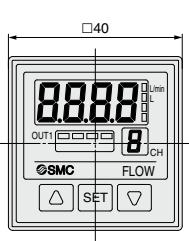


Part no.	Normal condition		Standard condition	
	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2A510-□-1	1	10	1.1	10.7
PF2A550-□-1	5	50	5.4	53.5
PF2A511-□-1	10	100	11	107
PF2A521-□-1	20	200	21	214
PF2A551-□-1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

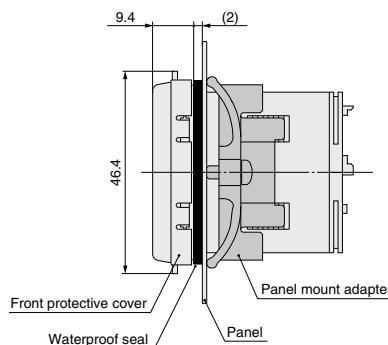
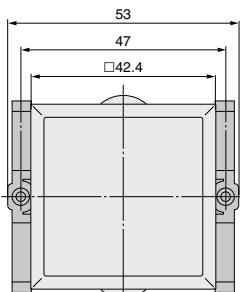
Part no.	Normal condition		Standard condition	
	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2A510-□-2	1	10	1.1	10.7
PF2A550-□-2	5	50	5.4	53.5
PF2A511-□-2	10	100	11	107
PF2A521-□-2	20	200	21	214
PF2A551-□-2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

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

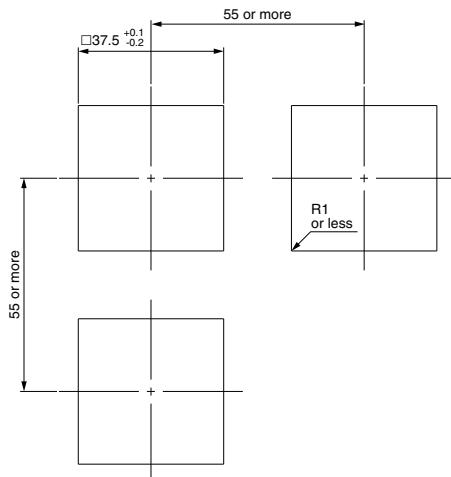
**PF2A200, 201**



**Front protective cover + Panel mount adapter**



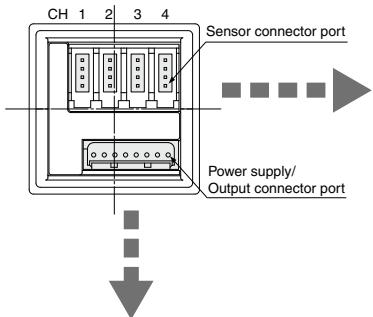
Panel fitting dimensions



\* Applicable panel thickness: 0.5 to 8 mm

# Series PF2A

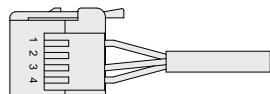
## Dimensions: Remote Type Monitor Unit For Air (4-channel Flow Monitor)



**Sensor connector (4P x 4)**

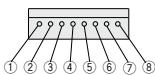


**Connector (option)**



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

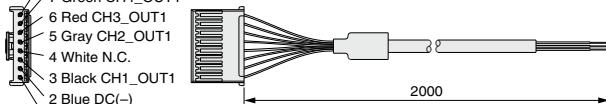
**Power supply/Output connector (8P)**



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)**

Pin no.  
 8 Yellow N.C.  
 7 Green CH4\_OUT1  
 6 Red CH3\_OUT1  
 5 Gray CH2\_OUT1  
 4 White N.C.  
 3 Black CH1\_OUT1  
 2 Blue DC(-)  
 1 Brown DC(+)



### Cable Specifications

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

# For Air

## Digital Flow Switch/High Flow Rate Type Series **PF2A**



### 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)			Applicable model
		3000	6000	12000	
10	1	●			PF2A703H
14	1 1/2		●		PF2A706H
20	2			●	PF2A712H

**Lead wire** (Refer to page 1037.)

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

• **Made to Order**

**X795** Wide range

Refer to page 1034 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<sup>3</sup>, m<sup>3</sup> x 10<sup>3</sup>  
Switching of switch output and accumulated pulse output is possible with NPN or PNP open collector outputs.

### Specifications

For details about the Flow Switch Precautions, refer to pages 952 and 953. For details about the Specific Product Precautions, refer to the Operation Manual at SMC website.

Model	PF2A703H	PF2A706H	PF2A712H
<b>Measured fluid</b>		Dry air, Nitrogen	
<b>Detection type</b>		Heater type	
<b>Rated flow range</b> (Note 1)	150 to 3000 L/min	300 to 6000 L/min	600 to 12000 L/min
<b>Minimum set unit</b> (Note 1)	5 L/min		10 L/min
<b>Note 2)</b> <b>Instantaneous flow rate</b>		L/min, CFM	
<b>Display units</b>	<b>Accumulated flow</b>	L, m <sup>3</sup> , m <sup>3</sup> x 10 <sup>3</sup> , ft <sup>3</sup> , ft <sup>3</sup> x 10 <sup>3</sup> , ft <sup>3</sup> x 10 <sup>6</sup>	
<b>Operating pressure range</b>		0.1 to 1.5 MPa	2.25 MPa
<b>Proof pressure</b>		2.25 MPa	
<b>Pressure loss</b>		20 kPa (at maximum flow rate)	
<b>Accumulated flow range</b> (Note 3)		0 to 9,999,999,999 L	
<b>Accuracy</b> (Note 4)		±1.5% F.S. (0.7 MPa, at 20°C)	
<b>Repeatability</b>	±1.0% F.S. (0.7 MPa, at 20°C), ±3.0% of F.S. in case of analog output		
<b>Pressure characteristics</b>	±1.5% F.S. (0.1 to 1.5 MPa, 0.7 MPa reference)		
<b>Temperature characteristics</b>	±2.0% F.S. (0 to 50°C, 25°C reference)		
<b>Output specifications</b>	<b>Switch output</b> (Note 5)	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)	
	<b>Accumulated</b> (Note 5) <b>pulse output</b>	NPN or PNP open collector Flow rate per pulse: 100 L/pulse, 10.0 ft <sup>3</sup> /pulse ON time per pulse width: 50 msec	
	<b>Analog output</b> (Note 6)	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	
<b>Response time</b>		1 sec. or less	
<b>Hysteresis</b>		Hysteresis mode: Variable (can be set from 0); Window comparator mode: (can be set from 0 to 3% F.S.)	
<b>Power supply voltage</b>		24 VDC ±10%	
<b>Current consumption</b>		150 mA or less	
<b>Enclosure</b>		IP65	
<b>Operating temperature range</b>		0 to 50°C (with no freezing and condensation)	
<b>Withstand voltage</b>		1000 VAC for 1 minute between terminals and housing	
<b>Insulation resistance</b>		50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing	
<b>Noise resistance</b>		1000 Vp-p, Pulse width 1 μs, Rise time 1 ns	
<b>Standards and regulations</b>		CE, RoHS	
<b>Weight</b>	1.1 kg (without lead wire)	1.3 kg (without lead wire)	2.0 kg (without lead wire)
<b>Port size (Rc, NPT, G)</b>	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<sup>3</sup> or m<sup>3</sup> x 10<sup>3</sup>]) 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 high flow rate type is CE marking compatible; however, the linearity with applied noise is ±5% F.S. or less.

Note 5) Switch output and accumulated pulse output selection are made using the button controls. Note 6) The analog output operates only for instantaneous flow rate, and does not operate for accumulated flow.

Note 7) For details about wiring and thread type, refer to the Operation Manual that can be downloaded from SMC website (<http://www.smeworld.com>).

PFM

PFMV

PF2A

PF3W

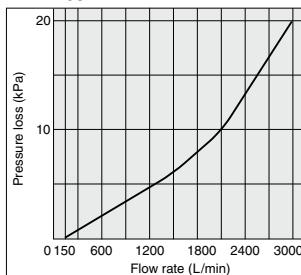
PF2D

IF

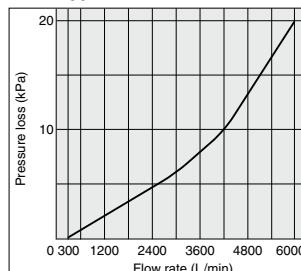
# Series PF2A

## Flow Characteristics (Pressure Loss)

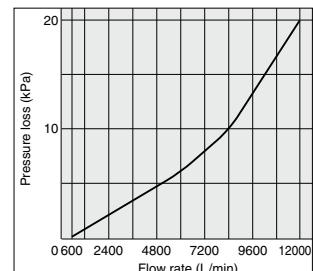
PF2A703H



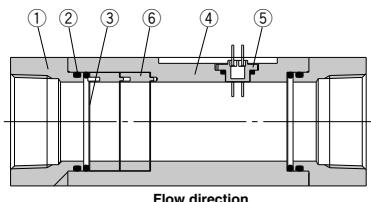
PF2A706H



PF2A712H



## Wetted Parts Construction



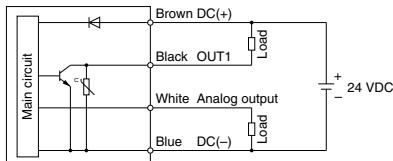
### Parts list

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

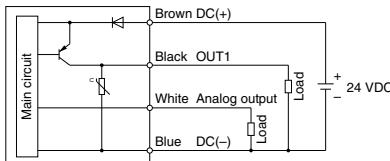
-28/29

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



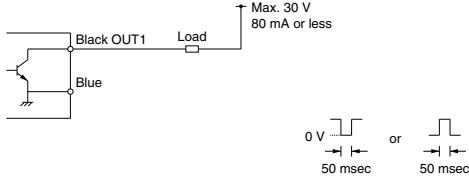
-68/69

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

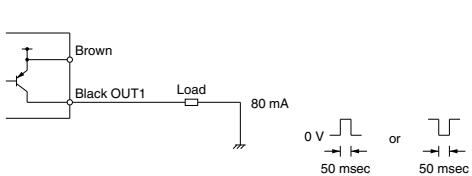


## Accumulated pulse output wiring examples

-28/29

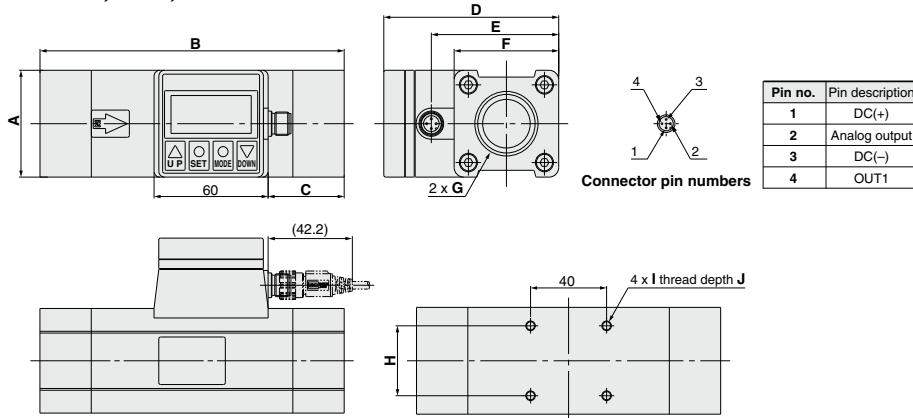


-68/69



## Dimensions

### PF2A703H, 706H, 712H

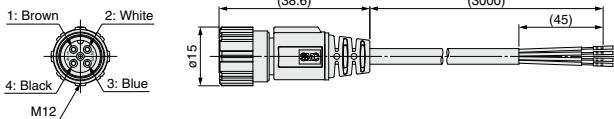


Be sure to allow straight pipe length that is minimum 8 times the port size upstream and downstream of the switch piping.

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	Rc1½, NPT1½, G1½	46	M6 x 1	9
PF2A712H	75	220	55	114	89	75	Rc2, NPT2, G2	56	M6 x 1	9

### ZS-37-A

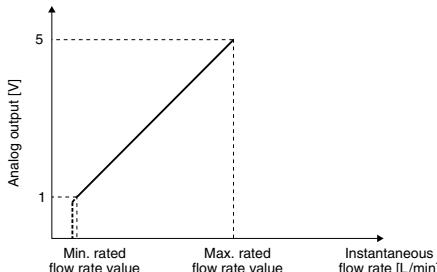
#### Lead wire with M12 connector



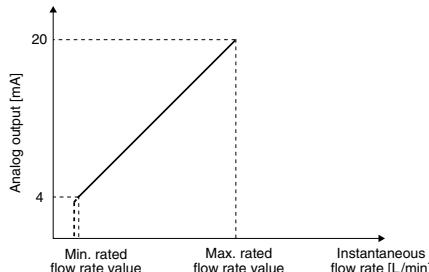
#### Lead Wire Specifications

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

#### Analog output 1 to 5 VDC



#### 4 to 20 mA DC



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

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

PFM

PFMV

PF2A

PF3W

PF2D

IF

# Series PF2A7 Made to Order

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



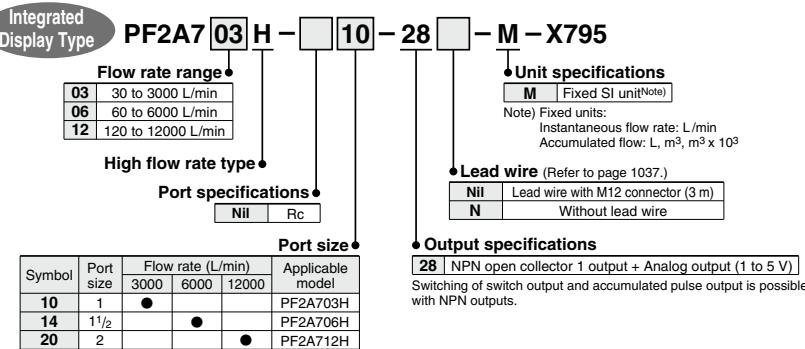
## 1 Wide Range Specifications

-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



### 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 1033.

## 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 <sup>-2</sup> , CFM x 10 <sup>-1</sup>	ft <sup>3</sup> x 10 <sup>-1</sup>

CFM = ft<sup>3</sup>/min

#### High Flow Rate Type (For Air)

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

#### 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<sup>3</sup>, m<sup>3</sup> x 10<sup>3</sup>) 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.

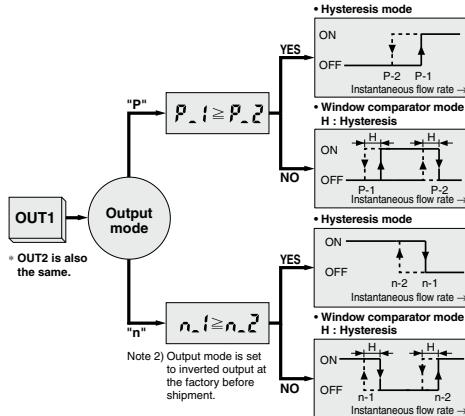
### Initialization of setting (only for Series PF2A7□□H)

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

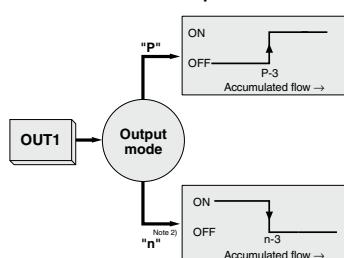
### Output types

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

#### Real-time switch output

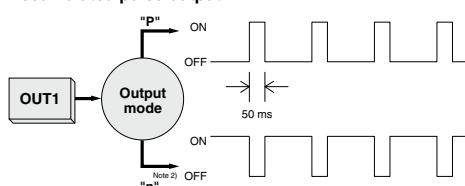


#### Accumulated switch output



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<sup>3</sup> or m<sup>3</sup> x 10<sup>3</sup>] 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.

PFM

PFMV

PF2A

PF3W

PF2D

IF

# Series PF2A

## 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
<i>Er 1</i> <small>Note 1)</small>	A current of more than 80 mA is flowing to OUT1.	Check the load and the wiring for OUT1.
<i>Er 1</i> <small>Note 2)</small>	A current of more than 80 mA is flowing to OUT2.	Check the load and the wiring for OUT2.
<i>Er 2</i> <small>Note 1)</small>	The set data has changed for some reason.	Perform the RESET operation, and reset all the data again.
<i>Er 3</i> <small>Note 2)</small>	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.
<i>Er 4</i> <small>Note 1)</small>	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
<i>Er 1</i>	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.
<i>Er 0</i>	Internal data error.	
<i>Er 7</i>	Internal data error.	Please contact SMC for investigation.
<i>Er 10</i>	Internal data error.	
<i>Er 5</i>	Internal data error.	Turn off the power supply and then turn on it again.
<i>Er 6</i>	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)

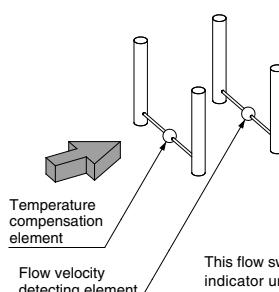
Every pushing the  $\Delta$  button, channel selection "1→2→3→4→1..." is available. The flow rate measurement of each selected channel is shown in the monitor unit.

### 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.

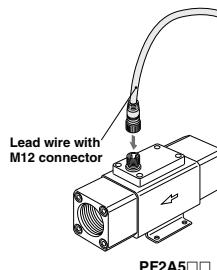
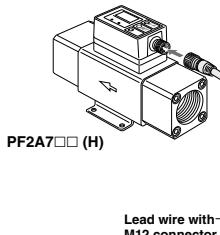
Contact SMC regarding the specifications for clean environment.

## Option

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

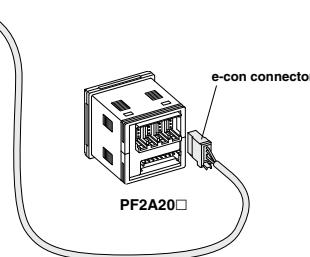
### Lead wire with M12 connector

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
		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

PFM

PFMV

PF2A

PF3W

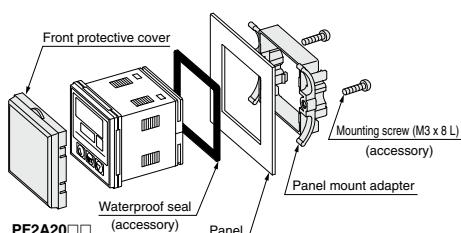
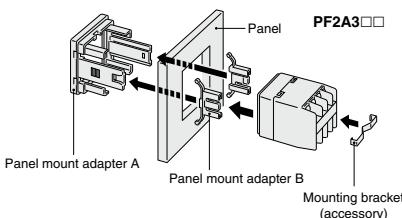
PF2D

IF

### 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

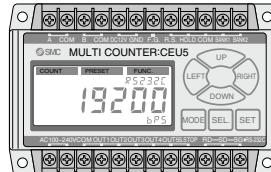
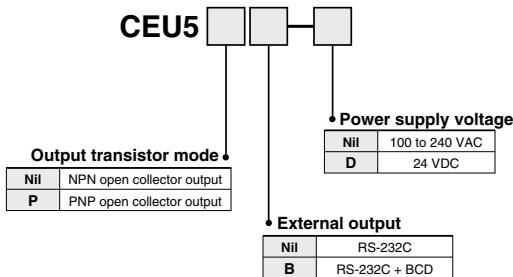


# Related Product

## Multi Counter/Series CEU5

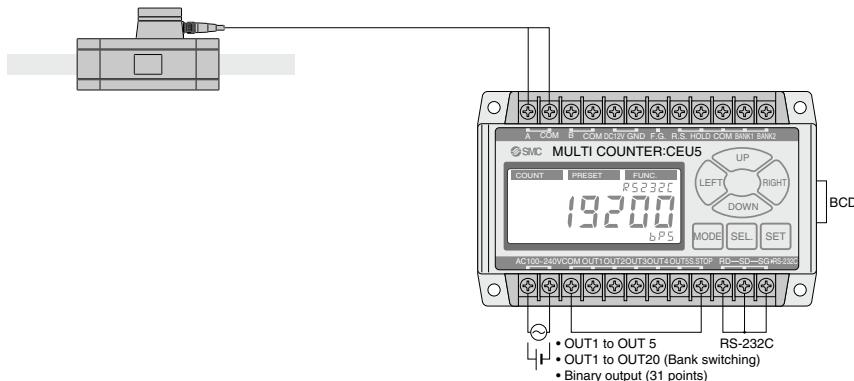


### How to Order



### 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<sup>3</sup> (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.

# For Water

## Digital Flow Switch

# Series **PF2W** CE

### 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  
**NII** Rc  
**N** NPT  
**F** G

Port size

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



• **Unit specifications**

**NII** 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

• **Lead wire** (Refer to page 322.)

**NII** 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

### 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 used 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

Nil	Rc
N	NPT
F	G

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

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.

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

**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)					
		Voltage output 1 to 5 V Accuracy: ±5% F.S., Min. load impedance: 100 kΩ (Output impedance: 1 kΩ)					
Analog output		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: 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 units conforms to the CE marking.

# Series PF2W

## How to Order



Remote Type  
Monitor Unit

PF2W3 **00** - **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

NiI	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) 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) 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 PF2W511.

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**

### Output specifications

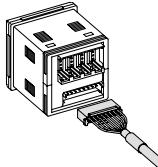
<b>0</b>	NPN 4 outputs
<b>1</b>	PNP 4 outputs

### Unit specifications

<b>Nil</b>	With unit switching function Note1)
<b>M</b>	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 2 (Refer to page 322.)

<b>Nil</b>	None
<b>4C</b>	Sensor connector (4 pc.)

### Option 1 (Refer to page 322.)

<b>Nil</b>	None
<b>A</b>	Panel mounting
<b>B</b>	Front protective cover + Panel mounting

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

## Specifications

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

Pressure Sensor

Pressure Control

Position Detection

Reduced-vibration  
Fieldbus System

Static Electricity  
Elimination Equipment

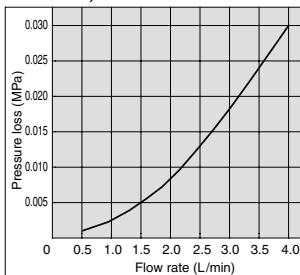
Length Measuring  
Counter

Alphabetical Index

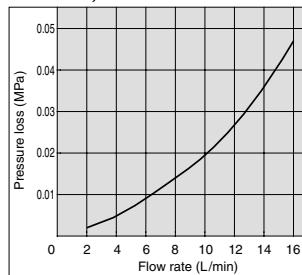
# Series **PF2W**

## Flow Characteristics (Pressure Loss)

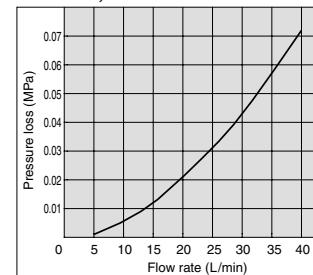
**PF2W704, 504**



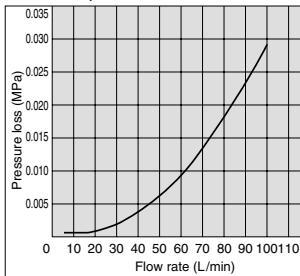
**PF2W720, 520**



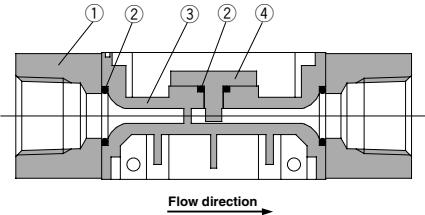
**PF2W740, 540**



**PF2W711, 511**



## Wetted Parts Construction/Sensor Unit

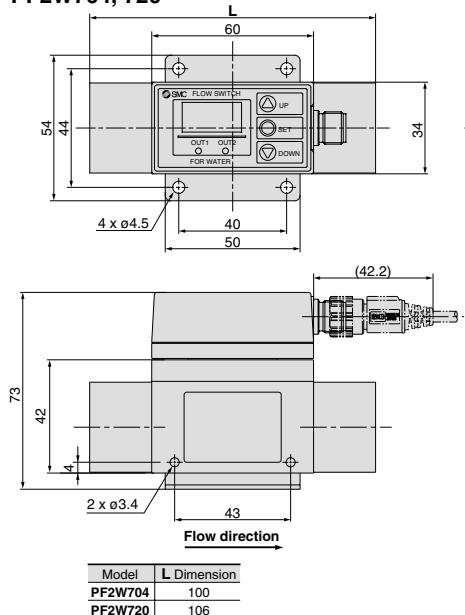


### Parts list

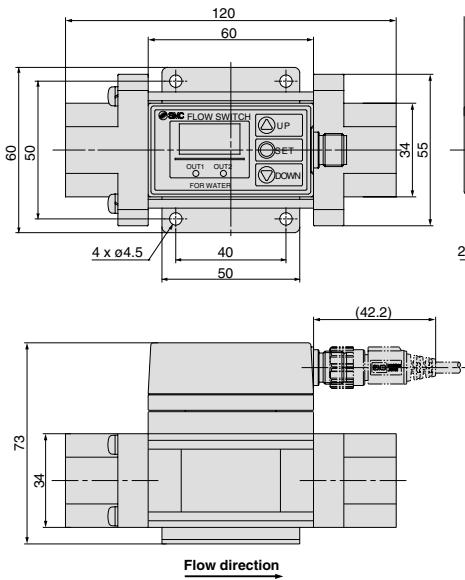
No.	Description	Material
1	Attachment	Stainless steel
2	Seal	NBR
3	Body	PPS
4	Sensor	PPS

Dimensions: Integrated Display Type **For Water**

**PF2W704, 720**



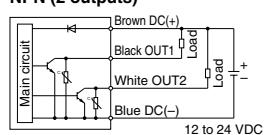
**PF2W740**



**Internal Circuits and Wiring Examples**

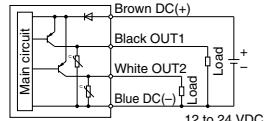
**-27**

**NPN (2 outputs)**

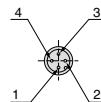


**-67**

**PNP (2 outputs)**



**Connector pin numbers**



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

Pressure Sensor

Pressure Control

Flow Sensor

Position Detection Switch

Reduced-Wiring Fieldbus System

Length Measuring

Counter

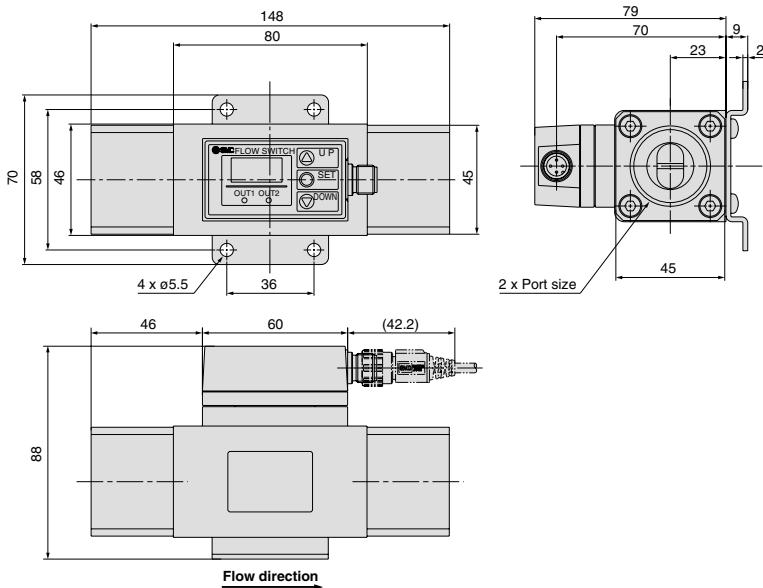
Static Electricity Elimination Equipment

Alphabetical Index

# Series **PF2W**

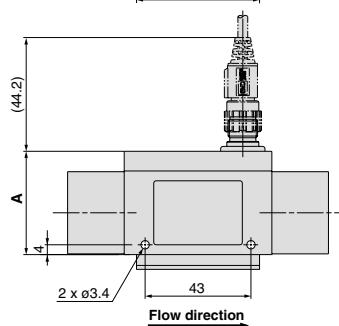
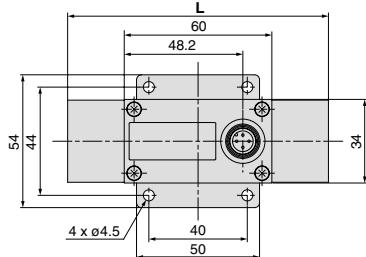
## Dimensions: Integrated Display Type **For Water**

### PF2W711



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

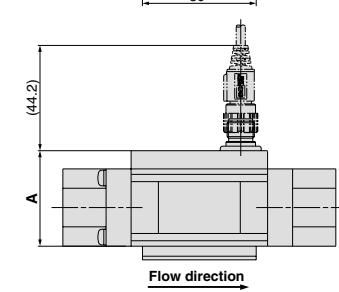
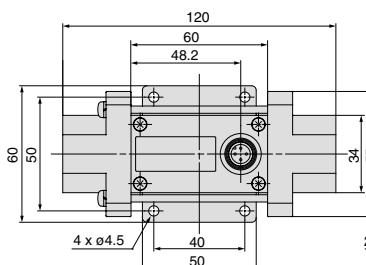
**PF2W504, 520-□(N)-□**



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

Model	L dimension
PF2W504	100
PF2W520	106

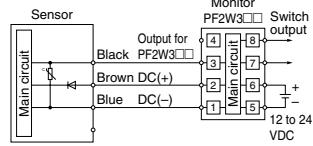
**PF2W540-□(N)-□**



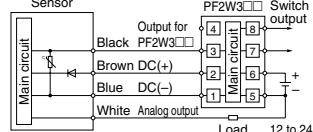
Output specification	A (mm)	B (mm)
Output for monitor unit only	42	62
Output for monitor unit + Analog output	52	72

**Internal Circuits and Wiring Examples**

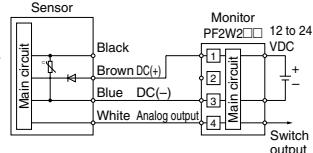
Nil



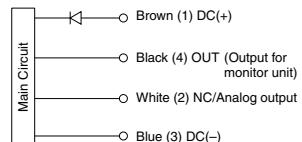
**-1/2  
Analog current output**



**-1  
Analog voltage output**



**Wiring**



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

**Connector pin numbers**

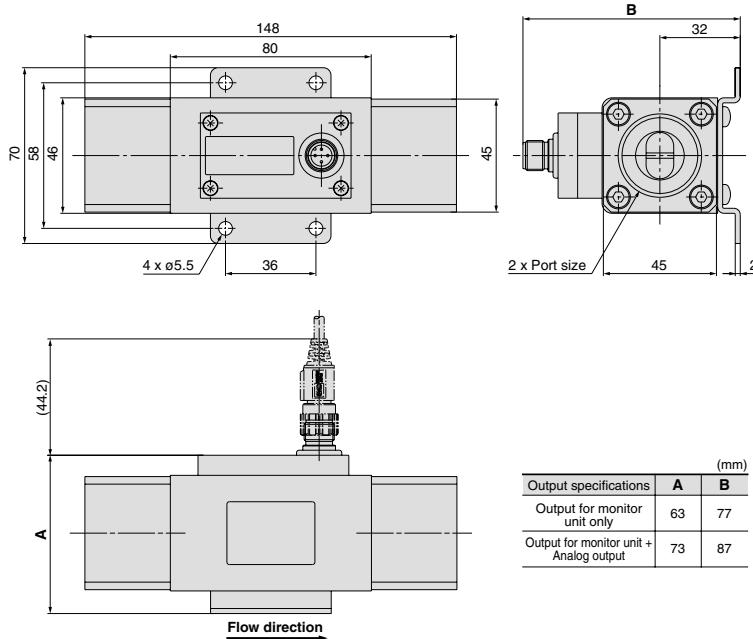


Pin no.	Pin description
1	DC(+)
2	NC/Analog output
3	DC(-)
4	OUT

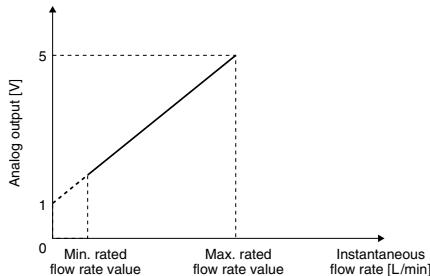
# Series PF2W

## Dimensions: Remote Type Sensor Unit For Water

### PF2W511-□(N)-□

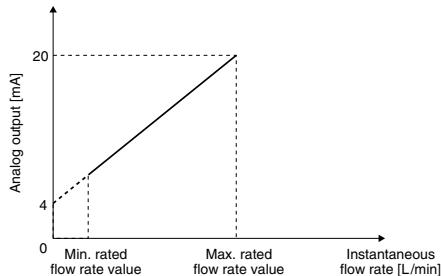


### Analog output 1 to 5 VDC



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

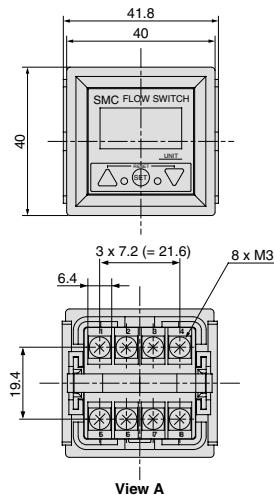


Part no.	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2W504-□-2	0.5	4
PF2W520-□-2	2	16
PF2W540-□-2	5	40
PF2W511-□-2	10	100

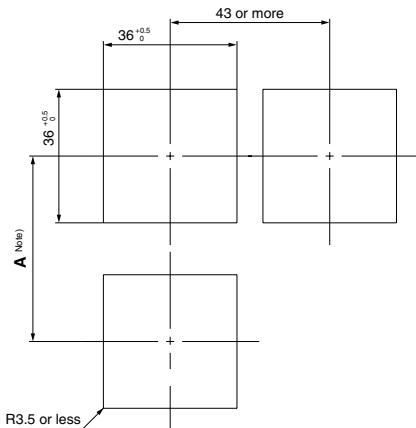
**Dimensions: Remote Type Monitor Unit For Water**

**PF2W3□□-A**

Panel mount adapter type



**Panel fitting dimensions**



Note) Decide the length of A taking into account the size of terminal you use.

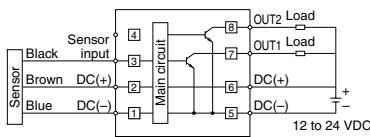
\* The applicable panel thickness is 1 to 3.2 mm.

Corner: R3.5 or less

**Internal Circuits and Wiring Examples**

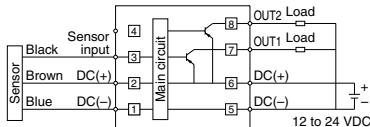
**-0**

**NPN (2 outputs)**

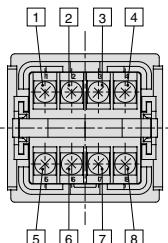


**-1**

**PNP (2 outputs)**



**Terminal block numbers**



Pressure Sensor

Pressure Control

Flow Sensor

Position Detection Switch

Reduced-Wiring Fieldbus System

Static Electricity Elimination Equipment

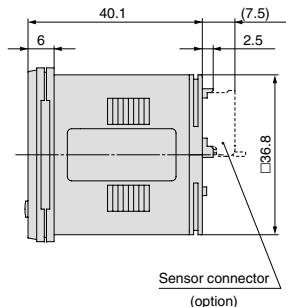
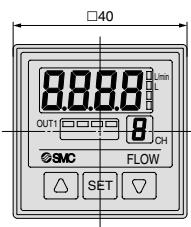
Length Measuring Counter

Alphabetical Index

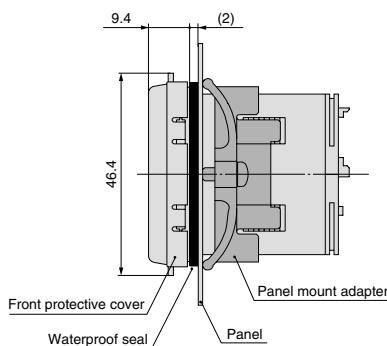
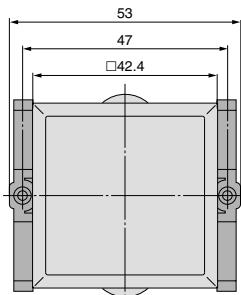
# Series PF2W

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

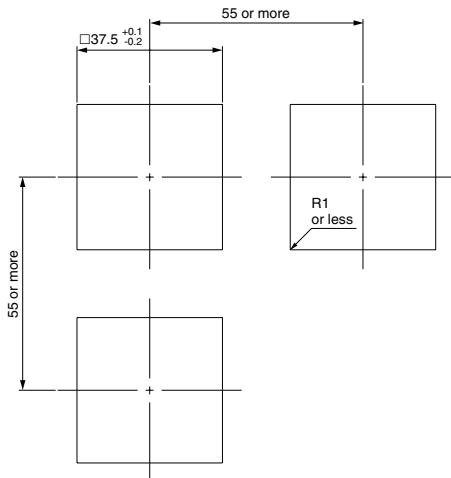
### PF2W200, 201



### Front protective cover + Panel mount adapter

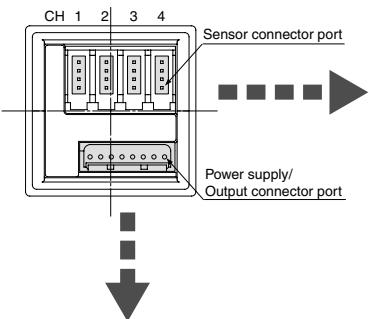


Panel fitting dimensions



\*Applicable panel thickness: 0.5 to 8 mm

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

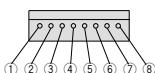


Sensor connector (4P x 4)

Connector (option)

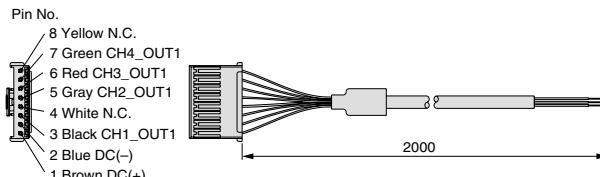
Pin no.	Terminal	Connector no.	Cable wire color
①	DC+	1	Brown
②	N.C.	2	Not used
③	DC-	3	Blue
④	IN: 1 to 5 V	4	White

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)

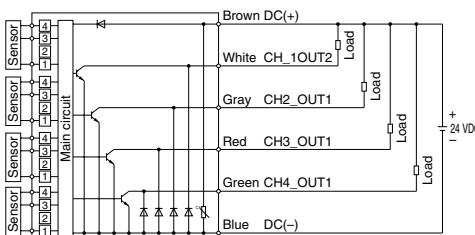


Cable Specifications

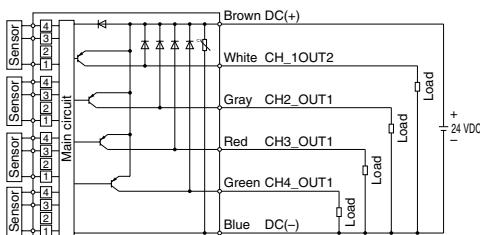
No. of cable wire	8
Conductor	Nominal cross-sectional area 0.15 mm <sup>2</sup>
Insulator	Dimension Approx. 0.5 mm
Sheath	Dimension Approx. 0.9 mm Brown, White, Blue, Black, Gray, Red, Green, Yellow
	Material Heat-resistant polyethylene
	O.D. 4.8 mm

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)	Applicable model
03	3/8	● 4 16 40	PF2W704T/PF2W720T
04	1/2	● 4 16 40	PF2W720T/PF2W740T
06	3/4	● 4 16 40	PF2W740T

Nil	With unit switching function
M	Fixed SI unit
N	Without lead wire

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

#### Unit specifications

Nil	Lead wire with M12 connector (3 m)
M	Fixed SI unit
N	Without lead wire

#### Output specifications

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

## Specifications

Model	PF2W704T	PF2W720T	PF2W740T		
<b>Measured fluid</b>	Water, Mixture of water (50%) and ethylene glycol (50%)				
<b>Flow rate measurement range</b>	0.35 to 4.5 L/min	1.7 to 17.0 L/min	3.5 to 45 L/min		
<b>Set flow rate range</b>	0.35 to 4.5 L/min	1.7 to 17.0 L/min	3.5 to 45 L/min		
<b>Rated flow range</b>	0.5 to 4 L/min	2 to 16 L/min	5 to 40 L/min		
<b>Minimum set unit</b>	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		
<b>Operating fluid temperature</b>	0 to 90°C (with no cavitation)				
<b>Accuracy</b>	±5% F.S.				
<b>Repeatability</b>	±3% F.S.				
<b>Temperature characteristics</b> Note 1)	±5% F.S. (0 to 90°C, 25°C reference)				
<b>Current consumption (No load)</b>	70 mA or less				
<b>Weight</b> Note 2)	710 g				
<b>Port size (Rc, NPT, G)</b>	3/8	3/8, 1/2	1/2, 3/4		
<b>Detection type</b>	Karman vortex				
<b>Indicator light</b>	3-digit, 7-segment LED				
<b>Display units</b> Note 3)	Instantaneous flow rate	L/min, gal(US)/min			
	Accumulated flow	L, gal(US)			
<b>Operating pressure range</b>	0 to 1 MPa				
<b>Withstand pressure</b>	1.5 MPa				
<b>Accumulated flow range</b> Note 4)	0 to 999999 L				
<b>Output specifications</b> 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		
<b>Accumulated pulse output</b>		NPN or PNP open collector (same as switch output)			
<b>Status LED's</b>	Lights up when output is turned ON OUT1: Green; OUT2: Red				
<b>Response time</b>	1 sec. or less				
<b>Hysteresis</b>	Hysteresis mode: Variable (can be set from 0); Window comparator mode Note 6): 3-digit fixed				
<b>Power supply voltage</b>	12 to 24 VDC ±10%				
<b>Environment</b>	<b>Enclosure</b>	IP65			
	<b>Operating temperature range</b>	Operating: 0 to 50°C, Stored: -25 to 85°C (with no freezing and condensation)			
	<b>Withstand voltage</b>	1000 VAC for 1 minute between terminals and housing			
	<b>Insulation resistance</b>	50 M Ω or more (500 VDC measured via megohmmeter) between terminals and housing			
	<b>Noise resistance</b>	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

Nil	Rc
N	NPT
F	G

Port size

Symbol	Port size	Flow rate (L/min)	Applicable model
03	3/8	● 4 16 40	PF2W504T/520T
04	1/2	● 2 to 16	PF2W520T/540T
06	3/4	● 5 to 40	PF2W540T



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.

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

**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)					
Power supply voltage	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)					
	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.

Pressure Sensor

Pressure Control

Position Detection

Reduced-wire  
Fieldbus System

Static Electricity  
Elimination Equipment

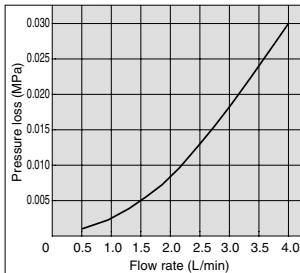
Lengh Measuring  
Counter

Alphabetical Index

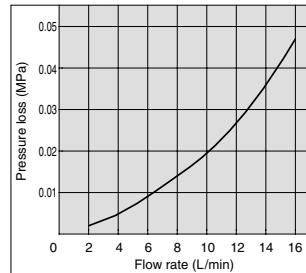
# Series **PF2W**

## Flow Characteristics (Pressure Loss)

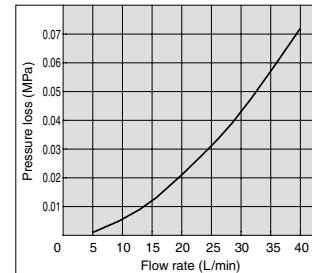
**PF2W704T, 504T**



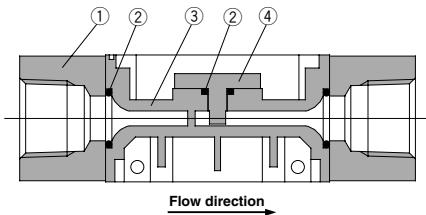
**PF2W720T, 520T**



**PF2W740T, 540T**



## Wetted Parts Construction/Sensor Unit

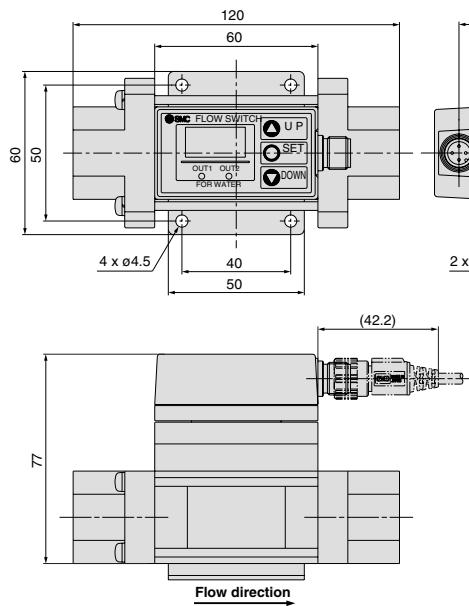


**Parts list**

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

**Dimensions: Integrated Display Type For Water**

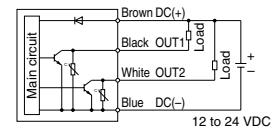
**PF2W704T, 720T, 740T**



**Internal Circuits and Wiring Examples**

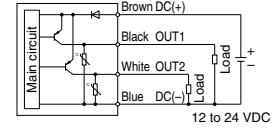
**-27**

**NPN (2 outputs)**

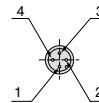


**-67**

**PNP (2 outputs)**



**Connector pin numbers**



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

Pressure Sensor

Pressure Control

Flow Sensor

Position Detection Switch

Reduced-Wiring Fieldbus System

Static Electricity Elimination Equipment

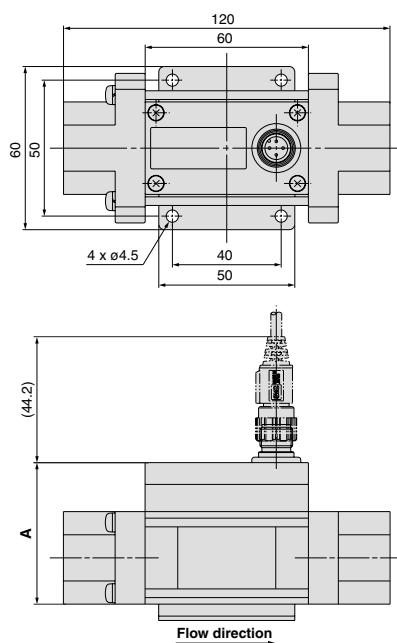
Length Measuring Counter

Alphabetical Index

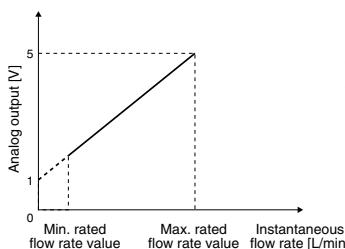
# Series PF2W

## Dimensions: Remote Type Sensor Unit For Water

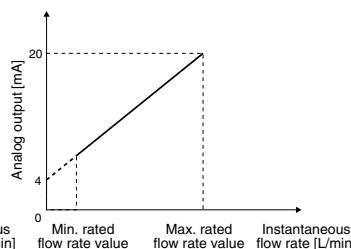
### PF2W504T, 520T, 540T-□(N)



**Analog output  
1 to 5 VDC**



**4 to 20 mA DC**

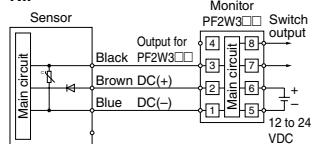


Part no.	Min. rated flow rate value [L/min]	Max. rated flow rate value [L/min]
PF2W504T-□-1	0.5	4
PF2W520T-□-1	2	16
PF2W540T-□-1	5	40

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

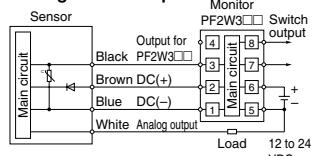
### Internal Circuits and Wiring Examples

Nil



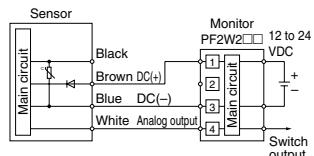
-1/2

### Analog current output

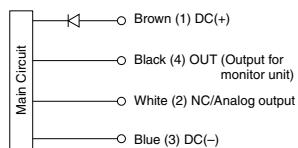


-1

### Analog voltage output



### Wiring



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

### Connector pin numbers



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

## Description

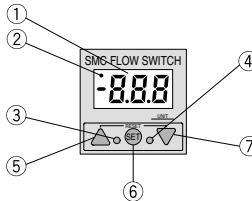
### Integrated Display Type

**PF2A710, 750, 711, 721, 751**  
**PF2W704(T), 720(T), 740(T), 711**



### Remote Type/Monitor Unit

**PF2A300, 301, 310, 311**  
**PF2W300, 301, 330, 331**



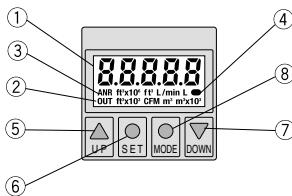
#### RESET button (▲ + ▼ button)

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)

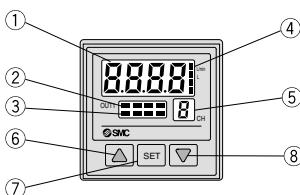
If the UP and DOWN buttons are pressed simultaneously, the RESET function will activate. In case of an emergency, please clear the display. The display of the accumulated flow will be reset to zero.

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 <sup>3</sup> , m <sup>3</sup> x 10 <sup>3</sup> ).
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.

# Series PF2A/PF2W

## 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 <sup>-2</sup> , CFM x 10 <sup>-1</sup>	ft <sup>3</sup> x 10 <sup>-1</sup>

CFM = ft<sup>3</sup>/min

#### High Flow Rate Type (For Air)

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

#### 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<sup>3</sup>, m<sup>3</sup> x 10<sup>3</sup>) 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.

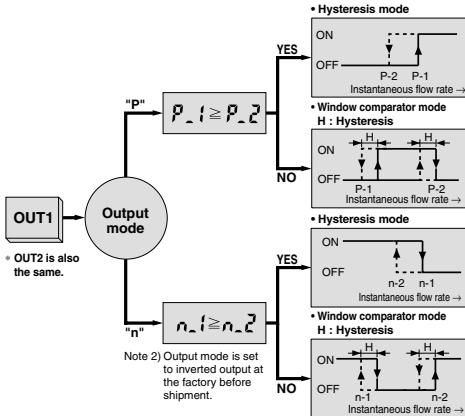
### Initialization of setting (only for Series PF2A7□□H)

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

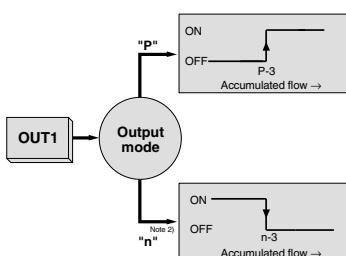
### Output types

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

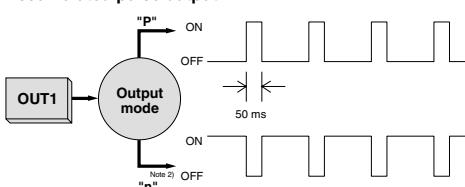
#### Real-time switch output



#### Accumulated switch output



#### Accumulated pulse output



## 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

### Channel select function (PF2□200, 201 only)

Every pushing the  $\Delta$  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.

### 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	
<i>Er 1</i> Note 1)	A current of more than 80 mA is flowing to OUT1.	Check the load and the wiring for OUT1.	
<i>Err_1</i> Note 2)			
<i>Er 2</i> Note 1)	A current of more than 80 mA is flowing to OUT2.	Check the load and the wiring for OUT2.	
<i>Err_3</i> Note 2)	The set data has changed for some reason.	Perform the RESET operation, and reset all the data again.	
<i>Er 4</i> Note 1)			
---	Note 1)	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 2)		

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
<i>Er 1</i>	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.
<i>Er 0</i>	Internal data error.	
<i>Er 7</i>	Internal data error.	Please contact SMC for investigation.
<i>Er 10</i>	Internal data error.	
<i>Er 5</i>	Internal data error.	Turn off the power supply and then turn on it again.
<i>Er 6</i>	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.

Pressure Sensor

Pressure Control

Flow Sensor

Position Detection Switch

Reduced-voltage Fieldsbus System

Static Electricity Elimination Equipment

Lengh Measuring Counter

Alphabetical Index

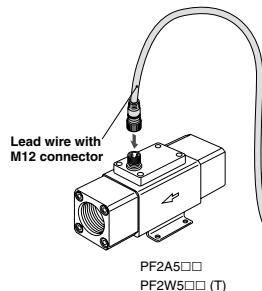
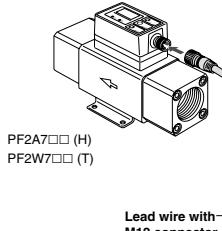
# Series PF2A/PF2W

## Option

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

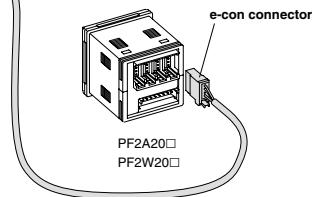
### Lead wire with M12 connector

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

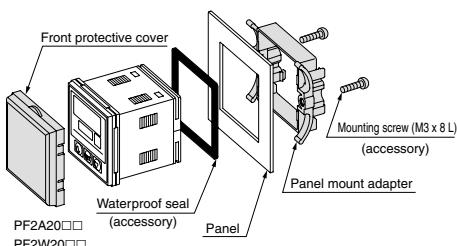
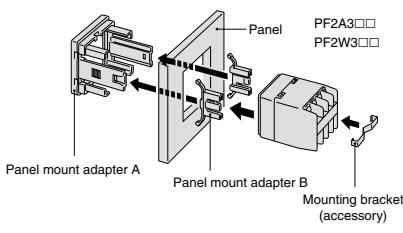
## Cable Specifications

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



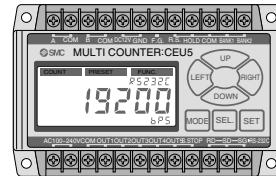
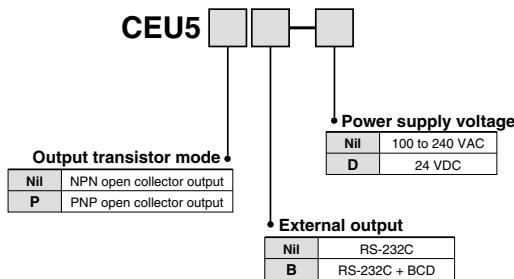
# Related Product

## Multi Counter

# Series CEU5

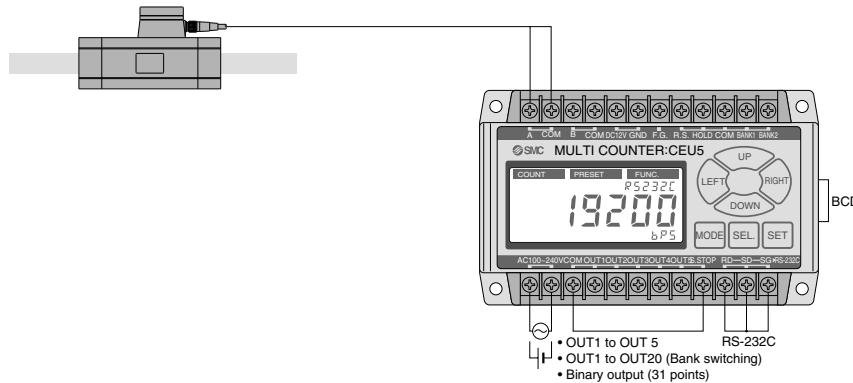


### How to Order



### 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<sup>3</sup> (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.

$$\text{Supply voltage} - \text{Internal voltage drop of switch} > \text{Minimum operating voltage of load}$$

#### [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>

- Use a device such as a water hammer relief valve to slow the valve's closing speed.
- Absorb impact pressure by using an accumulator or elastic piping material such as a rubber hose.
- 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<sup>2</sup>) 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]

- 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.

- 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]

- 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.

- 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

- 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.

- 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.

- 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.

- 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.

- 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

- 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

- 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.

- Mount the switch in a locations where there is no vibration greater than 98 m/s<sup>2</sup> or impact greater than 490 m/s<sup>2</sup>.

- 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.

- 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.

- 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]

- 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]

- 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.

Pressure Sensor

Pressure Control

Position Detection

Reduced Vibration

Fieldbus System

Static Electricity Elimination Equipment

Length Measuring Counter

Alphabetical Index



# 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.

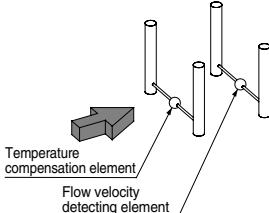
Allow an interval of 10 minutes after turning on the power, as there are some changes in the display.

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.

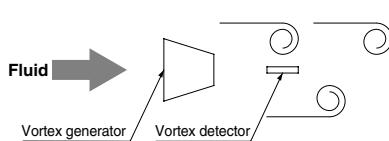
### Detection principle of digital flow switch for water

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



# Series PF2A/PF2W

## 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 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>

Sensor	Flow rate range				
	1 L/min	5 L/min	10 L/min	20 L/min	50 L/min
PF2A510	1 L/min	10 L/min			
	0.5 L/min	10.5 L/min			
PF2A550	5 L/min	50 L/min			
	2.5 L/min	52.5 L/min			
PF2A511	10 L/min		100 L/min		
	5 L/min		105 L/min		
PF2A521	20 L/min		200 L/min		
	10 L/min		210 L/min		
PF2A551	50 L/min		500 L/min		
	25 L/min		525 L/min		

##### <For Water/PF2W>

Sensor	Flow rate range						
	0.5 L/min	2 L/min	5 L/min	10 L/min	20 L/min	40 L/min	100 L/min
PF2W504	0.5 L/min	4 L/min					
PF2W504T	0.35 L/min	4.5 L/min					
PF2W520	2 L/min		16 L/min				
PF2W520T	1.7 L/min		17 L/min				
PF2W540	5 L/min		40 L/min				
PF2W540T	3.5 L/min		45 L/min				
PF2W511	10 L/min		100 L/min				
	7 L/min		110 L/min				

■ Rated flow range of sensor  
■ Set flow rate range of sensor

Pressure Sensor

Pressure Control

Flow Sensor

Position Detection

Reduced-voltage  
Fieldsight System

Static Electricity  
Elimination Equipment

Length Measuring  
Counter

Alphabetical Index



# 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/s<sup>2</sup>) 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.

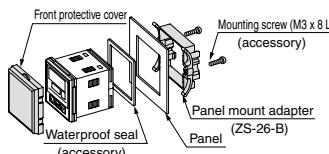
#### Mounting

##### ⚠ 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.



328

#### Wiring

##### ⚠ Caution

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

• Cut the sensor cable as shown below.

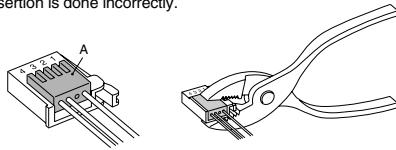
• Insert each lead wire into the corresponding connector number by following the chart provided below.

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.

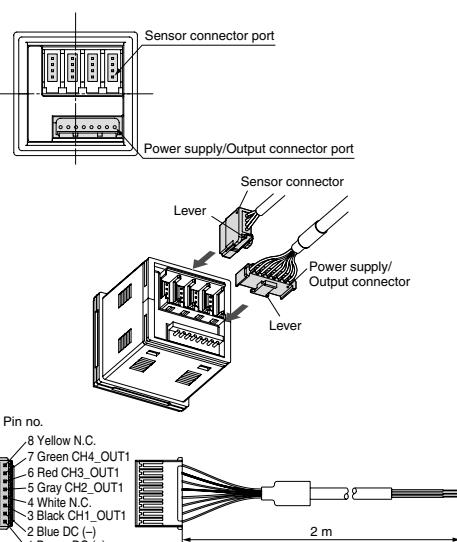
• Note that that connector cannot be taken apart for reuse once it is crimped. Use a new sensor connector if wiring or cable insertion is done incorrectly.



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 Chemicals

## Series PF2D



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 Series PF2D200

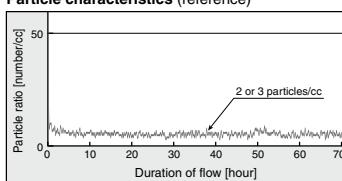
Dust generation of 3 particles/cc or less  
(average number)

Karman vortex eliminates moving parts  
and allows low dust generation.

#### Swept flow characteristics

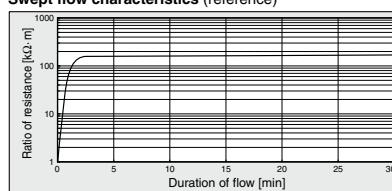
Tapered side seal minimizes dead volume  
to reduce accumulation of liquid pool.

#### Particle characteristics (reference)



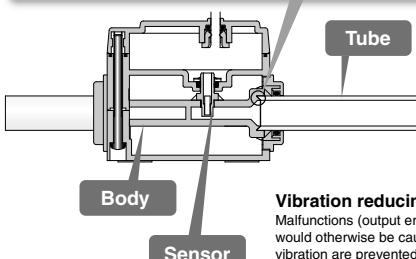
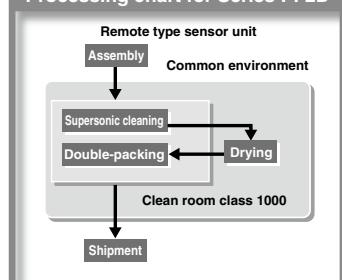
The data was obtained by performing an actual 10 minutes' supersonic cleaning using an average 16 MΩ-cm of deionized water at class 10000 clean room (1 L/min flow rate).  
The diameter of the measured particles ranges from 0.1 to 0.5 µm. The flow rate used during measuring is 100 cc/min.

#### Swept flow characteristics (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.

#### Processing chart for Series PF2D



Body

Sensor

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

# For Deionized Water and Chemicals

## Digital Flow Switch

# Series PF2D



### 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

• Option (Refer to page 1077.)

Nil	None
C	e-con connector x 1 pc.

The cable and connector are shipped unassembled.

• Output specification

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

For details about the Flow Switch Precautions, refer to pages 952 and 953. For details about the Specific Product Precautions, refer to the Operation Manual at SMC website.

### Specifications for Sensor Unit

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		
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.

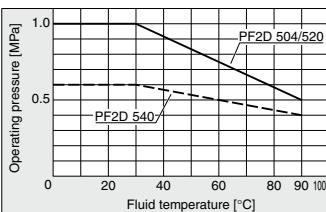
Note 4) The system accuracy when combined with PF2D301.

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

I Series LQ1 fluoropolymer fittings mounting type is I  
I also available. Refer to page 1078.

How to Order



Remote Type  
Monitor Unit

**PF2D30** **0 - A - M**

**Output specification**

<b>0</b>	NPN open collector 2 outputs
<b>1</b>	PNP open collector 2 outputs

**Unit specification**

<b>Nil</b>	With unit switching function
<b>M</b>	Fixed SI unit (Note)

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

**Mounting**

<b>A</b>	Panel mounting
----------	----------------

**Specifications for Monitor Unit**

For details about the Flow Switch Precautions, refer to pages 952 and 953. For details about the Specific Product Precautions, refer to the Operation Manual at SMC website.

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)				
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		1 sec. 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 PF2D500.

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.smeworld.com>).

**PFM**

**PFMV**

**PF2A**

**PF3W**

**PF2D**

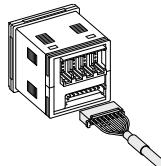
**IF**

# Series PF2D

## How to Order

4-channel Flow Monitor  
Remote Type  
Monitor Unit

Accessory / Power supply output cable (2 m)



**PF2D20** -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 1077.)

Nil	None
4C	Sensor connector (4 pc.)

### Option 1 (Refer to page 1077.)

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

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

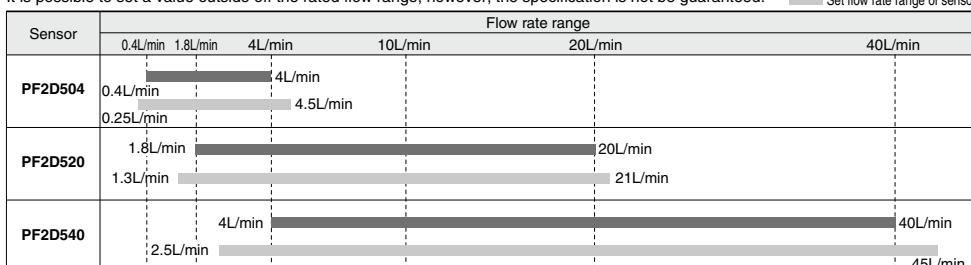
### Set the flow rate within the rated flow range.

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.).

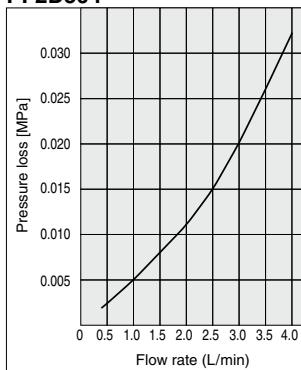
It is possible to set a value outside of the rated flow range, however, the specification is not be guaranteed.

■ Rated flow range of sensor  
■ Set flow rate range of sensor

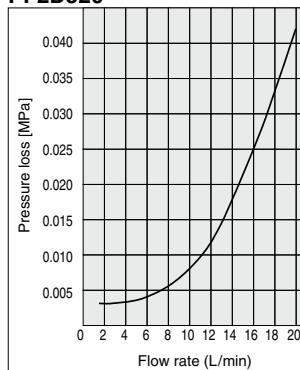


## Flow Characteristics (Pressure Characteristics)

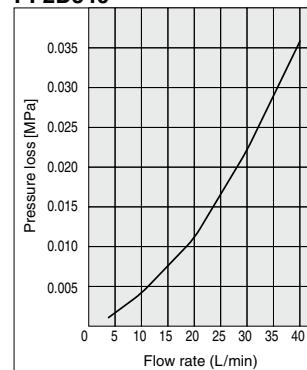
**PF2D504**



**PF2D520**

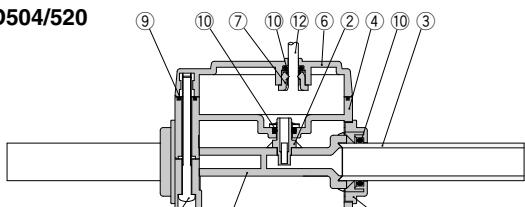


**PF2D540**

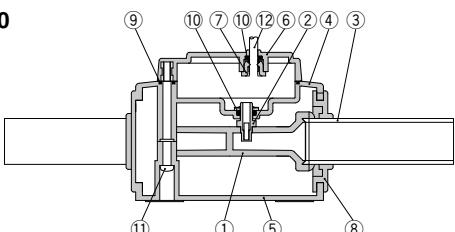


## Construction

**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

**PFM**

**PFMV**

**PF2A**

**PF3W**

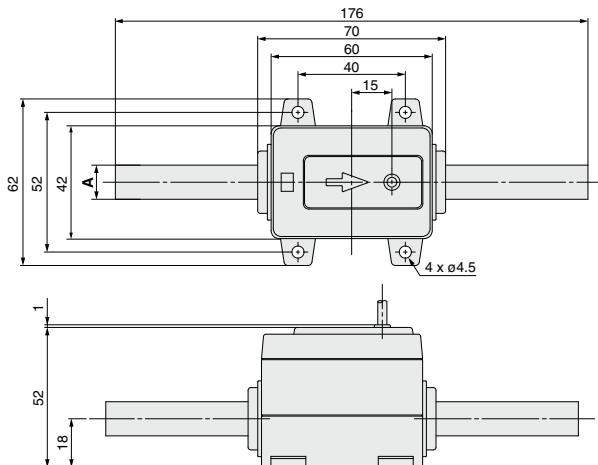
**PF2D**

**IF**

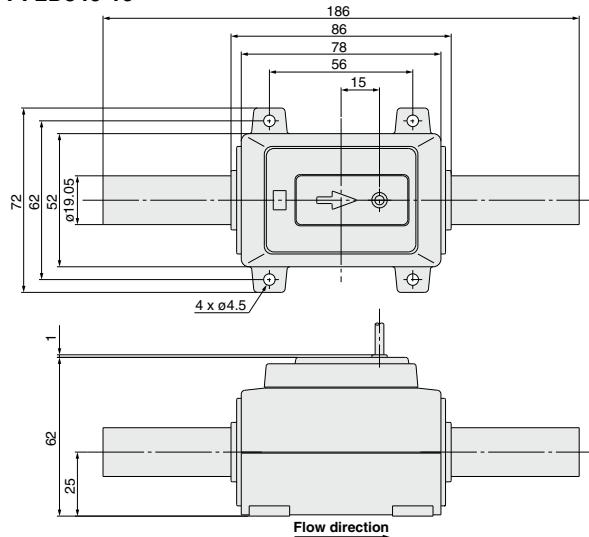
# Series PF2D

## Dimensions: Remote Type Sensor Unit

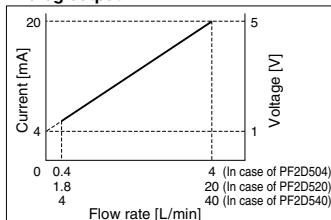
### PF2D504-11/520-13



### PF2D540-19



#### Analog output



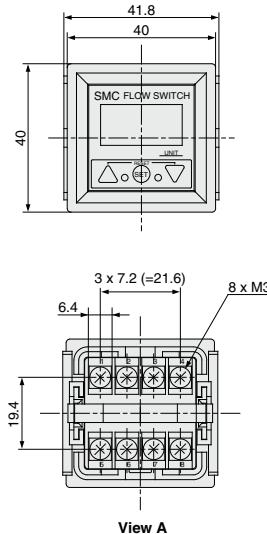
#### Cable Specifications

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

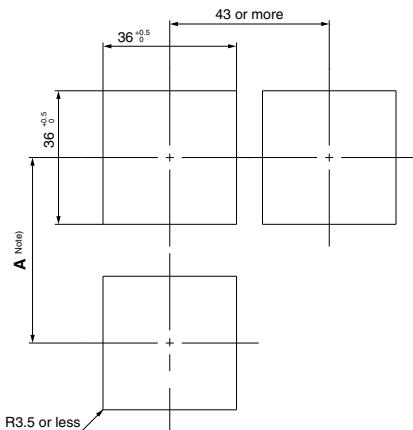
**Dimensions: Remote Type Monitor Unit**

**PF2D30<sup>0</sup>-A**

Panel mounting type



Panel fitting dimensions



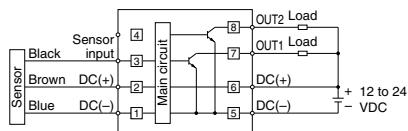
Note) Decide the length of A taking into account the size of terminal you use.

\* The applicable panel thickness is 1 to 3.2 mm.

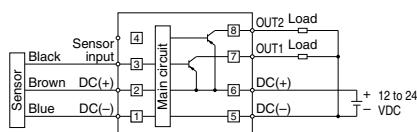
Corner: R3.5 or less

**Internal Circuits and Wiring Examples**

**-0**  
NPN (2 outputs)



**-1**  
PNP (2 outputs)



**PFM**

**PFMV**

**PF2A**

**PF3W**

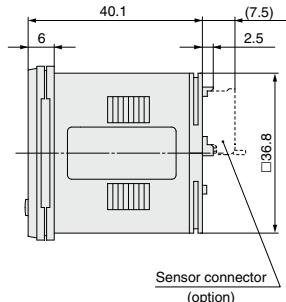
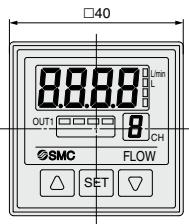
**PF2D**

**IF**

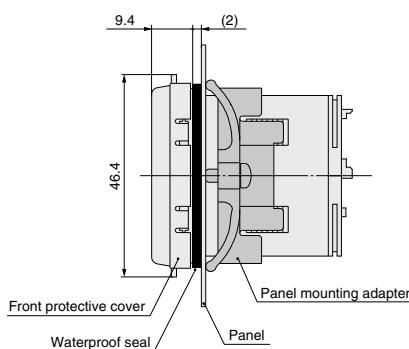
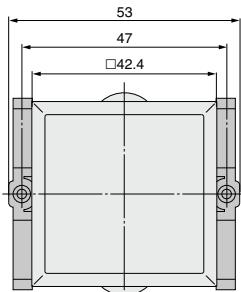
# Series PF2D

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

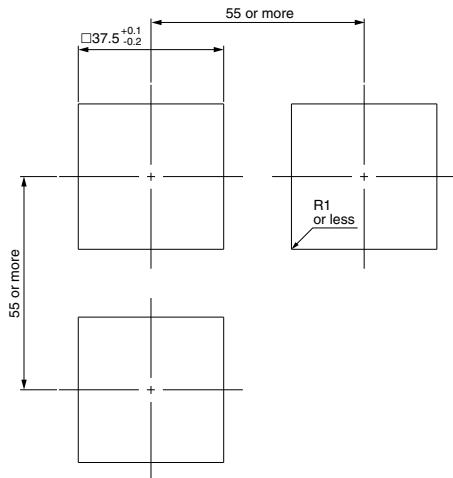
PF2D200/201



Front protective cover + Panel mounting



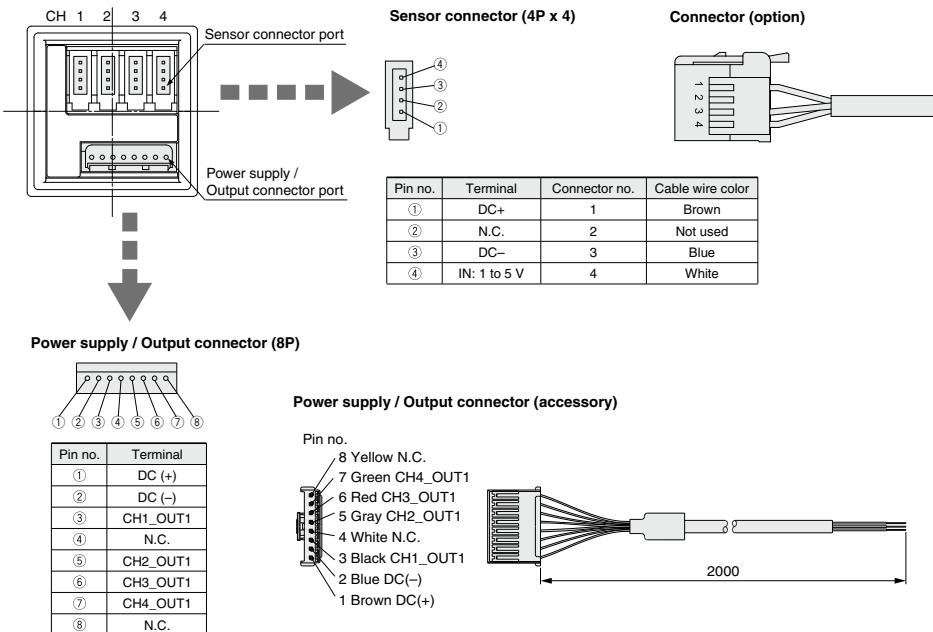
Panel fitting dimensions



\* Applicable panel thickness: 0.5 to 8 mm

# For Deionized Water and Chemicals Digital Flow Switch Series PF2D

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



PFM

PFMV

PF2A

PF3W

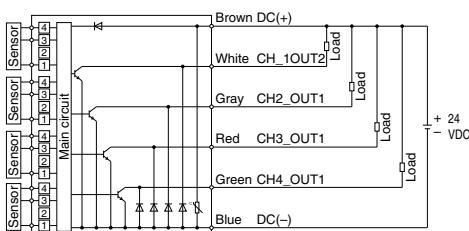
PF2D

IF

## Internal Circuits and Wiring Examples

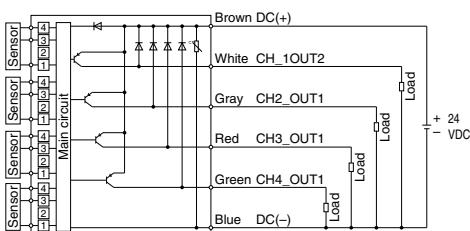
### PF2D200

NPN (4 outputs)



### PF2D201

PNP (4 outputs)



# Series PF2D

## Functions/PF2D

Refer to the "Instruction 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<sup>3</sup> or m<sup>3</sup>×10) 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
Er 1	A current of more than 80 mA is flowing to OUT1.	Check the load and the wiring for OUT1.
Er 2	A current of more than 80 mA is flowing to OUT2.	Check the load and the wiring for OUT2.
Er 4	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
Er 1	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.
Er 0	Internal data error.	Contact SMC.
Er 7	Internal data error.	
Er 10	Internal data error.	Shut off the power supply and then reset the switch.
Er 5	Internal data error.	
Er 6	Internal data error.	Use an adjustment valve, etc. to reduce the flow rate until it is within the flow rate range.
---	The flow rate is over the flow rate measurement range.	

### Key lock

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

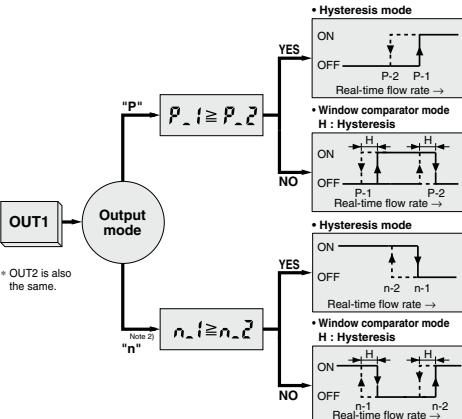
### Accumulation clearance

This is to clear the accumulated value.

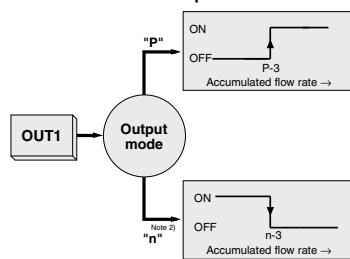
### Output types

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

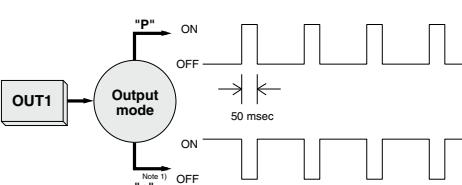
#### Real-time switch output



#### Accumulated switch output



#### Accumulated pulse output



## 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  $\Delta$  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)

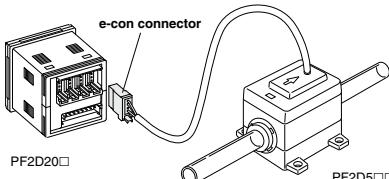
Changes displaying the channel shown every about 2 seconds and its detected flow rate.

## 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



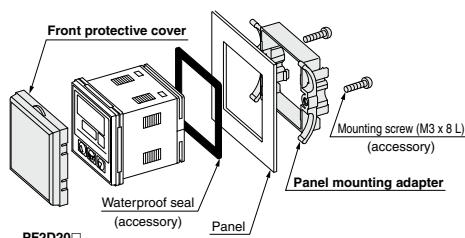
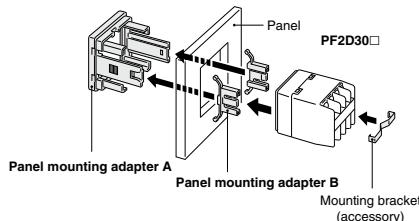
In addition to the connector shown above, those listed below (female contact) can be connected.

Manufacturer	Model
Sumitomo 3M 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



PFM

PFMV

PF2A

PF3W

PF2D

IF

# Series PF2D5 Made to Order

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

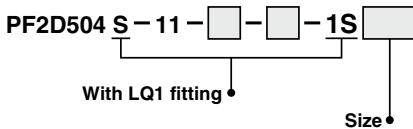


## 1 Fluoropolymer fittings mounting type (Space saving type)

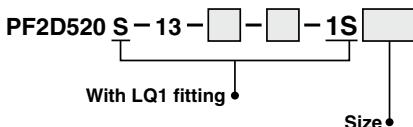
Attached insert bushings and nuts for LQ1 series fluoropolymer fittings on double end piping.

### How to Order

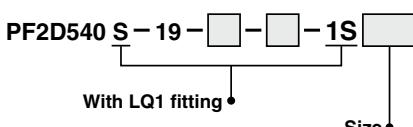
Refer to page 1068 for details  
about How to Order.



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)



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)

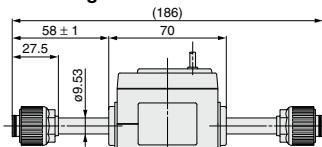


Model	IN side	OUT side
19	5	5
1925	5	6 (With reducer)
2519	6 (With reducer)	5
25	6 (With reducer)	6 (With reducer)

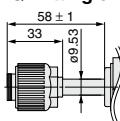
### Dimensions

External dimensions of the body are the same as those of standard products. Refer to page 1072.

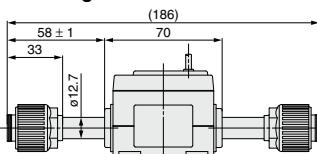
#### LQ1 fitting size: 3



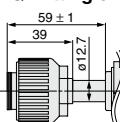
#### LQ1 fitting size: 4



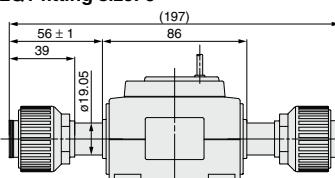
#### LQ1 fitting size: 4



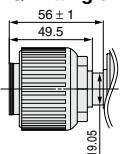
#### LQ1 fitting size: 5



#### LQ1 fitting size: 5



#### LQ1 fitting size: 6



# Made to Order Related Products

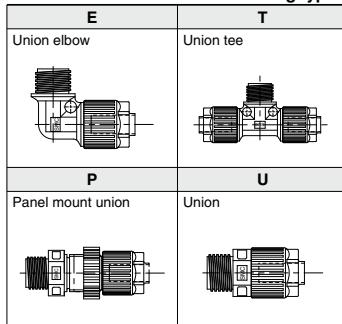


## How to Order Fittings for a Product with Nuts

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

• 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

	<b>PF2D504S-11-1-1S11</b> <b>LQ1E3B-SN</b> (Union elbow) <b>LQ1T3B-SN</b> (Union tee)	<b>PF2D504S-11-1-1S11</b> <b>LQ1E3B-SN</b> (Union elbow) <b>LQ1T3B-SN</b> (Union tee)	1 1 1
Note) Flow sensors and fittings are shipped packed separately.			

PFM

PFMV

PF2A

PF3W

PF2D

IF



Series PF2D

# 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.

- 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.

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