

Flow Switches

Series *PF2*□, *IF*□

Digital Flow Switch

Digital Flow Switch for Air: *Series PF2A* Refer to page 16-11-7.

Digital Flow Switch for Water: *Series PF2W* Refer to page 16-11-17.

Digital Flow Switch for Deionized Water and Chemicals: *Series PF2D* Refer to page 16-11-37.

Mechanical Flow Switch

Diaphragm Style Flow Switch: *Series IFW*

Model	Flow rate measuring range (ℓ/min)	Contacts	Port size (Rc, NPT, G)	Page
IFW510	1 to 10	1ab	3/8, 1/2, 3/4	16-12-1
IFW520	10 to 20			
IFW550	20 to 50			

Paddle Style Flow Switch: *Series IF3*□

Model	Flow rate measuring range (ℓ/min)	Contacts	Port size (Rc, NPT, G)	Page
1F3 □ 0	14 to 60	1ab	3/4	16-12-6
1F3 □ 1	20 to 150		1	
1F3 □ 3	36 to 2600		1	

ZSE□
ISE□

PSE

ZSE3
I

PS

ZSE1
I

ZSP

ISA2

IS□

ZSM

PF2□

IF□

Data



Flow Switches Precautions 1

Be sure to read before handling.

Design and Selection

Warning

- 1. Make sure to use a switch by the specified voltage.**
Use of a switch outside the range of the specified voltage can cause not only malfunction and damage of the switch, but also electrocution and fire.
- 2. Never use such a load, which exceeds the maximum allowable load.**
It may result in a damage to a switch.
- 3. Since the type of fluid varies depending on the product, make sure to verify the specifications.**
Never use flammable gases or fluids, since the switch is not explosion proof construction. It may result in a fire.

[For air]

- 4. Make sure to use a switch within the specified flow rate for measurement and the maximum operating pressure.**
Operating beyond the specified flow rate and operating pressure can damage the switch.
If using a switch by exceeding the maximum operating pressure, switch is damaged.

[For water]

- 5. Make sure to use a switch within the specified flow rate for measurement and the maximum operating pressure.**
Operating beyond the specified flow rate and operating pressure can damage the switch.
Damage to the switch may occur if the switch is subject to higher pressure than its designed limit.
Avoid especially the application of pressure above specifications through a water hammer.
<Countermeasure examples>
 - a) Use a device such as a water hammer relief valve to slow the valve's closing speed.
 - b) Absorb an impact pressure by using a rubber material piping such as a rubber hose and an accumulator.
 - c) Keep the piping length as short as possible.

Mounting

Warning

- 1. Mount a switch by observing the proper tightening torque.**

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

Thread	Proper tightening torque (N·m)
1/8	7 to 9
1/4	12 to 14
3/8	22 to 24
1/2	28 to 30
3/4	28 to 30
1	36 to 38

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

Do not apply a wrench to the plastic part of the main housing of the switch.

- 3. Monitor the flow direction of the fluid.**

Install a switch in the direction as indicated on the body.

- 4. Remove solid foreign objects, etc. inside piping by air blow before connecting a switch with piping.**

- 5. Do not drop or bump.**

Do not drop, bump, or apply excessive impacts (490 m/s²) while handling. Although the external body of the switch (switch case) may not be damaged, the inside of the switch could be damaged and cause a malfunction.

- 6. Hold the body of a switch when handling.**

The tensile strength of the cord is 49 N. Applying a greater pulling force on it can cause a malfunction. When handling, hold the body of the switch—do not dangle it from the cord.

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

Verify whether it is mounted correctly by running fluids or applying the electricity in order to conduct suitable function and leakage tests when mounting for the first time or after system repair or modification was made.

[For air]

- 8. Ever mount a switch in a place that will be used as a scaffold during piping.**

If an excessive weight is applied on a switch, switch may be damaged.

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

Do not suddenly narrow the pipe size because doing so will disturb the flow speed distribution in the pipe, making it impossible to obtain the correct measurements.

[For water]

- 10. Never install a switch in such a place, where switch is used as a foothold in the 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 15 N·m or more to the metal parts of the switch.



Flow Switches Precautions 2

Be sure to read before handling.

Wiring

Warning

- 1. Verify the color and terminal number when wiring.**
Incorrect wiring can cause a switch to be damaged and may result in a malfunction. Verify the color of wiring and the terminal number in the instruction manual when wiring.
- 2. Avoid repeatedly bending or stretching the lead wire.**
Repeatedly applying bending stress or stretching force to the lead wire will cause it to break.
- 3. Confirm proper insulation of wiring.**
Make sure that there is no wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Overcurrent is flown and may result in a damage.

Operating Environment

Warning

- 1. Never use in an environment, where explosive gases are used.**
The switches do not have an explosion-proof rating. Never use in an environment, where explosive gases are used, as this may cause a serious explosion.
- 2. Mount a switch in such locations, where no vibration or shock (less than 98 m/s²) is affected.**

[For air]

- 3. Use the switch within the specified fluid and ambient temperature range.**
Fluid and ambient temperatures are 0° to 50°C. Take measures to prevent freezing fluid when below 5°C, since this may cause damage to a switch and lead to a malfunction. The installation of an air dryer is recommended for eliminating condensate and moisture.
Never use a switch in an environment, where temperature changes drastically even within the allowable ambient temperature range.

Maintenance

Warning

- 1. Perform periodical inspections to ensure proper operation of the switch.**
Unexpected malfunctions and wrong operations may not secure the safety.
- 2. Use caution when using a switch for an interlock circuit.**
When a pressure switch is used for an interlock circuit, devise a multiple interlock system to prevent trouble or malfunctioning. Verify the operation of the switch and interlock function on a regular basis.
- 3. Do not disassemble or modify the main body.**

Fluid

Warning

- 1. Check regulators and the 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. Fluids for measurement for this digital flow switch are nitrogen and air.**
Please note that accuracy cannot be guaranteed when other fluids are used.
- 3. Never use flammable fluids.**
- 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. Never use flammable fluids.**
- 6. Install a filter in the inlet side when it is likely for solid foreign objects to get mixed with fluids.**

ZSE
ISE

PSE

ZSE3
I SE3

PS

ZSE1
I SE2

ZSP

ISA2

IS

ZSM

PF2

IF

Data

Digital Flow Switch

Series PF2A/PF2W

For Air For Water



Remote Type

For Air Series PF2A



Integrated Type

For Water Series PF2W

- 1 Flow rate setting and monitoring are possible with the digital display.
- 2 Two types for different applications Integrated and remote type displays
- 3 Three types of output: Switch, accumulated pulse, and analog outputs.
- 4 Switching from real-time flow rate to accumulated flow is possible.
- 5 Two independent flow rate settings are possible.
- 6 Water resistant construction conforming to IP65

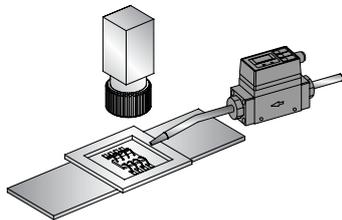
Flow rate measurement range (l/min)

For Air	For Water	For High Temperature Fluid (Water 90°C)
1 to 10	0.5 to 4	0.5 to 4
5 to 50	2 to 16	2 to 16
10 to 100	5 to 40	5 to 40
20 to 200	10 to 100	
50 to 500		
150 to 3000		
300 to 6000		
600 to 12000		

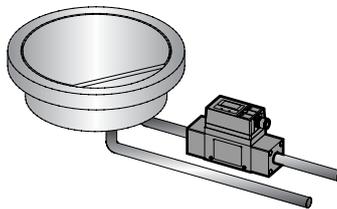
- ZSE
- ISE
- PSE
- ZSE3
- PS
- ZSE1
- ZSE2
- ZSP
- ISA2
- IS
- ZSM
- PF2
- IF
- Data

Application examples

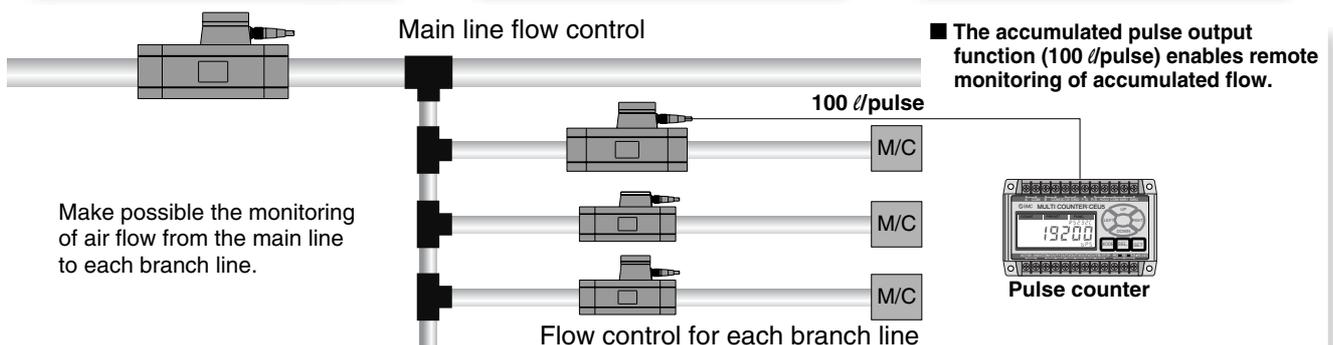
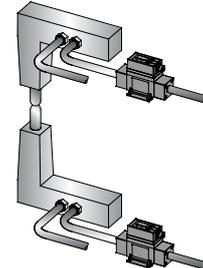
Flow control of N₂ gas to prevent detection camera shimmering and lead frame oxidation



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



Flow control of pressurized cooling water for welding gun



Series Variation

Series PF2A, PF2W

For Air **Series PF2A** P. 16-11-7



50 l/min
10 l/min



500 l/min
200 l/min
100 l/min



12000 l/min
6000 l/min
3000 l/min

Integrated display type	Remote type		Flow rate measurement range l/min	Output specifications			Port size (Rc, NPT, G)							
	Display unit	Sensor unit		Switch output	Analog output	Accumulated pulse output	1/8	1/4	3/8	1/2	1	1 1/2	2	
PF2A710	PF2A30□	PF2A510	1 to 10	●	●	●	●	●						
750		550	5 to 50	●	●	●	●	●						
711	31□	511	10 to 100	●	●	●	●	●	●					
721		521	20 to 200	●	●	●	●	●						
751		551	50 to 500	●	●	●	●	●						
703H	-	-	150 to 3000	●	●	●	●	●	●					
706H			300 to 6000	●	●	●	●	●	●	●				
712H			600 to 12000	●	●	●	●	●	●	●	●	●		

● : Output from integrated display type and remote display unit type
● : Output from remote sensor unit type

For Water **Series PF2W** P. 16-11-17



16 l/min
4 l/min



40 l/min



100 l/min

Integrated display type	Remote type		Flow rate measurement range l/min	Output specifications			Port size (Rc, NPT, G)			
	Display unit	Sensor unit		Switch output	Analog output	Accumulated pulse output	3/8	1/2	3/4	1
PF2W704	PF2W30□	PF2W504	0.5 to 4	●	●	●	●	●	●	●
720		520	2 to 16	●	●	●	●	●	●	●
740		540	5 to 40	●	●	●	●	●	●	●
711	33□	511	10 to 100	●	●	●	●	●	●	●

● : Output from integrated display type and remote display unit type
● : Output from remote sensor unit type

For High Temperature Fluid (Water 90°C) **Series PF2W** P. 16-11-26



Integrated display type	Remote type		Flow rate measurement range l/min	Output specifications			Port size (Rc, NPT, G)		
	Display unit	Sensor unit		Switch output	Analog output	Accumulated pulse output	3/8	1/2	3/4
PF2W704T	PF2W30□	PF2W504T	0.5 to 4	●	●	●	●	●	●
720T		520T	2 to 16	●	●	●	●	●	●
740T		540T	5 to 40	●	●	●	●	●	●

● : Output from integrated display type and remote display unit type
● : Output from remote sensor unit type

Digital Flow Switch For Air

Series PF2A



How to Order

Integrated display type

PF2A7 10 — 01 — 27 —

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

Port size

Symbol	Port size	Flow rate (ℓ /min)					Applicable model
		10	50	100	200	500	
01	1/8	●	●				PF2A710, PF2A750
02	1/4	●	●				
03	3/8			●	●		PF2A711, PF2A721
04	1/2					●	PF2A751

Wiring specifications

Nil	3 m lead wire with connector
N	Without lead wire

Unit specifications

Nil	With unit switching function
M	Fixed SI unit (Note)

Note) Fixed unit:
Real-time flow rate: ℓ /min
Accumulated flow: ℓ

Output specifications

Symbol	Output specifications	Applicable model
27	NPN open collector 2 outputs	PF2A710, PF2A750 PF2A711, PF2A721, PF2A751
67	PNP open collector 2 outputs	PF2A710, PF2A750 PF2A711, PF2A721/PF2A751

Specifications

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
Flow rate measuring range	1 to 10 ℓ /min	5 to 50 ℓ /min	10 to 100 ℓ /min	20 to 200 ℓ /min	50 to 500 ℓ /min
Minimum set unit	0.1 ℓ /min	0.5 ℓ /min	1 ℓ /min	2 ℓ /min	5 ℓ /min
Accumulated pulse flow rate exchange value (Pulse width: 50 ms)	0.1 ℓ /pulse	0.5 ℓ /pulse	1 ℓ /pulse	2 ℓ /pulse	5 ℓ /pulse
Display unit ^{Note 1, 2)}	Real-time flow rate	ℓ /min, CFM x 10 ⁻²			ℓ /min, CFM x 10 ⁻¹
	Accumulated flow	ℓ , ft ³ x 10 ⁻¹			
Operating fluid temperature	0 to 50°C				
Linearity	±5% F.S. or less				
Repeatability	±1% F.S. or less		±2% F.S. or less		
Temperature characteristics	±3% F.S. or less (15 to 35°C, based on 25°C), ±5% F.S. or less (0 to 50°C, based on 25°C)				
Current consumption (No load)	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				
Display	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	0 to 999999 ℓ				
Output ^{Note 4)} 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; Two outputs			
	Accumulated pulse output	NPN or PNP open collector (same as switch output)			
Indicator light	Lights up when output is ON OUT1: Green; OUT2: Red				
Response time	1sec. or less				
Hysteresis	Hysteresis mode: Variable (can be set from 0). Window comparator mode: 3-digit fixed ^{Note 5)}				
Power supply voltage	12 to 24 VDC (Ripple ±10% or less)				
Resistance	Enclosure	IP65			
	Operating temperature range	Operating: 0 to 50°C, Stored: -25 to 85°C (No condensation or freezing)			
	Withstand voltage	1000 VAC for 1 min. between external terminal and case			
	Insulation resistance	50 M Ω (500 VDC) between external terminal and case			
	Vibration resistance	10 to 500 Hz at whichever is smaller: 1.5 mm amplitude or 98 m/s ² acceleration, in X, Y, Z directions for 2 hrs. each (De-energized)			
	Impact resistance	490 m/s ² in X, Y, Z directions 3 times each			
Noise resistance	1000 Vp-p, Pulse width 1 μ s, Rise time 1 ns				

Note 1) For digital flow switch with unit switching function. (Fixed SI unit [ℓ /min, or ℓ , m³ or m³ x 10³]) 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) Switch output and accumulated pulse output can be selected during initial setting.

Note 5) 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 6) The flow switch is conformed to CE mark.

ZSE
ISE

PSE

ZSE3

PS

ZSE1

ZSP

ISA2

IS

ZSM

PF2

IF

Data

How to Order

Remote type Display unit

PF2A5 **10** — **01** —

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

Output specifications

Nil	Output for display unit
1	Output for display unit + analog output (1 to 5 V)
2	Output for display unit + analog output (4 to 20 mA)

Wiring specifications

Nil	3 m lead wire with connector
N	Without lead wire

Port size

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



Specifications

Model	PF2A510	PF2A550	PF2A511	PF2A521	PF2A551
Measured fluid	Air, Nitrogen				
Detection type	Heater type				
Flow rate measuring 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				
Linearity <small>Note 1)</small>	±5% F.S. or less				
Repeatability <small>Note 1)</small>	±1% F.S. or less				
Temperature characteristics	±2% F.S. or less (15 to 35°C, based on 25°C) ±3% F.S. or less (0 to 50°C, based on 25°C)				
Output <small>Note 2)</small> specifications	Output for display unit	Analog voltage output (Non-linear) output impedance 1 kΩ output for display unit PF2A3□□			
	Analog output	Voltage output 1 to 5 V within the flow rate range Linearity: ±5% F.S. or less; allowable load resistance: 100 kΩ or more. Current output 4 to 20 mA within the flow rate range Linearity: ±5% F.S. or less; allowable load resistance: 300 Ω or less with 12 VDC, 600 Ω or less with 24 VDC			
Power supply voltage	12 to 24 VDC (Ripple ±10% or less)				
Current consumption (No load)	100 mA or less				110 mA or less
Resistance	Enclosure	IP65			
	Operating temperature range	Operating: 0 to 50°C, Stored: -25 to 85°C (No condensation or freezing)			
	Withstand voltage	1000 VAC for 1 min. between external terminal and case			
	Insulation resistance	50 MΩ (500 VDC) between external terminal and case			
	Vibration resistance	10 to 500 Hz at whichever is smaller: 1.5 mm amplitude or 98 m/s ² acceleration			
	Impact resistance	490 m/s ² in X, Y, Z directions 3 times each			
Weight <small>Note 3)</small>	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 PF2A3□□.

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 units conformed to CE mark.



How to Order

Remote type
Display unit

PF2A3 0 0 - A - □

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

Symbol	Mounting
A	Panel mounting

Unit specifications

Symbol	Unit specifications
Nil	With unit switching function
M	Fixed SI unit (Note)

Note) Fixed unit:

Real-time flow rate: ℓ/min

Output specifications

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

Specifications

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
Display unit (Note 2, 3)	Real-time flow rate	ℓ/min, CFM × 10 ⁻²		ℓ/min, CFM × 10 ⁻¹	
	Accumulated flow	ℓ, ft ³ × 10 ⁻¹			
Accumulated flow range		0 to 999999 ℓ			
Linearity (Note 4)		±5% F.S. or less			
Repeatability (Note 4)		±1% F.S. or less			
Temperature characteristics		±1% F.S. or less (15 to 35°C based on 25°C) ±2% F.S. or less (0 to 50°C based on 25°C)			
Current consumption		50 mA or less		60 mA or less	
Weight		45 g			
Output specifications (Note 5)	Switch output	NPN open collector (PF2A300, PF2A310) Maximum load current: 80 mA Internal voltage drop: 1 V or less (With load current of 80 mA) Maximum applied voltage: 30 V 2 outputs			
	Accumulated pulse output	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			
Display		NPN or PNP open collector (same as switch output)			
Indicator light		3-digit, 7-segment LED			
Power supply voltage		Lights up when output is ON OUT1: Green; OUT2: Red			
Response time		12 to 24 VDC (Ripple ±10% or less)			
Hysteresis		1 sec. or less			
Enclosure		Hysteresis mode: Variable (can be set from 0), Window comparator mode: Fixed (3 digits) (Note 6)			
Resistance	Operating temperature range	IP40			
	Withstand voltage	Operating: 0 to 50°C, Stored: -25 to 85°C (No condensation or freezing)			
	Insulation resistance	1000 VAC for 1 min. between external terminal and case			
	Vibration resistance	50 MΩ (500 VDC) between external terminal and case			
	Impact resistance	10 to 500 Hz at whichever is smaller: 1.5mm amplitude or 98 m/s ² acceleration, in X, Y, Z directions for 2 hrs. each			
	Noise resistance	490 m/s ² in X, Y, Z directions 3 times each 1000 Vp-p, Pulse width 1 μs, Rise time 1 ns			

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) The system accuracy when combined with PF2A5□□.

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 display unit is conformed to CE mark.

ZSE□
ISE□

PSE

ZSE3

PS

ZSE1

ZSP

ISA2

IS□

ZSM

PF2□

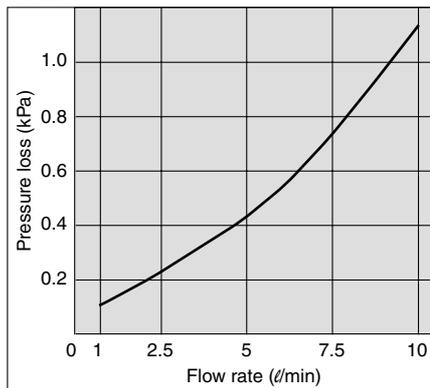
IF□

Data

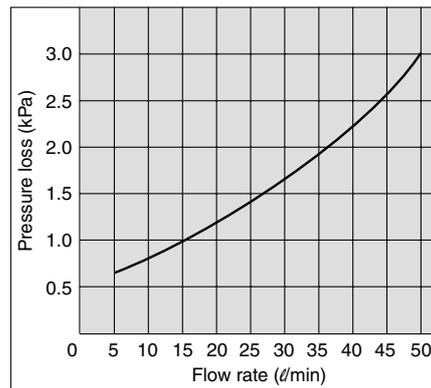
Series PF2A

Flow Characteristics (Pressure loss)

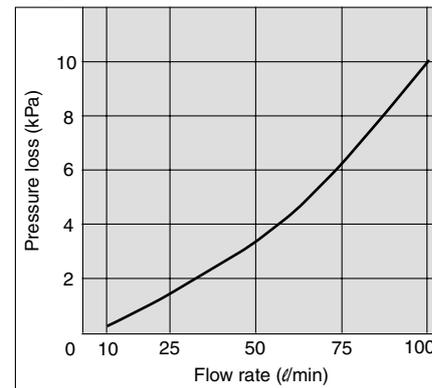
PF2A710/510



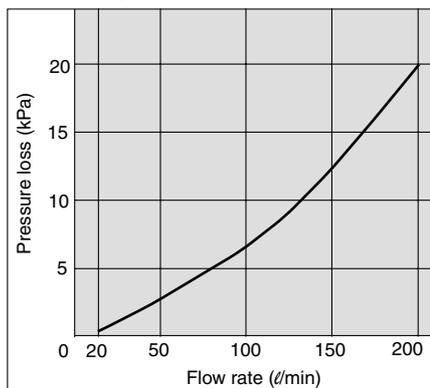
PF2A750/550



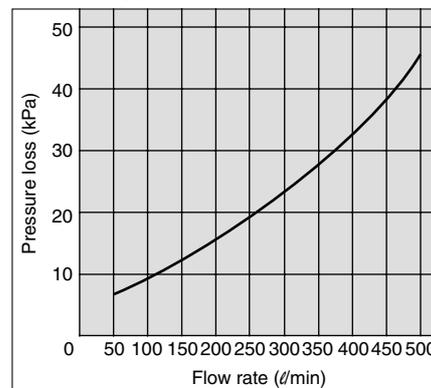
PF2A711/511



PF2A721/521

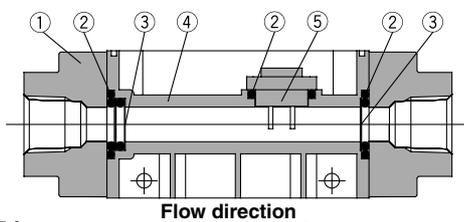


PF2A751/551



Sensor Unit Construction

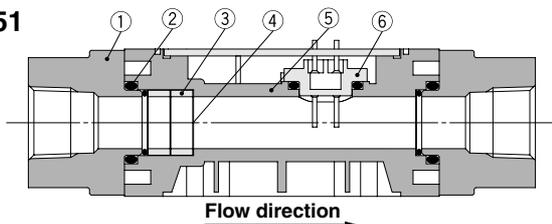
PF2A710/750
PF2A510/550



Component Parts

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

PF2A711/721/751
PF2A511/521/551



Component Parts

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

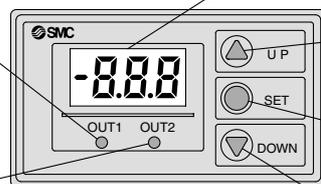
Operating Unit Descriptions

RESET Buttons

Press the ▲ and ▼ buttons simultaneously to activate the RESET function. This clears the unit when an abnormality occurs and resets the accumulated flow display to "0".

Output (OUT1) Indicator: Green
Lights up when OUT1 is ON. Blinks when an overcurrent error occurs on OUT1.

Output (OUT2) Indicator: Red
Lights up when OUT2 is ON. Blinks when an overcurrent error occurs on OUT2.



LED Display

Displays the real-time flow rate, accumulated flow, and set value. The ■ mark blinks when the accumulated flow is being measured.

UP Button (▲ Button)

Use this button to increase a set value.

SET Button (● Button)

Use this button to change a set value or any of the modes.

DOWN Button (▼ Button)

Use this button to decrease a set value.

Connectors

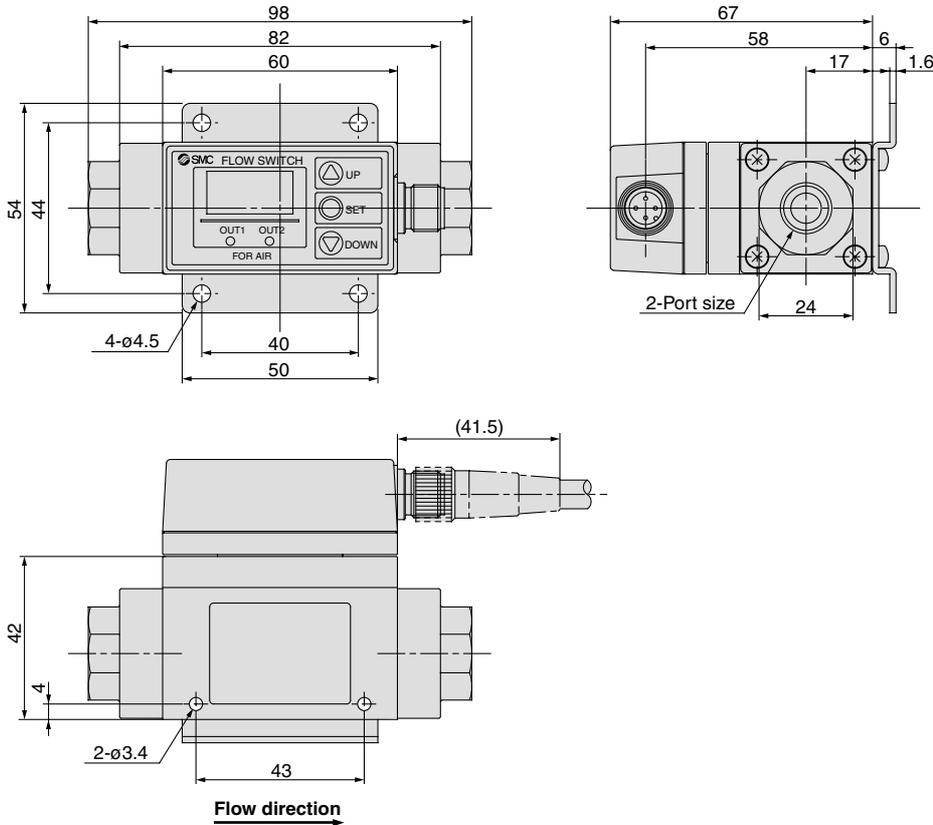
Connectors shown below are applicable (female contact).

Contact each manufacturer for details.

Connector size	Number of pins	Manufacturer	Applicable series
M12	4	Correns Corporation	VA-4D
		OMRON Corporation	XS2
		Yamatake Corporation	PA5-4I
		Hirose Electric Co., Ltd.	HR24
		DDK Ltd.	CM01-8DP4S

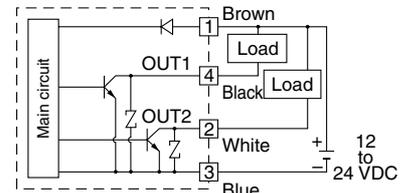
Dimensions: Integrated Display Type for Air

PF2A710/750

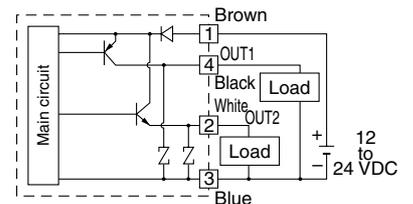


Internal circuit and wiring example

① to ④ are terminal numbers.

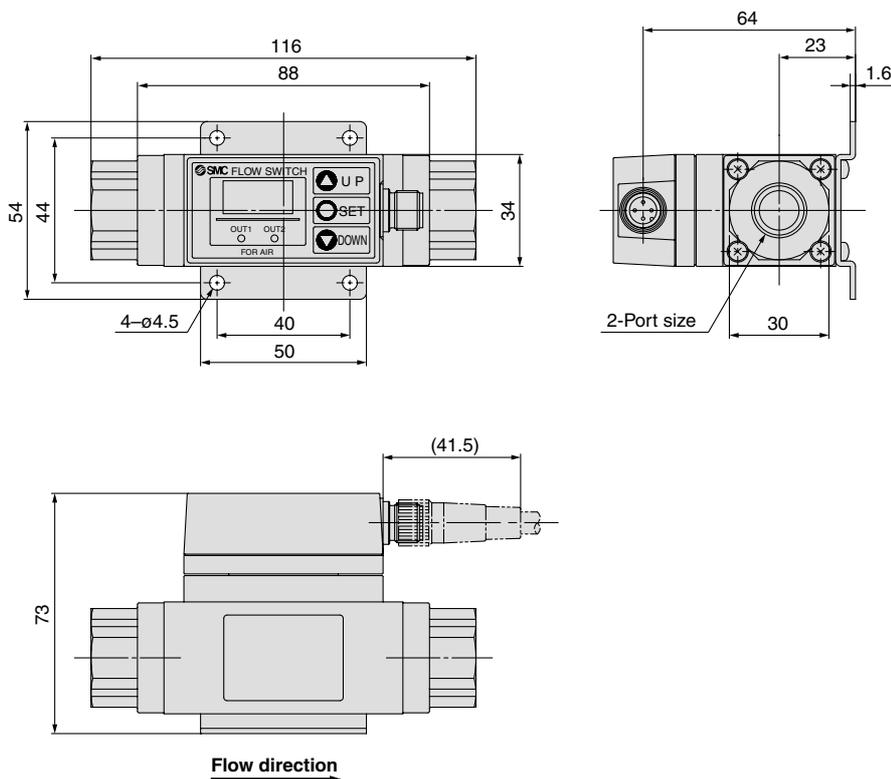


PF2A7□□-□□-27□(-M)

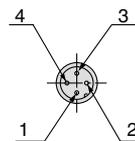


PF2A7□□-□□-67□(-M)

PF2A711/721/751



Connector pin numbers



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

ZSE□
ISE□

PSE

ZSE3
I

PS

ZSE1
I

ZSP

ISA2

IS□

ZSM

PF2□

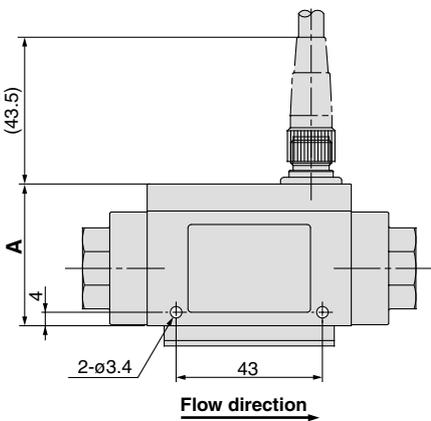
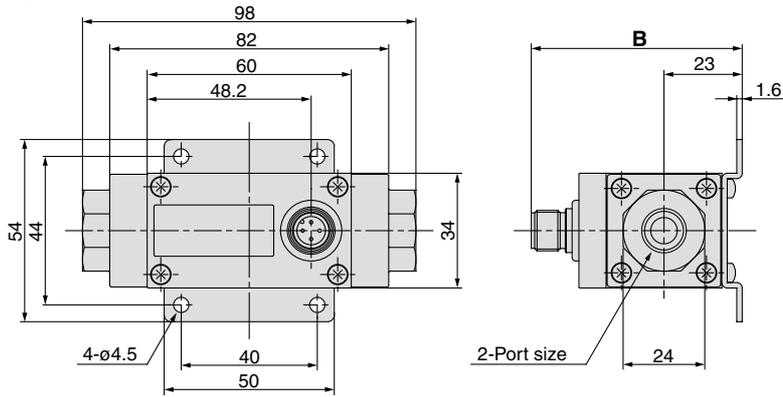
IF□

Data

Series PF2A

Dimensions: Remote Type Sensor Unit for Air

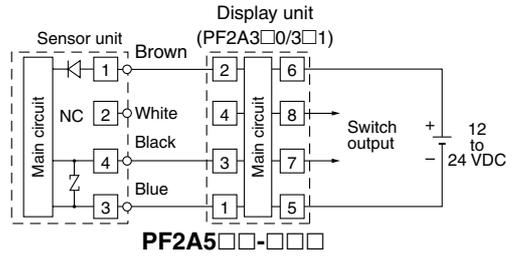
PF2A510/550



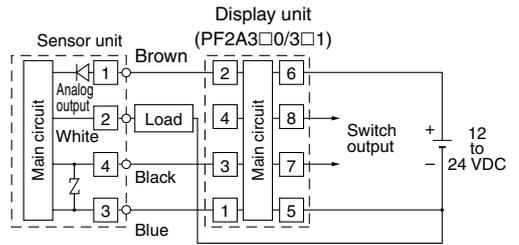
Output specifications	A	B
Pulse output only	42	62
Pulse output + Analog output	52	72

Internal circuit and wiring example

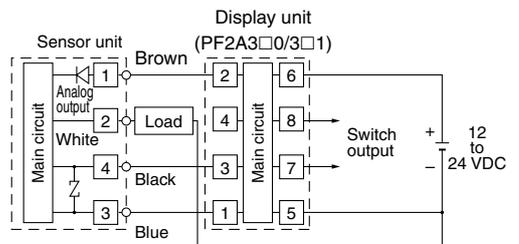
① to ⑧ are terminal numbers.



PF2A5□□-□□□□

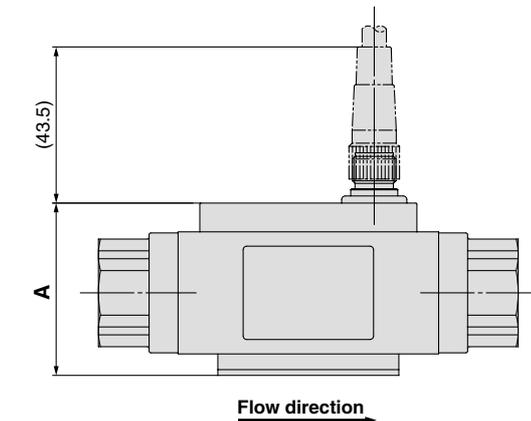
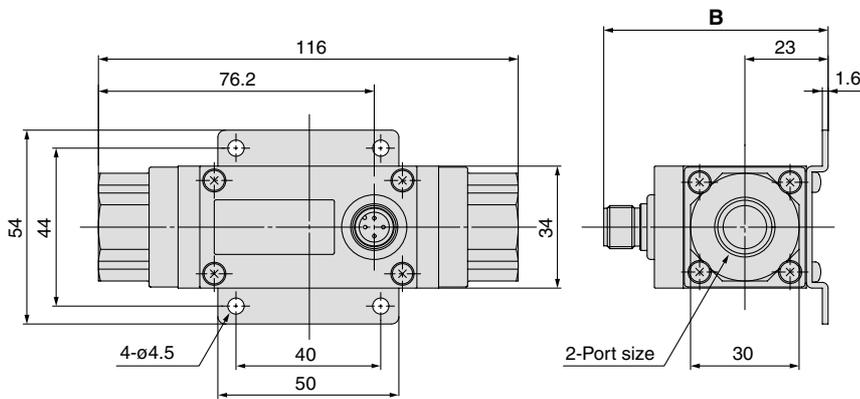


PF2A5□□-□□□□-1



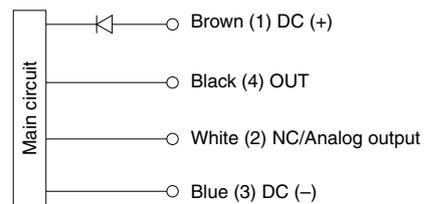
PF2A5□□-□□□□-2

PF2A511/521/551



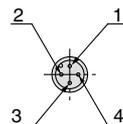
Output specifications	A	B
Pulse output only	48	62
Pulse output + Analog output	58	72

Wiring



* Use this sensor by connecting to SMC remote type display unit Series PF2A3□□□.

Connector pin numbers

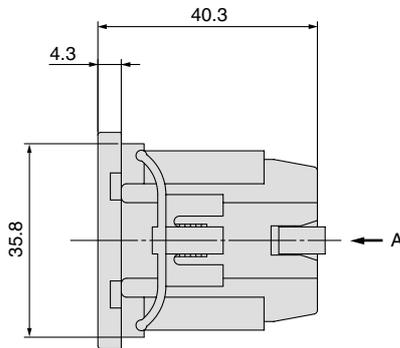
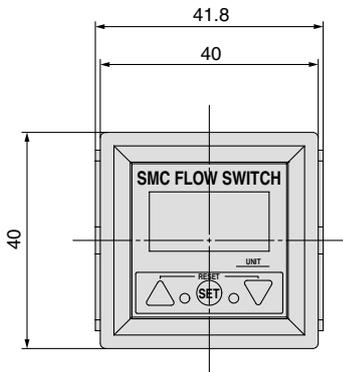


Pin no.	Pin description
1	DC (+)
2	NC/Analog output
3	DC (-)
4	OUT

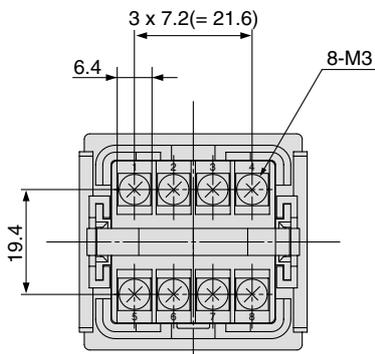
Dimensions: Remote Type Display Unit for Air

PF2A3□□-A

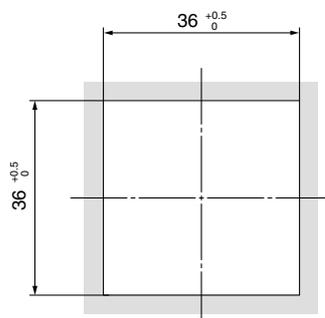
Panel mounting type



Panel fitting dimensions



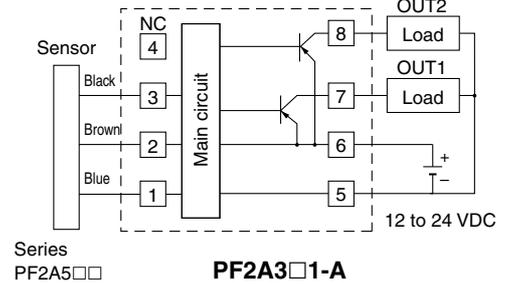
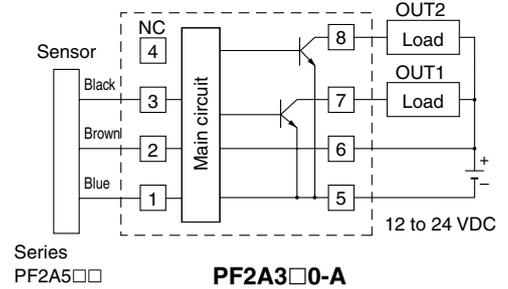
View A



* The applicable panel thickness is 1 to 3.2 mm.

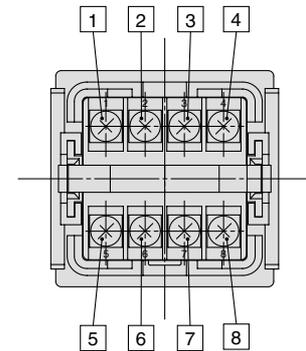
Internal circuit and wiring example

① to ⑧ are terminal numbers.

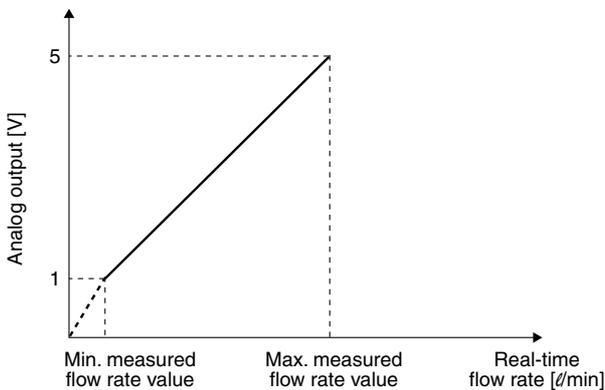


* Do not connect the white wire of the sensor to ③.

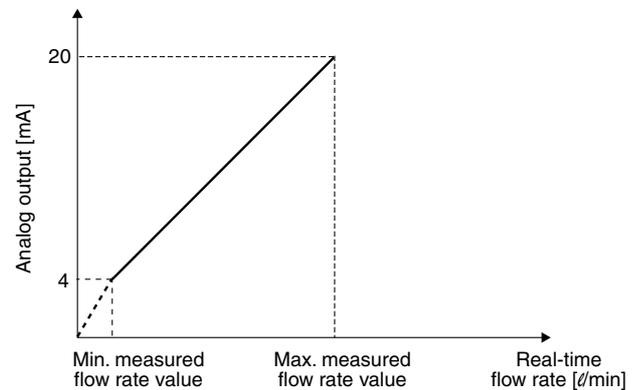
Terminal block number



Analog output 1 to 5 VDC



4 to 20 mADC



Part no.	Basic condition		Standard condition	
	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]	Minimum measured flow rate value [l/min]	Maximum measured 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.	Basic condition		Standard condition	
	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]	Minimum measured flow rate value [l/min]	Maximum measured 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

Digital Flow Switch, Large Flow Type For Air

Series PF2A

How to Order



Integrated display type

PF2A7 [] H [] [] [] [] []

Flow rate range

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

High flow type

Port specifications

Nil	Rc
N	NPT
F	G

Port size

Symbol	Port size	Flow rate (ℓ/min)			Applicable model
		3000	6000	12000	
10	1	●			PF2A703H
14	1½		●		PF2A706H
20	2			●	PF2A712H

Wiring specifications

Nil	3 m lead wire with connector
N	Without lead wire

Unit specifications

Nil	With unit switching function
M	Fixed SI unit (Note)

Output specifications

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

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

Note) Fixed unit:
Real-time flow rate: ℓ/min
Accumulated flow: ℓ, m³, m³ x 10³

Specifications

Model		PF2A703H	PF2A706H	PF2A712H
Measured fluid		Dry air		
Detection type		Heater type		
Flow rate measuring range (Note 1)		150 to 3000 ℓ/min	300 to 6000 ℓ/min	600 to 12000 ℓ/min
Minimum setting unit (Note 1)		5 ℓ/min	10 ℓ/min	
Display unit (Note 2)	Real-time flow rate	ℓ/min, CFM		
	Accumulated flow	ℓ, m ³ , m ³ x 10 ³ , ft ³ , ft ³ x 10 ³ , ft ³ x 10 ⁶		
Operating pressure range		0.1 to 1.5 MPa		
Proof pressure		2.25 MPa		
Pressure loss		20 kPa (at maximum flow rate)		
Accumulated flow range		0 to 9,999,999,999 ℓ		
Linearity (Note 3)		±1.5% F.S. or less (0.7 MPa, at 20°C)		
Repeatability		±1.0% F.S. or less (0.7 MPa, at 20°C), ±3.0% of F.S. or less in case of analog output		
Pressure characteristics		±1.5% F.S. or less (0.1 to 1.5 MPa, based on 0.7 MPa)		
Temperature characteristics		±2.0% F.S. or less (0 to 50°C, based on 25°C)		
Output specifications	Switch output (Note 4)	NPN open collector Max. load current: 80 mA; Max. applied voltage: 30 V; Internal voltage drop: 1 V or less (With load current of 80 mA) PNP open collector Max. load current: 80 mA; Internal voltage drop: 1.5 V or less (With load current of 80 mA)		
	Accumulated (Note 4) pulse output	NPN or PNP open collector	Flow rate per pulse: 100 ℓ/pulse, 10.0 ft ³ /pulse Pulse width: 50 msec	
	Analog output (Note 5)	Output voltage: 1 to 5 V; Load impedance: 100 kΩ or more Output current: 4 to 20 mA; Load impedance: 250 Ω or less		
Response time		1 sec. or less		
Hysteresis		Hysteresis mode: Variable (can be set from 0); Window comparator mode: (can be set from 0 to 3% F.S.)		
Power supply voltage		24 VDC (Ripple ±10% or less)		
Current consumption		150 mA or less		
Resistance	Enclosure	IP65		
	Operating temperature range	0 to 50°C (No condensation)		
	Withstand voltage	1000 VAC for 1 min. between external terminal and case		
	Insulation resistance	50 MΩ (500 VDC) between external terminal and case		
	Vibration resistance	10 to 500 Hz at whichever is smaller: 1.5 mm amplitude or 98 m/s ² acceleration, in X, Y, Z directions for 2 hrs. each		
	Impact resistance	490 m/s ² in X, Y, Z directions 3 times each		
Noise resistance		1000 Vp-p, Pulse width 1 μs, Rise time 1 ns		
Weight		1.1 kg (Without lead wire)	1.3 kg (Without lead wire)	2.0 kg (Without lead wire)
Port size (Rc, NPT, G)		1	1½	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, m³ or m³ x 10³)] will be set for switch type without the unit switching function.)

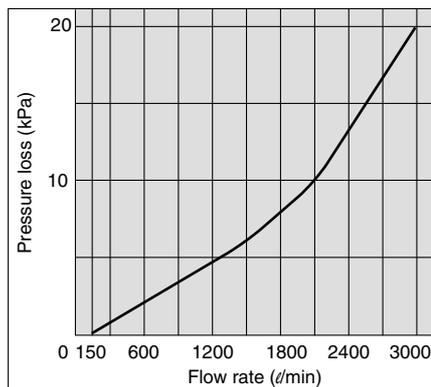
Note 3) The high flow rate type is CE marked; however, the linearity with applied noise is ±5% F.S. or less.

Note 4) Switch output and accumulated pulse output selections are made using the button controls.

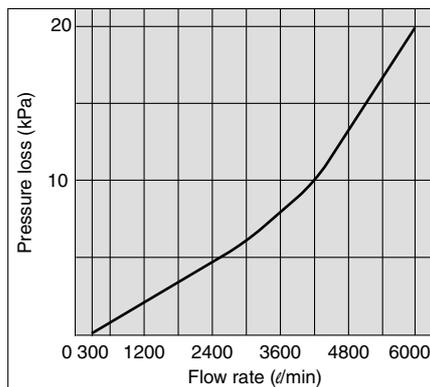
Note 5) The analog output operates only for real-time flow rate, and does not operate for accumulated flow.

Flow Characteristics (Pressure loss)

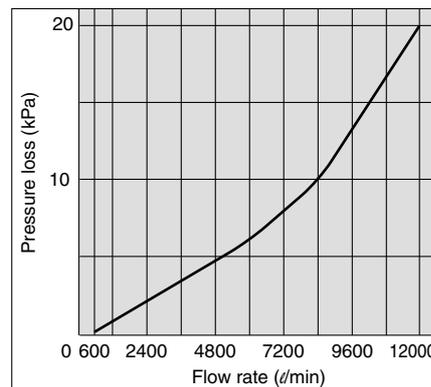
PF2A703H



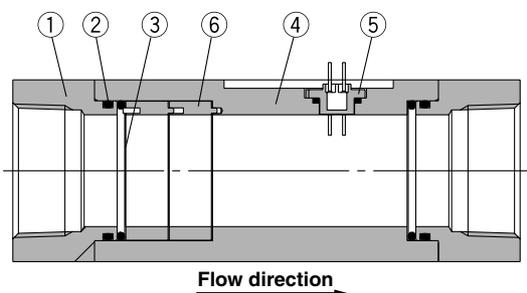
PF2A706H



PF2A712H



Construction



Component Parts

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	—

Operating Unit Descriptions

RESET buttons

Press the UP and DOWN buttons simultaneously to activate the RESET function. This clears the unit when an abnormality occurs and resets the accumulated flow display to "0".

Unit display

Displays the selected unit. Fixed SI unit (l/min, or l, m³ or m³ x 10³) will be set for switches without the unit switching function.

Output (OUT1) indicator

Lights up when OUT1 is ON. Blinks when an overcurrent error occurs on OUT1.

UP button (▲ button)

Use this button to increase a set value.

SET button (● button)

Use this button to select a function.

Flow rate display

Displays the real-time flow rate, accumulated flow, and set value.

Flow rate confirmation indicator

The blinking intervals change depending on the flow rate value.

DOWN button (▼ button)

Use this button to decrease a set value.

MODE button (● button)

Use this button to change a function.

Connectors

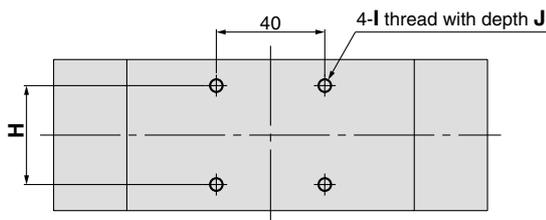
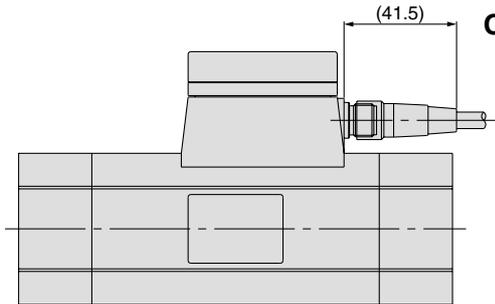
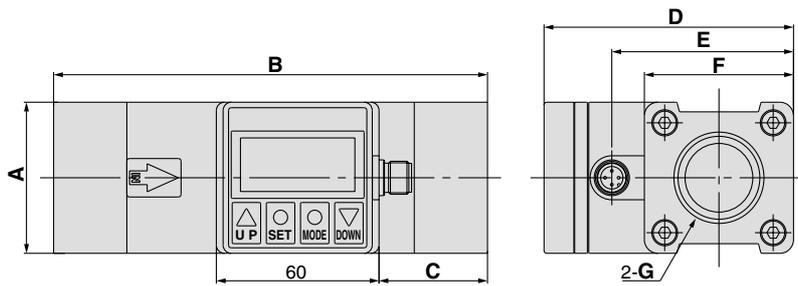
Connectors shown below are applicable (female contact). Contact each manufacturer for details.

Connector size	Number of pins	Manufacturer	Applicable series
M12	4	Correns Corporation	VA-4D
		OMRON Corporation	XS2
		Yamatake Corporation	PA5-4I
		Hirose Electric Co., Ltd.	HR24
		DDK Ltd.	CM01-8DP4S

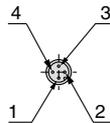
Series PF2D

Dimensions

PF2A703H/706H/712H



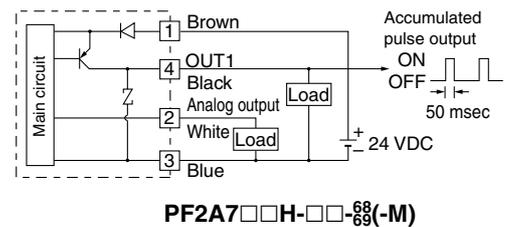
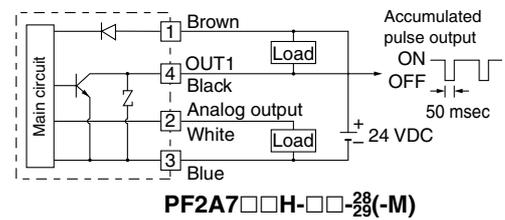
Connector pin numbers



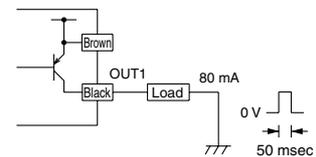
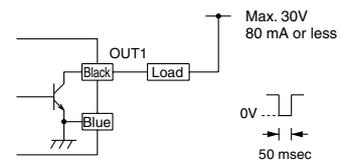
Pin no.	Pin description
1	DC (+)
2	Analog output
3	DC (-)
4	OUT1

Internal circuit and wiring example

① to ④ are terminal numbers.

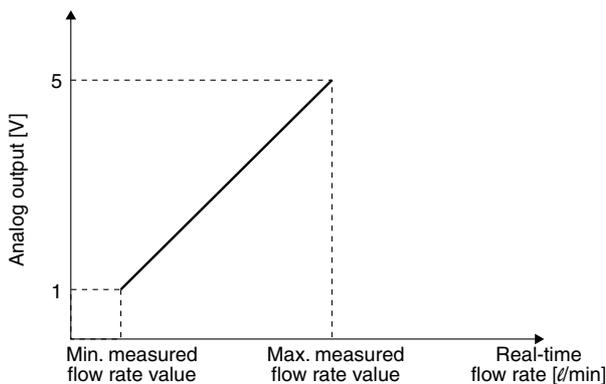


Accumulated pulse output wiring examples



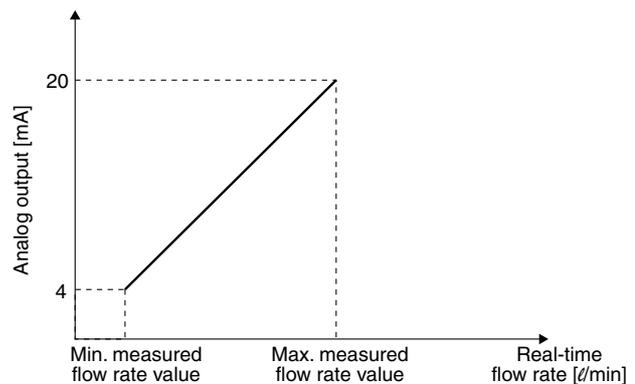
Model	A	B	C	D	E	F	G	H	I	J
PF2A703H	55	160	40	92	67	55	Rc 1, NPT 1, G 1	36	M5 x 0.8	8
PF2A706H	65	180	45	104	79	65	Rc 1 1/2, NPT 1 1/2, G 1 1/2	46	M6 x 1	9
PF2A712H	75	220	55	114	89	75	Rc 2, NPT 2, G 2	56	M6 x 1	9

Analog output 1 to 5 VDC



Part no.	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]
PF2A703H-28 PF2A703H-68	150	3000
PF2A706H-28 PF2A706H-68	300	6000
PF2A712H-28 PF2A712H-68	600	12000

4 to 20 mADC



Part no.	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]
PF2A703H-29 PF2A703H-69	150	3000
PF2A706H-29 PF2A706H-69	300	6000
PF2A712H-29 PF2A712H-69	600	12000

Digital Flow Switch For Water

Series PF2W



How to Order

Integrated display type PF2W7 20 — [] 03 — 27 [] []

Flow rate range

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

Thread type

Nil	Rc
N	NPT
F	G

Port size

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

Unit specifications

Nil	With unit switching function
M	Fixed SI unit (Note)

Note) Fixed unit:
Real-time flow rate: l/min
Accumulated flow: l

Wiring specifications

Nil	3 m lead wire with connector
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
Flow rate measuring 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
Linearity	±5% F.S. or less			±3% F.S. or less
Repeatability	±3% F.S. or less			±2% F.S. or less
Temperature characteristics (Note 1)	±5% F.S. or less (0° to 50°C, based on 25°C)			
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			
Display	3-digit, 7-segment LED			
Display unit (Note 3)	Real-time 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	0 to 999999 l			
Ambient temperature range	Operating: 0 to 50°C, Stored: -25 to 85°C (No condensation or freezing)			
Output specifications (Note 4)	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		
	Accumulated pulse output	PNP open collector Maximum load current: 80 mA Internal voltage drop: 1.5 V or less (With load current of 80 mA); 2 outputs NPN or PNP open collector (same as switch output)		
Indicator light	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: 3-digit fixed (Note 5)			
Power supply voltage	12 to 24 VDC (Ripple ±10% or less)			
Resistance	Enclosure	IP65		
	Operating temperature range	0 to 50°C		
	Withstand voltage	1000 VAC for 1 min. between external terminal and case		
	Insulation resistance	50 MΩ (500 VDC) between external terminal and case		
	Vibration resistance	10 to 500 Hz at whichever is smaller: 1.5 mm amplitude or 98 m/s ² acceleration in X, Y, Z directions for 2 hrs. each		
	Impact resistance	490 m/s ² in X, Y, Z directions 3 times each		
	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, based on 25°C).

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) Switch output and accumulated pulse output can be selected during initial setting.

Note 5) 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. The minimum setting unit is 1 digit. (Refer to the table above.)

(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 flow switch is conformed to CE mark.

How to Order



Remote type
Sensor unit

PF2W5 **20** — **03** —

● Flow rate range

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

● Thread type

Nil	Rc
N	NPT
F	G

● Output specifications

Nil	Output for display unit (sensor output) only
1	Output for display unit + Analog output (1 to 5V)
2	Output for display unit + Analog output (4 to 20 mA)

● Wiring specifications

Nil	Lead wire with connector 3 m
N	Without lead wire

● Port size

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

Specifications

Model	PF2W504	PF2W520	PF2W540	PF2W511
Measured fluid	Water			
Detection type	Karman vortex			
Flow rate measuring 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
Linearity ^{Note 1)}	±5% F.S. or less			±3% F.S. or less
Repeatability ^{Note 1)}	±2% F.S. or less			±1% F.S. or less
Temperature characteristics	±2% F.S. or less (15 to 35°C based on 25°C), ±3% F.S. or less (0 to 50°C based on 25°C)			
Output ^{Note 2)} specifications	Output for display unit	Pulse output, N channel, open drain, output for display unit PF2W3□□. (Specifications: Maximum load current of 10mA; Maximum applied voltage of 30 V)		
	Analog output	Voltage output 1 to 5V within the flow rate range Linearity: ±5% F.S. or less; allowable load resistance: 100 kΩ or more. Current output 4 to 20 mA within the flow rate range Linearity: ±5% F.S. or less; allowable load resistance: 300 Ω or less with 12 VDC, 600 Ω or less with 24 VDC		
Power supply voltage	12 to 24 VDC (Ripple ±10% or less)			
Current consumption (No load)	20 mA or less			
Resistance	Enclosure	IP65		
	Operating temperature range	Operating: 0 to 50°C, Stored: -25 to 85°C (No condensation or freezing)		
	Withstand voltage	1000 VAC for 1 min. between external terminal and case		
	Insulation resistance	50 MΩ (500 VDC) between external terminal and case		
	Vibration resistance	10 to 500 Hz at whichever is smaller: 1.5 mm amplitude or 98 m/s ² acceleration in X, Y, Z directions for 2 hrs. each		4.9 m/s ²
	Impact resistance	490 m/s ² in X, Y, Z directions 3 times each		
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 PF2W3□□.

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 conformed to CE mark.



How to Order

Remote type
Display unit

PF2W3 0 0 — A —

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
---	----------------

Panel mount adapter part no.

Description	Panel adapter B
Part no.	ZS-22-02

Unit specifications

Nil	With unit switching function
M	Fixed SI unit ^{Note)}

Note) Fixed unit:
Real-time 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
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
Minimum setting unit ^{Note 1)}		0.05 ℓ/min	0.1 ℓ/min	0.5 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
Display unit ^{Note 2)}	Real-time flow rate	ℓ/min, gal (US)/min		
	Accumulated flow	ℓ, gal (US)		
Accumulated flow range		0 to 999999 ℓ		
Linearity ^{Note 3)}		±5% F.S. or less		±3% F.S. or less
Repeatability ^{Note 3)}		±3% F.S. or less		±1% F.S. or less
Temperature characteristics		±2% F.S. or less (0 to 50°C, based on 25°C), ±1% F.S. or less (15 to 35°C, based on 25°C)		
Current consumption (No load)		50 mA or less		60 mA or less
Weight		45 g		
Output specifications ^{Note 4)}	Switch output	NPN open collector (PF2W300, PF2W330) Maximum load current: 80 mA Internal voltage drop: 1V or less (With load current of 80 mA) Maximum applied voltage: 30 V 2 outputs		
		PNP open collector (PF2W301, PF2W331) Maximum load current: 80 mA Internal voltage drop: 1.5 V or less (With load current of 80 mA) 2 outputs		
	Accumulated pulse output	NPN or PNP open collector (Same as switch output)		
Resistance	Enclosure	IP40		
	Operating temperature range	Operating: 0 to 50°C, Stored: -25 to 85°C (No condensation or freezing)		
	Withstand voltage	1000 VAC for 1 min. between external terminal and case		
	Insulation resistance	50 MΩ (500 VDC) between external terminal and case		
	Vibration resistance	10 to 500 Hz at whichever is smaller: 1.5 mm amplitude or 98 m/s ² acceleration in X, Y, Z directions for 2 hrs. each		
	Impact resistance	490 m/s ² in X, Y, Z directions 3 times each		
	Noise resistance	1000 Vp-p, Pulse width 1 μs, Rise time 1 ns		
Display	3-digit, 7-segment LED			
Indicator light	Lights up when output is ON, OUT1: Green; OUT2: Red			
Power supply voltage	12 to 24 VDC (Ripple ±10% or less)			
Response time	1 sec. or less			
Hysteresis	Hysteresis mode: Variable (can be set from 0) Window comparator mode: 3-digit fixed ^{Note 5)}			

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) The system accuracy when combined with PF2W5.

Note 4) Switch output and accumulated pulse output can be selected during initial setting.

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 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 6) The display unit is conformed to CE mark.

ZSE□
ISE□

PSE

ZSE3
I

PS

ZSE1
I

ZSP

ISA2

IS□

ZSM

PF2□

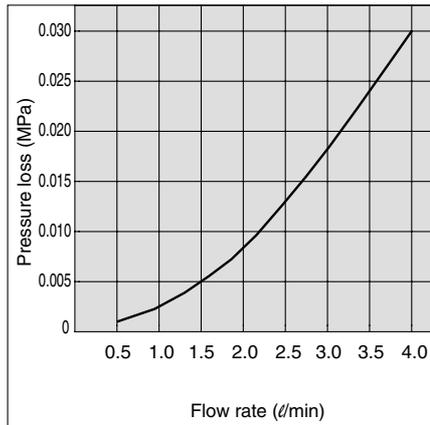
IF□

Data

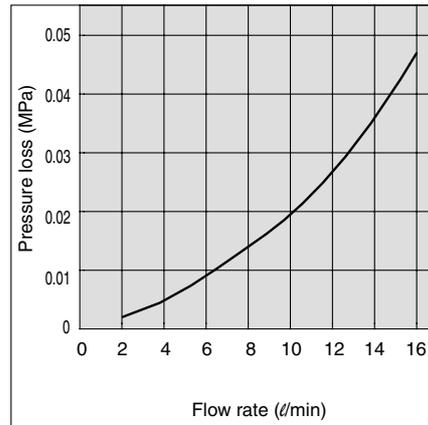
Series PF2W

Flow Characteristics (Pressure loss)

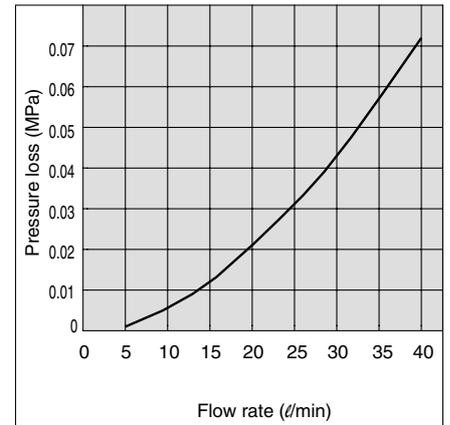
PF2W704, PF2W504



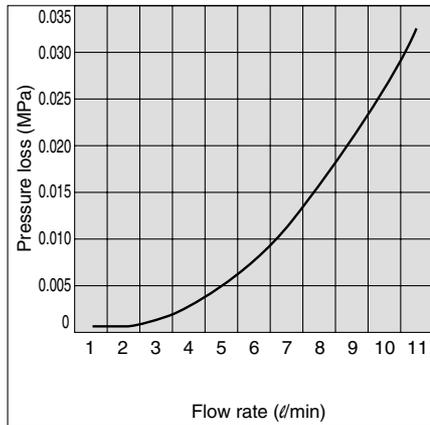
PF2W720, PF2W520



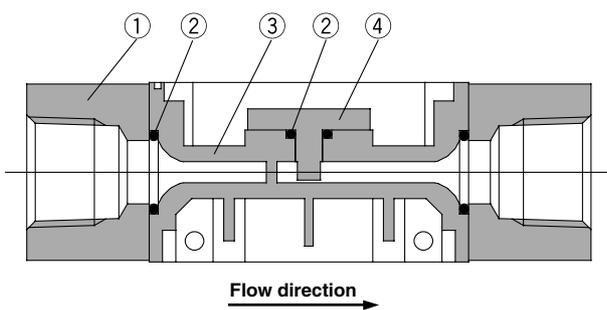
PF2W740, PF2W540



PF2W711, PF2W511



Sensor Unit Construction



Component Parts

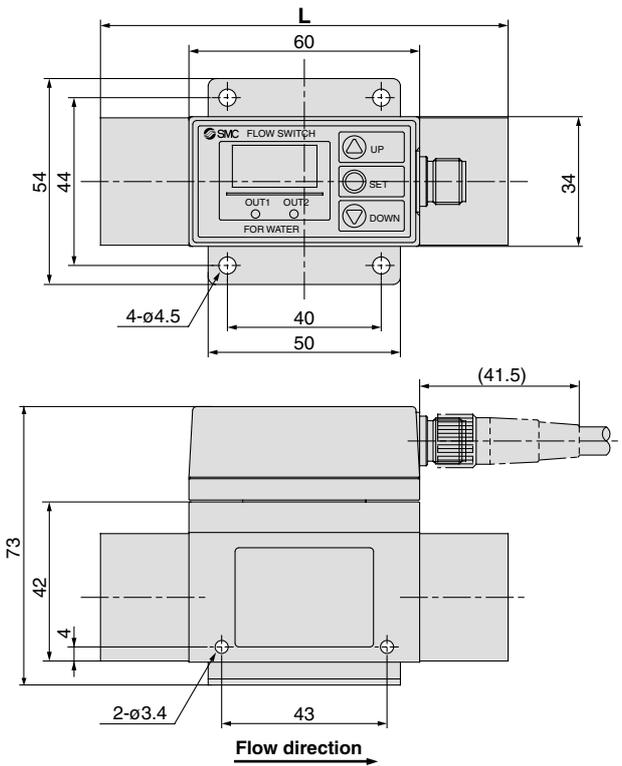
No.	Description	Material
①	Attachment	Stainless steel
②	Seal	NBR
③	Body	PPS
④	Sensor	PPS



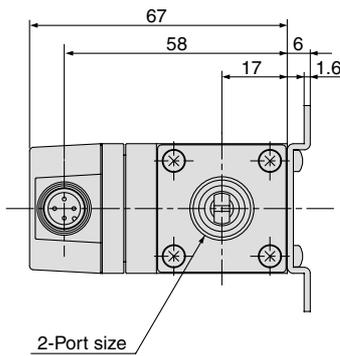
Connectors and operating unit descriptions are the same as Series PF2A for air. Refer to page 16-11-10.

Dimensions: Integrated Display Type for Water

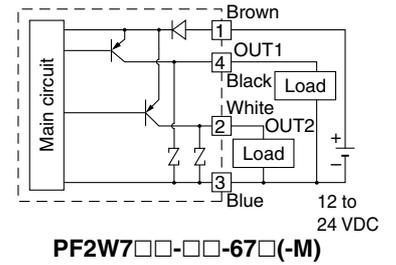
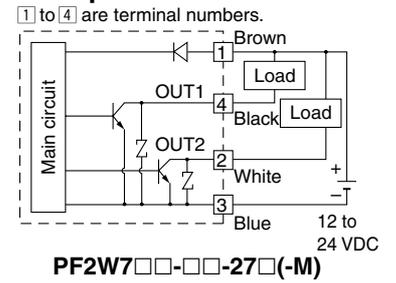
PF2W704, PF2W720



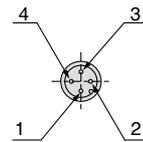
Model	L dimension
PF2W704	100
PF2W720	106



Internal circuit and wiring example

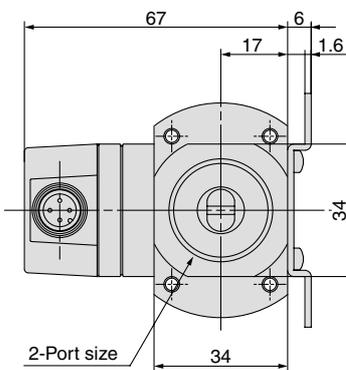
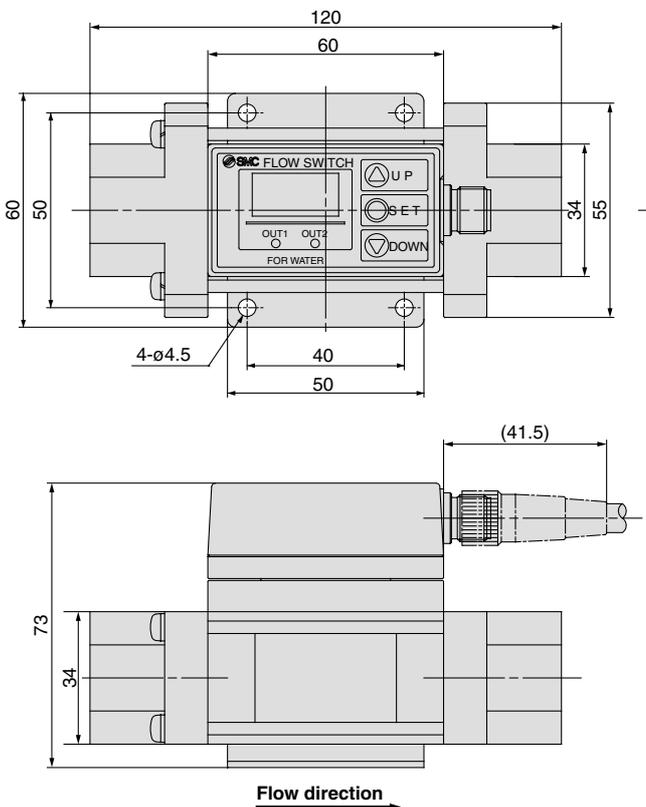


Connector pin numbers



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

PF2W740

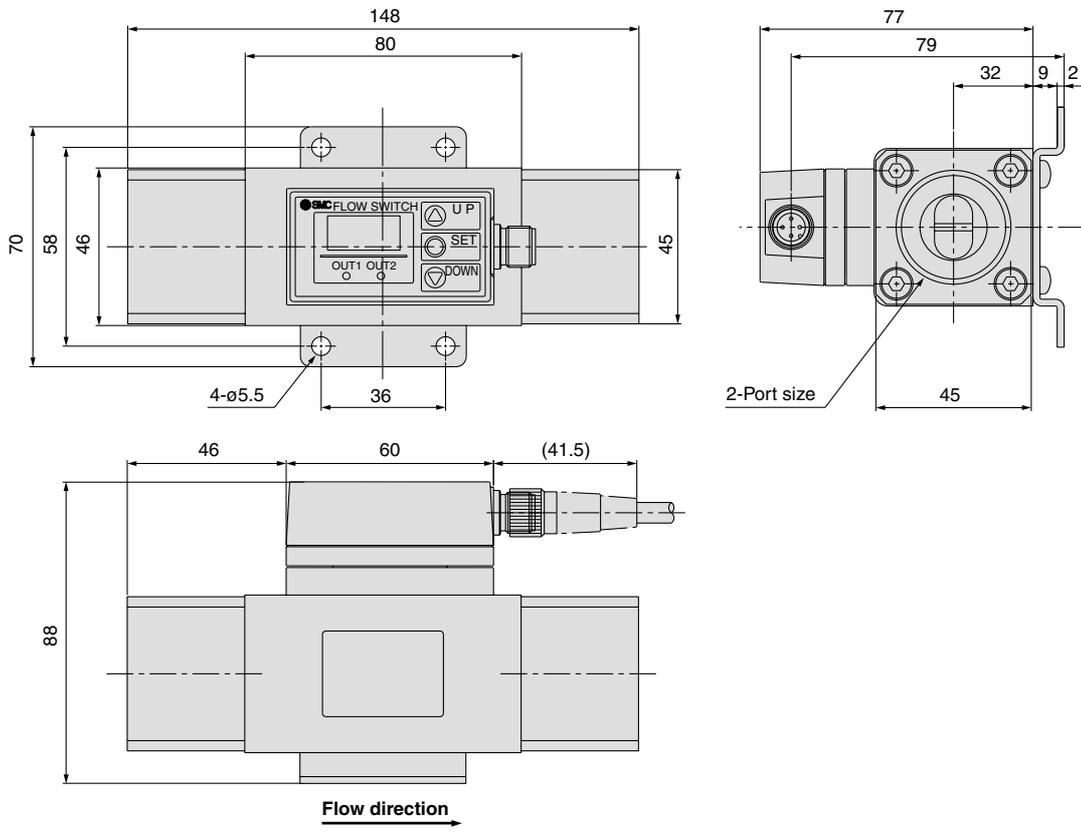


- ZSE□
- ISE□
- PSE
- ZSE3
- PS
- ZSE1
- ZSP
- ISA2
- IS□
- ZSM
- PF2□
- IF□
- Data

Series PF2W

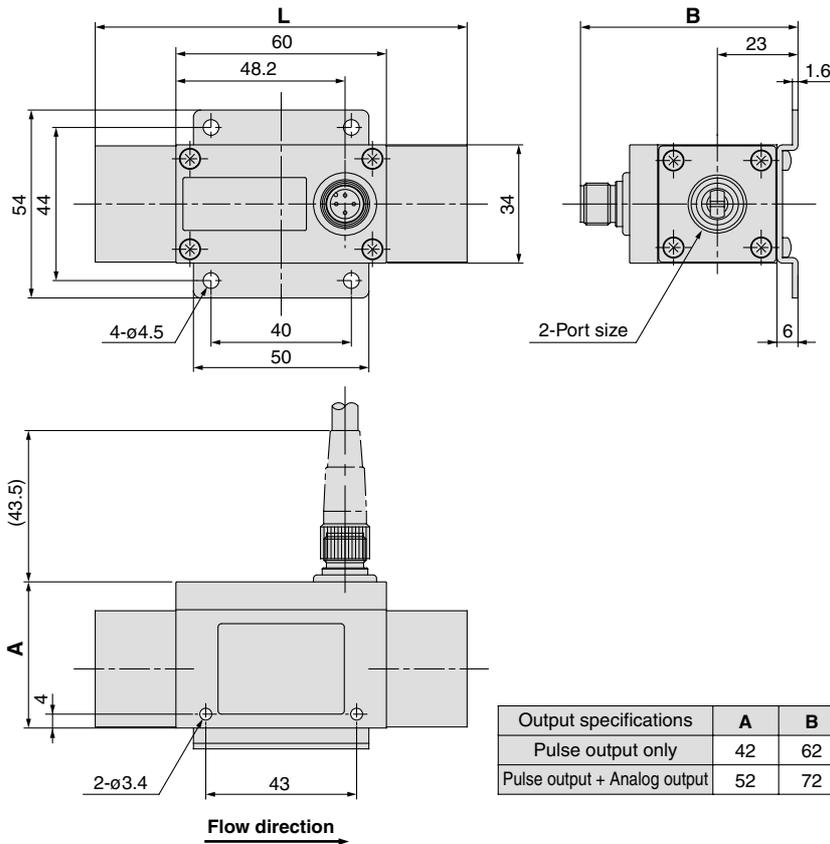
Dimensions: Integrated Display Type for Water

PF2W711



Dimensions: Remote Type Sensor Unit for Water

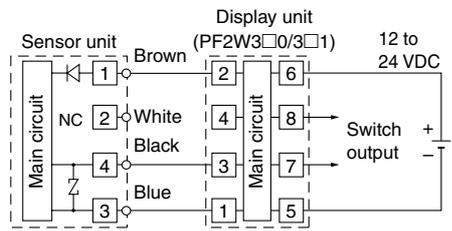
PF2W504/520-□(N)-□



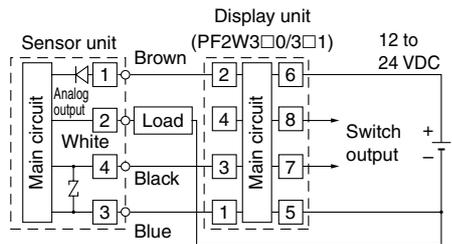
Model	L dimension
PF2W504	100
PF2W520	106

Internal circuit and wiring example

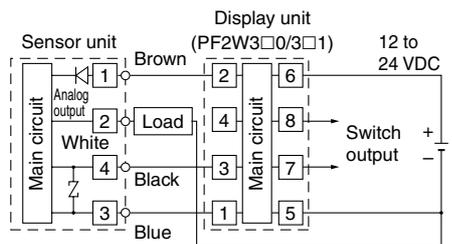
① to ⑧ are terminal numbers.



PF2W5□□-□□□

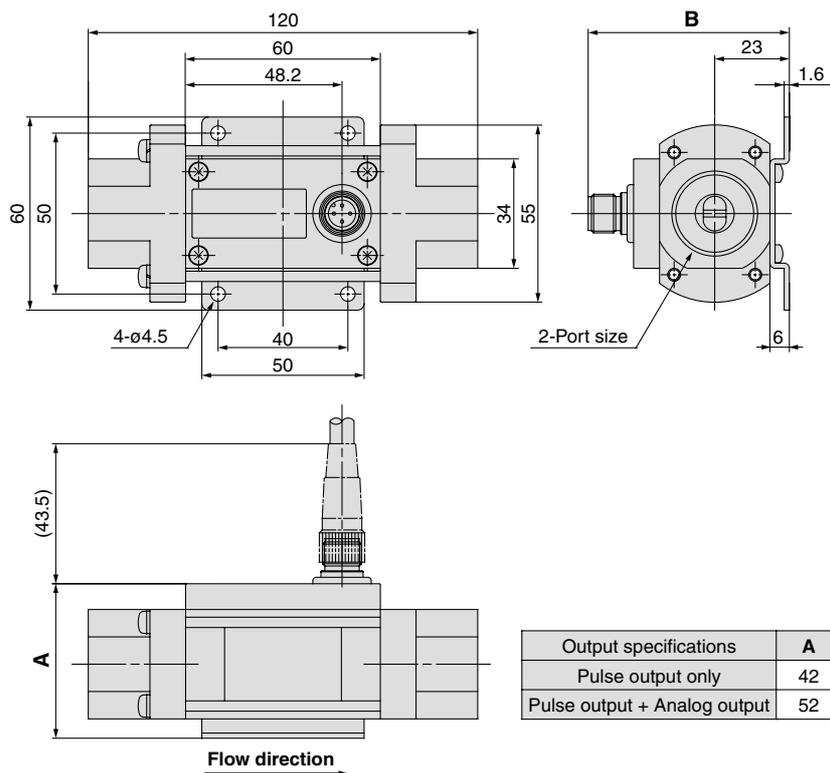


PF2W5□□-□□□-1

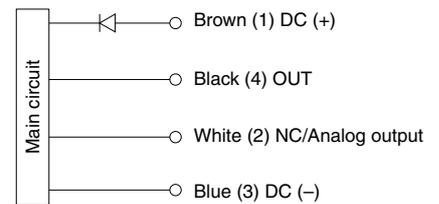


PF2W5□□-□□□-2

PF2W504-□(N)-□

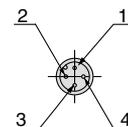


Wiring



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

Connector pin numbers

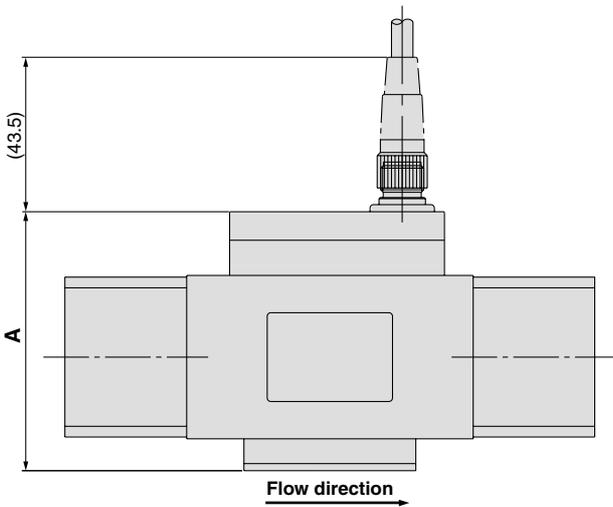
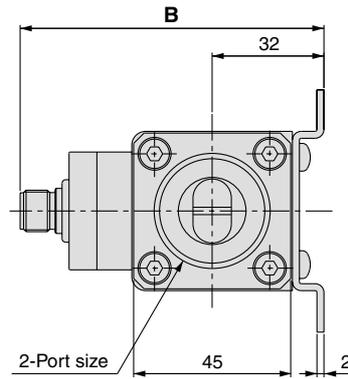
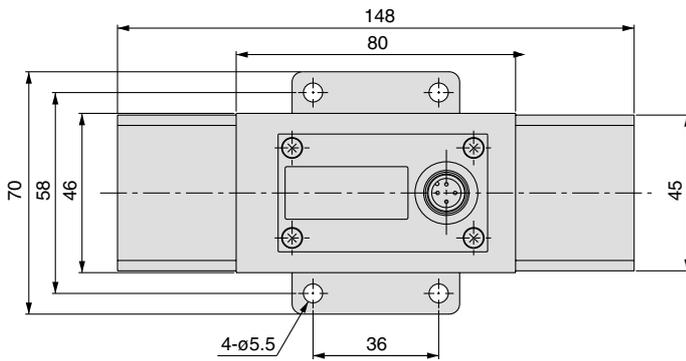


Pin no.	Pin description
1	DC (+)
2	NC/Analog output
3	DC (-)
4	OUT

Series PF2W

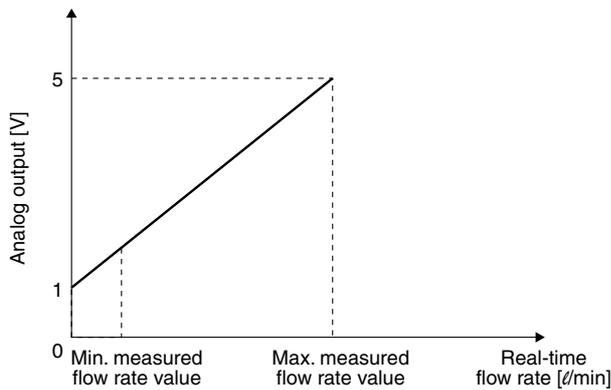
Dimensions: Remote Type Sensor Unit for Water

PF2W511-□(N)-□



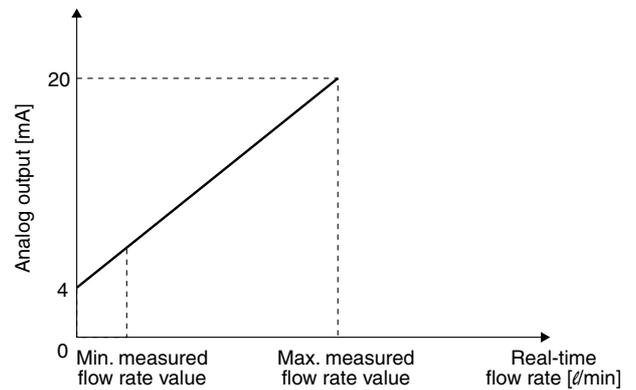
Output specifications	A	B
Pulse output only	63	77
Pulse output + Analog output	73	87

Analog output 1 to 5 VDC



Part no.	Minimum measured flow rate value [l/min]	Maximum measured 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 mADC

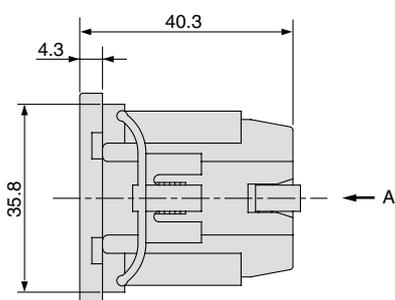
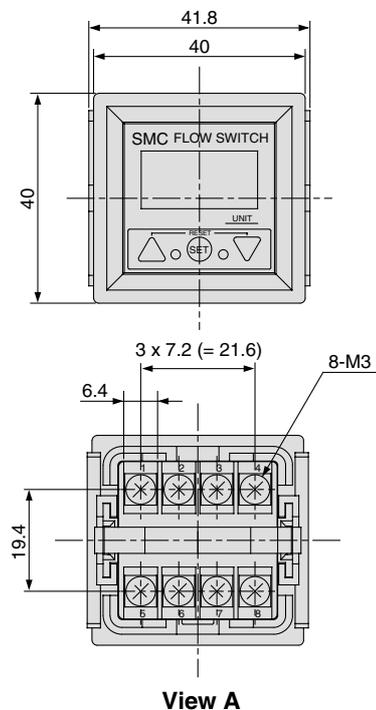


Part no.	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]
PF2W504-□-2	0.5	4
PF2W520-□-2	2	16
PF2W540-□-2	5	40
PF2W511-□-2	10	100

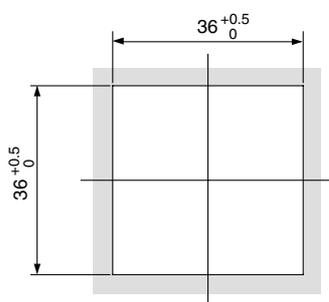
Dimensions: Remote Type Display Unit for Water

PF2W3□□-A
Panel mounting type

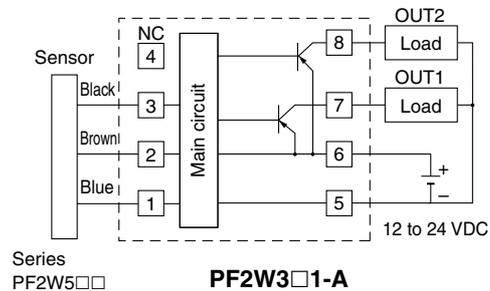
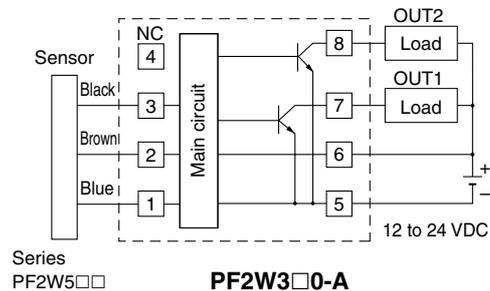
Internal circuit and wiring example



Panel fitting dimension



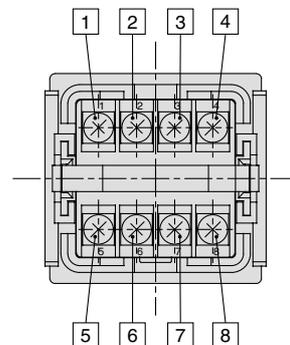
① to ⑧ are terminal numbers.



* The applicable panel thickness is 1 to 3.2 mm.

* Do not connect the white wire of the sensor to ③.

Terminal block number



ZSE□
ISE□

PSE

ZSE3
I SE3

PS

ZSE1
I SE2

ZSP

ISA2

IS□

ZSM

PF2□

IF□

Data

Digital Flow Switch, High Temperature Fluid Type For Water

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
		4	16	40	
03	3/8	●	●		PF2W704T, PF2W720T
04	1/2		●	●	PF2W720T, PF2W740T
06	3/4			●	PF2W740T

Wiring specifications

Nil	3 m lead wire with connector
N	Without lead wire

Unit specifications

Nil	With unit switching function
M	Fixed SI unit (Note)

Note) Fixed unit:
Real-time flow rate: ℓ/min
Accumulated flow: ℓ

Output specifications

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

Specifications

Model		PF2W704T	PF2W720T	PF2W740T
Measured fluid				
Water, Mixture of water (50%) and ethylene glycol (50%)				
Flow rate measurement range		0.35 to 4.5 ℓ/min	1.7 to 17.0 ℓ/min	3.5 to 45 ℓ/min
Set flow rate range		0.35 to 4.5 ℓ/min	1.7 to 17.0 ℓ/min	3.5 to 45 ℓ/min
Flow rate measuring range		0.5 to 4 ℓ/min	2 to 16 ℓ/min	5 to 40 ℓ/min
Minimum setting unit		0.05 ℓ/min	0.1 ℓ/min	0.5 ℓ/min
Accumulated pulse flow rate exchange value (Pulse width: 50 ms)		0.05 ℓ/pulse	0.1 ℓ/pulse	0.5 ℓ/pulse
Operating fluid temperature		0 to 90°C (With no cavitation)		
Linearity		±5% F.S. or less		
Repeatability		±3% F.S. or less		
Temperature characteristics (Note 1)		±5% F.S. or less (0 to 90°C, based on 25°C)		
Current consumption (No load)		70 mA or less		
Weight (Note 2)		710 g		
Port size (Rc, NPT, G)		3/8	3/8, 1/2	1/2, 3/4
Detection type		Karman vortex		
Display		3-digit, 7-segment LED		
Display unit (Note 3)	Real-time flow rate	ℓ/min, gal (US)/min		
	Accumulated flow	ℓ, gal (US)		
Operating pressure range		0 to 1 MPa		
Withstand pressure		1.5 MPa		
Accumulated flow range		0 to 99999 ℓ		
Output specifications (Note 4)	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	
	Accumulated pulse output	PNP open collector	Maximum load current: 80 mA; Internal voltage drop: 1.5 V or less (With load current of 80 mA); 2 outputs	
Indicator light		NPN or PNP open collector (Same as switch output)		
Response time		Lights up when output is ON OUT1: Green; OUT2: Red		
Hysteresis		1 sec. or less		
Hysteresis		Hysteresis mode: Variable (can be set from 0); Window comparator mode: 3-digit fixed		
Power supply voltage		12 to 24 VDC (Ripple ±10% or less)		
Resistance	Enclosure	IP65		
	Operating temperature range	Operating: 0 to 50°C, Stored: -25 to 85°C (No condensation or freezing)		
	Withstand voltage	1000 VAC for 1 min. between external terminal and case		
	Insulation resistance	50 MΩ (500 VDC) between external terminal and case		
	Vibration resistance	10 to 500 Hz at whichever is smaller: 1.5 mm amplitude or 98 m/s ² acceleration in X, Y, Z directions for 2 hrs. each		
	Impact resistance	490 m/s ² in X, Y, Z directions 3 times each		
Noise resistance		1000 Vp-p, Pulse width 1 μs, Rise time 1 ns		

Note 1) ±5% F.S. or less (0 to 50°C, based on 25°C), ±3% F.S. or less (15 to 35°C, based on 25°C)

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) Switch output and accumulated pulse output can be selected during initial setting.

Note 5) 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 6) The flow switch is conformed to CE mark.

How to Order

Remote type
Display unit

PF2W5 **20** T — **03** —

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

Output specifications

Nil	Output for display unit
1	Output for display unit + Analog output (1 to 5 V)
2	Output for display unit + Analog output (4 to 20 mA)

Wiring specifications

Nil	3 m lead wire with connector
N	Without lead wire

Port size

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



Specifications

Model	PF2W504T	PF2W520T	PF2W540T
Measured fluid	Water, Mixture of water (50%) and ethylene glycol (50%)		
Detection type	Karman vortex		
Flow rate measuring 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)		
Linearity ^{Note 1)}	±5% F.S. or less		
Repeatability ^{Note 1)}	±2% F.S. or less		
Temperature characteristics	±2% F.S. or less (15 to 35°C based on 25°C), ±3% F.S. or less (0 to 50°C based on 25°C)		
Output specifications ^{Note 2)}	Output for display unit	Pulse output, N channel, open drain, output for display unit PF2W3□□. (Specifications: Maximum load current of 10 mA; Maximum applied voltage of 30 V)	
	Analog output	Voltage output 1 to 5 V within the flow rate range Linearity: ±5% F.S. or less; allowable load resistance: 100 kΩ or more.	
		Current output 4 to 20 mA within the flow rate range Linearity: ±5% F.S. or less; allowable load resistance: 300 Ω or less with 12 VDC, 600 Ω or less with 24 VDC	
Power supply voltage	12 to 24 VDC (Ripple ±10% or less)		
Current consumption (No load)	20 mA or less		
Resistance	Enclosure	IP65	
	Operating temperature range	Operating: 0 to 50°C, Stored: -25 to 85°C (No condensation or freezing)	
	Withstand voltage	1000 VAC for 1 min. between external terminal and case	
	Insulation resistance	50 MΩ (500 VDC) between external terminal and case	
	Vibration resistance	10 to 500 Hz at whichever is smaller: 1.5 mm amplitude or 98 m/s ² acceleration in X, Y, Z directions for 2 hrs. each	
	Impact resistance	490 m/s ² in X, Y, Z directions 3 times each	
	Noise resistance	1000 Vp-p, Pulse width 1 μs, Rise time 1 ns	
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 PF2W3□□.

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 conformed to CE mark.

Display units are the same as those of remote type digital flow switch for water (series PF2W3□□).
Refer to page 16-13-19 for details.

ZSE□
ISE□

PSE

ZSE3

PS

ZSE1

ZSP

ISA2

IS□

ZSM

PF2□

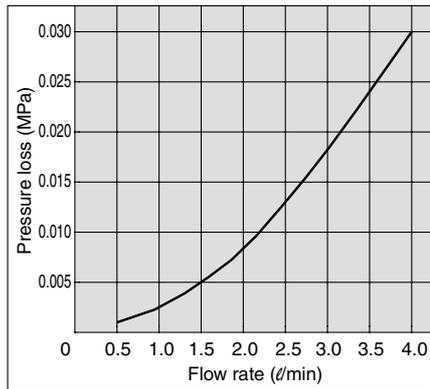
IF□

Data

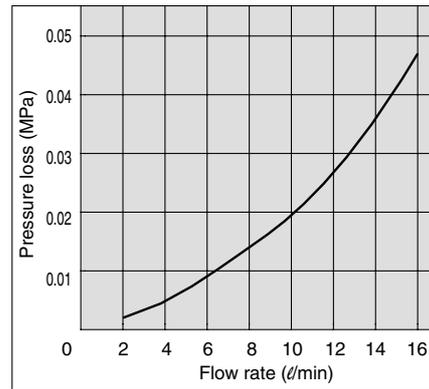
Series PF2W

Flow Characteristics (Pressure loss)

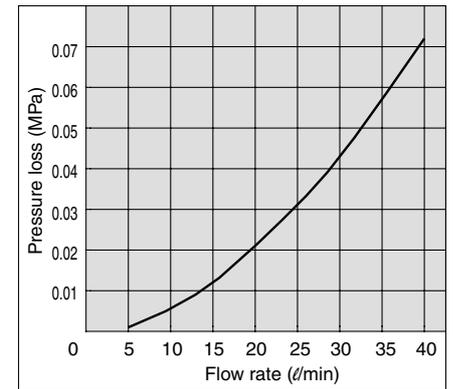
PF2W704T/504T



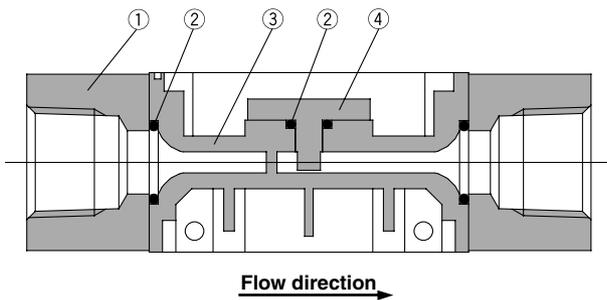
PF2W720T/520T



PF2W740T/540T



Sensor Unit Construction



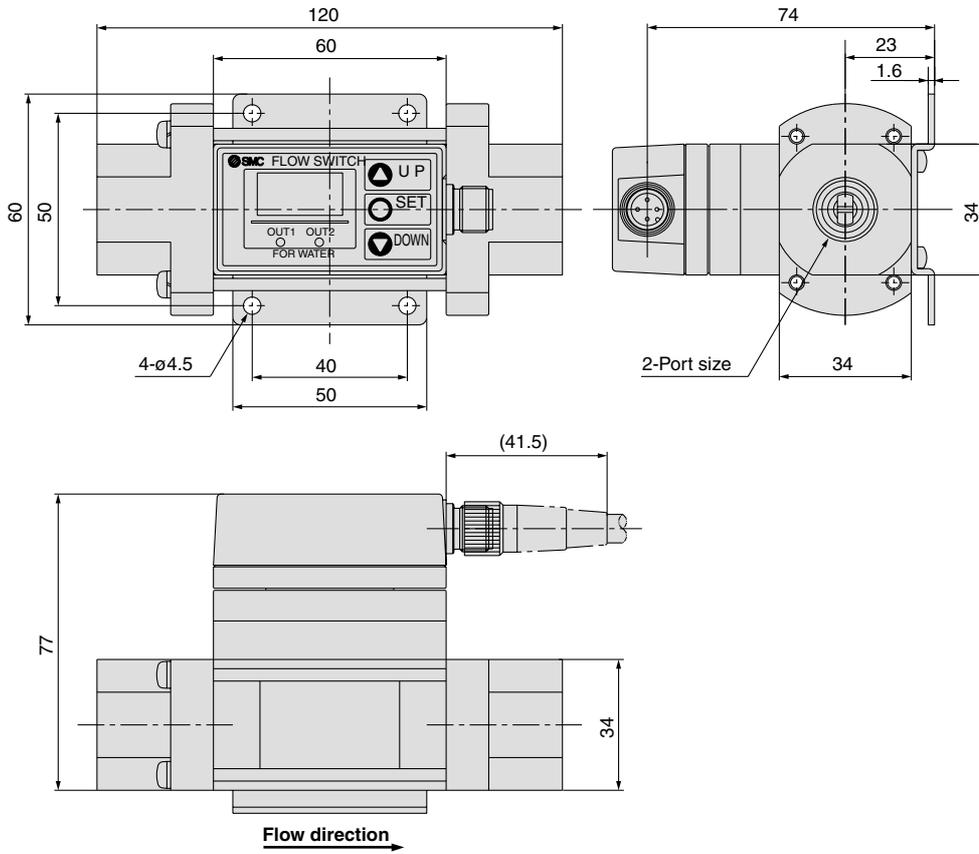
Component Parts

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



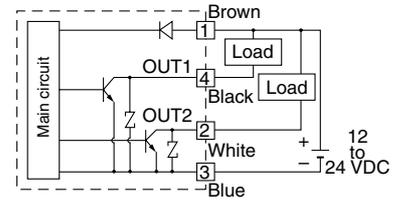
Connectors and operating unit descriptions are the same as Series PF2A for air. Refer to page 16-11-10.

Dimensions: Integrated Display Type for Water

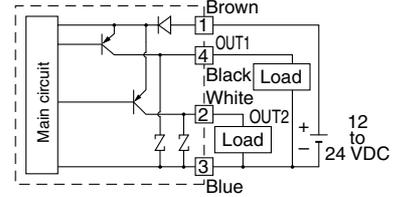


Internal circuit and wiring example

① to ④ are terminal numbers.

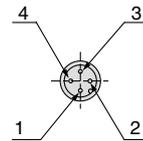


PF2W7□□T-□□-27□(-M)



PF2W7□□T-□□-67□(-M)

Connector pin numbers



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

ZSE□
ISE□

PSE

ZSE3
I

PS

ZSE1
I2

ZSP

ISA2

IS□

ZSM

PF2□

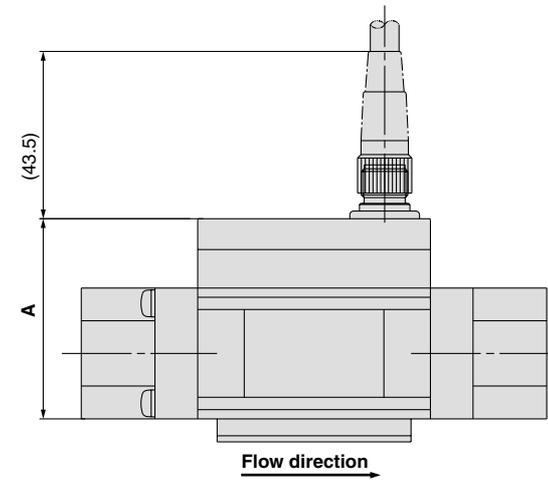
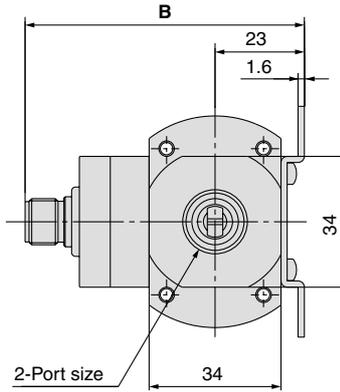
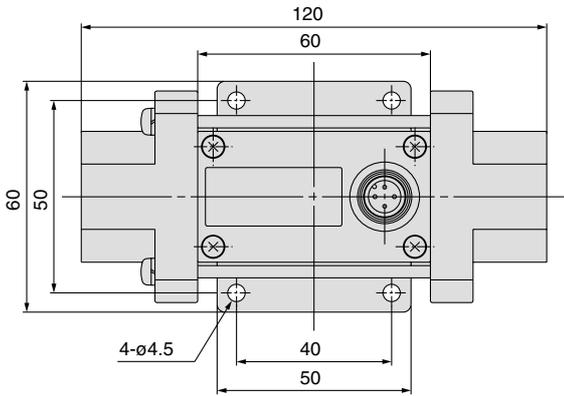
IF□

Data

Series PF2W

Dimensions: Remote Type Sensor Unit for Water

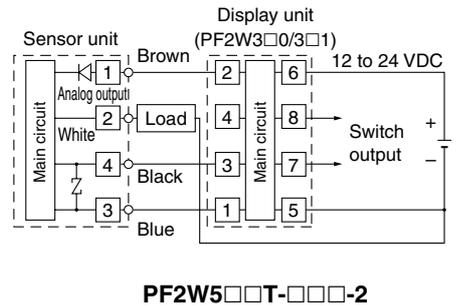
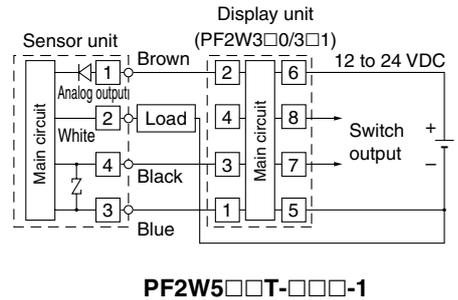
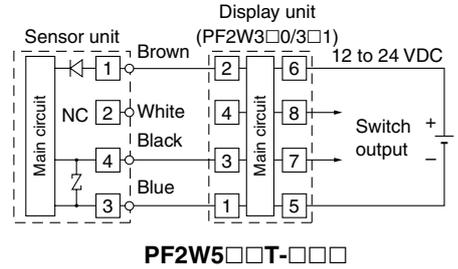
PF2W504T/520T/540T-□(N)



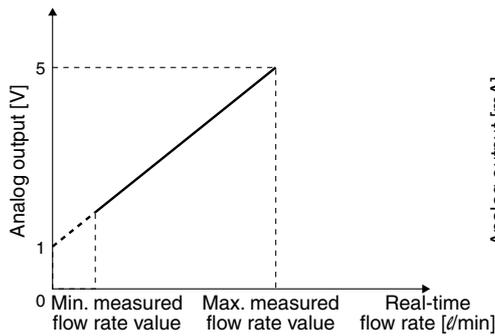
Output specifications	A	B
Pulse output only	52	72
Pulse output + Analog output	62	82

Internal circuit and wiring example

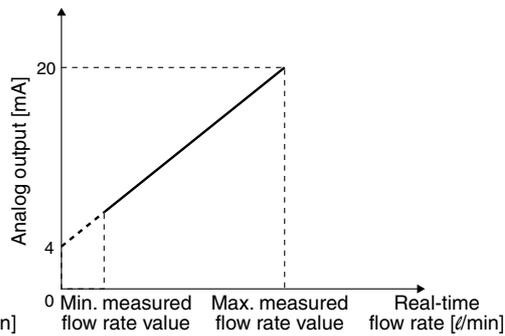
① to ⑧ are terminal numbers.



Analog output 1 to 5 VDC



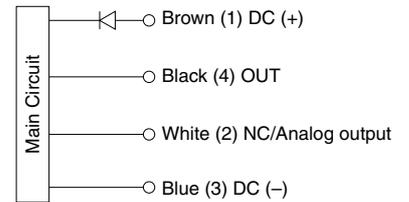
4 to 20 mADC



Part no.	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]
PF2W504T-□-1	0.5	4
PF2W520T-□-1	2	16
PF2W540T-□-1	5	40

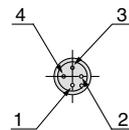
Part no.	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]
PF2W504T-□-2	0.5	4
PF2W520T-□-2	2	16
PF2W540T-□-2	5	40

Wiring



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

Connector pin numbers



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



Refer to PF2W3□□ on page 16-11-25 for dimensions of remote type display unit.

Functions: PF2A, PF2W

Refer to the operation manual how to set and to operate.

Flow rate measurement selection

Real-time flow rate and accumulated flow rate can be selected. Up to 999999 of flow rate value can be accumulated.

Unit switching

For Air

Display	Real-time flow rate	Accumulated flow
U_1	l/min	l
U_2	CFM x 10 ⁻² , CFM x 10 ⁻¹	ft ³ x 10 ⁻¹

CFM = ft³/min

High Flow Rate Type (For Air)

Display	Real-time flow rate	Accumulated flow
U_1	l/min	l, m ³ , m ³ x 10 ³
U_2	CFM	ft ³ , ft ³ x 10 ³ , ft ³ x 10 ⁶

High Temperature Fluid Type (For Water)

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 or l] will be set for the type without the unit switching function.

Flow rate conversion

Basic state: 0°C, 101.3 kPa

Standard state: 20°C, 101.3 kPa, 65%RH (ANR)

Switchable between these states.

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

LED display	Contents	Solution
Er1 <small>Note 1)</small>	A current of more than 80mA is flowing to OUT1	Check the load and wiring for OUT1.
Err_1 <small>Note 2)</small>		
Er2 <small>Note 1)</small>	A current of more than 80mA is flowing to OUT2.	Check the load and wiring for OUT2.
Err_3 <small>Note 2)</small>	The setting data has changed for whatever reasons.	Perform the RESET operation, and reset all data again.
Er4 <small>Note 1)</small>		
--- <small>Note 1)</small>	The flow rate is over the flow rate measurement range (for air only).	Reduce the flow rate until it is within the flow rate measurement range, using an adjustment valve.
---- <small>Note 2)</small>		

Note 1) Applicable for all integrated display types other than series PF2A7□□H and remote type sensor display units.

Note 2) Only for series PF2A7□□H.

Key lock

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

Accumulation clearance

This is to clear the accumulated value.

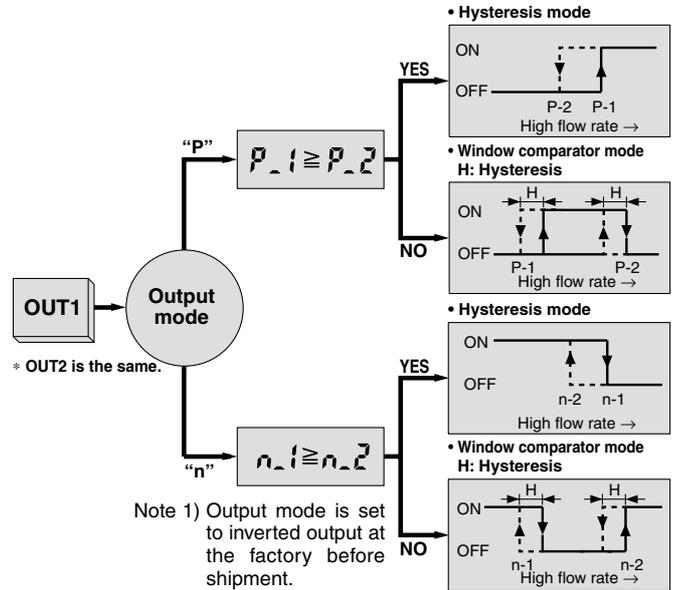
Initialization of setting (Only for series PF2A7□□H)

This is to restore the setting to the initial state when dispatched from the factory.

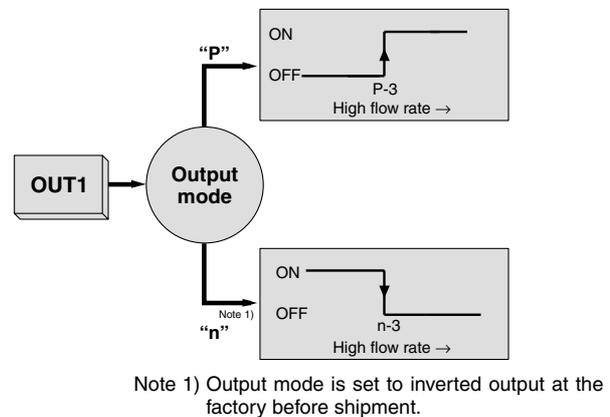
Output types

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

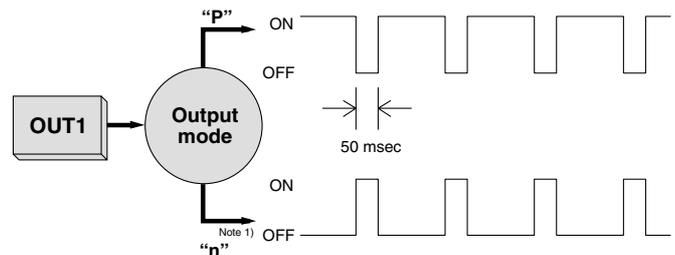
Real-time switch output (OUT1)



Accumulated switch output (OUT1)



Accumulated pulse output (OUT1)



Note 1) For digital flow switch with unit switching function. (Fixed SI unit [l/min, or l, m³ or m³ x 10³] will be set for switch types without unit switching function.) Refer to the specifications of display unit for the flow rate value per pulse.

ZSE□
ISE□

PSE

ZSE3
I SE2

PS

ZSE1
I SE2

ZSP

ISA2

IS□

ZSM

PF2□

IF□

Data



Specific Product Precautions 1

Be sure to read before handling.

Design and Selection

⚠ Warning

1. Operate the switch only within the specified voltage.

Use of the switch outside the range of the specified voltage can cause not only malfunction and damage of the switch but also electrocution 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 surge voltage.

Although surge protection is installed in the circuit at the output side of the switch, damage may still occur if a surge is applied repeatedly. When a surge generating a load such as a relay or solenoid is directly driven, use a type of 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 flammable gases or fluids.

5. Monitor the internal voltage drop of the switch.

When operating below a 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. Avoid especially the application of pressure above specifications through a water hammer.

<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 at a flow rate 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.

Design and Selection

[Series PF2A7□□H]

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

⚠ Caution

1. Data of the flow switch will be stored even after the power is turned off.

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

Mounting

⚠ Warning

1. Mount switches using the proper tightening torque.

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

Thread	Tightening torque N·m	Thread	Tightening torque N·m
Rc 1/8	7 to 9	Rc 3/4	28 to 30
Rc 1/4	12 to 14	Rc 1	36 to 38
Rc 3/8	22 to 24	Rc 1 1/2	48 to 50
Rc 1/2	28 to 30	Rc 2	48 to 50

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

Do not apply wrench to anything other than the piping attachment as this may damage the switch.

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 the piping using an air blower before connecting piping to the switch.

5. Do not drop or bump.

Do not drop, bump, or apply excessive impacts (490 m/s²) while handling. Although the external body of the switch (switch case) may not be damaged, the inside of the switch could be damaged and cause a malfunction.

6. Hold the body of the switch when handling.

The tensile strength of the cord is 49N. Applying a greater pulling force on it can cause a malfunction. When handling, hold the body of the switch – do not dangle it from the cord.

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.



Specific Product Precautions 2

Be sure to read before handling.

Mounting

⚠ Warning

[For air]

- 9. **Never mount a switch in a place that will be used as a scaffold during piping.**

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

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

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

[For water]

- 11. **Never mount a switch in a place that will be used as a scaffold 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 15 N·m or more to the metal part of the switch.

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

When abruptly reducing the size of piping or when there is a restriction such as a valve on the upstream side, the 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.

When used with the downstream side open, be careful of the cavitation that is prone to occur.

Wiring

⚠ Warning

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

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

- 2. **Avoid repeatedly bending or stretching the lead wire.**

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

- 3. **Confirm proper insulation of wiring.**

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

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

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

- 5. **Do not allow loads to short circuit.**

Although switches indicate excess current error if loads are short circuited, all incorrect wiring connections cannot be protected. Take precautions to avoid incorrect wiring.

Usage

⚠ Warning

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

Operating Environment

⚠ Warning

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

- 2. **Mount switches in locations where there is no vibration greater than 98 m/s², or impact greater than 490 m/s².**

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

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

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

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

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

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

[For air]

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

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

[For water]

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

The fluid and ambient temperatures range for the switches is 0° to 50°C (and 0° to 90°C for high temperature fluid). Take measures to prevent freezing fluid when 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.

ZSE□
ISE□

PSE

ZSE3

PS

ZSE1

ZSP

ISA2

IS□

ZSM

PF2□

IF□

Data



Be sure to read before handling.

Maintenance

Warning

1. Perform periodical inspections to ensure proper operation of the switch.

Unexpected malfunctions may cause possible danger.

2. Take precautions when using the switch for an interlock circuit.

When a pressure switch is used for an interlock circuit, devise a multiple interlock system to prevent trouble or malfunctioning, 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. However, only dry air can be measured with the high flow rate type.

Please note that accuracy cannot be guaranteed when other fluids are used.

3. Never use flammable 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.

Please note that accuracy cannot be guaranteed when other fluids are used.

Measured Fluid

Warning

6. Never use flammable fluids.

7. Install a filter on the inlet side when there is a possibility of condensate and foreign matter being mixed in 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. Since switch output remains OFF while a message is displayed after the power is turned on, start 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. With the 100, 200, and 500 l/min type switches for air, output turns OFF when the switch's initial setting and flow rate setting are performed.

3. Do not apply excessive rotational force to the display unit.

The integrated type display unit can rotate 360°. Rotation is controlled by the stopper; however, the stopper may be damaged if the display unit is turned with excessive force.

[For air]

4. Be certain to turn on the power when the flow rate is at zero.

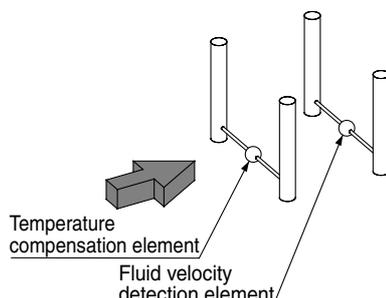
Allow an interval of 10 minutes after turning on the power, as there are some changes in the display.

5. Flow rate unit

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. 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 fluid velocity, the fluid 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. The conversion conditions can be switched to 20°C and 101.3 kPa with high flow type switches.

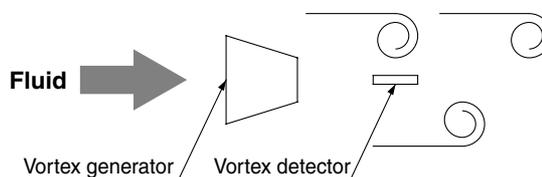
Detection principle of digital flow switch for water

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 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.



* Top view



Series PF2A/PF2W

Specific Product Precautions 4

Be sure to read before handling.

Set Flow Rate Range and Rated Flow Rate Range

⚠ Caution

Set the flow rate within the rated flow rate range.

The regulating flow rate range is the range of flow rate that can be set on the controller.

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

Although it is possible to set a value outside the rated flow rate range, the specifications will not be guaranteed even if the value stays within the regulating flow rate range.

<For Air: PF2A>

Sensor	Flow rate range							
	1 ℓ/min	5 ℓ/min	10 ℓ/min	20 ℓ/min	50 ℓ/min	100 ℓ/min	200 ℓ/min	500 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 PF2W504T	0.5 ℓ/min — 4 ℓ/min		0.35 ℓ/min — 4.5 ℓ/min					
PF2W520 PF2W520T	2 ℓ/min — 16 ℓ/min		1.7 ℓ/min — 17 ℓ/min					
PF2W540 PF2W540T	5 ℓ/min — 40 ℓ/min		3.5 ℓ/min — 45 ℓ/min					
PF2W511	10 ℓ/min — 100 ℓ/min		7 ℓ/min — 110 ℓ/min					

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

ZSE
ISE

PSE

ZSE3

PS

ZSE1
ISE2

ZSP

ISA2

IS

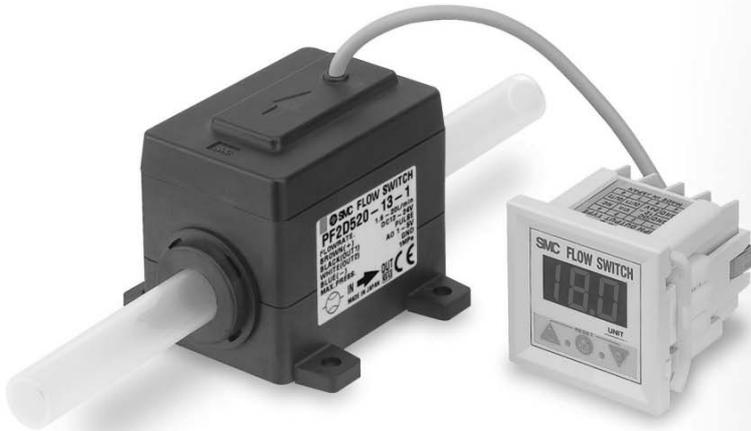
ZSM

PF2

IF

Data

Digital Flow Switch For Deionized Water and Chemicals Series PF2D



Series PF2D

Body and sensor
New PFA
Tube
Super PFA

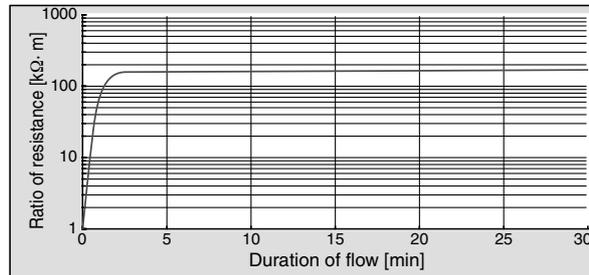
Three types of flow range

- 0.4 to 4 μmin (PF2D504)
- 1.8 to 20 μmin (PF2D520)
- 4.0 to 40 μmin (PF2D540)

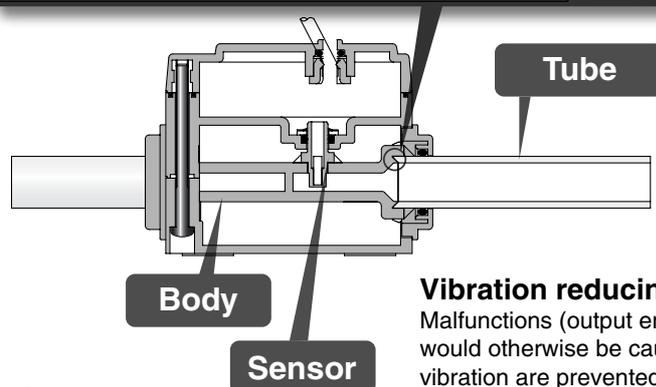
Swept flow characteristics

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

Swept Flow Characteristics (Reference)



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



Vibration reducing seals

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

4 types of outputs available

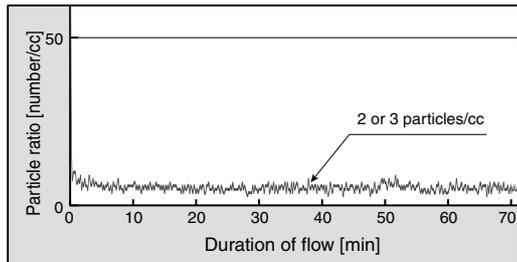
With button operation, 4 types of output specification combinations are available.

	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

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

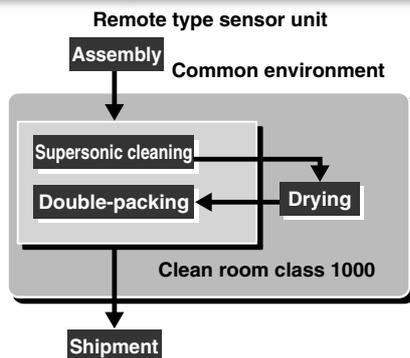
Karman vortex eliminates moving parts and allows low dust generation.

Particle Characteristics (Reference)



The data was obtained by performing an actual 10 minutes' supersonic cleaning using an average 16 M Ω -cm of deionized water at class 10000 clean room (1 μmin 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.

Processing chart for Series PF2D



ZSE□
ISE□

PSE

ZSE3

PS

ZSE1

ZSP

ISA2

IS□

ZSM

PF2□

IF□

Data

Digital Flow Switch For Deionized Water and Chemicals Series *PF2D*

How to Order



Remote type
Sensor unit

PF2D5 **20** — **13** — **1**

Flow rate range

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

Port size (inch)

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

Output specifications

1	Output for display unit Note 1) + analog output (1 to 5 V)
2	Output for display unit Note 1) + analog output (4 to 20 mA)

Note 1) Output for the display units of PF2D 300/301

Specifications for Sensor Unit

Model		PF2D504	PF2D520	PF2D540
Measured fluid		Liquid not to corrode nor erode deionized water and/or Teflon®. Viscosity: 3 mPa·s (3 cP) or less		
Detection style		Karman vortex		
Flow rate measuring 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		
Linearity Note 4)		±2.5%F.S. or less (at 25°C water)		
Repeatability		±1%F.S. or less (at 25°C water)		
Temperature characteristics		±5%F.S. or less (0 to 50°C)		
Output specifications	Pulse output	Pulse output, N channel, open drain, output for display unit PF2D300/301 (Specifications: Maximum load current of 10 mA; Maximum applied voltage of 30 V)		
	Analog output	Voltage output Note 5) 1 to 5 V within the flow rate range Linearity: ±2% F.S. or less, Allowable load resistance: 100 kΩ or more Current output Note 6) 4 to 20 mA within the flow rate range Linearity: ±2% F.S. or less, Allowable load resistance: 30 0Ω or less with 12 VDC, 600 Ω or less with 24 VDC		
Power supply voltage		12 to 24 VDC (Ripple ±10% or less)		
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 (No freezing or condensation)		
	Voltage resistance	1000 VAC for 1 min between external terminals and case		
	Insulation resistance	50 MΩ or more (500 VDC) between external terminals and case		
	Vibration resistance	4.9 m/s ²		
	Impact resistance	490 m/s ² to X, Y, Z directions 3 times for each		
	Noise resistance	1000 Vp-p, Pulse width: 1 μs, Standing: 1 ns		
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.

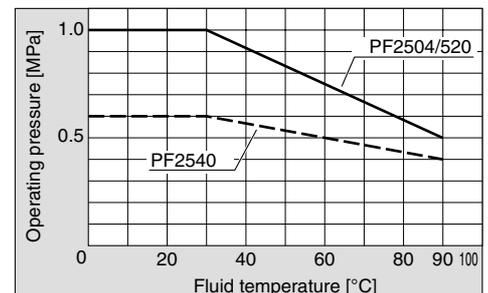
Note 3) 1.5 times of the maximum operating pressure and varying with fluid temperature.

Note 4) The system accuracy when combined with PF2D300□.

Note 5) When the voltage output is selected.

Note 6) When the current output is selected.

Note 7) The sensor unit is conformed to CE mark.



How to Order



**Remote type
Display unit**

PF2D30 0 — A — M

Output specifications

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

Panel mounting

Unit specifications

Nil	With unit switching function
M	Fixed SI unit (Note 1)

Note 1) Fixed unit:
Real-time flow rate: ℓ/min
Accumulated flow: ℓ

Specifications for Display Unit

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 setting unit ^{Note 1)}		0.05 ℓ/min	0.1 ℓ/min	0.5 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
^{Note 2)} Display units	Real-time flow rate	ℓ/min , gal (US)/min		
	Accumulated flow	ℓ , gal (US)		
Accumulated flow range		0 to 999999 ℓ		
Linearity ^{Note 3)}		$\pm 2.5\%$ F.S. or less		
Repeatability		$\pm 0.5\%$ F.S. or less		
Temperature characteristics		$\pm 1\%$ F.S. or less (15 to 35°C) $\pm 2\%$ F.S. or less (0 to 50°C)		
Current consumption		60 mA or less		
Weight		45 g		
^{Note 4)} Output specifications	Switch output	NPN open collector (PF2D300, PF2W300, PF2W330)	Maximum load current: 80 mA Internal voltage drop: 1.5 V or less (With load current of 80 mA) Maximum applied voltage: 30 V 2 outputs	
		PNP open collector (PF2D301, PF2W301, PF2W331)	Maximum load current: 80 mA Internal voltage drop: 1.5 V or less (With load current of 80 mA) 2 outputs	
	Accumulated pulse output	NPN open collector or PNP open collector (Same as switch output)		
Environmental resistance	Enclosure	IP40		
	Operating temperature range	Operating: 0 to 50°C, Stored: -25 to 85°C (No freezing or condensation)		
	Voltage resistance	1000 VAC for 1 min between external terminals and case		
	Insulation resistance	50 M Ω or more (500 VDC Mega) between external terminals and case		
	Vibration resistance	10 to 500 Hz at whichever is smaller: 1.5 mm amplitude or 98 m/s ² acceleration in X, Y, Z directions for 2 hrs each		
	Impact resistance	490 m/s ² to X, Y, Z directions 3 times for each		
	Noise resistance	1000 Vp-p, Pulse width: 1 μs , Standing: 1 ns		
Display		3-digits 7-segment LED		
Indicator light		ON: when light is on, OUT1: Green; OUT2: Red		
Power supply voltage		12 to 24 VDC (Ripple $\pm 10\%$ or less)		
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 unit switching function.)

Note 3) The system accuracy when combined with PF2D5□□.

Note 4) Switch output and accumulated pulse output can be selected using the control button operation during initial setting.

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

Note 5) Window comparator mode: Since hysteresis (H) will reach 3 digits, keep P_1 and P_2 or n_1 and n_2 apart by 7 digits more. (In case of output OUT2, n_1, 2 to be n_3, 4 and P_1, 2 to be P_3, 4.)

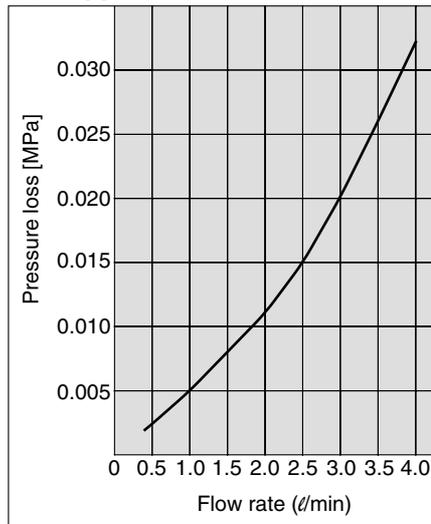
Note 6) The display unit is conformed to CE mark.

ZSE□
ISE□
PSE
ZSE3
PS
ZSE1
ZSE2
ZSP
ISA2
IS□
ZSM
PF2□
IF□
Data

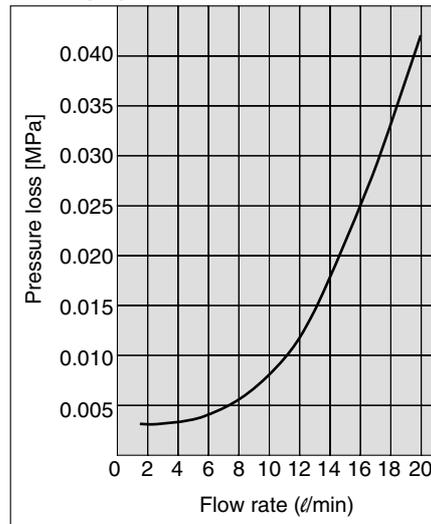
Series PF2D

Flow Characteristics (Pressure characteristics)

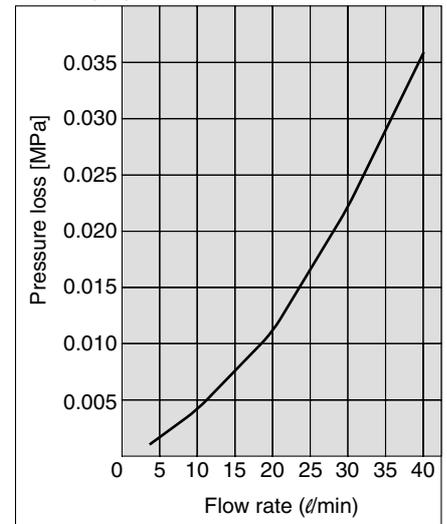
PF2D504



PF2D520

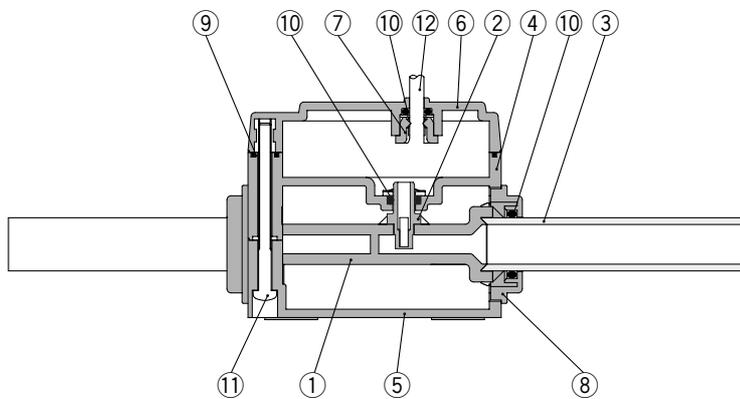


PF2D540



Construction

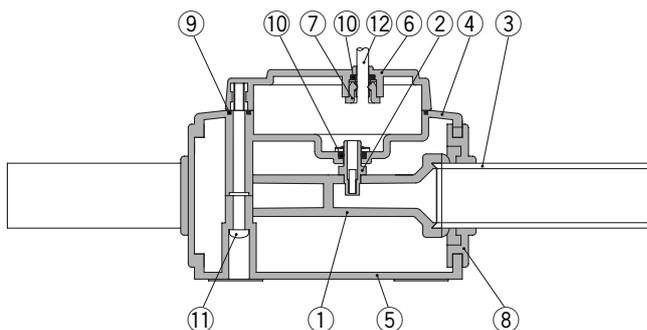
PF2D504/520



Component Parts

No.	Description	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

PF2D540

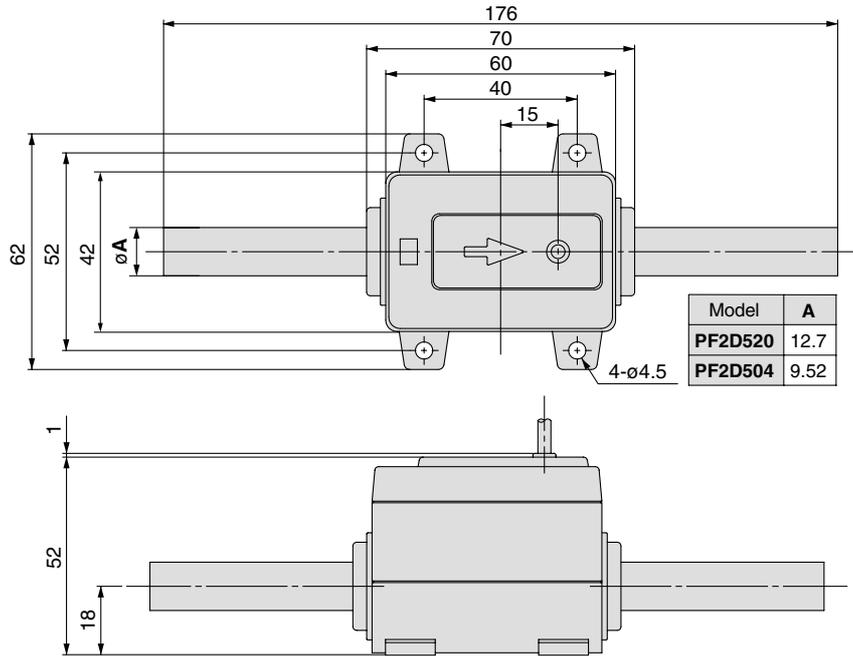


Digital Flow Switch Series PF2D

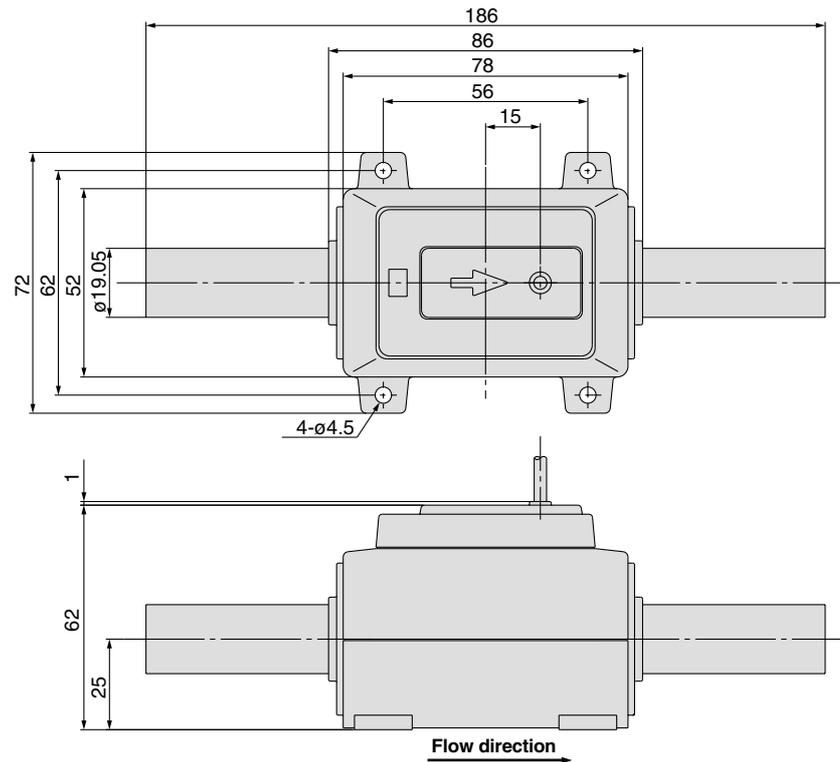
For Deionized Water and Chemicals

Dimensions: Separate Type Sensor Unit

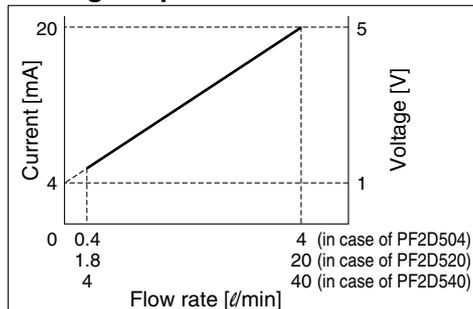
PF2D504-11/520-13



PF2D540-19

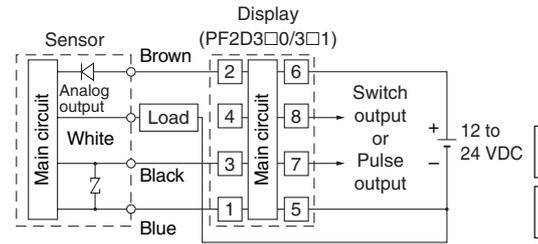


Analog Output

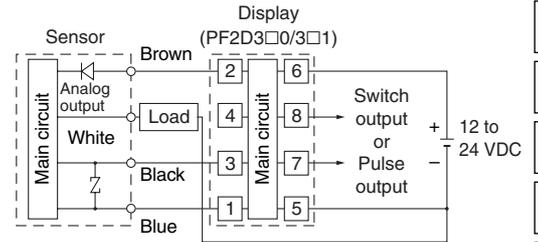


Internal circuit and wiring example

① to ⑧ are terminal numbers.

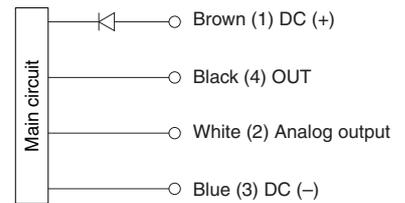


PF2D5□□-□-1



PF2D5□□-□-2

Wiring



* Use this sensor by connecting to SMC remote type display unit Series

ZSE□
ISE□

PSE

ZSE3
I SE3

PS

ZSE1
I SE1

ZSP

ISA2

IS□

ZSM

PF2□

IF□

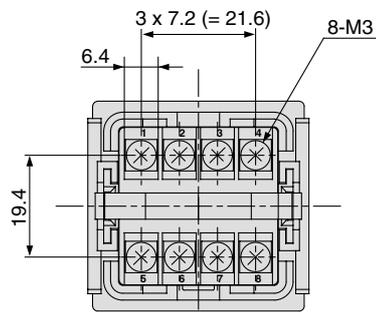
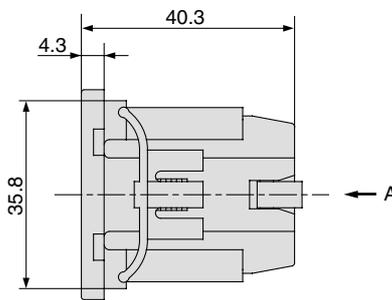
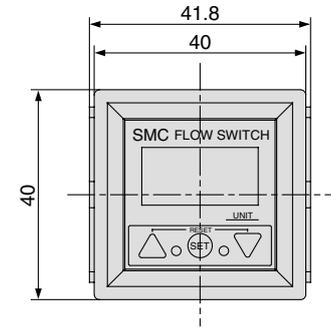
Data

Series PF2D

Dimensions: Separate Type Display Unit

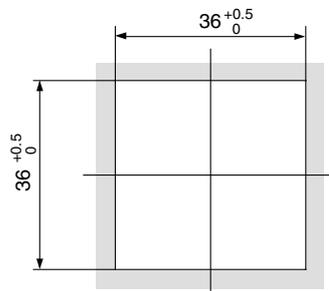
PF2D30⁰-A

Panel mounting type



View A

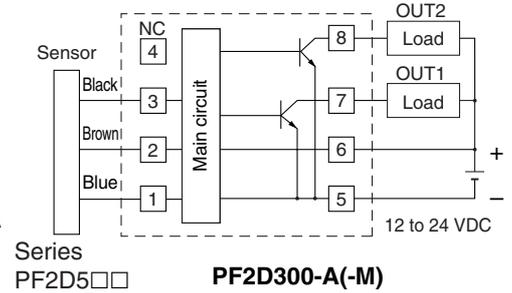
Panel fitting dimension



The applicable panel thickness is 1 to 3.2 mm.

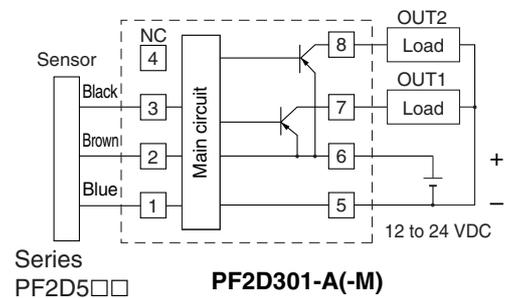
Internal circuit and wiring example

① to ⑧ are terminal numbers.



Series PF2D5□□

PF2D300-A(-M)

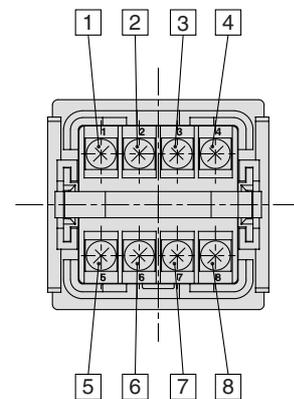


Series PF2D5□□

PF2D301-A(-M)

Do not connect the white wire of the sensor to ③ of the display unit.

Terminal block number



Functions/PF2D

Refer to the operation manual how to set and to operate.

Flow rate measurement selection

Real-time flow rate and accumulated flow rate can be selected.
Up to 999999 of flow rate value can be accumulated.

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, m³ or m³ x 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

LED display	Contents	Solution
E-1	A current of more than 80 mA is flowing to OUT1	Check the load and wiring for OUT1
E-4	The setting data has changed for whatever reasons.	Perform the RESET operation, and reset all data again.
- - - -	The flow rate is over the flow rate measurement range.	Reduce the flow rate until it is within the flow rate range, using an adjustment valve.

Key lock

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

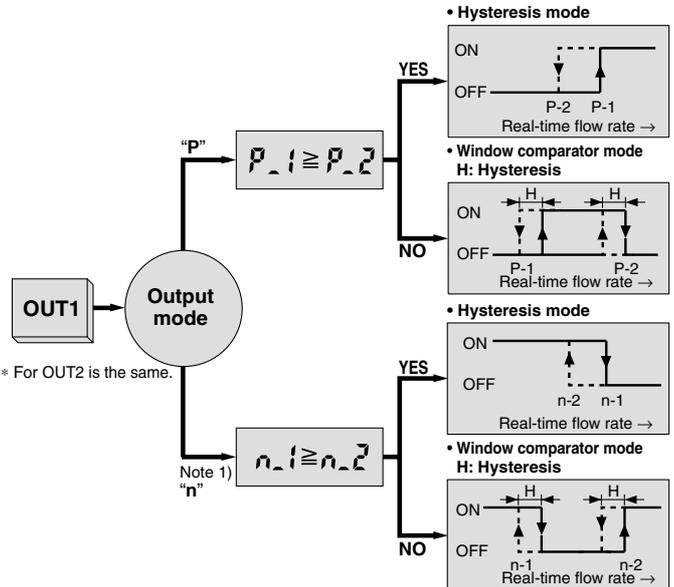
Accumulation clearance

This is to clear the accumulated value.

Output types

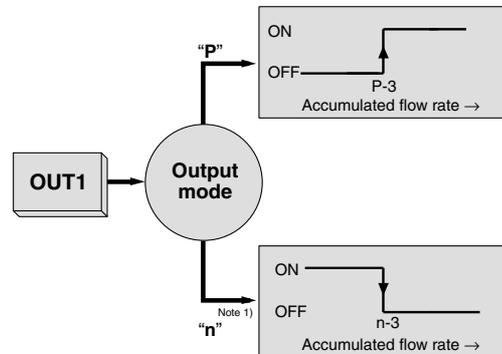
Real-time switch output, accumulated switch output, or accumulated pulse output can be selected as an output type.

Real-time switch output (αU 1.0)



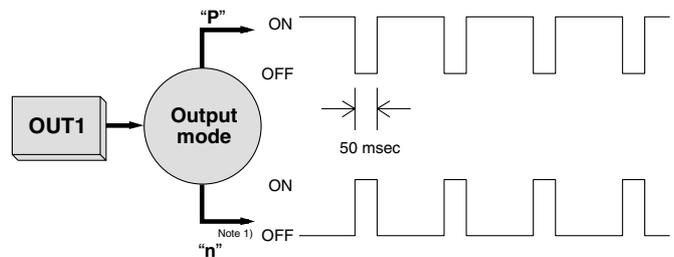
Note 1) Output mode is set to inverted output at the factory before shipment.

Accumulated switch output (αU 1.1)



Note 1) Output mode is set to inverted output at the factory before shipment.

Accumulated pulse output (αU 1.2)



Note 1) Refer to the specifications of display unit for the flow rate value per pulse.

ZSE
ISE

PSE

ZSE3

PS

ZSE1
SE2

ZSP

ISA2

IS

ZSM

PF2

IF

Data



Applicable Fluid

Compatibility check list: Materials of digital flow switch for deionized water and chemicals and fluid

Chemical	Compatibility
Acetone	○
Ammonium hydroxide	○
Isobutyl alcohol	X
Isopropyl alcohol	○
Hydrochloric acid	○
Ozone	X
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	X
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) Please consult with SMC for made to order specifications such as: Teflon coated threads to prevent rust/corrosion when in contact with strong acid or alkali.

- Compatibility is indicated for fluid temperatures at 100°C or less.
- Please consult with SMC regarding fluids other than the above.
- Please consult with SMC regarding operating conditions.
- The product is not explosion proof. Please be sure to take measures to guard it from explosive gas when using explosive fluid.

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



Be sure to read before handling.

Design and Selection

⚠ Warning

1. Operate the switch only within the specified voltage.

Use of the switch outside the range of the specified voltage can cause not only malfunction and damage of the switch but also electrocution 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 surge voltage.

Although surge protection is installed in the circuit at the output side of the switch, damage may still occur if a surge is applied repeatedly. When a surge generating a load such as a relay or solenoid is directly driven, use a type of switch with a built-in surge absorbing element.

4. Be sure to verify the applicable fluid.

The switch does not have an explosion proof rating. To prevent possible fire hazard, do not use with flammable gases or fluids.

5. Monitor the internal voltage drop of the switch.

When operating below a 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.

$$\frac{\text{Supply voltage} - \text{Internal voltage drop of switch}}{\text{Minimum operating voltage of load}} > 1$$

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. Avoid especially the application of pressure above specifications through a water hammer.

<Examples of pressure reduction measures>

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

7. 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.

8. Operate at a flow rate 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.

9. Never use flammable fluids and/or penetrable fluids.

These can cause fire, explosion or corrosion.

* Refer to MSDA (material safety data sheet) when using chemicals.

Design and Selection

⚠ Caution

1. Data of the flow switch will be stored even after the power is turned off.

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

Mounting

⚠ Warning

1. 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.

2. Remove dirt and dust from inside the piping using an air blower before connecting piping to the switch.

3. Do not drop or bump.

Do not drop, bump, or apply excessive impacts (490 m/s²) while handling. Although the external body of the switch (switch case) may not be damaged, the inside of the switch could be damaged and cause a malfunction.

4. Hold the body of the switch when handling.

The tensile strength of the cord is 49 N. Applying a greater pulling force on it can cause a malfunction. When handling, hold the body of the switch—do not dangle it from the cord.

5. 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.

6. Never mount a switch in a place that will be used as a scaffold during piping.

7. 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 inlet 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 outlet side of the switch.

When used with the outlet side open, be careful of the cavitation that is prone to occur.

ZSE
ISE

PSE

ZSE1
ISE2

PS

ZSE1
ISE2

ZSP

ISA2

IS

ZSM

PF2

IF

Data



Specific Product Precautions 2

Be sure to read before handling.

Wiring

Warning

- 1. Verify the color and terminal number when wiring.**
Incorrect wiring can cause the switch to be damaged and malfunction. Verify the color and the terminal number in the instruction manual when wiring.
- 2. Avoid repeatedly bending or stretching the lead wire.**
Repeatedly applying bending stress or stretching force to the lead wire will cause it to break.
- 3. Confirm proper insulation of wiring.**
Make sure that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.
- 4. Do not wire in conjunction with power lines or high voltage lines.**
Wire separately from power lines and high voltage lines, avoiding wiring in the same conduit with these lines. Control circuits including switches may malfunction due to noise from these other lines.
- 5. Do not allow loads to short circuit.**
Although switches indicate excess current error if loads are short circuited, all incorrect wiring connections such as power supply polarity cannot be protected. Take precautions to avoid incorrect wiring.

Usage

Warning

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

Operating Environment

Warning

- 1. Never use in the presence of explosive gases.**
The switches do not have an explosion proof rating. Never use in the presence of an explosive gas as this may cause a serious explosion.
- 2. Mount switches in locations where there is no vibration greater than 98 m/s², or no impact greater than 490 m/s².**
- 3. Do not use in an area where surges are generated.**
When there are units that generate a large amount of surge in the area around pressure switches, (e.g., solenoid type lifters, high frequency induction furnaces, motors, etc.) this may cause deterioration or damage to the switches' internal circuitry. Avoid sources of surge generation and crossed lines.
- 4. Switches are not equipped with surge protection against lightning.**
Flow switches are CE compliant; however, they are not equipped with surge protection against lightning. Lightning surge protection measures should be applied directly to system components as necessary.
- 5. Avoid using switches in an environment where the likelihood of splashing or spraying of liquids exists.**
Switches are dustproof and splashproof; however, avoid using in an environment where the likelihood of heavy splashing or spraying of water and/or oil exist. Since the display unit of the remote type switches featured here is not dust or splash proof, the use in an environment where water and/or oil splashing or spraying exists must be avoided.

Maintenance

Warning

- 1. Perform periodical inspections to ensure proper operation of the switch.**
Unexpected malfunctions may cause possible danger.
- 2. Take precautions when using the switch for an interlock circuit.**
When a pressure switch is used for an interlock circuit, devise a multiple interlock system to prevent trouble or malfunctioning. 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.**
- 4. Check the following during regular maintenance to avoid damage and loss because of chemicals.**
 - a) Do not touch the remaining chemicals in piping and/or digital flow switch.
 - b) Verify the names and characteristics of using chemicals and treat them accordingly.



Series PF2D

Specific Product Precautions 3

Be sure to read before handling.

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.

2. Be sure to take preventive measures not to expose the switch to inflammable and/or explosive gases when using inflammable fluid.

3. Place the filter on the upstream side when extraneous material can be infected.

Accurate measurement cannot be fulfilled when extraneous material is adherent to the vortex generator and the vortex detector of the switch.

Others

Warning

1. Since switch output remains OFF while a message is displayed after the power is turned on, start 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. Output turns OFF when the switch's initial setting and flow rate setting are preformed.

Set Flow Rate Range and Rated Flow Rate Range

Caution

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

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

The flow rate measuring range is the range that satisfies the specifications (accuracy, linearity etc.) on the sensor.

Although it is possible to set a value outside the flow rate measuring range, the specifications will not be guaranteed.

Sensor	Flow range					
	0.4 ℓ/min	1.8 ℓ/min	4 ℓ/min	10 ℓ/min	20 ℓ/min	40 ℓ/min
PF2D504	0.4 ℓ/min		4 ℓ/min			
	0.25 ℓ/min		4.5 ℓ/min			
PF2D520	1.8 ℓ/min		20 ℓ/min			
	1.3 ℓ/min		21 ℓ/min			
PF2D540	4 ℓ/min		40 ℓ/min			
	2.5 ℓ/min		45 ℓ/min			

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

ZSE□
ISE□

PSE

ZSE3

PS

ZSE1
SE2

ZSP

ISA2

IS□

ZSM

PF2□

IF□

Data



Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO 4414 ^{Note 1)}, JIS B 8370 ^{Note 2)} and other safety practices.

 **Caution** : Operator error could result in injury or equipment damage.

 **Warning** : Operator error could result in serious injury or loss of life.

 **Danger** : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power--General rules relating to systems.

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

Warning

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

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalog information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

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

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.



Common Precautions

Be sure to read before handling.

For detailed precautions on every series, refer to main text.

Selection

Warning

1. Confirm the specifications.

Products represented in this catalog are designed for use in compressed air applications only (including vacuum), unless otherwise indicated.

Do not use the product outside their design parameters.

Please contact SMC when using the products in applications other than compressed air (including vacuum).

Mounting

Warning

1. Instruction manual

Install the products and operate them only after reading the instruction manual carefully and understanding its contents. Also keep the manual where it can be referred to as necessary.

2. Securing the space for maintenance

When installing the products, please allow access for maintenance.

3. Tightening torque

When installing the products, please follow the listed torque specifications.

Piping

Caution

1. Before piping

Make sure that all debris, cutting oil, dust, etc., are removed from the piping.

2. Wrapping of pipe tape

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not get inside the piping. Also, when the pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.

Air Supply

Warning

1. Operating fluid

Please consult with SMC when using the product in applications other than compressed air (including vacuum).

Regarding products for general fluid, please ask SMC about applicable fluids.

2. Install an air dryer, aftercooler, etc.

Excessive condensate in a compressed air system may cause valves and other pneumatic equipment to malfunction.

Installation of an air dryer, after cooler etc. is recommended.

3. Drain flushing

If condensate in the drain bowl is not emptied on a regular basis, the bowl will over flow and allow the condensate to enter the compressed air lines.

If the drain bowl is difficult to check and remove, it is recommended that a drain bowl with the auto-drain option be installed.

For compressed air quality, refer to "Air Preparation Equipment" catalog.

4. Use clean air

If the compressed air supply is contaminated with chemicals, synthetic materials, corrosive gas, etc., it may lead to break down or malfunction.

Operating Environment

Warning

1. Do not use in environments where the product is directly exposed to corrosive gases, chemicals, salt water, water or steam.

2. Do not expose the product to direct sunlight for an extended period of time.

3. Do not use in a place subject to heavy vibrations and/or shocks.

4. Do not mount the product in locations where it is exposed to radiant heat.

Maintenance

Warning

1. Maintenance procedures are outlined in the operation manual.

Not following proper procedures could cause the product to malfunction and could lead to damage to the equipment or machine.

2. Maintenance work

If handled improperly, compressed air can be dangerous.

Assembly, handling and repair of pneumatic systems should be performed by qualified personnel only.

3. Drain flushing

Remove drainage from air filters regularly. (Refer to the specifications.)

4. Shut-down before maintenance

Before attempting any kind of maintenance make sure the supply pressure is shut of and all residual air pressure is released from the system to be worked on.

5. Start-up after maintenance and inspection

Apply operating pressure and power to the equipment and check for proper operation and possible air leaks. If operation is abnormal, please verify product set-up parameters.

6. Do not make any modifications to be product.

Do not take the product apart.

Quality Assurance Information (ISO 9001, ISO 14001)

Reliable quality of products in the global market

To enable our customers throughout the world to use our products with even greater confidence, SMC has obtained certification for international standards “ISO 9001” and “ISO 14001”, and created a complete structure for quality assurance and environmental controls. SMC products pursue to meet its customers’ expectations while also considering company’s contribution in society.

Quality management system ISO 9001

This is an international standard for quality control and quality assurance. SMC has obtained a large number of certifications in Japan and overseas, providing assurance to our customers throughout the world.



Environmental management system ISO 14001

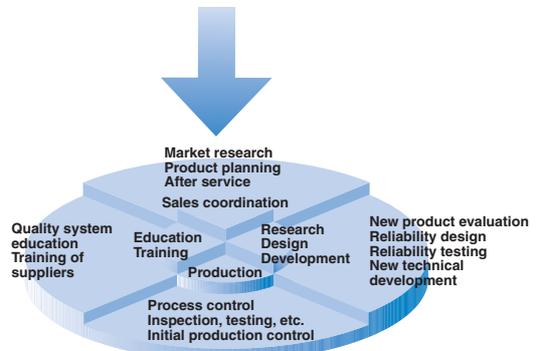
This is an international standard related to environmental management systems and environmental inspections. While promoting environmentally friendly automation technology, SMC is also making diligent efforts to preserve the environment.



SMC’s quality control system



Quality policies



Quality control activities

SMC Product Conforming to Inter

SMC products complying with EN/ISO, CSA/UL standards are supporting



The CE mark indicates that machines and components meet essential requirements of all the EC Directives applied.

It has been obligatory to apply CE marks indicating conformity with EC Directives when machines and components are exported to the member Nations of the EU.

Once “A manufacturer himself” declares a product to be safe by means of CE marking (declaration of conformity by manufacturer), free distribution inside the member Nations of the EU is permissible.

■ CE Mark

SMC provides CE marking to products to which EMC and Low Voltage Directives have been applied, in accordance with CETOP (European hydraulics and pneumatics committee) guide lines.

■ As of February 1998, the following 18 countries will be obliged to conform to CE mark legislation

Iceland, Ireland, United Kingdom, Italy, Austria, Netherlands, Greece, Liechtenstein, Sweden, Spain, Denmark, Germany, Norway, Finland, France, Belgium, Portugal, Luxembourg

■ EC Directives and Pneumatic Components

• Machinery Directive

The Machinery Directive contains essential health and safety requirements for machinery, as applied to industrial machines e.g. machine tools, injection molding machines and automatic machines. Pneumatic equipment is not specified in Machinery Directive. However, the use of SMC products that are certified as conforming to EN Standards, allows customers to simplify preparation work of the Technical Construction File required for a Declaration of Conformity.

• Electromagnetic Compatibility (EMC) Directive

The EMC Directive specifies electromagnetic compatibility. Equipment which may generate electromagnetic interference or whose function may be compromised by electromagnetic interference is required to be immune to electromagnetic affects (EMS/immunity) without emitting excessive electromagnetic affects (EMI/emission).

• Low Voltage Directive

This directive is applied to products, which operate above 50 VAC to 1000 VAC and 75 VDC to 1500 VDC operating voltage, and require electrical safety measures to be introduced.

• Simple Pressure Vessels Directive

This directive is applied to welded vessels whose maximum operating pressure (PS) and volume of vessel (V) exceed 50 bar/L. Such vessels require EC type examination and then CE marking.

national Standards

you to comply with EC directives and CSA/UL standards.



■ CSA Standards & UL Standards

UL and CSA standards have been applied in North America (U.S.A. and Canada) symbolizing safety of electric products, and are defined to mainly prevent danger from electric shock or fire, resulting from trouble with electric products. Both UL and CSA standards are acknowledged in North America as the first class certifying body. They have a long experience and ability for issuing product safety certificate. Products approved by CSA or UL standards are accepted in most states and governments beyond question.

Since CSA is a test certifying body as the National Recognized Testing Laboratory (NRTL) within the jurisdiction of Occupational Safety and Health Administration (OSHA), SMC was tested for compliance with CSA Standards and UL Standards at the same time and was approved for compliance with the two Standards. The above CSA NRTL/C logo is described on a product label in order to indicate that the product is approved by CSA and UL Standards.

■ TSSA (MCCR) Registration Products

TSSA is the regulation in Ontario State, Canada. The products that the operating pressure is more than 5 psi (0.03 MPa) and the piping size is bigger than 1 inch. fall into the scope of TSSA regulation.

Products conforming to CE Standard

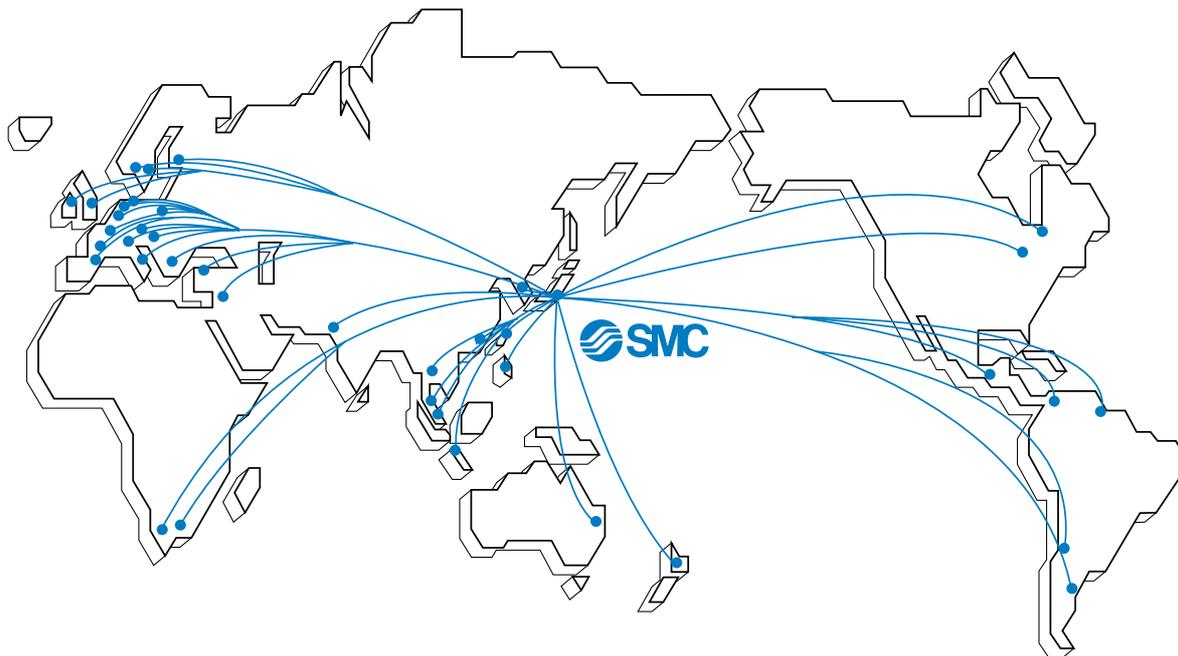


With CE symbol for simple visual recognition

In this catalog each accredited product series is indicated with a CE mark symbol. However, in some cases, every available models may not meet CE compliance. Please visit our web site for the latest selection of available models with CE mark.

<http://www.smcworld.com>

SMC's Global Service Network



America

U.S.A. **SMC Corporation of America**

3011 North Franklin Road Indianapolis, IN 46226, U.S.A.
TEL: 317-899-4440 FAX: 317-899-3102

CANADA **SMC Pneumatics (Canada) Ltd.**

6768 Financial Drive Mississauga, Ontario, L5N 7J6 Canada
TEL: 905-812-0400 FAX: 905-812-8686

MEXICO **SMC Corporation (Mexico), S.A. DE C.V.**

Carr. Silao-Trejo K.M. 2.5 S/N, Predio San Jose del Duranzo
C.P. 36100, Silao, Gto., Mexico
TEL: 472-72-2-55-00 FAX: 472-72-2-59-44/2-59-46

CHILE **SMC Pneumatics (Chile) S.A.**

Av. La Montaña 1,115 km. 16.5 P. Norte Parque
Industrial Valle Grande, Lampa Santiago, Chile
TEL: 02-270-8600 FAX: 02-270-8601

ARGENTINA **SMC Argentina S.A.**

Teodoro Garcia 3860 (1427) Buenos Aires, Argentina
TEL: 011-4555-5762 FAX: 011-4555-5762

BOLIVIA **SMC Pneumatics Bolivia S.R.L.**

Avenida Beni Numero 4665
Santa Cruz de la Sierra-Casilla de Correo 2281, Bolivia
TEL: 591-3-3428383 FAX: 591-3-3449900

VENEZUELA **SMC Neumatica Venezuela S.A.**

Apartado 40152, Avenida Nueva Granada, Edificio Wanlac,
Local 5, Caracas 1040-A, Venezuela
TEL: 2-632-1310 FAX: 2-632-3871

PERU (Distributor) **IMPECO Automatizacion Industrial S.A.**

AV. Canevaro 752, Lince, Lima, Peru
TEL: 1-471-6002 FAX: 1-471-0935

URUGUAY (Distributor) **BAKO S.A.**

Galicia 1650 esq. Gaboto C.P. 11200, Montevideo, Uruguay
TEL: 2-401-6603 FAX: 2-409-4306

BRAZIL **SMC Pneumaticos Do Brasil Ltda.**

Rua. Dra. Maria Fidelis, nr. 130, Jardim Piraporinha-Diadema-S.P.
CEP: 09950-350, Brasil
TEL: 11-4051-1177 FAX: 11-4071-6636

COLOMBIA (Distributor) **Airmatic Ltda.**

Calle 18 69-05 Apart. Aereo 081045 Santa Fe de Bogotá, Colombia
TEL: 1-424-9240 FAX: 1-424-9260

Europe

U.K. **SMC Pneumatics (U.K.) Ltd.**

Vincent Avenue, Crownhill, Milton Keynes, MK8 0AN, Buckinghamshire, U.K.
TEL: 01908-563888 FAX: 01908-561185

GERMANY **SMC Pneumatik GmbH**

Boschring 13-15 D-63329 Egelsbach, Germany
TEL: 06103-4020 FAX: 06103-402139

ITALY **SMC Italia S.p.A.**

Via Garibaldi 62 I-20061 Carugate Milano, Italy
TEL: 02-9271365 FAX: 02-9271365

FRANCE **SMC Pneumatique S.A.**

1 Boulevard de Strasbourg, Parc Gustave Eiffel, Bussy Saint Georges, F-77600
Marne La Vallee Cedex 3 France
TEL: 01-64-76-10-00 FAX: 01-64-76-10-10

SWEDEN **SMC Pneumatics Sweden AB**

Ekhagsvägen 29-31, S-141 05 Huddinge, Sweden
TEL: 08-603-07-00 FAX: 08-603-07-10

SWITZERLAND **SMC Pneumatik AG**

Dorfstrasse 7, Postfach 117, CH-8484 Weisslingen, Switzerland
TEL: 052-396-3131 FAX: 052-396-3191

AUSTRIA **SMC Pneumatik GmbH (Austria)**

Girakstrasse 8, A-2100 Korneuburg, Austria
TEL: 0-2262-6228-0 FAX: 0-2262-62285

SPAIN **SMC España, S.A.**

Zuazobidea 14 Pol. Ind. Júndiz 01015 Vitoria, Spain
TEL: 945-184-100 FAX: 945-184-510

IRELAND **SMC Pneumatics (Ireland) Ltd.**

2002 Citywest Business Campus, Naas Road, Saggart, Co. Dublin, Ireland
TEL: 01-403-9000 FAX: 01-466-0385

NETHERLANDS (Associated company) **SMC Pneumatics BV**

De Ruyterkade 120, NL-1011 AB Amsterdam, Netherlands
TEL: 020-5318888 FAX: 020-5318880

GREECE (Distributor) **S.Parianopoulos S.A.**

7, Konstantinoupoleos Street 11855 Athens, Greece
TEL: 01-3426076 FAX: 01-3455578

DENMARK **SMC Pneumatik A/S**

Knudsminde 4 B DK-8300
Odder, Denmark
TEL: 70252900 FAX: 70252901

Europe

FINLAND SMC Pneumatics Finland OY

PL72, Tiistiniityntie 4, SF-02231 ESP00, Finland
TEL: 09-8595-80 FAX: 09-8595-8595

NORWAY SMC Pneumatics Norway A/S

Vollsvæien 13C, Granfoss Næringspark N-1366 LYSAKER, Norway
TEL: 67-12-90-20 FAX: 67-12-90-21

BELGIUM (Distributor) SMC Pneumatics N.V./S.A.

Nijverheidsstraat 20 B-2160 Wommelgem Belgium
TEL: 03-355-1464 FAX: 03-355-1466

POLAND SMC Industrial Automation Polska Sp.z.o.o.

ul. Konstruktorska 11A, PL-02-673 Warszawa, Poland
TEL: 022-548-5085 FAX: 022-548-5087

TURKEY (Distributor) Entek Pnömatik San.ve Tic. Ltd. Sti

Perpa Tic. Merkezi Kat:11 No.1625 80270 Okmeydani Istanbul, Türkiye
TEL: 0212-221-1512 FAX: 0212-221-1519

RUSSIA SMC Pneumatik LLC.

36/40 Sredny prospect V.O. St. Petersburg 199004, Russia
TEL: 812-118-5445 FAX: 812-118-5449

CZECH SMC Industrial Automation CZ s.r.o.

Hudcova 78a, CZ-61200 Brno, Czech Republic
TEL: 05-4121-8034 FAX: 05-4121-8034

HUNGARY SMC Hungary Ipari Automatizálási kft.

Budafoki ut 107-113 1117 Budapest
TEL: 01-371-1343 FAX: 01-371-1344

ROMANIA SMC Romania S.r.l.

Str. Frunzei, Nr. 29, Sector 2, Bucharest, Romania
TEL: 01-3205111 FAX: 01-3261489

SLOVAKIA SMC Priemyselná automatizácia, s.r.o.

Nova 3, SK-83103 Bratislava
TEL: 02-4445-6725 FAX: 02-4445-6028

SLOVENIA SMC Industrijska Avtomatila d.o.o.

Grajski trg 15, SLO- 8360 Zuzemberk, Slovenia
TEL: 07388-5240 FAX: 07388-5249

LATVIA SMC Pneumatics Latvia SIA

Šmerļa ielā 1-705, Rīga LV-1006
TEL: 777 94 74 FAX: 777 94 75

SOUTH AFRICA (Distributor) Hyflo Southern Africa (Pty.) Ltd.

P.O.Box 240 Paardeneiland 7420 South Africa
TEL: 021-511-7021 FAX: 021-511-4456

EGYPT (Distributor) Saadani Trading & Ind. Services

15 Sebaai Street, Miami 21411 Alexandria, Egypt
TEL: 3-548-50-34 FAX: 3-548-50-34

Oceania/Asia

AUSTRALIA SMC Pneumatics (Australia) Pty.Ltd.

14-18 Hudson Avenue Castle Hill NSW 2154, Australia
TEL: 02-9354-8222 FAX: 02-9894-5719

NEW ZEALAND SMC Pneumatics (New Zealand) Ltd.

8C Sylvia Park Road Mt.Wellington Auckland, New Zealand
TEL: 09-573-7007 FAX: 09-573-7002

TAIWAN SMC Pneumatics (Taiwan) Co.,Ltd.

17, Lane 205, Nansan Rd., Sec.2, Luzhu-Hsiang, Taoyuan-Hsien, TAIWAN
TEL: 03-322-3443 FAX: 03-322-3387

HONG KONG SMC Pneumatics (Hong Kong) Ltd.

29/F, Clifford Centre, 778-784 Cheung, Sha Wan Road, Lai Chi Kok, Kowloon, Hong Kong
TEL: 2744-0121 FAX: 2785-1314

SINGAPORE SMC Pneumatics (S.E.A.) Pte. Ltd.

89 Tuas Avenue 1, Jurong Singapore 639520
TEL: 6861-0888 FAX: 6861-1889

PHILIPPINES SHOKETSU SMC Corporation

Unit 201 Common Goal Tower, Madrigal Business Park, Ayala Alabang Muntinlupa, Philippines
TEL: 02-8090565 FAX: 02-8090586

MALAYSIA SMC Pneumatics (S.E.A.) Sdn. Bhd.

Lot 36 Jalan Delima1/1, Subang Hi-Tech Industrial Park, Batu 3 40000 Shah Alam Selangor, Malaysia
TEL: 03-56350590 FAX: 03-56350602

SOUTH KOREA SMC Pneumatics Korea Co., Ltd.

Woolim e-BIZ Center (Room 1008), 170-5, Guro-Dong, Guro-Gu, Seoul, 152-050, South Korea
TEL: 02-3219-0700 FAX: 02-3219-0702

CHINA SMC (China) Co., Ltd.

7 Wan Yuan St. Beijing Economic & Technological Development Zone 100176, China
TEL: 010-67882111 FAX: 010-67881837

THAILAND SMC Thailand Ltd.

134/6 Moo 5, Tiwanon Road, Bangkadi, Amphur Muang, Patumthani 12000, Thailand
TEL: 02-963-7099 FAX: 02-501-2937

INDIA SMC Pneumatics (India) Pvt. Ltd.

D-107 to 112, Phase-2, Extension, Noida, Dist. Gautaim Budh Nagar, U.P. 201 305, India
TEL: (0120)-4568730 FAX: 0120-4568933

INDONESIA (Distributor) P.T. Riyadi Putera Makmur

Jalan Hayam Wuruk Komplek Glodok Jaya No. 27-28 Jakarta 11180 Indonesia
TEL: 021-625 5548 FAX: 021-625 5888

PAKISTAN (Distributor) Jubilee Corporation

First Floor Mercantile Centre, Newton Road Near Boulton Market P.O. Box 6165 Karachi 74000 Pakistan
TEL: 021-243-9070/8449 FAX: 021-241-4589

ISRAEL (Distributor) Baccara Automation Control

Kvutza Geva 18915 Israel
TEL: 04-653-5960 FAX: 04-653-1445

SAUDI ARABIA (Distributor) Assaggaff Trading Est.

P.O. Box 3385 Al-Amir Majed Street, Jeddah-21471, Saudi Arabia
TEL: 02-6761574 FAX: 02-6708173