

For Deionized Water and Chemicals

Digital Flow Switch

Series PF2D



How to Order



Remote Type
Sensor Unit

PF2D5 20 — 13 — 1 — C

Flow rate range

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

Port size: (inch)

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

Option (Refer to page 55.)

Nil	None
C	e-con connector x 1 pc.

The cable and connector are shipped unassembled.

Output specification

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

Specifications for Sensor Unit

Model	PF2D504	PF2D520	PF2D540
Measured fluid	Liquid not to corrode nor erode deionized water and/or Teflon®. Viscosity: 3mPa·s (3cP) or less		
Detection style	Karman vortex		
Rated flow range	0.4 to 4 l/min	1.8 to 20 l/min Note 1)	4 to 40 l/min
Operating pressure range Note 2)	0 to 1 MPa		0 to 0.6 MPa
Proof pressure Note 3)	1.5 MPa		0.9 MPa
Operating fluid temperature	0 to 90°C		
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, based on 25°C)		
Output specifications	Pulse output	Pulse output, N channel, open drain, output for display unit PF2D 300/301 (Specifications: Maximum load current of 10 mA; Maximum applied voltage of 30 V)	
	Analog output	Voltage output Note 5) 1 to 5 V Linearity: ±2% F.S. or less, allowable load resistance: 100 kΩ or more Current output Note 6) 4 to 20 mA Linearity: ±2% 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	20 mA or less (without load)		
Environmental resistance	Enclosure	IP65	
	Operating temperature range	Operating: 0 to 50°C, Stored: -25 to 85°C in stock (with no condensation and freezing)	
	Voltage resistance	1000 VAC for 1 min. between external terminals and case	
	Insulation resistance	50M Ω or more (500 VDC Mega) 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, Rise time: 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.

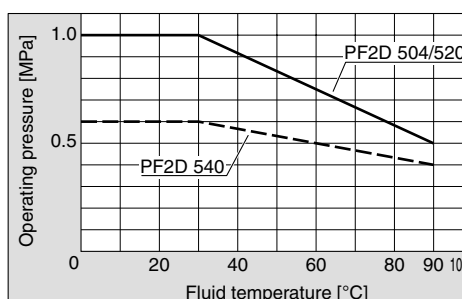
Note 3) 1.5 times of the maximum operating pressure and varying with fluid temperature.

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 conforms to the CE mark.



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



How to Order

Remote Type
Display Unit

PF2D30 0 — A — M

Output specification

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

Panel mounting

Unit specification

Nil	With unit switching function
M	Fixed SI unit

Note) Fixed units: 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 set unit ^{Note 1)}	0.05 ℓ/min	0.1 ℓ/min	0.5 ℓ/min
Accumulated pulse flow rate exchange value (Pulse width: 50ms) ^{Note 1)}	0.05 ℓ/pulse	0.1 ℓ/pulse	0.5 ℓ/pulse
^{Note 2)} Display units	Real-time flow rate	ℓ/min, gal (US)/min	
	Accumulated flow	ℓ, gal (US)	
Accumulated flow range ^{Note)}	0 to 999999 ℓ		
Linearity ^{Note 3)}	±2.5% F.S. or less		
Repeatability	±0.5% 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 (No load)	60 mA or less		
Weight	45 g		
^{Note 4)} Output specifications	Switch output	NPN open collector (PF2D300)	Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA) Maximum applied voltage: 30 V 2 outputs
		PNP open collector (PF2D301)	Maximum load current: 80 mA Internal voltage drop: 1.5 V or less (with load current of 80 mA) 2 outputs
	Accumulated pulse output	NPN open collector or PNP open collector (same as switch output)	
Environmental resistance	Enclosure	IP40	
	Operating temperature range	Operating: 0 to 50°C, Stored: -25 to 85°C (with no condensation and freezing)	
	Voltage resistance	1000 VAC for 1 min. between external terminal and case	
	Insulation resistance	50M Ω or more (500 VDC Mega) between external terminal and case	
	Vibration resistance	10 to 500 Hz with a 1.5 mm amplitude or 98 m/s ² acceleration in each X, Y, Z direction for 2 hrs., whichever is smaller.	
	Impact resistance	490 m/s ² to X, Y, Z directions 3 times for each	
Noise resistance	1000 Vp-p, Pulse width: 1 μs, Rise time: 1 ns		
Indicator light	3-digits 7-segment LED		
Status LED's	ON: when light is on, OUT1: Green; OUT2: Red		
Power supply voltage	12 to 24 VDC (ripple ±10% or less)		
Response time	1sec. or less		
Hysteresis	Hysteresis mode: adjustable (can be set from 0) Window comparator mode ^{Note 5)} : fixed (3 digits)		

Note 1) The value varies depending on set flow range

Note 2) For digital flow switch with unit switching function. (Fixed SI unit [ℓ/min or ℓ] will be set for switch types without the unit switching function.)

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

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

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

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

Note 6) The display unit conforms to the CE mark.

Note) Accumulated flow rate is reset when the power supply turns OFF.

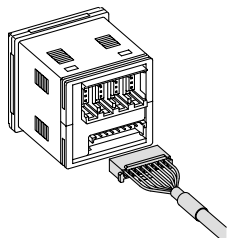
Series PF2D

How to Order



4-channel Flow Monitor
Remote Type
Display Unit

Accessory / Power supply output cable (2 m)



PF2D20 M

Output specification

0	NPN4 outputs
1	PNP4 outputs

Unit specification

Nil	With unit switching function
M	Fixed SI unit Note)

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

Option 2 (Refer to page 55.)

Nil	None
4C	Sensor connector (4 pc.)

Option 1 (Refer to page 55.)

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

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

Specifications

Model		PF2D200/201		
Applicable flow rate sensor		PF2D504-□-1	PF2D520-□-1	PF2D540-□-1
Flow rate measurement range Note 1)		0.25 to 4.50 ℓ/min	1.3 to 21.0 ℓ/min	2.5 to 45.0 ℓ/min
Set flow rate range Note 1)		0.25 to 4.50 ℓ/min	1.3 to 21.0 ℓ/min	2.5 to 45.0 ℓ/min
Minimum set unit Note 1)		0.05 ℓ/min	0.1 ℓ/min	0.5 ℓ/min
Accumulated pulse flow rate exchange value (Pulse width: 50ms) Note 1)		0.05 ℓ/pulse	0.1 ℓ/pulse	0.5 ℓ/pulse
Display units Note 1)	Real-time flow rate	ℓ/min, gal(US)/min		
	Accumulated flow	ℓ, gal(US)		
Accumulated flow range Note 1)		0 to 999999 ℓ, 0 to 999999 gal(US)		
Power supply voltage		24 VDC (ripple ±10% or less) (With power supply polarity protection)		
Current consumption		55 mA or less (Not including the current consumption of the sensor)		
Power supply voltage for sensor		Same as [Power supply voltage]		
Power supply current for sensor Note 2)		Max. 110 mA (However, the total current for the 4 inputs is 440 mA maximum or less.)		
Sensor input		1 to 5 VDC (Input impedance: Approx. 800K Ω)		
No. of inputs		4 inputs		
Input protection		Excess voltage protection		
Output specifications Note 3)	Switch output (Real-time switch output, Accumulated switch output)	NPN open collector (PF2D200)	Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA) Maximum applied voltage: 30 V	
		PNP open collector (PF2D201)	Maximum load current: 80 mA Internal voltage drop: 1 V or less (with load current of 80 mA)	
	Accumulated pulse output	NPN open collector or PNP open collector (same as switch output)		
	No. of outputs	4 outputs (1 output per 1 sensor input)		
Output protection		Short circuit protection		
Hysteresis		Hysteresis mode: Variable (can be set from 0), Window comparator mode: Fixed (3-digits)		
Response time Note 4)		1s or less		
Linearity Note 4)		±5% F.S. or less		
Repeatability Note 4)		±3% F.S. or less		
Temperature characteristics		±2% F.S. or less (0 to 50°C, based on 25°C)		
Display method		For measured value display: 4-digits, 7-segment LED (Orange) For channel display: 1-digit, 7-segment LED (Red)		
Status LED's		Illuminates when output is ON OUT1: Red		
Resistance	Enclosure	IP65 for the front face only, the rest is IP40.		
	Operating temperature range	Operating: 0 to 50°C, Stored: -10 to 60°C (with no freezing and condensation)		
	Operating humidity range	Operating or Stored: 35 to 85%RH (with no condensation)		
	Vibration resistance	10 to 500 Hz with a 1.5 mm amplitude or 98 m/s ² acceleration, in each X, Y, Z direction for 2 hrs., whichever is smaller. (de-energized)		
	Impact resistance	980 m/s ² in X, Y, Z directions 3 times each (de-energized)		
Noise resistance		500 Vp-p, Pulse width 1 μs, Rise time 1 ns		
Connection		Power supply / Output connection: 8P connector, Sensor connection: 4P connector (e-con)		
Material		Housing: PBT, Display: PET, Backside rubber: CR		
Weight		60 g (Except for any accessories that are shipped together.)		

Note 1) Fixed SI unit [ℓ/min or ℓ] will be set for switch types without the unit switching function. ("M" is suffixed at the end of part number.) Accumulated flow is reset when the power supply turns OFF.

Note 2) If Vcc side on sensor input connector part is short-circuited with the 0V side, the flow monitor inside will be damaged.

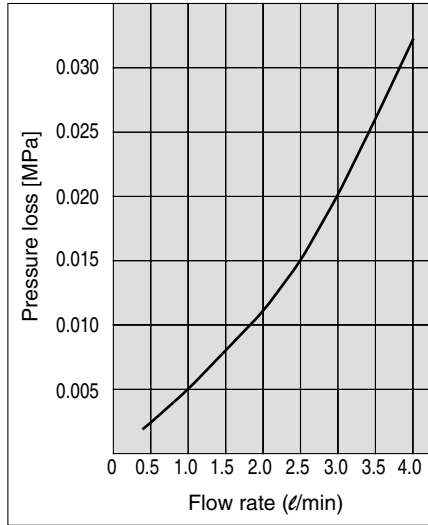
Note 3) Switch output and accumulated pulse output can be selected during initial setting.

Note 4) The system accuracy when combined with an applicable flow sensor.

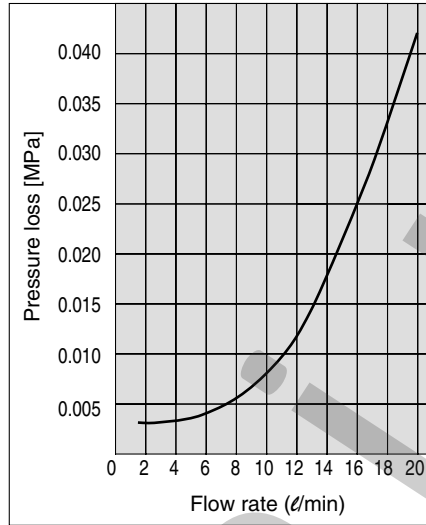
Note 5) This product conforms to the CE mark.

Flow Characteristics (Pressure Characteristics)

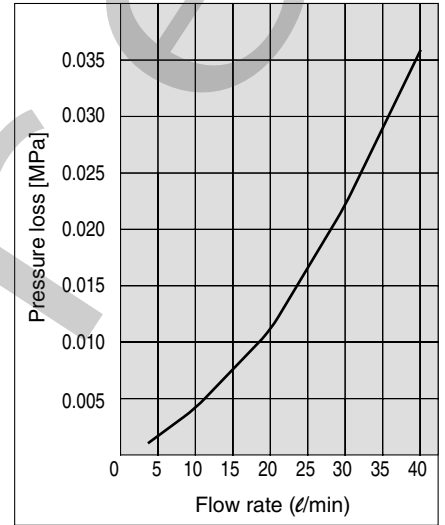
PF2D504



PF2D520

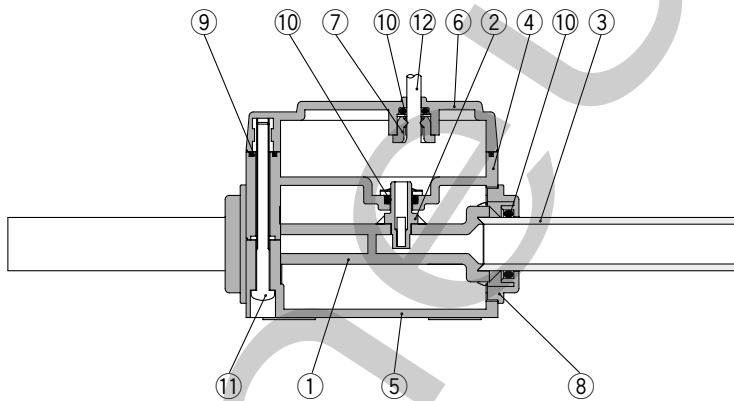


PF2D540



Construction

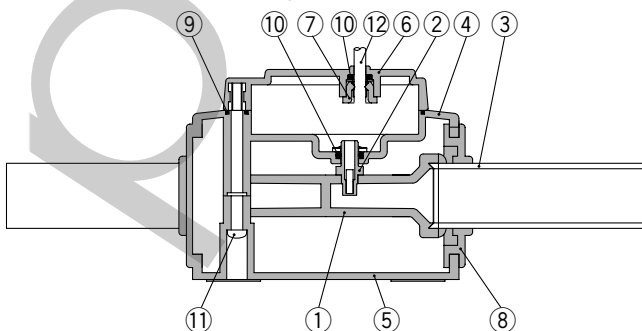
PF2D504/520



Parts list

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

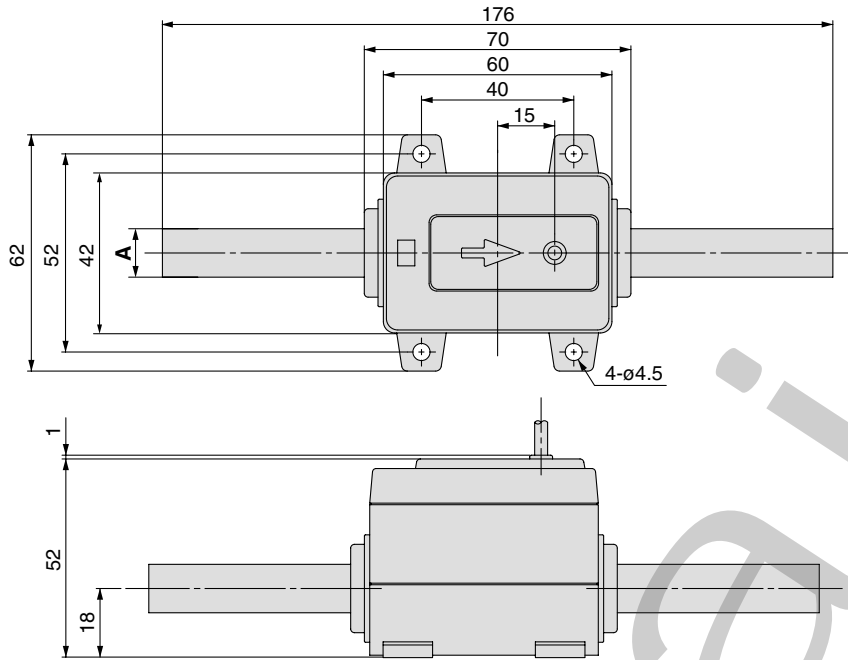
PF2D540



Series PF2D

Dimensions: Remote Type Sensor Unit

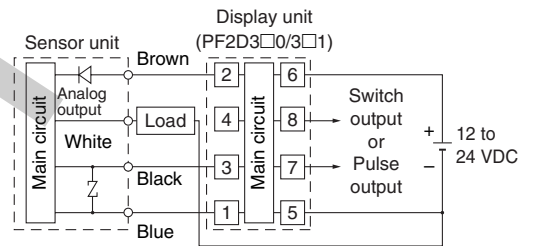
PF2D504-11/520-13



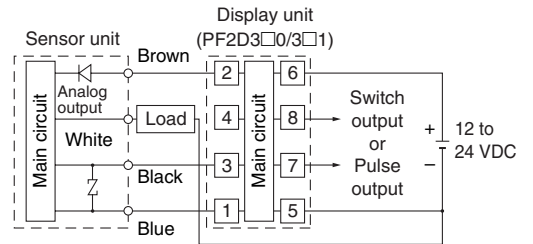
Model	A
PF2D504	ø9.52
PF2D520	ø12.7

Internal circuits and wiring examples

① to ⑧ are the terminal numbers.

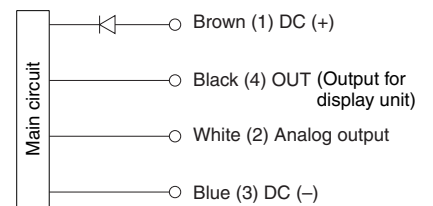


Load is an analog input equipment such as a voltmeter.
PF2D5□□-□-1 (With voltage output type)



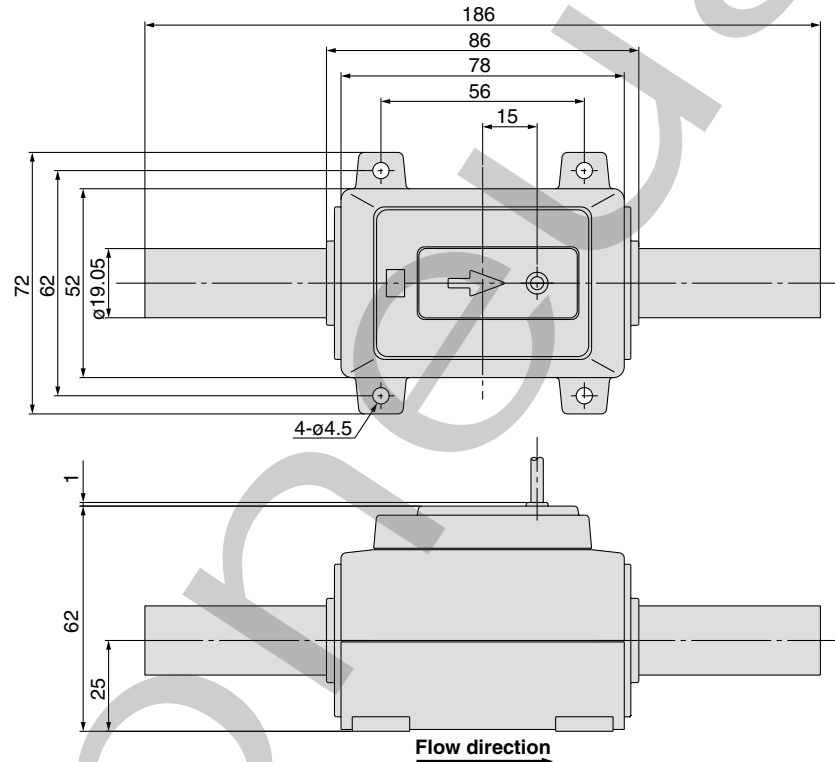
Load is an analog input equipment such as a voltmeter.
PF2D5□□-□-2 (With voltage output type)

Wiring

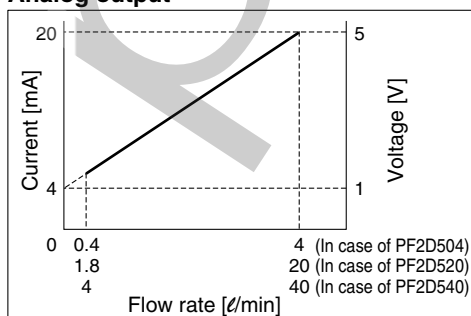


* Use this sensor by connecting it to a P/A remote type display unit Series PF2D2□□/3□□.

PF2D540-19



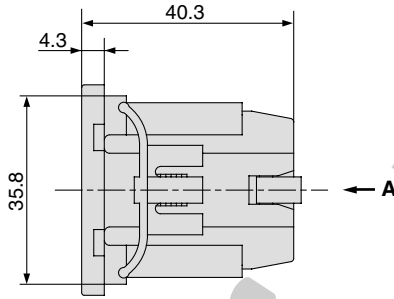
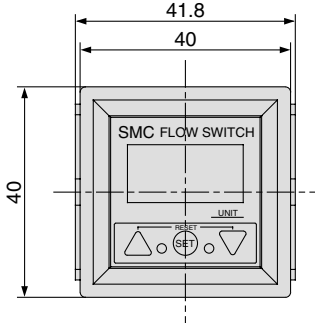
Analog output



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

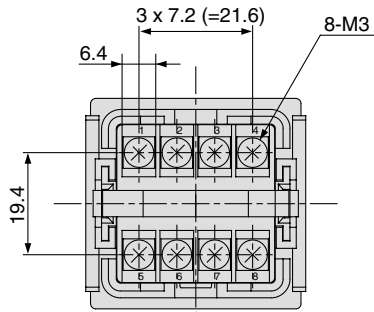
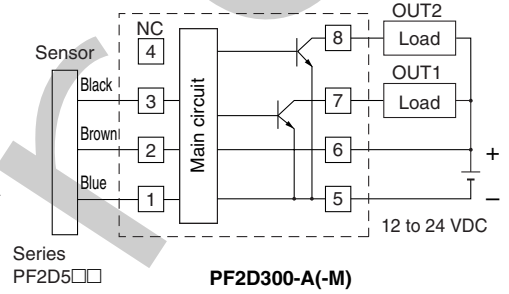
Dimensions: Remote Type Display Unit

PF2D30⁰-A
Panel mounting type



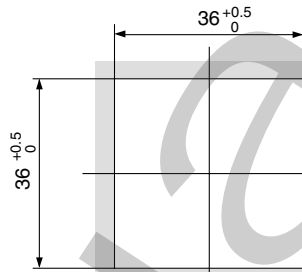
Internal circuits and wiring examples

① to ⑧ are the terminal numbers.

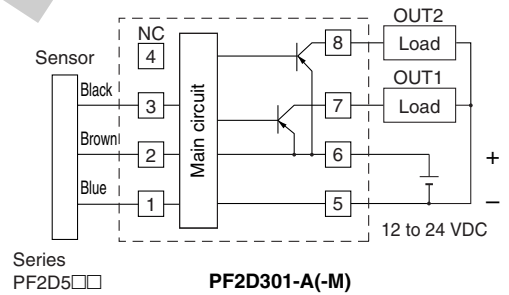


View A

Panel fitting dimensions

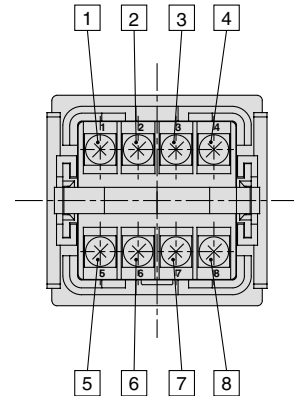


* The applicable panel thickness is 1 to 3.2 mm.



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

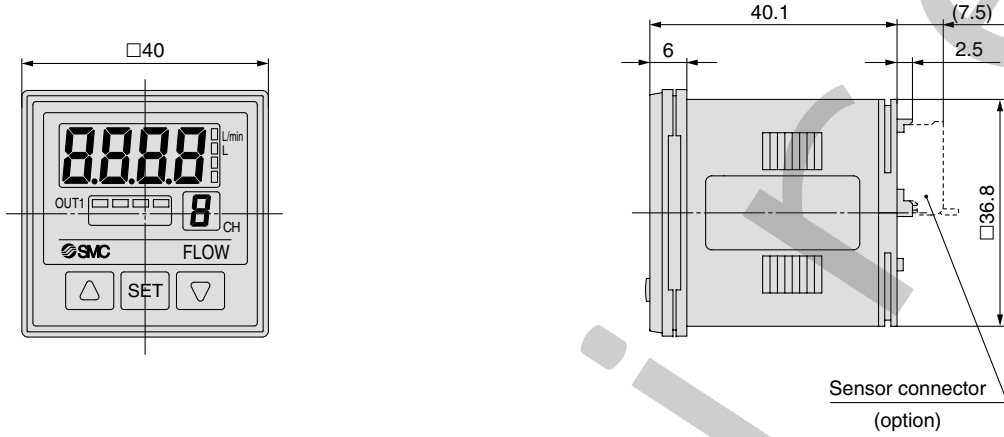
Terminal block numbers



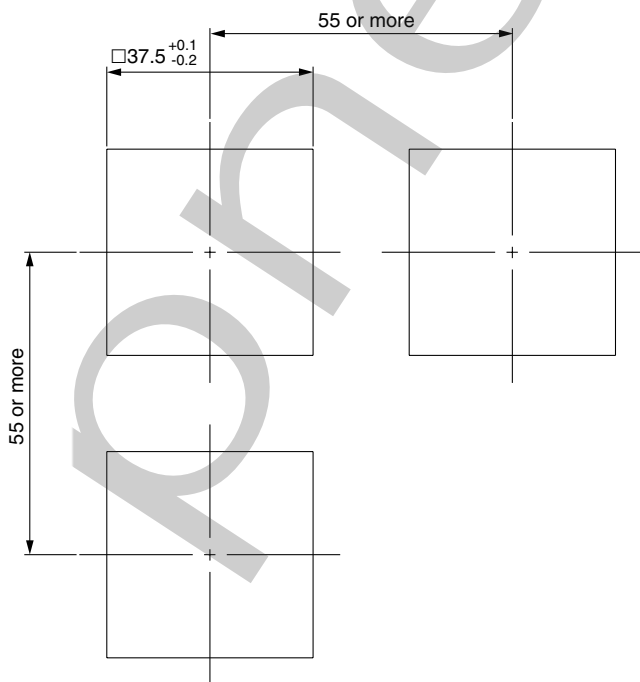
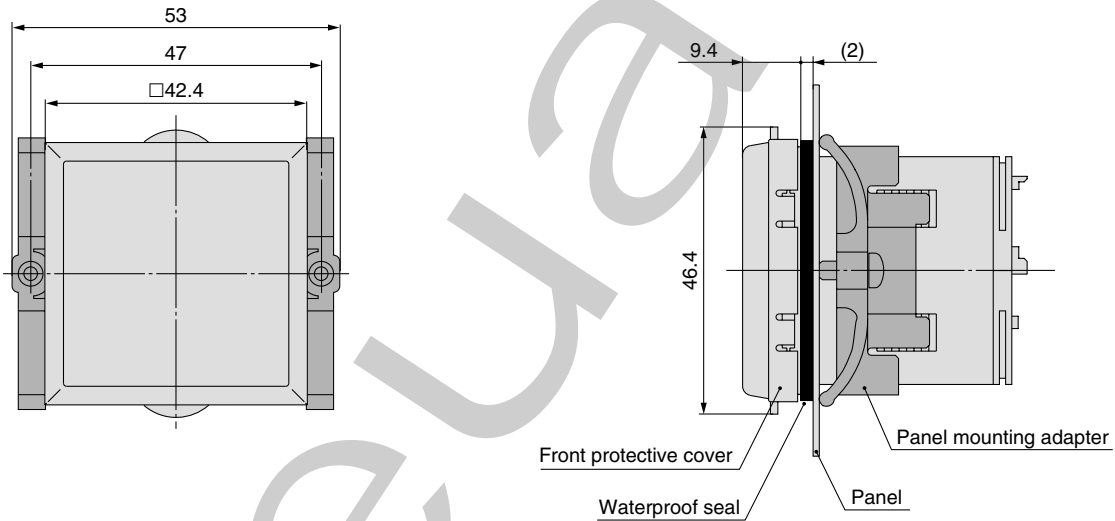
Series PF2D

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

PF2D200/201



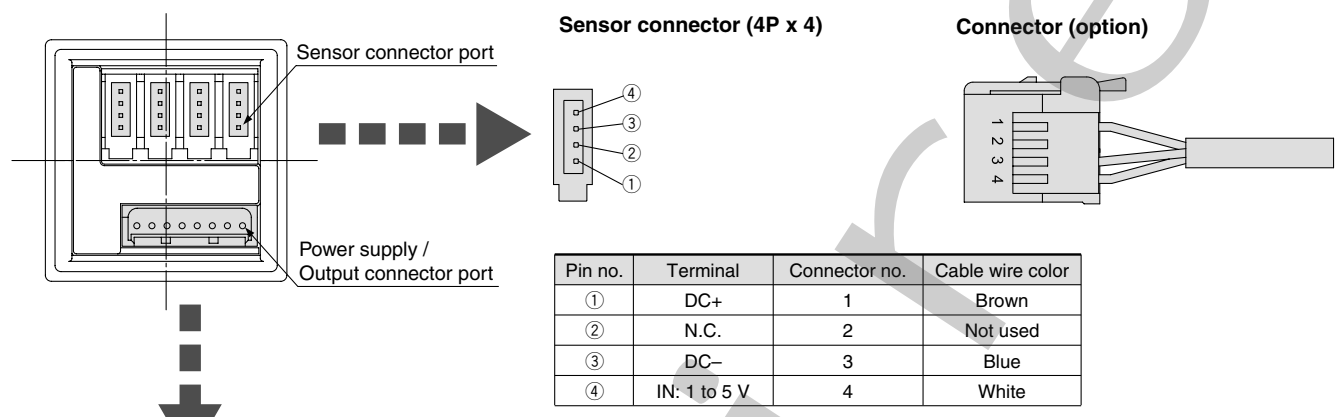
Front protective cover + Panel mounting



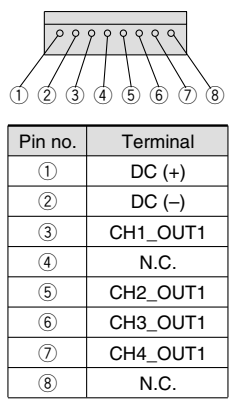
Panel fitting dimensions
Applicable panel thickness: 0.5 to 8 mm

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

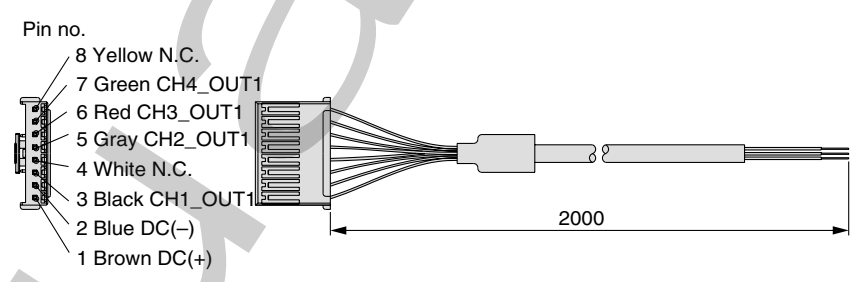
Dimensions: Remote Type Display Unit for Deionized Water and Chemicals (4-channel Controller)



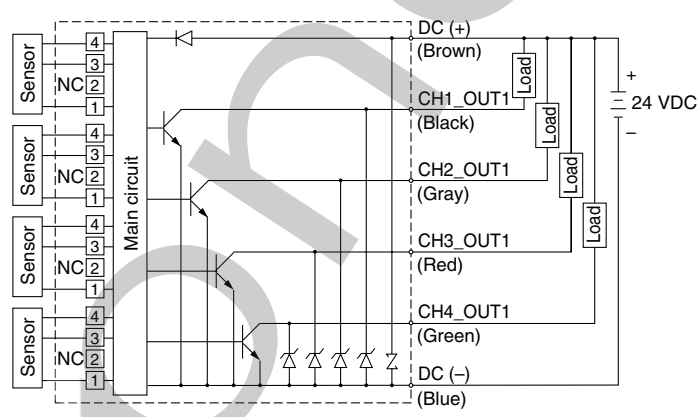
Power supply / Output connector (8P)



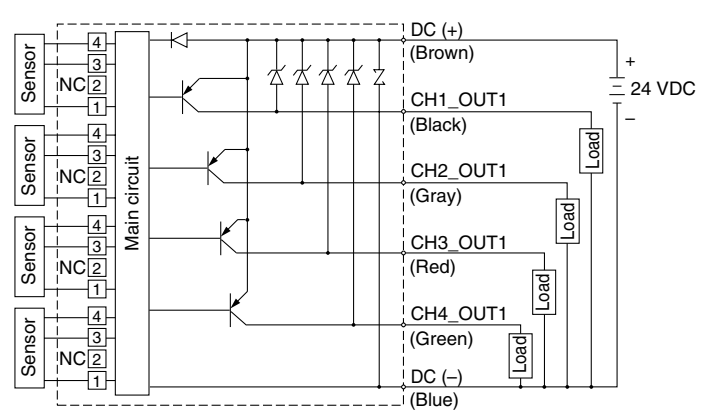
Power supply / Output connector (accessory)



Internal circuits and wiring examples PF2D200



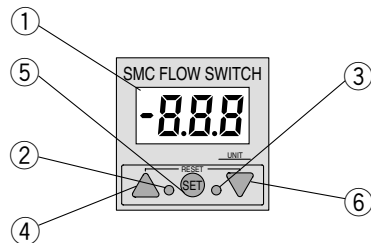
PF2D201



Series PF2D

Description

Remote Type/Display Unit PF2D300, 301



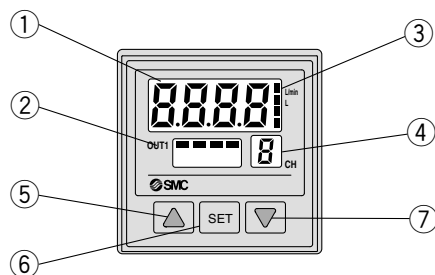
RESET button (▲ + ▼ button)

If the UP and DOWN buttons are pressed simultaneously, the RESET function will activate.

In case of an emergency, please clear the display. The display of the accumulated flow will be reset to zero.

①	LED display/Red	Displays the measured flow rate, each setting condition, and error code.
②	Output (OUT1) display/Green	Displays the output condition of OUT1. Illuminates when turned ON.
③	Output (OUT2) display/Red	Displays the output condition of OUT2. Illuminates when turned ON.
④	UP button (▲ button)	Use to change the mode or to increase the set value.
⑤	SET button (● button)	Use this button to set the value or the set mode.
⑥	DOWN button (▼ button)	Use to change the mode or decrease the set value.

4-channel Flow Monitor (Remote type/Display unit) PF2D200, 201



①	LED display/Orange	Displays the measured flow rate, each setting condition, and error code.
②	Switch output display/Red	Displays the output condition of OUT1 (CH1 to 4). Lights up when turned ON.
③	Unit display/Orange	Illuminates the selected unit. Use after putting the unit label other than l/min, l.
④	Channel display/Red	Displays the selected channel.
⑤	UP button (▲ button)	Use to change the mode or to increase the set value.
⑥	SET button	Use this button to set the value or the set mode.
⑦	DOWN button (▼ button)	Use to change the mode or decrease the set value.

Functions/PF2D

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

Flow rate measurement selection

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

Unit switching

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

GPM = gal (US)/min

Note) Fixed SI unit (ℓ/min, ℓ, m³ or m³×10) will be set for the type without the unit switching function.

Flow rate measuring unit confirmation

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

Error correction

For PF2D300/301

LED display	Contents	Solution
Er 1	A current of more than 80 mA is flowing to OUT1.	Check the load and the wiring for OUT1.
Er 2	A current of more than 80 mA is flowing to OUT2.	Check the load and the wiring for OUT2.
Er 4	The set data has changed for some reason.	Perform the RESET operation, and reset all the data again.
---	The flow rate is over the flow rate measurement range.	Use an adjustment valve, etc. to reduce the flow rate until it is within the flow rate range.

For PF2D200/201

LED display	Contents	Solution
Er 1	Over current is flowing to the load of a switch output.	Shut off the power supply. After eliminating the output factor that caused the excess current, turn the power supply back on.
Er 0	Internal data error.	Contact P/A.
Er 7	Internal data error.	
Er 10	Internal data error.	
Er 5	Internal data error.	Shut off the power supply and then reset the switch.
Er 6	Internal data error.	
---	The flow rate is over the flow rate measurement range.	Use an adjustment valve, etc. to reduce the flow rate until it is within the flow rate range.

Key lock

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

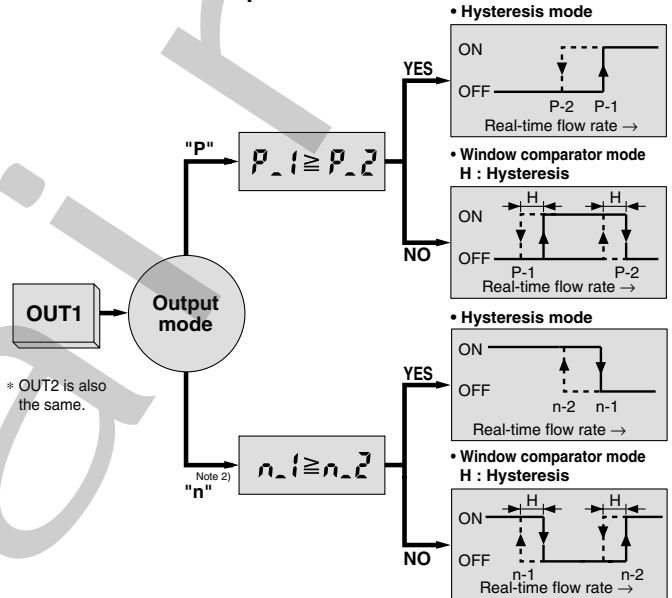
Accumulation clearance

This is to clear the accumulated value.

Output types

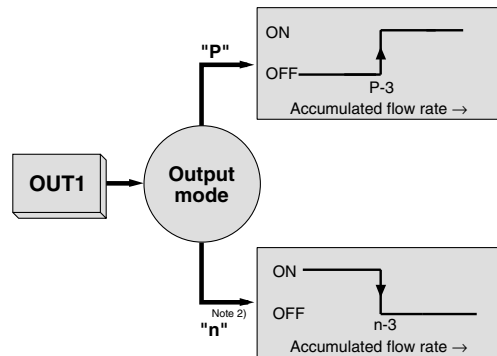
Real-time switch output, accumulated switch output, or accumulated pulse output can be selected as an output type.

Real-time switch output



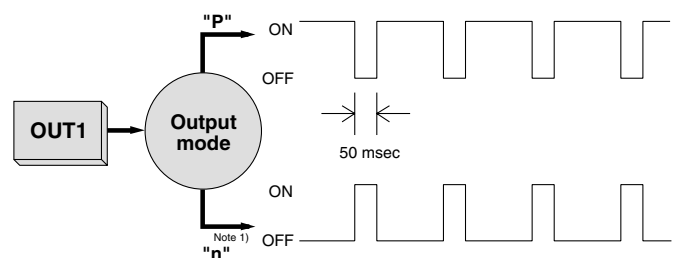
Note 2) Output mode is set to inverted output at the factory before shipment.

Accumulated switch output



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

Accumulated pulse output



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

Series PF2D

Functions

Copy function (PF2D200, 201 only)

Information to be copied is:

- ① Flow rate range
- ② Display mode
- ③ Display unit (Only available when the unit specification is nil.)
- ④ Output method
- ⑤ Output mode
- ⑥ Flow rate value

Peak hold, Bottom hold display function

(PF2D200, 201 only)

The maximum or minimum value can be held in the case where the real-time flow rate display mode is selected during the initial setting.

Channel select function (PF2D200, 201 only)

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

Channel scan function (PF2D200, 201 only)

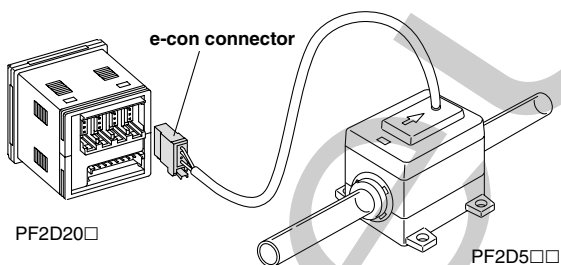
Changes displaying the channel shown every about 2 seconds and its detected flow rate.

Option

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

e-con connector

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

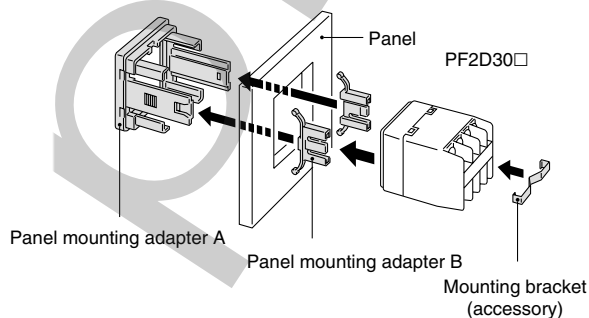


In addition to the connector shown above, those listed below (female contact) can be connected.

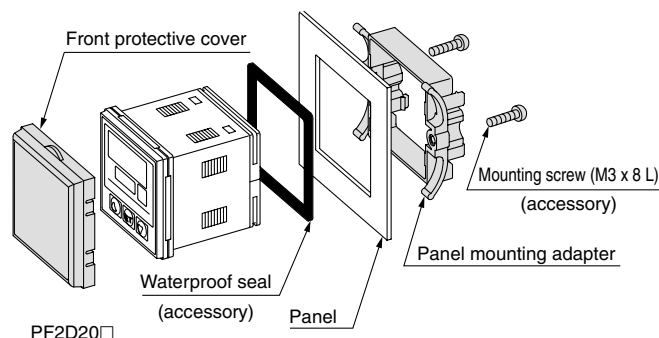
Manufacturer	Model
Sumitomo 3M Limited	37104-3101-000FL
Tyco Electronics AMP K.K.	1-1473562-4
OMRON Corp.	XN2A-1430

Panel mounting

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



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





Applicable Fluid

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

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

Note 1) The material and fluid compatibility check list provides reference values as a guide only.

Note 2) It is possible that some fluids are permeable depending on the type of fluid, its density and temperature. Any permeated fluid may affect the products life.

Thus, when using these fluid types, verify the fluid in advance by testing it, prior to making a decision to use it.

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

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

