ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *SMC PFA750-01-27* at our website: *Click HERE*

SMC



Integrated Type Remote Type

Digital Flow Switches

For Air For Water

Series PFA/PFW



Series PFW water digital flow switches are better than ever.
Our product lineup now includes 100*l*/min flow rate
and high temperature fluid types.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Digital Flow Switches

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

Bright and easy to read LED display/digital setting

A new LCD display is used for the high flow rate type switches (PFA703H, PFA706H, and PFA712H) in order to reduce power consumption without losing visibility.

Two independent flow rate settings are possible.

Two types for different applications

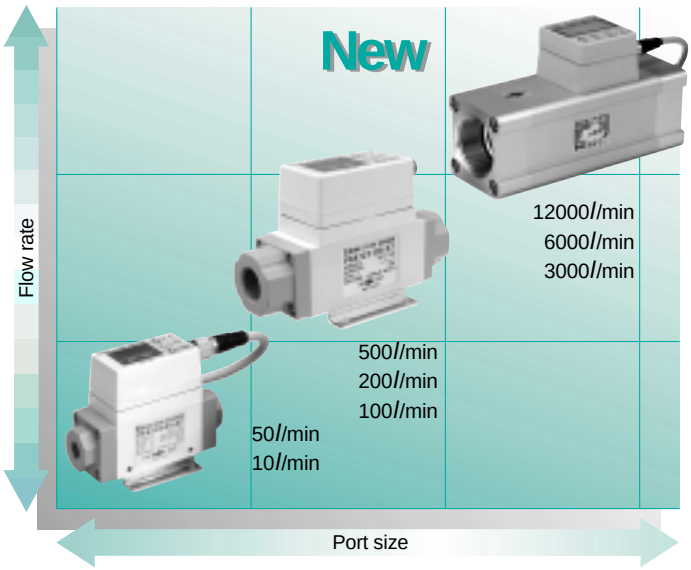
Integrated and remote type displays

Water resistant construction conforming to IP65

Switching from real-time flow rate to accumulated flow is possible.

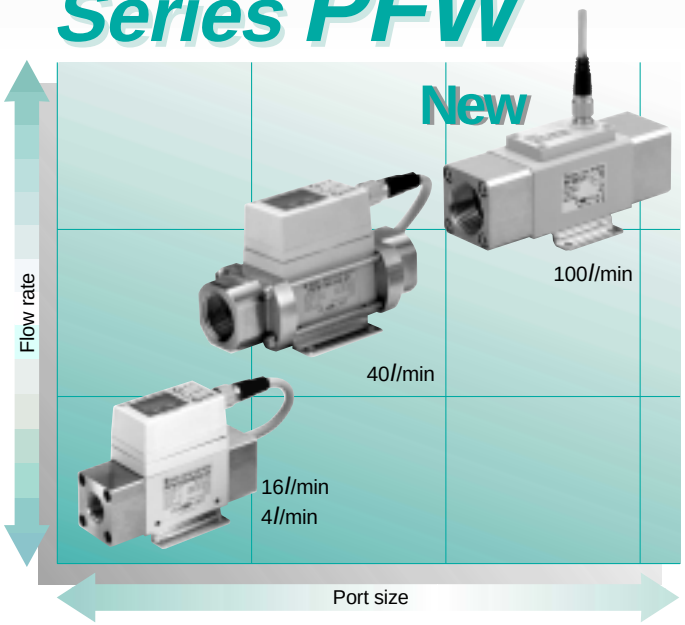
Digital Flow Switches **for Air**

Series PFA



Digital Flow Switches **for Water**

Series PFW



For Air Series variations

Integrated display type	Remote type		Flow rate measurement range /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
PFA710	PFA30□	PFA510	1 to 10	●			●	●					
PFA750		PFA550	5 to 50	●			●	●					
PFA711	PFA31□	PFA511	10 to 100	●	●				●				
PFA721		PFA521	20 to 200	●	●				●				
PFA751		PFA551	50 to 500	●	●					●			
PFA703H	—	—	150 to 3000	●	●	●					●		
PFA706H			300 to 6000	●	●	●						●	
PFA712H			600 to 12000	●	●	●							●

For Water Series variations

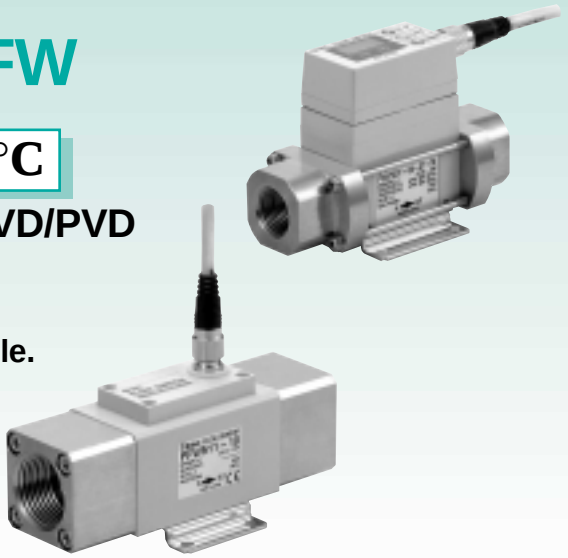
Integrated display type	Remote type		Flow rate measurement range /min	Output specifications		Port size (Rc, NPT, G)			
	Display unit	Sensor unit		Switch output	Analog output	3/8	1/2	3/4	1
PFW704	PFW31□	PFW504	0.5 to 4	●	●	●			
PFW720	PFW30□	PFW520	2 to 16	●	●	●	●		
PFW740	PFW32□	PFW540	5 to 40	●	●		●	●	
PFW711	PFW33□	PFW511	10 to 100	●	●			●	●

For High Temperature Fluid (Water) Series variations

Integrated display type	Remote type		Flow rate measurement range /min	Output specifications		Port size (Rc, NPT, G)			
	Display unit	Sensor unit		Switch output	Analog output	3/8	1/2	3/4	1
PFW704T	PFW31□	PFW504T	0.5 to 4	●	●	●			
PFW720T	PFW30□	PFW520T	2 to 16	●	●	●	●		
PFW740T	PFW32□	PFW540T	5 to 40	●	●		●	●	

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

New For Water: Series PFW



For high temperature fluid: 0° to 90°C

Able to control cooling water used in CVD/PVD processes and metal die casting.

- 3 different flow rates: up to 4/, 16/, and 40/
- Integrated and remote type displays are available.

100/min type

Flow rate measurement: up to 100/

Analog output

Analog output selection for all models is possible with a remote type switch.

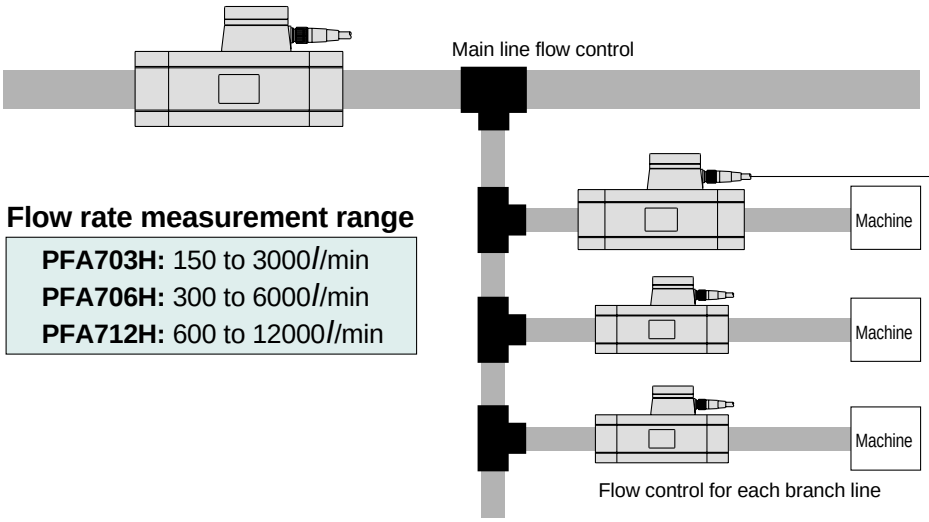
For Air: Series PFA Introducing



High flow rate switches with maximum flow rates of:

3000/6000/12000/min.

High flow type switches conserve energy and make possible the monitoring of air flow from the main line to each branch line.



- The accumulated pulse output function (100/pulse) enables remote monitoring of accumulated flow.

100/pulse

Pulse counter

- Both analog output (1 to 5VDC, 4 to 20mA) and switch output are possible.

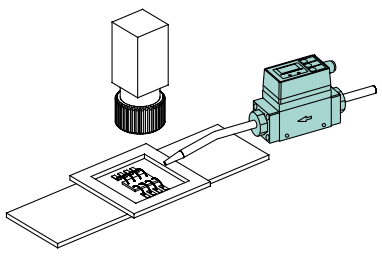
Flow rate measurement range

PFA703H:	150 to 3000/min
PFA706H:	300 to 6000/min
PFA712H:	600 to 12000/min

Application examples

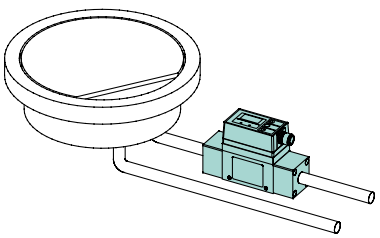
For Air

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

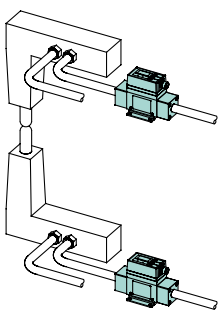


For Water

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



Flow control of pressurized cooling water for welding gun



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

For Air

Digital Flow Switch

Series PFA



How to Order

Integrated Display Type **PFA7 10 – □ 01 – 27 □ – □**

Flow rate range

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

Thread type

Nil	Rc
N	NPT
F	G

Port size

Symbol	Port size	Flow rate (l/min) 10	50	100	200	500	Applicable models
01	1/8	●	●				PFA710, PFA750
02	1/4	●	●				
03	3/8			●	●		PFA711, PFA721
04	1/2					●	PFA751

Wiring specification

Nil	3m lead wire with connector
N	Without lead wire

Output specification

	Output specification	Applicable models
27	NPN open collector 2 outputs	PFA710, PFA750 PFA711, PFA721, PFA751
28	NPN open collector 1 output + Analog output (1 to 5V)	PFA711, PFA721, PFA751
67	PNP open collector 2 outputs	PFA710, PFA750 PFA711, PFA721, PFA751
68	PNP open collector 1 output + Analog output (1 to 5V)	PFA711, PFA721, PFA751

Unit specification

Nil	With unit switching function
M	Fixed SI unit Note)

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

Specifications

Model		PFA710	PFA750	PFA711	PFA721	PFA751
Measured fluid		Dry air, N_2				
Detection type		Heater type				
Flow rate measurement range		1 to 10l/min	5 to 50l/min	10 to 100l/min	20 to 200l/min	50 to 500l/min
Minimum setting unit		1% of maximum flow rate				
Note 1) Display units	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 pressure range		0 to 0.5MPa				
Proof pressure		1.0MPa				
Pressure loss		3kPa (at 50l/min)		3kPa (at 100l/min)	10kPa (at 200l/min)	30kPa (at 500l/min)
Accumulated flow range		0 to 999999l				
Operating temperature range		0° to 50°C (with no condensation)				
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), ±5% F.S. or less (0° to 50°C)				
Note 2) Output specifications	Switch output	NPN open collector	Maximum load current: 80mA; Internal voltage drop: 1V or less (with load current of 80mA) Maximum applied voltage: 30V			
		PNP open collector	Maximum load current: 80mA Internal voltage drop: 1.5V or less (with load current of 80mA)			
	Analog output	—		Output voltage: 1 to 5V Load impedance: 100kΩ or more		
Indicator lights		**27, 67**: Lights up when output is ON OUT1: Green; OUT2: Red		**27, 67**: Lights up when output is ON OUT1: Green; OUT2: Red **28, 68**: Lights up when output is ON OUT1: Green; OUT2: None		
Response time		1 sec. or less				
Hysteresis		Hysteresis mode: Variable (can be set from 0), Window comparator mode: 3-digit fixed Note 3)				
Power supply voltage		12 to 24VDC (ripple ±10% or less)				
Current consumption		150mA or less		160mA or less		170mA or less
Withstand voltage		1000VAC for 1 min. between external terminal and case				
Insulation resistance		50MΩ (500VDC) between external terminal and case				
Noise resistance		1000Vp-p, Pulse width 1μs, Rise time 1ns				
Vibration resistance		10 to 500Hz at whichever is smaller: 1.5mm amplitude or 98m/s² acceleration, in X, Y, Z directions for 2 hrs. each				
Impact resistance		490m/s² in X, Y, Z directions 3 times each				
Weight		250g (without lead wire)		290g (without lead wire)		
Enclosure		IP65				
Port size (Rc, NPT, G)		1/8, 1/4		3/8		1/2

Note 1) 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 2) The output functions operate only for the real-time flow rate display, and do not operate for the accumulated flow display.
Note 3) Window comparator mode — Since hysteresis will reach 3 digits, keep P1 and P2 apart by 7 digits or more. The minimum setting unit is 1 digit. (Refer to the table above.)
∗ Flow rate units measured under the following conditions: 0°C and 101.3kPa.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

How to Order



Remote Type Display Unit

PFA3 0 0 — A — □

Flow rate range

0	10, 50 l/min
1	100, 200, 500 l/min

Mounting

A	Panel mounting
B	DIN rail, wall mounting

Unit specification

Nil	With unit switching function
M	Fixed SI unit Note)

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

Output specification

Nil	Output specification	Applicable models
0	NPN open collector 2 outputs	PFA30□, PFA31□
1	PNP open collector 2 outputs	
2	NPN open collector 1 output + Analog output (1 to 5V)	PFA31□
3	PNP open collector 1 output + Analog output (1 to 5V)	

∗ PFA302 and 303 combinations are not available.

Specifications

Model		PFA300	PFA301	PFA310	PFA311	PFA312	PFA313
Flow rate measurement range		1 to 10, 5 to 50 l/min		10 to 100 l/min, 20 to 200 l/min 50 to 500 l/min			
Minimum setting unit		1% of maximum flow rate					
Display units Note 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}					
Accumulated flow range		0 to 999999 l					
Operating temperature range		0° to 50°C (with no condensation)					
Linearity Note 3)		±5% F.S. or less					
Repeatability		±1% F.S. or less Note 3)		±1% F.S. or less			
Temperature characteristics		±1% F.S. or less (15° to 35°C) ±2% F.S. or less (0° to 50°C)					
Output Specifications Note 4)	Switch output	NPN open collector	Maximum load current: 80mA Maximum applied voltage: 30V Internal voltage drop: 1V or less (with load current of 80mA)				
		PNP open collector	Maximum load current: 80mA Internal voltage drop: 1.5V or less (with load current of 80mA)				
	Analog output	—				Output voltage: 1 to 5V Load impedance: 100kΩ or more	
Indicator lights		Lights up when output is ON OUT1: Green; OUT2: Red				Lights up when output is ON OUT1: Green; OUT2: None	
Response time		1 sec. or less					
Hysteresis		Hysteresis mode: Variable (can be set from 0), Window comparator mode: Fixed (3 digits) Note 5)					
Power supply voltage		12 to 24VDC (ripple ±10% or less)					
Current consumption		50mA or less		60mA or less			
Enclosure		IP40					
Weight		45g					

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) System accuracy when combined with sensor unit.
Note 4) The output functions operate only for the real-time flow rate display, and do not operate for the accumulated flow display.
Note 5) Window comparator mode — Since hysteresis will reach 3 digits, keep P1 and P2 apart by 7 digits or more. The minimum setting unit is 1 digit. (Refer to the table above.)
∗ Flow rate units measured under the following condtions: 0°C and 101.3kPa.

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

How to Order

Remote Type Sensor Unit

PFA5 10 — □ 01 □



Flow rate range

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

Thread type

Nil	Rc
N	NPT
F	G

Wiring specification

Nil	3m lead wire with connector
N	Without lead wire

Port size

Symbol	Port size	Flow rate (l/min) 10	50	100	200	500	Applicable models
01	1/8	●	●				PFA510, PFA550
02	1/4	●	●				
03	3/8			●	●		PFA511, PFA521
04	1/2					●	PFA551

Specifications

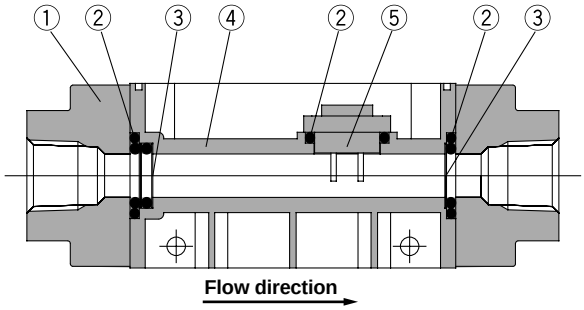
Model	PFA510	PFA550	PFA511	PFA521	PFA551
Measured fluid	Dry air, N_2				
Detection type	Heater type				
Flow rate measurement range	1 to 10/min	5 to 50/min	10 to 100/min	20 to 200/min	50 to 500/min
Operating pressure range	0 to 0.5MPa				
Proof pressure	1.0MPa				
Pressure loss	3kPa (at 50/min)		3kPa (at 100/min)	10kPa (at 200/min)	30kPa (at 500/min)
Operating temperature range	0° to 50°C (with no condensation)				
Linearity Note 1)	±25% F.S. or less		±20% F.S. or less		
Repeatability	±1% F.S. or less Note 2)		±1% F.S. or less		
Temperature characteristics	±2% F.S. or less (15° to 35°C) ±3% F.S. or less (0° to 50°C)				
Power supply voltage	12 to 24VDC (ripple ±10% or less)				
Current consumption	100mA or less				110mA or less
Weight	200g (without lead wire)		240g (without lead wire)		
Enclosure	IP65				
Port size (Rc, NPT, G)	1/8, 1/4		3/8		1/2

Note 1) The system accuracy will be adjusted to ±5% F.S. or less when combined with PFA3□□.
Note 2) The system accuracy will be adjusted to ±1% F.S. or less when combined with PFA30□.
∗ Flow rate unit measured under the following conditions: 0°C and 101.3kPa.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Sensor Unit Construction

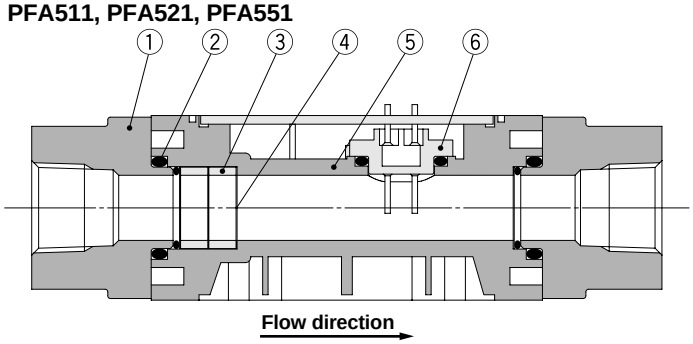
PFA710, PFA750
PFA510, PFA550



Parts list

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

PFA711, PFA721, PFA751
PFA511, PFA521, PFA551



Parts list

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

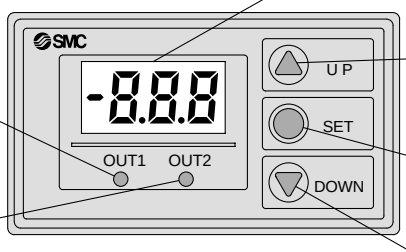
Press the ▲ and ▼ buttons simultaneously to activate the RESET function.
This clears the unit when an abnormality occurs and resets the accumulated flow display to "0".

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.

Error Correction

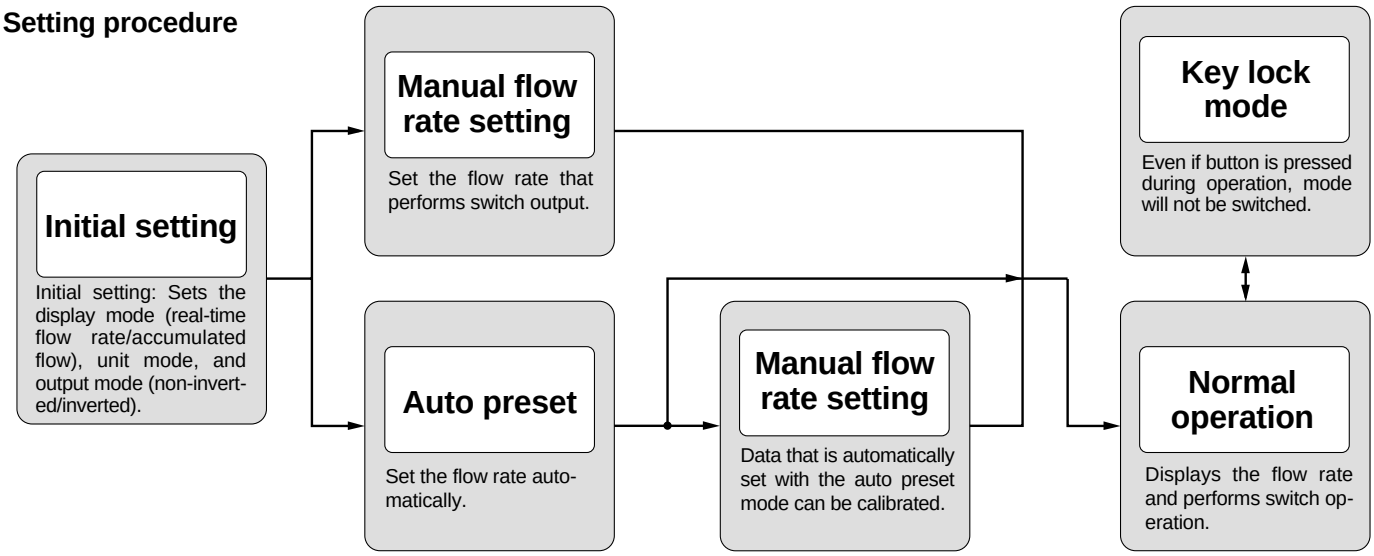
Take the following corrective solutions when errors occur.

LED display	Contents	Solution
Er1	A current of more than 80mA is flowing to OUT1.	Check the load and wiring for OUT1.
Er2	A current of more than 80mA is flowing to OUT2.	Check the load and wiring for OUT2.
Er4	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 (for air only).	Reduce the flow rate until it is within the flow rate measurement range, using an adjustment valve.

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Flow Rate Setting

Setting procedure



Initial setting

Note) Operation is the same for the integrated display type and the remote type (display unit).

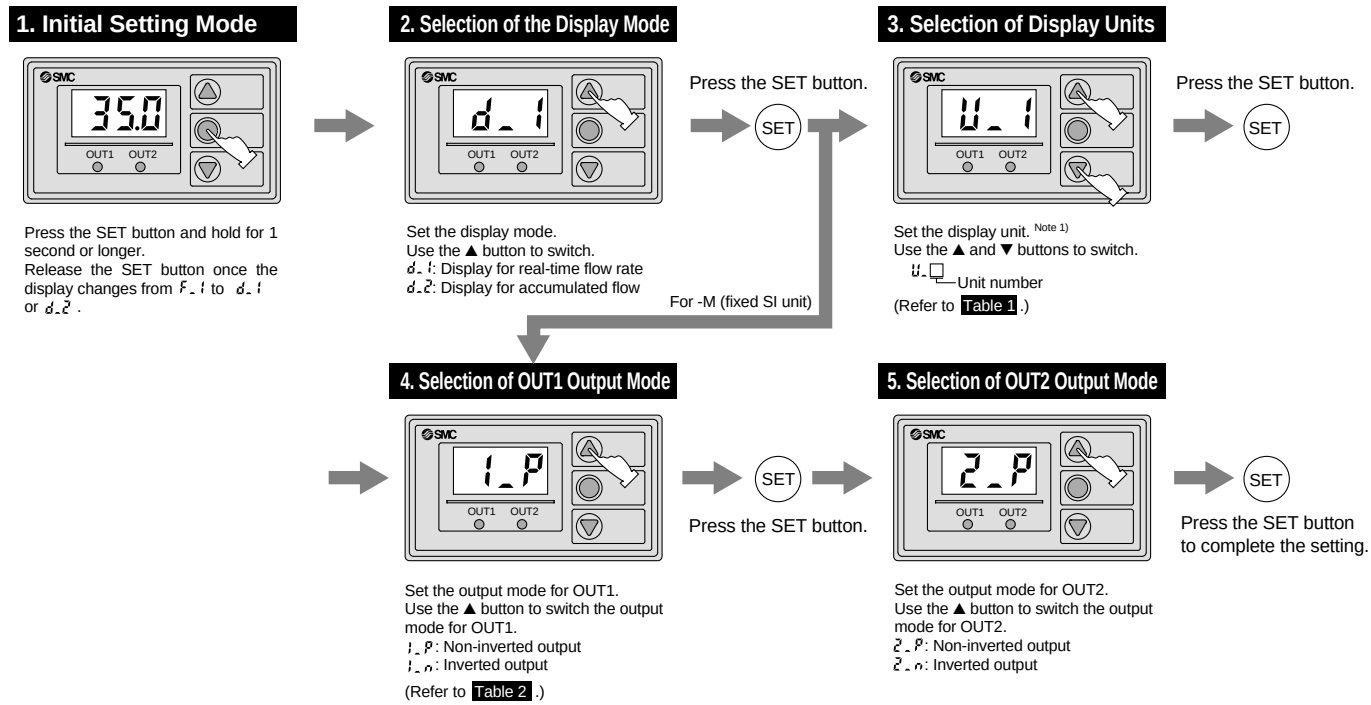


Table 1 Note 1)

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 = ft^3/min

For water

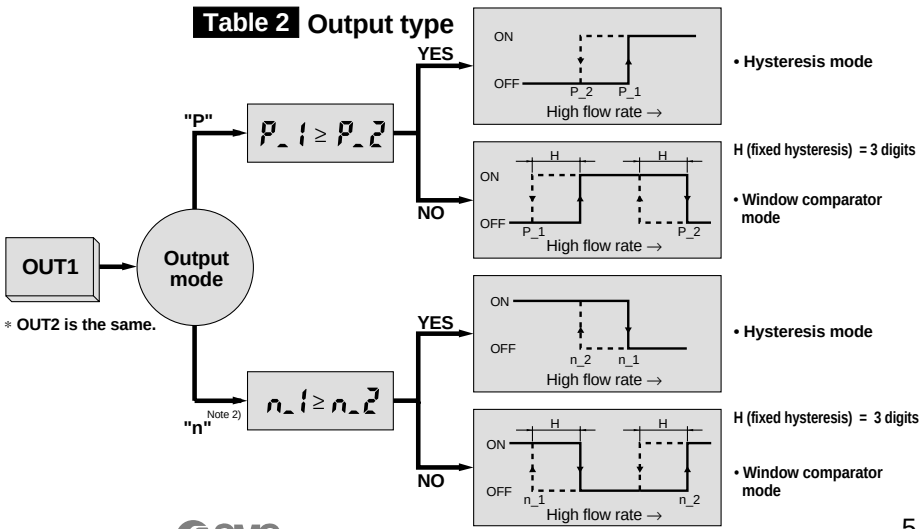
Display	Real-time flow rate	Accumulated flow
U_1	l/min	l
U_2	GPM	gal (US)

GPM = gal (US)/min

Note 1) For digital flow switch with unit switching function (Fixed SI unit [l/min or l] will be set for the type without the unit switching function.)

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

Table 2 Output type

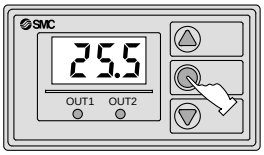


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Flow Rate Setting

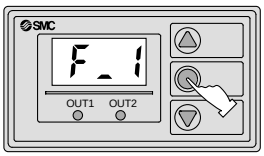
Flow rate setting mode (manual)

1. Set Value Input Mode (Manual)



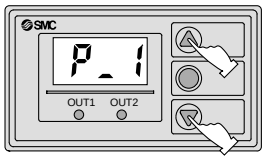
Press the SET button.
(Refer to **Table 2** for the relationship between each value and the switch output.)

2. Manual Mode Setting



Press the SET button when F_1 is displayed.

3. Setting the first (1) Value for OUT 1

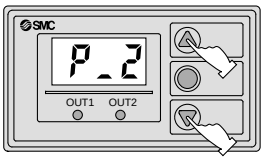


SET

Press the SET button.

Set the first (1) value for OUT1.
The value you set and P_1 (or n_1) will be alternately displayed.
▲ button: Increases the set value.
▼ button: Decreases the set value.

4. Setting the second (2) Value for OUT 1

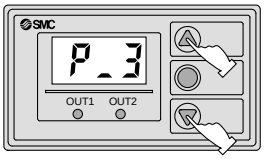


SET

Press the SET button.

Set the second (2) value for OUT1.
The value you set and P_2 (or n_2) will be alternately displayed.
▲ button: Increases the set value.
▼ button: Decreases the set value.

5. Setting the first (1) Value for OUT2

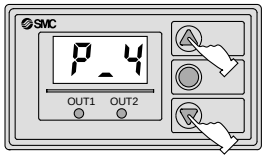


SET

Press the SET button.

Set the first (1) value for OUT2.
The value you set and P_3 (or n_3) will be alternately displayed.
▲ button: Increases the set value.
▼ button: Decreases the set value.

6. Setting the second (2) Value for OUT 2



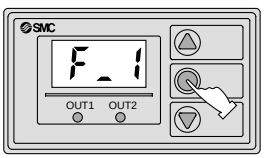
SET

Press the SET button to complete the setting.

Set the second (2) value for OUT2.
The value you set and P_4 (or n_4) will be alternately displayed.
▲ button: Increases the set value.
▼ button: Decreases the set value.

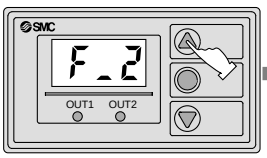
Flow rate setting mode (auto preset)

1. Set value Input Mode



Press the SET button, and release it as soon as F_1 is displayed.

2. Setting in the Auto Preset Mode

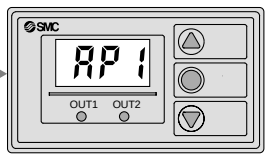


SET

Press the SET button.

Press the ▲ button to switch the display to F_2.

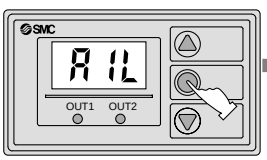
3. Auto Preset Preparations



This mode prepares equipment for the OUT1 setting. Flow for switch output will start.

(When the OUT1 setting is not required, press the ▲ and ▼ buttons simultaneously in this mode.)

4. OUT1 Auto Preset

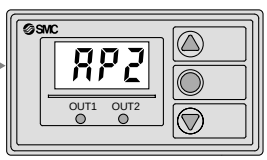


SET

Press the SET button.

When the SET button is pressed at this point, the optimum value will calculated and input set automatically.
A1L and the input value will be alternately displayed.

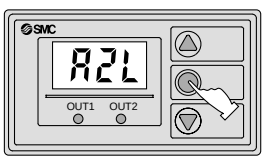
5. Auto Preset Preparations



Prepares equipment for the OUT 2 setting.

(When the OUT2 setting is not required, press the ▲ and ▼ buttons simultaneously in this mode.)

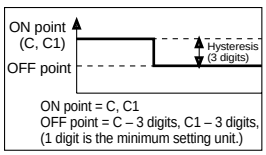
6. OUT2 Auto Preset



SET

Press the SET button to complete the setting.

When the SET button is pressed at this point, the optimum value will be calculated and input automatically.
A2L and the input value will be alternately displayed.

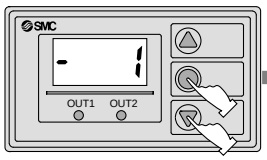


SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

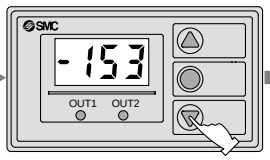
Other functions

• Accumulated flow function

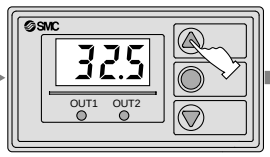
Start of Accumulation



Start accumulation.
Press the SET button while pressing the ▼ button at the same time.
The - mark blinks and accumulation begins.

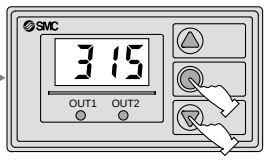


Up to 999999 (*l*) of flow can be accumulated, but normally only the lower 3 digits are displayed. Press the ▼ button to verify the upper 3 digits.



Press the ▲ button to verify the real-time flow rate during accumulation.

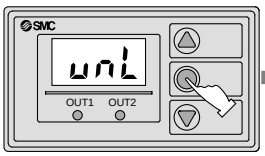
Stopping Accumulation



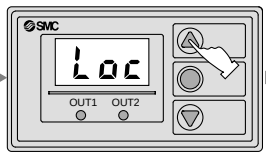
Press the SET button while pressing the ▼ button at the same time.
The display fixes upon the current accumulated value and stops. To start further accumulation from this point, press the SET button while pressing the ▼ button at the same time.
Press the ▲ and ▼ buttons simultaneously and hold for 2 seconds or longer to clear the display.

• Key lock mode --- Prevents incorrect operations of the button control.

Start of Key Lock Function



Press the SET button and hold it for 3 seconds or longer.
Release the SET button when the display changes from F.1 to d.1 and displays unL.

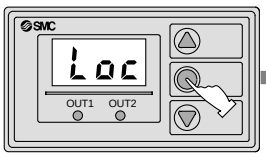


Use the ▲ button to display Loc.

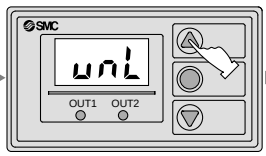


Press the SET button to complete the setting.

Release of Key Lock Function



Press the SET button and hold it for 3 seconds or longer.
Release the SET button when Loc is displayed.



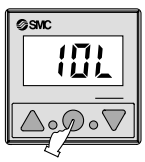
Use the ▲ button to display unL.



Press the SET button to complete the setting.

• Switching the flow rate range of the remote type (for air)

Switching Flow Rate Range



Press the SET button and hold it for 4 seconds or longer. the values shown in **Table 3** will be displayed.



Use the ▲ button to select the desired flow rate range.



Press the SET button to complete the setting.

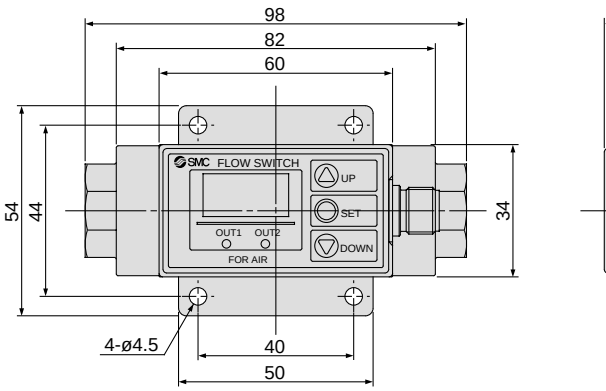
Table 3

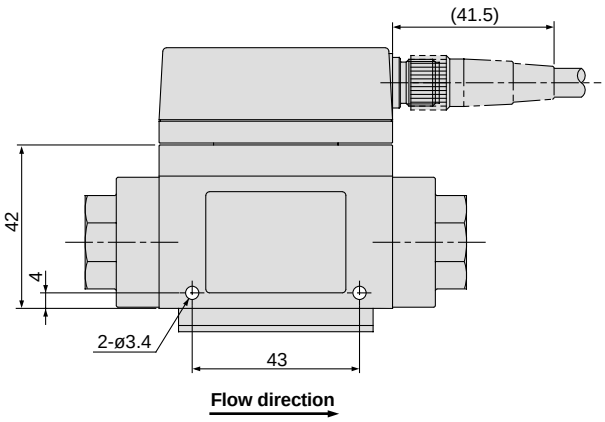
Display	Flow rate range	Applicable model
10L	1 to 10/min	For PFA30□
50L	5 to 50/min	
1 1L	10 to 100/min	For PFA31□
2 1L	20 to 200/min	
5 1L	50 to 500/min	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

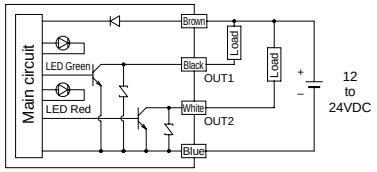
Dimensions: Integrated Display Type for Air

PFA710, PFA750

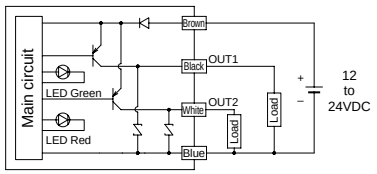




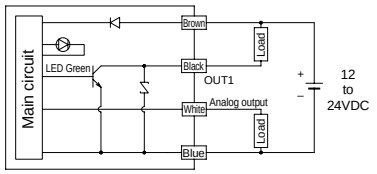
Internal circuits and wiring examples



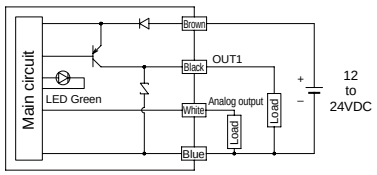
PFA7□□-□□-27□(-M)



PFA7□□-□□-67□(-M)

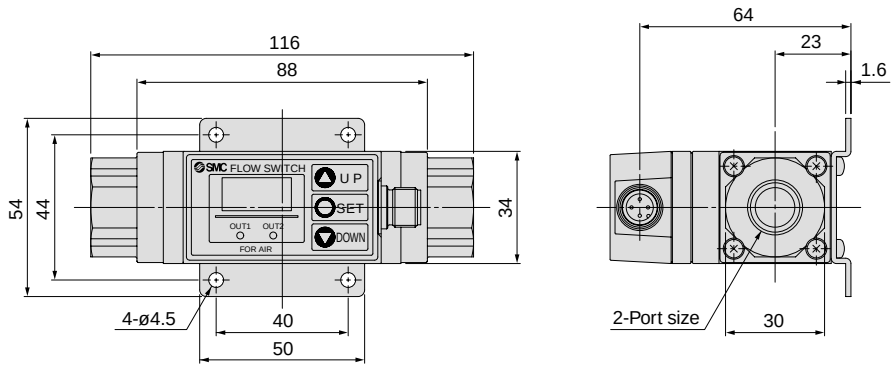


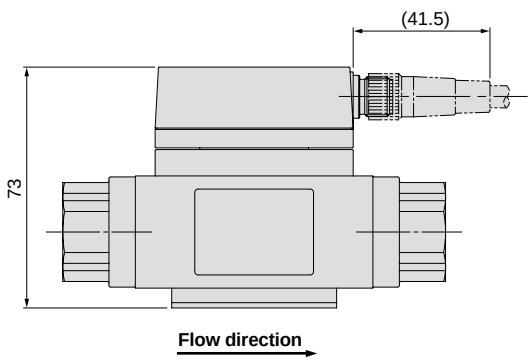
PFA7□1-□□-28□(-M)



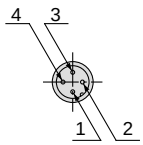
PFA7□1-□□-68□(-M)

PFA711, PFA721, PFA751





Connector pin numbers

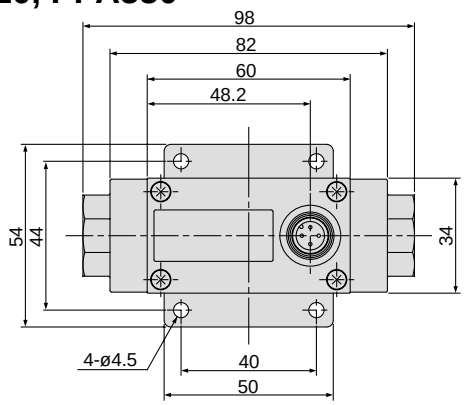


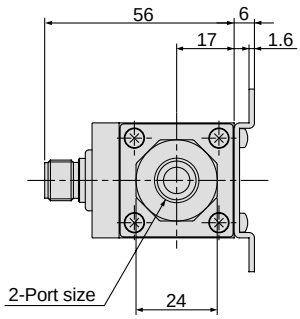
Pin no.	Pin description
1	DC(+)
2	OUT2/Analog output
3	DC(–)
4	OUT1

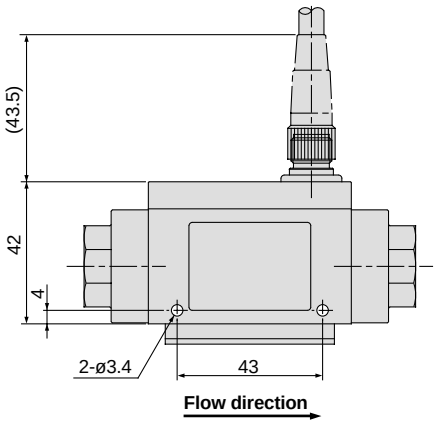
SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Dimensions: Remote Type Sensor Unit for Air

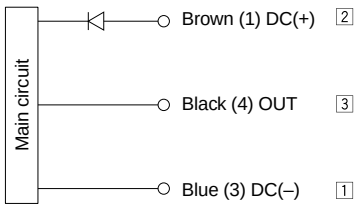
PFA510, PFA550





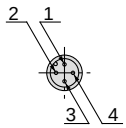


Wiring



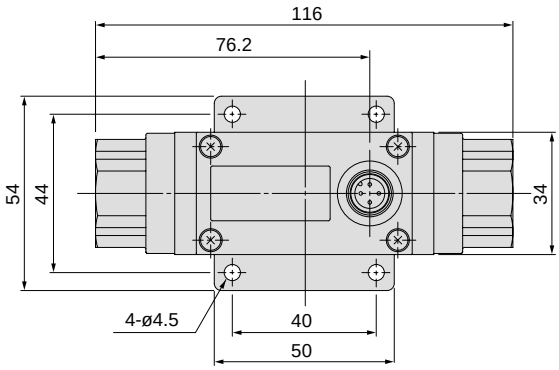
∗ Use this sensor by connecting to SMC remote type display unit Series PFA3□□.
(1), (3), and (4) are connector pin numbers.
1, 2, and 3 are terminal numbers for Series PFA3□□.

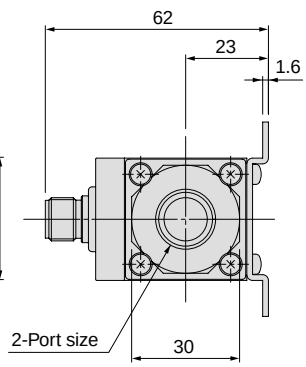
Connector pin numbers

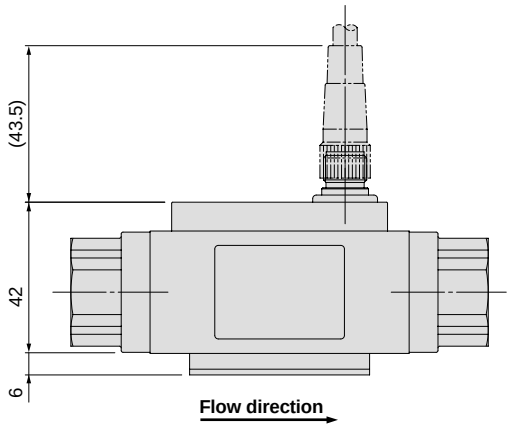


Pin no.	Pin description
1	DC(+)
2	NC
3	DC(–)
4	OUT

PFA511, PFA521, PFA551





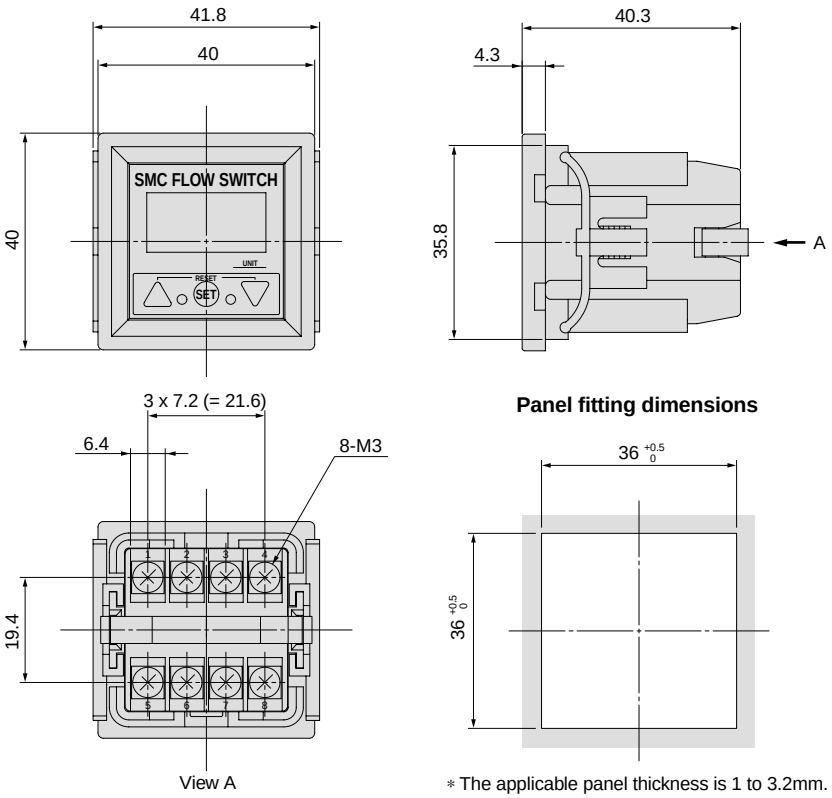


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Dimensions: Remote Type Display Unit for Air

PFA3□□-A

Panel mounting type

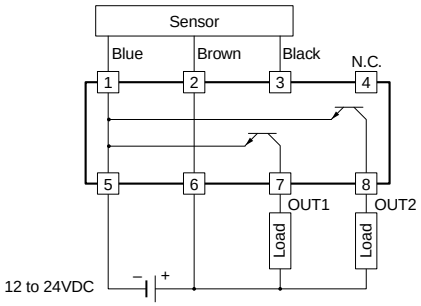


Panel fitting dimensions

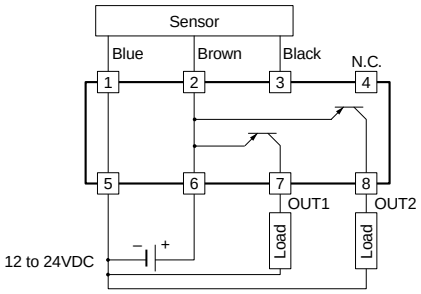
∗ The applicable panel thickness is 1 to 3.2mm.

Internal circuits and wiring examples

1 to 8 are terminal numbers.



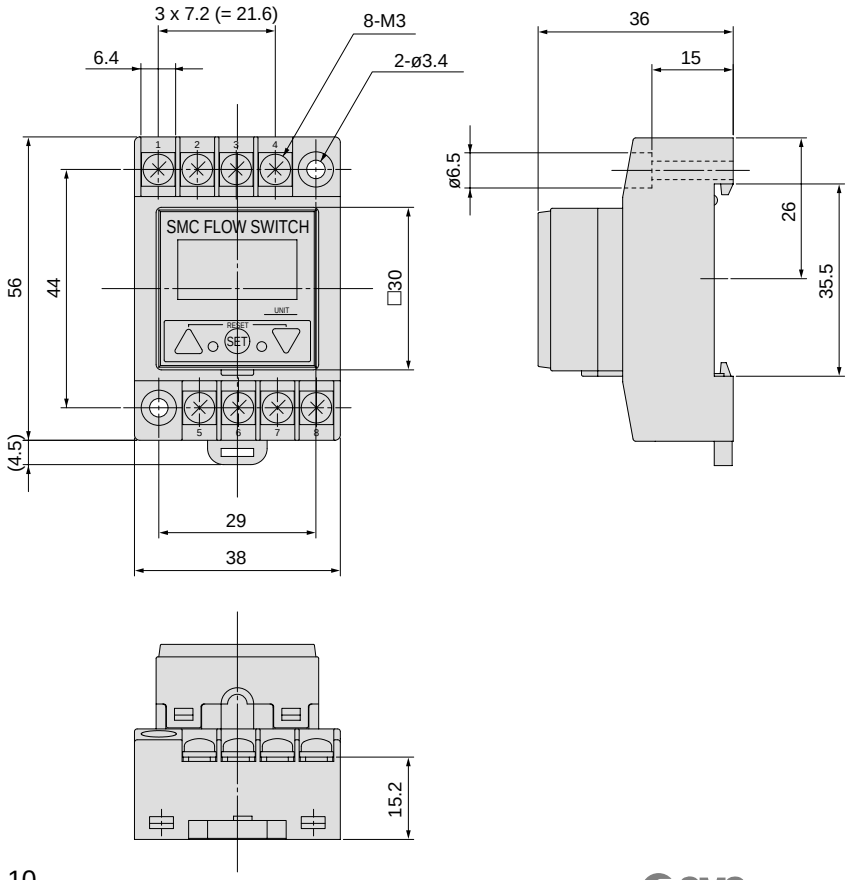
PFA3□0-□(-M)

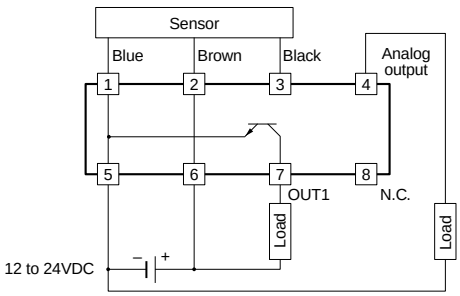


PFA3□1-□(-M)

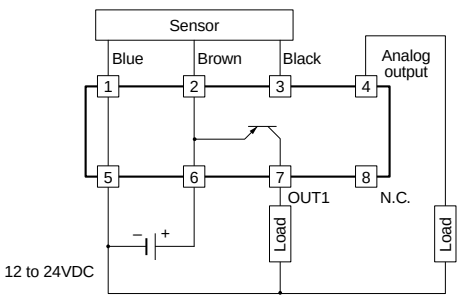
PFA3□□-B

DIN rail type





PFA312-□(-M)



PFA313-□(-M)

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

For Air

Digital Flow Switch/High Flow Rate Type

Series PFA



How to Order

Integrated Display Type

PFA7 □ H — □ □ — □ □ — □

Flow rate range

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

High flow rate type

Port specification

Nil	Rc
N	NPT
F	G

Port size

Symbol	Port size	Flow rate (/min) 3000	6000	12000	Applicable model
10	1	●			PFA703H
14	1 1/2		●		PFA706H
20	2			●	PFA712H

Wiring specification

Nil	3m lead wire with connector
N	Without lead wire

Output specification

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

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

Unit specification

Nil	With unit switching function
M	Fixed SI unit Note)

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

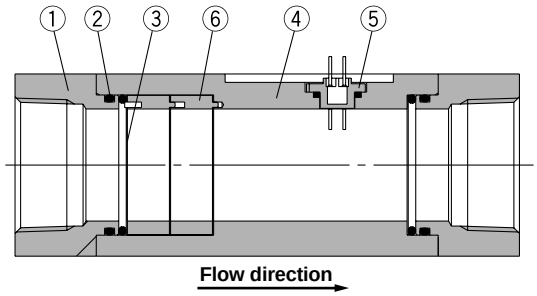
Specifications

Model		PFA703H	PFA706H	PFA712H
Measured fluid		Dry air		
Detection type		Heater type		
Flow rate measurement range Note 5)		150 to 3000/min	300 to 6000/min	600 to 12000/min
Minimum setting unit Note 5)		5/min	10/min	
Display units Note 1)	Real-time flow rate	/min, CFM		
	Accumulated flow	, m³, m³ x 10³, ft³, ft³ x 10³, ft³ x 10⁶		
Operating pressure range		0.1 to 1.5MPa		
Proof pressure		2.25MPa		
Pressure loss		20kPa (at maximum flow rate)		
Accumulated flow range		0 to 9,999,999,999		
Operating temperature range		0° to 50°C (with no condensation)		
Linearity Note 2)		±1.5% F.S. or less (0.7MPa, at 20°C)		
Repeatability		±1.0% F.S. or less (0.7MPa, at 20°C)		
Pressure characteristics		±1.5% F.S. or less (0.1 to 1.5MPa, based on 0.7MPa)		
Temperature characteristics		±2.0% F.S. or less (0° to 50°C, based on 25°C)		
Output specifications	Switch output Note 3)	NPN open collector Max. load current: 80mA; Max. applied voltage: 30V; Internal voltage drop: 1V or less (with load current of 80mA)		
		PNP open collector Max. load current: 80mA; Internal voltage drop: 1.5V or less (with load current of 80mA)		
	Accumulated pulse output Note 3)	NPN or PNP open collector — Flow rate per pulse: 100/pulse, 10.0ft³/pulse; Pulse width: 50msec		
	Analog output Note 4)	Output voltage: 1 to 5V; Load impedance: 100kΩ or more		
		Output current: 4 to 20mA; Load impedance: 250Ω 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		24VDC (ripple ±10% or less)		
Current consumption		150mA or less		
Withstand voltage		1000VAC for 1 min. between external terminal and case		
Insulation resistance		50MΩ (500VDC) between external terminal and case		
Noise resistance		1000Vp-p, Pulse width 1μs, Rise time 1ns		
Vibration resistance		10 to 500Hz at whichever is smaller: 1.5mm amplitude or 98m/s² acceleration, in X, Y, Z directions for 2 hrs. each		
Impact resistance		490m/s² in X, Y, Z directions 3 times each		
Weight		1.1kg (without lead wire)	1.3kg (without lead wire)	2.0kg (without lead wire)
Enclosure		IP65		
Port size (Rc, NPT, G)		1	1 1/2	2

Note 1) For digital flow switch with unit switching function. (Fixed SI unit [(/min, or , m³ or m³ x 10³)] will be set for switch type without the unit switching function.)
Note 2) The high flow rate type is CE marked; however, the linearity with applied noise is ±5% F.S. or less.
Note 3) Switch output and accumulated pulse output selections are made using the button controls.
Note 4) The analog output operates only for real-time flow rate, and does not operate for accumulated flow.
Note 5) Flow rate display can be switched between the basic condition of 0°C, 101.3kPa and the standard condition (ANR) of 20°C, 101.3kPa, and 65% RH.

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

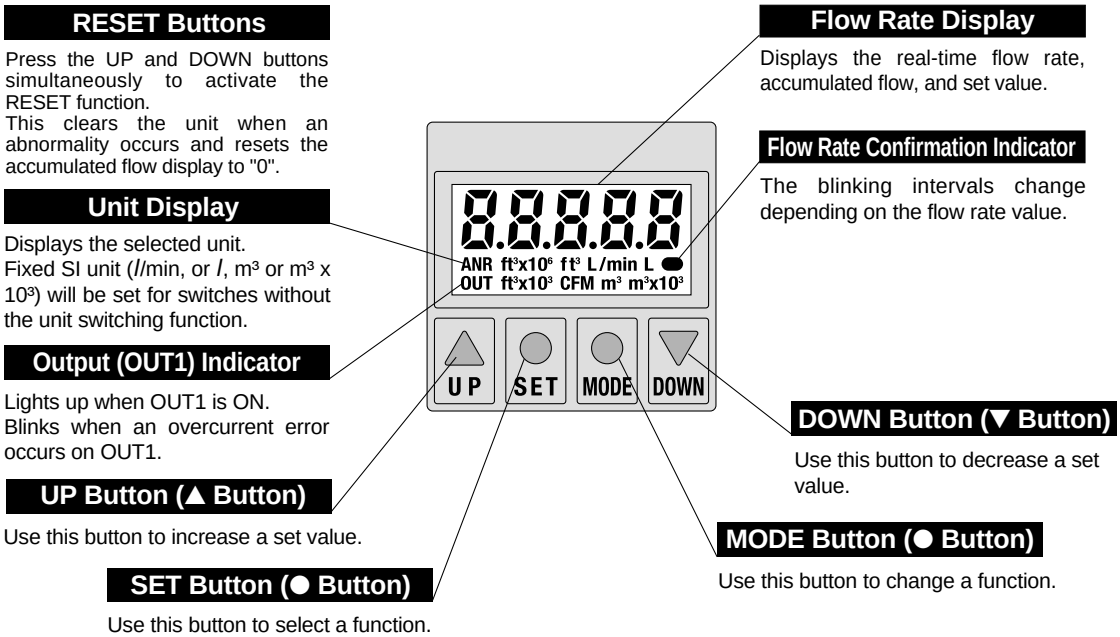
Construction



Parts list

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

Operating Unit Descriptions



Error Correction

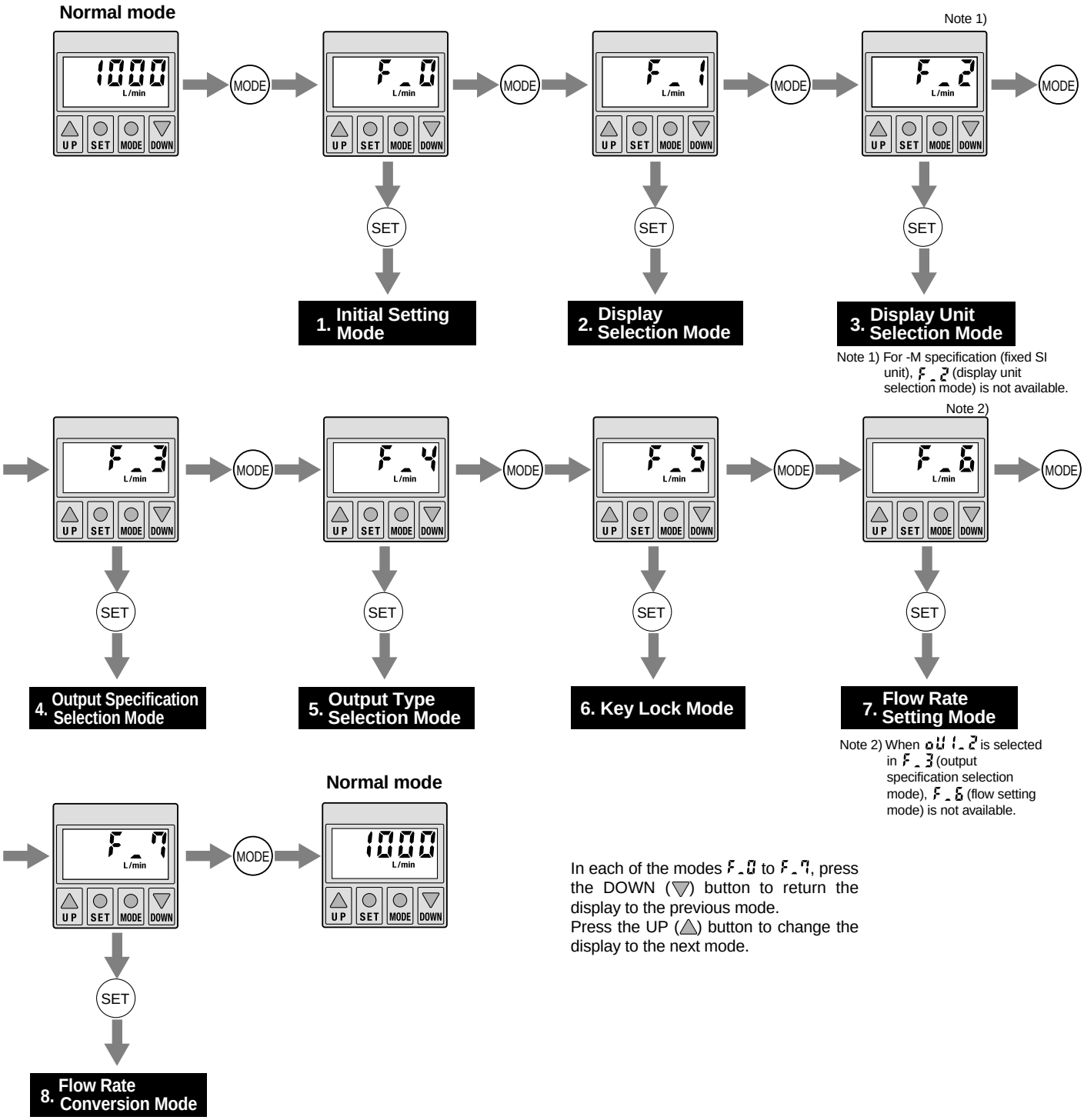
Take the following corrective solutions when errors occur.

LED display	Contents	Solution
Err 1	A current of more than 80mA is flowing to OUT1.	Check the load and wiring for OUT1.
Err 3	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 measurement range, using an adjustment valve.

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Operation

Function configuration



Note 1) For -M specification (fixed SI unit), F_2 (display unit selection mode) is not available.

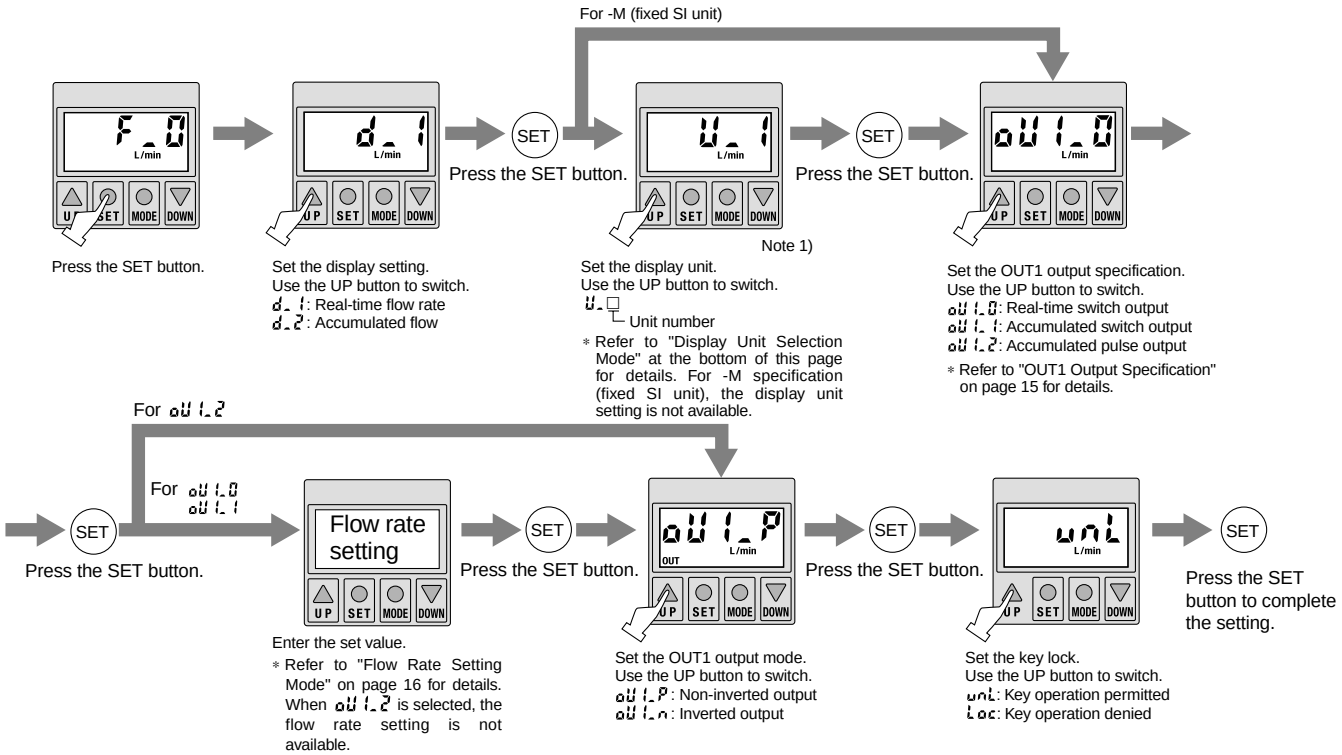
Note 2) When oUt_2 is selected in F_3 (output specification selection mode), F_6 (flow setting mode) is not available.

In each of the modes F_0 to F_7, press the DOWN (▽) button to return the display to the previous mode.
Press the UP (△) button to change the display to the next mode.

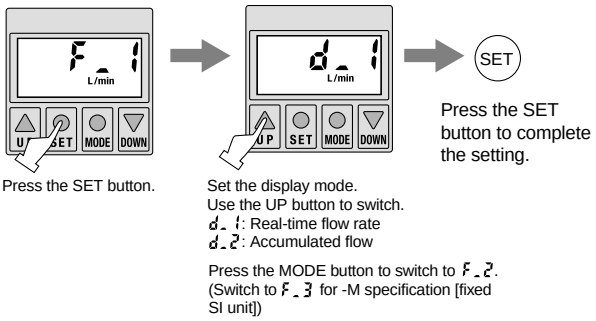
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Operation

1. Initial Setting Mode



2. Display Selection Mode



3. Display Unit Selection Mode

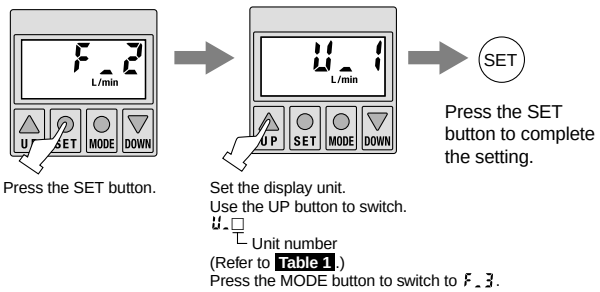


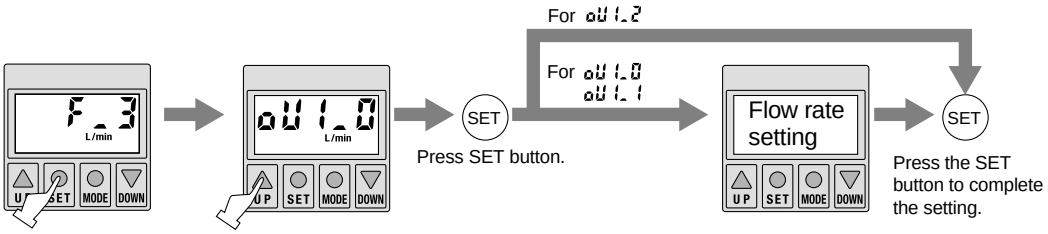
Table 1

Display	Real-time flow rate	Accumulated flow
U_1	/min	*l*, m³, m³ x 10³
U_2	CFM	ft³, ft³ x 10³, ft³ x 10⁶

Note) For the switch with unit switching function
(Fixed SI unit [/min, or *l*, m³ or m³ x 10³] will be set for switch types without unit switching function.)

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. Output Specification Selection Mode

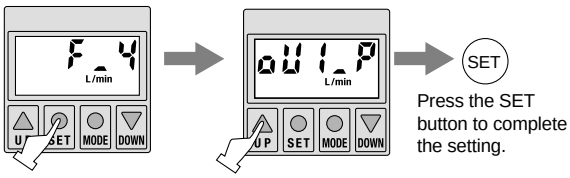


Press the SET button.

Set the OUT1 output specifications.
Use the UP button to switch.
oU1_0: Real-time switch output
oU1_1: Accumulated switch output
oU1_2: Accumulated pulse output
Refer to the OUT1 output specifications below.
Press the MODE button to switch to F_4.

Enter the set value.
* Refer to "Flow Rate Setting Mode" on page 16 or details. When oU1_2 is selected, the flow rate setting is not available.

5. Output Type Selection Mode



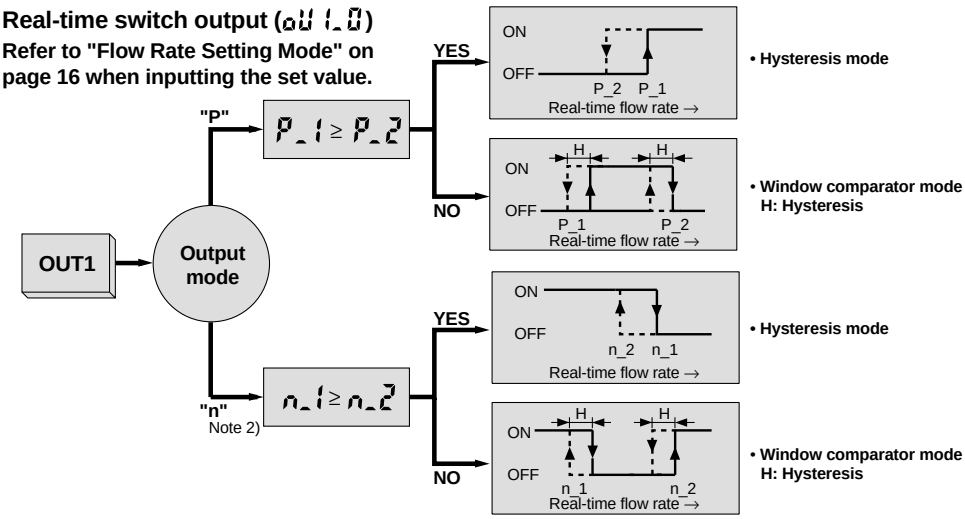
Press the SET button.

Set the OUT1 output mode.
Use the UP button to switch.
oU1_P: Non-inverted output
oU1_n: Inverted output
Press the MODE button to switch to F_5.

OUT1 Output Specifications

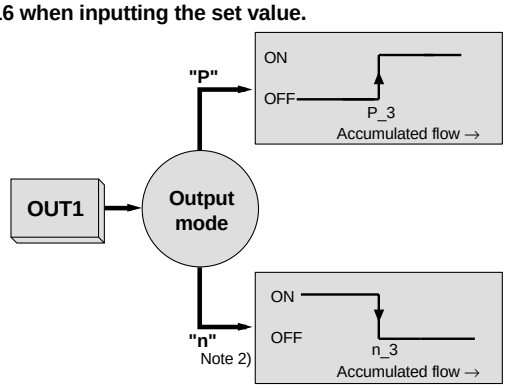
Real-time switch output (oU1_0)

Refer to "Flow Rate Setting Mode" on page 16 when inputting the set value.



Accumulated Switch Output (oU1_1)

Refer to "Flow Rate Setting Mode" on page 16 when inputting the set value.



Accumulated pulse output (oU1_2)

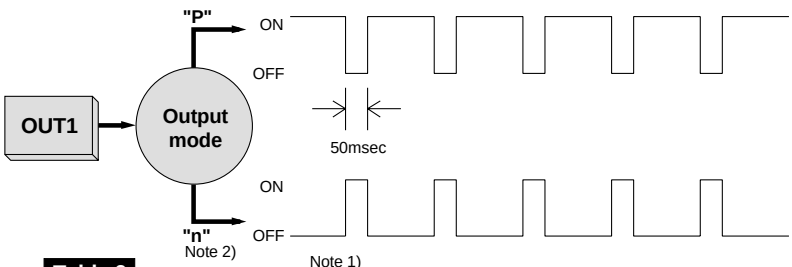


Table 2 Flow rate value per pulse

Display	Accumulated flow
U_1	100ℓ/pulse
U_2	10.0ft³/pulse

Note 1) For the switch with unit switching function (Fixed SI unit (ℓ/min, or ℓ, m³ or m³ x 10³) will be set for switch types without the unit switching function.)

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

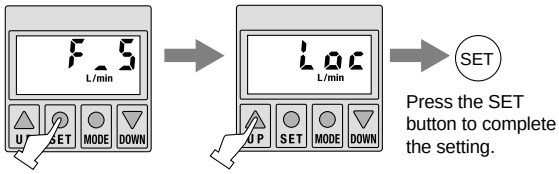
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Operation

6. Key Lock Mode

Prevents incorrect button operation.

Start of key lock

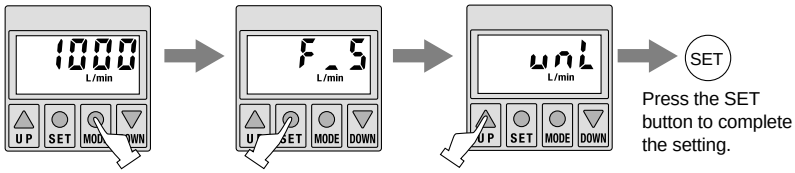


Press the SET button.

Use the ▲ button to switch.
unL: Key operation permitted
Loc: Key operation denied
Press the MODE button to switch to F_6.
(Switched to F_7 if oUt_2 is selected in F_3 mode.)

Press the SET button to complete the setting.

Release of key lock



Press the MODE button and hold for 3 seconds or longer.

Press the SET button.

Use the ▲ button to display unL.

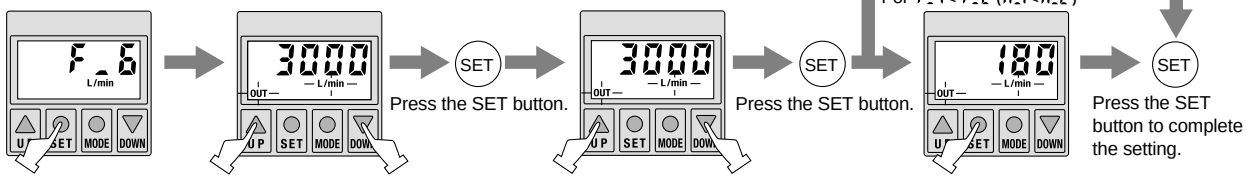
Press the SET button to complete the setting.

7. Flow Rate Setting Mode

Enters the set value

The input method varies depending on the OUT1 output specification.

Real-time switch output (oUt_0)



Press the SET button.

Enter the set value.
The set value and P_1 (or n_1) are alternately displayed.
▲ button:
Increases the set value.
▼ button:
Decreases the set value.

Press the SET button.

Enter the set value.
The set value and P_2 (or n_2) are alternately displayed.
▲ button:
Increases the set value.
▼ button:
Decreases the set value.

Press the SET button.

For P_1 < P_2 (n_1 < n_2)

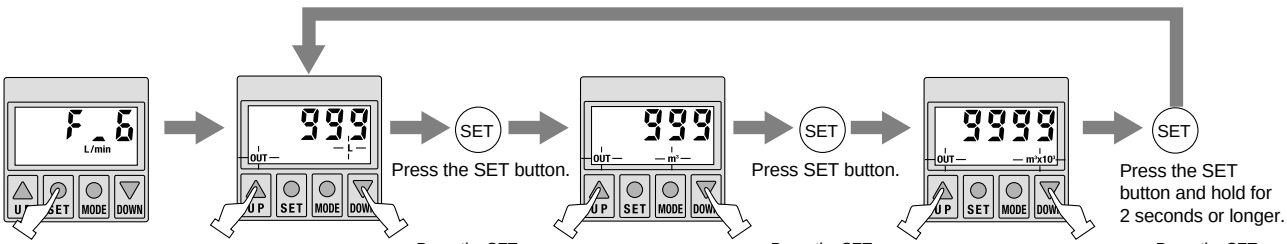
P_1 < P_2 (n_1 < n_2): Window comparator mode
Set the hysteresis value.
The hysteresis value and HYS are alternately displayed.
▲ button: Increases the set value.
▼ button: Decreases the set value.
The hysteresis value can be set between 0 to 3% of the rated flow rate value. However, if the difference between P_1 (n_1) and P_2 (n_2) is less than 6% of the rated flow rate value, the maximum hysteresis set value will be half of the differential value between P_1 (n_1) and P_2 (n_2).

For P_1 ≥ P_2 (n_1 ≥ n_2)

P_1 ≥ P_2 (n_1 ≥ n_2): Hysteresis mode
Hysteresis value setting is not available.

Press the SET button to complete the setting.

Accumulated switch output (oUt_1)



Press the SET button. The maximum set values are 9,999 (m^3 x 10^3), 999 (m^3) or 999 (*l*).

Enter the set value.
The set value and P_3 (or n_3) are alternately displayed.
▲ button:
Increases the set value.
▼ button:
Decreases the set value.

Press the SET button.

Press the SET button and hold for 2 seconds or longer to complete the setting.

Enter the set value.
The set value and P_3 (or n_3) are alternately displayed.
▲ button:
Increases the set value.
▼ button:
Decreases the set value.

Press SET button.

Press the SET button and hold for 2 seconds or longer to complete the setting.

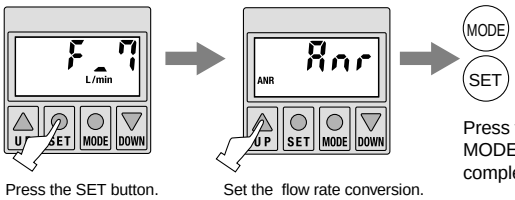
Enter the set value.
The set value and P_3 (or n_3) are alternately displayed.
▲ button:
Increases the set value.
▼ button:
Decreases the set value.

Press the SET button and hold for 2 seconds or longer.

Press the SET button and hold for 2 seconds or longer to complete the setting.

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

8. Flow Rate Conversion Mode



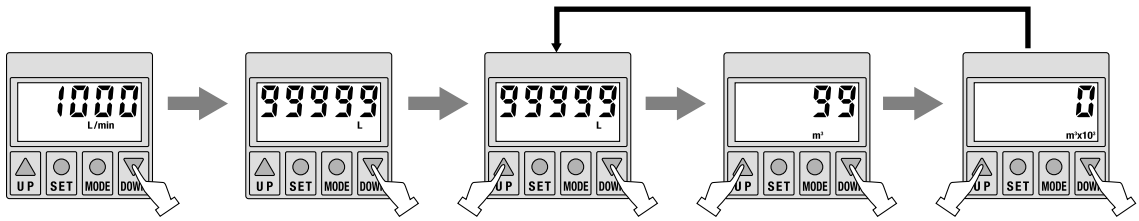
Press the SET button.

Set the flow rate conversion.
Use the ▲ button to switch.
Anr : 20°C, 101.3kPa, 65% RH (ANR)
nor : 0°C, 101.3kPa

Press the SET or MODE button to complete the setting.

Flow rate display verification

Verifying the accumulated flow when real-time flow rate is selected.

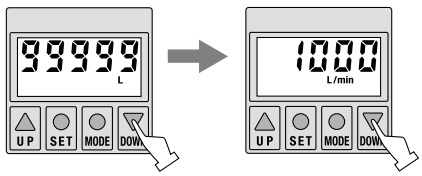


Press the ▼ button.

The accumulated flow is displayed only while the ▼ button is pressed.
(Release the ▼ button to return to the real-time flow rate display.)

Press the ▲ button while pressing the ▼ button to switch the accumulated flow unit.

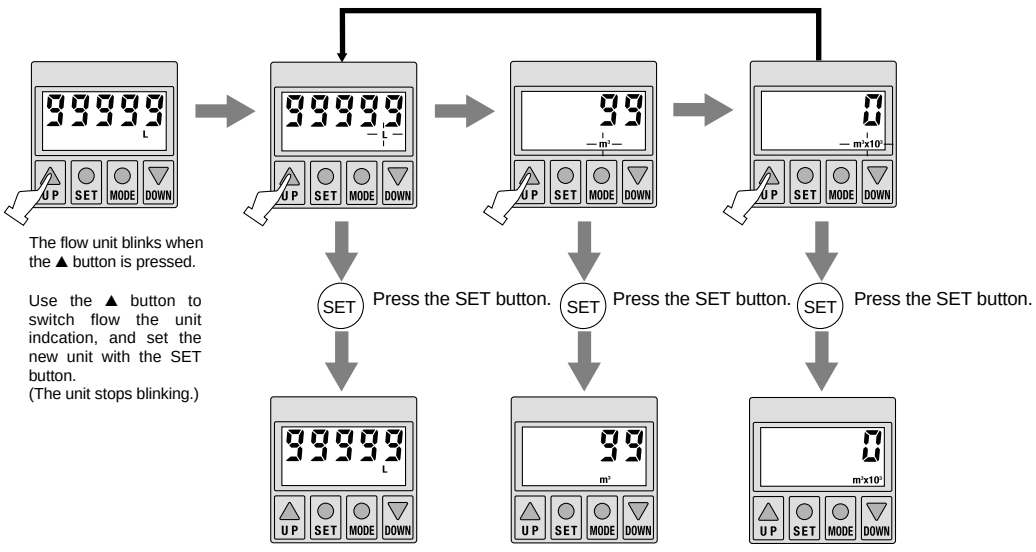
Verifying the real-time flow rate when accumulated flow is selected.



Press the ▼ button.

The real-time flow rate is displayed while the ▼ button is pressed.
(Release the ▼ button to return to the accumulated flow display.)

Switching the accumulated flow unit (Sets the accumulated flow display unit when accumulated flow is selected.)



The flow unit blinks when the ▲ button is pressed.

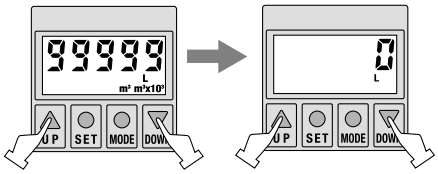
Use the ▲ button to switch flow the unit indcation, and set the new unit with the SET button.
(The unit stops blinking.)

∗ When the button operation is not performed for 5 seconds, the flow unit will stop blinking automatically and the setting for the accumulated flow display unit will be completed. The accumulated flow display unit will not chang.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Operation

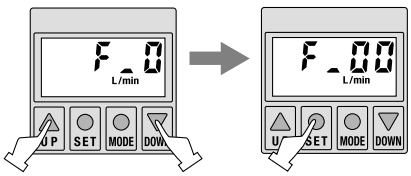
Clearing the accumulated value



Press the ▲ button while pressing the ▼ button.

Hold these buttons for 5 seconds or longer to clear the accumulated value.

Initializing the setting



In the initial setting mode F_0, press the ▲ and ▼ buttons and hold for 2 seconds or longer.

Press the SET button to return the setting to the foriginal setting at the time of delivery.

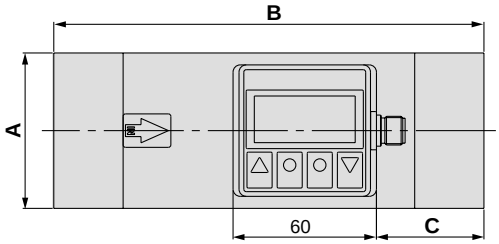
Original setting
Display setting: Real-time flow rate (d_1)
Unit setting: l/min (U_1)
Switch specification: Real-time switch output (out1_0)
Output mode: Inverted output (out1_n)
Flow rate setting value: Real-time flow rate: Full range median value
Accumulated flow: 0
Key lock mode: Unlocked (unL)
Flow rate conversion conditions: 20°, 101.3kPa, 65% RH (ANR) (Anr)

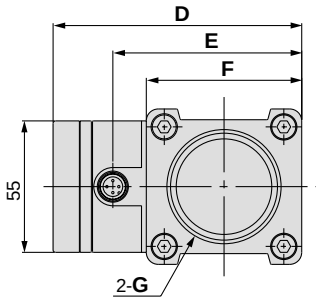
Press MODE button to switch to F_0 without initializing.

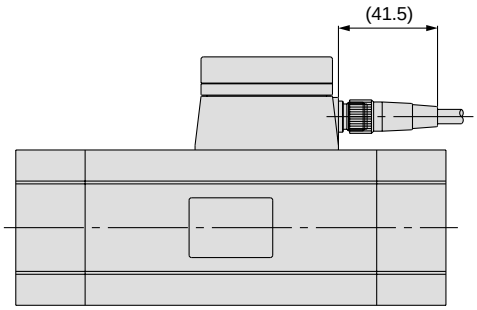
SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

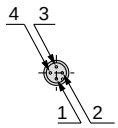
Dimensions

PFA703H, PFA706H, PFA712H



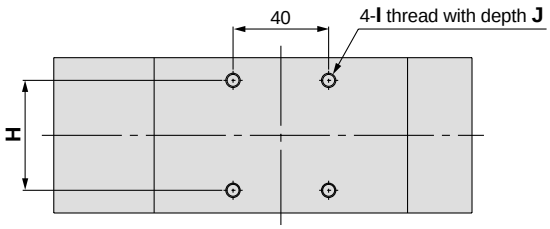






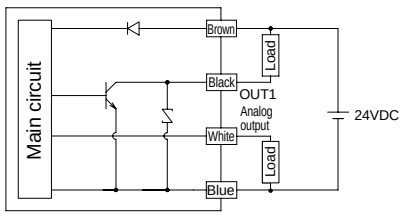
Connector pin numbers

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

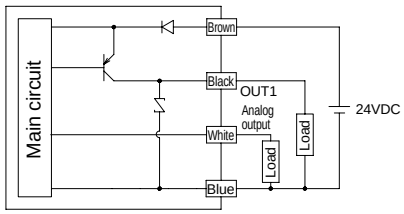


Model	A	B	C	D	E	F	G	H	I	J
PFA703H	55	160	40	92	67	55	Rc 1, NPT 1, G 1	36	M5 x 0.8	8
PFA706H	65	180	45	104	79	65	Rc 1 1/2, NPT 1 1/2, G 1 1/2	46	M6 x 1	9
PFA712H	75	220	55	114	89	75	Rc 2, NPT 2, G 2	56	M6 x 1	9

Internal circuits and wiring examples

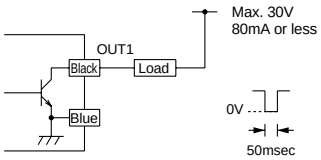


PFA7□□H-□□-$\frac{28}{29}$(-M)

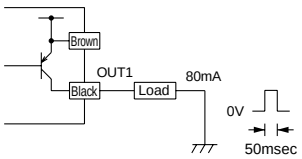


PFA7□□H-□□-$\frac{68}{69}$(-M)

Accumulated pulse output wiring examples

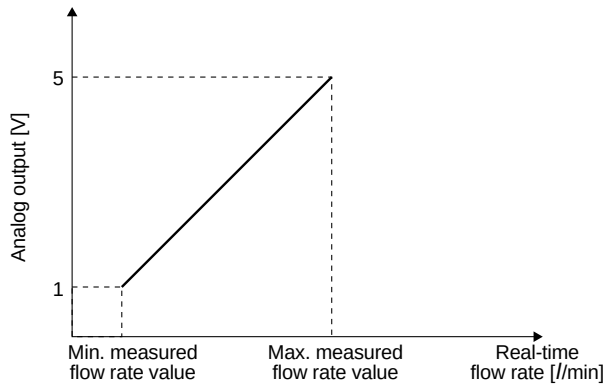


PFA7□□H-□□-$\frac{28}{29}$(-M)



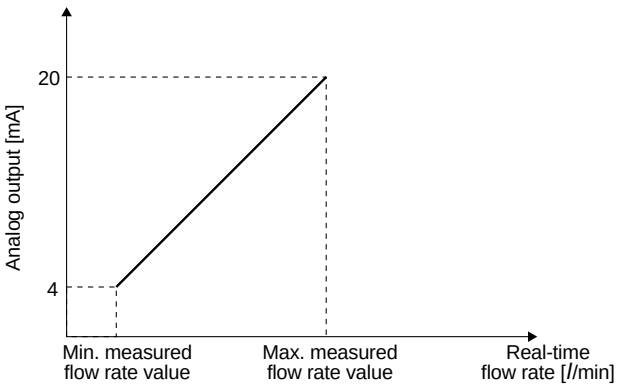
PFA7□□H-□□-$\frac{68}{69}$(-M)

Analog output
1 to 5VDC



Part nos.	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]
PFA703H-□-28 **PFA703H-□-68**	150	3000
PFA706H-□-28 **PFA706H-□-68**	300	6000
PFA712H-□-28 **PFA712H-□-68**	600	12000

4 to 20mADC



Part nos.	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]
PFA703H-□-29 **PFA703H-□-69**	150	3000
PFA706H-□-29 **PFA706H-□-69**	300	6000
PFA712H-□-29 **PFA712H-□-69**	600	12000

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

For Water

Digital Flow Switch

Series PFW



How to Order

Integrated Display Type

PFW7 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) 4	16	40	100	Applicable models
03	3/8	●	●			PFW704, PFW720
04	1/2		●	●		PFW720, PFW740
06	3/4			●	●	PFW740, PFW711
10	1				●	PFW711

Output specification

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

Wiring specification

Nil	3m lead wire with connector
N	Without lead wire

Unit specification

Nil	With unit switching function
M	Fixed SI unit Note)

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

Specifications

Model		PFW704	PFW720	PFW740	PFW711
Measured fluid		Water			
Detection type		Karman vortex			
Flow rate measurement and setting range		0.5 to 4 (setting is 0.6 to 4) l/min	2 to 16 l/min	5 to 40 l/min	10 to 100 l/min
Minimum setting unit		0.05 l/min	0.1 l/min	0.5 l/min	1 l/min
Display units Note 1)	Real-time flow rate	l/min, gal (US)/min			
	Accumulated flow	l, gal (US)			
Operating pressure range		0 to 1MPa			
Proof pressure		1.5MPa			
Accumulated flow range		0.0 to 99999.9 l	0 to 999999 l		
Operating temperature range		0° to 50°C (with no condensation)			
Linearity		±5% F.S. or less			±3% F.S. or less
Repeatability		±3% F.S. or less			±2% F.S. or less
Temperature characteristics		±5% F.S. or less (0° to 50°C)			±3% F.S. or less (15° to 35°C) ±5% F.S. or less (0° to 50°C)
Output specifications Note 2)	Switch output	NPN open collector	Maximum load current: 80mA; Internal voltage drop: 1V or less (with load current of 80mA) Maximum applied voltage: 30V		
		PNP open collector	Maximum load current: 80mA Internal voltage drop: 1.5V or less (with load current of 80mA)		
Indicator lights		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 3)			
Power supply voltage		12 to 24VDC (ripple ±10% or less)			
Current consumption		70mA or less			80mA or less
Withstand voltage		1000VAC for 1 min. between external terminal and case			
Insulation resistance		50MΩ (500VDC) between external terminal and case			
Noise resistance		1000Vp-p, Pulse width 1µs, Rise time 1ns			
Vibration resistance		10 to 500Hz at whichever is smaller: 1.5mm amplitude or 98m/s² acceleration in X, Y, Z directions for 2 hrs. each			
Impact resistance		490m/s² in X, Y, Z directions 3 times each			
Weight		460g (without lead wire)	520g (without lead wire)	700g (without lead wire)	1,150g (without lead wire)
Enclosure		IP65			
Port size (Rc, NPT, G)		3/8	3/8, 1/2	1/2, 3/4	3/4, 1

Note 1) 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 2) The output functions operate only for the real-time flow rate display, and do not operate for the accumulated flow display.
Note 3) Window comparator mode — Since hysteresis will reach 3 digits, keep P1 and P2 apart by 7 digits or more. The minimum setting unit is 1digit. (refer to the table above).

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

How to Order



Remote Type Display Unit **PFW3 0 0 — A — □**

Flow rate range

1	0.5 to 4 l/min
0	2 to 16 l/min
2	5 to 40 l/min
3	10 to 100 l/min

Output specification

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

Mounting

A	Panel mounting
B	DIN rail, wall mounting

DIN rail type for PFW330-B (for 100 l/min) is a semi-standard option.

Panel mount adapter part no.

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

Unit specification

Nil	With unit switching function
M	Fixed SI unit Note)

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

Specifications

Model		PFW310	PFW311	PFW300	PFW301	PFW320	PFW321	PFW330	PFW331
Flow rate measurement and set flow rate range		0.5 to 4 (setting is 0.6 to 4) l/min		2 to 16 l/min		5 to 40 l/min		10 to 100 l/min	
Minimum setting unit		0.05 l/min		0.1 l/min		0.5 l/min		1 l/min	
Display units Note 1)	Real-time flow rate	l/min, gal (US)/min							
	Accumulated flow	l, gal (US)							
Accumulated flow range		0.0 to 99999.9 l		0 to 999999 l					
Operating temperature range		0° to 50°C (with no condensation)							
Linearity Note 2)		±5% F.S. or less						±3%F.S. or less	
Repeatability Note 2)		±3% F.S. or less						±1%F.S. or less	
Temperature characteristics Note 2)		±5% F.S. or less (0° to 50°C)						±1%F.S. or less (15° to 35°C) ±2%F.S. or less (0° to 50°C)	
Output specifications Note 3)	Switch output	NPN open collector	Maximum load current: 80mA Maximum applied voltage: 30V Internal voltage drop: 1V or less (with load current of 80mA)						
		PNP open collector	Maximum load current: 80mA Internal voltage drop: 1.5V or less (with load current of 80mA)						
Indicator lights		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 4)							
Power supply voltage		12 to 24VDC (ripple ±10% or less)							
Current consumption		50mA or less						60mA or less	
Weight		45g							
Enclosure		IP40							

Note 1) 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 2) The system accuracy when combined with PFW5□□.
Note 3) The output functions operate only for the real-time flow rate display, and do not operate for the accumulated flow display.
Note 4) Window comparator mode — Since hysteresis will reach 3 digits, keep P1 and P2 apart by 7 digits or more. The minimum setting unit is 1 digit. (refer to the table above).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



How to Order

Remote Type Sensor Unit

PFW5 20 — □ 03 □ □

Flow rate range

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

Thread type

Nil	Rc
N	NPT
F	G

Port size

Symbol	Port size	Flow rate (ℓ/min) 4	16	40	100	Applicable models
03	3/8	●	●			PFW504, PFW520
04	1/2		●	●		PFW520, PFW540
06	3/4			●	●	PFW540, PFW511
10	1				●	PFW511

Wiring specification

Nil	Lead wire with connector
N	Without lead wire

Output specification

Nil	Pulse output (sensor output) only
1	Pulse output + 1 to 5V
2	Pulse output + 4 to 20mA

Specifications

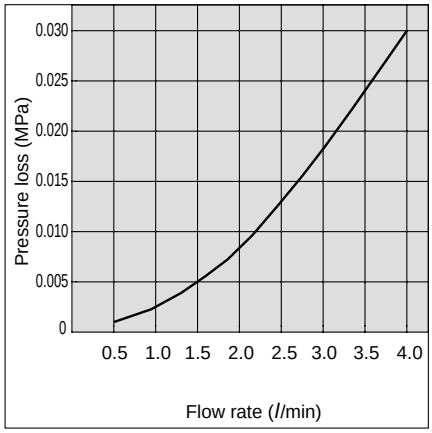
Model		PFW504	PFW520	PFW540	PFW511
Measured fluid		Water			
Detection type		Karman vortex			
Flow rate measurement range		0.5 to 4ℓ/min	2 to 16ℓ/min	5 to 40ℓ/min	10 to 100ℓ/min
Operating pressure range		0 to 1MPa			
Withstand pressure		1.5MPa			
Operating temperature range		0° to 50°C (with no condensation)			
Linearity Note 1)		±5% F.S. or less			±3% F.S. or less
Repeatability		±2% F.S. or less			±1% F.S. or less
Temperature characteristics		±5% F.S. or less (0° to 50°C)			±2% F.S. or less (15° to 35°C) ±3% F.S. or less (0° to 50°C)
Power supply voltage		12 to 24VDC (ripple ±10% or less)			
Current consumption		20mA or less			
Weight Note 2)		410g (without lead wire)	470g (without lead wire)	650g (without lead wire)	1,100g (without lead wire)
Enclosure		IP65			
Port size (Rc, NPT, G)		3/8	3/8, 1/2	1/2, 3/4	3/4, 1
Analog output specifications	Voltage output	Output voltage: 1 to 5V; Load impedance: 100kΩ or more			
	Current output	Current output: 4 to 20mA; Load impedance: 300Ω or less			

Note 1) The system accuracy when combined with PFW3□□.
Note 2) Sensor unit with analog output (PFW5□□-□□-1, -2) is 20g heavier.

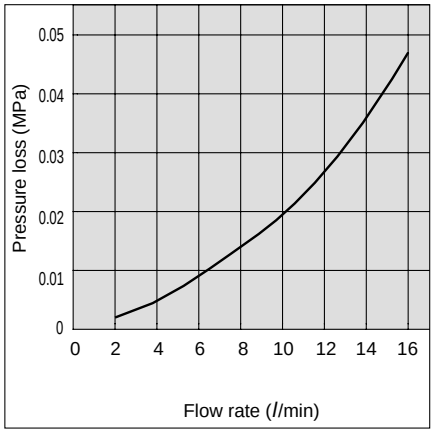
SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Flow Characteristics (Pressure Loss)

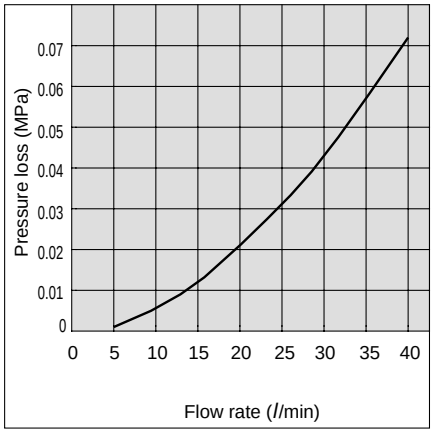
PFW704, PFW504



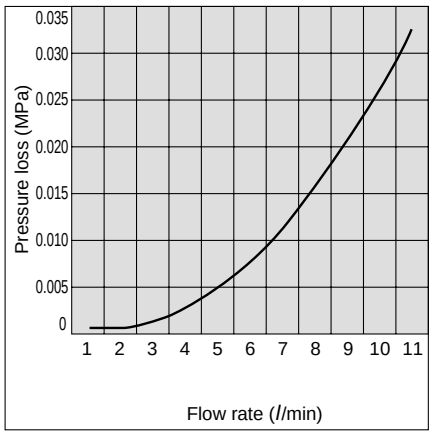
PFW720, PFW520



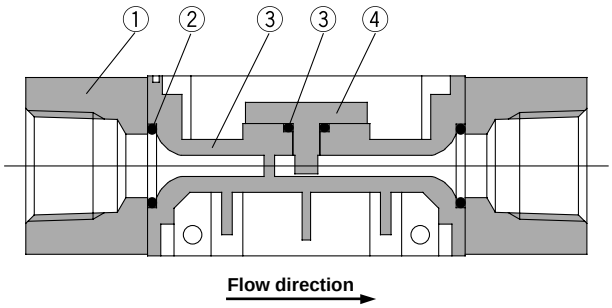
PFW740, PFW540



PFW711, PFW511



Sensor Unit Construction



Parts list

No.	Description	Material
1	**Attachment**	Class 303 stainless steel Note)
2	**Seal**	NBR
3	**Body**	PPS
4	**Sensor**	PPS

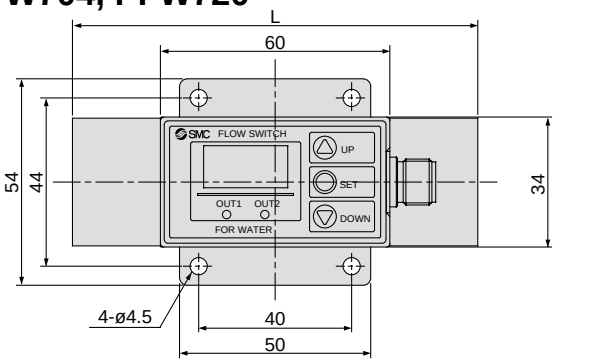
Note) Attachment material for PFW711 and PFW511 is class 304 stainless steel.

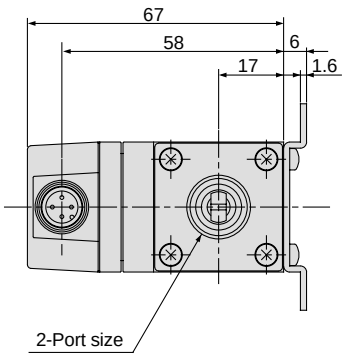
Error correction, connectors, operating part descriptions, and flow rate setting are the same as series PFA for air. Refer to pages 1 through 7.

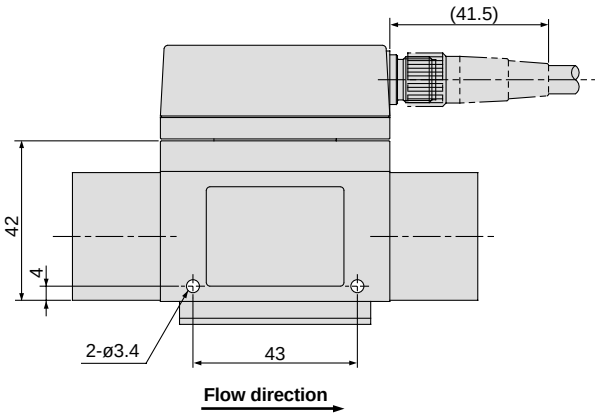
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Dimensions: Integrated Display Type for Water

PFW704, PFW720



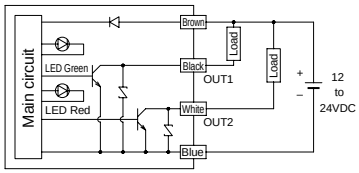




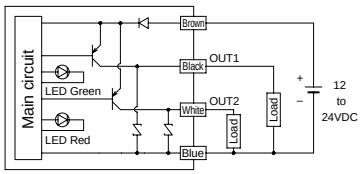
Flow direction

Model	L Dimension
PFW704	100
PFW720	106

Internal circuits and wiring examples

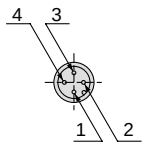


PFW7□□-□□-27□(-M)



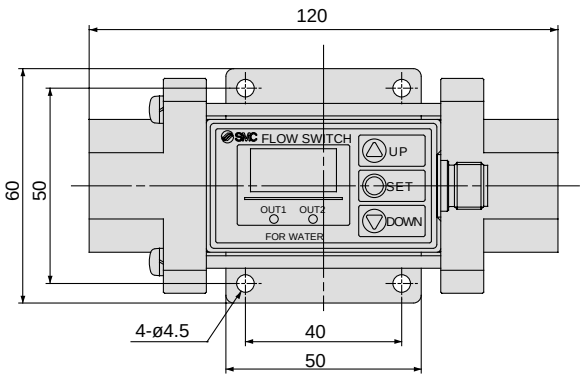
PFW7□□-□□-67□(-M)

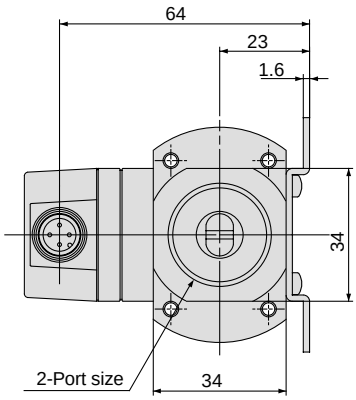
Connector pin numbers

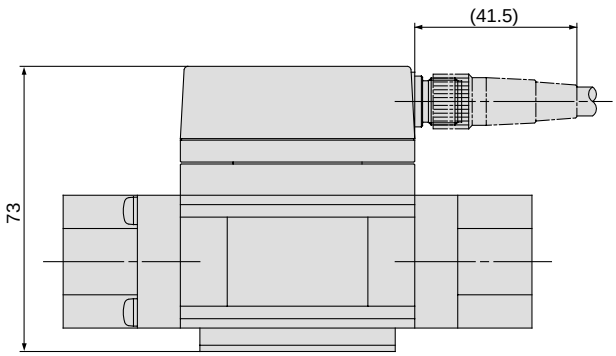


Pin no.	Pin description
1	DC(+)
2	OUT2
3	DC(–)
4	OUT1

PFW740





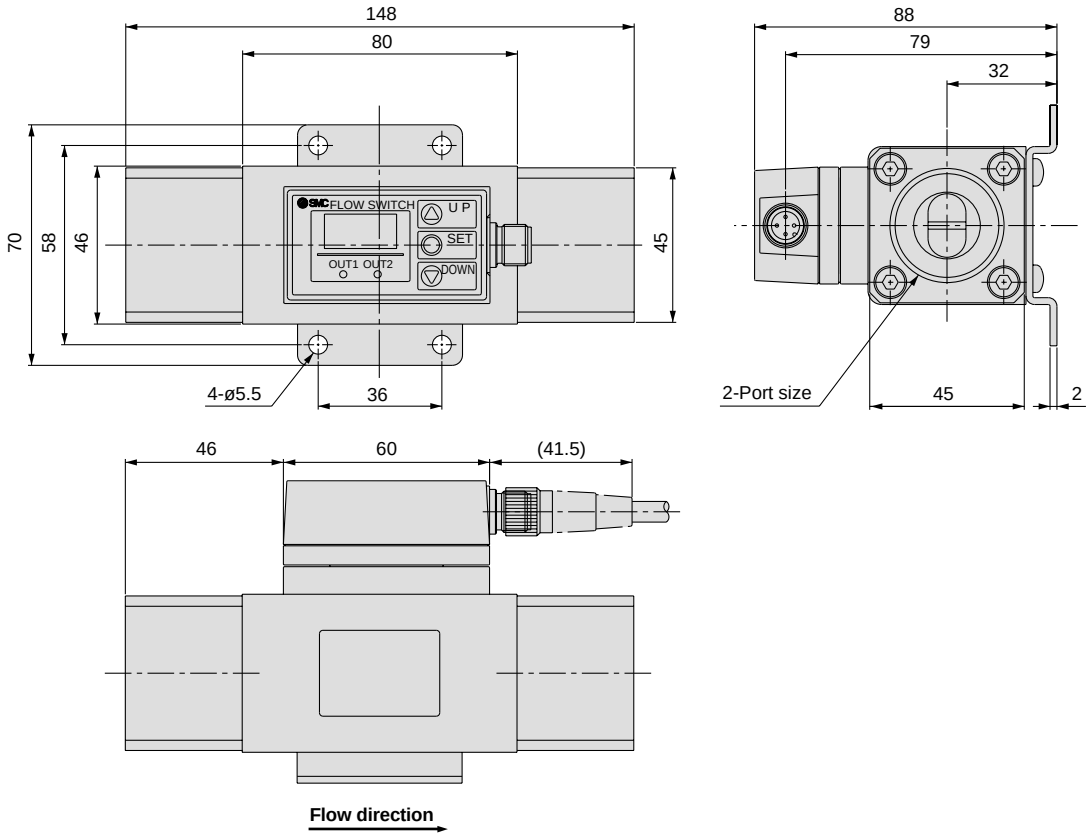


Flow direction

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Dimensions: Integrated Display Type for Water

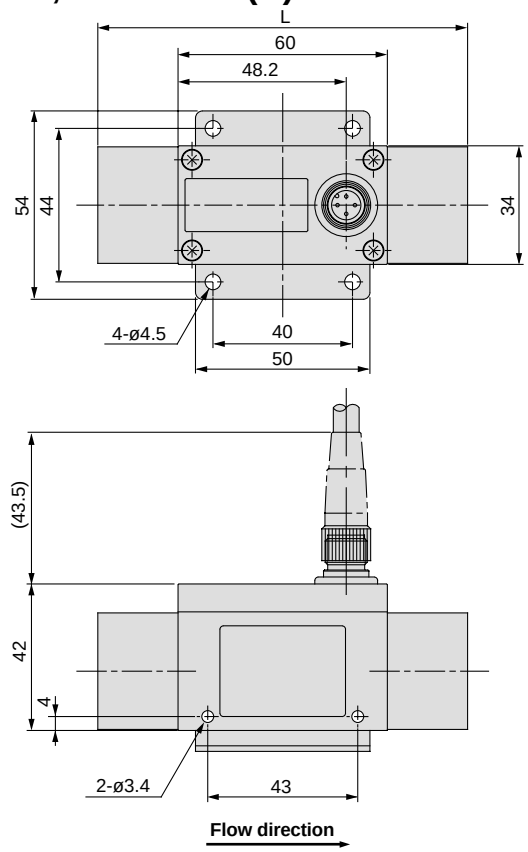
PFW711

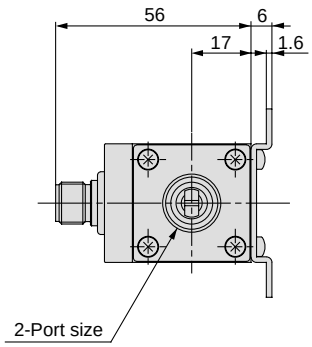


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

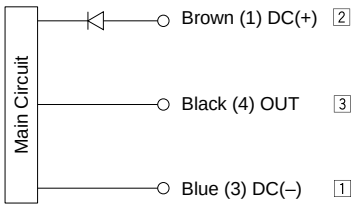
Dimensions: Remote Type Sensor Unit for Water

PFW504, PFW520-□(N)



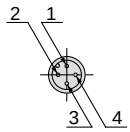


Wiring



∗ Use this sensor by connecting to SMC remote type display unit Series PFW3□□.
(1), (3), and (4) are connector pin numbers.
1, 2, 3 and are terminal numbers for Series PFW3□□.

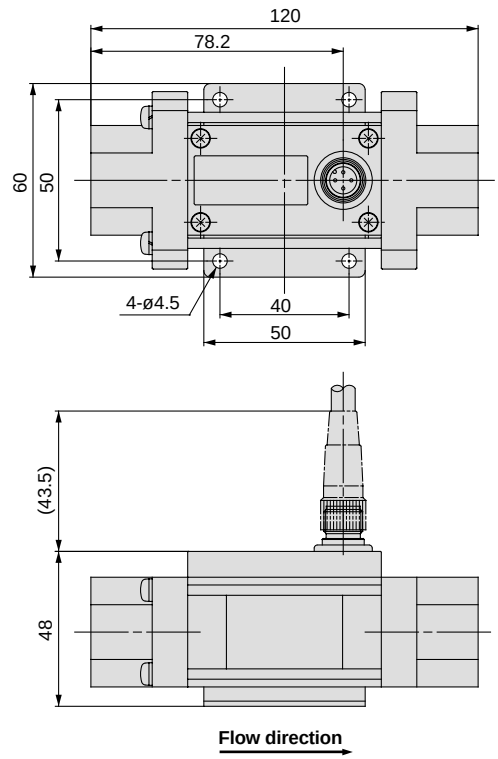
Connector pin numbers

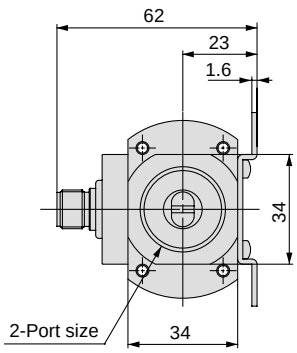


Pin no.	Pin description
1	DC(+)
2	NC
3	DC(–)
4	OUT

Model	L dimension
PFW504	100
PFW520	106

PFW540-□(N)

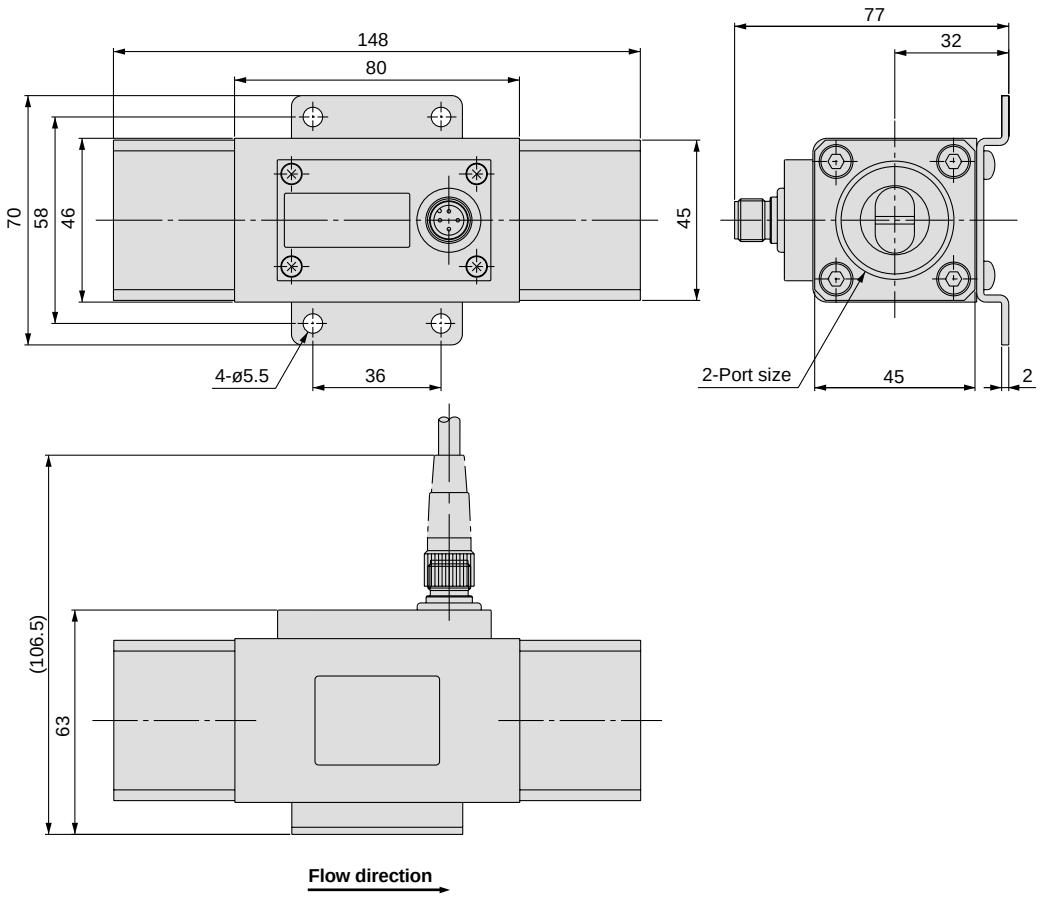




SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Dimensions: Remote Type Sensor Unit for Water

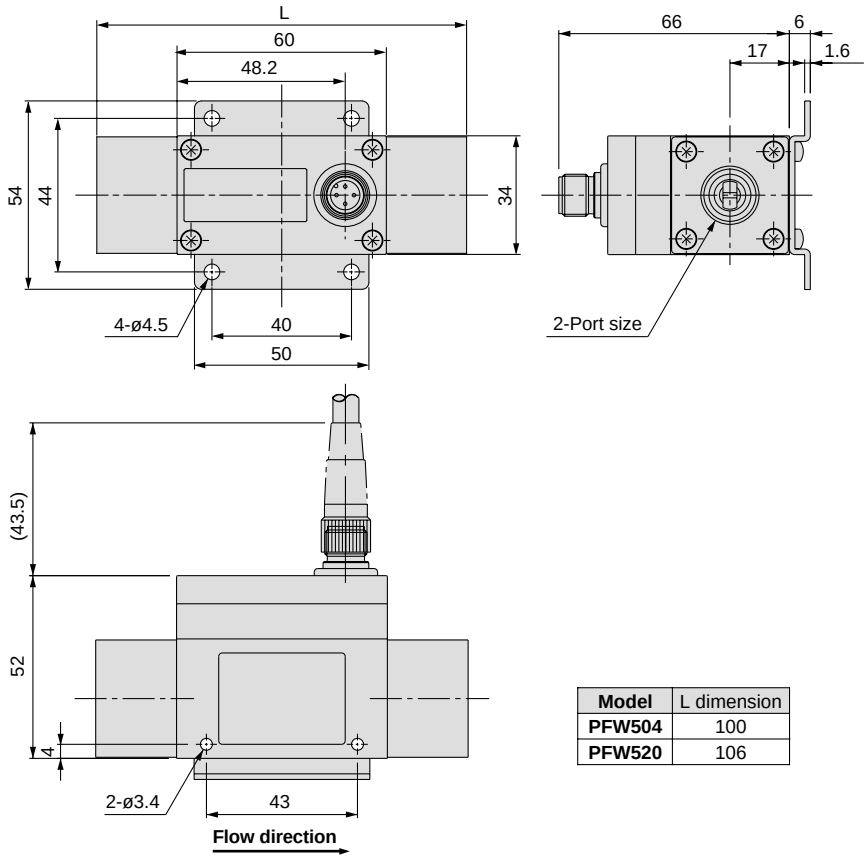
PFW511-□(N)



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

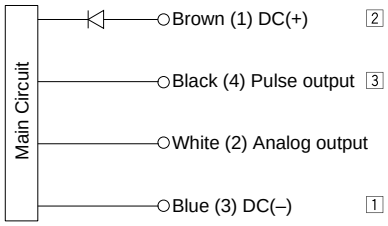
Dimensions: Remote Type Sensor Unit for Water

PFW504, PFW520-□(N)-$\frac{1}{2}$: Analog output



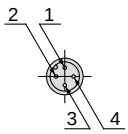
Model	L dimension
PFW504	100
PFW520	106

Wiring



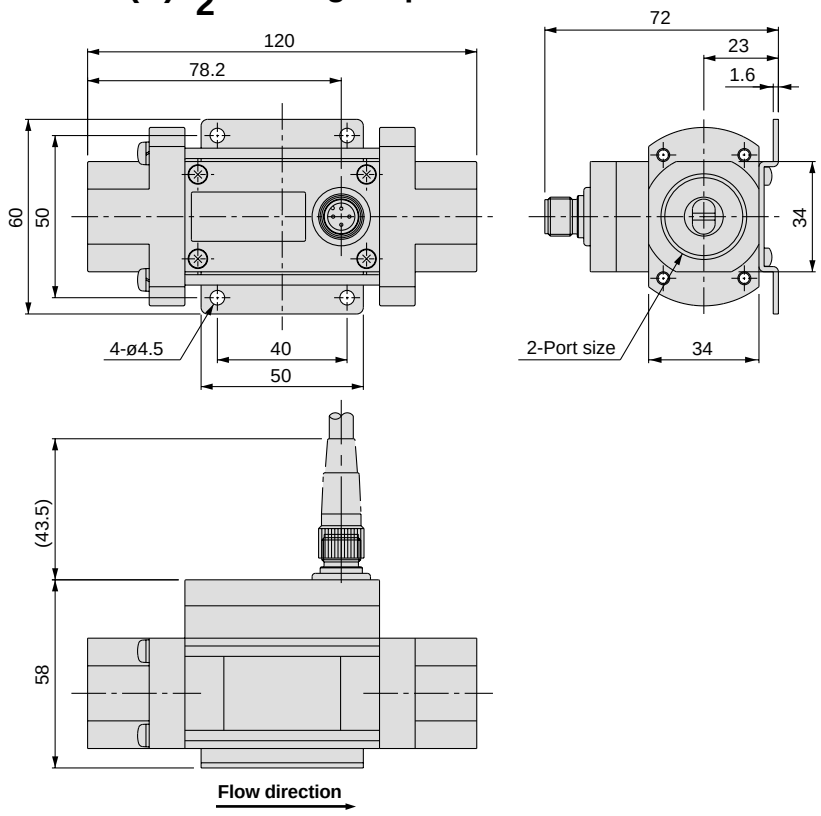
∗ Use this sensor by connecting to SMC remote type display unit Series PFW3□□.
(1), (2), (3), and (4) are connector pin numbers.
1, 2, and 3 are terminal numbers for Series PFW3□□.

Connector pin numbers



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

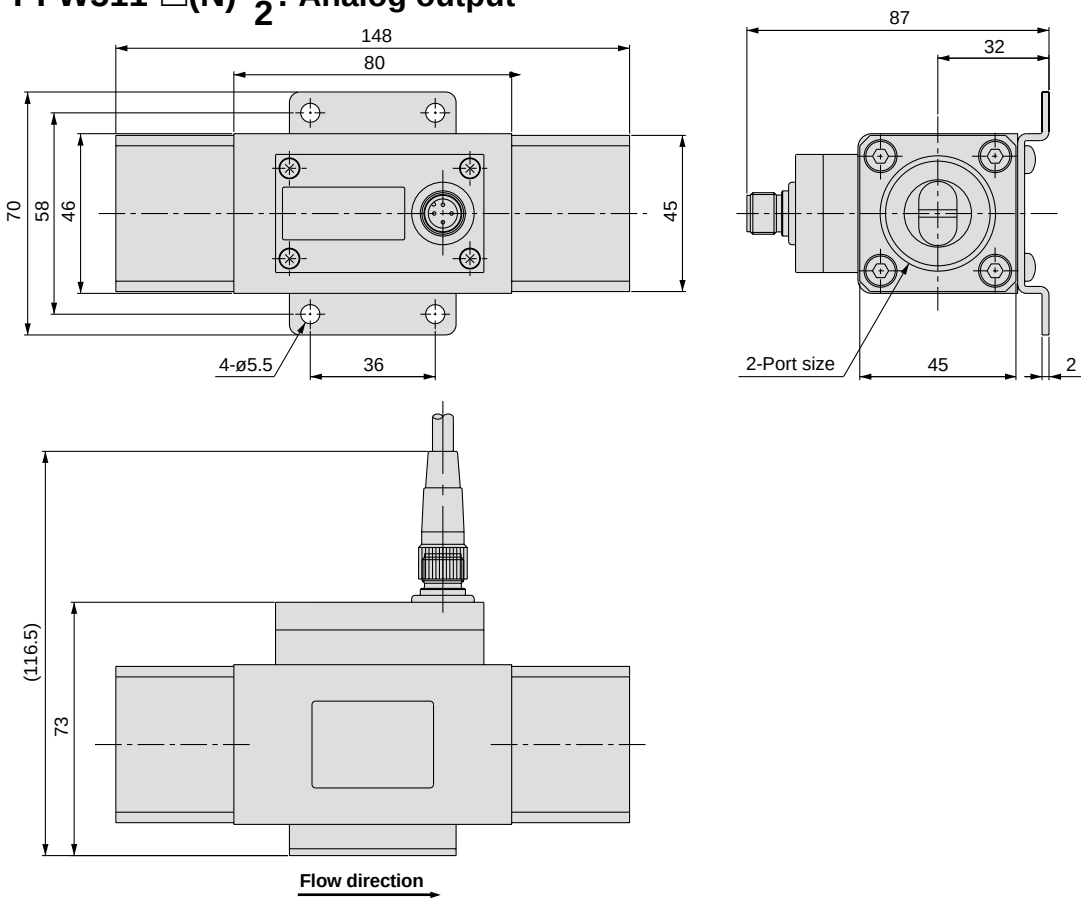
PFW540-□(N)-$\frac{1}{2}$: Analog output



SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

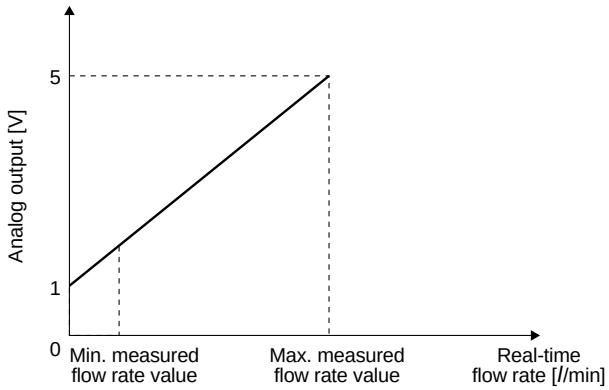
Dimensions: Remote Type Sensor Unit for Water

PFW511-□(N)-$\frac{1}{2}$: Analog output



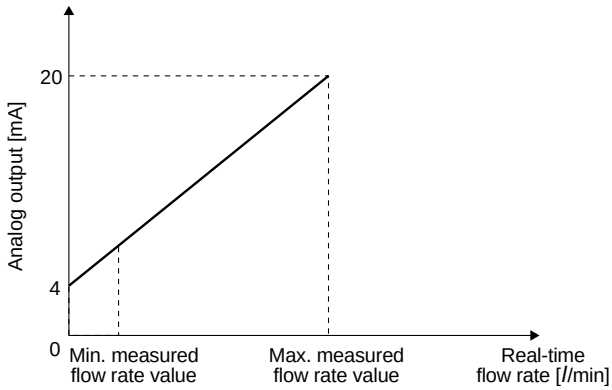
Analog output

1 to 5VDC



Part no.	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]
PFW504-□-1	0.5	4
PFW520-□-1	2	16
PFW540-□-1	5	40
PFW511-□-1	10	100

4 to 20mADC

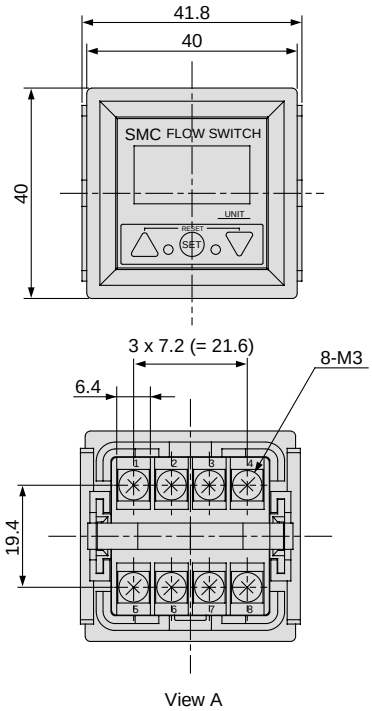


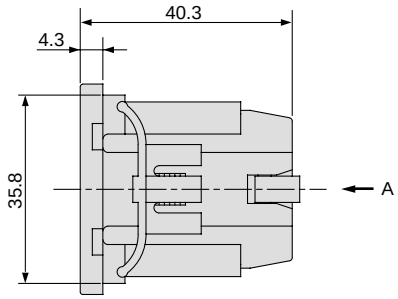
Part no.	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]
PFW504-□-2	0.5	4
PFW520-□-2	2	16
PFW540-□-2	5	40
PFW511-□-2	10	100

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

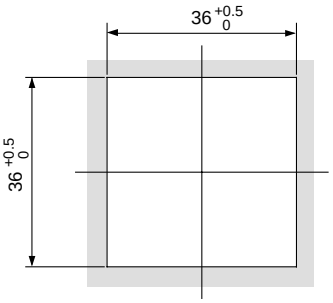
Dimensions: Remote Type Display Unit for Water

PFW3□□-A
Panel mounting type



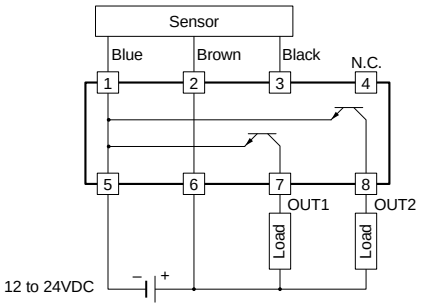


Panel fitting dimension

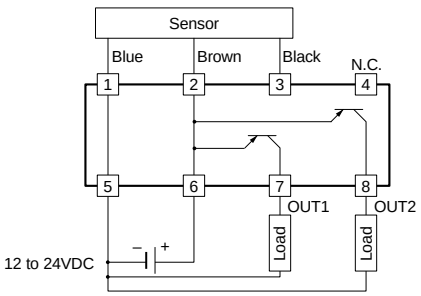


∗ The applicable panel thickness is 1 to 3.2mm.

Internal circuits and wiring examples

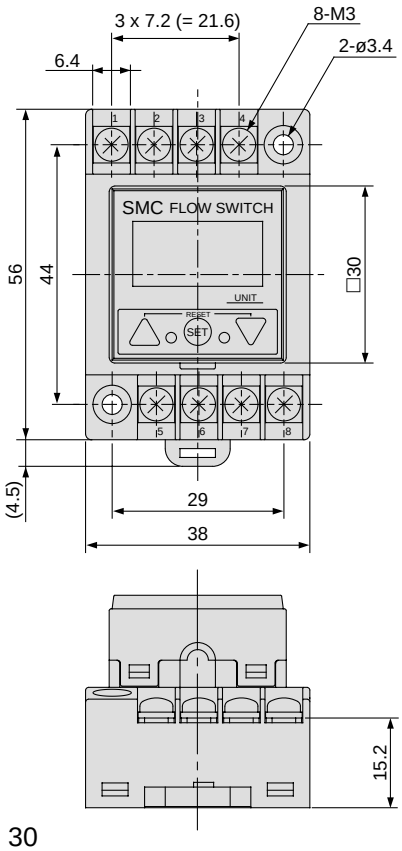


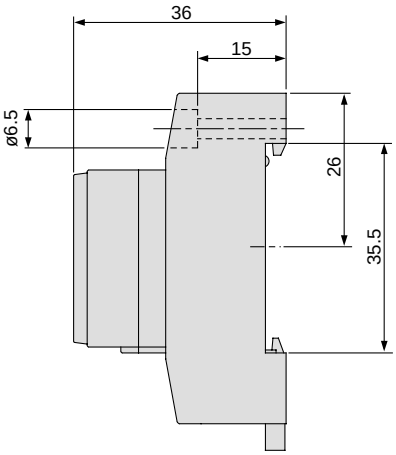
PFW3□0-□(-M)



PFW3□1-□(-M)

PFW3□□-B
DIN rail type





SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

For Water

Digital Flow Switch/High Temperature Fluid Type

Series PFW



How to Order

Integrated Display Type

PFW7 20 T — □ 03 — 27 □ — □

Flow rate range

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

Temperature range

T	0° to 90°C

Thread type

Nil	Rc
N	NPT
F	G

Port size

Symbol	Port size	Flow rate (l/min) 4	16	40	Applicable models
03	3/8	●	●		PFW704T, PFW720T
04	1/2		●	●	PFW720T, PFW740T
06	3/4			●	PFW740T

Output specification

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

Wiring specification

Nil	3m lead wire with connector
N	Without lead wire

Unit specification

Nil	With unit switching function
M	Fixed SI unit Note)

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

Specifications

Model		PFW704T	PFW720T	PFW740T
Measured fluid		Water		
Detection type		Karman vortex		
Flow rate measurement and setting range		0.5 to 4 (setting is 0.6 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
Display units Note 1)	Real-time flow rate	l/min, gal (US)/min		
	Accumulated flow	l, gal (US)		
Operating pressure range		0 to 1MPa		
Withstand pressure		1.5MPa		
Accumulated flow range		0 to 999999 l		
Operating Temperature range	Fluid temperature	0° to 90°C (with no cavitation)		
	Ambient temperature	0° to 50°C (with no condensation)		
Linearity		±5% F.S. or less		
Repeatability		±3% F.S. or less		
Temperature characteristics		±5% F.S. or less		
Output specifications Note 2)	Switch output	NPN open collector: Maximum load current: 80mA; Internal voltage drop: 1V or less (with load current of 80mA) Maximum applied voltage: 30V		
		PNP open collector: Maximum load current: 80mA Internal voltage drop: 1.5V or less (with load current of 80mA)		
Indication lights		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 3)		
Power supply voltage		12 to 24VDC (ripple ±10% or less)		
Current consumption		70mA or less		
Withstand voltage		1000VAC for 1 min. between external terminal and case		
Insulation resistance		50MΩ (500VDC) between external terminal and case		
Noise resistance		1000Vp-p, Pulse width 1µs, Rise time 1ns		
Vibration resistance		10 to 500Hz at whichever is smaller: 1.5mm amplitude or 98m/s² acceleration, in X, Y, Z directions for 2 hrs. each		
Impact resistance		490m/s² in X, Y, Z directions 3 times each		
Weight		710g (without lead wire)		
Enclosure		IP65		
Port size (Rc, NPT, G)		3/8	3/8, 1/2	1/2, 3/4

Note 1) 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 2) The output functions operate only for the real-time flow rate display, and do not operate for the accumulated flow display.
Note 3) Window comparator mode — Since hysteresis will reach 3 digits, keep P1 and P2 apart by 7 digits or more. The minimum setting unit is 1 digit. (refer to the table above).

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



How to Order

Remote Type Display Unit

PFW5 20 T — □ 03 □ — □

Flow rate range

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

Temperature range

T	0° to 90°C

Thread type

Nil	Rc
N	NPT
F	G

Wiring specification

Nil	3m lead wire with connector
N	Without lead wire

Port size

Symbol	Port size	Flow rate (l/min) 4	16	40	Applicable models
03	3/8	●	●		PFW504T, PFW520T
04	1/2		●	●	PFW520T, PFW540T
06	3/4			●	PFW540T

Output specification

Nil	Pulse output (Sensor output) only
1	Pulse output + 1 to 5V
2	Pulse output + 4 to 20mA

Specifications

Model		PFW504T	PFW520T	PFW540T
Measured fluid		Water		
Detection type		Karman vortex		
Flow rate measurement range		0.5 to 4l/min	2 to 16l/min	5 to 40l/min
Operating pressure range		0 to 1MPa		
Proof pressure		1.5MPa		
Operating Temperature range	Fluid temperature	0° to 90°C (with no cavitation)		
	Ambient temperature	0° to 50°C (with no condensation)		
Linearity Note 1)		±5% F.S. or less		
Repeatability		±2% F.S. or less		
Temperature characteristics		±5% F.S. or less		
Power supply voltage		12 to 24VDC (ripple ±10% or less)		
Current consumption		20mA or less		
Weight Note 2)		660g (without lead wire)		
Enclosure		IP65		
Port size (Rc, NPT, G)		3/8	3/8, 1/2	1/2, 3/4
Analog output specifications	Voltage output	Output voltage: 1 to 5V; Load impedance 100kΩ or more		
	Current output	Current output: 4 to 20mA; Load impedance 300Ω or less		

Note 1) The system accuracy when combined with PFW3□□.

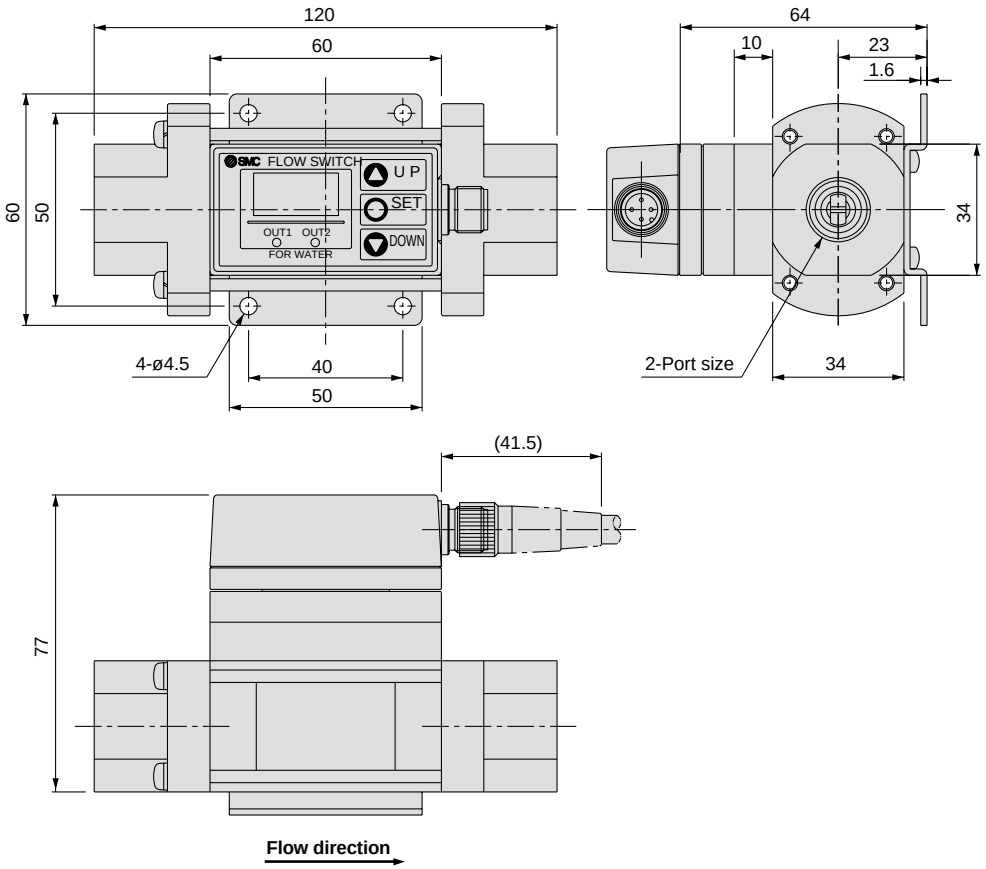
Note 2) Sensor unit with analog output (PFW5□□-□□-1, -2) is 20g heavier.

Display units are the same as those of remote type digital flow switch for water (series PFW3□□).
Refer to page 21 for details.

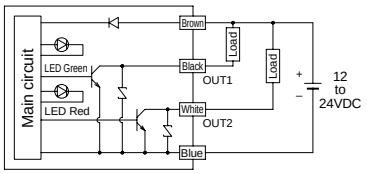
SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Dimensions: Integrated Display Type for Water

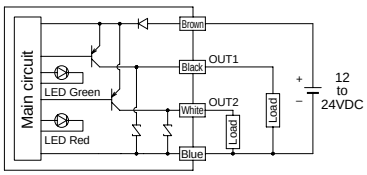
PFW704T, PFW720T, PFW740T



Internal circuits and wiring examples

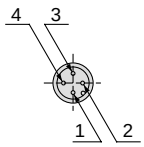


PFW7□□T-□□-27□(-M)



PFW7□□T-□□-67□(-M)

Connector pin numbers

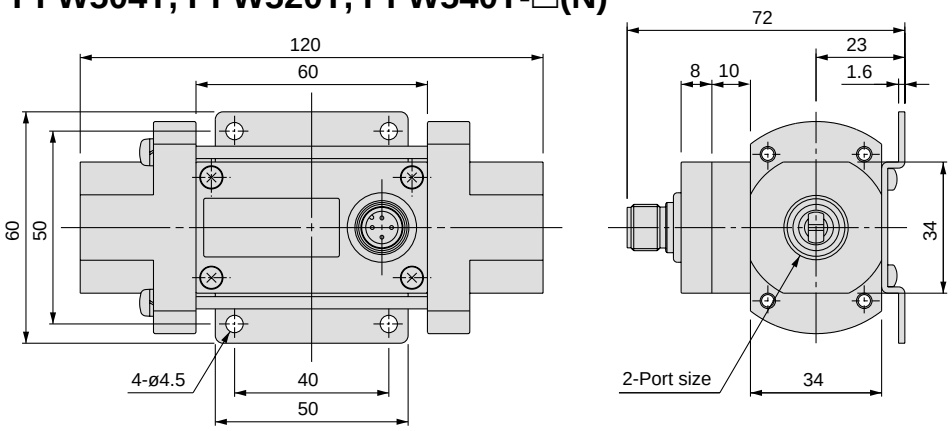


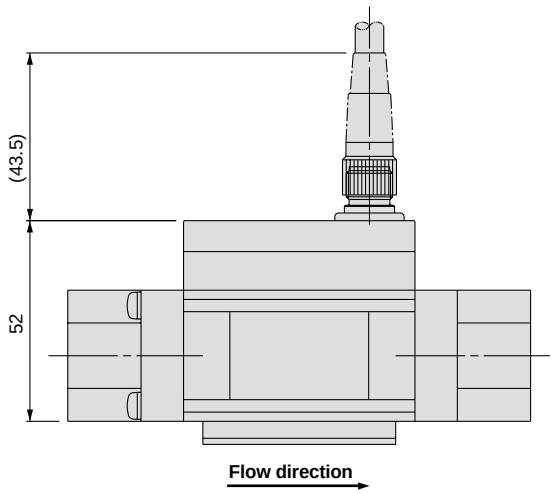
Pin no.	Pin description
1	DC(+)
2	OUT2
3	DC(–)
4	OUT1

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

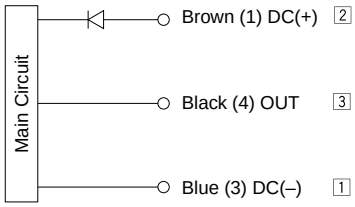
Dimensions: Remote Type Sensor Unit for Water

PFW504T, PFW520T, PFW540T-□(N)



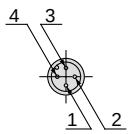


Wiring



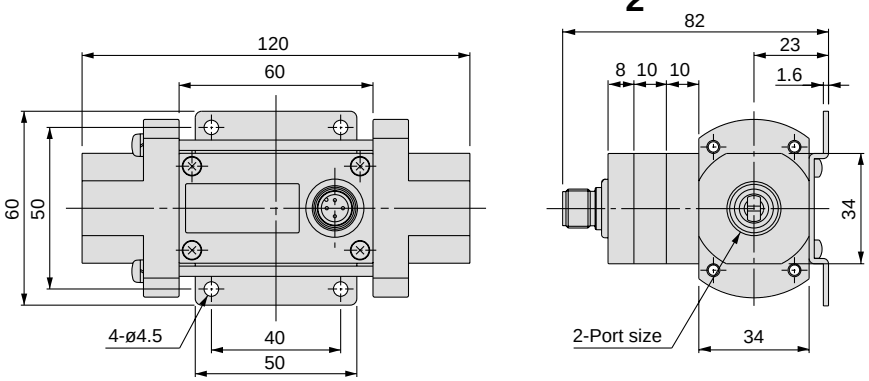
∗ Use this sensor by connecting to SMC remote type display unit Series PFW3□□.
(1), (3), and (4) are connector pin numbers.
1, 2, and 3 are terminal numbers for Series PFW3□□.

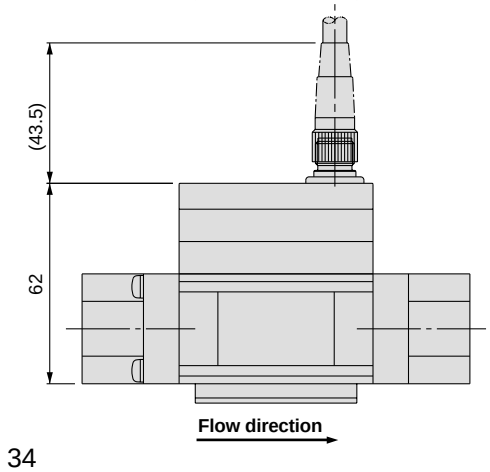
Connector pin numbers



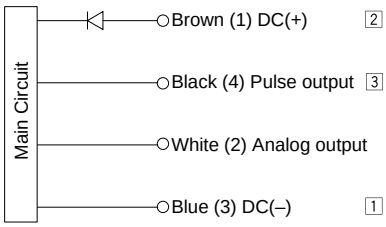
Pin no.	Pin description
1	DC(+)
2	NC
3	DC(–)
4	OUT

PFW504T, PFW520T, PFW540T-□(N)-$\frac{1}{2}$: Analog output



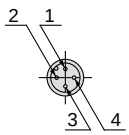


Wiring



∗ Use this sensor by connecting to SMC remote type display unit Series PFW3□□.
(1), (2), (3), and (4) are connector pin numbers.
1, 2, and 3 are terminal numbers for Series PFW3□□.

Connector pin numbers

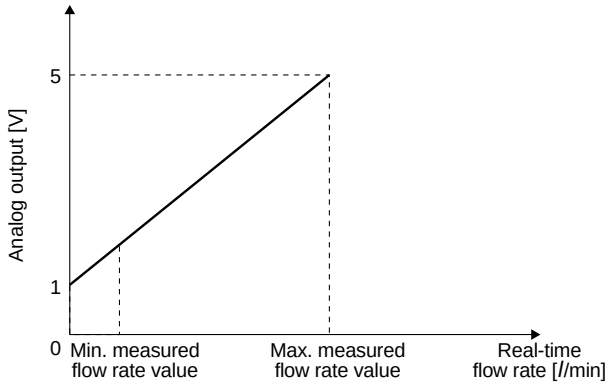


Pin no.	Pin description
1	DC(+)
2	Analog output
3	DC(–)
4	OUT

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

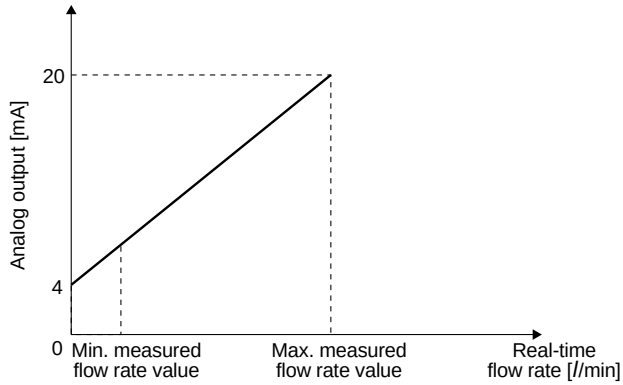
Remote type Sensor Unit for water

Analog output
1 to 5VDC



Part no.	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]
PFW504T-□-1	0.5	4
PFW520T-□-1	2	16
PFW540T-□-1	5	40

4 to 20mADC



Part no.	Minimum measured flow rate value [l/min]	Maximum measured flow rate value [l/min]
PFW504T-□-2	0.5	4
PFW520T-□-2	2	16
PFW540T-□-2	5	40

Refer to PFW3□□ on page 30 for dimensions of remote type display unit.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Series PFA/PFW
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 a label of **"Caution"**, **"Warning"**, or **"Danger"**. To ensure safety, be sure to observe these 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.

⚠ Warning

1. The compatibility of 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 with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.

2. Only trained personnel should operate machinery and equipment.

Equipment can be dangerous if an operator is unfamiliar with it. Assembly, handling or maintenance of 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 after confirmation of safe locked-out control positions.
2. When equipment is to be removed, first confirm that safety measures have been implemented.
3. Before machinery/equipment is restarted, confirm that safety measures have been implemented and proceed with caution.

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, 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.

SMC
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Series PFA/PFW
Specific Product Precautions 1

Be sure to read before handling. Refer to page 36 for safety instructions.

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.

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

[For air]

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

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

[For water]

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

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

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

⚠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
Rc 1/8	7 to 9
Rc 1/4	12 to 14
Rc 3/8	22 to 24
Rc 1/2	28 to 30

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

2. Apply 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 (490m/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.

[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.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Series PFA/PFW
Specific Product Precautions 2

Be sure to read before handling. Refer to page 36 for safety instructions.

Mounting

⚠Warning

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 15N·m or more to the metal part of the switch.

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

When abruptly reducing the size of piping or when there is a restriction such as a valve on the upstream side, the 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 98m/s², or greater than 490m/s². Be aware that these are maximum values, so try to keep vibration and impact down to a minimum.

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.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Series PFA/PFW
Specific Product Precautions 3

Be sure to read before handling. Refer to page 36 for safety instructions.

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 upstream 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.

Other

⚠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//min type switches for air, output turns OFF when the switch's initial setting and flow rate setting are preformed.

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.

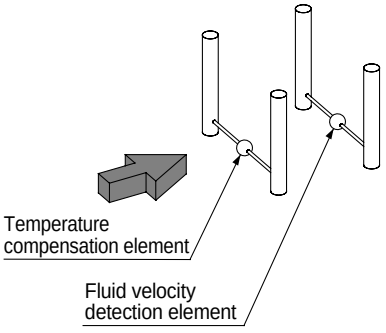
[For air]

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 //min as the flow rate indicator unit, in which the volumetric flow is substituted for mass flow at 0°C and 101.3kPa. The volumetric flow rate at 20°C, 101.3kPa, 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.



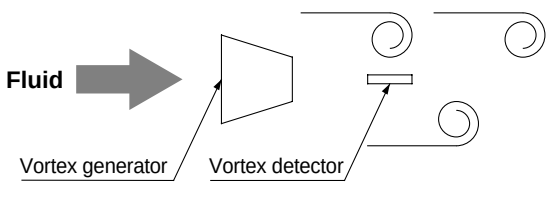
This flow switch uses //min as the flow rate indicator unit. The mass flow is converted and displayed under the conditions of 0°C and 101.3kPa.
The conversion conditions can be switched to 20°C and 101.3kPa with high flow type switches.

Detection principle of digital flow switch for water

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

$$f = k \times v$$

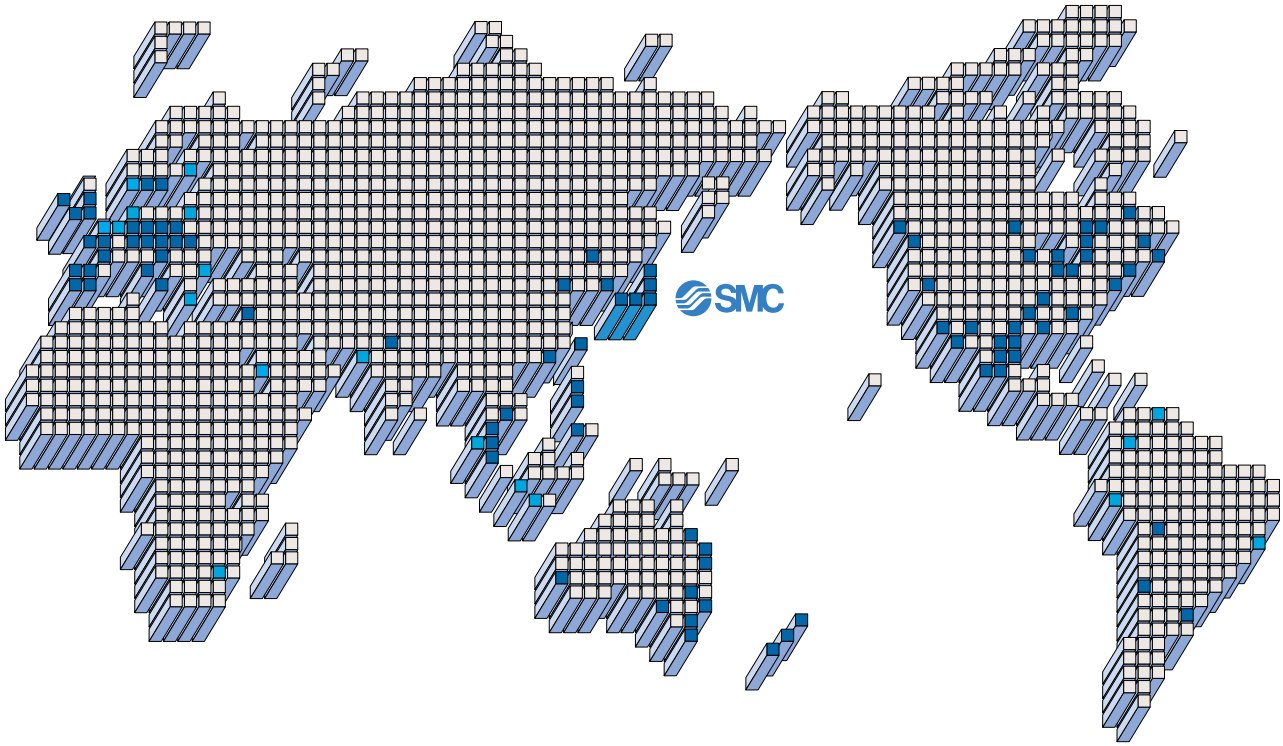
f: Frequency of vortex v: Flow velocity k: Proportional constant (determined by the vortex generator's dimensions and shape).
Therefore, the flow rate can be measured by detecting this frequency.



∗ Top view

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SMC'S GLOBAL MANUFACTURING, DISTRIBUTION AND SERVICE NETWORK



EUROPE

AUSTRIA
SMC Pneumatik GmbH

CZECH
SMC Industrial Automation CZ s.r.o.

DENMARK
SMC Pneumatik A/S

FINLAND
SMC Pneumatics Finland Oy

FRANCE
SMC Pneumatique SA

GERMANY
SMC Pneumatik GmbH

HUNGARY
SMC Hungary Ipari Automatizálási Kft.

IRELAND
SMC Pneumatics (Ireland) Ltd.

ITALY
SMC Italia S.p.A.

NETHERLANDS
SMC Pnuematics BV.

NORWAY
SMC Pneumatics Norway A/S

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

ROMANIA
SMC Romania s.r.l.

RUSSIA
SMC Pneumatik LLC.

SLOVAKIA
SMC Priemyselná automatizáciá, s.r.o.

EUROPE

SLOVENIA
SMC Industrijska Avtomatika d.o.o.

SPAIN/PORTUGAL
SMC España, S.A.

SWEDEN
SMC Pneumatics Sweden AB

SWITZERLAND
SMC Pneumatik AG.

UK
SMC Pneumatics (U.K.) Ltd.

ASIA

CHINA
SMC (China) Co., Ltd.

HONG KONG
SMC Pneumatics (Hong Kong) Ltd.

INDIA
SMC Pneumatics (India) Pvt. Ltd.

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

PHILIPPINES
SMC Pneumatics (Philippines), Inc.

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

SOUTH KOREA
SMC Pneumatics Korea Co., Ltd.

TAIWAN
SMC Pneumatics (Taiwan) Co., Ltd.

THAILAND
SMC Thailand Ltd.

NORTH AMERICA

CANADA
SMC Pneumatics (Canada) Ltd.

MEXICO
SMC Corporation (Mexico) S.A. de C.V.

USA
SMC Corporation of America

SOUTH AMERICA

ARGENTINA
SMC Argentina S.A.

BOLIVIA
SMC Pneumatics Bolivia S.R.L.

BRAZIL
SMC Pneumaticos Do Brazil Ltda.

CHILE
SMC Pneumatics (Chile) S.A.

VENEZUELA
SMC Neumatica Venezuela S.A.

OCEANIA

AUSTRALIA
SMC Pneumatics (Australia) Pty. Ltd.

NEW ZEALAND
SMC Pneumatics (N.Z.) Ltd.

SMC CORPORATION

1-16-4 Shimbashi, Minato-ku, Tokyo 105-0004, JAPAN
Tel: 03-3502-2740 Fax: 03-3508-2480
URL http://www.smcworld.com

© 2001 SMC CORPORATION All Rights Reserved

1st printing September, 2001 D-SMC.L.A. P-80 (JT)
This catalog is printed on recycled paper with concern for the global environment.

All specifications in this catalog are subject to change without notice.
Printed in Japan.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP