

Digital Flow Switch Operation Manual



For Air

PF2A 710/750 Series

PF2A 711/721/751 Series

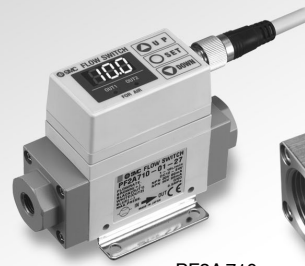
For Water

PF2W 704/720/740 Series

PF2W 711 Series

For Water (High Temperature Fluid Type)

PF2W 704T/720T/740T Series



PF2A 710



PF2W 711

SMC Corporation

URL <http://www.smcworld.com>

Thank you for purchasing the SMC PF2*7** Series Digital Flow Switch.
Please read this manual carefully before operating digital flow switch and understand digital flow switch, its capabilities and limitations.
Please keep this manual handy for future reference.

OPERATOR

- This operation manual has been written for those who have knowledge of machinery and apparatus that use pneumatic equipment and have full knowledge of assembly, operation and maintenance of such equipment.
- Please read this operation manual carefully and understand it before assembling, operating or providing maintenance service to the flow switch.

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SAFETY

The Digital Flow Switch and this manual contain essential information for the protection of users and others from possible injury and property damage and to ensure correct handling. Please check that you fully understand the definition of the following messages (signs) before going on to read the text, and always follow the instructions.

Please read the operation manuals of related apparatus and understand it before operating the flow switch.

IMPORTANT MESSAGES	
Read this manual and follow its instructions. Signal words such as WARNING, CAUTION and NOTE, will be followed by important safety information that must be carefully reviewed.	
⚠WARNING	Indicates a potentially hazardous situation which could result in death or serious injury if you do not follow instructions.
⚠CAUTION	Indicates a potentially hazardous situation which if not avoided, may result in minor injury or moderate injury.
NOTE	Gives you helpful information.

⚠WARNING

Do not disassemble, remodel (including change of printed circuit board) or repair.

An injury or failure can result.

Do not operate beyond specification range.

Fire, malfunction or switch damage can result.
Please use it after confirming the specification.

Do not operate in atmosphere of an inflammable, an explosive and corrosive gas.

Fire or an explosion can result.
This flow switch is not an explosion proof type.

Prepare the double interlock by another system (Mechanical interlock etc.) and check operating normally, when using this flow switch for an interlock circuit.

An accident by a malfunction may potentially result.

Do not use with an inflammable, an explosive and combustible fluid.

Otherwise, a fire or an explosion or damage may potentially result.
(The detector of the flow switch for air is heated by 150°C)

⚠CAUTION

Check fluid leak after installing the flow switch pipe.

Neglecting fluid leak may cause a burn or damage to the machines and equipment. A burn may potentially be inflicted for High temperature model for water.

Do not touch the pipe joining parts. (High temperature model for water)

Otherwise, a burn may potentially be inflicted.
Touch it after confirming that the part is sufficiently cool.

SAFETY (continue)

NOTE

Follow the instructions given below when handling your flow switch. Otherwise, the switch may be damaged or may fail, thereby resulting in malfunction.

- Do not drop it, bring it into collision with other objects or apply excessive shock (490m/s^2 or more).
- Do not pull the lead wire with force nor lift the main unit by holding the lead wire. (Pulling strength less than 49N)
- Wiring correctly.
- Do not wiring while power is on.
- Although the flow switch complies with the CE Marking, since it does not have the thunder surge protection, please carry out protection to thunder surge by the equipment side.
- Although the flow switch complies with the CE Marking, since the equipment and apparatus which are made to generate the surge (Electro-magnetic lifter, High frequency induction furnace, Motor etc.) around the flow switch should perform measure against surge come out.
- Do not use with power cable or high-voltage cable in the same wire route.
- Do not use in a place in which oil or chemical splashes.
- Do not push the setting buttons by a sharply pointed object.
- Turn on the power supply of a flow switch for Air, when flow is zero. Some initial drift occurs during ten minutes after turning the power on.
- Start measurement by the flow switch three seconds after turning on the power. (Also in momentary interception of the power supply by reset etc.) Please take a measure by the program of equipment etc.
- Maintain the switch status for measurement output before setting when initializing or setting a flow switch. Measure after checking impacts to the equipment.
- Carry out a setup since a control system is shut down if required.
- Install a filter on the primary side (inlet side) if foreign matter is feared to mix in a fluid.
- Use this flow switch under the specified operating pressure range. Design the pipe and set the switch for water so that the pressure beyond the specified pressure range by the water hammer may not be impressed.
- Don't attach the flow switch for air the bottom of a body upward.

Names and Functions of Individual Parts

Display Part

Output (OUT1) Lamp (Green) : Lit when OUT1 is ON. Flickers when an overcurrent error occurs.

Output (OUT2) Lamp (Red) : Lit when OUT2 is ON. Flickers when an overcurrent error occurs.

LED Display : Displays a flow rate, set mode status, selected display unit and error code.

▲ Button (UP) : Selects a mode and increases a set ON/OFF value.

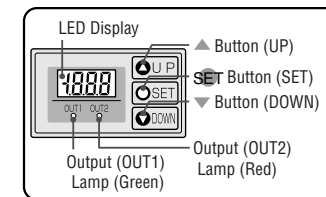
▼ Button (DOWN) : Selects a mode and decreases a set ON/OFF value.

SET Button (SET) : Changes the mode and sets a set value.

* RESET

Pressing the ▲ and ▼ buttons simultaneously will activate the RESET function.

Use this function to clear errors when a trouble occurs.



Body

Flow switch sensor body

The arrow on the side of the body indicates the direction of flow.

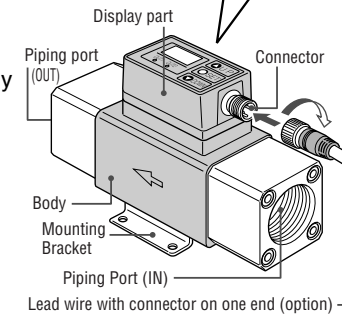
Piping port

This port connects with pipeline. Use a pipe fitting to connect with external pipeline.

Accessories

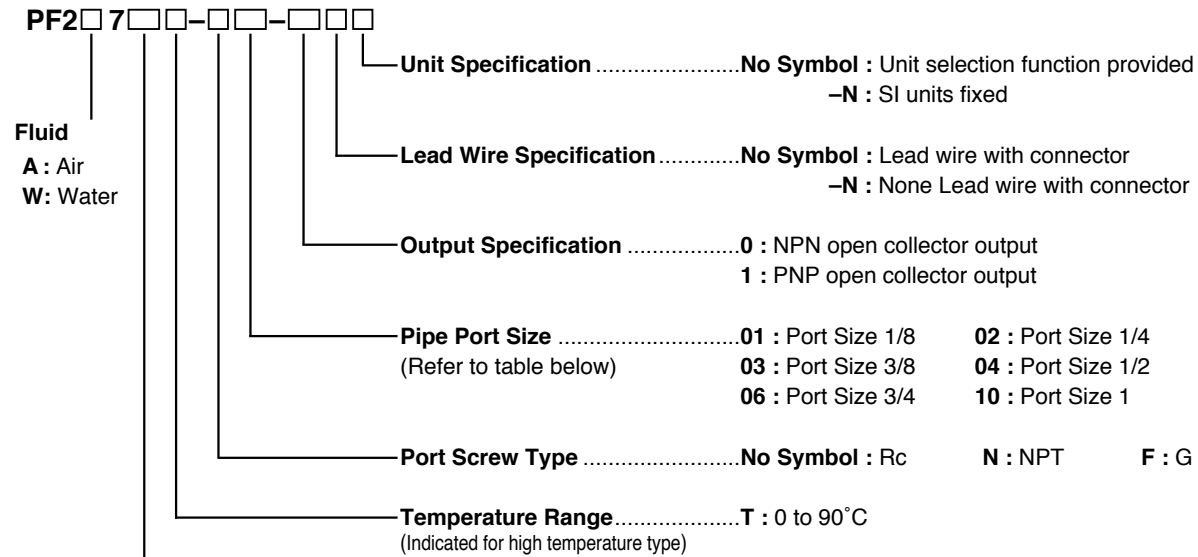
(When no symbol is specified for optional wiring in the type specification.)

Lead wire with connector on one end (3m in length)



PF2W 711

Model Indication Method



Type	Flow Rate	Pipe Port Size
PF2A7	10 : 1 to 10L/min	01, 02
	50 : 5 to 50L/min	01, 02
	11 : 10 to 100L/min	03
	21 : 20 to 200L/min	03
	51 : 50 to 500L/min	04
PF2W7	04 : 0.5 to 4L/min	03
	20 : 2 to 16L/min	03, 04
	40 : 5 to 40L/min	04, 06
	11 : 10 to 100L/min	06, 10

NOTE 1: The new Measurement Low prohibits use in Japan of flow switches with a unit selection function.

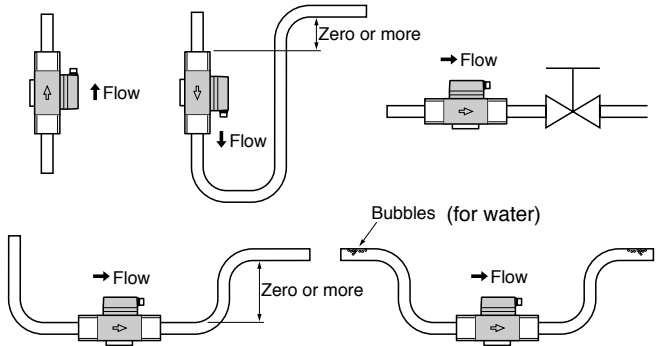
NOTE 2: Fixed unit for instantaneous flow rate is :L/min
 for integrated flow rate is :L

Installation Mounting procedure

Before you mount a flow switch, read "SAFETY " and "Installation" described in this chapter carefully to obtain safe and correct measurement.

Mounting

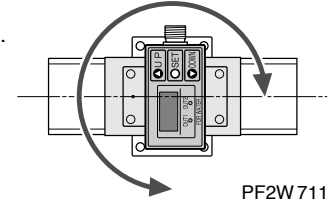
- Use this flow switch under the specified operating pressure range.
- Use this flow switch under the specified operating temperature range.
- Withstand pressure are 1.0MPa for air and 1.5MPa for water.
- Do not install a flow switch at a foothold position.
- Bubbles may be generated depending on the piping design. Refer to an example of recommended piping system. (For water)



PF2W 711

- Install a flow switch so that the flow direction agrees with the arrow direction on the side of the body.
- Provide a straight pipe length of more than eight times the pipe diameter to the primary side (inlet side) of the flow switch.
- To start designing piping system, check the pressure loss at the operating flow rate using the flow rate characteristic (pressure loss) curve.

- Set Display Part proper position. Display Part rotates in 270° degree.



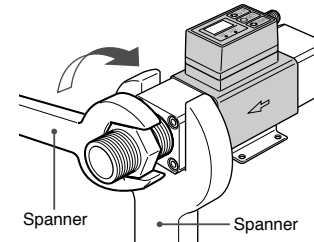
PF2W 711

Piping connections

- Use a pipe fitting to connect pipeline with the flow switch.
- Observe the specified tightening torque when connecting pipes. Refer to the following table for the appropriate torque values.

Nominal size of screws	Appropriate 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
Rc 3/4	28 to 30
Rc 1	36 to 38

- When connecting pipeline to the switch, apply a spanner to the metal part of the piping section for the switch.
- Make sure that sealing tapes will not enter inside the pipe when connecting pipes.
- Connect pipes securely so that fluid will not leak from loose connections.

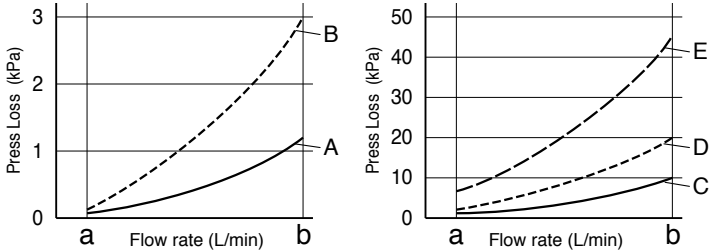


PF2W 711

Installation (continue)

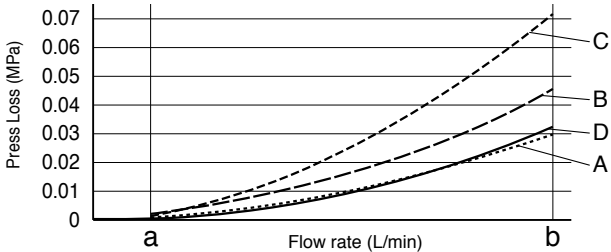
Flow rate characteristic (Pressure Loss)

PF2A 7**



Type	Graph	a (L/min)	b (L/min)
PF2A 710	A	1	10
PF2A 750	B	5	50
PF2A 711	C	10	100
PF2A 721	D	20	200
PF2A 751	E	50	500

PF2W 7**



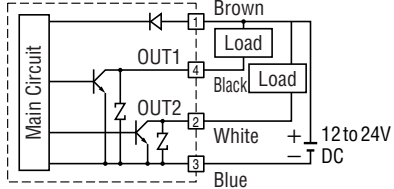
Type	Graph	a (L/min)	b (L/min)
PF2W 704/704T	A	0.5	4
PF2W 720/720T	B	2	16
PF2W 740/740T	C	5	40
PF2W 711	D	10	100

Example of Internal Circuit and Wiring

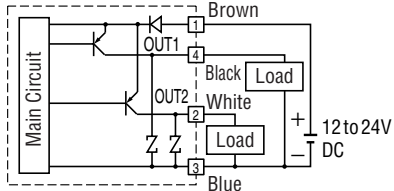
Output Specification

When the Lead wire with connector provided by SMC corporation is used the color of wire(Brown, white, Black, Blue) shown on circuit diagram will be applied.

-27
 NPN Open Collector Output 2 Outputs
 Max. 30V, 80mA Internal Voltage Drop 1V or less



-67
 PNP Open Collector Output 2 Outputs
 Max. 80mA Internal Voltage Drop 1.5V or less

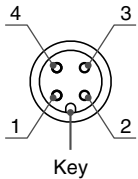


Example of Internal Circuit and Wiring (continue)

How to connect connectors:

- Turn off power before connecting or disconnecting the connector.
- To insert the connector, push the connector socket of the lead wire to the key part of the switch connector after aligning them to each other and secure the connector with the lock nut.
- To disconnect the connector, unlock the connector lock nut and pull out the connector straight.
- Install the lead wire separately from the route for power cable or high-voltage cable. Otherwise, malfunction may potentially result due to noise.

Connector pin number

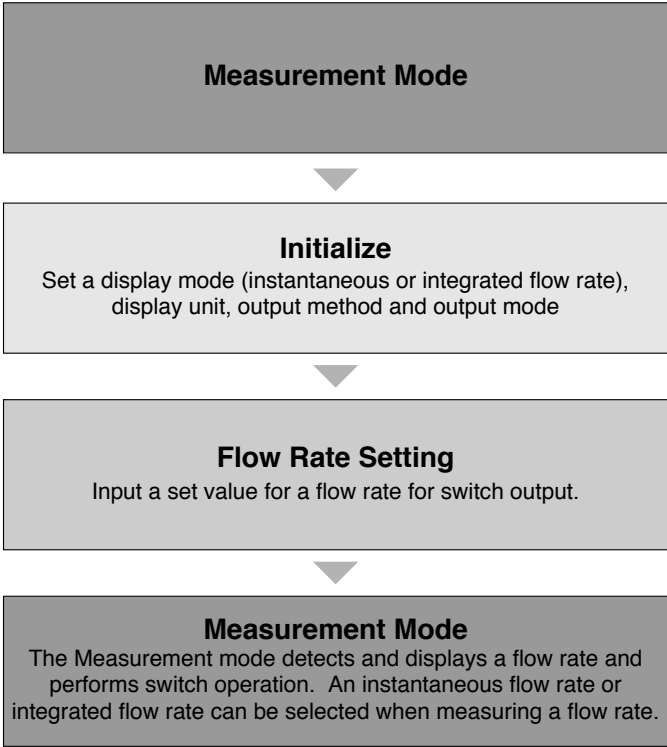


Pin No.	Pin name
1	DC (+)
2	OUT2
3	DC (-)
4	OUT1

Setting

Setting Procedures

Check installation condition and wiring and set as follows




Initialize

Keep pressing the **SET** button longer than two seconds. Remove the finger off the **SET** button when [d_□] is displayed.

1. Display Mode Setting

Select whether to display instantaneous flow rate or integrated flow rate.

To change the Display mode, press the **▲** button and select the desired flow rate to display. Then press the **SET** button.

[d_1] is for display of an instantaneous flow rate and [d_2],
integrated flow rate. 

2. Selecting Display Unit

(In case [-M] is not assigned to unit specification in model indication)

Refer to page 16.


3. Output Method Setting

Three output methods are available, namely, instantaneous switch, integrating switch and integrating pulse. The method for output to OUT1 or OUT2 is set as follows.

1) First, the output method for OUT1 is set.


* Press the **▲** button and select the instantaneous switch, integrating switch or integrating pulse.

* Press the **SET** button to set.

[o10] [o11] and [o12] respectively indicate the instantaneous switch, integrating switch and integrating pulse. 

2) Select one output method for OUT2 from three output methods by pressing the **▲** button, as in OUT1.

* Press the **SET** button to set.

[o20] [o21] and [o22] respectively indicate the instantaneous switch, integrating switch and integrating pulse. 


4. Output Mode Setting

Two output modes are available, namely, the Reverse Output mode and Non-Reverse Output mode. An output mode for OUT1 and OUT2 is set.

1) First, the output method for OUT1 is set.


* Press the **▲** button and select the Reverse Output mode or Non-Reverse Output mode.

* Press the **SET** button to set.

[1_n] and [1_P] respectively indicate the Reverse Output mode and Non-Reverse Output mode. 

2) Select one output method for OUT2 from the Reverse Output mode and Non-Reverse Output mode by pressing the **▲** button, as in OUT1.

* Press the **SET** button to set.

[2_n] and [2_P] respectively indicate the Reverse Output mode and Non-Reverse Output mode. 

Initialize (continue)

Selecting Display Unit
In case [-M] is not assigned to unit specification in model indication
 Two units each in instantaneous flow rate or integrated flow rate can be selected freely. Pressing the ▲ or ▼ button in unit setting will change to a unit and a set value will be converted automatically.
 Press the SET button to set and to move to setting the output method.


Display Part	LED Display	Instantaneous Flow Rate	Integrated Flow Rate
PF2A 7**	U_1	L/min	L
	U_2	CFM×10 ⁻² ; CFM×10 ⁻¹	ft ³ ×10 ⁻¹
PF2W 7**	U_1	L/min	L
	U_2	gal(us)/min	gal(us)

Selecting Flow rate Display Unit
(Only for PF2A 7 for Air)**
 Two units in normal condition or standard condition (ANR) can be selected.


Normal condition: 0°C/ 101.3kPa
 Standard condition: 20°C/ 101.3kPa/ 65%RH

Press the ▲ button and select the display unit, then press the SET button to set. [nor] means Normal condition and [Anr] means Standard condition.

When normal condition is selected the indicator shown in right illustration will be lit.

Indicator → 

Display Function of Integrated Flow Rate Value




- Press the ▼ button first, then the SET button, to press both buttons simultaneously. Integration starts when [-]  flickers.
- Lower three digits of an integrated value are always displayed. Press the ▼ button when wishing to check upper three digits.
- Pressing the ▲ button enables to display an instantaneous flow rate even during integration.
- To stop integration, press the ▼ button first, then the SET button, to press both buttons simultaneously. The display will keep the present integrated value. To clear display of an integrated value, press both the ▲ and ▼ buttons simultaneously longer than two seconds. To further continue integration from the saved value, repress the ▼ button first, then the SET button, to press both buttons simultaneously.

Instantaneous Flow Rate Setting Mode

Manual

Manually set an actuation value of the instantaneous-value switch in case the instantaneous switch is selected in initialization.

The output method is also set in accordance with the value set manually. Set the output method while referring to the output method described below.

1. Keep pressing the **SET** button and remove the finger off when [F-1] is displayed. 
2. Repress the **SET** button to set for input of a set value in [n_1] (P_1 in the Non-Reverse Output mode) for OUT1. 
In case the Reverse Output mode is selected in initialization, [n_1] and the set value will be displayed alternately.
(In case the Non-Reverse Output mode is selected in initialization, [P_1] and the set value will be displayed alternately.)
3. Press the **▲** or **▼** buttons to select a desired set value.
Press the **▲** button to increase the set value or the **▼** button to decrease the set value.
4. Press the **SET** button to set the set value and to move to the setting mode for [n_2] (P_2 in the Non-Reverse Output mode). 
In case the Reverse Output mode is selected in initialization, [n_2] and the set value will be displayed alternately.
(In case the Non-Reverse Output mode is selected in initialization, [P_2] and the set value will be displayed alternately.)
5. Press the **▲** or **▼** buttons to select a desired set value.
Press the **▲** button to increase the set value or the **▼** button to decrease the set value.

6. Press the **SET** button to set the set value and to move to the setting mode for OUT2.

Set the set value as in OUT1.

In case the Reverse Output mode is selected for the OUT2 setting in initialization, [n_3] or [n_4] and the set value will be displayed alternately.

In case the Non-Reverse Output mode is selected in initialization, [P_3] or [P_4] and the set value will be displayed alternately.





7. Completing settings for [n_1] to [n_4] ([P_1] to [P_4] in the Non-Reverse Output mode) will finish flow rate setting and the mode will return to the Measurement mode.

Instantaneous Flow Rate Setting Mode (continue)



Auto Presetting

The flow rate flowing through the flow switch will be set as a reference value and a Hysteresis (H) will be set automatically at a value 3digits lower when setting auto preset input.

The output method for setting by auto presetting is only hysteresis mode.

1. Keep pressing the **SETT** button and remove the finger off when [F_1] is displayed. 
2. Press the **▲** button and change [F_1] in the display to [F_2]. 
3. Press the **SETT** button and set the auto preset state of OUT1. 
The display will change to show [AP1] .
(In case OUT1 setting is not needed, press the **▲** and **▼** button simultaneously.)
4. Prepare the equipment to set the flow rate of OUT1 and flow fluid of the required flow rate.
5. Pressing the **SETT** button will automatically read the flow rate. A value 3digits lower will be set automatically as a Hysteresis (H). The display will show [A1L] and the set value alternately.
6. Press the **SETT** button and set auto preset state of OUT2. 
The display will change to show [AP2].
(In case OUT2 setting is not needed, press the **▲** and **▼** buttons simultaneously.)
7. Prepare the equipment to set the flow rate of OUT2 and flow fluid of the required flow rate.
8. Pressing the **SETT** button will automatically read the flow rate. A value 3digits lower will be set automatically as a Hysteresis (H). The display will show [A2L] and the set value alternately.
9. Press the **SETT** button to finish the Auto Presetting mode and the mode will return to the Measurement mode.

Integrated Flow Rate Setting Mode

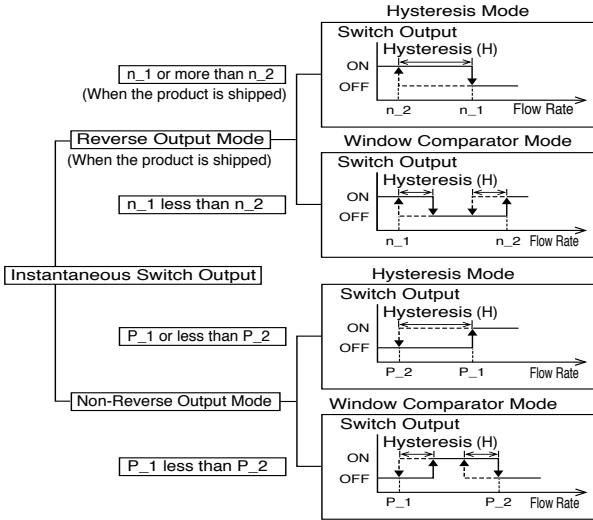
- The switch is set to an integrated flow rate.  or 
 - Integrated flow rate is displayed by switching lower three digits and upper three digits. Settings are made also by dividing into lower three digits and upper three digits.
1. Keep pressing the **SETT** button and remove the finger off when [F_1] or [F_3] is displayed.
Proceed to Step 3. if [F_3] is displayed.
([F_1] will be displayed in case the instantaneous switch is selected for any switch output in initialization. In other cases, [F_3] will be displayed.)
 2. When [F_1] is displayed, push the **▲** button till the display shows [F_3]. The subsequent setting operation will be the same as that when [F_3] is displayed. Set as follows.
 3. Set as follows if [F_3] is displayed.
 - 1) Press the **SETT** button and display the lower three digits of the integrated flow rate of OUT1.
 - 2) Press the **▲** or **▼** buttons and adjust the set value to the desired value.
 - 3) Press the **SETT** button to set. The upper three digits of OUT1 will be displayed.
 - 4) Press the **▲** or **▼** buttons and adjust the set value to the desired value.
 - 5) Press the **SETT** button to set. The lower three digits of OUT2 will be displayed.
 - 6) Press the **▲** or **▼** buttons and adjust the set value to the desired value.
 - 7) Press the **SETT** button to set. The upper three digits of OUT2 will be displayed.
 - 8) Press the **▲** or **▼** buttons and adjust the set value to the desired value.
 - 9) Press the **SETT** button to finish setting of an integrated flow rate and the mode will return to the Measurement mode.

Output Selection

Instantaneous Switch Output Method

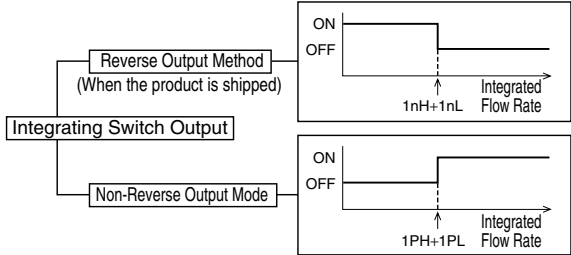
Four output methods can be selected by selecting an output mode and by combining large and small set values of OUT1 and OUT2. One of these four output methods can be selected for each output.

- OUT1 and OUT2 can be set independently.
- 1digit flow rate conversion will be a minimum set unit. See the specification for the set flow rate units.
- When setting in the Auto Presetting mode, the Hysteresis mode will be set automatically. Hysteresis in this case will be 3digits fixed.
- In the Window Comparator mode, leave between [P_1] and [P_2] or between [n_1] and [n_2] span more than 7digits.
- The following is given using OUT1 as an example. The descriptions for OUT2 are the same as those for OUT1, under the conditions that [n_1] and [n_2] should be replaced by [n_3] and [n_4] and [P_1] and [P_2] should be replaced by [P_3] and [P_4].



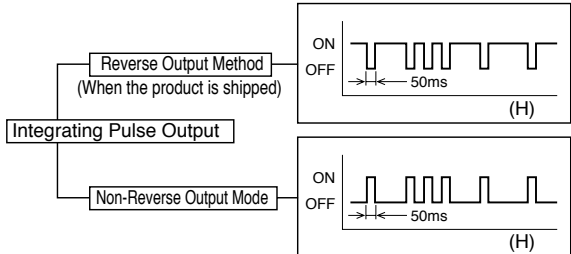
Integrating Switch Output

- Two output methods can be selected by selecting an output mode. One of these two output methods can be selected for each output.
- OUT1 and OUT2 can be set independently.
- The following is given using OUT1 as an example. The descriptions for OUT2 are the same as those for OUT1, under the conditions that 1nL and 1nH should be replaced by 2nL and 2nH and 1PL and 1PH should be replaced by 2PL and 2PH.



Integrating Pulse Output

- Pulse output for integrated flow rate measurement.



Other Functions

Key Lock Function

This function prevents errors such as changing a set value by mistake.

Lock

- Keep pressing the **SET** button longer than three seconds. The display will change to show [F_1] → [d_□] → [unL.]
- Remove the finger off the button when [unL.] is displayed.
- Press the **▲** button to set the display to [Loc]
- Press the **SET** button and return to the Measurement mode.

unL

Unlock

- Press the **SET** button longer than three seconds. Remove the finger off the button when [Loc] is displayed.
- Press the **▲** button to change the display to [unL]
- Press the **SET** button and return to the Measurement mode.

Loc

Error Display and Troubleshooting

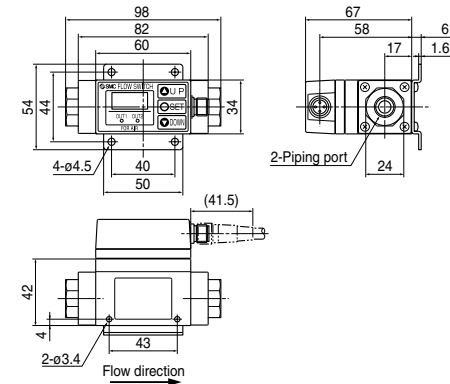
In case an error occurs, take the following actions:

LED Display	Error Nature	Troubleshooting
Er 1	A current exceeding 80mA is flowing to OUT1.	Turn the power off. Check the load and wiring of OUT1.
Er 2	A current exceeding 80mA is flowing to OUT2.	Turn the power off. Check the load and wiring of OUT2.
Er 4	Set data has been changed due to some reason.	Reset and return the settings to those that were set when the equipment was delivered to you. If the settings cannot be reset to those that were set when the equipment was shipped, your equipment has to be examined by us.
- - -	A fluid is flowing at a flow rate higher than the rated rate.	Reduce the flow below the rated value. Error display will automatically be reset when the flow lowers below the rated value.

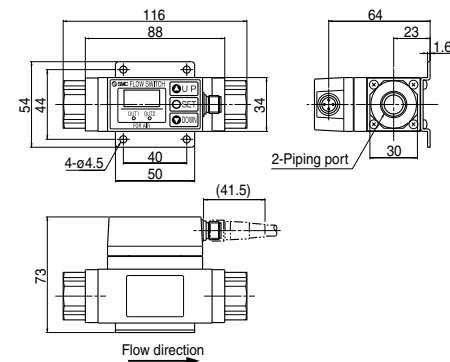
To reset display of Error 1, 2 or 4, press the **▲** and **▼** buttons simultaneously.

Outline with Dimensions (in mm)

PF2A 710 / 750

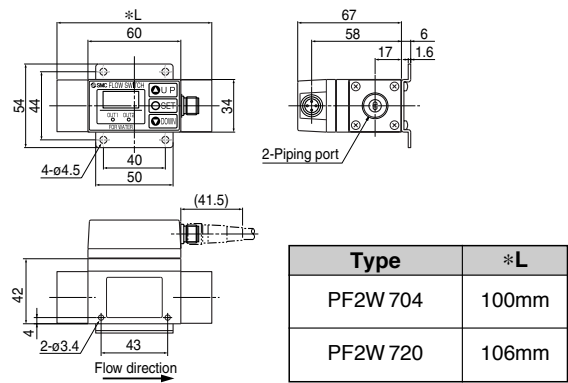


PF2A 711 / 721 / 751

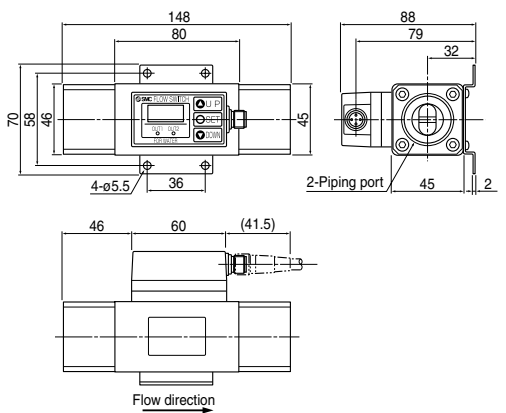


Outline with Dimensions (in mm) (continue)

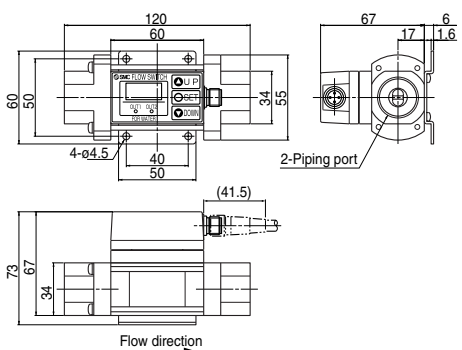
PF2W 704 / 720



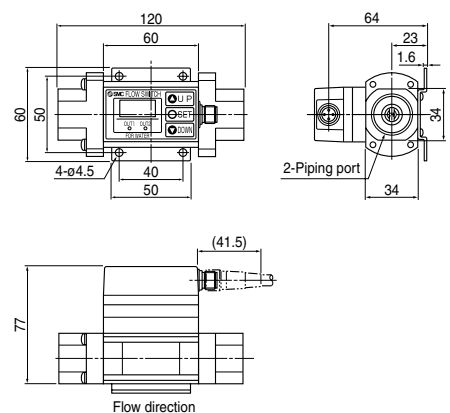
PF2W 711



PF2W 740



PF2W 704T / 720T / 740T



Specification

Model	PF2A 710	PF2A 750	PF2A 711	PF2A 721	PF2A 751
Fluid to be Measured	Air, Nitrogen				
Flow Rate Indication Range	0.5 to 10.5L/min	2.5 to 52.5L/min	5 to 105L/min	10 to 210L/min	25 to 525L/min
Set Flow Rate Range	0.5 to 10.5L/min	2.5 to 52.5L/min	5 to 105L/min	10 to 210L/min	25 to 525L/min
Rated Flow Range	1 to 10L/min	5 to 50L/min	10 to 100L/min	20 to 200L/min	50 to 500L/min
Minimum Set Unit	0.1L/min	0.5L/min	1L/min	2L/min	5L/min
Flow rate conversion value	0.1L/pulse (Pulse width: 50msec)	0.5L/pulse (Pulse width: 50msec)	1L/pulse (Pulse width: 50msec)	2L/pulse (Pulse width: 50msec)	5L/pulse (Pulse width: 50msec)
Unit	L/min, CFM×10 ⁻²		L/min, CFM×10 ⁻¹		
(*1, 2) Instantaneous Flow Rate					
Integrated Flow Rate	L, ft ³ ×10 ⁻¹				
Operating Fluid Temperature	0 to 50°C				
Linearity	±5%F.S. or less				
Repeatability	±1%F.S. or less		±2%F.S. or less		
Temperature Characteristic	±3%F.S. or less (15 to 35°C, 25°C standard) ±5%F.S. or less (0 to 50°C, 25°C standard)				
Current Consumption (No load)	150mA or less		160mA or less		170mA or less
Mass (Weight) (*3)	250g		290g		
Piping Specification	1/8, 1/4		3/8		1/2
Material of Wet Part	Attachment: ADC Packing: NBR Mesh: SUS Internal Body: PBT Sensor-housing: PBT Sensor: Lead-glass/ PtIr/ FeNi/ OFC		Attachment: ADC Packing: NBR Spacer: PBT Mesh: SUS Internal Body: PBT Sensor-housing: PBT Sensor: Lead-glass/ PtIr/ FeNi/ OFC		

*1: With a unit selection function

(Without a unit selection function, fixed to SI units(L/min or L))

*2: The flow unit is based on 0°C/ 101.3kPa.

*3: Lead wire not included.

*4: Select whether to switch output or pulse output of integrated flow rate by the initialization.

*5: Window Comparator mode. Hysteresis (H) will be in 3digits.

Separate [P_1] and [P_2], as well as [n_1] and [n_2], more than 7digits.

(In case of the output 2, n_1,2 becomes n_3,4 and P_1,2 becomes P_3,4)

*6: The Flow Switch conforms entirely to the CE standard.

Common Specification		
Detecting Method	Calorimetry	
Displayed Digits	3digits 7-segment LED	
Operating Pressure Range	-50kPa to 0.5MPa	
Withstand Pressure	1.0MPa	
Integrated Flow Rate Range	0 to 999999L	
Ambient Temperature Range	Operation: 0 to 50°C, Storage: -25 to 85°C (No condensation or Freezing)	
Output Specification (*4)	Switch Output	
	NPN Open Collector	Maximum Load Current: 80mA, Internal voltage drop: 1V or less (@ load current 80mA) Maximum Input Voltage: 30V 2 outputs
	PNP Open Collector	Maximum Load Current: 80mA, Internal voltage drop: 1.5V or less (@ load current 80mA) 2 outputs
Integrating Pulse Output	NPN or PNP Open Collector (same specification as that of switch output)	
Operation Indicator Lamp	Lit when ON Output (OUT1): Green, Output (OUT2): Red	
Response Time	1sec or less	
Hysteresis	Hysteresis Mode: Variable (Settable starting 0), Window Comparator mode (*5): Fixed (3digits)	
Power Supply Voltage	12 to 24VDC, ripple ±10% or less	
Withstand Voltage	1000VAC 1 minute Between group of external terminals and case	
Insulation Resistance	50MΩ or more (@ 500VDC M) Between group of external terminals and case	
Resistance to Noise	1000Vp-p pulse width 1μs, rise 1ns	
Vibration proof	10 to 500Hz and amplitude 1.5mm or acceleration 98m/s ² whichever is smaller	
Impact proof	490m/s ² , (3times each directions of X, Y and Z respectively)	
Enclosure	IP65	

Specification (continue)

Model	PF2W 704	PF2W 720	PF2W 740	PF2W 711
Fluid to be Measured	Water			
Flow Rate Indication Range	0.35 to 4.5L/min	1.7 to 17.0L/min	3.5 to 45L/min	7 to 110L/min
Set Flow Rate Range	0.35 to 4.5L/min	1.7 to 17.0L/min	3.5 to 45L/min	7 to 110L/min
Rated Flow Range	0.5 to 4L/min	2 to 16L/min	5 to 40L/min	10 to 100L/min
Minimum Set Unit	0.05L/min	0.1L/min	0.5L/min	1L/min
Flow rate conversion value	0.05L/pulse (Pulse width: 50msec)	0.1L/pulse (Pulse width: 50msec)	0.5L/pulse (Pulse width: 50msec)	1L/pulse (Pulse width: 50msec)
Operating Fluid Temperature	0 to 50°C			
Linearity	±5%F.S. or less			±3%F.S. or less
Repeatability	±3%F.S. or less			±2%F.S. or less
Temperature Characteristic	±5%F.S. or less (0 to 50°C, 25°C standard)			(*1)
Current Consumption (No load)	70mA or less			80mA or less
Mass (Weight) (*2)	460g	520g	700g	1,150g
Piping Specification	3/8	3/8, 1/2	1/2, 3/4	3/4, 1
Material of Wet Part	Attachment: SUS, Packing: NBR, Internal Body: PPS, Sensor: PPS			

Model	PF2W 704T	PF2W 720T	PF2W 740T
Fluid to be Measured	Water, 50% of water and an ethylene glycol 50% fluid		
Flow Rate Indication Range	0.35 to 4.5L/min	1.7 to 17.0L/min	3.5 to 45L/min
Set Flow Rate Range	0.35 to 4.5L/min	1.7 to 17.0L/min	3.5 to 45L/min
Rated Flow Range	0.5 to 4L/min	2 to 16L/min	5 to 40L/min
Minimum Set Unit	0.05L/min	0.1L/min	0.5L/min
Flow rate conversion value	0.05L/pulse (Pulse width: 50msec)	0.1L/pulse (Pulse width: 50msec)	0.5L/pulse (Pulse width: 50msec)
Operating Fluid Temperature	0 to 90°C (No cavitation)		
Linearity	±5%F.S. or less		
Repeatability	±3%F.S. or less		
Temperature Characteristic	±5%F.S. or less (0 to 90°C, 25°C standard)		
Current Consumption (No load)	70mA or less		
Mass (Weight) (*2)	710g		
Piping Specification	3/8	3/8, 1/2	1/2, 3/4
Material of Wet Part	Attachment: SUS, Packing: FKM, Internal Body: PPS, Sensor: PPS		

Common Specification	
Detecting Method	Karman Vortex Method
Displayed Digits	3digits 7-segment LED
Unit	Instantaneous Flow Rate L/min, gal (US)/min
(*3) Integrated Flow Rate	L, gal (US)
Operating Pressure Range	0 to 1MPa
Withstand Pressure	1.5MPa
Integrated Flow Rate Range	0 to 999999L
Ambient Temperature Range	Operation: 0 to 50°C, Storage: -25 to 85°C (No condensation or Freezing)
Output Specification (*4)	Switch Output
	NPN Open Collector
	PNP Open Collector
Integrating Pulse Output	NPN or PNP Open Collector (same specification as that of switch output)
Operation Indicator Lamp	Lit when ON Output (OUT1): Green, Output (OUT2): Red
Response Time	1sec or less
Hysteresis	Hysteresis Mode: Variable (Settable starting 0), Window Comparator mode (*5): Fixed (3digits)
Power Supply Voltage	12 to 24VDC, ripple ±10% or less
Withstand Voltage	1000VAC 1 minute Between group of external terminals and case
Insulation Resistance	50MΩ or more (@ 500VDC M) Between group of external terminals and case
Resistance to Noise	1000Vp-p pulse width 1μs, rise 1ns
Vibration proof	10 to 500Hz and amplitude 1.5mm or acceleration 98m/s ² whichever is smaller
Impact proof	490m/s ² , (3times each directions of X, Y and Z respectively)
Enclosure	IP65

*1: ±3%F.S. or less (15 to 35°C, 25°C standard), ±5%F.S. or less (0 to 50°C, 25°C standard)

*2: Lead wire not included.

*3: With a unit selection function

(Without a unit selection function, fixed to SI units(L/min or L))

*4: Select whether to switch output or pulse output of integrated flow rate by the initialization.

*5: Window Comparator mode. Hysteresis (H) will be in 3digits.

Separate [P_1] and [P_2], as well as [n_1] and [n_2], more than 7digits.

(In case of the output 2, n_1,2 becomes n_3,4 and P_1,2 becomes P_3,4)

*6: The Flow Switch conforms entirely to the CE standard.