

# Before Use

## Digital Flow Switch

### PFMC7501/7102/7202



Thank you for purchasing an SMC PFMC7 series Digital Flow Switch. Please read this manual carefully before operating the product and make sure you understand its capabilities and limitations. Please keep this manual handy for future reference.

To obtain the operation manual about this product and control unit, please refer to the SMC website (URL <http://www.smcworld.com>) or contact SMC directly.

## Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution", "Warning" or "Danger". They are all important notes for safety and must be followed in addition to International standards (ISO/IEC) and other safety regulations.

- Caution:** CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
- Warning:** WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
- Danger:** DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

## Operator

- ◆ The operation manual is intended for those who have knowledge of machinery using pneumatic equipment, and have sufficient knowledge of assembly, operation and maintenance of such equipment. Only those persons are allowed to perform assembly, operation and maintenance.
- ◆ Read and understand the operation manual carefully before assembling, operating or providing maintenance to the product.

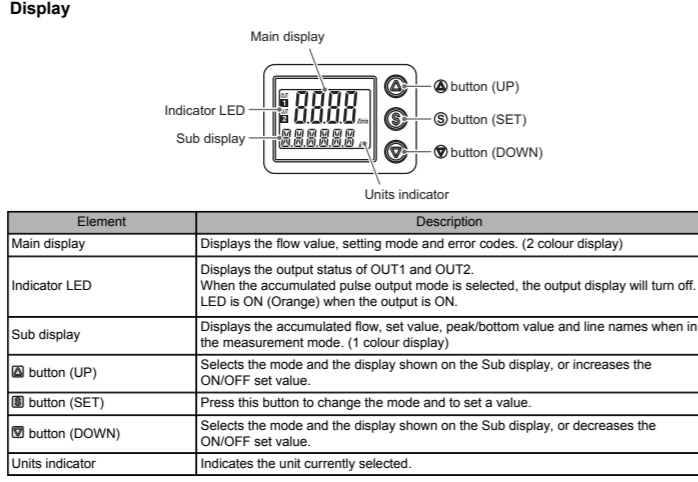
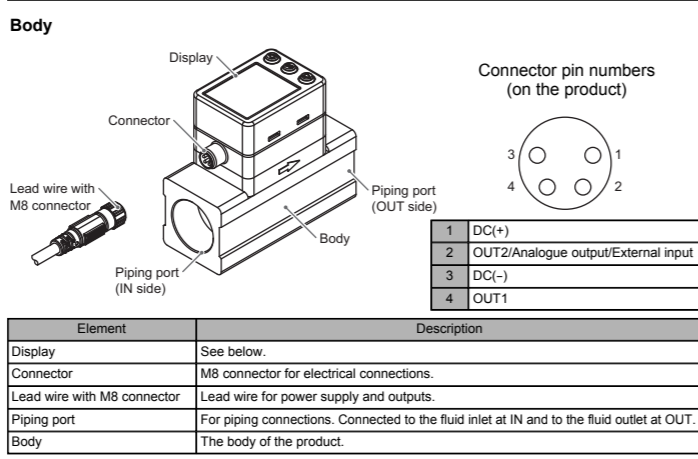
## Safety Instructions

- Warning**
  - ◆ Do not disassemble, modify (including changing the printed circuit board) or repair. An injury or failure can result.
  - ◆ Do not operate the product outside of the specifications. Do not use for flammable or harmful fluids. Fire, malfunction or damage to the product can result. Verify the specifications before use.
  - ◆ Do not operate in an atmosphere containing flammable, explosive or corrosive gas. Fire, explosion or corrosion can result. This product is not designed to be explosion proof.
  - ◆ Do not use the product for flammable fluid. Fire or explosion can result. Only air, N<sub>2</sub>, are applicable.
  - ◆ Do not use the product in a place where static electricity is a problem. Otherwise it can cause failure or malfunction of the system.
  - ◆ If using the product in an interlocking circuit:
    - Provide a double interlocking system, for example a mechanical system
    - Check the product regularly for proper operation
    - Otherwise malfunction can result, causing an accident.
  - ◆ The following instructions must be followed during maintenance:
    - Turn off the power supply
    - Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance work
    - Otherwise an injury can result.
- Caution**
  - ◆ Do not touch the terminals and connectors while the power is on. Otherwise electric shock, malfunction or damage to the product can result.
  - ◆ After maintenance is complete, perform appropriate functional inspections and leak tests. Stop operation if the equipment does not function properly or there is a leakage of fluid. When leakage occurs from parts other than the piping, the product might be faulty. Disconnect the power supply and stop the fluid supply. Do not apply fluid under leaking conditions. Safety cannot be assured in the case of unexpected malfunction.

## NOTE

- ◆ The direct current power supply used should be UL approved as follows. Circuit (class 2) of maximum 30 Vrms (42.4 V peak) or less, with UL 1310 class 2 power supply unit or UL 1585 class 2 transformer.

## Summary of Product parts

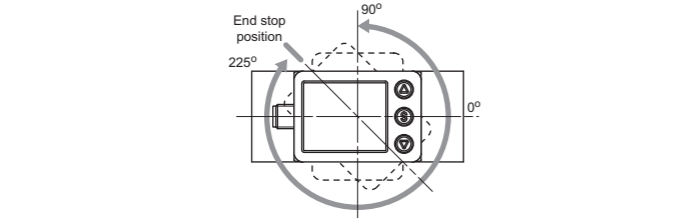


## Mounting and Installation

Refer to the product catalogue or SMC website (URL <http://www.smcworld.com>) for more detailed information.

**Mounting**

- ◆ Never mount the product in a place where it will be used as a mechanical support.
- ◆ Mount the product so that the fluid flows in the direction indicated by the arrow on the side of the body.
- ◆ The monitor with integrated display can be rotated. It can be positioned at 45° and 90° intervals, clockwise and anti-clockwise. Rotating the display with excessive force will damage the end stop.



## Installation

**Bracket mounting**

- ◆ Mount the bracket to the product using the mounting screws (2 pcs.).
- ◆ Fasten the bracket mounting screws to a torque of 0.5 to 0.7 Nm.



- ◆ Mount the product with bracket using M4 screws (4 pcs.) or equivalent.
- ◆ Screw is prepared by customer.



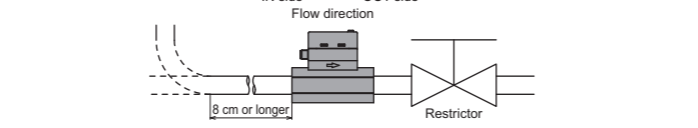
**Direct mounting**

- ◆ For direct mounting use M3 screws (2 pcs.) or equivalent.
- ◆ Screws are prepared by customer.
- ◆ Tightening torque is 0.5 to 0.7 Nm.
- ◆ Refer to the dimension from SMC website (URL <http://www.smcworld.com>) for mounting hole size.



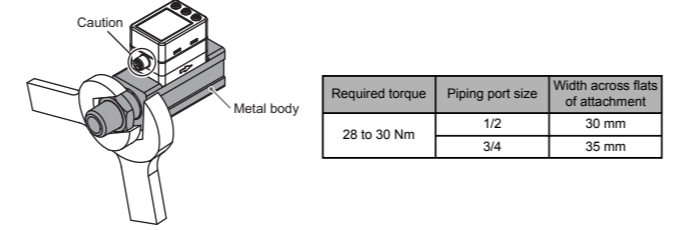
## Piping

- ◆ Never mount the product upside down.
- ◆ The straight piping length shall be 8 cm or longer.
- ◆ Otherwise, if a straight section of piping is not installed, the accuracy varies by approximately ±2%F.S.
- ◆ Avoid sudden changes in the piping size on the IN side of the product.
- ◆ Do not release the OUT side piping port of the product directly to the atmosphere without the piping connected.
- ◆ If the product is used with the piping port released to atmosphere, the accuracy may vary.



**Piping for the metal body**

- ◆ Tighten to the specified torque. Refer to the table below for the required torque values.
- ◆ If the tightening torque is exceeded, the product can be broken.
- ◆ If the tightening torque is insufficient, the fitting may become loose.
- ◆ Avoid any sealing tape getting inside the flow path.
- ◆ Ensure there is no leakage after piping.
- ◆ When mounting the fitting, a spanner should be used on the metal body of the fitting only. Holding other parts of the product with a spanner may damage the product. Specifically, make sure that the spanner does not damage the connector.



**Piping for the One-touch fitting**

- ◆ For the one-touch fitting, use tubing with a tube inside diameter of 9 mm or more. Accuracy can vary approximately ±2%F.S. when such tubing is not used.
- ◆ Refer to the operation manual from SMC website (URL <http://www.smcworld.com>) for more information about the tube.

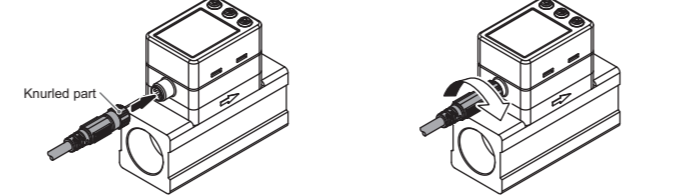
## Wiring

**Connection**

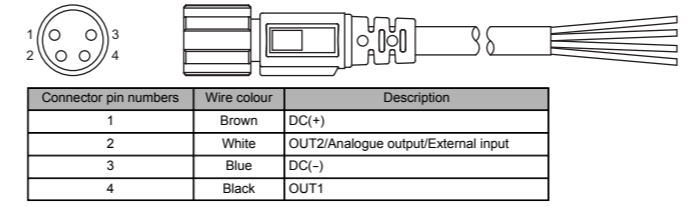
- ◆ Connections should only be made with the power supply turned off.
- ◆ Use a separate route for the product wiring and any power or high voltage wiring. Otherwise, malfunction may result due to noise.
- ◆ Ensure that the FG terminal is connected to ground when using a commercially available switch-mode power supply. When a switch-mode power supply is connected to the product, switching noise will be superimposed and the product specification can no longer be met. This can be prevented by inserting a noise filter, such as a line noise filter and ferrite core, between the switch-mode power supply and the product or by using a series power supply instead of a switch-mode power supply.

**Connecting/Disconnecting**

- ◆ Align the lead wire connector with the connector key groove, and insert it straight in. When the knurled part is fully tightened. Check that the connection is not loose.
- ◆ When removing the connector, unlock the knurled part and pull out the connector straight.



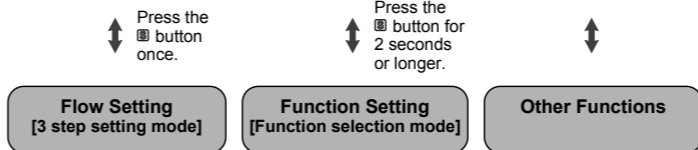
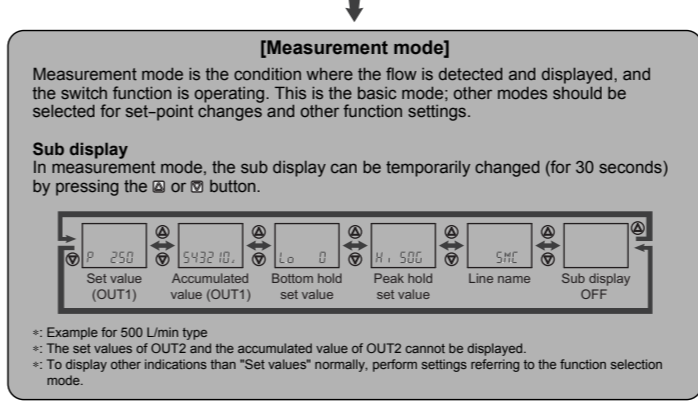
## Connector pin numbers (lead wire)



## Outline of settings

**Power is supplied**

The output will not operate for 3 seconds after supplying power. The identification code of the product is displayed.



- ◆ The outputs will continue to operate during setting.
- ◆ If a button operation is not performed for 30 seconds during the setting, the display will flash (This is to prevent the setting from remaining incomplete if, for instance, an operator were to leave during setting).
- ◆ 3 step setting mode and Function selection mode are reflected on each other.

## Flow Setting (set value only) of OUT1 · OUT2

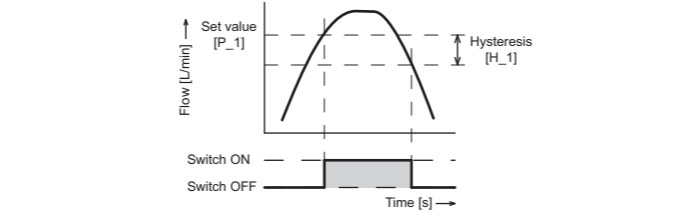
### 3 step setting mode

In this mode, only the set values can be input, in just 3 steps.

#### Default settings

When the flow exceeds the set value [P\_1], the switch will be turned ON. When the flow falls below the set value by the amount of hysteresis [H\_1] or more, the switch will turn OFF.

If the operation shown in the diagram below is acceptable, then keep these settings. For more detailed settings, set each function in the function selection mode.



Item	PFMC7501	PFMC7102	PFMC7202
[P_1] Set value of OUT1	250	500	1000
[H_1] Hysteresis of OUT1	25	50	100
[P_2] Set value of OUT2 +	250	500	1000
[H_2] Hysteresis of OUT2 +	25	50	100

[L/min]

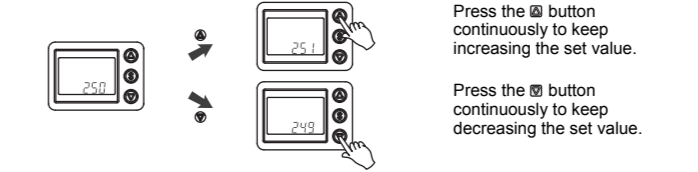
◆ Only available for models with switch outputs for both OUT1 and OUT2.

## Operation

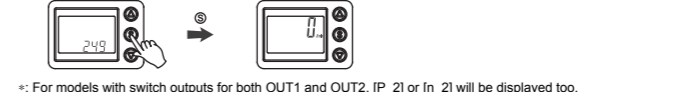
1. Press the ⬆ button once in measurement mode. [P\_1] or [n\_1] and [the current set value] are displayed in turn.



2. Press the ⬆ or ⬇ button to change the set value. The ⬆ button is to increase and the ⬇ button is to decrease the set value.



3. Press the ⬆ button to complete the setting. Return to measurement mode.

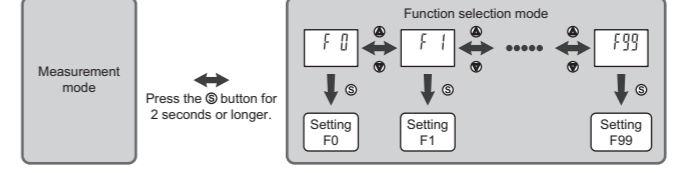


- ◆ For models with switch outputs for both OUT1 and OUT2, [P\_2] or [n\_2] will be displayed too. Set as above.
- ◆ If a mode other than Hysteresis Mode is selected, refer to the operation manual from SMC website (URL <http://www.smcworld.com>) or contact SMC.
- ◆ Note that the set value and hysteresis settings are limited by each other.

## Function Setting

### Function selection mode

In measurement mode, press the S button for 2 seconds or longer, to display [F 0]. The [F 0] indicates the mode for changing each Function Setting. Press the ⬆ button for 2 seconds or longer in function selection mode to return to measurement mode.



To change setting, refer to the operation manual from SMC website (URL <http://www.smcworld.com>) or contact SMC.

## Default settings

Item (Main display)	Default settings (Sub display)
[F 0] [ r EF] Reference condition	[ Anr] Standard condition
[ Un ] Unit selection function +1	[ L] L/min
[ OUT1] Output mode of OUT1	[ HYS] Hysteresis mode
[ 1ot] Switch operation of OUT1	[ 1_P] Normal output
[ P_1] Set value of OUT1	[ 250] 250 L/min (PFMC7501)
[ H_1] Hysteresis of OUT1	[ 500] 500 L/min (PFMC7102)
[ Col] Display colour of OUT1	[ 1000] 1000 L/min (PFMC7202)
[ oU2] Output mode of OUT2 -2	[ 25] 25 L/min (PFMC7501)
[ 2ot] Switch operation of OUT2 -2	[ 50] 50 L/min (PFMC7102)
[ P_2] Set value of OUT2 -2	[ 100] 100 L/min (PFMC7202)
[ H_2] Hysteresis of OUT2 -2	[ HYS] Hysteresis mode
[ r ES] Response time	[ 1.0] 1 second
[ SUB] Sub display	[ oU] Set value
[ inP] External input -3	[ REACUM] Accumulated flow external reset
[ Fr E] Setting of analogue output +4	[ oFF] Variable range OFF
[ SAvE] Accumulated value hold	[ oFF] Not held
[ PoS] Orientation	[ Hor] Horizontal mounting
[ Pr S] Supply pressure	[ m i] 0.4 MPa minimum, 0.6 MPa maximum
[ dSP] Display OFF mode	[ on] Display ON
[ P in] Security code	[ oFF] Not used
[ LinE] Line name	[ * * * * *]
[ ALL] Setting of all functions	[ oFF] Not used
[ TES] Output check	[ NoRMAL] Normal output
[ in ] Reset to the default settings	[ oFF] Reset OFF

- 1: This setting is only available for models with the unit selection function.
- 2: This setting is only available for models with switch output for both OUT1 and OUT2.
- 3: This setting is only available for models with the external input.
- 4: This setting is only available for models with the analogue output.

## Other Functions

◆ **Reset operation**

The accumulated flow value can be reset, when displaying the accumulated flow. To reset the accumulated flow, press the ⬆ and ⬇ buttons simultaneously for 1 second or longer. The peak/bottom value can be reset, when displaying the peak value (bottom value). To reset the peak/bottom value, press the ⬆ and ⬇ buttons simultaneously for 1 second or longer.

◆ **Key lock function**

To use each of these functions, refer to the operation manual from SMC website (URL <http://www.smcworld.com>) or contact SMC.

## Maintenance

**How to reset the product after a power cut or when the power has been unexpectedly removed**

The settings of the product are retained from before the power cut or de-energizing. The output condition also recovers to that before power cut or de-energizing, but may change depending on the operating environment. Therefore, check the safety of the whole installation before operating the product.

## Specifications / Dimensions

Refer to the product catalogue or operation manual from SMC website (URL <http://www.smcworld.com>) for more information about the product specifications and dimensions.

## Troubleshooting

### Error indication

Error name	Error display	Description	Measures
Instantaneous flow error	HHH	The flow has exceeded the upper limit of the flow display range.	Reduce the flow.
OUT1 over current error	Err1	The switch output (OUT1) load current has exceeded 80 mA.	Turn the power OFF and remove the cause of the over current. Then turn the power ON again.
OUT2 over current error	Err2	The switch output (OUT2) load current has exceeded 80 mA.	Turn the power OFF and remove the cause of the over current. Then turn the power ON again.
System error	Err0, Err4, Err6, Err8	An internal data error has occurred.	Turn the power OFF and turn it ON again.
Accumulated flow error	999999, 9999999	The accumulated flow has exceeded the accumulated flow range. (For accumulated increment)	Reset the accumulated flow. (Press the ⬆ and ⬇ buttons simultaneously for 1 second or longer).
	UUUUUU	The accumulated flow has reached the set accumulated flow value. (For accumulated decrement)	Reset the accumulated flow. (Press the ⬆ and ⬇ buttons simultaneously for 1 second or longer).

◆ If the error cannot be reset after the above measures are taken, then please contact SMC.

Refer to the operation manual from SMC website (URL <http://www.smcworld.com>) for more information about troubleshooting.