

# Flow Monitor

# Operation Manual

PFMV3



Thank you for purchasing an SMC PFMV3 Series Flow Monitor. 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 more detailed information about operating this product, 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

- ◆ This 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 this 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 or explosive gases. Fire or an explosion can result. This product is not designed to be explosion proof.
- 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.

## NOTE

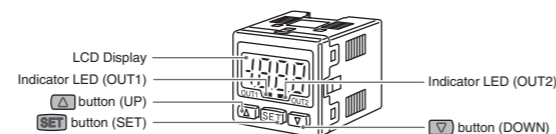
- The direct current power supply used should be UL approved as follows. Circuit (of class 2) which is of maximum 30Vrms (42.4 V peak), with UL 1310 class 2 power supply unit or UL 1585 class 2 transformer.
- The product is a approved product only if it has a mark on the body.

## Maintenance

**How to reset the product after a power cut forcible de-energizing**  
The setting of the product will be retained as it was before a power cut or de-energizing. The output condition is also basically recovered to that before a 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.

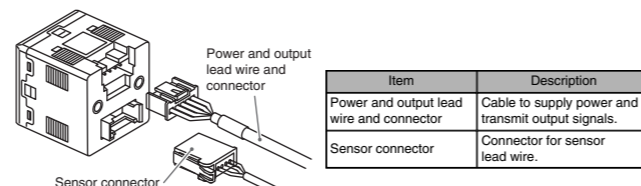
## Summary of Product parts

### Front



Item	Description
LCD Display	Displays the flow value, setting mode, and error indication. Four display modes can be selected: display always in red or green, or display changing from green to red, or red to green, according to the output status (OUT1).
Indicator LED (OUT1)	Indicates the output status of OUT1. LED is ON (Green) when OUT1 is ON.
Indicator LED (OUT2)	Indicates the output status of OUT2. LED is ON (Red) when OUT2 is ON.
▲ button (UP)	Selects the mode or increases the ON/OFF set value. Press this button to change to the peak display mode.
SET button (SET)	Press this button to change to another mode and to set a value.
▼ button (DOWN)	Selects the mode or decreases the ON/OFF set value. Press this button to change to the bottom display mode.

### Back

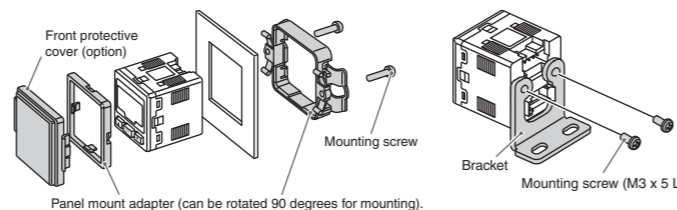


Item	Description
Power and output lead wire and connector	Cable to supply power and transmit output signals.
Sensor connector	Connector for sensor lead wire.

## Mounting and Installation

### Installation

- Panel mounting**
- Fix the panel mount adapter to the product with the mounting screws (nominal size: 3 x 8 L, 2 pcs.) supplied.
  - The monitor can be mounted on a panel with a thickness of 0.5 to 6.0 mm.
- Bracket mounting**
- Mount the bracket using the mounting screws (M3 x 5 L) supplied.
  - The required tightening torque is 0.5 to 0.7 Nm.
  - Install the product (with bracket) using the M4 screws (2 pcs.).
  - Bracket thickness is approximately 1.6 mm.
- Refer to the product catalogue or SMC website (URL <http://www.smcworld.com>) for more information about panel cut-out and mounting hole dimensions.



### Wiring

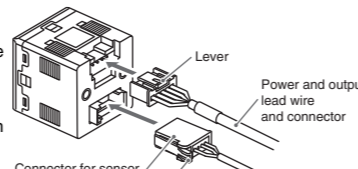
- Wiring of connector**
- Connections should only be made with the power supply turned off.
  - Use separate routes for the product wiring and any power or high voltage wiring. Otherwise, malfunction may result due to noise.
  - Ensure that the FG terminal is connected to ground when using a commercially 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.

### Attaching the connector to the sensor wire

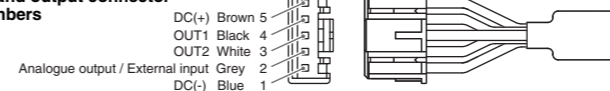
- Strip the sensor wire as shown.
  - Do not cut the insulator.
  - Insert the corresponding wire colour shown in the table into the pin number printed on the sensor connector, to the bottom.
- | Pin no. | Wire colour           |
|---------|-----------------------|
| 1       | Brown (DC+)           |
| 2       | NC                    |
| 3       | Blue (DC-)            |
| 4       | Black (IN (1 to 5 V)) |
- Check that the above preparation has been performed correctly, then part A shown should be pressed in by hand to make temporary connection. • Part A should then be pressed in using a suitable tool, such as pliers. • The sensor connector cannot be re-used once it has been fully crimped. In cases of connection failure such as incorrect order of wires or incomplete insertion, please use a new connector. • If the sensor is not connected correctly "LLL" or "HHH" will be displayed.

### Connecting / Disconnecting

- When mounting the connector, insert it straight into the socket, holding the lever and connector body, and push the connector until the lever hooks into the housing, and locks.
- When removing the connector, press down the lever to release the hook from the housing and pull the connector straight out.



### Power and output connector pin numbers



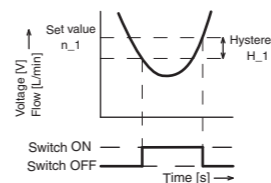
## Flow Setting

### Measurement mode

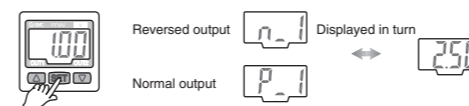
The mode in which the flow is detected and displayed, and the switch function is operating. This is the basic operating mode; other modes should be selected for set-point and other Function Setting changes.   
\*: The display will indicate [LLL] if a sensor is not connected.   
To use the product for flow rate indication, select the connected flow sensor using function [F95] before setting any other functions.

### Switch operation

When the flow (or voltage) falls below the set value by the amount of hysteresis or more, the switch will turn ON. When the flow (or voltage) exceeds the set value, the switch will turn OFF. If this condition, shown to the right, is acceptable, then keep these settings.



- <Operation> \*: The Product outputs will continue operating during setting.   
1. Press the SET button in measurement mode to display the set values. [P\_1] or [n\_1] and the set value are displayed in turn.   
\*: [LLL] is displayed during measurement mode when the sensor is not connected.



2. Press the ▲ or ▼ button to change the set value. The ▲ button is to increase and the ▼ button is to decrease the set value.   
• Press the ▲ button once to increase by one digit, or press it continuously to keep increasing the set value.   
• Press the ▼ button once to decrease by one digit, or press it continuously to keep decreasing the set value.

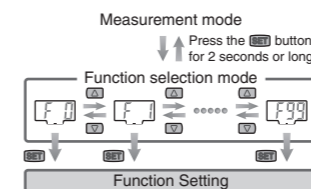


3. Press the SET button to complete the setting of OUT1. [n\_2] or [P\_2] will be displayed. Set as above.

## Function Setting

### Function selection mode

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



### Default setting

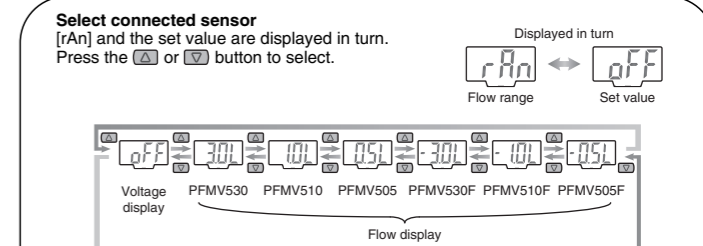
The default settings are provided as follows. If these settings are acceptable, retain for use.

Item	Default setting
[F 0] Auto-preset	-
[oU1] Output mode (OUT1)	[HYS] Hysteresis mode
[1ot ] Reversed output (OUT1)	[1_n] Reversed output
[n_1] Input of set value (OUT1)	[2.50] (Voltage display)
[H_1] Setting of hysteresis (OUT1)	[0.12] (Voltage display)
[CoL] Display colour	[SOG] ON: Green OFF: Red
[oU2] Output mode (OUT2)	[HYS] Hysteresis mode
[2ot ] Reversed output (OUT2)	[2_n] Normal output
[n_2] Input of Set value (OUT2)	[2.50] (Voltage display)
[H_2] Setting of hysteresis (OUT2)	[0.12] (Voltage display)
[F 3] [rES] Response time	[.002] 2 msec.
[F 4] [inP] External input	[oFF] Unused
[F 5] [Eco] Power saving mode	[oFF] Unused
[F 6] [P in] Security code	[oFF] Unused
[F95] [r An] Select connected sensor	[oFF] Unused
[Un i] Unit selection function	[LPm] L/min
[F99] [in i] Reset to the default settings	[oFF] Unused

## [F95] Selection of flow indication

The flow rate can be displayed. The flow rate units can be selected (for models with unit selection function) after selecting the connected sensor. L/min. or CFM(ft<sup>3</sup>/min.) x 10<sup>2</sup> are the selectable display units. To use for flow rate indication, select the sensor and units before setting the functions [F1], [F2], [F4]. The set values for [F1], [F2] and [F4] will be reset when the flow indication setting is changed.

<Operation> Press the ▲ or ▼ button in function selection mode to display [F95]. Press the SET button.



Connected sensor model	Displayed flow range	Rated flow range
PFMV30	3.0 L	0 to 3.0 [L/min]
PFMV510	1.0 L	0 to 1.0 [L/min]
PFMV505	0.5 L	0 to 0.5 [L/min]
PFMV530F	-3.0 L	-3.0 to 3.0 [L/min]
PFMV510F	-1.0 L	-1.0 to 1.0 [L/min]
PFMV505F	-0.5 L	-0.5 to 0.5 [L/min]

\*: The set values of OUT1 and OUT2 will be reset when the flow range setting is changed.

Press the SET button to set. Move on to unit selection function (for models with unit selection function).

Selection of flow indication completed. Return to Function selection mode.

Standard value offset function  
The display can be offset to the standard value by pressing the ▲ and ▼ buttons simultaneously for 1 second or longer. For the initial operation, always perform the standard value offset function with no flow applied.

## Other Settings

- Standard value offset function
  - Peak/Bottom value display
  - Indicated content check function
  - Key lock function
- To set each of these functions, refer to the SMC website (URL <http://www.smcworld.com>) for more detailed information, or contact SMC.

## Troubleshooting

### Error indication

Error name	Error display	Error type	Troubleshooting method
Input voltage flow error	HHH	The flow (input voltage) has exceeded the upper limit of the display range.	Reduce input voltage (= flow).
	LLL	The flow (input voltage) is less than the lower limit of the display range.	Increase input voltage (= flow).
Overcurrent error	E r 1	The switch output load current (OUT1) has exceeded 80 mA.	Turn off the power supply and remove the cause of the over current. Then supply the power again.
	E r 2	The switch output load current (OUT2) has exceeded 80 mA.	
System error	E r 0	The product has lost the factory adjustment settings. The internal circuit may be damaged.	Stop operation immediately and contact SMC.
	E r 3	System error. The product has failed to store the data, or the internal circuit may be damaged.	Turn the power off and turn it on again, then repeat the Function Setting.
Standard value offset error	E r 4	The standard value offset function has been performed outside the effective range for correction.	Perform the standard value offset under no flow conditions.

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

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

## Specifications / Outline with Dimensions

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

SMC Corporation URL <http://www.smcworld.com>  
Akihabara UDX 15F, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN  
Phone: +81 3-5207-8249 Fax: +81 3-5298-5362

Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer. © 2011 SMC Corporation All Rights Reserved