

Flow Sensor Operation Manual



PFM5

Thank you for purchasing an SMC PFM5 Series Flow Sensor. 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.

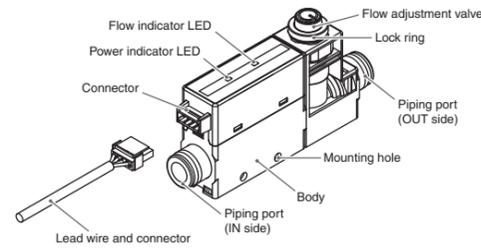
These instructions indicate the level of potential hazard with the labels of "Caution", "Warning" or "Danger". They are all important notes for safety and must be followed in addition to International standards (ISO/IEC) and other safety regulations.

- 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.

Summary of Product parts



Item	Description
Flow indicator LED	Indicates the flow status. LED is flashing (Green) when flow is detected. As the flow rate increases, the flashing rate increases. LED is ON (Red) when the max. rated flow has been exceeded.
Power indicator LED	Indicates the power supply status. LED is ON (Green) when power is ON. LED is ON (Red) when a system error occurred.
Connector	Connector for electrical connections.
Piping port	Connected to the fluid inlet at IN side and to the fluid outlet at OUT side.
Flow adjustment valve *	Orifice mechanism to adjust the flow.
Lock ring *	Used to lock the flow adjustment valve.
Mounting hole	Used to mount the product on a DIN rail or directly to a panel.
Body	The body of the product.
Lead wire and connector	Cable to supply power and transmit output signals.

*: The table shows the specifications when a flow adjusting valve is included.

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 for flammable fluid. A fire or explosion can result. Only dry air, N₂, CO₂, and Ar 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 30Vrms (42.4 V peak) or less, 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.

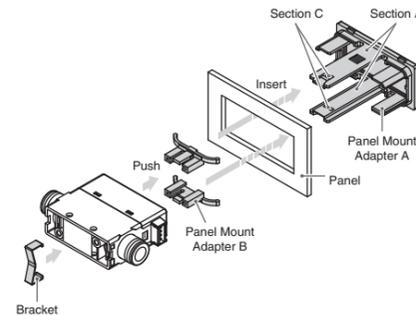
Mounting and Installation

Installation

Refer to the product catalogue or SMC website (URL <http://www.smcworld.com>) for more information about panel cut-out and mounting hole dimensions.

Panel mounting

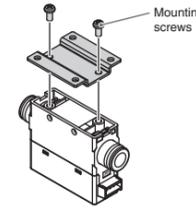
- Insert Panel Mount Adapter B (supplied as an accessory) into Section A of Panel Mount Adapter A.
- Push Panel Mount Adapter B from behind until the display is fixed onto the panel. The pin of Panel Mount Adapter B engages the notched part of Panel Adapter section C to fix the display.
- The switch can be mounted on a panel with a thickness of 1 to 3.2 mm.



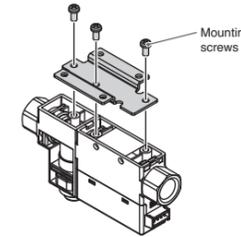
Bracket mounting

- Mount the bracket using the mounting screws supplied.
- The required tightening torque is 0.5±0.05 Nm.

Without flow adjustment valve (using ZS-33-M)



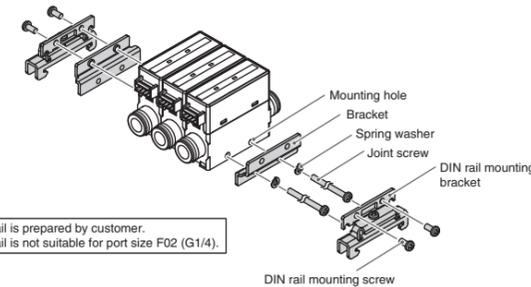
With flow adjustment valve (using ZS-33-MS)



- Install the product (with bracket) using the M3 screws (4 pcs.).
- Bracket thickness is approximately 1.2 mm.

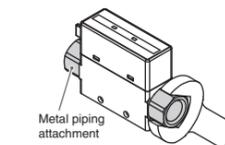
DIN rail mounting (using ZS-33-R □)

- Mount the DIN rail mounting parts using DIN rail mounting screws and joint screws supplied.
- The required tightening torque of the DIN rail mounting screws and joint screws is 0.4±0.05 Nm.



Piping

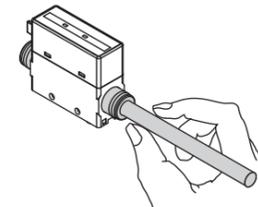
- Ensure that the metal piping attachments are tightened to the required torque. (refer to the table below)
- If the tightening torque is exceeded, the product can be broken. If the tightening torque is insufficient, the fittings may become loose.
- When connecting piping to the product, a spanner should be used on the metal piping attachment only. Using a spanner on other parts may damage the product.
- Avoid any sealing tape from entering inside the piping.
- Ensure that there is no leakage from loose piping.



Nominal thread size	Required torque
Rc (NPT) 1/8	7 to 9 Nm
Rc (NPT) 1/4	12 to 14 Nm

Nominal size of screws	Width across flats of attachment
Rc (NPT) 1/8 Rc (NPT) 1/4 G1/8	17 mm
G1/4	21 mm

- For one-touch fittings, insert the tube until it bottoms out, to ensure it cannot be pulled out.
- Insertion with excessive force can cause damage.
- Ensure that there is no leakage after piping.
- Use this product within the specified operating pressure and temperature ranges.
- Proof pressure is 1.0 MPa.



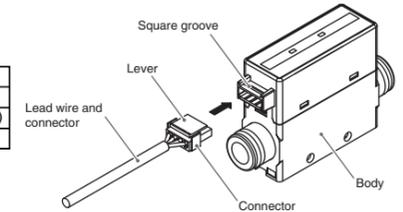
Wiring

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.

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.



Blue	DC(-)
Black	Analogue output
White	Select response time (input)
Brown	DC(+)

Select response time (input)

The response time can be selected to improve the stability of the analogue output, if the output is unstable due to flow rate pulsation.

How to select the response time

Connect the response time input wire (white) to GND. While connected, the response time will be 1.0 second, or 50 ms when not connected.

Troubleshooting

Error indication

Error name	Error display	Error type	Troubleshooting method
Flow error		Flow has exceeded the upper limit of the rated flow range.	Reduce the flow.
System error		System error. The internal circuit may be damaged.	Turn the power off and turn it on again.

*: 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>

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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