



ORIGINAL INSTRUCTIONS

**Instruction Manual**  
**Digital Flow sensor**  
**PFMV5## series**



The intended use of the digital flow sensor is to monitor and display flow information and provide an output signal.

**1 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)<sup>1)</sup>, and other safety regulations.

- <sup>1)</sup> ISO 4414: Pneumatic fluid power - General rules relating to systems.
- ISO 4413: Hydraulic fluid power - General rules relating to systems.
- IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)
- ISO 10218-1: Manipulating industrial robots - Safety, etc.
- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

<b>Caution</b>	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
<b>Warning</b>	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
<b>Danger</b>	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

**Warning**

- Always ensure compliance with relevant safety laws and standards.
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.
- This product is class A equipment intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted or radiated disturbances.
- Refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>) for more safety instructions.

**2 Specifications**

**2.1 Specifications**

Model	PFMV 505	PFMV 510	PFMV 530	PFMV 505F	PFMV 510F	PFMV 530F
Applicable fluid	Dry air, N <sub>2</sub> (air quality class to ISO8573-1 1.1.2 to 1.6.2, JIS B8392-1 1.1.2 to 1.6.2)					
Rated flow range (L/min)	0 to 0.5	0 to 1	0 to 3	-0.5 to 0.5	-1 to 1	-3 to 3
Repeatability	±2% F.S. max.					
Temperature characteristics (25 °C ref.)	±2% F.S. max. (15 to 35 °C) ±5% F.S. max. (0 to 50 °C)					
Pressure characteristic (0 kPa ref.)	±2% F.S. max. (0 to 300 kPa) ±5% F.S. max. (-70 to 0 kPa)					
Rated pressure range	-70 kPa to 300 kPa					
Operating pressure range	-100 kPa to 400 kPa					
Proof pressure	500 kPa					
Analogue output	Output voltage	1 to 5 V				
	Response time	5 ms or less				
	Output impedance	Approx. 1 kΩ				
Supply voltage	12 to 24 VDC ±10%, ripple(p-p) 10% or less (with polarity protection)					
Power consumption	16 mA or less					
Environment	Enclosure	IP40				
	Operating fluid temperature	0 to 50 °C (no freezing or condensation)				
	Operating temperature	Operating: 0 to 50 °C Storage: -10 to 60 °C (no freezing or condensation)				
	Operating humidity range	Operating, storage: 35 to 85% R.H. (no condensation)				
	Withstand voltage	1000 VAC, 1 min between battery and the body				
Insulation resistance	50 MΩ min. (at 500 VDC) between terminals and case					
Port size	M5 x 0.8 (tightening torque: 1 to 1.5 N•m or less)					
Fluid contact material	PPS, Si, Au, SUS316, C3604 (electroless nickel plating)					
Weight	30 g (with lead wire), 10 g (without lead wire)					

**2.2 Cable specifications**

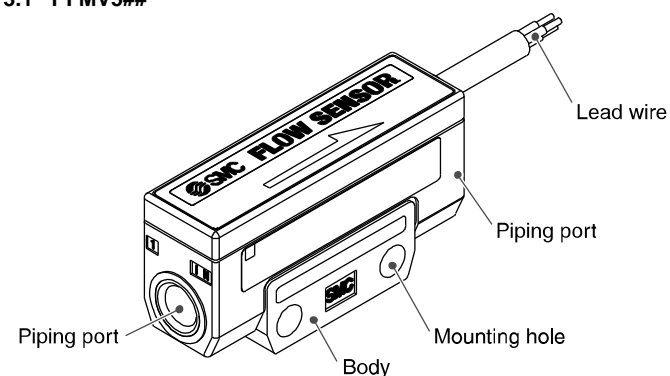
Conductor	Nominal cross section area	approx. 0.15 mm <sup>2</sup>
	Individual wire diameter	approx. 0.58 mm
Insulator	Outside diameter	approx. 0.88 mm
	Colours	Brown, Blue, Black
Sheath	Material	Oil-resistant, Heat resistant vinyl
	Outer diameter	approx. φ2.6 mm

**Warning**

- Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

**3 Names of Individual parts**

**3.1 PFMV5##**



Part	Description
Piping port	Connection port for piping.
Body	The body of the product.
Mounting hole	Used to mount the product on a DIN rail or directly on to a panel.
Lead wire	Lead wire to supply power and transmit output signals.

**4 Installation**

**4.1 Installation**

**Warning**

- Do not install the product unless the safety instructions have been read and understood.
- Use the product within the specified operating rated flow, operating pressure and temperature range.
- The pressure could vary according to the fluid temperature. Check the characteristics data for operating pressure and proof pressure.

**4.2 Environment**

**Warning**

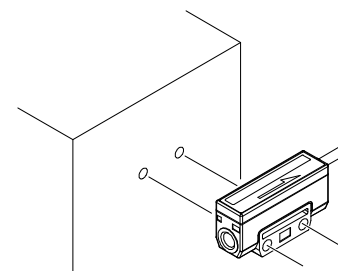
- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.
- When the product is installed in a vertical direction, a natural convection is generated due to the sensor characteristics around the zero flow range, so there is a possibility that an error up to approximately 3% F.S. might be generated. Install the product taking this into consideration.

**4.3 Mounting**

- Never mount the product in a location that will be used as a foothold.
- Mount the product so that the fluid flows in the direction indicated by the arrow on the body.

**4.3.1 Direct mounting**

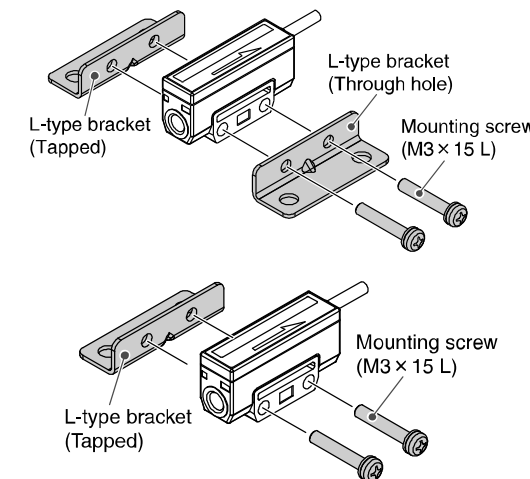
- Install the product using M3 screws (2 pcs.).



**4 Installation (continued)**

**4.3.2 Bracket mounting**

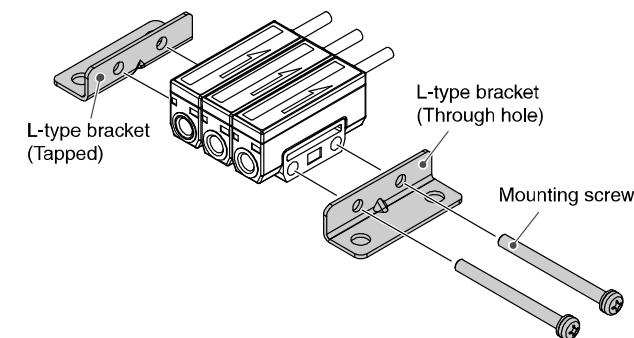
- Mount the bracket (Part No. ZS-36-A1) on to the product using the mounting screws (M3 x 15 L) supplied.
- The required tightening torque is 0.32 ±0.02 N•m.



- Install the product with the bracket using M4 screws (2 pcs. or 4 pcs.).
- The bracket thickness is approximately 1 mm.

**4.3.3 Manifold mounting**

- Mount the brackets (Part No. ZS-36-A2, -A3, -A4 or -A5) to the product using the mounting screws supplied.
- The required tightening torque is 0.32 ± 0.02 N•m.
- Mounting in series using the mounting brackets is not suitable for all models, depending on which piping port fitting type is used.



- Install the products with the bracket using M4 screws (2 pcs. or 4 pcs.).
- The bracket thickness is approximately 1 mm.

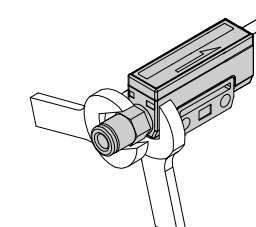
Refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>) for mounting hole dimensions.

**4.4 Piping**

**Caution**

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port.
- Ensure there is no leakage after piping.
- When connecting the piping, hold the specified part of the body with a spanner. Using a spanner on other parts may damage the product.
- After hand-tightening, retighten approx. 1/4 turn (approx. 0.5 to 1.0 N•m) using a tightening tool.

If the tightening torque is exceeded, the product can be damaged. If the correct tightening torque is not applied, the fittings may become loose.



#### 4 Installation (continued)

##### 4.4.1 PFMV5## recommended fittings

- One-Touch fitting / Series KQ2

Type	Tube dimension	Port size	Model
Male Connector	4 mm	M5 x 0.8	KQ2H04-M5
Hexagon socket head male connector			KQ2S04-M5
Male elbow			KQ2L04-M5

- One-Touch mini / Series KJ

Type	Tube dimension	Port size	Model
Male Connector	4 mm	M5 x 0.8	KJH04-M5
Hexagon socket head male connector			KJS04-M5
Male elbow			KJL04-M5

- Miniature fitting / Series M

Type	Tube dimension	Port size	Model
Barb fittings for nylon tubing	4 mm	M5 x 0.8	M-5AN-4

#### 5 Wiring

##### 5.1 Wiring

###### Caution

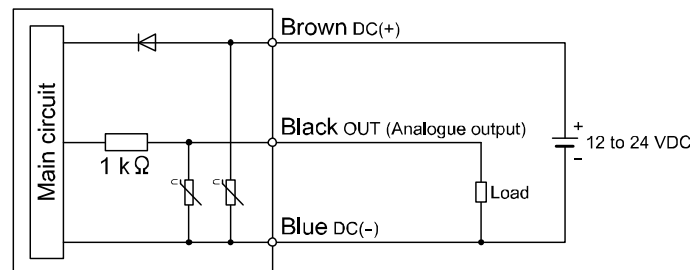
- Do not perform wiring while the power is on.
- Confirm proper insulation of wiring.
- Use separate routes for the product wiring and any power or high voltage wiring. Otherwise, malfunction may result due to noise.
- Keep wiring as short as possible to prevent interference from electromagnetic noise and surge voltage.

- Ensure that the FG terminal is connected to ground when using a commercially available switch-mode power supply. 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

##### Details of Lead wire

Colour	Content
Brown	DC (+)
Black	OUT (Analogue output)
Blue	DC (-)

##### Internal circuit and wiring example



Analogue output: 1 to 5 V  
Output impedance: approx. 1 kΩ

#### 6 How to Order

Refer to the operation manual or catalogue on the SMC website (URL: <https://www.smcworld.com>) for How to order information.

#### 7 Outline Dimensions (mm)

Refer to the operation manual or catalogue on the SMC website (URL: <https://www.smcworld.com>) for Outline Dimensions.

#### 8 Maintenance

##### 8.1 General Maintenance

###### Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.
- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.
- 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 the power cut or de-energizing, but may change depending on the operating environment. Therefore, check the safety of the whole system before operating the product.

#### 9 Limitations of Use

##### 9.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

#### 10 Product disposal

This product should not be disposed of as municipal waste. Check your local regulations and guidelines to dispose of this product correctly, in order to reduce the impact on human health and the environment.

#### 11 Contacts

Refer to [www.smcworld.com](https://www.smcworld.com) or [www.smc.eu](https://www.smc.eu) for your local distributor / importer.

## SMC Corporation

URL : <https://www.smcworld.com> (Global) <https://www.smc.eu> (Europe)  
SMC Corporation, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, Japan  
Specifications are subject to change without prior notice from the manufacturer.  
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