2-Color Display Digital Flow Switch

- **Flow rate range:** 10, 25, 50, 100 l/min.
- **Minimum setting unit:** 0.01 l/min.
  (0.1 l/min when the flow rate range is 25, 50, 100 l/min.)
- **Fluid:** Air, N\textsubscript{2}, Ar, CO\textsubscript{2}
- **Repeatability:** \(\pm 1\%\) F.S. or less
- **Grease-free**
- **Flow adjustment valve is integrated.**
  (Reduced piping and space saving)
- **Response time:**
  Either 50 msec., 0.5 sec., 1 sec. or 2 sec. can be chosen.

**Series PFM**
**Compact size**

Same size even when the model with different flow rate range (10, 25, 50, 100 l/min) is chosen.

**Lightweight: 55 g (PFM711)**

(With one-touch fitting, without flow adjustment valve)

Conventional model PFM711: 290 g

**Piping space can be reduced.**

Mountable in a narrow location since the straight piping length* is not required.

* A straight piping length of 8 times the piping diameter is required for the conventional model.

**Comparison with the conventional model PFM711 (10 to 100 l/min) when ø6 one-touch fittings are attached.**

<table>
<thead>
<tr>
<th>Features 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Features 1</td>
<td></td>
</tr>
<tr>
<td>Features 1</td>
<td></td>
</tr>
<tr>
<td>Features 1</td>
<td></td>
</tr>
<tr>
<td>Features 1</td>
<td></td>
</tr>
<tr>
<td>Features 1</td>
<td></td>
</tr>
</tbody>
</table>

**Piping Variations**

<table>
<thead>
<tr>
<th>One-touch fittings: ø4, ø6, ø8, ø1/4</th>
<th>Female thread: Rc 1/8, 1/4 • NPT 1/8, 1/4 • G 1/8, 1/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight</td>
<td>Bottom side</td>
</tr>
</tbody>
</table>

**Flow Rate Range**

<table>
<thead>
<tr>
<th>Series</th>
<th>Flow rate range l/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFM710</td>
<td>0.2 to 10 (0.2 to 5)</td>
</tr>
<tr>
<td>PFM725</td>
<td>0.5 to 25 (0.5 to 12.5)</td>
</tr>
<tr>
<td>PFM750</td>
<td>1 to 50 (1 to 25)</td>
</tr>
<tr>
<td>PFM711</td>
<td>2 to 100 (2 to 50)</td>
</tr>
</tbody>
</table>

* In the case of CO2

**Output Specifications**

- 2 NPN or PNP outputs
- 1 NPN or PNP output + Analog (1 to 5 V)
- 1 NPN or PNP output + Analog (4 to 20 mA)
- 1 NPN or PNP output + External input
Comparison with Float Type Flow Meter

- **Digital display**
  - Indicated value is the same at any installation position. (No conversion is needed.)

- **Not subject to pressure variations**
  - Indicated value depends on the viewing angle.

- **Free mounting orientation**
  - Mounting orientation is not limited.

- **With switch output and analog output**
  - Indicates whether greater or less than set flow rate. The flow condition can be controlled all the time.

- **Accumulated flow rate display**
  - Can confirm the total air consumption per day (Max. 999999 ℓ).

**Features**
- Control of metal wire tension
- Accumulated indication shows the operating flow rate or residual amount (of N₂ etc.) in a gas cylinder.
- Flow control of N₂ gas to prevent lead frame oxidation.
- N₂ blow prevents distortion of camera image due to air turbulence.

**Applications**
- Detection camera
- Accumulated indication shows the operating flow rate or residual amount (of N₂ etc.) in a gas cylinder.
- suction check

- Approved
- Approved
Several combinations are possible.

Depending on the installation conditions, it is possible to add or remove the flow adjustment valve, change the fitting type and the piping direction as desired.

Details → P. 2

The accuracy may fluctuate by 2 to 3% just after replacement. (Repeatability does not change.)

Recommended Air Circuits

For compressed air

- Dryer
- Air filter
- Regulator
- Micro mist separator
- Flow switch

For vacuum

- Suction filter
- Flow switch

Dryer
Air filter
Regulator
Micro mist separator
Flow switch

IDF
IDU
AF
AR
IR
AMD
AFD
PFM

Selection of fluid
Air, Nitrogen (N2), Argon (Ar) or Carbon dioxide (CO2) can be selected using the buttons.

Selection of indication unit
User can select between ANR and NL/min for each fluid.

[ANR] Indicates the flow rate converted to a volume under standard conditions: 20°C, 1 atm (atmosphere), 65%RH

[NL/min] Indicates the flow rate converted to a volume under normal conditions: 0°C, 1 atm (atmosphere).

External input
Can be selected from accumulated value external reset, auto shift and auto shift zero.

Indication resolution
Minimum setting unit can be selected from 1 L/min, 0.1 L/min and 0.01 L/min. Depends on the model. Refer to specifications (P3) for details.

For other functions and details, refer to functional explanation (P15).

Main Functions

Features 3
### SMC Digital Flow Switch Variations

#### For Air

<table>
<thead>
<tr>
<th>Flow rate measurement range l/min</th>
<th>Integrated type Model</th>
<th>Remote type Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 10</td>
<td>PF2A710</td>
<td>PF2A710</td>
</tr>
<tr>
<td>5 to 50</td>
<td>PF2A750</td>
<td>PF2A750</td>
</tr>
<tr>
<td>10 to 100</td>
<td>PF2A711</td>
<td>PF2A711</td>
</tr>
<tr>
<td>20 to 200</td>
<td>PF2A721</td>
<td>PF2A721</td>
</tr>
<tr>
<td>50 to 500</td>
<td>PF2A751</td>
<td>PF2A751</td>
</tr>
<tr>
<td>150 to 3000</td>
<td>PF2A703H</td>
<td>PF2A703H</td>
</tr>
<tr>
<td>300 to 6000</td>
<td>PF2A706H</td>
<td>PF2A706H</td>
</tr>
<tr>
<td>600 to 12000</td>
<td>PF2A712H</td>
<td>PF2A712H</td>
</tr>
</tbody>
</table>

#### For Water

<table>
<thead>
<tr>
<th>Flow rate measurement range l/min</th>
<th>Integrated type Model</th>
<th>Remote type Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 4</td>
<td>PF2W704(T)</td>
<td>PF2W704(T)</td>
</tr>
<tr>
<td>2 to 16</td>
<td>PF2W720(T)</td>
<td>PF2W720(T)</td>
</tr>
<tr>
<td>5 to 40</td>
<td>PF2W740(T)</td>
<td>PF2W740(T)</td>
</tr>
<tr>
<td>10 to 100</td>
<td>PF2W711</td>
<td>PF2W711</td>
</tr>
</tbody>
</table>

#### For Deionized Water and Chemicals

<table>
<thead>
<tr>
<th>Flow rate measurement range l/min</th>
<th>Remote type Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4 to 4</td>
<td>PF2D504</td>
</tr>
<tr>
<td>1.8 to 20</td>
<td>PF2D520</td>
</tr>
<tr>
<td>4.0 to 40</td>
<td>PF2D540</td>
</tr>
</tbody>
</table>

Notes:
- For details, refer to the individual catalog (CAT.ES100-54).
2-Color Display
Digital Flow Switch
Series PFM

How to Order

PFM7 10  C4  A  M

<table>
<thead>
<tr>
<th>Type</th>
<th>7 Integrated display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated flow range (Flow rate range)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.2 to 10 (5) l/min</td>
</tr>
<tr>
<td>25</td>
<td>0.5 to 25 (12.5) l/min</td>
</tr>
<tr>
<td>50</td>
<td>1 to 50 (25) l/min</td>
</tr>
<tr>
<td>111</td>
<td>2 to 100 (50) l/min</td>
</tr>
</tbody>
</table>

| Flow adjustment valve | Nil None S Yes |

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Flow rate range</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Rc1/8</td>
<td>10 25 50 111</td>
</tr>
<tr>
<td>02</td>
<td>Rc1/4</td>
<td></td>
</tr>
<tr>
<td>N01</td>
<td>NPT1/8</td>
<td></td>
</tr>
<tr>
<td>N02</td>
<td>NPT1/4</td>
<td></td>
</tr>
<tr>
<td>F01</td>
<td>G1/8</td>
<td>25</td>
</tr>
<tr>
<td>F02</td>
<td>G1/4</td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>ø4 (5/32&quot;) One-touch fitting</td>
<td></td>
</tr>
<tr>
<td>C6</td>
<td>ø6 One-touch fitting</td>
<td></td>
</tr>
<tr>
<td>C8</td>
<td>ø8 (5/16&quot;) One-touch fitting</td>
<td></td>
</tr>
<tr>
<td>N7</td>
<td>ø1/4 One-touch fitting</td>
<td></td>
</tr>
</tbody>
</table>

Accessory
A lead wire with connector is attached as standard. ZS-33-D
Lead wire length 2 m

Piping Variations
With one-touch fittings (C4, C6, C8, N7) Female thread (01, 02, N01, N02, F01, F02)

<table>
<thead>
<tr>
<th>Without flow adjustment (Nil)</th>
<th>With flow adjustment (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight (Nil)</td>
<td>Straight (Nil)</td>
</tr>
<tr>
<td>Bottom side (L)</td>
<td>Bottom side (L)</td>
</tr>
</tbody>
</table>

Output specification
A 2 NPN outputs
B 2 PNP outputs
C 1 NPN output + Analog (1 to 5 V)
D 1 NPN output + Analog (4 to 20 mA)
E 1 PNP output + Analog (1 to 5 V)
F 1 PNP output + Analog (4 to 20 mA)
G 1 NPN output + External input
H 1 PNP output + External input
J 1 NPN output + External input

Piping entry direction
Nil Straight L Bottom side

Note 1) Fixed units: Real-time flow rate: l/min Accumulated flow: l, m3, m3 x 10^3
Note 2) This product is for overseas use only according to the new Measurement Law. (The SI unit is provided for use in Japan.)
Note 3) User can select from external reset, auto shift and auto shift zero.

Accessory
A lead wire with connector is attached as standard. ZS-33-D
Lead wire length 2 m

Piping Variations
With one-touch fittings (C4, C6, C8, N7) Female thread (01, 02, N01, N02, F01, F02)

<table>
<thead>
<tr>
<th>Without flow adjustment (Nil)</th>
<th>With flow adjustment (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight (Nil)</td>
<td>Straight (Nil)</td>
</tr>
<tr>
<td>Bottom side (L)</td>
<td>Bottom side (L)</td>
</tr>
</tbody>
</table>

Approved
Approved

The certificate is written in English and Japanese. Other languages are available as specials.

The certificate is written in English and Japanese. Other languages are available as specials.
2-Color Display Digital Flow Switch  

**Series PFM**

### Options (Please order separately.)

- **Panel mounting adapter** *(Without flow adjustment valve)*
  - ZS-33-J
  - Panel mounting adapter A
  - Panel mounting adapter B
  - Mounting bracket

- **Panel mounting adapter** *(With flow adjustment valve)*
  - ZS-33-JS
  - Panel mounting adapter A
  - Mounting bracket

- **Bracket** *(Without flow adjustment valve)*
  - ZS-33-M
  - Tapping screw (accessory)

- **Bracket** *(With flow adjustment valve)*
  - ZS-33-MS
  - Tapping screw (accessory)

- **Rubber cover for connector parts (Silicon rubber)*
  - ZS-33-F

### DIN rail mounting bracket

- **Stations**
  - 1 station
  - 2 stations
  - 3 stations
  - 4 stations
  - 5 stations

**ZS-33-R**

- DIN rail (supplied by customers)
- Port size F02: G1/4 cannot be mounted with a DIN rail.

### Through-hole mounting bracket

- **ZS-33-U**

- Thread, washer (supplied by customers)
- The size is equivalent to M3. Select length depending on conditions.
- Port size F02: G1/4 cannot be mounted.

### Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Lead wire with connector (2 m) (accessory)</td>
<td>ZS-33-D</td>
</tr>
<tr>
<td>3</td>
<td>IN side Bottom side piping adapter (with pin)</td>
<td>ZS-33-P1L</td>
</tr>
<tr>
<td>4</td>
<td>OUT side Bottom side piping adapter (with pin)</td>
<td>ZS-33-P2L</td>
</tr>
<tr>
<td>5</td>
<td>For straight piping Flow adjustment valve assembly (with pin)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For 10 l/min</td>
<td>ZS-33-10N</td>
</tr>
<tr>
<td></td>
<td>For 25 l/min</td>
<td>ZS-33-25N</td>
</tr>
<tr>
<td></td>
<td>For 50 l/min</td>
<td>ZS-33-50N</td>
</tr>
<tr>
<td></td>
<td>For 100 l/min</td>
<td>ZS-33-11N</td>
</tr>
<tr>
<td>6</td>
<td>For bottom side piping Flow adjustment valve assembly (with pin)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For 10 l/min</td>
<td>ZS-33-10NL</td>
</tr>
<tr>
<td></td>
<td>For 25 l/min</td>
<td>ZS-33-25NL</td>
</tr>
<tr>
<td></td>
<td>For 50 l/min</td>
<td>ZS-33-50NL</td>
</tr>
<tr>
<td></td>
<td>For 100 l/min</td>
<td>ZS-33-11NL</td>
</tr>
<tr>
<td>7</td>
<td>One-touch fitting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ø4 (5/32&quot;)</td>
<td>ZS-33-C4</td>
</tr>
<tr>
<td></td>
<td>ø6</td>
<td>ZS-33-C6</td>
</tr>
<tr>
<td></td>
<td>ø8 (5/16&quot;)</td>
<td>ZS-33-C8</td>
</tr>
<tr>
<td></td>
<td>ø1/4</td>
<td>ZS-33-N7</td>
</tr>
<tr>
<td>8</td>
<td>Female mounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rc1/8</td>
<td>ZS-33-01</td>
</tr>
<tr>
<td></td>
<td>NPT1/8</td>
<td>ZS-33-N01</td>
</tr>
<tr>
<td></td>
<td>G1/8</td>
<td>ZS-33-F01</td>
</tr>
<tr>
<td></td>
<td>Rc1/4</td>
<td>ZS-33-02</td>
</tr>
<tr>
<td></td>
<td>NPT1/4</td>
<td>ZS-33-N02</td>
</tr>
<tr>
<td></td>
<td>G1/4</td>
<td>ZS-33-F02</td>
</tr>
</tbody>
</table>
Series PFM

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>PFM710</th>
<th>PFM725</th>
<th>PFM750</th>
<th>PFM711</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable fluid</td>
<td>Dry air, N2, Ar, CO2</td>
<td>(Air quality grade is JIS B8392.1-1, 1.2 to 1.6.2 and ISO 8573.1-1, 1.2 to 1.6.2.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated flow range (Flow rate range)</td>
<td>Dry air, N2, Ar</td>
<td>0.2 to 10 l/min</td>
<td>0.5 to 25 l/min</td>
<td>1 to 50 l/min</td>
</tr>
<tr>
<td>Set flow rate range</td>
<td>Dry air, N2, Ar</td>
<td>0 to 10.5 l/min</td>
<td>0 to 26.3 l/min</td>
<td>0 to 52.5 l/min</td>
</tr>
<tr>
<td>Minimum setting unit</td>
<td>0.01 l/min</td>
<td>0.1 l/min</td>
<td>0.1 l/min</td>
<td>0.1 l/min</td>
</tr>
<tr>
<td>Accumulated pulse flow rate exchange value</td>
<td>0.1 l/pulse</td>
<td>0.1 l/pulse</td>
<td>0.1 l/pulse</td>
<td>0.1 l/pulse</td>
</tr>
</tbody>
</table>

**Note 1:** When the minimum setting unit 0.01 l/min is selected for 10 l/min type, the indication upper limit will be [9.99 l/min].
When the minimum setting unit 0.1 l/min is selected for 100 l/min type, the indication upper limit will be [99.9 l/min].

**Note 2:** User can select between 0.01 l/min and 0.1 l/min for the PFM710, and between 0.1 l/min and 1 l/min for the PFM711 respectively.
If the indication unit is selected to “CFM”, the minimum setting unit cannot be changed.

**Note 3:** Set to “ANR” at the time of shipment from the factory.
“ANR” is used for standard conditions: 20°C, 1 atm and 65%RH.

**Note 4:** Cleared when the power supply is turned off. Hold function can be selected. (Interval of 2 min or 5 min can be selected).
If the 5 min interval is selected, the life of the memory element (electronic part) is limited to 1 million cycles. (If energized for 24 hours, life is calculated as 5 min x 1 million = 5 million min = 9.5 years). Therefore, if using the hold function, calculate the memory life for your operating conditions, and use within this life.

**Note 5:** Set to 1.5 s (90%), can be changed to 100 ms.

**Note 6:** Set to hysteresis mode at the time of shipment from the factory. Can be changed to window comparator mode using push-buttons.

<table>
<thead>
<tr>
<th>Model</th>
<th>PFM710</th>
<th>PFM725</th>
<th>PFM750</th>
<th>PFM711</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeatability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display accuracy</td>
<td>±3% of FS or less (Fluid: using dry air)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog output accuracy</td>
<td>±1% of FS or less (Fluid: using dry air)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure characteristics</td>
<td>±5% of FS or less (based on 0.35 MPa)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature characteristics</td>
<td>±2% of FS (15 to 35°C)</td>
<td>±5% of FS (0 to 50°C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating pressure range</td>
<td>−70 kPa to 750 kPa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof pressure</td>
<td>1 MPa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch output</td>
<td>NPN or PNP open collector</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum load current</td>
<td>80 mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum applied voltage</td>
<td>28 VDC (at NPN output)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal voltage drop</td>
<td>NPN output: 1 V or less (at 80 mA)</td>
<td>PNP output: 1.5 V or less (at 80 mA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>1 s (50 ms, 0.5 s, 2 s can be selected.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output protection</td>
<td>Short-circuit protection, Overcurrent protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog output</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>1.5 s or less (90% response)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage output</td>
<td>Voltage output: 1.5 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output impedance</td>
<td>1 kΩ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current output</td>
<td>Current output: 4 to 20 mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td></td>
<td>Variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis mode</td>
<td>Variable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Window comparator mode</td>
<td>Variable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External input</td>
<td>No-voltage input (Reed or Solid state)</td>
<td>Input 30 ms or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display method</td>
<td>3-digit, 7-segment LED, 2-color display (Red/Green)</td>
<td>Renewed cycle: 10 times/1 s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status LED’s</td>
<td>OUT1: Illuminates when output is turned ON (Green)</td>
<td>OUT2: Illuminates when output is turned ON (Red)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>24 VDC ±10%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>55 mA or less</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating fluid temperature</td>
<td>0 to 50°C (with no freezing and condensation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>Operating: 0 to 50°C</td>
<td>Stored: −10 to 60°C (with no freezing and condensation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating humidity range</td>
<td>Operating: Stored: 35 to 85%RH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstand voltage</td>
<td>1000 VAC for 1 min, between external terminal and case</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>50 MΩ or more (500 VDC Mega) between external terminal and case</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Without orbit: 10 to 500 Hz with a 1.5 mm amplitude or 98 m/s² acceleration, in each X, Y, Z direction for 2 hrs, whichever is smaller</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact resistance</td>
<td>490 m/s² in X, Y, Z directions 3 times each</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1: When the minimum setting unit 0.01 l/min is selected for 10 l/min type, the indication upper limit will be [9.99 l/min].
When the minimum setting unit 0.1 l/min is selected for 100 l/min type, the indication upper limit will be [99.9 l/min].
Piping Specifications / Weight

<table>
<thead>
<tr>
<th>Part no.</th>
<th>01</th>
<th>02</th>
<th>N01</th>
<th>N02</th>
<th>F01</th>
<th>F02</th>
<th>C4</th>
<th>C6</th>
<th>C6</th>
<th>N7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port size</td>
<td>Rc</td>
<td>Rc</td>
<td>NPT</td>
<td>NPT</td>
<td>G1/8</td>
<td>G1/4</td>
<td>ø4 (5/32&quot;)</td>
<td>ø6 (1/8&quot;)</td>
<td>ø8 (5/16&quot;)</td>
<td>1/4</td>
</tr>
<tr>
<td>Weight</td>
<td>Straight</td>
<td>Without orifice: 95 g</td>
<td>Straight</td>
<td>Without orifice: 125 g</td>
<td>Straight</td>
<td>Without orifice: 55 g</td>
<td>One-touch fitting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bottom side</td>
<td>Without orifice: 105 g</td>
<td>Bottom side</td>
<td>With orifice: 135 g</td>
<td>Bottom side</td>
<td>With orifice: 95 g</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Straight</td>
<td>Without orifice: 135 g</td>
<td>Straight</td>
<td>With orifice: 165 g</td>
<td>Straight</td>
<td>With orifice: 65 g</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bottom side</td>
<td>Without orifice: 175 g</td>
<td>Bottom side</td>
<td>With orifice: 105 g</td>
<td>Bottom side</td>
<td>With orifice: 105 g</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Wetted parts material: LCP, PBT, Brass (Electroless nickel plated), HNBR (+ Fluoro coated), FKM (+ Fluoro coated), Silicon, Au, Stainless steel 304

Analog Output

Analog Voltage Output (1 to 5 V)

- Model: PFM710-L52408-C/E
  - Max. measured flow rate value: 10 l/min

- Model: PFM725-L52408-C/E
  - Max. measured flow rate value: 25 l/min

- Model: PFM750-L52408-C/E
  - Max. measured flow rate value: 50 l/min

- Model: PFM711-L52408-C/E
  - Max. measured flow rate value: 100 l/min

Analog Current Output (4 to 20 mA)

- Model: PFM710-L52408-D/F
  - Max. measured flow rate value: 10 l/min

- Model: PFM725-L52408-D/F
  - Max. measured flow rate value: 25 l/min

- Model: PFM750-L52408-D/F
  - Max. measured flow rate value: 50 l/min

- Model: PFM711-L52408-D/F
  - Max. measured flow rate value: 100 l/min

Internal Circuits and Wiring Examples

2 NPN outputs type

- Model: PFM710-L52408-A
  - Brown DC (+)
  - Black OUT1
  - White OUT2
  - Blue DC (–)
  - 24 VDC

- Model: PFM725-L52408-A
  - Brown DC (+)
  - Black OUT1
  - White OUT2
  - Blue DC (–)
  - 24 VDC

- Model: PFM750-L52408-A
  - Brown DC (+)
  - Black OUT1
  - White OUT2
  - Blue DC (–)
  - 24 VDC

- Model: PFM711-L52408-A
  - Brown DC (+)
  - Black OUT1
  - White OUT2
  - Blue DC (–)
  - 24 VDC

2 PNP outputs type

- Model: PFM710-L52408-B
  - Brown DC (+)
  - Black OUT1
  - White OUT2
  - Blue DC (–)
  - 24 VDC

- Model: PFM725-L52408-B
  - Brown DC (+)
  - Black OUT1
  - White OUT2
  - Blue DC (–)
  - 24 VDC

- Model: PFM750-L52408-B
  - Brown DC (+)
  - Black OUT1
  - White OUT2
  - Blue DC (–)
  - 24 VDC

- Model: PFM711-L52408-B
  - Brown DC (+)
  - Black OUT1
  - White OUT2
  - Blue DC (–)
  - 24 VDC

2 Color Display Digital Flow Switch Series PFM

- Analog output [mA]
  - Model: PFM710-L52408-C/E
  - Max. 30 V, 80 mA
  - Internal voltage drop: 1 V or less

- Model: PFM725-L52408-C/E
  - Max. 30 V, 80 mA
  - Internal voltage drop: 1 V or less

- Model: PFM750-L52408-C/E
  - Max. 30 V, 80 mA
  - Internal voltage drop: 1 V or less

- Model: PFM711-L52408-C/E
  - Max. 30 V, 80 mA
  - Internal voltage drop: 1 V or less

- Analog output [V]
  - Model: PFM710-L52408-D/E
  - Max. 30 V, 80 mA
  - Internal voltage drop: 1 V or less

- Model: PFM725-L52408-D/E
  - Max. 30 V, 80 mA
  - Internal voltage drop: 1 V or less

- Model: PFM750-L52408-D/E
  - Max. 30 V, 80 mA
  - Internal voltage drop: 1 V or less

- Model: PFM711-L52408-D/E
  - Max. 30 V, 80 mA
  - Internal voltage drop: 1 V or less
Series PFM

Pressure Loss (Pressure: 350 [kPa])

For 10 (ℓ/min)

For 50 (ℓ/min)

For 100 (ℓ/min)

Flow Characteristics

For 10 (ℓ/min)

For 50 (ℓ/min)

For 100 (ℓ/min)
Parts Description

**Construction**

**Detection Principle**

This MEMS sensor chip consists of upstream temperature measuring sensor (Ru) and downstream temperature measuring sensor (Rd), which are placed symmetrically from the center of a platinum thin film coated heater (Rh) mounted on a membrane, and ambient temperature sensor (Ra) for measuring gas temperature. The principle is as shown in the diagram on the right. (a) When the gas is static, the temperature distribution of heated gas centered around Rh is uniform, and Ru and Rd have the same resistance. (b) When the gas flows from the left side, it upsets the balance of the temperature distribution of heated gas, and the resistance of Rd becomes greater than that of Ru. The difference in resistance between Ru and Rd is proportional to the gas velocity, so measurement and analysis of the resistance can show the flow direction and velocity of the gas. Ra is used to compensate the gas and ambient temperature.
## Series PFM

### Dimensions

**PFM7□□-C4/C6/C8/N7**

<table>
<thead>
<tr>
<th>Applicable tube O.D.</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø4 (5/32&quot;)</td>
<td>64.2</td>
</tr>
<tr>
<td>ø6</td>
<td>64.6</td>
</tr>
<tr>
<td>ø8 (5/16&quot;)</td>
<td>68</td>
</tr>
<tr>
<td>ø1/4</td>
<td>64.6</td>
</tr>
</tbody>
</table>

**PFM7□□-C4L/C6L/C8L/N7L**

<table>
<thead>
<tr>
<th>Applicable tube O.D.</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø4 (5/32&quot;)</td>
<td>10.1</td>
</tr>
<tr>
<td>ø6</td>
<td>10.3</td>
</tr>
<tr>
<td>ø8 (5/16&quot;)</td>
<td>12</td>
</tr>
<tr>
<td>ø1/4</td>
<td>10.3</td>
</tr>
</tbody>
</table>
2-Color Display Digital Flow Switch  Series PFM

Dimensions

PFM7□□-(N)01/(N)02/F01

PFM7□□-(N)01L/(N)02L/F01L
Series PFM

Dimensions

PFM7□□-F02

PFM7□□-F02L
Series PFM

Dimensions

PFM7□S-(N)01/(N)02/F01

PFM7□S-(N)01L/(N)02L/F01L
2-Color Display Digital Flow Switch  Series PFM

Dimensions

PFM7□S-F02

PFM7□S-F02L

Approved

Approved
**Series PFM**

**Dimensions**

**Panel mount / Without flow adjustment valve / Straight (mm)**

**Panel mount / With flow adjustment valve / Straight (mm)**

**Panel Fitting Dimension**

Panel thickness 1 to 3.2 mm

Note) Piping entry direction: Minimum dimensions for bottom side piping. If using straight piping, the piping material and tubing need to be taken into consideration when designing the system.

Approved

Approved
2-Color Display Digital Flow Switch  Series PFM

Dimensions

<table>
<thead>
<tr>
<th>With bracket / Without flow adjustment valve</th>
<th>With bracket / With flow adjustment valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Diagram of dimensions]</td>
<td>![Diagram of dimensions]</td>
</tr>
</tbody>
</table>

DIN rail mounting

- DIN rail (supplied by customers)
- Port size, F02: G1/4 cannot be mounted with a DIN rail.

Approved

Approved
**Series PFM**

### Function Details

**Output operation**
The output operation can be selected from the following:
- Output corresponding to real-time flow rate (hysteresis mode and window comparator mode)
- Output corresponding to accumulated flow rate

Accumulated output pulse output

At the time of shipment from the factory, it is set to hysteresis mode and normal output.

**Indication color**
The indication color can be selected for each output condition. The selection of the indication color provides visual identification of abnormal values. (The indication color depends on OUT1 setting.)

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>ON</td>
</tr>
<tr>
<td>Red</td>
<td>OFF</td>
</tr>
<tr>
<td>Red all the time</td>
<td></td>
</tr>
<tr>
<td>Green all the time</td>
<td></td>
</tr>
</tbody>
</table>

**Selection of operating fluid**
The fluid can be selected. If argon (Ar) or carbon dioxide (CO2) is used, the setting needs to be changed.

- **Dry air, N2**
- **Argon**
- **CO2**

**Selection of indication unit reference**
The indication unit reference can be selected between standard conditions and normal conditions.

- **Standard conditions:** The flow rate converted to a volume at 20°C and 1atm (atmosphere).
- **Normal conditions:** The flow rate converted to a volume at 0°C and 1atm (atmosphere).

**Setting of response time**
The flow rate may change momentarily during transition between ON (open) and OFF (closed) of the valve. It can be set so that this momentary change is not detected.

- **Principle:**
  - The flow rate may change momentarily due to transition between ON (open) and OFF (closed) of the valve.
  - A signal with fast response speed can be generated by turning off the analog output filter.
  - The indication unit reference can be selected between standard conditions and normal conditions.

**Indication mode**
The indication mode can be selected between real-time flow rate and accumulated flow rate.

**External input function**
The external input function can be selected from accumulated value external reset, auto shift and auto shift zero.

- **Input signal:** Connect input line to GND for 30 ms or more.
- **External reset:** This function resets the accumulated value to 0 when an input signal is applied.
- **Auto shift:**
  - This function generates an output corresponding to the change in relation to real-time flow rate when an input signal is applied.
  - The flow rate may change momentarily due to transition between ON (open) and OFF (closed) of the valve.
  - A signal with fast response speed can be generated by turning off the analog output filter.

**Indication resolution**
The indication resolution of the PFM710 and 711 series can be changed to enable values to be indicated in smaller steps.

<table>
<thead>
<tr>
<th>Resolution</th>
<th>PFM710</th>
<th>PFM711</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 resolution</td>
<td>by 0.1 min</td>
<td>by 0.1 min</td>
</tr>
<tr>
<td>1000 resolution</td>
<td>by 0.1 min</td>
<td>by 0.1 min</td>
</tr>
</tbody>
</table>

**Accumulated value hold**
Accumulated value is not cleared even when the power supply is turned off.

- The accumulated value is memorized every 2 or 5 min. during measurement, and continues from the last memorized value when the power supply is turned on again.
- The life time of the memory element is 1 million access cycles.

**Selection of analog output filter**
This selection is available when using a product with an analog output.

- A signal with fast response speed can be generated by turning off the analog output filter.

**Selection of power saving mode**
The power saving mode can be selected.

- With this function, if no buttons are pressed for 30 sec., it shifts to power saving mode.
- At the time of shipment from the factory, the product is set to the normal mode (the power saving mode is turned off).
  - (When power saving mode is activated, the decimal point flashes.)

**Setting of secret code**
The user can select whether a secret code must be entered to release key lock.

- At the time of shipment from the factory, it is set such that the secret code is not required.

**Peak / Bottom value indication**
The maximum (minimum) flow rate is detected and updated from when the power supply is turned on. In peak (bottom) value indication mode, this maximum (minimum) flow rate is displayed.

**Error indication function**
When an error or abnormality arises, the location and contents are displayed.

<table>
<thead>
<tr>
<th>Description</th>
<th>Contents</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate error</td>
<td>The flow rate exceeds the upper limit of indicated flow rate range.</td>
<td>Decrease the flow rate.</td>
</tr>
<tr>
<td>Overcurrent error</td>
<td>Load current of 80 mA or more is applied to the switch output (OUT1).</td>
<td>Eliminate the cause of the overcurrent by turning off the power supply and then turn it on again.</td>
</tr>
<tr>
<td>System error</td>
<td>Possibility of internal circuit damage before factory adjustment.</td>
<td>Stop operation immediately and contact SMC.</td>
</tr>
<tr>
<td>Zero clear error</td>
<td>If zero clear is performed (by holding down and buttons simultaneously for 1 sec.) while there is some flow, “END” will be displayed for 1 sec.</td>
<td>Perform zero clear of accumulated flow rate when there is no flow.</td>
</tr>
</tbody>
</table>

*If the error or abnormality cannot be solved by the action above, contact SMC for further investigation.*
Changing the piping entry direction combination for IN and OUT side.

**PFM7**

- **C4**
- **A**
- **M**
- **X693**

Piping entry direction

Note: No symbol is entered.

Dimensions:

**PFM7** - C4/C6/C8/N7-X693

**PFM7** - C4/C6/C8/N7-X694

---

**Changing the piping entry direction combination**

- **X693** IN side: Straight / OUT side: Bottom side
- **X694** IN side: Bottom side / OUT side: Straight

---

**One-touch fitting**

<table>
<thead>
<tr>
<th>Applicable tube O.D.</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4 ø4 (5/32&quot;)</td>
<td>10.1</td>
<td>8.1</td>
</tr>
<tr>
<td>C6 ø6</td>
<td>10.3</td>
<td>8.3</td>
</tr>
<tr>
<td>C8 ø8 (5/16&quot;)</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>N7 ø1/4</td>
<td>10.3</td>
<td>8.3</td>
</tr>
</tbody>
</table>

**Port size**

<table>
<thead>
<tr>
<th>Port size</th>
<th>A</th>
<th>B</th>
<th>C (Width across flats)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rc1/8, 1/4</td>
<td>13</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>NPT1/8, 1/4</td>
<td>17</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>G1/8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Series PFM

Dimensions

<table>
<thead>
<tr>
<th>Port size</th>
<th>A</th>
<th>B</th>
<th>C (Width across flats)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rc1/8, 1/4</td>
<td>13</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>NPT1/8, 1/4</td>
<td>13</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>G1/4</td>
<td>17</td>
<td>15</td>
<td>21</td>
</tr>
</tbody>
</table>

One-touch fitting
Applicable tube O.D. A B
φ4 (5/32") 10.1 8.1
φ6 10.3 8.3
φ8 (5/16") 12 10
φ1/4 10.3 8.3

<table>
<thead>
<tr>
<th>Port size</th>
<th>A</th>
<th>B</th>
<th>C (Width across flats)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rc1/8, 1/4</td>
<td>13</td>
<td>39</td>
<td>17</td>
</tr>
<tr>
<td>NPT1/8, 1/4</td>
<td>13</td>
<td>39</td>
<td>17</td>
</tr>
<tr>
<td>G1/4</td>
<td>17</td>
<td>43</td>
<td>21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Port size</th>
<th>A</th>
<th>B</th>
<th>C (Width across flats)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rc1/8, 1/4</td>
<td>13</td>
<td>39</td>
<td>17</td>
</tr>
<tr>
<td>NPT1/8, 1/4</td>
<td>13</td>
<td>39</td>
<td>17</td>
</tr>
<tr>
<td>G1/4</td>
<td>17</td>
<td>43</td>
<td>21</td>
</tr>
</tbody>
</table>

Approved

Approved
Series PFM
Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

■Explanation of the Labels

<table>
<thead>
<tr>
<th>Labels</th>
<th>Explanation of the labels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger</td>
<td>In extreme conditions, there is a possible result of serious injury or loss of life.</td>
</tr>
<tr>
<td>Warning</td>
<td>Operator error could result in serious injury or loss of life.</td>
</tr>
<tr>
<td>Caution</td>
<td>Operator error could result in injury Note 3) or equipment damage. Note 4)</td>
</tr>
</tbody>
</table>

Note 1) ISO 4414: Pneumatic fluid power – General rules relating to systems
Note 2) JIS B 8370: General Rules for Pneumatic Equipment
Note 3) Injury indicates light wounds, burns and electrical shocks that do not require hospitalization or hospital visits for long-term medical treatment.
Note 4) Equipment damage refers to extensive damage to the equipment and surrounding devices.

■Selection/Handling/Applications

1. The compatibility of the pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications. Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or post analysis and/or tests to meet the specific requirements. The expected performance and safety assurance are the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalog information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. Only trained personnel should operate pneumatic machinery and equipment. Compressed air can be dangerous if handled incorrectly. Assembly, handling or repair of the systems using pneumatic equipment should be performed by trained and experienced operators. (Understanding JIS B 8370 General Rules for Pneumatic Equipment, and other safety rules are included.)

3. Do not service the machinery/equipment or attempt to remove components until safety is confirmed.
   1. Inspection and maintenance of the machinery/equipment should only be performed once measures to prevent falling or runaway of the driven objects have been confirmed.
   2. If the equipment must be removed, confirm the safety process as mentioned above. Turn off the supply pressure for the equipment and exhaust all residual compressed air in the system, and release all the energy (liquid pressure, spring, condenser, gravity).
   3. Before the machinery/equipment is restarted, take measures to prevent quick extension of a cylinder piston rod, etc.

4. If the equipment will be used in the following conditions or environment, please contact SMC first and be sure to take all necessary safety precautions.
   1. Conditions and environments beyond the given specifications, or if product is used outdoors.
   2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
   3. An application which has the possibility of having negative effects on people, property, requiring special safety analysis.
   4. If the products are used in an interlock circuit, prepare a double interlock style circuit with a mechanical protection function for the prevention of a breakdown. And, examine the devices periodically if they function normally or not.

■Exemption from Liability

1. SMC, its officers and employees shall be exempted from liability for any loss or damage arising out of earthquakes or fire, action by a third person, accidents, customer error with or without intention, product misuse, and any other damages caused by abnormal operating conditions.

2. SMC, its officers and employees shall be exempted from liability for any direct or indirect loss or damage, including consequential loss or damage, loss of profits, or loss of chance, claims, demands, proceedings, costs, expenses, awards, judgments and any other liability whatsoever including legal costs and expenses, which may be suffered or incurred, whether in tort (including negligence), contract, breach of statutory duty, equity or otherwise.

3. SMC is exempted from liability for any damages caused by operations not contained in the catalogs and/or instruction manuals, and operations outside of the specification range.

4. SMC is exempted from liability for any loss or damage whatsoever caused by malfunctions of its products when combined with other devices or software.
**Design and Selection**

**Warning**

1. Operate the switch only within the specified voltage.

   Use of the switch outside of the specified voltage range can cause not only a malfunction and damage to the switch, but it can also cause electrocution and fire.

2. Do not exceed the maximum allowable load specification.

   A load exceeding the maximum load specification can cause damage to the switch.

3. Do not use a load that generates surge voltage.

   Although surge protection is installed in the circuit at the output side of the switch, damage may still occur if a surge is applied repeatedly. When working directly such an unit as relay, solenoid valve, etc., which generates surge, use a built-in surge absorbing element type.

4. Be sure to verify the applicable fluid.

   The switches do not have an explosion proof rating. To prevent possible fire hazard, do not use with flammable gases or fluids.

5. Monitor the internal voltage drop of a switch.

   When operating below the specified voltage, it is possible that a load may be ineffective, even though the pressure switch function is normal. Therefore, the formula below should be satisfied after confirming the voltage of the load.

6. Use the switch within the specified flow rate measurement and operating pressure.

   Operating beyond the specified flow rate and operating pressure can damage the switch.

7. Never use flammable fluids and/or permeable fluids.

   They may cause a fire, explosion or corrosion.
   - Refer to the MSDA (Material Safety Data Sheet) when using chemicals.

8. To prevent damage due to failure and/or malfunction of the product, establish a backup system such as a fail-safe system which enables multiple-stage type operation of the equipment and machinery.

9. When the product is for an interlock circuit, the following points should be noted.

   - Provide double interlocking through another system (mechanical protection function, etc.).
   - Perform checks to ensure the product is operating properly, as there is a risk of injury.

**Caution**

1. Ensure sufficient space for maintenance activities.

   Provide space required for maintenance.

2. The direct-current power supply to combine should be UL authorized power supply.

   (1) Limited voltage current circuit in accordance with UL 508.

   A circuit in which power is supplied by the secondary coil of a transformer that meets the following conditions.
   - Maximum voltage (with no load):
     - 30 Vrms (42.4 V peak) or less
   - Maximum current:
     - (1) 8 A or less (including when short circuited)
     - (2) limited by circuit protector (such as fuse) with the following ratings.

   ![No load voltage (V peak) Max. current rating
   0 to 20 [V] 5.0
   Above 20 to 30 [V] 100 Peak voltage](chart)

   (2) A circuit using max. 30 Vrms or less (42.4 V peak), which is powered by UL 1310 or UL 1585 compatible Class-2 power supply.

3. Data of the switch are stored even after the power supply is turned off.

   Input data is stored in an EEPROM so that the data will not be lost after the flow switch is turned off. (The data can be rewritten for up to one million times, and stored for up to 20 years.)

**Mounting**

**Warning**

1. Monitor the flow direction of the fluid.

   Install and connect piping so that fluid flows in the direction of the arrow indicated on the body.

2. Remove dirt and dust from inside of the piping by means of air blow, before attaching to the switch.

3. Do not drop or bump.

   Do not drop, bump, or apply excessive impacts (490 m/s²) while handling. Although the external body of a switch (switch case) may not be damaged, the switch inside could be damaged and cause a malfunction.

4. Hold the body of the switch when handling.

   The tensile strength of the cord is 49 N and applying a greater pulling force than this can cause a malfunction. When handling, hold the body of the switch.

5. Do not use until you can verify that equipment can operate properly.

   Following mounting, repair, or retrofit, verify correct mounting by conducting suitable function and leakage tests after piping and power connections have been made.

6. Never mount the switch in a place that will be used as a scaffold during piping.

7. Apply a wrench only to the metal part of the piping when installing the flow switch in the system piping.

   There is a risk of breakage of the switch.
**Mounting**

**Caution**
1. Observe the proper tightening torque.
   When the switch is tightened beyond the specified tightening torque, the switch may be damaged.
2. Do not mount the switch in a place that will be used as a scaffold.
   The switch could break if subjected to excessive load such as being accidentally stepped on.
3. Use a tapping screw (P-tite) with nominal diameter of 3 to mount the product by using the bracket mounting hole(s) at the bottom.
   The length of the screw depends on the thickness of the plate to be fixed. Please select a screw whose length is the thickness of the plate + 4.8 mm. (The hole depth is 5 mm.)

**Warning**
6. Do not connect wiring while energizing the product.
   The switch and any equipment connected to it could break and malfunction.

**Operating Environment**

**Warning**
1. Never use in the presence of explosive gases.
   The switch does not have an explosion proof construction. If it is used in an environment where explosive gases are used, it may cause an explosive disaster. Therefore, never use it in such an environment.
2. Mount the switch in a location where there is no vibration greater than 98 m/s², or no impact greater than 490 m/s².
   With a switch with orifice, the adjusted flow rate value could be affected by vibration.
3. Do not use in an area where surges are generated.
   When there are units that generate a large amount of surge in the area around a pressure switch, (e.g., solenoid type lifters, high frequency induction furnaces, motors, etc.) this may cause deterioration or damage to the switch's internal circuitry. Avoid sources of surge generation and crossed lines.
4. Switches are not equipped with surge protection against lightning.
   The flow switches are CE compliant; however, they are not equipped with surge protection against lightning. Lightning surge protection measures should be applied directly to system components as necessary.
5. Avoid using the switch in an environment where the likelihood of splashing or spraying of liquids exists.
   The switch is an open type and should not be used in an environment exposed to splashing of water and oil.
6. Do not use the product in an environment subject to a temperature cycle.
   If the product is subject to a temperature cycle other than natural changes in air temperature, the internal components of the switch could be adversely affected.
7. Do not mount the product in locations where it is exposed to radiant heat.
   This could result in damage and/or malfunction.

**Wiring**

**Warning**
1. Verify the color and the terminal number when wiring.
   Incorrect wiring can cause the switch to be damaged and malfunction. Verify the color and the terminal number in the instruction manual when wiring.
2. Use caution not to repeatedly apply bending or stretching forces to the lead wire.
   Repeated pulling or bending of the lead wire may cause some of the wires to break.
3. Confirm proper insulation of wiring.
   Make sure that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.
4. Do not wire in conjunction with power lines or high voltage lines.
   Wire separately from power lines and high voltage lines, and avoid wiring in the same conduit with these lines. Control circuits, including switches, may malfunction due to noise from these lines.
5. Do not short-circuit a load.
   Although the switch displays an overcurrent error if a load is short-circuited, there is not protection against incorrect wiring (power source polarity, etc.). Use caution to avoid wiring incorrectly.

---

**Series PFM**

Specific Product Precautions 2

Be sure to read this before handling.
Refer to the back of page 1 for Safety Instructions and “Precautions for Handling Pneumatic Devices” (M-03-E3A) for Common Precautions.

---

Back page 3
### Maintenance

**Warning**

1. Perform periodical inspections to ensure proper operation of the switch.  
   Unexpected malfunctions may cause a possible danger.
2. Take precautions when using the switch for an interlock circuit.  
   When a pressure switch is used for the interlock circuit, devise a multiple interlock system to prevent trouble or malfunction, and verify the operation of the switch and interlock function on a regular basis.
3. Do not make any modifications to the product.  
   It may cause human injuries and damage.
4. When maintenance work is performed, the following points should be noted.  
   - Turn off the power supply.
   - Cut off the fluid supply, drain the fluid from the piping and ensure the fluid is released to atmosphere before carrying out maintenance. Otherwise, it could cause injury.

**Caution**

1. Do not wipe the product with chemicals such as benzene or thinner.  
   Such chemicals could damage the product.
2. The accuracy could change by 2 to 3% when the piping is removed or replaced.
3. Do not poke the inside of the piping port with a stick.  
   The rectifier could break, making the product unable to sustain the desired performance.
4. Do not touch terminals or connectors when energizing the product.  
   It could cause electric shock, malfunction, or damage to the switch.

### Fluid

**Warning**

1. Check regulators and flow adjustment valves before introducing the fluid.  
   If pressure or flow rate beyond the specified range are applied to the switch, the sensor unit may be damaged.
2. Install a filter on the inlet side when there is a possibility of foreign matter being mixed with the fluid.  
   If foreign matter gets stuck to the vortex generator and/or vortex detector of the switch, accurate measurement could be prevented.
3. Use dry air of quality compliant with JIS B 8329-1 1.1.2 to 1.6.2: 2003 for this product.  
   If any mist or drainage present in the air attaches to the product, accurate measurement could be prevented.

**Recommended air circuits**

- **For compressed air**
  - Dryer
  - Air filter
  - Regulator
  - Micro mist separator
  - Flow switch
  - IDF
  - AF
  - AR
  - AMD
  - AFD
  - PFM

- **For vacuum**
  - Vacuum line
  - Suction filter
  - Flow switch
  - ZF
  - PFM

### Others

**Warning**

1. After the power is turned on, the switch’s output remains off while a message is displayed.  
   Therefore, start the measurement after a value is displayed.
2. Perform settings after stopping control systems.  
   When the switch’s initial setting and flow rate setting are performed, output maintains the condition prior to the settings.  
   The output will be OFF when performing initial setting and flow rate setting.

---

Back page 4
**Set Flow Rate Range and Rated Flow Range**

**Caution**

Set the flow rate within the rated flow range.
The set flow rate range is the range of flow rate that can be set in the switch.
The rated flow range is the range that satisfies the switch specifications (accuracy, linearity etc.).
It is possible to set a value outside of the rated flow range, however, the specification is not be guaranteed.
The flow rate range if using CO2 is given in brackets.

### <For Air/PFM>

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Flow rate range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2 ℓ/min</td>
</tr>
<tr>
<td>PFM710</td>
<td>0</td>
</tr>
<tr>
<td>PFM720</td>
<td>0.5 ℓ/min</td>
</tr>
<tr>
<td>PFM750</td>
<td>1 ℓ/min</td>
</tr>
<tr>
<td>PFM711</td>
<td>2 ℓ/min</td>
</tr>
</tbody>
</table>

- **Rated flow range of sensor**
- **Set flow rate range of sensor**

---

**Series PFM**

**Specific Product Precautions 4**

Be sure to read this before handling.
Refer to the back of page 1 for Safety Instructions and “Precautions for Handling Pneumatic Devices” (M-03-E3A) for Common Precautions.
SMC'S GLOBAL MANUFACTURING, DISTRIBUTION
AND SERVICE NETWORK

SOUTH KOREA
SMC Pneumatics Korea Co., Ltd.

TAIWAN
SMC Pneumatics (Taiwan) Co., Ltd.

THAILAND
SMC Thailand Ltd.

NORTH AMERICA
CANADA
SMC Pneumatics (Canada) Ltd.

MEXICO
SMC Corporation (Mexico) S.A. de C.V.

USA
SMC Corporation of America

SOUTH AMERICA
ARGENTINA
SMC Argentina S.A.

BOLIVIA
SMC Pneumatics Bolivia S.R.L.

BRAZIL
SMC Pneumatics Do Brazil Ltda.

CHILE
SMC Pneumatics (Chile) S.A.

VENEZUELA
SMC Neumaticos Venezuela S.A.

OCEANIA
AUSTRALIA
SMC Pneumatics (Australia) Pty. Ltd.

NEW ZEALAND
SMC Pneumatics (N.Z.) Ltd.

ASIA
CHINA
SMC (China) Co., Ltd.

HONG KONG
SMC Pneumatics (Hong Kong) Ltd.

INDIA
SMC Pneumatics (India) Pvt. Ltd.

INDONESIA
PT. SMC Pneumatics Indonesia

MALAYSIA

PHILIPPINES
SHOKETSU-SMC Corporation

EUROPE
AUSTRIA
SMC Pneumatik GmbH

BELGIUM
SMC Pneumatics N.V./S.A.

BULGARIA
SMC Industrial Automation Bulgaria EOOD

CROATIA
SMC Industrijska automatika d.o.o.

CZECH REPUBLIC
SMC Industrial Automation CZ s.r.o.

DENMARK
SMC Pneumatik A/S

ESTONIA
SMC Pneumatics Estonia OÜ

FINLAND
SMC Pneumatics Finland OY

FRANCE
SMC Pneumatique SA

GERMANY
SMC Pneumatik GmbH

HUNGARY
SMC Hungary Ipari Automatizáci Kft.

IRELAND
SMC Pneumatics (Ireland) Ltd.

ITALY
SMC Italia S.p.A.

LATVIA
SMC Pneumatics Latvia SIA

LITHUANIA
SMC Pneumatics Lietuva, UAB

NETHERLANDS
SMC Pneumatics BV.

Norway
SMC Pneumatics Norway A/S

Poland
SMC Industrial Automation Polska Sp.z.o.o.

Romania
SMC Romania s.r.l.

Russia
SMC Pneumatik LLC.

Slovakia
SMC Priemyselná automatizáci, s.r.o.

Slovenia
SMC INDUSTRIJSKA AVTOMATIKA d.o.o.

Spain/Portugal
SMC España, S.A.

Sweden
SMC Pneumatics Sweden AB

Switzerland
SMC Pneumatik AG.

UK
SMC Pneumatics (U.K.) Ltd.

SMC Corporation
Akihabara UDX 15F,
4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN
Phone: 03-5207-8249   FAX: 03-5298-5362
URL http://www.smcworld.com
© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

© 2006 SMC Corporation  All Rights Reserved
Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

Safety Instructions
Be sure to read “Precautions for Handling Pneumatic Devices” (M-03-E3A) before using.