2-Colour Display
Digital Flow Switch

Applicable fluid: Air, N₂

Expanded flow range! Wide range of flow measurement with one product

Flow ratio* (100: 1)
* Flow ratio is 10: 1 for current PF2A.

Setting resolution: 1 L/min
Current PF2A: 5 L/min (200 L: 2 L/min)

<table>
<thead>
<tr>
<th>Applicable flow range [L/min]</th>
<th>0.2</th>
<th>0.5</th>
<th>1</th>
<th>2</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>25</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>500</th>
<th>600</th>
<th>1000</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td></td>
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<td></td>
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<td>10</td>
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<td></td>
</tr>
</tbody>
</table>

Compact, Space saving
Approx. 1/3 the volume of the current product (200 L type)

500 L/1000 L type

200 L type

Comparison with PFMB7201 and PF2A721-03

Comparison with PFMB7501-04 and PF2A751-04

Series PFMB

New PFMB

Comparison with PFMB7501-04 and PF2A751-04
**Series PFMB**

**2-Colour Display Digital Flow Switch**

**Flow adjustment valve is integrated.**

- **200 L type**
  - Reduces piping installation work and space requirements.
  - Special design provides smooth adjustment to match needle rotations.

**Response time**

Can be selected from

- 50 msec (0.05 sec) / 0.1 sec / 0.5 sec / 1.0 sec / 2.0 sec

Response time can be set depending on application.

**Grease-free**

**Piping variations**

- **Straight**
  - One-touch fitting ø8
  - Female thread Rc, NPT, G 1/4

- **Bottom**
  - One-touch fitting ø8
  - Female thread Rc, NPT, G 1/4

**Reversed display mode**

When the switch is used upside down, the orientation of the display can be rotated to make it easier to read.

- No display rotating function
- Display is upside down

**With display rotating function**

**Functions**

- Output operation
- Display colour
- Reference condition
- Response time
- Display mode
- External input function
- Accumulated value hold
- Analogue output hold
- Forced output function
- Analogue output free range function
- Power-saving mode
- Peak/Bottom value display
- Keylock function
- Error display function
- Orientation correction function
- Reversed display mode
- Reset to the default settings
- Setting of security code

**Bypass structure**

Bypass structure with protruding part at the main piping, reduces the contact of moist air with the sensor, reducing degradation of the sensor and maintaining accuracy.

**Features 1**
Digital flow switch to save energy!

**Flow control** is necessary for promoting energy saving in any application. Saving energy starts from numerical control of the flow consumption of equipment and lines and clarification of the purpose and effect.

- Digital display allows visualization of flow rate.
- **2-Colour** display  Improved visibility
- Remote control is possible with accumulated pulse.

**Applications**

- Control of purge air flow of ionizer
- Flow control of the air for spray painting
- Flow control of N₂ gas to prevent lead frame oxidation
- Accumulated indication shows the operating flow rate or residual amount (of N₂ etc.) in a gas cylinder.

**Mounting**

- 200 L type
- 500 L/1000 L type

**Example of Recommended Pneumatic Circuit**

Air quality in the product specification can be satisfied by using this pneumatic circuit.

- Compressed air line
- Dryer IDF IDU
- Air filter AF
- Regulator AR IR
- Micro mist separator AMD AFD
- Flow switch PFMB

Features 2
### Flow Switch Flow Rate Variations

<table>
<thead>
<tr>
<th>Series</th>
<th>Applicable fluid</th>
<th>Detection method</th>
<th>Minimum setting unit</th>
<th>Applicable flow range [L/min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFMV</td>
<td>Air, N₂</td>
<td>Thermal type (MEMS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PFM</td>
<td>Air, N₂, Argon, CO₂</td>
<td>Thermal type (MEMS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PFMB</td>
<td>Air, N₂</td>
<td>Thermal type (MEMS)</td>
<td>Bypass flow type</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PF2A</td>
<td>Air, N₂</td>
<td>Thermal type (Thermistor)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### New Features
- PFMB: Bypass flow type

---

SMC

Features 3
# Flow Switch Variations/Basic Performance Table

<table>
<thead>
<tr>
<th>Feature</th>
<th>PFMV</th>
<th>PFM</th>
<th>PFMB</th>
<th>PF2A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Series</strong></td>
<td>![Image]</td>
<td>![Image]</td>
<td>![Image]</td>
<td>![Image]</td>
</tr>
<tr>
<td><strong>Enclosure</strong></td>
<td>IP40</td>
<td>IP40</td>
<td>IP40</td>
<td>IP65</td>
</tr>
<tr>
<td><strong>Fluid</strong></td>
<td>Dry air, N₂</td>
<td>Dry air, N₂, Ar, CO₂</td>
<td>Dry air, N₂</td>
<td>Dry air, N₂</td>
</tr>
<tr>
<td><strong>Setting</strong></td>
<td>Digital</td>
<td>Digital</td>
<td>Digital</td>
<td>Digital</td>
</tr>
<tr>
<td><strong>Rated flow range</strong></td>
<td>0 to 0.5 L/min, 0 to 1 L/min, 0 to 3 L/min</td>
<td>0.2 to 10 L/min, 0.5 to 25 L/min, 1 to 50 L/min, 2 to 100 L/min</td>
<td>2 to 200 L/min</td>
<td>1 to 10 L/min, 5 to 50 L/min, 10 to 100 L/min, 20 to 200 L/min</td>
</tr>
<tr>
<td><strong>Power supply voltage</strong></td>
<td>24 VDC ±10%</td>
<td>24 VDC ±10%</td>
<td>12 to 24 VDC ±10%</td>
<td>12 to 24 VDC ±10%</td>
</tr>
<tr>
<td><strong>Temperature characteristics (25°C reference)</strong></td>
<td>±2% F.S. (15 to 35°C), ±5% F.S. (0 to 50°C)</td>
<td>±2% F.S. (15 to 35°C), ±5% F.S. (0 to 50°C)</td>
<td>±2% F.S. (15 to 35°C), ±5% F.S. (0 to 50°C)</td>
<td>±3% F.S. (15 to 35°C), ±5% F.S. (0 to 50°C), ±2% F.S. (PF2A7□□□□H, 0 to 50°C)</td>
</tr>
<tr>
<td><strong>Repeatability</strong></td>
<td>±1% F.S. (Fluid: Dry air), Analogue output: ±5% F.S.</td>
<td>Monitor unit: ±0.1% F.S., Analogue output: ±0.5% F.S.</td>
<td>±1% F.S. (Fluid: Dry air), Analogue output: ±3% F.S.</td>
<td>±1% F.S. (Fluid: Dry air)</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>NPN/PNP, Open collector, Analogue voltage output, Analogue current output</td>
<td>NPN/PNP, Open collector, Accumulated pulse output, Analogue voltage output, Analogue current output</td>
<td>NPN/PNP, Open collector, Accumulated pulse output, Analogue voltage output, Analogue current output</td>
<td>NPN/PNP, Open collector, Accumulated pulse output</td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td>2-Colour LCD display</td>
<td>2-Colour LED display</td>
<td>2-Colour LED display</td>
<td>LED display</td>
</tr>
</tbody>
</table>

Features 4
Digital Flow Switch
Series PFMB7

How to Order

PFMB 7 201 [□ □ □ □ □]
Type
7 Integrated display
Rated flow range (Flow rate range)
201 2 to 200 L/min
Flow adjustment valve
— None
S Yes
Port size
C8 ø8 (5/16”) One-touch fitting
02 Rc1/4
N02 NPT1/4
F02 G1/4 (Note 4)
Note 4) ISO1179-1 compliant
— Made to Order
Pipe entry direction
— Straight
L Bottom
— Made to Order

Output specifications

<table>
<thead>
<tr>
<th></th>
<th>OUT1</th>
<th>OUT2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>NPN</td>
<td>NPN</td>
</tr>
<tr>
<td>B</td>
<td>PNP</td>
<td>PNP</td>
</tr>
<tr>
<td>C</td>
<td>NPN</td>
<td>Analogue 1 to 5 V</td>
</tr>
<tr>
<td>D</td>
<td>NPN</td>
<td>Analogue 4 to 20 mA</td>
</tr>
<tr>
<td>E</td>
<td>PNP</td>
<td>Analogue 1 to 5 V</td>
</tr>
<tr>
<td>F</td>
<td>PNP</td>
<td>Analogue 4 to 20 mA</td>
</tr>
<tr>
<td>G</td>
<td>NPN</td>
<td>External input (Note)</td>
</tr>
<tr>
<td>H</td>
<td>PNP</td>
<td>External input (Note)</td>
</tr>
</tbody>
</table>

Note) Accumulated flow, peak flow and minimum flow can be reset by external signal input.
— Made to Order

Calibration certificate
— None
A* With calibration certificate
Note 1) Certificate in both English and Japanese
* Made to Order

Unit specifications

M SI unit only (Note 2)
— Unit selection function (Note 3)
Note 2) Fixed unit: Instantaneous flow: L/min
Accumulated flow: L
Note 3) Since the unit for Japan is fixed to SI due to new measurement law, this option is for overseas.
Unit can be changed. Instantaneous flow: L/min⇔cfm
Accumulated flow: L⇔ft³

Piping entry direction

— Straight
L Bottom
— Made to Order

Output specifications

<table>
<thead>
<tr>
<th></th>
<th>OUT1</th>
<th>OUT2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>NPN</td>
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<td>F</td>
<td>PNP</td>
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</tr>
<tr>
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<td>NPN</td>
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</tr>
<tr>
<td>H</td>
<td>PNP</td>
<td>External input (Note)</td>
</tr>
</tbody>
</table>

Note) Accumulated flow, peak flow and minimum flow can be reset by external signal input.
— Made to Order

1. Option 1

With lead wire with connector (2 m)
ZS-33-D

With lead wire with connector (2 m)
ZS-33-F

ZS-33-D

With lead wire with connector (2 m)
ZS-33-F

Note) If an accessory is required, order separately using “ZS” part numbers.

2. Option 2

With bracket (For without flow adjustment valve)
ZS-33-M

With bracket (For with straight type flow adjustment valve)
ZS-33-MS

With 2 self-tapping screws

With 3 self-tapping screws

With panel mount adapter (For without flow adjustment valve)
ZS-33-J

With panel mount adapter (For with flow adjustment valve)
ZS-33-JS

Note) Each option is not assembled with the product, but shipped together.
If an accessory is required, order separately using “ZS” part numbers.

DIN Rail Mounting Bracket (Order Separately)

ZS – 33 – R

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

• DIN rail is prepared by customer.
• DIN rail is not suitable for port size F02 (G1/4).
### Output specifications

<table>
<thead>
<tr>
<th></th>
<th>OUT1</th>
<th>OUT2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>NPN</td>
<td>NPN</td>
</tr>
<tr>
<td>B</td>
<td>PNP</td>
<td>PNP</td>
</tr>
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<tr>
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</tr>
<tr>
<td>F</td>
<td>PNP</td>
<td>Analogue 4 to 20 mA</td>
</tr>
<tr>
<td>G</td>
<td>NPN</td>
<td>External input (Note 4)</td>
</tr>
<tr>
<td>H</td>
<td>PNP</td>
<td>External input (Note 4)</td>
</tr>
</tbody>
</table>

**Note 4)** Accumulated flow, peak flow and minimum flow can be reset by external signal input.  
*Made to Order

### Option 1

- **With lead wire with connector (2 m)**
  - ZS-33-D
  - ZS-33-F

- **No lead wire**
  - N

**Note** If an accessory is required, order separately using “ZS” part numbers.

### Option 2/Part No.

<table>
<thead>
<tr>
<th>Option</th>
<th>Part no.</th>
<th>Qty.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bracket</td>
<td>ZS-42-C</td>
<td>1</td>
<td>PFMB 7501/7102 with self-tapping screw (3 x 6), 4 pcs.</td>
</tr>
</tbody>
</table>

### How to Order

**PFMB 7**

501 04 A M

**Type**

- 7 Integrated display

**Rated flow range (Flow rate range)**

<table>
<thead>
<tr>
<th>Flow rate range</th>
<th>501</th>
<th>102</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 500 L/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 to 1000 L/min</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Thread type**

- N NPT
- F Rc
- G (Note)

**Port size**

<table>
<thead>
<tr>
<th>Port size</th>
<th>Rated flow range</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>1/2</td>
</tr>
</tbody>
</table>

**Output specifications**

<table>
<thead>
<tr>
<th>Option</th>
<th>Part no.</th>
<th>Qty.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bracket</td>
<td>ZS-42-C</td>
<td>1</td>
<td>PFMB 7501/7102 with self-tapping screw (3 x 6), 4 pcs.</td>
</tr>
</tbody>
</table>

### Calibration certificate

- None
- **A** With calibration certificate

**Note 1)** Certificate in both English and Japanese  
*Made to Order

### Option 2

- **With bracket**
  - With 4 self-tapping screws
  - With bracket

**Unit specifications**

<table>
<thead>
<tr>
<th>M</th>
<th>SI unit only (Note 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unit selection function (Note 3)</td>
</tr>
</tbody>
</table>

**Note 2)** Fixed unit: Instantaneous flow: L/min  
Accumulated flow: L

**Note 3)** Since the unit for Japan is fixed to SI due to new measurement law, this option is for overseas.  
Unit can be changed. Instantaneous flow: L/min ⇔ cfm  
Accumulated flow: L ⇔ ft³

**SMT**
### Series PFMB7 Specifications

#### Model
- **PFMB7201**
- **PFMB7501**
- **PFMB7102**

#### Fluid
- **Applicable fluid**
  - Note 1) Refer to “Example of Recommended Pneumatic Circuit” on Features 2.
- **Fluid temperature range**
  - 0 to 50°C

#### Flow
- **Detection method**
  - Thermal type
- **Rated flow range**
  - 2 to 200 L/min
- **Set flow rate**
  - **Instananeous flow**
    - 2 to 210 L/min
  - **Accumulated flow**
    - 0 to 999,999,999 L
- **Minimum setting unit**
  - Instananeous flow: 1 L/min
  - Accumulated flow: 10 L
- **Response time**
  - Refer to “Pressure Loss” graph.
- **Pressure characteristics**
  - ±5%F.S. (-0.75 MPa to 0.35 MPa reference) or more (500 VDC measured via megohmmeter) between terminals and housing

#### Pressure
- **Rated pressure range**
  - 0 to 0.75 MPa
- **Pressure loss**
  - Interval of 2 or 5 minutes can be selected.
- **Pressure characteristics**
  - ±5%F.S. (0 to 0.75 MPa, 0.35 MPa reference) ±5%F.S. (0 to 0.8 MPa, 0.6 MPa reference)

#### Electrical
- **Power supply voltage**
  - 12 to 24 VDC ±10%
- **Current consumption**
  - 55 mA or less
- **Protection**
  - Polarity protection

#### Switch output
- **Output type**
  - NPN open collector
  - PNP open collector
- **Output mode**
  - Select from Accumulated output or Accumulated pulse output modes.
- **Switch operation**
  - Select from Normal or Reversed output.
- **Maximum load current**
  - 80 mA
- **Maximum applied voltage (NP only)**
  - 28 VDC
- **Response time**
  - Select from 0.05 sec., 0.1 sec., 0.5 sec., 1 sec., or 5 sec.
- **Hysteresis**
  - Variable from 0%

#### Analog output
- **Output type**
  - Voltage output: 1 to 5 V, Current output: 4 to 20 mA
- **Impedance**
  - Voltage output: approx. 1 kΩ
  - Current output: Max. load impedance at power supply voltage 24 V: 600 Ω
- **Current output**
  - at power supply voltage 12 V: 300 Ω
- **Response time**
  - Linked with the response time of the switch output.

#### Environmental
- **Enclosure**
  - IP40
- **Withstand voltage**
  - 1000 VAC for 1 minute between terminals and housing
- **Insulation resistance**
  - 50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing
- **Operating temperature range**
  - Operation: 0 to 50°C, Storage: –10 to 60°C (No condensation or freezing)
- **Operating humidity range**
  - Operation: Storage: 35% to 95%RH (No condensation or freezing)

#### Piping
- **Piping specifications**
  - Rc1/4, NPT1/4, G1/4, ø8 One-touch fitting
- **Piping direction**
  - Straight, Bottom

#### Materials of parts in contact with fluid
- **Main materials of parts in contact with fluid**
  - Note 12) ADC, PPS, Stainless steel 304, Au HNBR, Si, GE4F

#### Weight
- **Body**
  - Rc1/4, NPT1/4/ Straight: 70 g Bottom: 85 g
  - G1/4/Straight: 115 g Bottom: 130 g
  - ø8 One-touch fitting/Straight: 50 g Bottom: 65 g
- **Flow adjustment valve**
  - +45 g
- **Lead wire**
  - +35 g
- **Bracket**
  - +20 g
- **Panel mount adapter**
  - +15 g
- **DN rail mounting bracket**
  - +65 g

### Notes
- **Note 1) Refer to “Example of Recommended Pneumatic Circuit” on Features 2.**
- **Note 2) When using the accumulated value hold function, use the operating conditions to calculate the product life, and do not exceed it.**
- **Note 3) Do not release the OUT side piping port of the product directly to the atmosphere without connecting piping. If the product is used with the piping port released to atmosphere, accuracy may vary.**
- **Note 4) The time from when the flow is changed by a step input (when the flow rate changes from 0 to the maximum flow instantly) until the switch output turns ON (or OFF) when set at 90% of the rated flow rate.**
- **Note 5) If the flow fluctuates around the set value, the width for setting more than the fluctuating width needs to be set. Otherwise, chattering will occur.**
- **Note 6) When using a product with an analogue output**
- **Note 7) The time from when the flow is changed as a step input (when the flow rate changes from 0 to the maximum flow instantly) until the analogue output reaches 90% of the rated flow rate.**
- **Note 8) When using a product with an external input**
- **Note 9) The flow rate given in the specification is the value at standard condition.**
- **Note 10) Setting is only possible for models with the unit selection function.**
- **Note 11) Refer to “Straight Piping Length and Accuracy” on page 4 for details.**
- **Note 12) Refer to “Construction/Fluid Contact Parts” on page 5 for details.**
Flow Range

<table>
<thead>
<tr>
<th>Model</th>
<th>Flow range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>~100 L/min 0 L/min 200 L/min 500 L/min 1000 L/min 2000 L/min</td>
</tr>
<tr>
<td>PFMB7201</td>
<td>2 L/min 2 L/min 200 L/min 210 L/min 210 L/min</td>
</tr>
<tr>
<td>PFMB7501</td>
<td>5 L/min 5 L/min 500 L/min 525 L/min 525 L/min</td>
</tr>
<tr>
<td>PFMB7102</td>
<td>10 L/min 10 L/min 1000 L/min 1050 L/min 1050 L/min</td>
</tr>
</tbody>
</table>

Analogue Output

<table>
<thead>
<tr>
<th>Flow/Analogue Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage output</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1 V 1.04 V 5 V</td>
</tr>
<tr>
<td>Current output</td>
</tr>
<tr>
<td>4 mA 4.16 mA 20 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated flow [L/min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>PFMB7201</td>
<td>2 200</td>
</tr>
<tr>
<td>PFMB7501</td>
<td>5 500</td>
</tr>
<tr>
<td>PFMB7102</td>
<td>10 1000</td>
</tr>
</tbody>
</table>

Pressure Loss

<table>
<thead>
<tr>
<th>PFMB7201 (for 200 L/min)</th>
<th>PFMB7501 (for 500 L/min)</th>
<th>PFMB7102 (for 1000 L/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply pressure 200 kPa</td>
<td>Supply pressure 200 kPa</td>
<td>Supply pressure 200 kPa</td>
</tr>
<tr>
<td>Supply pressure 400 kPa</td>
<td>Supply pressure 400 kPa</td>
<td>Supply pressure 400 kPa</td>
</tr>
</tbody>
</table>

Straight Piping Length and Accuracy

- The piping on the IN side must have a straight section of piping with a length of 8 cm or more. If a straight section of piping is not installed, the accuracy can vary by approximately ±2% F.S.
- A straight section means a part of the piping without any bends or rapid changes in the cross sectional area.
- When the PFMB7201 is connected to tubing, use a tube I.D. 5 mm just before the product.
- When the PFMB7501 or 7102 is connected to tubing, use a tube I.D. 9 mm or more just before the product.
  The accuracy can vary by approximately ±2% F.S. when such tubing is not used.
Series PFMB7

Construction/Fluid Contact Parts

PFMB7201

Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sensor body</td>
<td>PPS</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Gasket</td>
<td>HNBR</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Flow rectifier</td>
<td>Stainless steel 304</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Sensor chip</td>
<td>Silicone</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Printed circuit board</td>
<td>GE4F</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Gasket</td>
<td>HNBR</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Flow rectifier</td>
<td>Stainless steel 304</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>O-ring</td>
<td>FKM</td>
<td>Fluoro coating</td>
</tr>
<tr>
<td>9</td>
<td>O-ring</td>
<td>FKM</td>
<td>Fluoro coating</td>
</tr>
<tr>
<td>10</td>
<td>Fitting for piping</td>
<td>Brass</td>
<td>Electroless nickel plating</td>
</tr>
<tr>
<td>11</td>
<td>O-ring</td>
<td>FKM</td>
<td>Fluoro coating</td>
</tr>
<tr>
<td>12</td>
<td>Body</td>
<td>PBT</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Gasket</td>
<td>HNBR</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Bottom piping adapter</td>
<td>PBT</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>O-ring</td>
<td>HNBR</td>
<td>Fluoro coating</td>
</tr>
<tr>
<td>16</td>
<td>Flow adjustment valve body</td>
<td>PBT</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Body</td>
<td>Brass</td>
<td>Electroless nickel plating</td>
</tr>
<tr>
<td>18</td>
<td>Needle</td>
<td>Brass</td>
<td>Electroless nickel plating</td>
</tr>
<tr>
<td>19</td>
<td>O-ring</td>
<td>HNBR</td>
<td>Fluoro coating</td>
</tr>
<tr>
<td>20</td>
<td>O-ring</td>
<td>HNBR</td>
<td>Fluoro coating</td>
</tr>
</tbody>
</table>

PFMB7501/7102

Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sensor body</td>
<td>PPS</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Gasket</td>
<td>HNBR</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Flow rectifier</td>
<td>Stainless steel 304</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Sensor chip</td>
<td>Silicone</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Printed circuit board</td>
<td>GE4F</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Gasket</td>
<td>HNBR</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Body</td>
<td>PPS</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Mesh</td>
<td>Stainless steel 304</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Spacer</td>
<td>PPS</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>O-ring</td>
<td>HNBR</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>O-ring</td>
<td>HNBR</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Attachment</td>
<td>ADC</td>
<td>Coating</td>
</tr>
</tbody>
</table>
Dimensions

**PFMB7201-C8**

![Diagram of PFMB7201-C8 with dimensions]

**PFMB7201-C8L**

![Diagram of PFMB7201-C8L with dimensions]
Series PFMB7

Dimensions

PFMB7201-(N)02

Width across flats 17

2 x 2.5 depth 5

2 x 3.4

DC (+)  DC (−)

OUT2 OUT1

2 x Port size
Rc1/4  NPT1/4

IN

OUT

PFMB7201-(N)02L

Width across flats 17

2 x 2.5 depth 5

2 x 3.4

DC (+)  DC (−)

OUT2 OUT1

2 x Port size
Rc1/4  NPT1/4

IN

OUT

IN

OUT

IN

OUT
2-Colour Display Digital Flow Switch  Series PFMB7

Dimensions

PFMB7201-F02

PFMB7201-F02L
Series PFMB7

Dimensions

PFMB7201S-C8

PFMB7201S-C8L
Series PFMB7

Dimensions

PFMB7201S-F02

PFMB7201S-F02L
Dimensions

**PFMB7201**

Panel mount/
Without flow adjustment valve/Straight

Panel mount/
With flow adjustment valve/Straight

Panel mount/
Without flow adjustment valve/Bottom

Panel mount/
With flow adjustment valve/Bottom

Panel Fitting Dimensions

Note) Piping entry direction: Minimum dimensions for bottom piping. If using straight piping, the piping material and tubing need to be taken into consideration when designing the system. If a bend (R) is used, limit it to R3 or less.
**Dimensions**

**PFMB7201**

With bracket/Without flow adjustment valve

With bracket/With flow adjustment valve

- DIN rail is prepared by customer.
- DIN rail is not suitable for port size F02 (G1/4).
### Dimensions

**PFMB7501/7102**

![Diagram of Dimensions]

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation</td>
<td></td>
</tr>
<tr>
<td>Finished external diameter</td>
<td>ø3.5</td>
</tr>
<tr>
<td>Nominal cross section area</td>
<td>AWG26</td>
</tr>
<tr>
<td>External diameter</td>
<td></td>
</tr>
<tr>
<td>Colours</td>
<td>Brown, White, Black, Blue</td>
</tr>
<tr>
<td>Material</td>
<td>Oil-resistant PVC</td>
</tr>
</tbody>
</table>

#### Lead wire with connector
**ZS-33-D**

![Diagram of Lead wire with connector]

- **Terminal semi-stripped**
- **Brown** (6.5)
- **White** (20)
- **Black** (30)
- **Blue** (20)

#### Cable Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductor</td>
<td>AWG26</td>
</tr>
<tr>
<td>Nominal cross section area</td>
<td>ø3.5</td>
</tr>
<tr>
<td>External diameter</td>
<td>Approx. 0.50 mm</td>
</tr>
<tr>
<td>Insulation</td>
<td>Approx. 1.00 mm</td>
</tr>
<tr>
<td>Colours</td>
<td>Brown, White, Black, Blue</td>
</tr>
<tr>
<td>Sheath Material</td>
<td>Oil-resistant PVC</td>
</tr>
<tr>
<td>Finished external diameter</td>
<td>ø3.5</td>
</tr>
</tbody>
</table>
Output operation
The output operation can be selected from the following:
- Output (hysteresis mode and window comparator mode) corresponding to instantaneous flow, or output (accumulated output and pulse output) corresponding to accumulated flow.

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

Display colour
The display colour can be selected for each output condition. The selection of the display colour provides visual identification of abnormal values. (The display colour depends on OUT1)

Green for ON, Red for OFF
Red for ON, Green for OFF
Red all the time
Green all the time

Reference condition
The display unit can be selected from standard condition or normal condition.
- Standard condition: Flow rate converted to a volume at 20°C and 1 atm (atmosphere)
- Normal condition: Flow rate converted to a volume at 0°C and 1 atm (atmosphere)

Response time
The response time can be selected to suit the application.
- (default setting is 1 second.)
- 0.05 sec.
- 0.1 sec.
- 0.5 sec.
- 1 sec.
- 2 sec.

Power-saving mode
The display can be turned off to reduce the power consumption.
In this power-saving mode, decimal points flash on the main screen. If any button is pressed during power-saving mode, the display reverts to normal for 30 seconds to allow checking of the flow etc.

Setting of security code
The user can select whether a security code must be entered to release key lock. At the time of shipment from the factory, it is set such that the security code is not required.

External input function
This function can be used only when the optional external input is present. The accumulated flow, peak value and bottom value can be reset remotely.

Accumulated flow external reset: A function to reset the accumulated flow value when an external input signal is applied.
- In accumulated increment mode, the accumulated value will reset to, and increase from zero.
- In accumulated decrement mode, the accumulated value will reset to, and decrease from the set value.

Keylock function
Prevents operation errors such as accidentally changing setting values.

Analogue output free range function
Allows the flow that generates an output of 5 V or 20 mA to be changed. The value can be changed 10% of maximum rated flow to maximum display value.

Reversed display mode
When the switch is used upside down, the orientation of the display can be rotated to make it easier to read by using the display rotating function.

Reset to the default settings.
The product can be returned to its factory default settings.
## Error display function

When an error or abnormality arises, the location and contents are displayed.

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Contents</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Er1</td>
<td>OUT1 over current 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 on it again.</td>
</tr>
<tr>
<td>Er2</td>
<td>OUT2 over current error</td>
<td>Load current of 80 mA or more is applied to the switch output (OUT2).</td>
<td></td>
</tr>
<tr>
<td>HHH</td>
<td>Instantaneous flow 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>LLL</td>
<td>Reverse flow error</td>
<td>There is a reverse flow equivalent to −5% or more.</td>
<td>Turn the flow to correct direction.</td>
</tr>
<tr>
<td>999999999 (&quot;999&quot; will flash in any of upper, middle, lower 3-digit displays.)</td>
<td>Accumulated flow error</td>
<td>The flow rate exceeds the accumulated flow rate range.</td>
<td>Clear the accumulated flow rate.</td>
</tr>
<tr>
<td>Er0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Er4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Er6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Er8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If the failure cannot be solved after the above instructions are performed, please contact SMC for investigation.
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)1), and other safety regulations.

Safety Instructions

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.

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications. Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possible equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment. The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalogue.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Warning

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.2) Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.

2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Safety Instructions

Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.