2-Color Display

Digital Flow Switch

Applicable fluid: Dry air, N2

Wide range of flow measurement with one product

Flow ratio*1 **100 : 1**

*1 Rated flow ratio is 10 : 1 for the current PF2A.

Smallest settable increment: **1 L/min**

<table>
<thead>
<tr>
<th>Rated 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>200</th>
<th>500</th>
<th>1000</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rated flow range [L/min]

Compared with the current PF2A

- **Weight:** Approx. 76% reduction
  - 290 g => 70 g

- **Mounting space:** Approx. 81% reduction
  - 500 L/1000 L/2000 L type

Compared with the PFMB7201 and PF2A721-03

- **Weight:** Approx. 66% reduction
  - 290 g => 100 g

- **Mounting space:** Approx. 67% reduction

The PFMB7201 has been discontinued. Please select the new PF2M721 series. Click here for details.

New

3-Screen Display
Digital Flow Monitor
Allows for the monitoring of remote lines
PFG300 Series p. 24

PFMB Series

CAT.ES100-95C
PFMB Series

2-Color Display Digital Flow Switch

Flow adjustment valve is integrated.

- **500 L/1000 L/2000 L** type

Reduces piping installation work and space requirements. Special design provides smooth adjustment to match needle rotations.

Flow adjustment valve

**200 L type**

Response time

Can be selected from

- 50 ms (0.05 s)
- 0.1 s
- 0.5 s
- 1.0 s
- 2.0 s

Response time can be set depending on application.

Grease-free

Piping variations

**200 L type**

**Straight**

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

**Bottom**

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

Reversible display

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

When display is upside down:

With a reversible display function

(Can be set with the reversible display mode.)

Functions

- Output operation
- Display color
- Reference condition
- Display mode
- Response time
- Display OFF mode
- Setting of security code
- External input function
- Forced output function
- Accumulated value hold
- Peak/Bottom value display
- Keylock function
- Analog output free range function
- Reversible display mode
- Reset to the default settings
- Error display function

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.

- For the straight section of piping, refer to “IN Side Straight Piping Length and Accuracy” on page 12.
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-color display, Improved visibility

Remote control is possible with accumulated pulse.

- **Digital display allows visualization of flow rate.**
- 2-color display, Improved visibility

**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**
- **N2 blow prevents distortion of camera image due to air turbulence.**
- **Accumulated indication shows the operating flow rate or residual amount (of N2 etc.) in a gas cylinder.**
- **Detection camera**

- The product is not designed to be explosion proof.

**Mounting**

- 200 L type
  - Through-hole
  - DIN rail
  - Bracket
  - Panel mount

- 500 L/1000 L/2000 L type
  - Bracket

---

**Example of recommended pneumatic circuit**

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

- Compressed air line
  - Air dryer IDF IDU
  - Air filter AF
  - Regulator AR
  - Micro mist separator AMD AFD
  - Flow switch PFMB
The sub screen (label) shows the item to be set. It is possible to change the settings while checking the measured value.

Current model

Switches between displays

Switches

Setting complete

Use the or button to adjust to the set value.

Setting complete

Release the buttons after "---" is displayed on the right side sub screen.

With a snap shot function for set value reading

Pressing the and buttons simultaneously for a minimum of 1 second will make the set value (threshold value) the same as the current flow value.

Visualization of Settings

Always displayed on one screen

Main screen

Set value (Threshold value)

Sub screen/Left side

Label (Display item)

Sub screen/Right side

Set value (Threshold value)

Mode Examples

Accumulated flow

Set value (Threshold value)

Hysteresis value

Bottom value

Peak value

* Either "Input of line name" or "Display OFF" can be added via the function settings.

Easy Screen Switching

It is possible to change the settings while checking the measured value.

Simple 3-Step Setting

When the S button is pressed and the set value (P_1) is being displayed, the set value (threshold value) can be set. When the S button is pressed and the hysteresis (H_1) is being displayed, the hysteresis value can be set.

The sub screen can be switched by pressing the up/down buttons.

The flow rate of a flow switch installed in a distant location can be confirmed!
NPN/PNP Switch Function

The number of stock items can be reduced.

Analog output of 0 to 10 V is also available.

<table>
<thead>
<tr>
<th>Voltage output</th>
<th>1 to 5 V</th>
<th>Switchable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current output</td>
<td>4 to 20 mA</td>
<td>Fixed</td>
</tr>
</tbody>
</table>

Convenient Functions

- **Copy function**
  The set values of the monitor can be copied.

- **Security code**
  The key locking function keeps unauthorized persons from tampering with the settings.

- **Power saving mode**
  Power consumption is reduced by turning off the monitor.

<table>
<thead>
<tr>
<th>Current consumption</th>
<th>Reduction rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 mA or less</td>
<td>Approx. 50% reduction</td>
</tr>
</tbody>
</table>

  *1 During normal operation  *2 In power saving mode

- **External input function**
  The accumulated value, peak value, and bottom value can be reset remotely.

Compact & Lightweight

- **Compact**: Max. 6 mm shorter
- **Lightweight**: Max. 5 g lighter (30 g → 25 g)

Functions (Refer to pages 32 to 34 for details.)

- Output operation
- Simple setting mode
- Display color
- Delay time setting
- Digital filter setting
- FUNC output switching function
- Selectable analog output function
- External input function
- Forced output function
- Accumulated value hold
- Peak/Bottom value display
- Setting of security code
- Keylock function
- Reset to the default settings
- Display with zero cut-off setting
- Selection of display on sub screen
- Analog output free range function
- Error display function
- Copy function
- Selection of power saving mode

Mounting

The bracket configuration allows for mounting in four orientations.

Panel mount

- Mountable side by side without clearance
- One opening!
  - Reduced panel fitting labor
  - Space saving

Bracket A

Bracket B
# Flow Switch Flow Rate Variations

<table>
<thead>
<tr>
<th>Series</th>
<th>Applicable fluid</th>
<th>Detection method</th>
<th>Rated flow range [L/min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFMV</td>
<td>Dry air, N₂</td>
<td>Thermal type (MEMS)</td>
<td>-3 -2 -1 0 0.5 1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **PF2M7(-L)**
  - Applicable fluid: Dry air, N₂, Ar, CO₂
  - Detection method: Thermal type (MEMS)
  - Smallest settable increment: 0.001 L/min

- **PFMB**
  - Available on the digital flow monitor PFG300
  - Applicable fluid: Dry air, N₂
  - Detection method: Thermal type (MEMS) Bypass flow type
  - Rated flow range [L/min]: 0.1 0.5 1 2 5 10 20 50 100 150 200 2000 500 1000 2000 3000 6000 12000

- **PF2MC7(-L)**
  - Applicable fluid: Dry air, N₂
  - Detection method: Thermal type (MEMS) Bypass flow type
  - Rated flow range [L/min]: 0.02 0.05 0.1 0.3 1 2 5 10 20 50 100 200 2000

- **PF2A**
  - Applicable fluid: Air, N₂
  - Detection method: Thermal type (Thermistor)
  - Rated flow range [L/min]: 0.1 0.5 1 2 5 10 20 50

- **PF3A7□H**
  - Applicable fluid: Air, N₂
  - Detection method: Thermal type (Platinum sensor) Bypass flow type
  - Rated flow range [L/min]: 2 5 10 20 50 60 120 300 600 1200
## Flow Switch Variations / Basic Performance Table

<table>
<thead>
<tr>
<th>Series</th>
<th>PFMV</th>
<th>PF2M7(-L)</th>
<th>PFMB</th>
<th>PF2MC7(-L)</th>
<th>PF2A</th>
<th>PF3A7□H</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFMV3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Enclosure
- IP40

### Fluid
- Dry air, N₂

### Setting
- Digital

### Rated flow range
- 0 to 0.5 L/min
- 0.5 to 1 L/min
- 1 to 2 L/min
- 2 to 3 L/min

### Power supply voltage
- 12 to 24 VDC ±10%

### Temperature characteristics (0°C to 50°C)
- ±2% F.S. (15 to 35°C)
- ±5% F.S. (0 to 50°C)

### Repeatability
-±1% F.S. (Fluid: Dry air)

### Hysteresis
- Variable

### Output
- NPN/PNP open collector
- Analog voltage output
- Analog current output

### Display
- LED display

---

* The monitor unit shows the PFG300 and PFMV3.
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Analog Output .............................................................. p. 12
Pressure Loss ............................................................... p. 12
IN Side Straight Piping Length and Accuracy ................. p. 12
Construction: Parts in Contact with Fluid ..................... p. 13
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The PFMB7201 has been discontinued. Please select the new PF2M721 series. Click here for details.

2-Color Display Digital Flow Switch

PFMB7 Series

How to Order

PFMB 7 201 [ ] C8 [ ] A [ ] M [ ]

Rated flow range (Flow rate range)
201 2 to 200 L/min

Flow adjustment valve
Nil None
S Yes

Port size
C8 ø8 (5/16") One-touch fitting
02 Rc1/4
N02 NPT1/4
F02 G1/4

+1 Made to order
+2 ISO1179-1 compliant

Piping entry direction
Nil Straight
L Bottom

+1 Made to order

Output specification

<table>
<thead>
<tr>
<th>OUT1</th>
<th>OUT2</th>
<th>Applicable monitor unit model</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>Analog 1 to 5 V PFG300 series</td>
</tr>
<tr>
<td>D</td>
<td>NPN</td>
<td>Analog 4 to 20 mA PFG310 series</td>
</tr>
<tr>
<td>E</td>
<td>PNP</td>
<td>Analog 1 to 5 V PFG300 series</td>
</tr>
<tr>
<td>F</td>
<td>PNP</td>
<td>Analog 4 to 20 mA PFG310 series</td>
</tr>
<tr>
<td>G</td>
<td>NPN</td>
<td>External input *2</td>
</tr>
<tr>
<td>H</td>
<td>PNP</td>
<td>External input *2</td>
</tr>
</tbody>
</table>

+1 Made to order
+2 Accumulated flow value, peak/bottom flow value can be reset by external signal input.

Calibration certificate
Nil None
A With calibration certificate

+1 Certificate in both English and Japanese
+2 Made to order

Unit specification
M SI unit only *1
Nil Units selection function *2

+1 Fixed unit: Instantaneous flow: L/min Accumulated flow: L
+2 This product is for overseas use only according to the New Measurement Act. (The SI unit type is provided for use in Japan.) Unit can be changed. Instantaneous flow: L/min ⇒ cfm Accumulated flow: L ⇒ ft³

Option 1

Lead wire with connector (2 m) ZS-33-D
Rubber cover for connector (Silicone rubber) ZS-33-D
Nil W

Le...
### How to Order

**PFMB 7**

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Qty.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZS-33-D</td>
<td>1</td>
<td>Lead wire with connector (2 m)</td>
</tr>
<tr>
<td>ZS-33-F</td>
<td>1</td>
<td>Lead wire with connector (2 m)</td>
</tr>
<tr>
<td>ZS-33-D</td>
<td>1</td>
<td>Rubber cover for connector (Silicone rubber)</td>
</tr>
</tbody>
</table>

#### Option 1

<table>
<thead>
<tr>
<th>Option</th>
<th>Part no.</th>
<th>Qty.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead wire with connector</td>
<td>ZS-33-D</td>
<td>1</td>
<td>Lead wire: 2 m</td>
</tr>
<tr>
<td>Rubber cover (Silicone rubber)</td>
<td>ZS-33-F</td>
<td>1</td>
<td>For connector</td>
</tr>
</tbody>
</table>

#### Option 2

<table>
<thead>
<tr>
<th>Option</th>
<th>Part no.</th>
<th>Qty.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bracket (for PFMB7201)</td>
<td>ZS-33-M</td>
<td>1</td>
<td>With 2 tapping screws (3 x 6)</td>
</tr>
<tr>
<td>Bracket (for PFMB7201S)</td>
<td>ZS-33-MS</td>
<td>1</td>
<td>With 3 tapping screws (3 x 6)</td>
</tr>
<tr>
<td>Panel mount adapter (for PFMB7201)</td>
<td>ZS-33-J</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Panel mount adapter (for PFMB7201S)</td>
<td>ZS-33-JS</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Bracket (for PFMB7501/7102)</td>
<td>ZS-42-C</td>
<td>1</td>
<td>With 4 tapping screws (3 x 6)</td>
</tr>
<tr>
<td>Bracket (for PFMB7202)</td>
<td>ZS-42-D</td>
<td>1</td>
<td>With 4 tapping screws (3 x 6)</td>
</tr>
</tbody>
</table>

#### Calibration certificate

| Nil | None |
| A  | With calibration certificate |

| Nil | Certificate in both English and Japanese |
| Nil | Made to order |

#### Option 2

<table>
<thead>
<tr>
<th>Nil</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>No bracket</td>
<td>With 4 tapping screws</td>
</tr>
</tbody>
</table>

#### 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>
<tr>
<td>06</td>
<td>3/4</td>
</tr>
</tbody>
</table>

#### Output specification

<table>
<thead>
<tr>
<th>OUT1</th>
<th>OUT2</th>
<th>Applicable monitor unit model</th>
</tr>
</thead>
<tbody>
<tr>
<td>A NPN</td>
<td>NPN</td>
<td></td>
</tr>
<tr>
<td>B PNP</td>
<td>PNP</td>
<td></td>
</tr>
<tr>
<td>C NPN</td>
<td>Analog 1 to 5 V</td>
<td>PFG300 series</td>
</tr>
<tr>
<td>D NPN</td>
<td>Analog 4 to 20 mA</td>
<td>PFG310 series</td>
</tr>
<tr>
<td>E PNP</td>
<td>Analog 1 to 5 V</td>
<td>PFG300 series</td>
</tr>
<tr>
<td>F PNP</td>
<td>Analog 4 to 20 mA</td>
<td>PFG310 series</td>
</tr>
<tr>
<td>G PNP</td>
<td>External input</td>
<td></td>
</tr>
<tr>
<td>H PNP</td>
<td>External input</td>
<td></td>
</tr>
</tbody>
</table>

*1 Made to order
*2 Accumulated flow value, peak/bottom flow value can be reset by external signal input.

#### Unit specification

| M | SI unit only **1** |
| Nil | Units selection function **2** |

**1 Fixed unit: Instantaneous flow: L/min
Accumulated flow: L

**2 This product is for overseas use only according to the New Measurement Act. (The SI unit type is provided for use in Japan.)
Unit can be changed. Instantaneous flow: L/min ⇔ cfm
Accumulated flow: L ⇔ ft³
## PFMB7 Series Specifications

### Fluid

| Fluid | Model       | Application Fluid | Dry air, 
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PFMB7201</td>
<td>&quot;A&quot;</td>
<td>Air quality grade is JIS B 8392-1.1.2 to 1.6.2, ISO 8573-1.1.2 to 1.6.2</td>
</tr>
</tbody>
</table>

### Temperature range

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid temperature range</td>
<td>0 to 50°C</td>
<td>0 to 50°C</td>
<td>0 to 50°C</td>
<td>0 to 50°C</td>
</tr>
</tbody>
</table>

### Detection method

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>Thermal type</td>
<td>Thermal type</td>
<td>Thermal type</td>
<td>Thermal type</td>
</tr>
</tbody>
</table>

### Flow

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated flow range</td>
<td>2 to 200 L/min</td>
<td>5 to 500 L/min</td>
<td>10 to 1000 L/min</td>
<td>20 to 2000 L/min</td>
</tr>
<tr>
<td>Smallest settable increment</td>
<td>1 L/min</td>
<td>1 L/min</td>
<td>1 L/min</td>
<td>1 L/min</td>
</tr>
<tr>
<td>Accumulated flow</td>
<td>1 L</td>
<td>10 L</td>
<td>10 L</td>
<td>10 L</td>
</tr>
<tr>
<td>Accumulated value held function</td>
<td>Intervals of 2 or 5 minutes can be selected.</td>
<td>Intervals of 2 or 5 minutes can be selected.</td>
<td>Intervals of 2 or 5 minutes can be selected.</td>
<td>Intervals of 2 or 5 minutes can be selected.</td>
</tr>
</tbody>
</table>

### Pressure

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated pressure range</td>
<td>0 to 0.75 MPa</td>
<td>0 to 0.75 MPa</td>
<td>0 to 0.75 MPa</td>
<td>0 to 0.75 MPa</td>
</tr>
<tr>
<td>Proof pressure</td>
<td>1.0 MPa</td>
<td>1.0 MPa</td>
<td>1.0 MPa</td>
<td>1.0 MPa</td>
</tr>
</tbody>
</table>

### Pressure loss

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure characteristics</td>
<td>±5% F.S.</td>
<td>±5% F.S.</td>
<td>±5% F.S.</td>
<td>±5% F.S.</td>
</tr>
</tbody>
</table>

### Electrical

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply voltage</td>
<td>12 to 24 VDC</td>
<td>≤10%</td>
<td>55 mA or less</td>
<td>55 mA or less</td>
</tr>
</tbody>
</table>

### Display accuracy

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display accuracy</td>
<td>±3% F.S.</td>
<td>±3% F.S.</td>
<td>±3% F.S.</td>
<td>±3% F.S.</td>
</tr>
</tbody>
</table>

### Switch output

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output mode</td>
<td>Select from Hysteresis, Window comparator, Accumulated output, or Accumulated pulse output modes.</td>
<td>Select from Hysteresis, Window comparator, Accumulated output, or Accumulated pulse output modes.</td>
<td>Select from Hysteresis, Window comparator, Accumulated output, or Accumulated pulse output modes.</td>
<td>Select from Hysteresis, Window comparator, Accumulated output, or Accumulated pulse output modes.</td>
</tr>
</tbody>
</table>

### Analog output

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output type</td>
<td>Voltage output: 1 to 5 V</td>
<td>Current output: 4 to 20 mA</td>
<td>Voltage output: 1 to 5 V</td>
<td>Current output: 4 to 20 mA</td>
</tr>
</tbody>
</table>

### Display

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>L/min</td>
<td>cm³/min</td>
<td>L/min</td>
<td>cm³/min</td>
</tr>
<tr>
<td>Accumulated flow</td>
<td>L/min</td>
<td>cm³/min</td>
<td>L/min</td>
<td>cm³/min</td>
</tr>
<tr>
<td>Display range</td>
<td>10 to 210 L/min</td>
<td>25 to 525 L/min</td>
<td>50 to 1050 L/min</td>
<td>100 to 2100 L/min</td>
</tr>
<tr>
<td>Minimum display unit</td>
<td>1 L</td>
<td>1 L/min</td>
<td>1 L/min</td>
<td>1 L/min</td>
</tr>
<tr>
<td>Display</td>
<td>LCD, Color: Red/Green, 4 digits, 7 segments</td>
<td>LCD, Color: Red/Green, 4 digits, 7 segments</td>
<td>LCD, Color: Red/Green, 4 digits, 7 segments</td>
<td>LCD, Color: Red/Green, 4 digits, 7 segments</td>
</tr>
</tbody>
</table>

### Environment

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withstand voltage</td>
<td>1000 VAC for 1 minute between terminals and housing</td>
<td>250 VDC for 1 minute between terminals and housing</td>
<td>250 VDC for 1 minute between terminals and housing</td>
<td>250 VDC for 1 minute between terminals and housing</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>Operating: 0 to 50°C, Stored: −10 to 60°C</td>
<td>Operating: 0 to 50°C, Stored: −10 to 60°C</td>
<td>Operating: 0 to 50°C, Stored: −10 to 60°C</td>
<td>Operating: 0 to 50°C, Stored: −10 to 60°C</td>
</tr>
<tr>
<td>Operating humidity range</td>
<td>Operating/Stored: 35 to 85% RH</td>
<td>Operating/Stored: 35 to 85% RH</td>
<td>Operating/Stored: 35 to 85% RH</td>
<td>Operating/Stored: 35 to 85% RH</td>
</tr>
</tbody>
</table>

### Standards

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE, UL (CSA), RoHS</td>
<td>CE, UL (CSA), RoHS</td>
<td>CE, UL (CSA), RoHS</td>
<td>CE, UL (CSA), RoHS</td>
<td>CE, UL (CSA), RoHS</td>
</tr>
</tbody>
</table>

### Piping

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping specification</td>
<td>Rc1/4, NPT1/4, G1/4, all One-touch fitting</td>
<td>Rc1/2, NPT1/2, G1/2</td>
<td>Rc3/4, NPT3/4, G3/4</td>
<td>Rc1/4, NPT1/4, G1/4, all One-touch fitting</td>
</tr>
<tr>
<td>Piping entry direction</td>
<td>Straight, Bottom</td>
<td>Straight, Bottom</td>
<td>Straight, Bottom</td>
<td>Straight, Bottom</td>
</tr>
</tbody>
</table>

### Main materials of parts in contact with fluid

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>PTFE, Stainless steel 304, PPS, PTFE, Brass, Electroless nickel plating, HNBR, Si, Au, GE4F</td>
<td>PTFE, Stainless steel 304, PPS, PTFE, Brass, Electroless nickel plating, HNBR, Si, Au, GE4F</td>
<td>PTFE, Stainless steel 304, PPS, PTFE, Brass, Electroless nickel plating, HNBR, Si, Au, GE4F</td>
<td>PTFE, Stainless steel 304, PPS, PTFE, Brass, Electroless nickel plating, HNBR, Si, Au, GE4F</td>
</tr>
</tbody>
</table>

### Weight

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>100 g</td>
<td>100 g</td>
<td>100 g</td>
<td>100 g</td>
</tr>
<tr>
<td>Bracket</td>
<td>+25 g</td>
<td>+25 g</td>
<td>+25 g</td>
<td>+25 g</td>
</tr>
<tr>
<td>DIN rail mounting bracket</td>
<td>+5 g</td>
<td>+5 g</td>
<td>+5 g</td>
<td>+5 g</td>
</tr>
</tbody>
</table>

**1** Refer to the “Example of recommended pneumatic circuit” on page 2.

**2** When using the accumulated value hold function, use the operating conditions to calculate the product life, and do not exceed it. The maximum access limit of the memory device is 1 million times. If the product is operated more than 24 hours per day, the product life will be as follows:

- 5 min interval: life is calculated as 5 min x 1 million = 5 million min = 9.5 years
- 2 min interval: life is calculated as 2 min x 1 million = 2 million min = 3.8 years

If the accumulated value external reset is repeatedly used, the product life will be shorter than the calculated life.

**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.

**4** The time from when the flow is changed by a step input (when the flow rate changes from 0 to the maximum value of the rated flow range instantly) until the switch output turns ON (or OFF) when set to be 90% of the rated flow rate

**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.

**6** When using a product with an analog output

**7** The time from when the flow is changed by a step input (when the flow rate changes from 0 to the maximum value of the rated flow range instantly) until the analog output reaches 90% of the rated flow rate

**8** When using a product with an external input

**9** The flow rate given in the specifications is the value under standard conditions.

**10** Setting is only possible for models with the units selection function.

**11** For details, refer to “Not Side Straight Piping Length and Accuracy” on page 12.

**12** For details, refer to “Construction: Parts in Contact with Fluid” on page 14.

**13** The accumulated flow display is the upper 3-digit, middle 3-digit, and lower 3-digit (total of 9 digits) display. The position of the dots on the upper part of the screen indicates which digits are displayed.

For flow switch precautions and specific product precautions, refer to the “Operation Manual” on the SMC website. Click here for details.
Flow Range

<table>
<thead>
<tr>
<th>Model</th>
<th>Minimum value of the rated flow range</th>
<th>Maximum value of the rated flow range</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFMB7201</td>
<td>2 L/min</td>
<td>200 L/min</td>
</tr>
<tr>
<td>PFMB7501</td>
<td>5 L/min</td>
<td>500 L/min</td>
</tr>
<tr>
<td>PFMB7102</td>
<td>10 L/min</td>
<td>1000 L/min</td>
</tr>
<tr>
<td>PFMB7202</td>
<td>20 L/min</td>
<td>2000 L/min</td>
</tr>
</tbody>
</table>

Analog Output

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

Pressure Loss (Reference Data)

- PFMB7201 (for 200 L/min)
  - Without flow adjustment valve
- PFMB7501 (for 500 L/min)
- PFMB7102 (for 1000 L/min)
- PFMB7202 (for 2000 L/min)

Flow Adjustment Valve Flow Rate Characteristics (Reference Value)

- PFMB7201 (for 200 L/min)

IN Side Straight Piping Length and Accuracy (Reference Data)

- The piping on the IN side must have a straight section of piping with a length of 8 cm or more.
- "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.
PFMB7 Series

Internal Circuits and Wiring Examples

NPN (2 outputs) type
PFMB7-ABCDEFG

Max. applied voltage: 28 V, Max. load current: 80 mA, Internal voltage drop: 1 V or less

NPN (1 output) + Analog (1 to 5 V) output type
PFMB7-ABCDEFG

Max. applied voltage: 28 V, Max. load current: 80 mA, Internal voltage drop: 1 V or less
C: Analog output: 1 to 5 V
Output impedance: 1 kΩ
D: Analog output: 4 to 20 mA
Max. load impedance: 600 Ω

NPN (1 output) + Analog (1 to 5 V) output type
PFMB7-ABCDEFG

Max. applied voltage: 28 V, Max. load current: 80 mA, Internal voltage drop: 1 V or less
C: Analog output: 1 to 5 V
Output impedance: 1 kΩ
D: Analog output: 4 to 20 mA
Max. load impedance: 600 Ω

Accumulated pulse output wiring examples

NPN (2 outputs) type
PFMB7-ABCDEFG

Max. 28 V, 80 mA

NPN (1 output) + Analog output type
PFMB7-ABCDEFG

NPN (1 output) + External input type
PFMB7-ABCDEFG

PNP (2 outputs) type
PFMB7-ABCDEFG

Max. load current: 80 mA, Internal voltage drop: 1.5 V or less

PNP (1 output) + Analog (1 to 5 V) output type
PFMB7-ABCDEFG

Max. load current: 80 mA, Internal voltage drop: 1.5 V or less
E: Analog output: 1 to 5 V
Output impedance: 1 kΩ
F: Analog output: 4 to 20 mA
Max. load impedance: 600 Ω

PNP (1 output) + Analog (4 to 20 mA) output type
PFMB7-ABCDEFG

Max. load current: 80 mA, Internal voltage drop: 1.5 V or less
E: Analog output: 1 to 5 V
Output impedance: 1 kΩ
F: Analog output: 4 to 20 mA
Max. load impedance: 600 Ω

PNP (1 output) + External input type
PFMB7-ABCDEFG

Max. load current: 80 mA, Internal voltage drop: 1.5 V or less
External input: Input voltage 0.4 V or less (Reed or Solid state input) for 30 ms or longer

External input: Input voltage 0.4 V or less (Reed or Solid state input) for 30 ms or longer
Component Parts

**PFMB7201**

<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>Silicon</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 Fluoro coating</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>O-ring</td>
<td>FKM Fluoro coating</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Fitting for piping</td>
<td>Brass Electroless nickel plating</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>O-ring</td>
<td>FKM Fluoro coating</td>
<td></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 Fluoro coating</td>
<td></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 Electroless nickel plating</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Needle</td>
<td>Brass Electroless nickel plating</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>O-ring</td>
<td>HNBR Fluoro coating</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>O-ring</td>
<td>HNBR Fluoro coating</td>
<td></td>
</tr>
</tbody>
</table>

**PFMB7501/7102/7202**

<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>Silicon</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 Coating</td>
<td></td>
</tr>
</tbody>
</table>
**PFMB7 Series**

**Dimensions**

**PFMB7201-C8**

**PFMB7201-C8L**

With rubber cover for connector

2 x 8 One-touch fitting

IN

OUT

DC (−)

DC (+)

IN

OUT

2 x 2.5 depth 5

2 x 3.4

2 x 8 One-touch fitting

2 x 2.5 depth 5

2 x 3.4

Dimensions

PFMB7201-C8

PFMB7 Series
2-Color Display Digital Flow Switch  

PFMB7 Series

Dimensions

PFMB7201-(N)02

PFMB7201-(N)02L

Dimensions

PFMB7 Series

PFMB

Function

Details
Dimensions

PFMB7201-F02

PFMB7 Series

PFMB7201-F02L
Dimensions

PFMB7201S-C8

PFMB7201S-C8L
PFMB7 Series

Dimensions

PFMB7201S-(N)02

PFMB7201S-(N)02L
Dimensions

**PFMB7201S-F02**

- IN
- OUT1
- DC (-)
- OUT2
- DC (+)
- 2 x Port size G1/4
- Width across flats 21

**PFMB7201S-F02L**

- IN
- OUT
- DC (-)
- OUT
- DC (+)
- 2 x Port size G1/4
- Width across flats 21

**Dimensions**

<table>
<thead>
<tr>
<th>PFMB7201S-F02</th>
<th>PFMB7201S-F02L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width across flats 21</td>
<td>Width across flats 21</td>
</tr>
<tr>
<td>2 x Port size G1/4</td>
<td>2 x Port size G1/4</td>
</tr>
<tr>
<td>106</td>
<td>88</td>
</tr>
<tr>
<td>76</td>
<td>58</td>
</tr>
<tr>
<td>58</td>
<td>48</td>
</tr>
<tr>
<td>48</td>
<td>34</td>
</tr>
<tr>
<td>51.5 (Max. 58.5)</td>
<td>51.5 (Max. 58.5)</td>
</tr>
<tr>
<td>2 x 3.4</td>
<td>2 x 3.4</td>
</tr>
<tr>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>10.2</td>
<td>10.2</td>
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<tr>
<td>28</td>
<td>28</td>
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<tr>
<td>20</td>
<td>20</td>
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<td>68</td>
<td>68</td>
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<tr>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>58</td>
<td>58</td>
</tr>
<tr>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>3 x 2.5 depth 5</td>
<td>3 x 2.5 depth 5</td>
</tr>
</tbody>
</table>
Panel Fitting Dimensions

Panel thickness 1 to 3.2 mm

*1 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.

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

Panel thickness 1 to 3.2 mm

*1 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 mounting

- The DIN rail should be provided by the customer.
- The DIN rail is not suitable for port size F02 (G1/4).
PFMB7 Series

Dimensions

PFMB7501/7102/7202

Lead wire with connector
(Part no.: ZS-33-D)

Cable Specifications

<table>
<thead>
<tr>
<th>Conductor</th>
<th>Nominal cross section</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AWG26</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outside diameter</th>
<th>Approx. 0.50 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside diameter</td>
<td>Approx. 1.00 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color</th>
<th>Brown, White, Black, Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheath Material</td>
<td>Oil-resistant PVC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Finished outside diameter</th>
<th>ø3.5</th>
</tr>
</thead>
</table>

* For wiring, refer to the “Operation Manual” on the SMC website.
Documents/Download --> Instruction Manuals
### 3-Screen Display Digital Flow Monitor

**PFG300 Series**

#### How to Order

**Type**
- Remote type monitor unit

**Input specification**
- **Option 1**
  - Symbol: Nil
  - Description: Without lead wire
  - Part no. ZS-28-C-1
- **Option 2**
  - Symbol: L
  - Description: Power supply/output connection lead wire (Lead wire length: 2 m)
  - Part no. ZS-46-5L
- **Option 3**
  - Symbol: Nil
  - Description: Units selection function*3
  - Part no. ZS-28-C-1
- **Option 4**
  - Symbol: Nil
  - Description: Operation manual Calibration certificate

#### Connection Example

1. **Sensor connector**
2. **Power supply/output connection lead wire**
3. **Lead wire with connector** (Option for PFMB)

#### Options/Part Nos.
When only optional parts are required, order with the part numbers listed below.

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Option</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZS-28-C-1</td>
<td>Sensor connector</td>
<td>For PFMB</td>
</tr>
<tr>
<td>ZS-46-A1</td>
<td>Bracket A</td>
<td>Tapping screw: Nominal size 3 x 8 L (2 pcs.)</td>
</tr>
<tr>
<td>ZS-46-A2</td>
<td>Bracket B</td>
<td>Tapping screw: Nominal size 3 x 8 L (2 pcs.)</td>
</tr>
<tr>
<td>ZS-46-D</td>
<td>Panel mount adapter</td>
<td></td>
</tr>
<tr>
<td>ZS-46-5L</td>
<td>Power supply/output connection lead wire</td>
<td>5-core, 2 m</td>
</tr>
<tr>
<td>ZS-27-01</td>
<td>Front protection cover</td>
<td></td>
</tr>
</tbody>
</table>

#### Output specification
- **RT**
  - 2 outputs (NPN/PNP switching type) + Analog voltage output*1, 2
- **SV**
  - 2 outputs (NPN/PNP switching type) + Analog current output*2
- **XY**
  - 2 outputs (NPN/PNP switching type) + Copy function

*1 Can switch between 1 to 5 V and 0 to 10 V
*2 Can be switched to external input or copy function

#### Unit specification
- **Nil**
- **M**
  - Units selection function*3
  - SI unit only*4

*3 This product is for overseas use only according to the New Measurement Act. (The SI unit type is provided for use in Japan.)
*4 Fixed unit: Instantaneous flow: L/min Accumulated flow: L
### PFG300 Series

#### Specifications

**Applicable SMC flow switch**

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated flow range</strong></td>
<td>2 to 200 L/min</td>
<td>5 to 500 L/min</td>
<td>10 to 1000 L/min</td>
<td>20 to 2000 L/min</td>
</tr>
<tr>
<td><strong>Set point range</strong></td>
<td>Accidental flow</td>
<td>0 to 999,999,999,999 L</td>
<td>0 to 999,999,999,999 L</td>
<td>0 to 999,999,999,999 L</td>
</tr>
<tr>
<td><strong>Smallest settable increment</strong></td>
<td>1 L/min</td>
<td>1 L/min</td>
<td>1 L/min</td>
<td>1 L/min</td>
</tr>
<tr>
<td><strong>Accumulated value hold function</strong></td>
<td>1 L/pulse</td>
<td>10 L/pulse</td>
<td>1 L/pulse</td>
<td>10 L/pulse</td>
</tr>
</tbody>
</table>

**Flow**

- **Weight Body**: 25 g (Excluding the power supply/output connection lead wire)
- **Lead wire with connector**: <39 g

**Accuracy**

- **Analog output accuracy** ±0.5% F.S. (Ambient temperature: 25°C)
- **Ana log output accuracy** ±0.5% F.S. (Ambient temperature: 25°C)
- **Current consumption** 25 mA or less
- **Power supply voltage** 12 to 24 VDC ±10%

**Switch output**

- **Voltage output**: 1 to 5 V, 0 to 10 V (only when the power supply voltage is 24 VDC)
- **Current output**: 4 to 20 mA

**Display**

- **Display color**: Red/Green, Orange
- **Number of display digits**: 5 digits (7 segments)
- **Display range**
  - Instantaneous flow: 1 to 210 L/min
  - Accumulated flow: 0 to 999,999,999,999 L

**Environment**

- **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**: Operating: 0 to 50°C, Stored: −10 to 60°C (No condensation or freezing)
- **Operating humidity range**: Operating: 35 to 90% RH (No condensation or freezing)
- **Protection**
  - Over voltage protection (Up to 26.4 VDC)
  - Connector (e-CON)

**Electrical**

- **Display accuracy** ±0.5% F.S. ± Minimum display unit (Ambient temperature: 25°C)
- **Analog output accuracy** ±0.5% F.S. (Ambient temperature: 25°C)
- **Repeatability** ±0.1% F.S. ±1 digit
- **Temperature characteristics** ±0.5% F.S. (Ambient temperature: 0 to 50°C, 25°C standard)
- **Switch operation** Select from Normal or Reversed output.
- **Accumulated flow display**
  - Instantaneous flow: 1 to 210 L/min
  - Accumulated flow: 0 to 999,999,999,999 L

**Sensor input**

- **Input voltage**: 0.4 V or less (Reed or Solid state) for 30 ms or longer
- **Output impedance**: 1 kΩ
- **Max. applied voltage (NPN only)**: 30 VDC
- **Current consumption**: 25 mA or less
- **Current output**: 4 to 20 mA

**External input**

- **Response time**: 50 ms or less
- **External input**: Input voltage: 0.4 V or less (Reed or Solid state) for 30 ms or longer
- **Input mode**: Select from Accumulated value external reset or Peak/Bottom value reset.

**Digital filter**

- **Response time**: 2 ms or less
- **Set point range**: Instantaneous flow (Increment: 2 ms or less)
- **Set point range**: Accumulated flow (Increment: 2 s or less)

---

1. Rated flow range of the applicable flow switch
2. Value without digital filter (at 0.00 s)
3. When using the accumulated value hold function, use the operating conditions to calculate the product life, and do not exceed it. The maximum access limit of the memory device is 1.5 million times. If the product is operated 24 hours per day, the product life will be as follows:
   - 5 min interval: Life is calculated as 5 min x 1.5 million = 7.5 million min = 14.3 years
   - 2 min interval: Life is calculated as 2 min x 1.5 million = 3 million min = 5.7 years
   - If the accumulated value external reset is repeatedly used, the product life will be shorter than the calculated life.
4. 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.
5. Setting is only possible for models with external input.
6. Setting is only possible for models with external input.
7. Setting is only possible for models with the units selection function.
8. The response time indicates when the set value is 90% in relation to the step input.
9. The accumulated flow display is the upper 6-digit and lower 6-digit (total of 12 digits) display. When the upper digits are displayed, x 10^7 lights up.
   - Products with tiny scratches, marks, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

For flow switch precautions and specific product precautions, refer to the “Operation Manual” on the SMC website. Click here for details.
Internal Circuits and Wiring Examples

-XY
-RT
-SV
NPN (2 outputs) + Copy function

-RT: NPN (2 outputs) + Analog voltage output
-SV: NPN (2 outputs) + Analog current output

-RT: NPN (2 outputs) + External input
-SV: NPN (2 outputs) + External input

Accumulated pulse output wiring examples
NPN (2 outputs) type

PNP (2 outputs) type
Bracket configuration allows for mounting in four orientations.

Bracket A
(Part no.: ZS-46-A1)

Bracket B
(Part no.: ZS-46-A2)
### Dimensions

#### Panel mount adapter
(Part no.: ZS-46-B)

![Diagram of panel mount adapter](image1)

Panel thickness 0.5 to 7

#### Panel mount adapter + Front protection cover
(Part no.: ZS-46-D)

![Diagram of panel mount adapter + front protection cover](image2)

Panel thickness 0.5 to 7

#### Power supply/output connection lead wire
(Part no.: ZS-46-5L)

![Diagram of power supply/output lead wire](image3)

#### Sensor connector
(Part no.: ZS-28-C-1)

![Diagram of sensor connector](image4)

---

### Cable Specifications

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC (+)</td>
</tr>
<tr>
<td>2</td>
<td>N.C.</td>
</tr>
<tr>
<td>3</td>
<td>DC (−)</td>
</tr>
<tr>
<td>4</td>
<td>IN¹</td>
</tr>
</tbody>
</table>

¹ 1 to 5 V or 4 to 20 mA

- **Conductor cross section**: 0.15 mm² (AWG26)
- **Insulator**
  - Outside diameter: 1.0 mm
  - Color: Brown, Blue, Black, White, Gray (5-core)
- **Sheath**
  - Finished outside diameter: ø3.5
**Dimensions**

**Panel fitting dimensions**

**Individual mounting**

- Dimensions: $31 \pm 4 \times 31 \pm 4 \times 4 \times R^2 \text{ or less}$

**Multiple (2 pcs. or more) secure mounting**

- Horizontal: $31 \times n \text{ pcs.} + 3.5 \times (n \text{ pcs.} - 1)$
- Dimensions: $4 \times R^2 \text{ or less}$

- Vertical: $31 \pm 4$ (for individual mounting)

- Dimensions: $3 \times n \text{ pcs.} \times 3.5 \times (n \text{ pcs.} - 1)$

**Panel mount example**

- Horizontal:
- Vertical:
PFMB Series
Function Details

■ 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.
(DefaultValue: Hysteresis mode, Normal output)

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

■ 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)

■ Display mode
The display mode can be selected from instantaneous flow or accumulated flow.

Instantaneous flow display
Accumulated flow display

■ Response time
The response time can be selected to suit the application. (DefaultValue: 1 s) Abnormalities can be detected more quickly by setting the response time to 0.05 seconds. The effect of fluctuation and flickering of the display can be reduced by setting the response time to 2 seconds.

■ Display OFF mode
This function will turn the display OFF. In this mode, decimal points flash on the main screen. If any button is pressed during this 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 the key lock. At a time of shipment from the factory, it is set such that a 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 value 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.

When the accumulated value is stored to memory, every time the accumulated value external reset is activated, the memory (EEPROM) will be accessed. Take into consideration that the maximum number of times the memory can be accessed is 1 million times. The total number of external inputs and the accumulated value memorizing time interval should not exceed 1 million times.

Peak/Bottom value reset: Peak and bottom value are reset.

■ Forced output function
The output is turned on/off in a fixed state when starting the system or during maintenance. This enables confirmation of wiring and prevents system errors due to unexpected output.
For the analog output type, when ON the output will be 5 V or 20 mA, and when OFF, it will be 1 V or 4 mA.

Additionally, the change in flow and temperature will not change the on/off status of the output while the forced output function is activated.

■ Accumulated value hold
The accumulated value is not cleared even when the power supply is turned off. The accumulated value is memorized every 2 or 5 minutes during measurement and continues from the last memorized value when the power supply is turned on again.
The life time of the memory device is 1 million access times. Take this into consideration before using this function.

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

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

■ Analog output free range function
This function allows a flow that generates an output of 5 V or 20 mA to be changed. The value can be changed between 10% of the maximum value of the rated flow and the maximum value of the display range.

■ Reversible display
When the switch is used upside down, the orientation of the display can be rotated to make it easier to read by using the reversible display 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>Error name</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>OUT1 over current error</td>
<td>A load current of 80 mA or more is applied to the switch output (OUT1).</td>
<td>Eliminate the cause of the over current by turning off the power supply and then turning it on again.</td>
</tr>
<tr>
<td>ii</td>
<td>OUT2 over current error</td>
<td>A 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 maximum value of the display 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>Change the flow to the correct direction.</td>
</tr>
</tbody>
</table>

*999999999 (999 will flash in any of upper, middle, lower 3-digit displays.)*

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error name</td>
<td>Accumulated flow error</td>
<td>PFMB7201</td>
<td>PFMB7501</td>
<td>PFMB7102</td>
</tr>
<tr>
<td>Description</td>
<td>The flow rate exceeds the accumulated flow rate range.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>Clear the accumulated flow rate.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Error | System error | Internal data error | Turn the power off and then on again. |

If the error cannot be solved after the instructions above are performed, please contact SMC for investigation.

### Precautions on piping

**Piping for the metal attachment**

- Tighten to the specified torque. Refer to the table below for the required torque values.
- Use a wrench suited for the required torque. Do not use an extremely large wrench (Total length of 40 cm or more).
- If the tightening torque is exceeded, the product can be broken.
- If the tightening torque is insufficient, the fitting may become loose.
- Avoid any sealant tape getting inside the flow path.
- Ensure there is no leakage after piping.
- When mounting the fitting, a wrench should be used on the metal part (attachment) of the fitting only.

Holding other parts of the product with a wrench may damage the product.

Specifically, make sure that the wrench does not damage the connector.

### Table of Required Torque

<table>
<thead>
<tr>
<th>Model</th>
<th>Required torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFMB7201</td>
<td>12 to 14 N·m</td>
</tr>
<tr>
<td>PFMB7501</td>
<td>28 to 30 N·m</td>
</tr>
</tbody>
</table>

### Table of Nominal Thread Size and Width Across Flats of Attachment

<table>
<thead>
<tr>
<th>Model</th>
<th>Nominal thread size</th>
<th>Width across flats of attachment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFMB7201</td>
<td>Rc1/4, NPT1/4</td>
<td>17 mm</td>
</tr>
<tr>
<td>PFMB7501</td>
<td>G1/4</td>
<td>21 mm</td>
</tr>
<tr>
<td>PFMB7102</td>
<td>1/2</td>
<td>30 mm</td>
</tr>
<tr>
<td>PFMB7202</td>
<td>3/4</td>
<td>35 mm</td>
</tr>
</tbody>
</table>
PFG300 Function Details

- **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.
  (Default setting: Hysteresis mode, Normal output)

- **Simple setting mode**
  Only the set values for instantaneous flow and accumulated flow can be changed. Output mode, output type, display color, and accumulate pulse output cannot be changed.

- **Display color**
  The display color can be selected for each output condition. The selection of the display color provides visual identification of abnormal values.

- **Delay time setting**
  The time from when the instantaneous flow reaches the set value to when the switch output operates can be set. Setting the delay time can prevent the switch output from chattering.
  (Default setting: 0 s)

- **Digital filter setting**
  The time for the digital filter can be set to the sensor input. Setting the digital filter can reduce chattering of the switch output and flickering of the analog output and the display.
  The response time indicates when the set value is 90% in relation to the step input.
  (Default setting: 0 s)

- **FUNC output switching function**
  Analog output, external input, or copy function can be selected.
  (Default setting: Analog output)

- **Selectable analog output function**
  1 to 5 V or 0 to 10 V can be selected for the analog voltage output type.
  (Default setting: 1 to 5 V)

- **External input function**
  The accumulated flow, peak value, and bottom value can be reset remotely.
  **Accumulated value 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.
  (Default setting: 0.0 s)
  - 0.05 to 0.1 s (increment of 0.01 s)
  - 0.1 to 1.0 s (increment of 0.1 s)
  - 1 to 10 s (increment of 1 s)
  - 20 s
  - 30 s
  - 40 s
  - 50 s
  - 60 s

- **Forced output function**
  The output is turned on/off in a fixed state when starting the system or during maintenance. This enables the confirmation of wiring and prevents system errors due to unexpected output.
  For the analog output type: When ON, the output will be 5 V (or 10 V when 0 to 10 V is selected) or 20 mA, and when OFF, 1 V (or 0 V when 0 to 10 V is selected) or 4 mA.
  - Also, an increase or decrease of the flow will not change the on/off status of the output while the forced output function is activated.

- **Accumulated value hold**
  The accumulated value is not cleared even when the power supply is turned off. The accumulated value is memorized every 2 or 5 minutes during measurement and continues from the last memorized value when the power supply is turned on again.
  The maximum writable limit of the memory device is 1.5 million times, which should be taken into consideration.

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

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

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

- **Reset to the default settings**
  The product can be returned to its factory default settings.

- **Display with zero cut-off setting**
  When the flow is close to 0 L/min, the product will round the value down and zero will be displayed. A flow value may be displayed even when the flow rate is 0 L/min due to high pressure or depending on the installation. The zero cut function will force the display to zero. The range to display zero can be changed.
Selection of display on sub screen

The display on the sub screen in measuring mode can be set.

<table>
<thead>
<tr>
<th>Display Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set value display</td>
<td>Displays the set value</td>
</tr>
<tr>
<td>Accumulated value display</td>
<td>Displays the accumulated value</td>
</tr>
<tr>
<td>Peak value display</td>
<td>Displays the peak value</td>
</tr>
<tr>
<td>Bottom value display</td>
<td>Displays the bottom value</td>
</tr>
<tr>
<td>Line name display</td>
<td>Displays the line name</td>
</tr>
<tr>
<td>(Up to 5 alphanumeric characters can be input.)</td>
<td></td>
</tr>
<tr>
<td>OFF</td>
<td>Displays nothing</td>
</tr>
</tbody>
</table>

Analog output free range function

This function allows a flow that generates an output of 5 V (or 10 V when 0 to 10 V is selected) or 20 mA to be changed. The value can be changed between 10% of the maximum value of the rated flow and the maximum value of the display range.

Error display function

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

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Error Name</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Er 1</td>
<td>OUT over current error</td>
<td>A load current of 80 mA or more is applied to the switch output (OUT).</td>
<td>Eliminate the cause of the over current by turning off the power supply and then turning it on again.</td>
</tr>
<tr>
<td>KKK</td>
<td>Instantaneous flow error</td>
<td>The flow rate exceeds the maximum value of the display 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>Change the flow to the correct direction.</td>
</tr>
<tr>
<td>99999999flashes x 10^6</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>Er 0</td>
<td>System error</td>
<td>Internal data error</td>
<td>Turn the power off and then on again.</td>
</tr>
<tr>
<td>Er 14</td>
<td>Copy error</td>
<td>The copy function does not operate properly.</td>
<td>After clearing the error by pressing the and buttons simultaneously for a minimum of 1 second, check the wiring and the model, and then attempt to copy again.</td>
</tr>
</tbody>
</table>

If the error cannot be solved after the instructions above are performed, please contact SMC for investigation.
**Copy function**

The set values of the monitor can be copied. This can reduce setting labor and minimize the risk of setting mistakes. The set value can be copied to up to 10 flow monitors simultaneously. (Maximum transmission distance: 4 m)

1) Wire as shown in the figure on the left.
2) All monitors are set to copy destination when first purchased. (Default condition is the monitor to be copied to.)
3) Press the button on the source monitor to start copying.

**Selection of power saving mode**

Power saving mode can be selected. It shifts to the power saving mode without button operation for 30 seconds. It is set to the normal mode (Power saving mode is OFF.) at a time of shipment from the factory. (During power saving mode, [ECo] will flash in the sub screen and the operation light is ON (only when the switch is ON).)

* There may be a difference in the displayed value on the connected flow switch and the flow monitor. When the flow monitor display is being used, it is recommended to set the flow switch display to OFF mode.
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](https://via.placeholder.com/15)

**Caution:** Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

![Warning](https://via.placeholder.com/15)

**Warning:** Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

![Danger](https://via.placeholder.com/15)

**Danger:** Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

---

### Warning

1. **The product is provided for use in manufacturing industries.**
   - The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
   - If anything is unclear, contact your nearest sales branch.

2. **Compliance Requirements**
   - 1. The product is provided for use in manufacturing industries.
   - The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
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3. **Limited warranty and Disclaimer**
   - The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.
   - Read and accept them before using the product.

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**Safety Instructions**

Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.