**2-Color Display**

**Digital Flow Switch**

Applicable fluid: Dry air, N₂

Wide range of flow measurement with one product

**Flow ratio**: $100 : 1$

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

Smallest settable increment: $1$ L/min

Current PF2A: $5$ L/min (200 L: 2 L/min)

<table>
<thead>
<tr>
<th>Rated 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>200</th>
<th>300</th>
<th>500</th>
<th>1000</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>500</td>
<td>1000</td>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Wide range of flow measurement with one product

**Compact, Space saving**

Compared with the current PF2A

- **Weight**: Approx. 76% reduction
  - $290$ g to $70$ g

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

Compared with the PFMB701 and PF2A721-03

**PFMB Series**

Compared with the PFMB7501-04 and PF2A751-04

**PF2A series**

(Current model)
PFMB Series
2-Color 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.

### 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

### 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

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

### 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.

- With a reversible display function (Can be set with the reversible display mode.)

*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.**

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.

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.
The sub screen (label) shows the item to be set. It is possible to change the settings while checking the measured value.

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.

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

Visualization of Settings

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

Easy Screen Switching

The flow rate of a flow switch installed in a distant location can be confirmed!

Simple 3-Step Setting

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.

* Either “Input of line name” or “Display OFF” can be added via the function settings.
### 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>Current output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5 V</td>
<td>4 to 20 mA</td>
</tr>
<tr>
<td>0 to 10 V</td>
<td>Fixed</td>
</tr>
</tbody>
</table>

### Convenient Functions

- **Copy function**
  - The settings of the master monitor can be copied to the slave monitors.

- **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.

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

### Functions

- 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.

**Bracket A**

Mountable side by side without clearance

**Bracket B**

One opening!
- Reduced panel fitting labor
- Space saving

**Panel mount**

Mountable side by side without clearance
### 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 -0.5 0 0.5 1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PFM</td>
<td>Dry air, N₂, Ar, CO₂</td>
<td>Thermal type (MEMS)</td>
<td>0.01 L/min 0.5 L/min 1 L/min 2 L/min 5 L/min 10 L/min 20 L/min 50 L/min 100 L/min 200 L/min 500 L/min 1000 L/min 2000 L/min 3000 L/min 6000 L/min 12000 L/min</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PFMB</td>
<td>Dry air, N₂</td>
<td>Bypass flow type</td>
<td>0.01 L/min 0.5 L/min 1 L/min 2 L/min 5 L/min 10 L/min 20 L/min 50 L/min 100 L/min 200 L/min 500 L/min 1000 L/min 2000 L/min 3000 L/min 6000 L/min 12000 L/min</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PFMC</td>
<td>Dry air, N₂</td>
<td>Bypass flow type</td>
<td>0.01 L/min 0.5 L/min 1 L/min 2 L/min 5 L/min 10 L/min 20 L/min 50 L/min 100 L/min 200 L/min 500 L/min 1000 L/min 2000 L/min 3000 L/min 6000 L/min 12000 L/min</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PF2A</td>
<td>Air, N₂</td>
<td>Thermal type (Thermistor)</td>
<td>0.1 L/min 0.5 L/min 1 L/min 2 L/min 5 L/min 10 L/min 20 L/min 50 L/min 100 L/min 200 L/min 500 L/min 1000 L/min 2000 L/min 3000 L/min 6000 L/min 12000 L/min</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PF3A7H</td>
<td>Air, N₂</td>
<td>Bypass flow type</td>
<td>0.1 L/min 0.5 L/min 1 L/min 2 L/min 5 L/min 10 L/min 20 L/min 50 L/min 100 L/min 200 L/min 500 L/min 1000 L/min 2000 L/min 3000 L/min 6000 L/min 12000 L/min</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Flow Switch Variations / Basic Performance Table

<table>
<thead>
<tr>
<th>Series</th>
<th>PFMV</th>
<th>PFM</th>
<th>PFMB</th>
<th>PFMC</th>
<th>PF2A</th>
<th>PF3A7□H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure</td>
<td>IP40</td>
<td>IP40</td>
<td>IP40</td>
<td>IP65</td>
<td>IP65</td>
<td>IP65</td>
</tr>
<tr>
<td>Fluid</td>
<td>Dry air, N₂</td>
<td>Dry air, N₂, Ar, CO₂</td>
<td>Dry air, N₂</td>
<td>Dry air, N₂</td>
<td>Air, N₂</td>
<td>Air, N₂</td>
</tr>
<tr>
<td>Setting</td>
<td>Digital</td>
<td>Digital</td>
<td>Digital</td>
<td>Digital</td>
<td>Digital</td>
<td>Digital</td>
</tr>
<tr>
<td>Rated flow range</td>
<td>0 to 0.5 L/min - 0.5 to 0.5 L/min</td>
<td>0.2 to 10 L/min - 0.5 to 25 L/min</td>
<td>2 to 200 L/min</td>
<td>2 to 100 L/min</td>
<td>1 to 10 L/min</td>
<td>30 to 3000 L/min</td>
</tr>
<tr>
<td>Power supply</td>
<td>12 to 24 VDC ±10%</td>
<td>24 VDC ±10%</td>
<td>12 to 24 VDC ±10%</td>
<td>12 to 24 VDC ±10%</td>
<td>12 to 24 VDC ±10%</td>
<td>24 VDC ±10%</td>
</tr>
<tr>
<td>V. characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>±2% F.S. (15 to 35°C) ±1% F.S. (0 to 50°C)</td>
<td>±2% F.S. (15 to 35°C) ±1% F.S. (0 to 50°C)</td>
<td>±2% F.S. (15 to 35°C) ±1% F.S. (0 to 50°C)</td>
<td>±2% F.S. (15 to 35°C) ±1% F.S. (0 to 50°C)</td>
<td>±2% F.S. (15 to 35°C) ±1% F.S. (0 to 50°C)</td>
<td>±2% F.S. (15 to 35°C) ±1% F.S. (0 to 50°C)</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±1% F.S. (Fluid: Dry air)</td>
<td>±1% F.S. (Fluid: Dry air)</td>
<td>±1% F.S. (Fluid: Dry air)</td>
<td>±1% F.S. (Fluid: Dry air)</td>
<td>±1% F.S. (Fluid: Dry air)</td>
<td>±1% F.S. (Fluid: Dry air)</td>
</tr>
<tr>
<td>Display</td>
<td>[Monitor unit 2-color LCD display]</td>
<td>2-color LED display</td>
<td>2-color LED display</td>
<td>3-color LCD display</td>
<td>LED display</td>
<td>3-color LCD display</td>
</tr>
</tbody>
</table>

* The monitor unit shows the PFG300 and PFMV3.
# CONTENTS

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- Specifications: p. 11
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- Pressure Loss: p. 12
- IN Side Straight Piping Length and Accuracy: p. 12
- Internal Circuits and Wiring Examples: p. 13
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- PFG300/Function Details: p. 32
- Safety Instructions: Back Cover
**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**

<table>
<thead>
<tr>
<th>Nil</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Port size**

<table>
<thead>
<tr>
<th>C8</th>
<th>ø8 (5/16&quot;) One-touch fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>Rc1/4</td>
</tr>
<tr>
<td>N02</td>
<td>NPT1/4</td>
</tr>
<tr>
<td>F02</td>
<td>G1/4</td>
</tr>
</tbody>
</table>

- 1 Made to order
- 2 ISO1179-1 compliant

**Piping entry direction**

<table>
<thead>
<tr>
<th>Nil</th>
<th>L*1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 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>—</td>
</tr>
<tr>
<td>B</td>
<td>PNP</td>
<td>—</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.

**Option 1**

- **W**
  - Lead wire with connector (2 m)
  - Rubber cover for connector (Silicone rubber)

- **N**
  - Without lead wire with connector

- **V**
  - When only optional parts are required, refer to Option 1/Part Nos. on page 10.

**Option 2**

- **ZS-33-M**
  - With 2 tapping screws
- **ZS-33-MS**
  - With 3 tapping screws

**DIN Rail Mounting Bracket (Ordered Separately)**

**ZS – 33 – R**

<table>
<thead>
<tr>
<th>Stations</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 stations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 stations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 stations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 stations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

PFMB 7 501 - [ ] 04 - [ ] A - [ ] M - [ ]

Rated flow range (Flow rate range)

<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>

Option 2/Part Nos.

<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
- A
  - With calibration certificate
  - Certificate in both English and Japanese
  - Made to order

Option

- Nil
  - R
  - With bracket
  - No bracket
  - With 4 tapping screws

Port size

<table>
<thead>
<tr>
<th>Port size</th>
<th>Rated flow range</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>5/10/20</td>
</tr>
<tr>
<td>06</td>
<td>3/4</td>
</tr>
</tbody>
</table>

Output specification

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

- Nil
- R
  - With bracket
  - No bracket
  - With 4 tapping screws

Unit specification

<table>
<thead>
<tr>
<th>Option</th>
<th>Part No.</th>
<th>Qty.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>SI unit only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>Units selection function</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Fixed unit: Instantaneous flow: L/min
  - Accumulated flow: L

- 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/Part Nos.

- Nil
  - R
  - With bracket
  - No bracket
  - With 4 tapping screws

- When only optional parts are required, refer to Option 1/Part Nos. below.

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

Thread type

| Nil | Rc |
| N | NPT |
| F | G |

*1 ISO228 compliant

Port size

<table>
<thead>
<tr>
<th>Port size</th>
<th>Rated flow range</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>5/10/20</td>
</tr>
<tr>
<td>06</td>
<td>3/4</td>
</tr>
</tbody>
</table>

Lead wire with connector (2 m)

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

**2-Color Display Digital Flow Switch**

**PFMB7 Series**

* With 2 tapping screws

*1  Certificate in both English and Japanese
  - Made to order

*2  Accumulated flow value, peak/bottom flow value can be reset by external signal input.
### Specifications

**PFMB7 Series**

#### Flow

<table>
<thead>
<tr>
<th>Model</th>
<th>PFMB7201</th>
<th>PFMB7501</th>
<th>PFMB7102</th>
<th>PFMB7202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td>Applicable fluid</td>
<td>Dry air, N2 (Air quality grade is JIS B 8392-1.1.2 to 1.6.2, ISO 8573-1.1.2 to 1.6.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>0 to 50°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detection method</td>
<td>Thermal type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated flow range (L/min)</td>
<td>2 to 200</td>
<td>5 to 500</td>
<td>10 to 1000</td>
<td>20 to 2000</td>
</tr>
<tr>
<td>Accumulated flow (L)</td>
<td>0 to 999,999,999</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smallest settable increment</td>
<td>1 L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure loss</td>
<td>1 L/pulse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure characteristics</td>
<td>±5% F.S. (0.6 MPa, 0.6 MPa standard)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>12 to 24 VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>55 mA or less</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Precipitation</td>
<td>Variable from 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>Variable from 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td>Short circuit protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output type</td>
<td>NPN open collector, PNP open collector</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output mode</td>
<td>Select from Hysteresis, Window comparator, Accumulated output, or Accumulated pulse output modes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch operation</td>
<td>Select from Normal or Reversed output.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum load current</td>
<td>80 mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal voltage drop (Residual voltage)</td>
<td>NPN output type: 1 V or less (at load current of 80 mA) PNP output type: 1.5 V or less (at load current of 80 mA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>From 0.05 s, 0.1 s, 0.5 s, 1 s, or 2 s.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>±3% F.S.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog output</td>
<td>±3% F.S.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impedance</td>
<td>Voltage output: 1 to 5 V, Current output: 4 to 20 mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current output</td>
<td>Up to 20 mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage output</td>
<td>Up to 100 mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>Linked to the response time of the switch output</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External input</td>
<td>Input voltage: 0.4 V or less (Reed or Solid state) for 30 ms or longer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input mode</td>
<td>Select from Standard conditions or Normal conditions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference condition</td>
<td>Select from Standard conditions or Normal conditions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display mode</td>
<td>Select from Instantaneous flow or Accumulated flow.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instantaneous flow</td>
<td>L/min or cm³ can be selected.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accumulated flow</td>
<td>L or ft³ can be selected.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display range (L/min)</td>
<td>–10 to 210 L/min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instantaneous flow</td>
<td>–25 to 525 L/min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accumulated flow</td>
<td>–50 to 1050 L/min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>0 to 2100 L/min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum display unit</td>
<td>1 L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator LED</td>
<td>LED ON when switched on and OFF when switched off.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>LED, Color: Red/Green, 4 digits, 7 segments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>1000 VAC for 1 minute between terminals and housing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>Operating: 0 to 50°C, Stored: –10 to 60°C (No condensation or freezing)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating humidity</td>
<td>Operating/Storage: 35 to 85% RH (No condensation or freezing)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standards</td>
<td>CE, UL (CSA), RoHS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piping</td>
<td>R1c1, NPT1/4, G1/4, all One-piece fitting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piping entry direction</td>
<td>Straight, Bottom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main materials of parts in contact with fluid</td>
<td>316L Stainless steel, 304L, PPS, PVDF, Brass (Electrical Nickel plating), HMB, S, A, GE4F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>100 g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead wire</td>
<td>35 g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bracket</td>
<td>25 g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel mount adapter</td>
<td>+5 g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIN rail mounting bracket</td>
<td>+5 g</td>
<td></td>
<td></td>
<td></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. If the maximum access limit of the memory device is exceeded, the product life will be shorter than calculated.
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 the 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 is 5. If the flow fluctuates around the set value, the width for setting more than the fluctuating width needs to be set. Otherwise, changing will occur.
5. When using a product with an analog output
6. The time from when the flow is changed by a step input (when the flow rate changes from 0 to 100% of the rated flow range instantly) until the switch output turns ON (or OFF) when set to be 90% of the rated flow rate is 5. If the flow fluctuates around the set value, the width for setting more than the fluctuating width needs to be set. Otherwise, changing will occur.
7. When using a product with an external input
8. The flow rate given in the specifications is the value under standard conditions.
9. Setting is only possible for models with the units selection function.
10. For details, refer to "Construction: Parts in Contact with Fluid" on page 14.
11. 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.
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>−100 L/min</td>
<td>200 L/min</td>
</tr>
<tr>
<td></td>
<td>−10 L/min</td>
<td>210 L/min</td>
</tr>
<tr>
<td>PFMB7501</td>
<td>−25 L/min</td>
<td>500 L/min</td>
</tr>
<tr>
<td></td>
<td>−25 L/min</td>
<td>525 L/min</td>
</tr>
<tr>
<td>PFMB7102</td>
<td>−50 L/min</td>
<td>1000 L/min</td>
</tr>
<tr>
<td></td>
<td>−50 L/min</td>
<td>1050 L/min</td>
</tr>
<tr>
<td>PFMB7202</td>
<td>−100 L/min</td>
<td>2000 L/min</td>
</tr>
<tr>
<td></td>
<td>−100 L/min</td>
<td>2100 L/min</td>
</tr>
</tbody>
</table>

Analog Output

Flow/Analog Output

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 V</td>
<td>1.04 V</td>
<td>5 V</td>
</tr>
<tr>
<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

Flow Rate Characteristics

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.

2-Color Display Digital Flow Switch PFMB7 Series
Internal Circuits and Wiring Examples

NPN (2 outputs) type
PFMB7 Series

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 Series

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 (4 to 20 mA) output type
PFMB7 Series

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

NPN (1 output) + External input type
PFMB7 Series

Max. applied voltage: 28 V, Max. load current: 80 mA, Internal voltage drop: 1 V or less
External input: Input voltage 0.4 V or less (Reed or Solid state input) for 30 ms or longer

PNP (2 outputs) type
PFMB7 Series

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

Accumulated pulse output wiring examples

NPN (2 outputs) type
PFMB7 Series

Max. 28 V, 80 mA

NPN (1 output) + Analog output type
PFMB7 Series

NPN (1 output) + External input type
PFMB7 Series

PNP (2 outputs) type
PFMB7 Series

Max. 80 mA
Construction: Parts in Contact with Fluid

PFMB7201

PFMB7501/7102/7202

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>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</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>

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

Dimensions

PFMB7201-C8

With rubber cover for connector

PFMB7201-C8L

15
Dimensions

PFMB7201-(N)02

PFMB7201-(N)02L
**Dimensions**

**PFMB7201-F02**

**PFMB7 Series**

**PFMB7201-F02L**
Dimensions

**PFMB7201S-C8**

1 IN DC (−) DC (+) OUT1 OUT2

2 x ø8 One-touch fitting

**PFMB7201S-C8L**

1 IN DC (−) DC (+) OUT1 OUT2

2 x ø8 One-touch fitting

2-Color Display Digital Flow Switch **PFMB7 Series**
PFMB7 Series

Dimensions

PFMB7201S-(N)02

PFMB7201S-(N)02L
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 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

### Symbol

<table>
<thead>
<tr>
<th>Model</th>
<th>Symbol</th>
<th>A</th>
<th>B</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>H</th>
<th>K</th>
<th>L</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFMB7501/7102</td>
<td></td>
<td>70</td>
<td>30</td>
<td>43.7</td>
<td>37.2</td>
<td>15</td>
<td>14</td>
<td>26</td>
<td>18</td>
<td>13.6</td>
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<tr>
<td>PFMB7202</td>
<td></td>
<td>90</td>
<td>35</td>
<td>49.2</td>
<td>42.7</td>
<td>17.5</td>
<td>24</td>
<td>31</td>
<td>28</td>
<td>16.8</td>
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### Bracket dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>Symbol</th>
<th>S</th>
<th>T</th>
<th>U</th>
<th>V</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFMB7501/7102</td>
<td></td>
<td>24</td>
<td>22</td>
<td>32</td>
<td>40</td>
<td>50</td>
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<tr>
<td>PFMB7202</td>
<td></td>
<td>30</td>
<td>30</td>
<td>42</td>
<td>48</td>
<td>58</td>
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</table>

**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>Outside diameter</td>
<td>Approx. 0.50 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulator</th>
<th>Outside diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Brown, White, Black, Blue</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sheath</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finished outside diameter</td>
<td>Oil-resistant PVC</td>
</tr>
</tbody>
</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**

**PFG 300 - RT - M - L**

**Type**
3 Remote type monitor unit

---

**Input specification**

<table>
<thead>
<tr>
<th>Option</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>Voltage input</td>
</tr>
<tr>
<td>1</td>
<td>M</td>
<td>Current input</td>
</tr>
</tbody>
</table>

---

**Output specification**

<table>
<thead>
<tr>
<th>Option</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>RT</td>
<td>2 outputs (NPN/PNP switching type) + Analog voltage output*1,2</td>
</tr>
<tr>
<td>4</td>
<td>SV</td>
<td>2 outputs (NPN/PNP switching type) + Analog current output*2</td>
</tr>
<tr>
<td>5</td>
<td>XY</td>
<td>2 outputs (NPN/PNP switching type) + Copy function</td>
</tr>
</tbody>
</table>

*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**

<table>
<thead>
<tr>
<th>Option</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>N</td>
<td>Units selection function*3</td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>SI unit only*4</td>
</tr>
</tbody>
</table>

*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

---

**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>Description</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-B</td>
<td>Panel mount adapter</td>
<td></td>
</tr>
<tr>
<td>ZS-46-D</td>
<td>Panel mount adapter + Front protection cover</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>

---

**Connection Example**

- **Case A**
  - Sensor connector
  - Power supply/output connection lead wire (Option for PFMB)

- **Case B**
  - Panel mount adapter

---

**Function Details**

---

**3-Screen Display**

**Digital Flow Monitor**

**PFG300 Series**

---

**RoHS**

---

**PFMB**

---

**PFG300**

---

**24**
**Specifications**

- **Applicable SMC flow switch**
  - **Model**: PFG300 Series
  - **PFGB7201**
  - **Rated flow range**: 2 to 200 L/min
  - **Flow range**:
    - **Accumulated flow**: 1 L/min
    - **Accumulated flow (Pulse width = 50 ms)**: 1 L/pulse
    - **Accumulated volume per pulse**: 10 L/pulse
  - **Set point range**:
    - **Accumulated flow**: 0 to 999,999,999 L
    - **Accumulated flow (Pulse width = 50 ms)**: 0 to 999,999,999 L

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

- **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/Storage: 35 to 85% RH (No condensation or freezing)

- **Standards**
  - **CE marking** (EMC directive/RoHS directive)

- **Flow**
  - **Sensor input**
    - **Voltage input**: 1 to 5 VDC (Input impedance: 1 MΩ)
  - **Display**
    - **Minimum display unit**: 1 L
    - **Maximum display unit**: 10 L
  - **Digital filter**
    - **Unit**: L/min, cfm (ft³/min)
    - **Display range**:
      - **Accumulated flow**: 0 to 999,999,999,990 L
  - **Switch operation**
    - **Output type**: 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 (0 L/min to maximum value of the rated flow)
  - **Response time**
    - **External input**: 50 ms or less
  - **Sensor input**
    - **Input mode**: Select from Accumulated value external reset or Peak/Bottom value reset.
  - **Output type**
    - **Voltage output**: 1 to 5 V, 0 to 10 V (only when the power supply voltage is 24 VDC)
  - **Response time**
    - **External input**: 50 ms or less

- **Electrical**
  - **Power supply voltage**: 12 to 24 VDC ±10%
  - **Display color**
    - **Main screen**: Red/Green
    - **Sub screen**: Orange
  - **Indicator LED**
    - **Main screen**: 5 digits (7 segments)
    - **Sub screen**: 9 digits (7 segments)
  - **Digital filter**
    - **Unit**: L/min, cfm (ft³/min)
    - **Display range**:
      - **Accumulated flow**: 0 to 999,999,999,990 L
  - **Switch operation**
    - **Output type**: Voltage output: 1 to 5 V, 0 to 10 V (only when the power supply voltage is 24 VDC)
  - **Response time**
    - **External input**: 50 ms or less

- **Accuracy**
  - **Accuracy**:
    - **±0.5% F.S. ± Minimum display unit (Ambient temperature of 25°C)**
  - **Repeatability**
    - **±0.1% F.S. ± 1 digit
  - **Temperature characteristics**
    - **±0.5% F.S. (Ambient temperature: 0 to 50°C, 25°C standard)

- **Protection**
  - **Protection**
    - **Polarity protection
    - **Over voltage protection (Up to 26.4 VDC)**
  - **Short circuit protection

- **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/Storage: 35 to 85% RH (No condensation or freezing)

- **Standards**
  - **CE marking** (EMC directive/RoHS directive)

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

---

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 = 143 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 the units selection function.
*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 flow is the upper 6-digit and lower 6-digit (total of 12 digits) display. When the upper digits are displayed, x 10^4 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.
Internal Circuits and Wiring Examples

-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
**Dimensions**

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

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

Bracket configuration allows for mounting in four orientations.
Dimensions

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

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

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

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

Cable Specifications

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

Multiple (2 pcs. or more) secure mounting

<Horizontal>

Panel mount example

<Horizontal>

<Vertical>

Panel mount example

<Vertical>
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)

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.)

- 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)

Display mode

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

Response time

The response time can be selected to suit the application. (Default setting: 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.

- Also, an increase or decrease of the flow and temperature will not change the on/off status of the output while the forced output function is activated.
## 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>Er 1</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>Er 2</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>

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>
<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>
<tr>
<td>PFMB7102</td>
<td>3/4</td>
</tr>
<tr>
<td>PFMB7202</td>
<td></td>
</tr>
</tbody>
</table>

### Table of Models and Required Torque

<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 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.
  - (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.
  - When the accumulated value is stored to memory, every time the accumulated value external reset is activated, the memory will be accessed. Take into consideration that the maximum number of times the memory can be accessed is 1.5 million times. The total number of external inputs and the accumulated value memorizing time interval should not exceed 1.5 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 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>Set value display</th>
<th>Accumulated value display</th>
<th>Peak value display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displays the set value</td>
<td>Displays the accumulated value</td>
<td>Displays the peak value</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bottom value display</th>
<th>Line name display</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displays the bottom value</td>
<td>Displays the line name (Up to 5 alphanumeric characters can be input.)</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>Display</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>Er 2</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>99999999 flashes 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 13</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 settings of the master monitor can be copied to the slave monitors, reducing setting labor and minimizing 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. Select the slave monitor which is to be the master, and change it into a master using the buttons. (In the default setting, all flow monitors are set as slaves.)
3. Press the button on the master 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.
Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)\(^{1}\), and other safety regulations.

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

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

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

Warning

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 catalog information, with a view to giving due consideration to any possibility of 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 catalog.

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.

Caution

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 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.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

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.\(^{2}\)

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.

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

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

\(^{2}\) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

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.

Caution

SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Safety Instructions

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