# Voltage Monitor for PFMV5

# Series PFMV3


## How to Order

**Instruction manual**

| | |
|---|---|
| **Nil** | With instruction manual (Leaflet: Japanese and English) |
| **N** | None |

**Calibration certificate**

| | |
|---|---|
| **Nil** | None |
| **A** | With calibration certificate |

∗ The certificate is written in both English and Japanese. Please consult with us for other languages.

**PFMV3 0 0 − M L □ □ − □ □**

**Type**

| | |
|---|---|
| **3** | Remote display unit |

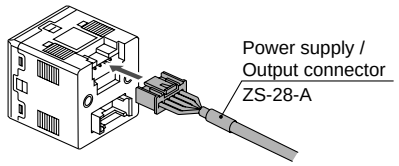
**Input specification**

| Symbol | Content | Applicable remote type sensor unit |
|---|---|---|
| **0** | Voltage input | PFMV5□(F)-1-□□ |

**Output specification**

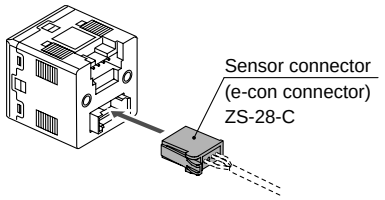
| | |
|---|---|
| **0** | 2 NPN outputs + 1 to 5 V output |
| **1** | 2 NPN outputs + 4 to 20 mA output |
| **2** | 2 NPN outputs + Auto-shift input |
| **3** | 2 PNP outputs + 1 to 5 V output |
| **4** | 2 PNP outputs + 4 to 20 mA output |
| **5** | 2 PNP outputs + Auto-shift input |

**Option 1**

| | |
|---|---|
| **Nil** | None |
| **L** | Power supply / Output connector<br>  |

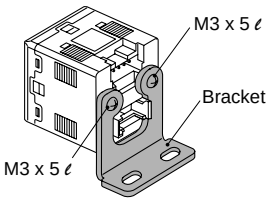
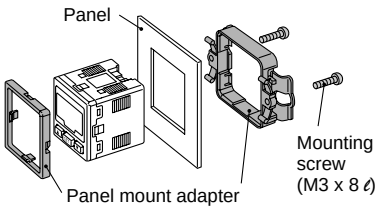
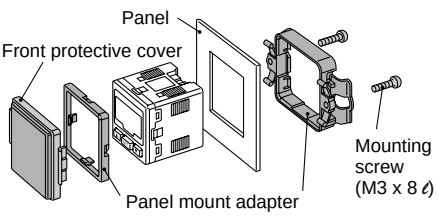
Note) Cable is shipped together, but not connected.

**Option 3**

| | |
|---|---|
| **Nil** | None |
| **G** | With sensor connector<br>  |

Note) Connector is shipped together, but not connected.

**Option 2**

| | |
|---|---|
| **Nil** | None |
| **E** | Bracket<br>  |
| **B** | Panel mount adapter<br>  |
| **D** | Panel mount adapter + Front protective cover<br>  |

Note) Options are shipped together, but not assembled.

The PFMV3 series is a monitor that displays the output voltage of the PFMV5 series.

## Option/Part No.

| Description | Part no. | Note |
|---|---|---|
| Power supply / Output connector (2 m) | ZS-28-A | |
| Bracket | ZS-28-B | With M3 x 5 ℓ (2 pcs.) |
| Sensor connector | ZS-28-C | 1 pc. |
| Panel mount adapter | ZS-27-C | With M3 x 8 ℓ (2 pcs.) |
| Panel mount adapter + Front protective cover | ZS-27-D | With M3 x 8 ℓ (2 pcs.) |

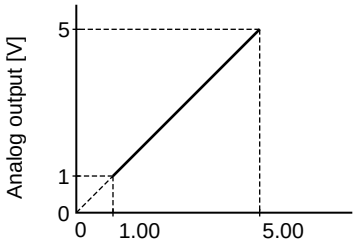
## Specifications

| Model | **Series PFMV3□□** |
|---|---|
| **Applicable sensor** | Series PFMV505(F), PFMV510(F), PFMV530(F) |
| **Displayable range** | 0.70 to 5.10 V: The voltage under 0.7 V is displayed as “LLL” and that of 5.1 V or more is displayed as “HHH”. |
| **Settable range** | 0.70 to 5.10 V |
| **Minimum unit setting** | 0.01 V |
| **Indication unit** | V |
| **Power supply voltage** | 12 to 24 VDC (Ripple ± 10% or less) (with polarity protection) |
| **Current consumption** | 50 mA or less |
| **Hysteresis** Note 1) | Hysteresis mode: Variable, Window comparator mode: Variable |
| **Switch output** | NPN or PNP open collector output: 2 outputs<br>Max. load current: 80 mA, Max. load voltage 30 VDC (at NPN output),<br>Residual voltage 1 V or less (at load current 80 mA), With short-circuit protection |
| **Response time** | Switch output: 2 ms (10 ms, 50 ms, 0.5 s, 1 s can be selected.) Note 2) |
| **Repeatability** | ±0.1% F.S. or less, , Analog output accuracy: ±0.3% F.S. or less |
| **Analog output** | Voltage output: 1 to 5 VDC, Output impedance: Approx. 1 kΩ<br>Current output: 4 to 20 mADC, Max. load impedance: 600 Ω (at 24 VDC)<br>Min. load impedance: 50 Ω, Accuracy: ±1% F.S. or less (relative to display value), Response: 0.1 s (90% response or less) |
| **Display accuracy** | ±0.5% F.S. ± 1 digit or less |
| **Display method** | 3+1/2-digit, 7-segment LED 2-color display (Red/Green) Updated cycle: 10 times/sec |
| **Status LEDs** | OUT1: Illuminates when output is turned ON (Green). OUT2: Illuminates when output is turned ON (Red). |
| **External input (Auto-shift input)** Note 3) | No-voltage input (Reed or Solid state), LOW level input 5 msec or more, LOW level 0.4 V or less |
| **Enclosure** | IP40 |
| **Operating temperature range** | Operating: 0 to 50°C Stored: –10 to 60°C (with no freezing and condensation) |
| **Operating humidity range** | Operating, Stored: 35 to 85% R.H. (with no condensation) |
| **Withstand voltage** | 1000 VAC for 1 min. between whole charging part and live part |
| **Insulation resistance** | 50 MΩ or more (500 VDC Mega) between whole charging part and live part |
| **Vibration resistance** | 10 to 150 Hz with a 1.5 mm amplitude or 98 m/s$^2$ acceleration, in each X, Y, Z direction for 2 hrs, whichever is smaller (de-energized) |
| **Impact resistance** | 100 m/s$^2$ in X, Y, Z directions 3 times each (De-energized) |
| **Temperature characteristics** | ±0.5% F.S. or less (Based on 25°C) |
| **Connection** | Power supply / Output connection: 5P connector, Sensor connection: 4P connector<br>(For cable specifications, refer to page 12.) |
| **Material** | Front case, Rear case: PBT |
| **Weight** | 30 g (without cable) 85 g (with cable) |

Note 1) Set to hysteresis mode at the time of shipment from the factory. Can be changed to window comparator mode using push-buttons.
Note 2) This is the response when the setting value is set to 90% to a 0 to 100% of step input.
Note 3) Auto-shift function is turned OFF at the time of shipment from the factory. Use it after auto-shift function is turned ON using push-buttons.

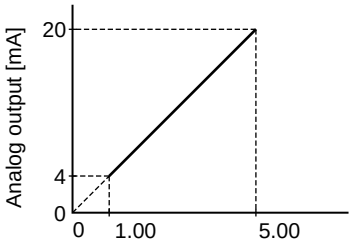
## Analog Output

**1 to 5 VDC**




Monitor display

**4 to 20 mADC**

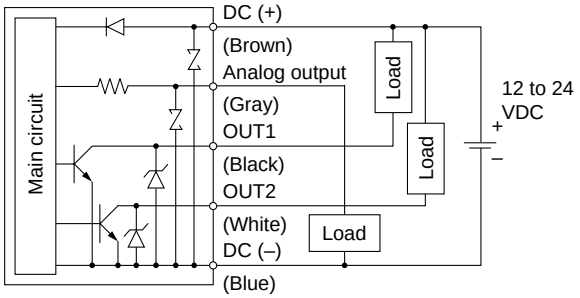



Monitor display

## Internal Circuits

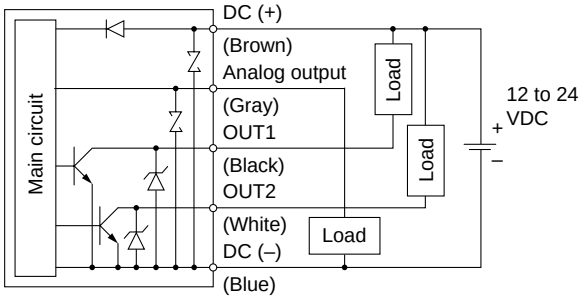
### PFMV300

NPN open collector output: 2 outputs
Max. 30 V, 80 mA, residual voltage 1 V or less
Analog output: 1 to 5 V
Output impedance: Approx. 1 kΩ



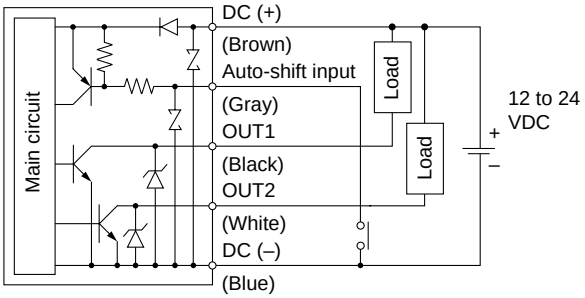

### PFMV301

NPN open collector output: 2 outputs
Max. 30 V, 80 mA, residual voltage 1 V or less
Analog output: 4 to 20 mA
Max. load impedance: 300 Ω (at 12 VDC) 600 Ω (at 24 VDC)
Min. load impedance: 50 Ω



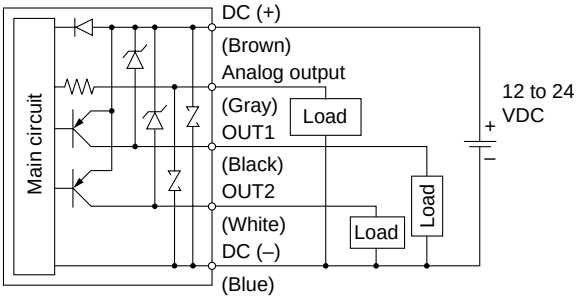

### PFMV302

NPN open collector output with auto-shift input: 2 outputs
Max. 30 V, 80 mA, residual voltage 1 V or less



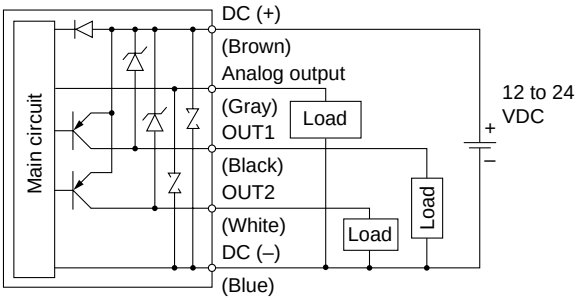

### PFMV303

PNP open collector output: 2 outputs
Max. 80 mA, residual voltage 1 V or less
Analog output: 1 to 5 V
Output impedance: Approx. 1 kΩ



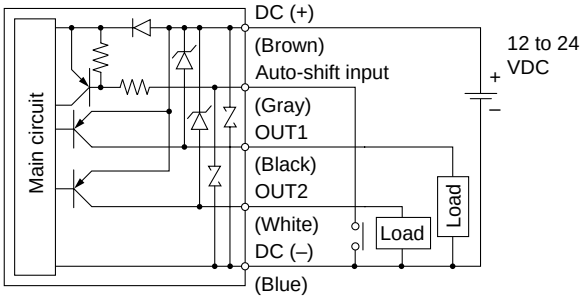

### PFMV304

PNP open collector output: 2 outputs
Max. 80 mA, residual voltage 1 V or less
Analog output: 4 to 20 mA
Max. load impedance: 300 Ω (at 12 VDC) 600 Ω (at 24 VDC)
Min. load impedance: 50 Ω




### PFMV305

PNP open collector output with auto-shift input: 2 outputs
Max. 80 mA, residual voltage 1 V or less



## Descriptions

**LCD Display**

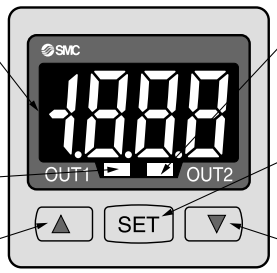
Shows the current voltage, mode setting, and error code. Four display modes are available, some of which use indications that are fixed either red or green, and others use indications that change from green to red.

**Output (OUT1) Indicator (Green)**

Lights when the output (OUT1) is turned on.

**△ Button**

Used for mode selection and increasing the ON/OFF setting value. Also used to switch to peak display mode.




**Output (OUT2) Indicator (Red)**

Lights when the output (OUT2) is turned on.

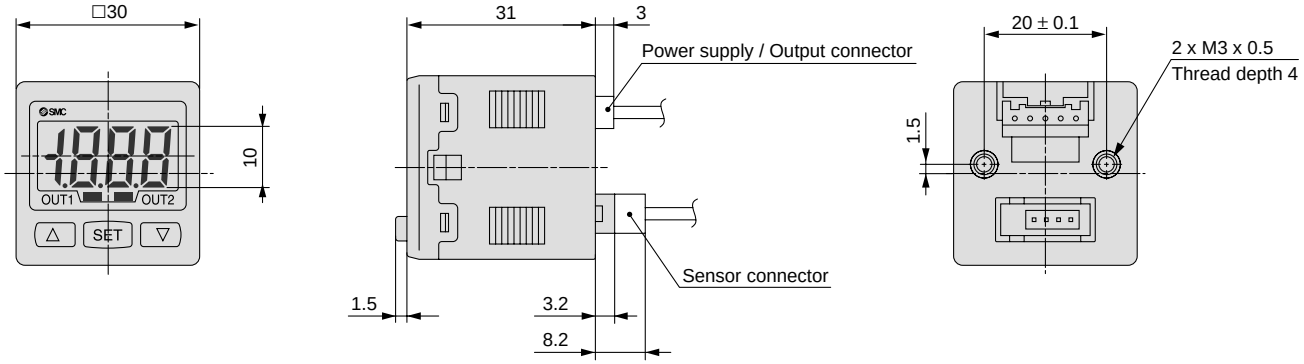
**SET Button**

Used to activate mode changes and new setting values.

**▽ Button**

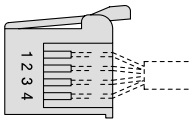
Used for mode selection and decreasing the on/off setting value. Also used to switch to bottom display mode.

## Dimensions



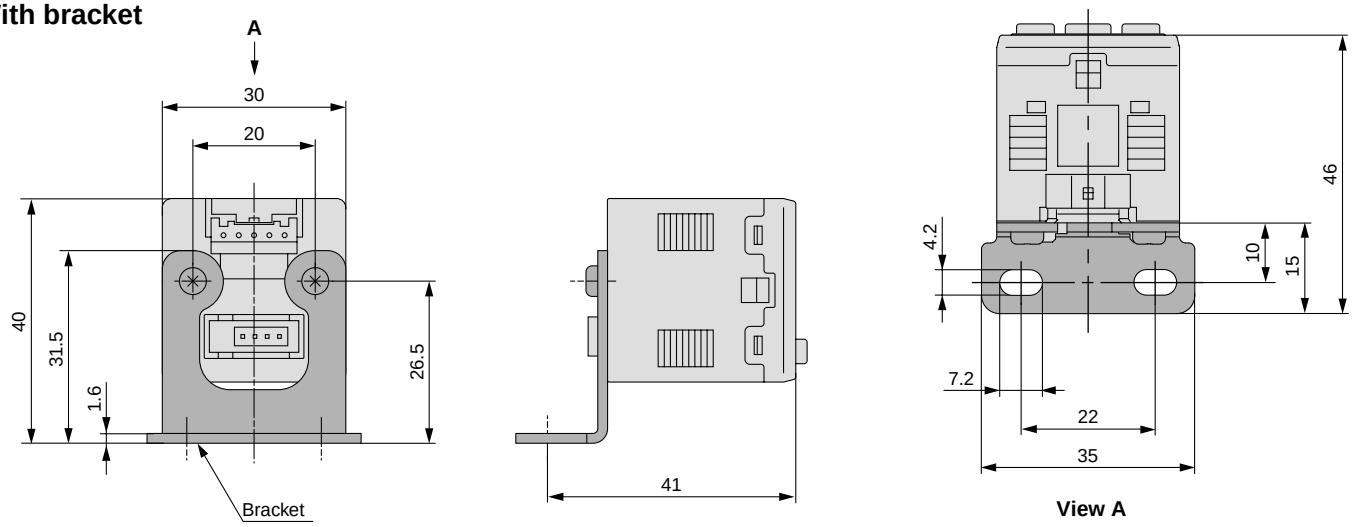

### Sensor connector (ZS-28-C)

| Pin no. | Terminal name |
|---|---|
| 1 | DC (+) |
| 2 | N.C. |
| 3 | DC (–) |
| 4 | IN |

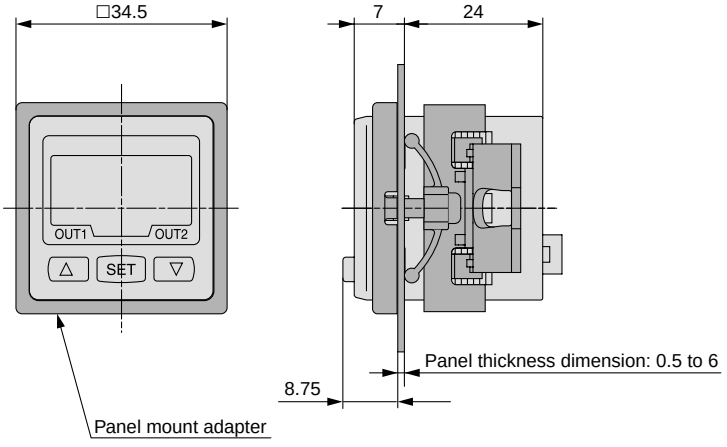



∗ 1 to 5 V (Sensor output)

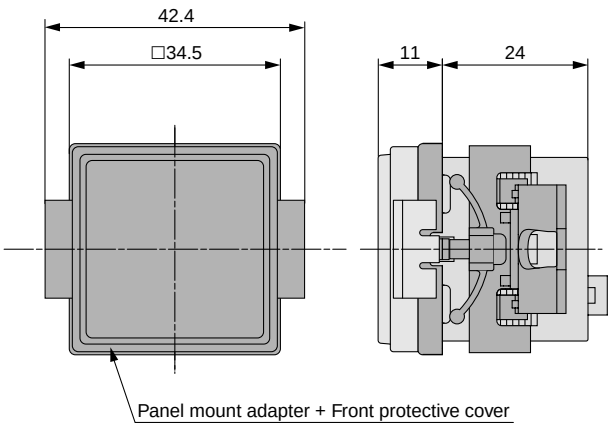
### With bracket




### With panel mount adapter



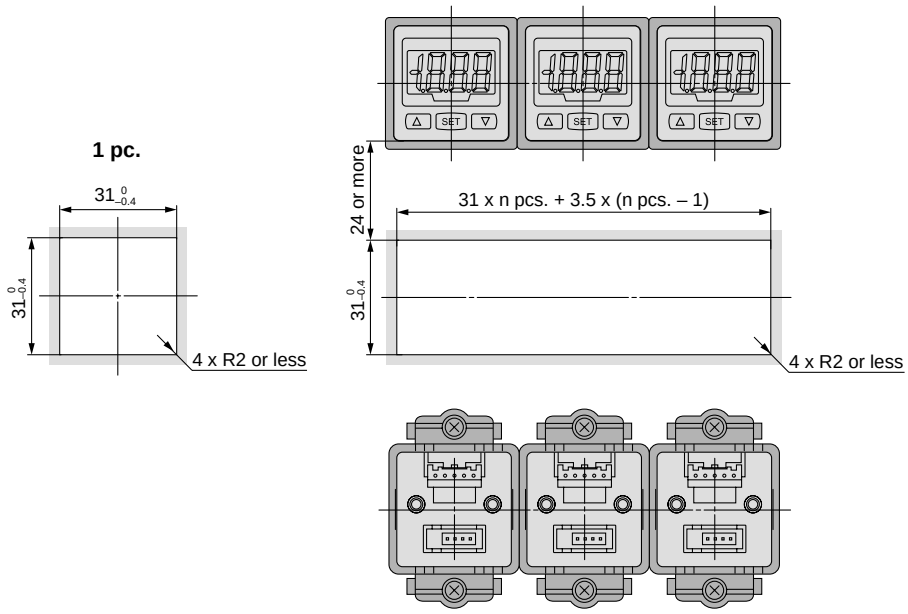

### With panel mount adapter + Front protective cover



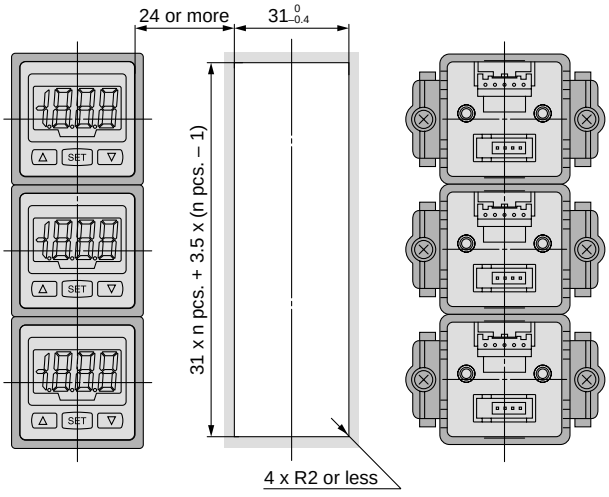
## Dimensions

### Panel fitting dimensions

**Secure mounting of n pcs. (2 or more) switches (Horizontal)**

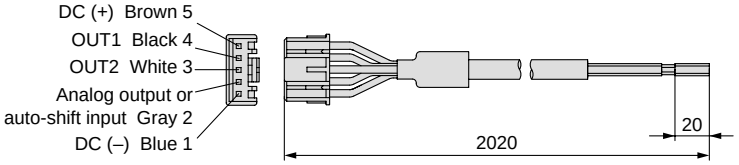



**Secure mounting of n pcs. (2 or more) switches (Vertical)**




Note) If a bend (R) is used, limit it to R2 or less.

### Power supply / Output connector (ZS-28-A)




### Cable Specifications

| | | |
|---|---|---|
| **Rated temperature** | | 105°C |
| **Rated voltage** | | 300 V |
| **Number of wires** | | 5 |
| **Con-ductor** | **Nominal cross section area** | 0.2 $mm^2$ |
| | **Material** | Soft copper wire |
| | **Construction** | 40 pcs. / 0.08 mm |
| | **External diameter** | 0.58 mm |
| **Insula-tor** | **Material** | Cross-linked vinyl chloride resin compound |
| | **External diameter** | Approx. 1.12 mm |
| | **Standard thickness** | 0.27 mm |
| | **Colors** | Brown, Black, White, Gray, Blue |
| **Sheath** | **Material** | Oil-resistant vinyl chloride resin compound |
| | **Standard thickness** | 0.5 mm |
| | **Color** | Light gray (Munsell N7) |
| **Finished external diameter** | | ø4.1 |

# Series PFMV3
# Function Details

## ■ Output operation
The output operation can be selected from the following:
Output (hysteresis mode and window comparator mode) corresponding to receiving voltage

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

## ■ Displayed values
The monitor receives the output voltage of the connected sensor and displays the received voltage. The unit is [V] and the voltage is displayed at 0.01 V intervals.
However, the voltage under 0.70 V is displayed as “LLL” and that of 5.1 V or more is displayed as “HHH”.
Since the voltage is displayed on the monitor, it doesn’t rely on the sensor range.

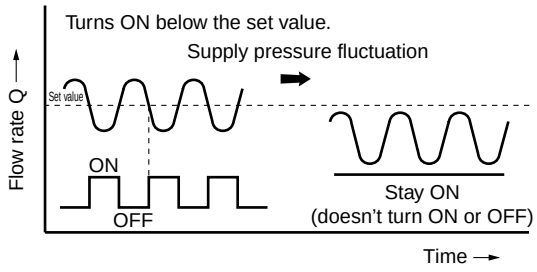
## ■ Indication color
The indication color can be selected for each output condition. The selection of the indication color provides visual identification of abnormal values. (The indication color depends on OUT1 setting.)

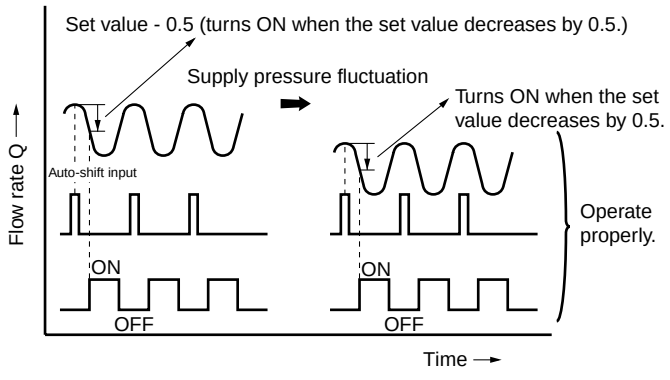
| |
|---|
| Green for ON, Red for OFF |
| Red for ON, Green for OFF |
| Red all the time |
| Green all the time |

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

| |
|---|
| 2 ms |
| 10 ms |
| 50 ms |
| 0.5 s |
| 1 s |

## ■ Auto-shift function
If the supply pressure of the air source fluctuates, the flow rate of vacuum generators such as an ejector also fluctuates. In that case, the switch may not operate properly when checking absorption. Auto-shift is a function that corrects this fluctuation.
This function sends the output corresponding to the relative change based on the flow rate when the auto shift signal is input.
Set value = 0.50: The switch turns ON and OFF when the set value increases by 0.5 V from the reference value.
Set value = –0.50: The switch turns ON and OFF when the set value decreases by 0.5 V from the reference value.
The reference value shows the voltage (= flow rate) when the auto-shift signal is input.




## ■ Auto-preset function
This is a function that calculates the set value automatically.
When predetermined operation is conducted while the sensor is connected, the set value is calculated and decided automatically by changing the flow rate. (Fine adjustment is available.)

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

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

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

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

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

| Description | Contents | Action |
|---|---|---|
| Input voltage error | The voltage outside the applicable indication range is input. | Check the input voltage. |
| System error | Possibility of internal circuit damage before factory adjustment. | Stop operation immediately and contact SMC. |
| | System error. Possibility of data memorizing failure or internal circuit damage. | Reset the unit, and carry out all settings again. |

If the error or abnormality cannot be solved by the action above, please contact SMC for further investigation.

## ■ Reference value correcting function
If the displayed value doesn’t become 1.00 due to the difference of the analog output of the connected sensors PFMV505, 510 and 530, the reference value will compulsively be set to 1.00.
When sensors PFMV505F, 510F and 530F are connected, the reference value will compulsively be set to 3.00.
Press the △ and ▽ buttons simultaneously for 1 second or more when the flow rate is zero (The display flashes when successfully corrected).
The effective range of the correcting function is from 1.00 ± 0.2 V or 3.00 ± 0.2 V. If the monitor is operated outside this range, it displays “Er4” and the reference value won’t be corrected. Be sure to operate the monitor when the flow rate is zero.
When the PFM505 is used and the flow rate is applied, please pay attention to the following point. If this correcting function is applied around 3.00 V, the reference value will be changed and the function won’t work properly. If the monitor is improperly operated, return the flow rate to zero and operate the monitor again.