3-Screen Display

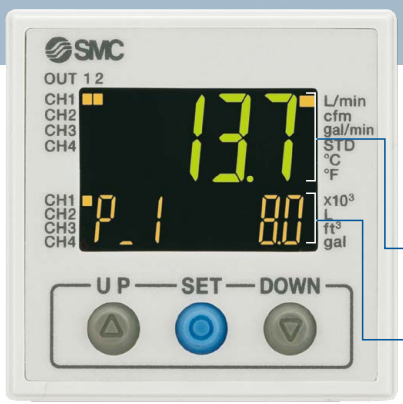
# 4-Channel Flow Monitor

New

CE UKCA RoHS

IO-Link

## Up to 4 flow sensors can be connected!


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

**Main screen** — Measured value (Current flow value)

**Sub screen** — Left side: Label (Display item); Right side: Set value (Threshold value)

● **Input Range Selection** p. 3

**Visualization of Settings**

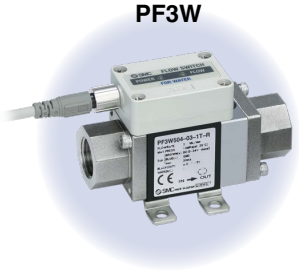
| | |
|---|---|
| Set value (Threshold value) | P_1 |
| Hysteresis value | H_1 |
| Peak value | H_Hi |
| Bottom value | H_Lo |
| Channel display | CH_1 |

## Applicable Flow Sensor Variations

Digital Flow Switch for Air
**PF2A**

3-Color Display
Digital Flow Switch for Water
**PF3W-Z**

3-Color Display
Digital Flow Switch for Water
**PF3W**



Digital Flow Switch for Deionized Water and Chemical Liquids
**PF2D**

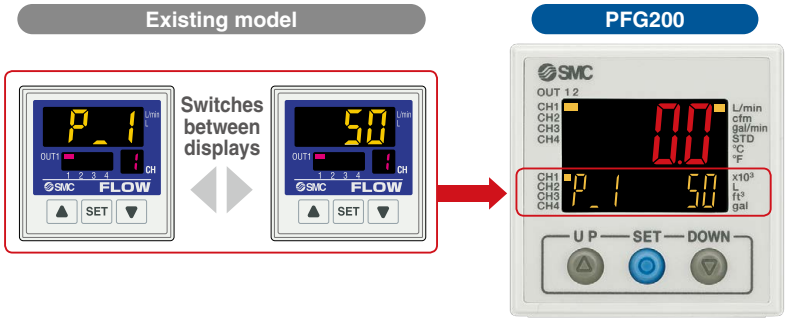
# *PFG200 Series*

SMC

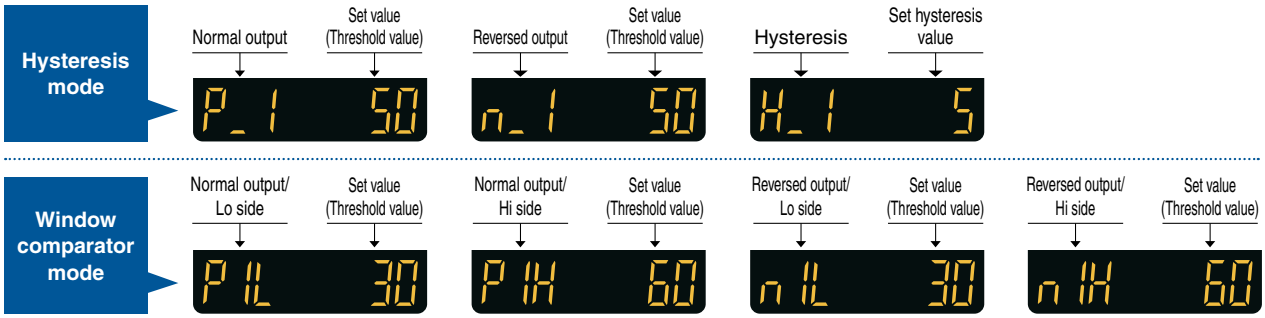
CAT.ES100-157A

# Visualization of Settings

Item and set value are displayed together.
Easy to confirm the displayed item

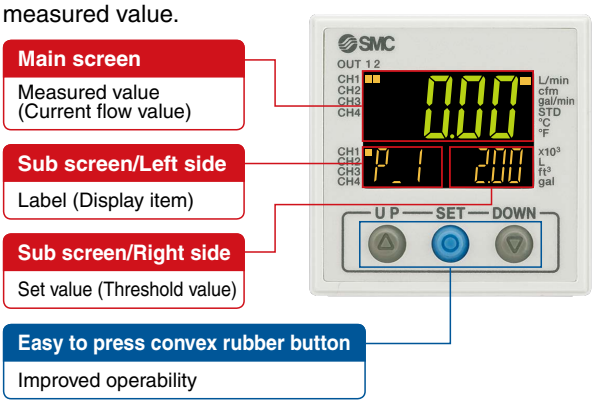



## Mode Examples

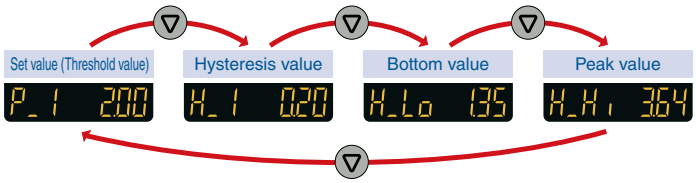



# Easy Screen Switching

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




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



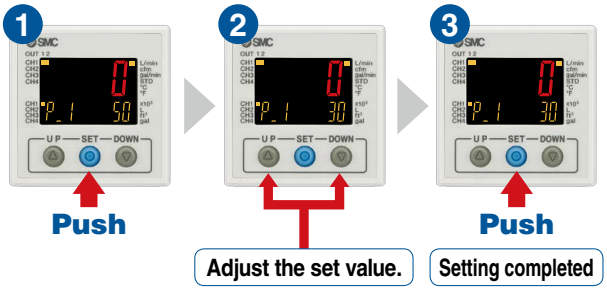

* One additional arbitrary display mode can be added via the function settings.

CH display | Other channel | Customer defined label | Display OFF

# Simple 3-Step Setting

After selecting the channel, when the SET button is pressed and the set value (P_1) is displayed, the set value (threshold value) can be set.

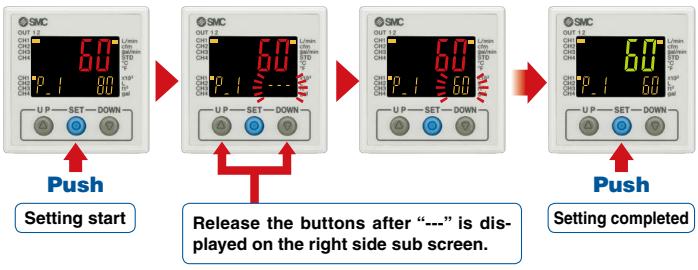
When the SET button is pressed and the hysteresis (H_1) is being displayed, the hysteresis value can be set.




## Now with a snap shot function for set value reading

**Snap shot function**

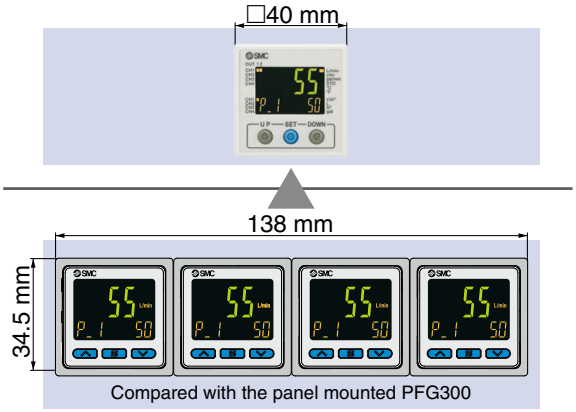
Pressing the △ and ▽ buttons simultaneously for a minimum of 1 second will make the set value (threshold value) the same as the current pressure value.

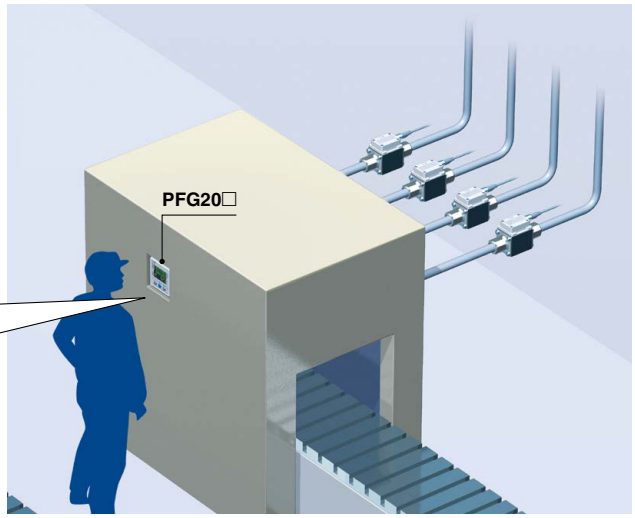


# Centralized Control Saves Installation Space.

**66% reduction in installation space**

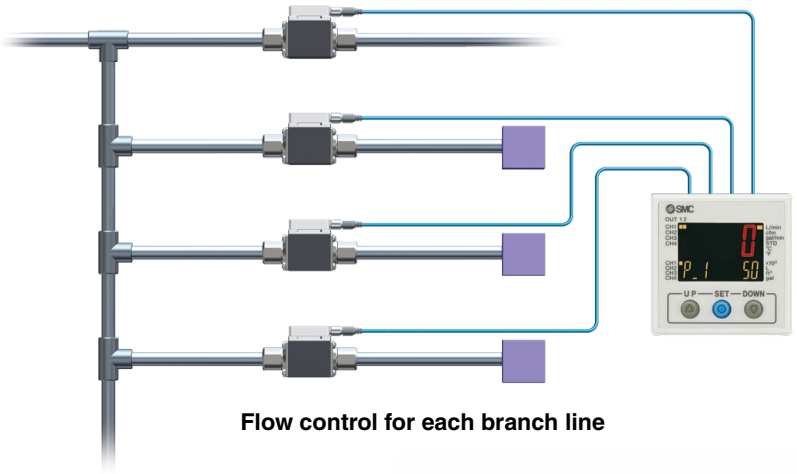
(Compared with the panel mounted PFG20□)




# Accumulated Flow Measurement

A single product can manage the accumulated flow in four lines.



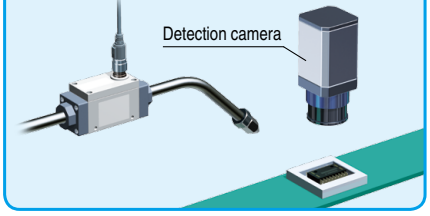
**Flow control for each branch line**

# A Single Monitor Various Applications

**3 channels are displayed simultaneously.**

(Customer defined channel can be set.)


- Flow control of $N_2$ gas to prevent lead frame oxidation
- $N_2$ blow prevents distortion of camera image due to air turbulence.




- Flow control of the air for spray painting

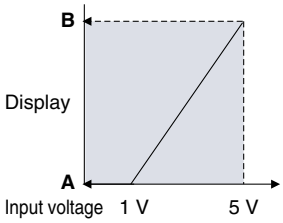


- Flow control of the circulating fluid in a chiller




∗ The product is not designed to be explosion proof.

# Input Range Selection (for Pressure/Flow rate)




The sensor input range can be set to the required value and displayed. (Voltage input: 1 to 5 V)
Pressure switch/Flow switch can be displayed.

**A is displayed for 1 V. B is displayed for 5 V.**
The range can be set as required.
Refer to pages 9 and 10 for the specification of the sensors which can be connected.
For the individual specifications of each connectable sensor, refer to the **Web Catalog**.

## For Digital Flow Switch for Air / PF2MC7

| | A | B |
|---|---|---|
| PF2MC7501 | 0 | 500 |
| PF2MC7102 | 0 | 1000 |
| PF2MC7202 | 0 | 2000 |

Set A and B to the values shown in the table on the left.

## For Flow Sensor / PFMV5

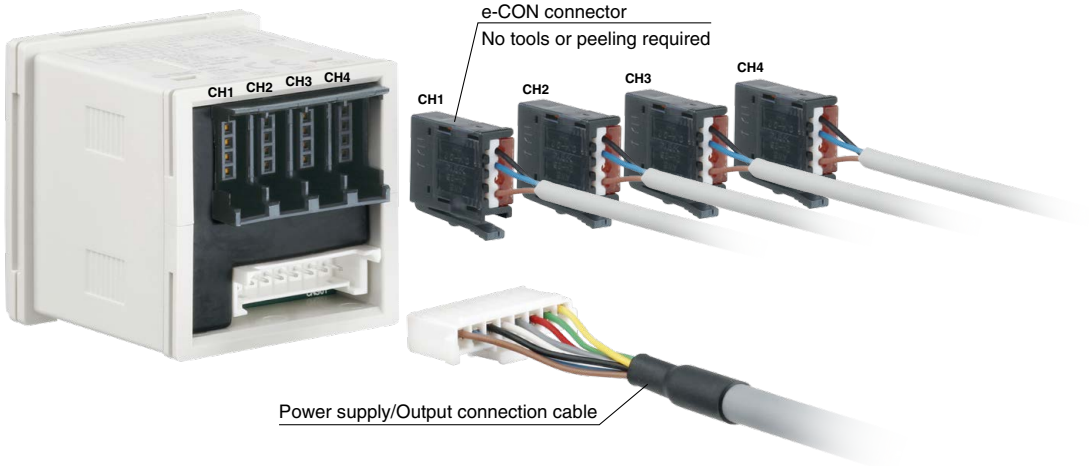
Setting of the display for analog voltage

| | A | B |
|---|---|---|
| PFMV5 Series | 1.00 | 5.00 |

Set A and B to the values shown in the table on the left.

# Connectors

Connection and removal of wiring is easy.




# Functions pp. 16 to 18

**Peak/Bottom value indication function**
This function constantly detects and updates the maximum (minimum) flow when the power is supplied, and allows to hold the maximum (minimum) flow value.

**Key-lock function**
This function prevents operation errors such as accidentally changing setting values.

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

**Error display function**
This function displays error location and content when a problem or error has occurred.

**Delay time setting**
The time from when the instantaneous flow reaches the set value to when the switch output operates can be set.

**Zero-cut setting**
When the flow display value is close to zero, this function forces the display to zero.

**Selection of power-saving mode**
Power-saving mode can be selected.
It shifts to power-saving mode automatically when there is no button operation for 30 seconds.

**Setting of security code**
Users can select whether a security code must be entered to release the key lock.

**Accumulated value hold**
The accumulated value is not cleared even when the power supply is turned OFF.

**Snap shot function**
The current flow rate value can be stored to the switch output ON/OFF set point.

**Output check function**
It is possible to check the switch output operation and process data value.

**Channel to channel copy function**
The set values can be copied to other channel.

**Channel select function**
Flow value for the selected channel is displayed.

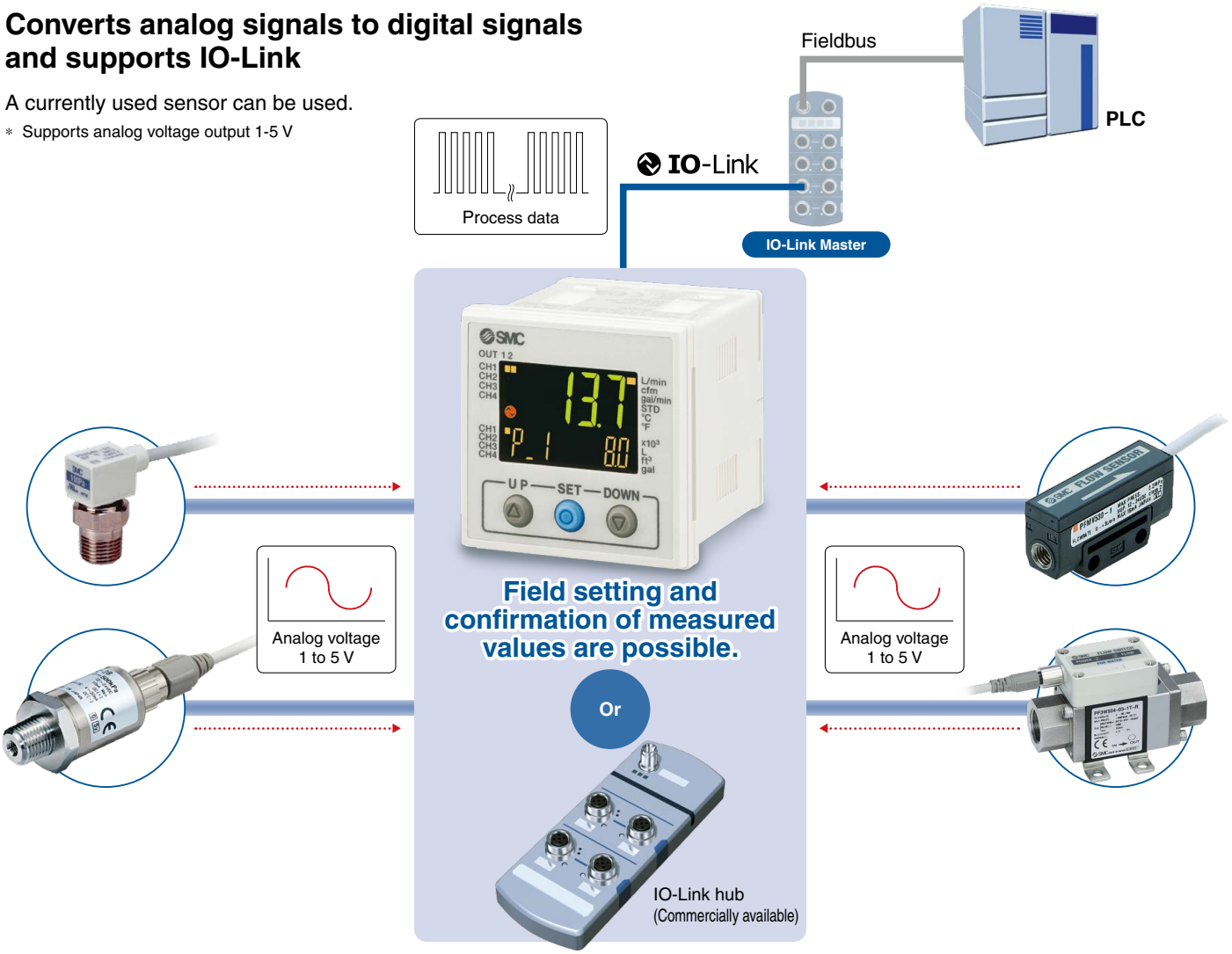
**Channel scan function**
Flow values for each channel are displayed in turn every 2 seconds.

# Hub Function

## Converts analog signals to digital signals and supports IO-Link

A currently used sensor can be used.

∗ Supports analog voltage output 1-5 V




### Process Data

| Bit offset | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | CH1 measured value: 16-bit signed integer | | | | | | | | | | | | | | | |
| Bit offset | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| Item | CH2 measured value: 16-bit signed integer | | | | | | | | | | | | | | | |
| Bit offset | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| Item | CH3 measured value: 16-bit signed integer | | | | | | | | | | | | | | | |
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Item | CH4 measured value: 16-bit signed integer | | | | | | | | | | | | | | | |

Measurement data of sensors for 4 channels are combined and cyclically sent as a process data.

| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | Error | System error | Fixed output | Reservation | CH4 diagnosis | CH3 diagnosis | CH2 diagnosis | CH1 diagnosis | CH4 OUT2 | CH4 OUT1 | CH3 OUT2 | CH3 OUT1 | CH2 OUT2 | CH2 OUT1 | CH1 OUT2 | CH1 OUT1 |

Each channel has 2 outputs∗1.

| Diagnosis item | · Internal product malfunction<br>· Outside of zero-clear range |
|---|---|

| Diagnosis item | · Output overcurrent |
|---|---|

| Diagnosis item | · Display upper and lower limits are exceeded.<br>· The accumulated flow upper and lower limits are exceeded |
|---|---|

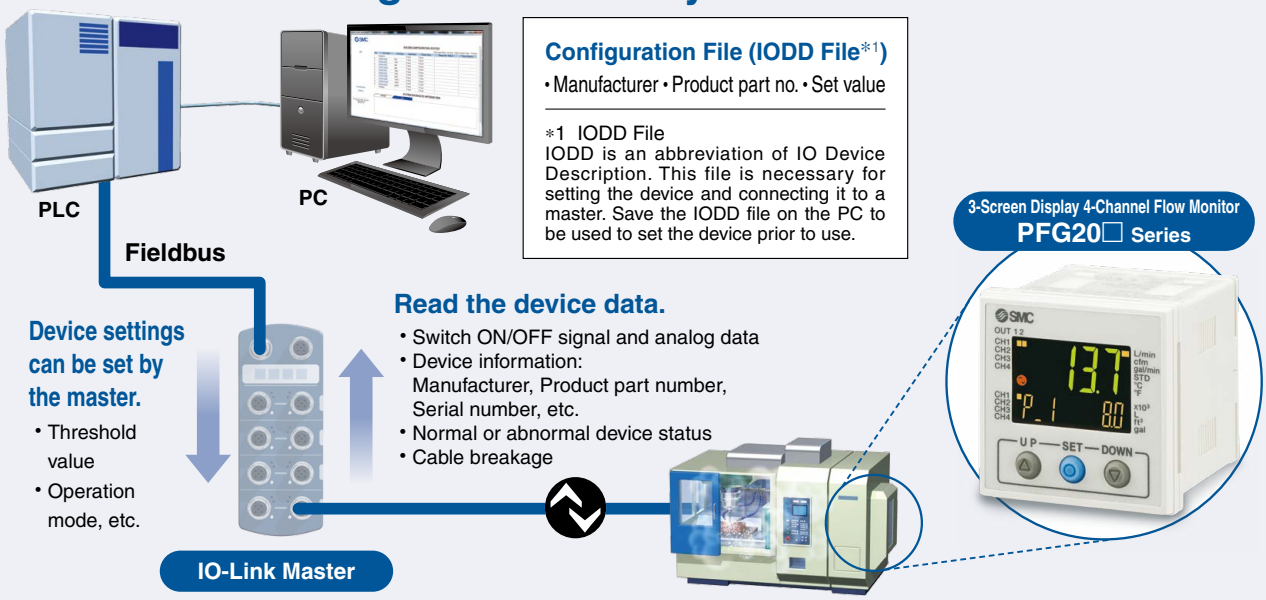
Implement diagnostic bits in the process data.

∗1 During SIO mode, only CH1 has 2 switch outputs. CH2-4 has one output each.

# IO-Link

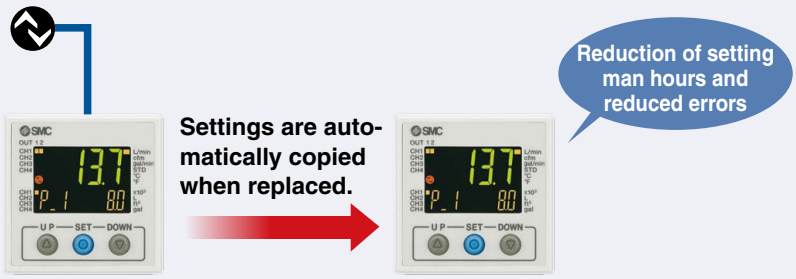
IO-Link is an open communication interface technology between the sensor/actuator and the I/O terminal that is an international standard, IEC61131-9.

## Visualization of operation/equipment status
## Remote monitoring and control by communication




### Automatic setting function [Data storage function]

When replacing the sensor monitor with the same type (the same device ID), the parameters (set values) stored in the IO-Link master are automatically copied (set) to the new sensor monitor.




### Displays the output communication status and indicates the presence of communication data


### Operation and Display

| Communication with master | IO-Link status indicator light | Status | | | Screen display *2 | Description |
|---|---|---|---|---|---|---|
| Yes | *1 | IO-Link mode | Normal | Operate | ModE oPE | Normal communication status (readout of measured value) |
| | | | | Start up | ModE Strt | At the start of communication |
| | | | | Preoperate | ModE PrE | |
| | *1 (Flashing) | | Abnormal | Version does not match | Er 15 V 1.0 | IO-Link version does not match that of the master. The master uses version 1.0. * The applicable IO-Link version is 1.1. |
| No | | | | Communication disconnection | ModE oPE / ModE Strt / ModE PrE | Normal communication was not received for 1 second or longer. |
| | OFF | SIO mode | | | ModE SIO | General switch output |

*1 In IO-Link mode, the IO-Link indicator is ON or flashes. *2 When the sub screen is set to Mode
* "ModE LoC" is displayed when the data storage lock is enabled. (Except for version mismatch or when in SIO mode)

# Series Variations

| | | Digital Sensor Monitor | |
|---|---|---|---|
| | | **PFG200**  | **PFG300**  Catalog PDF |
| Basic Specifications | Repeatability | ±0.1 % (F.S.) | ±0.1 % (F.S.) |
| | Voltage | 12 to 24 VDC | 12 to 24 VDC |
| | No. of outputs for switch | 5 outputs | 2 outputs |
| | Analog output | — | 1 to 5 V |
| | Operating temperature | 0 to 50 °C | 0 to 50 °C |
| Functions | Number of screens | 3 | 3 |
| | Enclosure | Front face: IP65<br>Others: IP40 | IP40 |
| | 3 Step | Yes | Yes |
| | Wiring | Connector | Connector |

## Applicable Flow Sensors

Catalog PDF

**For Air**

**PF2A5**

**For Water**

**PF3W5-Z**

**PF3W5**

**For Deionized Water and Chemical Liquids**

**PF3W5**

**PF2D5**

**For Air**

**PFMB**

**PF2MC7**

**PF3A7**

# CONTENTS

## 3-Screen Display 4-Channel Flow Monitor *PFG200 Series*

# 3-Screen Display
# 4-Channel Flow Monitor
# PFG200 Series

## How to Order

**PFG20 0 – M □ □ □**

### Input/Output specification

| Symbol | Description |
|---|---|
| **0** | NPN 5 outputs + External input |
| **1** | PNP 5 outputs + External input |
| **2**∗1 | IO-Link + NPN 4 outputs or NPN 5 outputs (SIO mode) |
| **3**∗1 | IO-Link + PNP 4 outputs or PNP 5 outputs (SIO mode) |

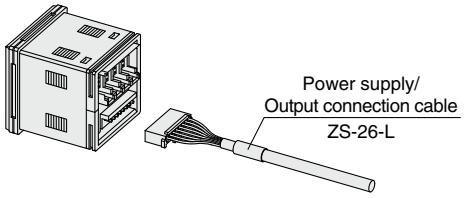
∗1 When the flow monitor is used as an IO-Link device, the total power supply current of the connected sensors should be 200 mA or less.

### Unit specification

| | |
|---|---|
| **Nil** | With unit selection function∗2 |
| **M** | SI units only∗3 |

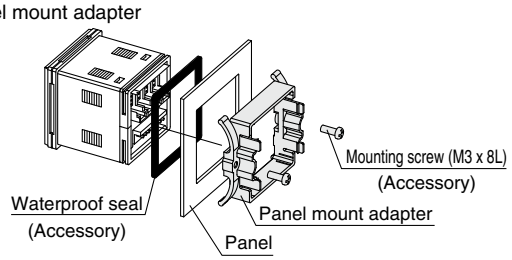
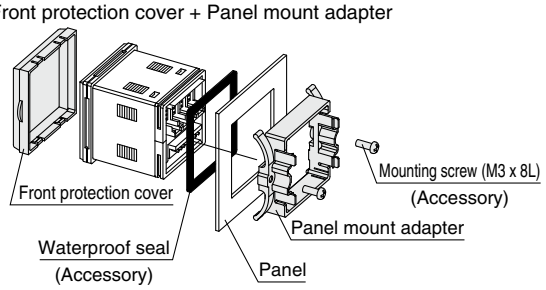
∗2 Under the New Measurement Act, switches with the unit selection function are no longer allowed for use in Japan.
∗3 Fixed unit: kPa, MPa, Pa

### Option 3

| | |
|---|---|
| **Nil** | Power supply/Output connection cable (2 m)<br>  |
| **N** | None |

∗ Cable is shipped together, but not connected.

### Option 1

| | |
|---|---|
| **Nil** | None |
| **A** | Panel mount adapter<br>  |
| **B** | Front protection cover + Panel mount adapter<br>  |

∗ Options are not assembled, but shipped together.

### Option 2

| | |
|---|---|
| **Nil** | None |
| **4C** | Sensor connector (4 pcs.)<br>∗ For PF2A5□, PF2/3W5□ |
| **4D** | Sensor connector (4 pcs.)<br>∗ For PF2D5□ |

∗ Connector is not connected, but shipped together.

## Options/Part Nos.

**When only optional parts are required, order with the part numbers listed below.**

| Description | Part no. | Note |
|---|---|---|
| Power supply/Output connection cable | ZS-26-L | Length: 2 m |
| For PF2A5□□, PF2W5□□, PF3W5□□<br>Sensor connector (e-CON) | ZS-28-CA-4 | 1 pc., Finished O.D.: ø1.15 to ø1.35, Cover color: Blue |
| For PF2D5□□<br>Sensor connector (e-CON) | ZS-28-CA-2 | 1 pc., Finished O.D.: ø0.9 to ø1.0, Cover color: Red |
| Panel mount adapter | ZS-26-B | Mounting screw (M3 x 8 L, 2 pcs.), With waterproof seal |
| Panel mount adapter + Front protection cover | ZS-26-C | Mounting screw (M3 x 8 L, 2 pcs.), With waterproof seal |
| Front protection cover | ZS-26-01 | — |
| Power supply with M12 connector cable (Made to Order) | ZS-26-LM12 | For use when using an M12 connector for IO-Link communication |

For flow switch precautions and specific product precautions, refer to the "Operation Manual" on the SMC website.

## Specifications

| Series | | | PFG20□ Series | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Applicable SMC flow sensor** | | | **PF2A510** | **PF2A550** | **PF2A511** | **PF2A521** | **PF2A551** | **PF2(3)W504** | **PF2(3)W520** |
| **Rated flow range** | | | 1 to 10 L/min | 5 to 50 L/min | 10 to 100 L/min | 20 to 200 L/min | 50 to 500 L/min | 0.5 to 4 L/min | 2 to 16 L/min |
| **Instantaneous flow rate display/Set flow rate range** | | | 0 to 11 L/min | 0 to 55 L/min | 0 to 110 L/min | 0 to 220 L/min | 0 to 550 L/min | 0.35 to 4.50 L/min (Flow under 0.35 L/min is displayed as "0.00") | 1.7 to 17.0 L/min (Flow under 1.7 L/min is displayed as "0.0") |
| Instantaneous flow rate display/Min. setting unit | | | 0.1 L/min | 0.5 L/min | 1 L/min | 2 L/min | 5 L/min | 0.05 L/min | 0.1 L/min |
| Accumulated flow display/Set flow rate range | | | 0 to 999,999,999 L | | | | 0 to 9,999,999.99 x $10^3$ L | 0 to 99,999,999.9 L | 0 to 999,999,999 L |
| Accumulated flow display/Min. setting unit | | | 1L | | | | 10 L | 0.1 L | 1 L |
| Accumulated pulse flow rate exchange value | | | 0.1L/pulse | 0.5 L/pulse | 1 L/pulse | 2 L/pulse | 5 L/pulse | 0.05 L | 0.1 L |
| **Unit** | | | L/min, cfm (depends on selected range) | | | | | L/min, gal/min (depends on selected range) | |
| **Electrical** | Power supply voltage | **When used as a switch output device** | 12 to 24 VDC ±10% with 10% ripple (p-p) or less | | | | | | |
| | | **When used as an IO-Link device** | 18 to 30 VDC, including ripple (p-p) 10%*1 | | | | | | |
| | **Current consumption** | | 55 mA or less | | | | | | |
| | **Protection** | | Polarity protection | | | | | | |
| | Power supply voltage for sensor*1 | | [Power supply voltage] −1.5 V | | | | | | |
| | Power supply current for sensor*2 | | Max. 110 mA (However, the total power supply current for the four inputs is 440 mA or less, and the total power supply current when used as an IO-Link device is 200 mA or less). | | | | | | |
| **Accuracy** | **Display accuracy (Linearity)** | | ±5.0% F.S. Max.*4 | | | | | | |
| | **Repeatability** | | ±3.0% F.S. Max.*4 | | | | | | |
| | **Temperature characteristics** | | ±0.5% F.S. Max. (Reference: 25°C) | | | | | | |
| **Switch output (SIO mode)** | **Output type** | | NPN or PNP open collector output: 5 outputs | | | | | | |
| | **Output mode** | | Hysteresis mode, Window comparator mode, Accumulated output, Accumulated pulse output, Error output, Output OFF | | | | | | |
| | **Switch operation** | | Normal output, Reversed output | | | | | | |
| | **Max. load current** | | 80 mA | | | | | | |
| | Max. applied voltage (NPN only) | | 30 VDC | | | | | | |
| | Internal voltage drop (Residual voltage) | | 1.5 V or less (at load current of 80 mA) | | | | | | |
| | **Delay time***3 | | 5 ms or less, variable from 0 to 60 s/0.01 s increments | | | | | | |
| | **Hysteresis** | | Variable from 0*5 | | | | | | |
| | **Protection** | | Over current protection | | | | | | |
| **Analog input** | **Input type** | | Voltage input: 1 to 5 VDC (Input impedance: 1 MΩ) | | | | | | |
| | **Number of inputs** | | 4 inputs (Check the "Internal Circuits and Wiring Examples" on pages 11 to 14.) | | | | | | |
| | **Connection method** | | e-CON | | | | | | |
| | **Protection** | | Over voltage protection (up to a voltage of 26.4 VDC) | | | | | | |
| **External input***8 | | | Voltage free input: 0.4 V or less (Reed or Solid state) for 30 ms or longer | | | | | | |
| **Display** | **Display type** | | LCD | | | | | | |
| | **Number of screens** | | 3-screen display (Main screen, Sub screen x 2) | | | | | | |
| | **Display color** | | Main screen: Red/Green, Sub screen: Orange | | | | | | |
| | **Number of display digits** | | Main screen: 4 digits (7 segments), Sub screen (Left): 4 digits (some digits are 11-segments, 7 segments for other), Sub screen (Right): 5 digits (some digits are 11-segments, 7 segments for other) | | | | | | |
| | **Indicator light** | | Lights up when switch output is turned ON. OUT1, OUT2: Orange | | | | | | |
| **Digital filter***6 | | | Variable from 0 to 30 s/0.01 s increments | | | | | | |
| **Environment** | **Enclosure** | | Front face: IP65 (when panel-mounted), Others: 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) | | | | | | |
| | **Operating humidity range** | | Operating/Stored: 35 to 85% RH (No condensation) | | | | | | |
| **Standards** | | | CE/UKCA marking | | | | | | |
| **Weight** | **Body** | | 51 g (Excludes power supply and output cable) | | | | | | |
| | **Power supply/Output cable** | | 60 g | | | | | | |
| | **e-CON (1 pc.)** | | 2 g | | | | | | |
| **Communication (IO-Link mode)** | **IO-Link type** | | Device | | | | | | |
| | **IO-Link version** | | V1.1 | | | | | | |
| | **Communication speed** | | COM2 (38.4 kbps) | | | | | | |
| | **Configuration file** | | IODD file*7 | | | | | | |
| | **Minimum cycle time** | | 4.8 ms | | | | | | |
| | **Process data length** | | Input data: 10 bytes, Output data: 0 bytes | | | | | | |
| | On request data communication | | Yes | | | | | | |
| | **Data storage function** | | Yes | | | | | | |
| | **Event function** | | Yes | | | | | | |
| | **Vendor ID** | | 131 (0 x 0083) | | | | | | |

*1 Check the power supply voltage range of the connected sensor.
*2 Over current on DC (+) side and DC (−) side of the sensor input connector results in breakage of the product.
*3 Value without digital filter (at 0 ms)
*4 The system accuracy when combined with an applicable flow sensor.
*5 If the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the amount of fluctuation, or chattering will occur.

For flow switch precautions and specific product precautions, refer to the "Operation Manual" on the SMC website.

| Series | | | PFG20□ Series | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Applicable SMC flow sensor** | | | **PF2(3)W540** | **PF2(3)W511** | **PF3W521** | **PF2D504** | **PF2D520** | **PF2D540** |
| **Rated flow range** | | | 5 to 40 L/min | 10 to 100 L/min | 50 to 250 L/min | 0.4 to 4 L/min | 1.8 to 20 L/min | 4 to 40 L/min |
| **Instantaneous flow rate display/Set flow rate range** | | | 3.5 to 45.0 L/min (Flow under 0.35 L/min is displayed as "0.00") | 7 to 110 L/min (Flow under 7 L/min is displayed as "0") | 20 to 280 L/min (Flow under 20 L/min is displayed as "0") | 0.25 to 4.50 L/min (Flow under 0.25 L/min is displayed as "0.00") | 1.3 to 21.0 L/min (Flow under 1.3 L/min is displayed as "0.0") | 2.5 to 45.0 L/min (Flow under 2.5 L/min is displayed as "0.0") |
| Instantaneous flow rate display/Min. setting unit | | | 0.5 L/min | 1 L/min | 2 L/min | 0.05 L/min | 0.1 L/min | 0.5 L/min |
| Accumulated flow display/Set flow rate range | | | 0 to 999,999,999L | | | 0 to 99,999,999.9 L | 0 to 999,999,999 L | |
| Accumulated flow display/Min. setting unit | | | 1 L | | | 0.1 L | 1 L | |
| Accumulated pulse flow rate exchange value | | | 0.5 L | 1 L | 2 L | 0.05 L | 0.1 L | 0.5 L |
| **Unit** | | | L/min, gal/min (depends on selected range) | | | L/min, gal/min (depends on selected range) | | |
| **Electrical** | Power supply voltage | **When used as a switch output device** | 12 to 24 VDC ±10% with 10% ripple (p-p) or less | | | | | |
| | | **When used as an IO-Link device** | 18 to 30 VDC, including ripple (p-p) 10%*1 | | | | | |
| | **Current consumption** | | 55 mA or less | | | | | |
| | **Protection** | | Polarity protection | | | | | |
| | Power supply voltage for sensor*1 | | [Power supply voltage] −1.5 V | | | | | |
| | Power supply current for sensor*2 | | Max. 110 mA (However, the total power supply current for the four inputs is 440 mA or less, and the total power supply current when used as an IO-Link device is 200 mA or less). | | | | | |
| **Accuracy** | **Display accuracy (Linearity)** | | ±5.0% F.S. Max.*4 | | | | | |
| | **Repeatability** | | ±3.0% F.S. Max.*4 | | | | | |
| | **Temperature characteristics** | | ±0.5% F.S. Max. (Reference: 25°C) | | | | | |
| **Switch output (SIO mode)** | **Output type** | | NPN or PNP open collector output: 5 outputs | | | | | |
| | **Output mode** | | Hysteresis mode, Window comparator mode, Accumulated output, Accumulated pulse output, Error output, Output OFF | | | | | |
| | **Switch operation** | | Normal output, Reversed output | | | | | |
| | **Max. load current** | | 80 mA | | | | | |
| | Max. applied voltage (NPN only) | | 30 VDC | | | | | |
| | Internal voltage drop (Residual voltage) | | 1.5 V or less (at load current of 80 mA) | | | | | |
| | **Delay time***3 | | 5 ms or less, variable from 0 to 60 s/0.01 s increments | | | | | |
| | **Hysteresis** | | Variable from 0*5 | | | | | |
| | **Protection** | | Over current protection | | | | | |
| **Analog input** | **Input type** | | Voltage input: 1 to 5 VDC (Input impedance: 1 MΩ) | | | | | |
| | **Number of inputs** | | 4 inputs (Check the "Internal Circuits and Wiring Examples" on pages 11 to 14.) | | | | | |
| | **Connection method** | | e-CON | | | | | |
| | **Protection** | | Over voltage protection (up to a voltage of 26.4 VDC) | | | | | |
| **External input***8 | | | Voltage free input: 0.4 V or less (Reed or Solid state) for 30 ms or longer | | | | | |
| **Display** | **Display type** | | LCD | | | | | |
| | **Number of screens** | | 3-screen display (Main screen, Sub screen x 2) | | | | | |
| | **Display color** | | Main screen: Red/Green, Sub screen: Orange | | | | | |
| | **Number of display digits** | | Main screen: 4 digits (7 segments), Sub screen (Left): 4 digits (some digits are 11-segments, 7 segments for other), Sub screen (Right): 5 digits (some digits are 11-segments, 7 segments for other) | | | | | |
| | **Indicator light** | | Lights up when switch output is turned ON. OUT1, OUT2: Orange | | | | | |
| **Digital filter***6 | | | Variable from 0 to 30 s/0.01 s increments | | | | | |
| **Environment** | **Enclosure** | | Front face: IP65 (when panel-mounted), Others: 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) | | | | | |
| | **Operating humidity range** | | Operating/Stored: 35 to 85% RH (No condensation) | | | | | |
| **Standards** | | | CE/UKCA marking | | | | | |
| **Weight** | **Body** | | 51 g (Excludes power supply and output cable) | | | | | |
| | **Power supply/Output cable** | | 60 g | | | | | |
| | **e-CON (1 pc.)** | | 2 g | | | | | |
| **Communication (IO-Link mode)** | **IO-Link type** | | Device | | | | | |
| | **IO-Link version** | | V1.1 | | | | | |
| | **Communication speed** | | COM2 (38.4 kbps) | | | | | |
| | **Configuration file** | | IODD file*7 | | | | | |
| | **Minimum cycle time** | | 4.8 ms | | | | | |
| | **Process data length** | | Input data: 10 bytes, Output data: 0 bytes | | | | | |
| | On request data communication | | Yes | | | | | |
| | **Data storage function** | | Yes | | | | | |
| | **Event function** | | Yes | | | | | |
| | **Vendor ID** | | 131 (0 x 0083) | | | | | |

*6 The response time indicates when the set value is 90% in relation to the step input.

*7 The configuration file can be downloaded from the SMC website.

*8 This setting is only possible for the PFG200/PFG201.

*9 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.

## Applicable Flow Sensors

| Applicable SMC flow sensor | Rated flow range [L/min] (0.4 0.5 1 2 4 5 10 20 40 50 100 200 250 500) |
|---|---|
| **PF2A510** | 1 – 10 |
| **PF2A550** | 5 – 50 |
| **PF2A511** | 10 – 100 |
| **PF2A521** | 20 – 200 |
| **PF2A551** | 50 – 500 |
| **PF2(3)W504** | 0.5 – 4 |
| **PF2(3)W520** | 2 – 16 |
| **PF2(3)W540** | 5 – 40 |
| **PF2(3)W511** | 10 – 100 |
| **PF3W521** | 50 – 250 |
| **PF2D504** | 0.4 – 4 |
| **PF2D520** | 1.8 – 20 |
| **PF2D540** | 4 – 40 |

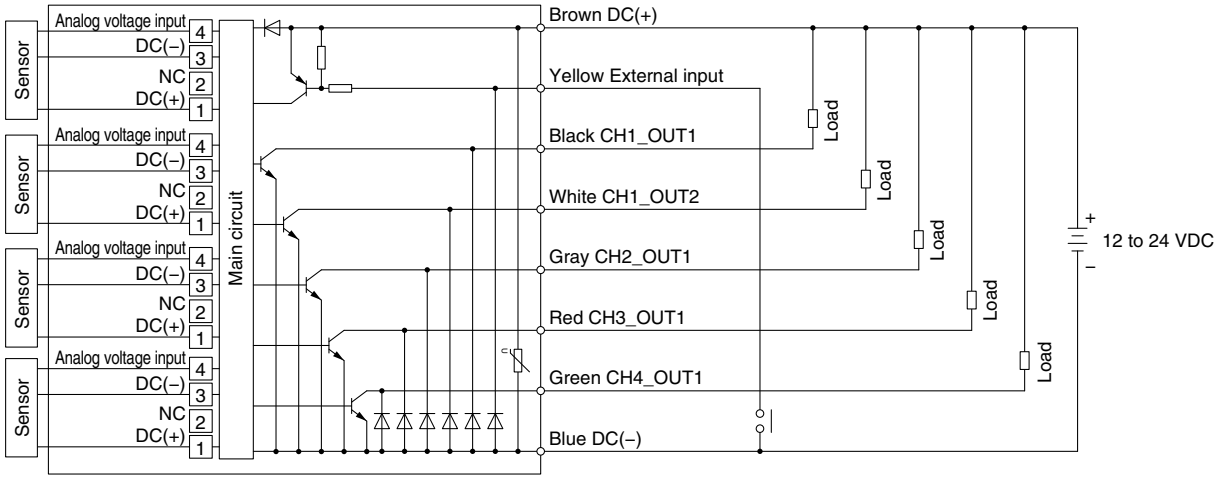
## Internal Circuits and Wiring Examples

**PFG20□–□□□□**

**• Input/Output specifications**

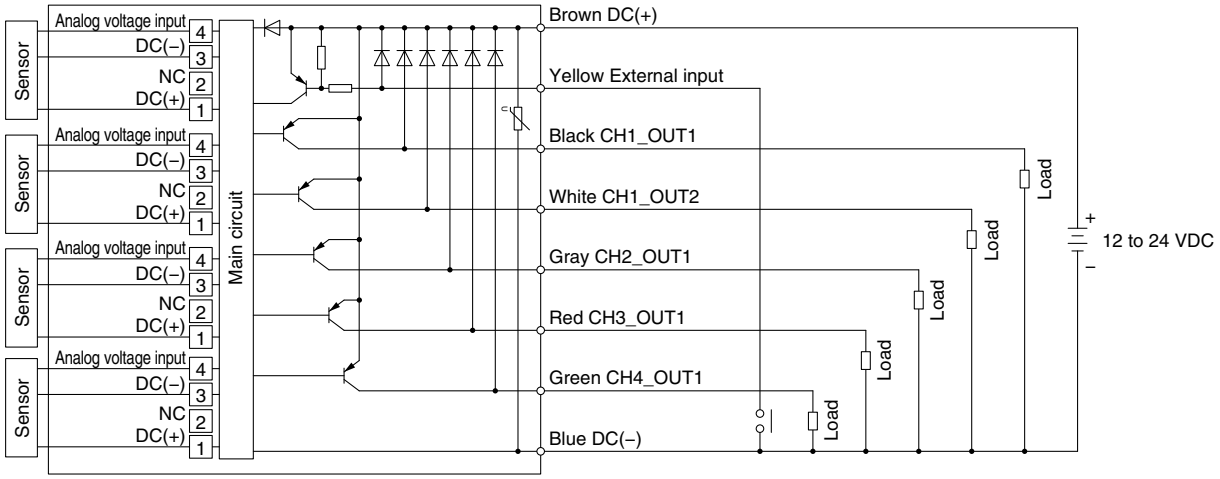
**0**

**· NPN open collector 5 outputs + External input**




**1**

**· PNP open collector 5 outputs + External input**



## Internal Circuits and Wiring Examples

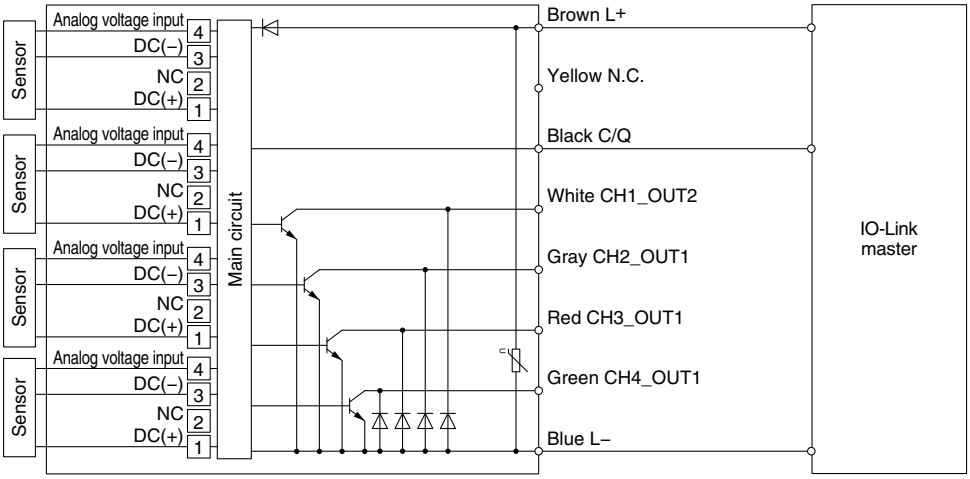
**PFG20□–□□□□**

**Input/Output specifications**

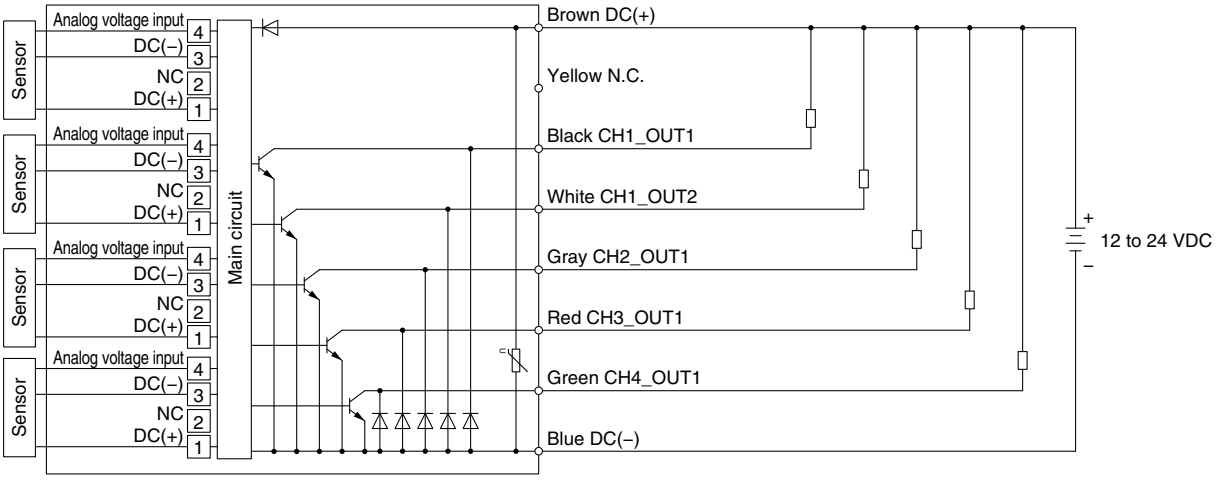
**2**

**· IO-Link/NPN open collector 1 output + NPN open collector 4 outputs**

**When used as an IO-Link device**




**When used as a switch output device**



## Internal Circuits and Wiring Examples

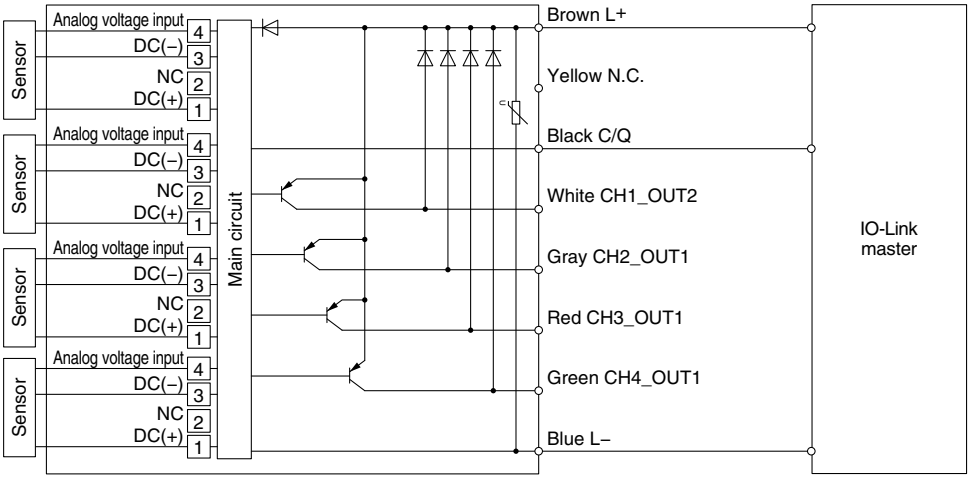
**PFG20□–□□□□**

**•Input/Output specifications**

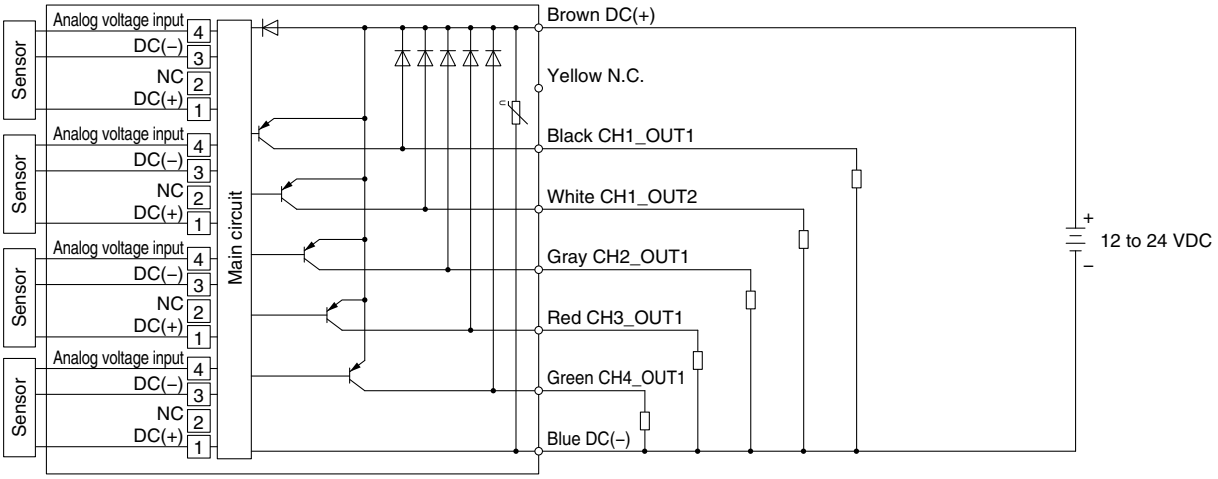
**3**

**· IO-Link/PNP open collector 1 output + PNP open collector 4 outputs**

**When used as an IO-Link device**



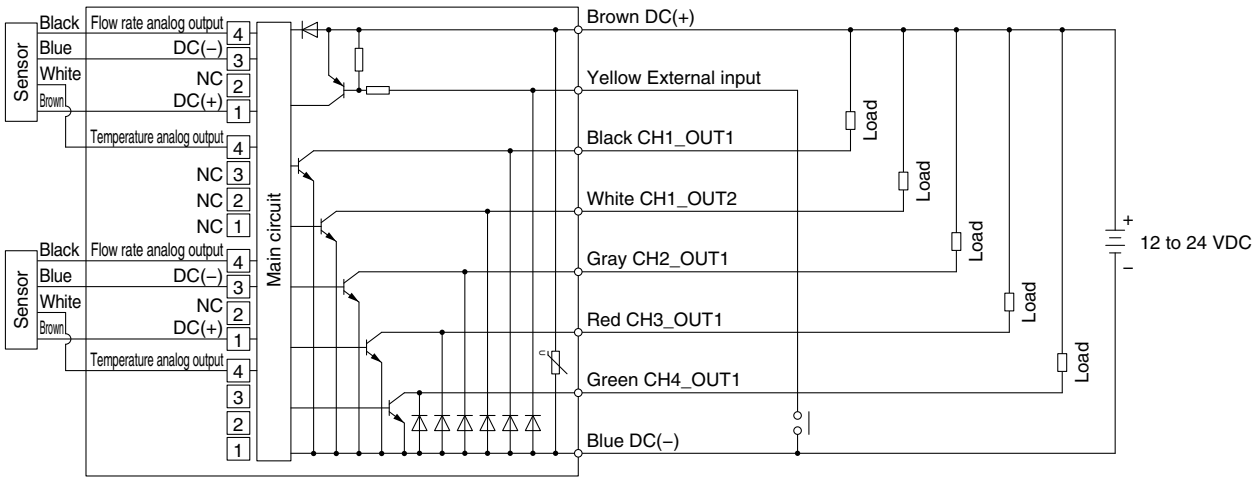

**When used as a switch output device**



## Internal Circuits and Wiring Examples

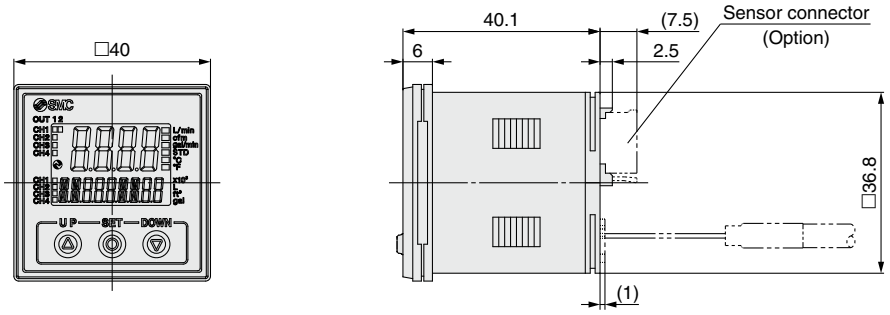
### When using the PF3W5□-1T (with temperature sensor) and measuring instantaneous flow and temperature simultaneously

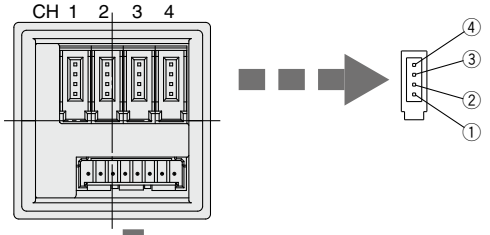
**Example) PF3W520-03-1T (2 units) + PFG200-M (for 4 analog outputs with 2 units)**




∗ When connecting the flow rate analog output and temperature analog output using a digital flow switch with a temperature sensor, use two e-con connectors per sensor.

## Dimensions

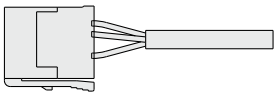


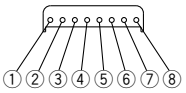

**Sensor connector (4P x 4)**

| Pin no. | Terminal |
|---|---|
| ① | DC (+) |
| ② | N.C |
| ③ | DC (–) |
| ④ | IN (1 to 5 V) |

**Connector (Option)**

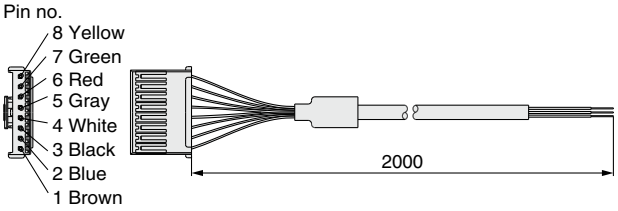


**Power supply/Output connector (8P)**



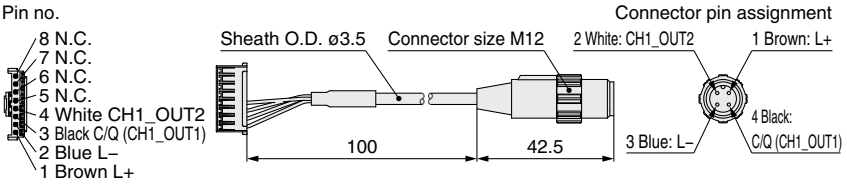

| Pin no. | Terminal | |
|---|---|---|
| | PFG200/PFG201 | PFG202/PFG203 |
| ① | DC (+) | L+ |
| ② | DC (–) | L– |
| ③ | CH1_OUT1 | C/Q (CH1_OUT1) |
| ④ | CH1_OUT2 | |
| ⑤ | CH2_OUT1 | |
| ⑥ | CH3_OUT1 | |
| ⑦ | CH4_OUT1 | |
| ⑧ | Auto-shift input | N.C. |

**Power supply/Output connection cable (Accessory)**

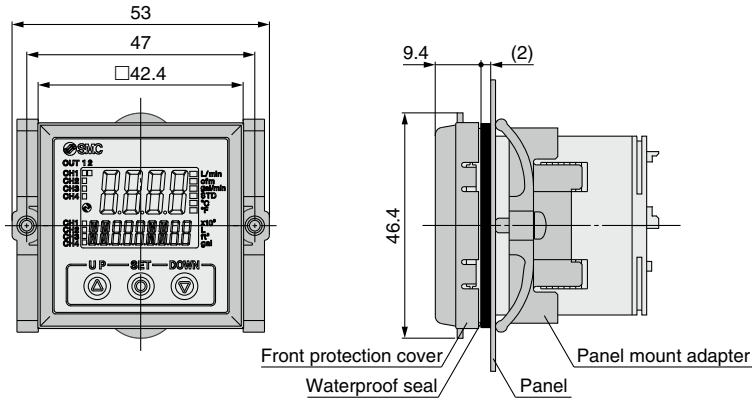


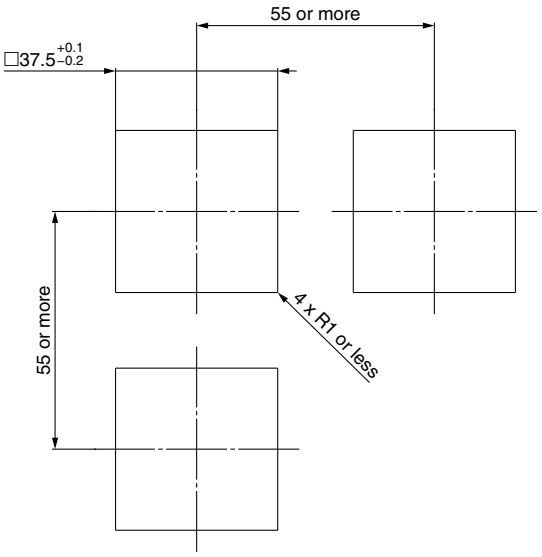

**Power supply with M12 connector/Output cable (Made to Order)**

∗ For use when using an M12 connector for IO-Link communication




### Front protection cover + Panel mount adapter



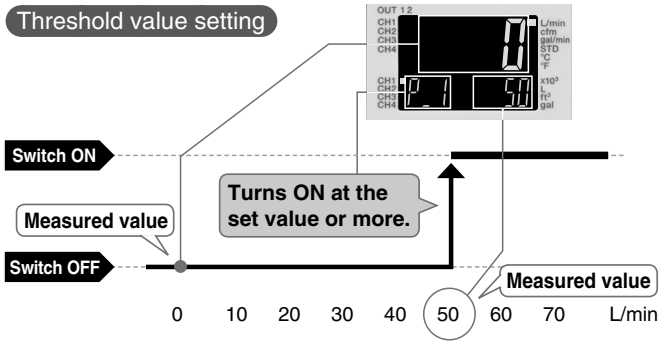



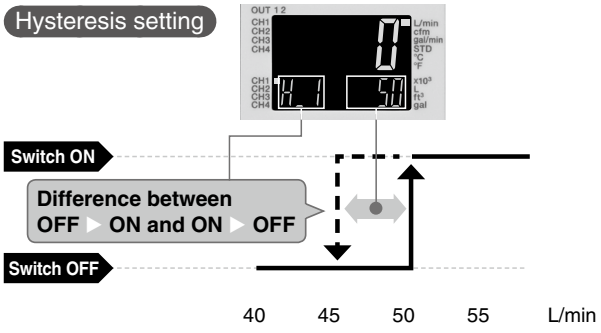

**Panel fitting dimensions**
**Applicable panel thickness:**
**0.5 to 8 mm**

# *PFG200 Series*
# Function Details

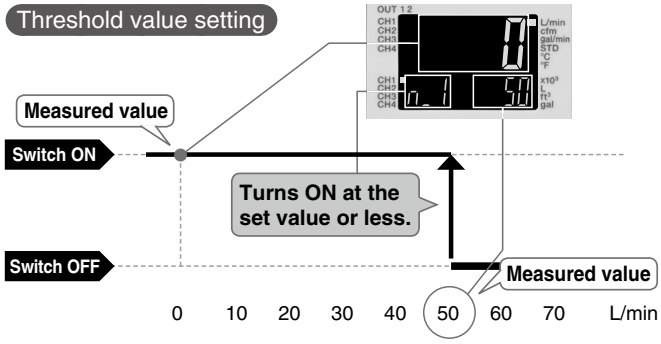
**Display examples of the main and sub (set value) screens of each mode. (When 100 L/min range is selected)**

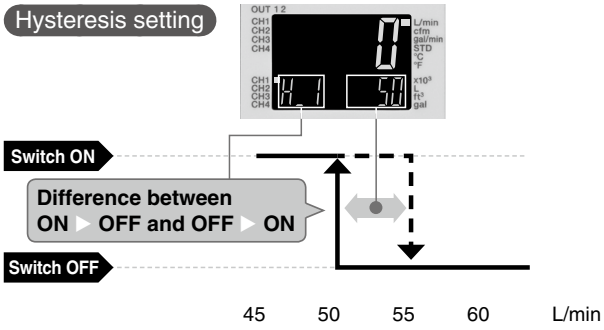
## Hysteresis mode, Normal output



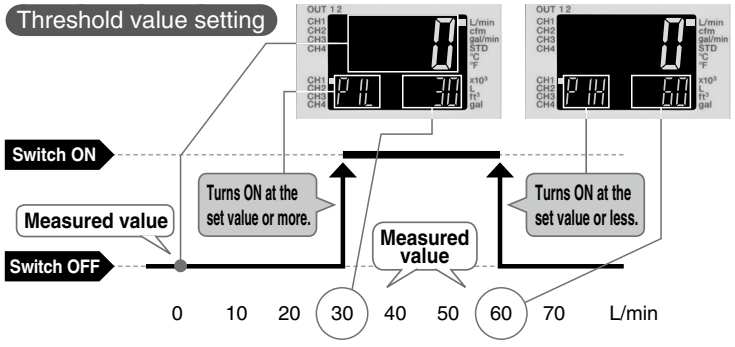



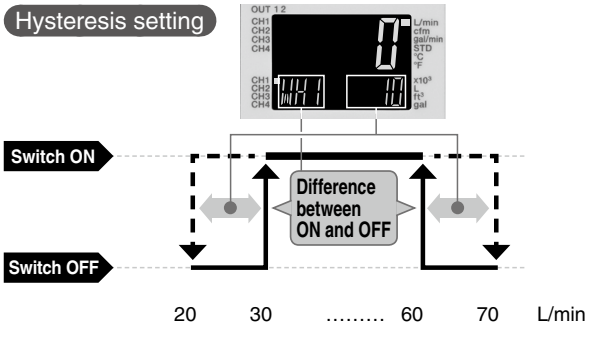

## Hysteresis mode, Reversed output



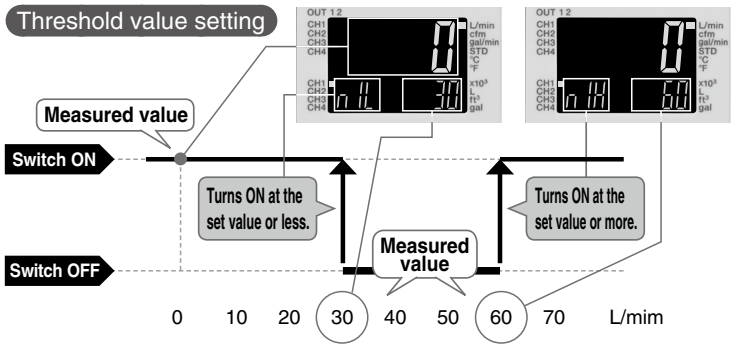



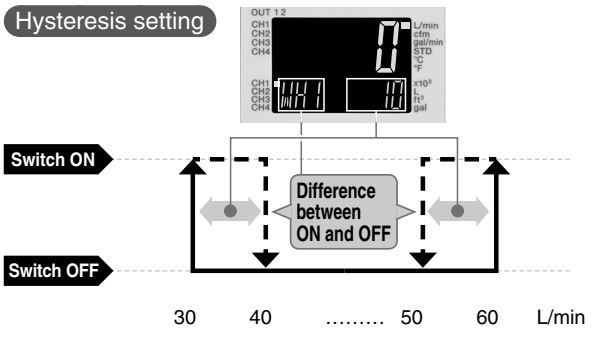

## Window comparator mode, Normal output




## Window comparator mode, Reversed output



## Function Details

### A Peak/Bottom value indication function

This function constantly detects and updates the maximum (minimum) flow when the power is supplied, and allows to hold the maximum (minimum) flow value.

When the ⓞ and ⓥ buttons are simultaneously pressed for 1 second or longer, while "holding", the held value will be reset.

### B Key-lock function

This function prevents operation errors such as accidentally changing setting values.

### C External input function

The accumulated flow, peak value, and bottom value can be reset remotely.

**Accumulated value external reset**: The accumulated flow value is reset via external input signal.
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 max. number of times the memory can be accessed is 970,000 times. The total number of external inputs and the accumulated value memorizing time interval should not exceed 970,000 times.

**Peak/Bottom value reset**: The peak value and bottom value are reset.

### D Error display function

This function displays error location and content when a problem or error has occurred.

| Error name | Error code | Description | Action |
|---|---|---|---|
| Over current error | Er 1 CH.∗1 oC1 / Er 2 CH.∗1 oC2 | The load current applied to the switch output has exceeded the maximum value.<br>∗1 indicates the channel with an error. | Turn the power off and remove the cause of the over current. Then supply the power again. |
| Above the upper limit of the display range | HHH | The flow rate or temperature exceeds the upper limit of the setting range. | Decrease the flow rate or temperature. |
| Below the lower limit of the display range | LLL | The flow rate or temperature exceeds the lower limit of the setting range. A sensor may be disconnected or mis-wired. | Decrease the flow rate or temperature. Check the sensor connection. |
| Accumulated flow error | 999999999 | The accumulated flow has exceeded the accumulated flow range. | Reset the accumulated flow. |
| System error | Er 0 / Er 6 / Er 4 / Er 8 / Er40 | Internal data error | Turn the power off and then on again. If the failure cannot be solved, please contact SMC for investigation. |

If the error cannot be reset after the above measures are taken, or errors other than those above are displayed, please contact SMC for investigation.

### E 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)

| |
|---|
| 0.00 s |
| 0.05 to 0.1 s (Increments of 0.01 s) |
| 0.1 to 1.0 s (Increments of 0.1 s) |
| 1 to 10 s (Increments of 1 s) |
| 20 s |
| 30 s |
| 40 s |
| 50 s |
| 60 s |

### F Zero-cut setting (F14)

When the flow display value is close to zero, this function forces the display to zero.
The range to display zero can be changed within the range of 0.0 to 10.0%.

Example: When the PF2A711 (100/Lmin range), zero-cut value = 1.0%, 0 is displayed in the range of –9 to 9 kPa.

### G Power-saving mode (F80)

Power-saving mode can be selected.
It shifts to power-saving mode automatically when there is no button operation for 30 seconds.
The product is set to normal mode (Power-saving mode is OFF) at the time of factory shipment.
(When in power-saving mode, [ECo] will flash in the sub screen and the operation light will be ON (only when the switch is ON).)

### H Setting of security code (F81)

Users can select whether a security code must be entered to release the key lock.
At the time of factory shipment, it is set so that a security code is not required.

### I Accumulated value hold

The accumulated value is not cleared even when the power supply is turned OFF.
The accumulated value is memorized every 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 970,000 access times. Take this into consideration before using this function.

# Function Details

## J Snap shot function

The current flow rate value can be stored to the switch output ON/OFF set point.
When the items on the Sub display (left) are selected in either 3 step setting mode, Simple setting mode or Setting of each function mode, by pressing the ▲ and ▼ buttons simultaneously for 1 second or longer, the value of the sub display (right) will show "----", and the values corresponding to the current flow rate are automatically displayed.

| Output mode | Configurable items | Sub display (left) | Snap shot function |
|---|---|---|---|
| Hysteresis mode | Set value | P_1 (n_1) / P_2 (n_2) | ○ |
| | Hysteresis | H_1 / H_2 | ○ |
| Window comparator mode | Set value | PtL (ntL), PtH (ntH) / P2L (n2L), P2H (n2H) | ○ |
| | Hysteresis | tH1 / tH2 | × |
| Accumulated output mode | Set value | P1, P2, nt1, nt2 | × |

## K Output check function

The output is forced ON/OFF when starting the system or during maintenance. This enables confirmation of the wiring and prevents system errors due to unexpected output.

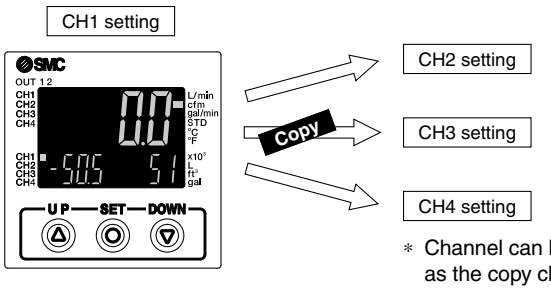
* Also, the increase or decrease of the flow will not change the ON/OFF status of the output while the forced output function is activated.

## L Channel to channel copy function (F95)

Information that can be copied includes the following:
F0 (system setting): Connected range, displayed unit
F1 (OUT1 setting), F3 (digital filter), F10 (sub-screen setting), F14 (zero-cut setting)

When CH1 is copied to CH2, CH3, and CH4, information on OUT1 in CH1 will be copied.
When CH2 (CH3, or CH4) is copied to CH1, information on OUT1 in CH2 (CH3, or CH4) will be copied only to OUT1 in CH1.

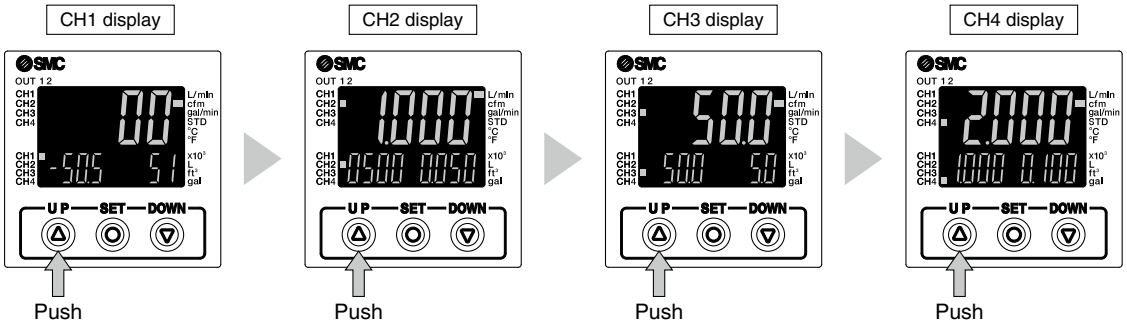
* When the channel to channel copy function is used, the copied pressure set value may vary by ±1 digit.
  Example) When copying CH1 to another channel




* Channel can be selected as the copy channel.

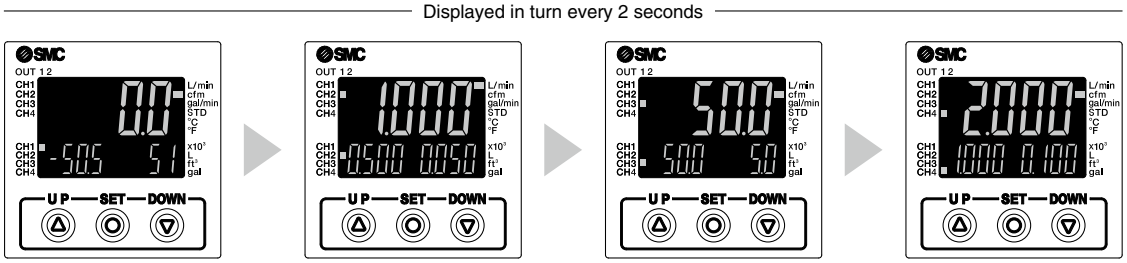
## M Channel select function

Flow value for the selected channel is displayed.
The function setting of each channel is performed on the selected channel.




## N Channel scan function

Flow values for each channel are displayed in turn every 2 seconds.



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

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

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

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

## ⚠ 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 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.

## Limited warranty and Disclaimer/ Compliance Requirements

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

### Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   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. |
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