No.PF※※-OMW0007-A

Operation Manual

PRODUCT NAME

Digital Flow Switch
(Integrated display type)

MODEL / Series / Product Number

PF2M7##

SMC Corporation

Table of Contents

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.

*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: Manipulating industrial robots -Safety.
etc.

⚠ **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.

⚠ 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.

Safety Instructions

⚠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 regulation 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.
Products that SMC manufactures or sells are not measurement instruments that are qualified by pattern approval tests relating to the measurement laws of each country.
Therefore, SMC products cannot be used for business or certification ordained by the measurement laws of each country.

Operator

- ♦This operation manual is intended for those who have knowledge of machinery using pneumatic equipment, and have sufficient knowledge of assembly, operation and maintenance of such equipment. Only those persons are allowed to perform assembly, operation and maintenance.
- ♦Read and understand this operation manual carefully before assembling, operating or providing maintenance to the product.

■Safety Instructions

⚠Warning

■Do not disassemble, modify (including changing the printed circuit board) or repair.
An injury or failure can result.

■Do not operate the product outside of the specifications.
Do not use for flammable or harmful fluids.
Fire, malfunction, or damage to the product can result.
Verify the specifications before use.

■Do not operate in an atmosphere containing flammable, explosive or corrosive gas.
Fire or an explosion can result.
This product is not designed to be explosion proof.

■Do not use the product for flammable fluid.
A fire or explosion can result.
Only dry air, N_2, CO_2 and Ar are applicable.

■Do not use the product in a place where static electricity is a problem.
Otherwise it can cause failure or malfunction of the system.

■If using the product in an interlocking circuit:
- •Provide a double interlocking system, for example a mechanical system
- •Check the product regularly for proper operation

Otherwise malfunction can result, causing an accident.

■The following instructions must be followed during maintenance :
- •Turn off the power supply
- •Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance work

Otherwise an injury can result.

⚠ Caution

■Do not touch the terminals and connectors while the power is on.
Otherwise electric shock, malfunction or damage to the product can result.

■After maintenance is complete, perform appropriate functional inspections and leak tests.
Stop operation if the equipment does not function properly or there is a leakage of fluid.
When leakage occurs from parts other than the piping, the product might be faulty.
Disconnect the power supply and stop the fluid supply.
Do not apply fluid under leaking conditions.
Safety cannot be assured in the case of unexpected malfunction.

■NOTE

○Follow the instructions given below when designing, selecting and handling the product.

●The instructions on design and selection (installation, wiring, environment, adjustment, operation, maintenance, etc.) described below must also be followed.

∗Product specifications

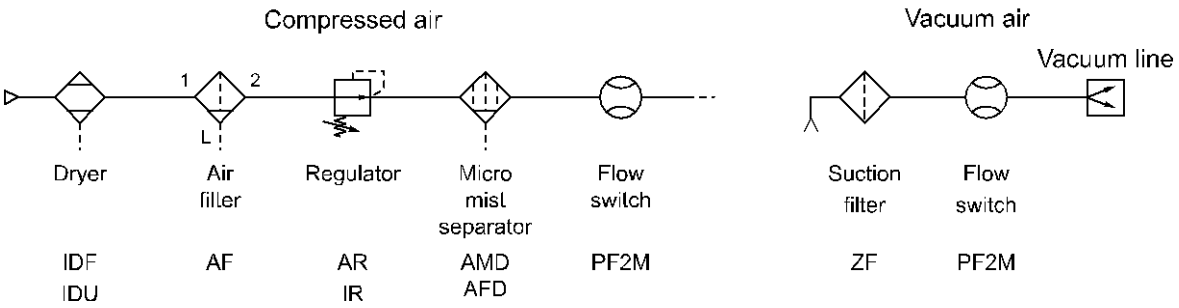
- The direct current power supply used should be UL approved as follows.
  Circuit (Class 2) of maximum 30 Vrms (42.4 V peak) or less, with UL1310 Class 2 power supply unit or UL1585 Class 2 transformer.
- The product is a UL approved product only if it has a c UL us mark on the body.
- Use the specified voltage.
  Otherwise failure or malfunction can result.
  Insufficient supply voltage may not drive a load due to a voltage drop inside the product.
  Verify the operating voltage of the load before use.
- Do not exceed the specified maximum allowable load.
  Otherwise it can cause damage or shorten the lifetime of the product.
- Data stored by the product is not deleted, even if the power supply is cut off.
  (Writing time: 3700000 cycles)
- Applicable operating fluid depends on the product.
  Check the details of the specifications before using.
- Before designing piping confirm the pressure loss at the sensor from the pressure loss graph.
  Confirm pressure loss of the sensor from the characteristics data.
- For the details of compressed air quality, refer to ISO 8573-1, 1.1.2 to 1.6.2.
- Use the specified measurement flow rate and operating pressure.
  Otherwise it can cause damage to the product or inability to measure correctly.
- Reserve a space for maintenance.
  Allow sufficient space for maintenance when designing the system.

●Product handling

∗Installation

- •Do not apply excessive stress to the product when it is mounted with a panel mount.
  Otherwise damage to the product and disconnection from the panel can result.
- •Ensure that the FG terminal is connected to ground when using a commercially available switch-mode power supply.
- •Do not drop, hit or apply excessive shock to the product.
  Otherwise damage to the internal parts can result, causing malfunction.
- •Do not pull the lead wire forcefully, or lift the product by the lead wire. (Tensile force 49N or less)
  Hold the product body when handling, to prevent damage, failure or malfunction
- •Any dust left in the piping should be flushed out by air blow before connecting the piping to the product.
  Otherwise damage or malfunction can result.
- •Refer to the flow direction of the fluid indicated on the product for installation and piping.
  Retention of air can cause inability to measure accurately.
- •Do not mount the body with the bottom facing upwards.
  Retention of air can cause inability to measure accurately.
- •Do not insert metal wires or other foreign matter into the piping port.
  This can damage the sensor causing failure or malfunction.
- •Never mount a product in a location that will be used as a foothold.
  The product may be damaged if excessive force is applied by stepping or climbing onto it.
- •If there is a risk of foreign matter entering the fluid, install and pipe a filter or the mist separator at the inlet to avoid failure and malfunction.
  Otherwise damage or malfunction can result.
  And it can cause inability to measure accurately.
  Refer to the figure below for the recommended pneumatic circuit.
- •If the fluid flow on the IN side (entry side) of the product is unstable, correct measurement will not be possible.
  If a valve is used on the IN side (entry side) of the product, the fluid may be unstable due to the change of the effective area, and there may be an error in the flow measurement results.

Recommended pneumatic circuit example



∗Wiring

- Do not pull the lead wires.
  In particular, never lift a product equipped with fitting and piping by holding the lead wires.
  Otherwise damage to the internal parts can result, causing malfunction or disconnection of the connector.
- Avoid repeatedly bending or stretching the lead wire, or placing heavy loads on it
  Repeated bending stress or tensile stress can cause damage to the sheath, or breakage of the wires.
  If the lead wire can move, fix it near the body of the product.
  The recommended bend radius of the lead wire is 6 times the outside diameter of the sheath, or 33 times the outside diameter of the wire insulation material, whichever is larger.
  Replace any damaged lead wire with a new one.
- Wire correctly.
  Incorrect wiring can damage the product.
- Do not perform wiring while the power is on.
  Otherwise damage to the internal parts can result, causing malfunction.
- Do not route wires and cables together with power or high voltage cables.
  Otherwise the product can malfunction due to interference or noise and surge voltage from power and high voltage cables.
- Confirm proper insulation of wiring.
  Poor insulation (interference from another circuit, poor insulation between terminals, etc.) can lead to excess voltage or current being applied to the product, causing damage.
- Keep wiring as short as possible to prevent interference from electromagnetic noise and surge voltage.
  Do not use a cable longer than 30 m.
  Wire the DC (-) line (blue) as close as possible to the power supply.
- When analogue output is used, install a noise filter (line noise filter, ferrite element, etc.) between the switch-mode power supply and this product.

∗Environment

- Do not use the product in area that is exposed to corrosive gases, chemicals, sea water, water or steam.
  Otherwise failure or malfunction can result.
- Do not use in a place where the product could be splashed by oil or chemicals.
  If the product is to be used in an environment containing oils or chemicals such as coolant or cleaning solvent, even for a short time, it may be adversely affected (damage, malfunction, or hardening of the lead wires)
- Do not use in an area where electrical surges are generated.
  If there is equipment generates large electrical surges (solenoid type lifter, high frequency induction furnace, motor, etc.) close to the product, damage or failure of the internal circuit may occur. Take measures against the surge sources, and prevent the wires from coming into close contact.
- Do not use a load which generates a surge voltage.
  When a surge-generating load such as a relay or solenoid is driven directly, use a product with a built-in surge absorbing element.
- The product is CE marked, but not immune to lightning strikes. Take measures against lightning strikes in the system.
- Do not use the product in areas that are exposed to vibration or impact.
  Otherwise failure or malfunction can result.
- Do not use the product in the presence of a magnetic field.
  This may lead to the malfunction of the product.
- Prevent foreign matter such as wire debris from entering the product.
  Otherwise failure or malfunction can result.
- Do not use the product in areas subject to large temperature cycle.
  Heating/cooling cycles other than ordinary changes in temperature can adversely affect the internal structure of the product
- Do not expose the product to direct sunlight.
  If using in a location directly exposed to sunlight, use a suitable protective cover.
  Otherwise failure or malfunction can result.
- Keep within the operating fluid temperature and operation temperatures range.
  The operating fluid temperature and operating temperature range is 0 to 50 ^{o}C.
  Operation below the minimum temperature limit may cause damage or operation failure due to frozen moisture in the fluid or air.
  Protection against freezing is necessary.
  An air dryer is recommended for elimination of drainage and water.
  Avoid sudden temperature changes even within the specified temperature range.
- Do not operate close to a heat source, or in a location exposed to radiant heat.
  Otherwise malfunction can result.
- The temperature between products rises when sticking is installed, and there is a possibility to influence the performance of the product.

∗Adjustment and Operation

- Connect load before turning on the power.
- Do not short-circuit the load.
  Although an error is displayed when the product load is short circuited, excess current may cause damage to the product.
- Do not press the setting buttons with a sharp pointed object.
  This may damage the setting buttons.
- Supply the power when there is no flow.
- The output is off for 3 seconds after power is supplied.
- Use settings suitable for the operating conditions.
  Incorrect settings can cause operational failure.
  (Refer to page 23 " Flow setting".)
- During the initial setting and any subsequent flow rate setting, the product will switch the output according to the existing settings until the changes are complete.
  Confirm the output has no adverse effect on machinery and equipment before setting.
  Stop the control system before setting if necessary.
- Do not touch the LCD during operation.
  The display can vary due to static electricity.

∗Maintenance

- Perform regular maintenance and inspections.
  There is a risk of unexpected malfunction of components due to the malfunction of equipment and machinery.
- Turn off the power supply, stop the supplied air, exhaust the residual pressure and verify the release of air before performing maintenance.
  There is a risk of unexpected malfunction.
- Perform drainage regularly.
  If condensate enters the outside, it can cause operating failure of pneumatic equipment.
- Do not use solvents such as benzene, thinner etc. to clean the product.
  They could damage the surface of the body and erase the markings on the body.
  Use a soft cloth to remove stains.
  For heavy stains, use a cloth lightly dampened with diluted neutral detergent, then wipe up any residue with a dry cloth.

∗Other

- If there is a restrictor fitted, vibration may cause the flow adjustment valve to rotate and change the flow rate.

Model Indication and How to Order

PF2M 7 □□ - □ - □□ - □□□

Integrated display type

Rated flow range (Flow range)

Symbol	Content
10	0.1 to 10 L/min
25	0.3 to 25 L/min
50	0.5 to 50 L/min
11	1 to 100 L/min

Flow adjustment valve

Symbol	Content
Nil	without flow adjustment valve
S	with flow adjustment valve

Port size

Symbol	Port size	Flow range			
		10	25	50	11
C6	φ6	●	●	●	-
C8	φ8	-	-	-	●

Output specification

Symbol	OUT1	OUT2
A	NPN 28 V 80 mA	NPN 28 V 80 mA
B	PNP 80 mA	PNP 80 mA
C	NPN 28 V 80 mA	AO. 1 to 5 V *1
D	NPN 28 V 80 mA	AO. 4 to 20 mA
E	PNP 80 mA	AO. 1 to 5 V *1
F	PNP 80 mA	AO. 4 to 20 mA

*1: 1 to 5 V or 0 to 10 V can be selected for analogue voltage output.

Option 1

Symbol	Content
Nil	With lead wire and connector (2 m) *5
W	With lead wire and connector (2 m) + connector cover *5
N	Without lead wire and connector (2 m)

*2: Interchangeable with the standard PFM series.

Unit specification

Symbol	Content
Nil	Unit selection function *3
M	SI unit only *4

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

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

Option 2

Symbol	Content
Nil	Without bracket
R	Bracket (without flow adjustment valve) *5
S	Bracket (with flow adjustment valve) *5
T	Panel mount adapter (without flow adjustment valve) *5
V	Panel mount adapter (with flow adjustment valve) *5

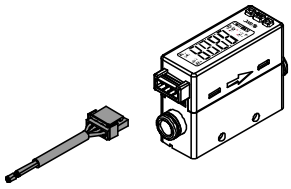
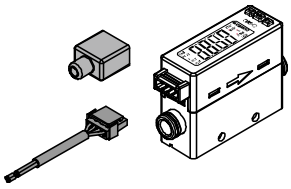
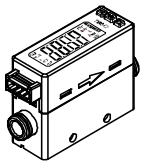
*5: Each accessory is not assembled with the product, but shipped together.

Calibration certificate *6

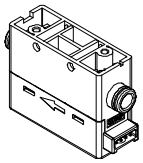
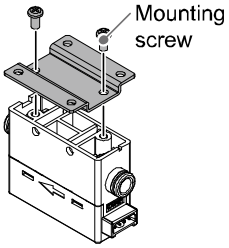
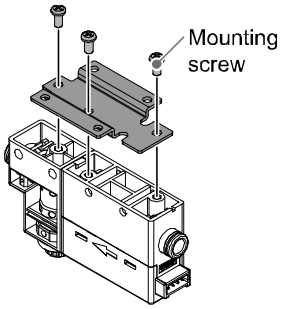
Symbol	Content
Nil	Without calibration certificate
A	With calibration certificate

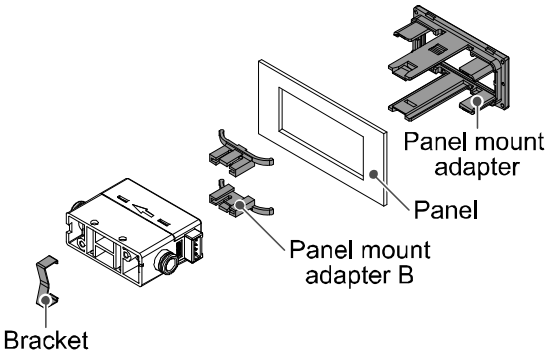
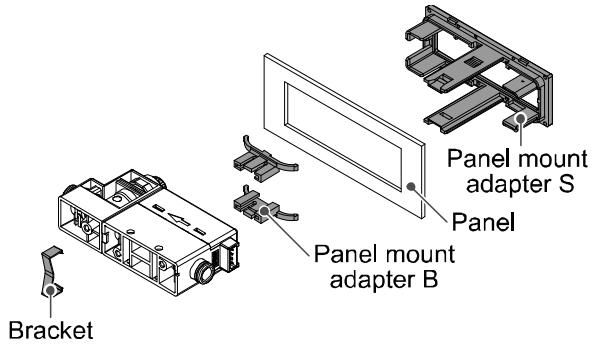
*6: Made to order.
Certificate in both Japanese and English.

Option1

Nil	W	N
with lead wire and connector (2 m) 	with lead wire and connector (2 m) + Connecter cover (silicone rubber) 	without lead wire 

Option2

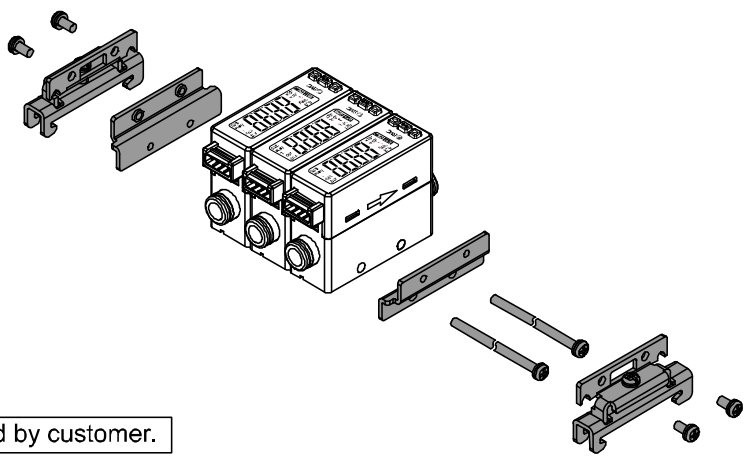
Nil	R	S
without bracket 	with bracket (without flow adjustment valve) 	with bracket (with flow adjustment valve) 

T	V
with panel mount adapter (without flow adjustment valve) 	with panel mount adapter (with flow adjustment valve) 

∗: Each accessory is not assembled with the product, but shipped together.

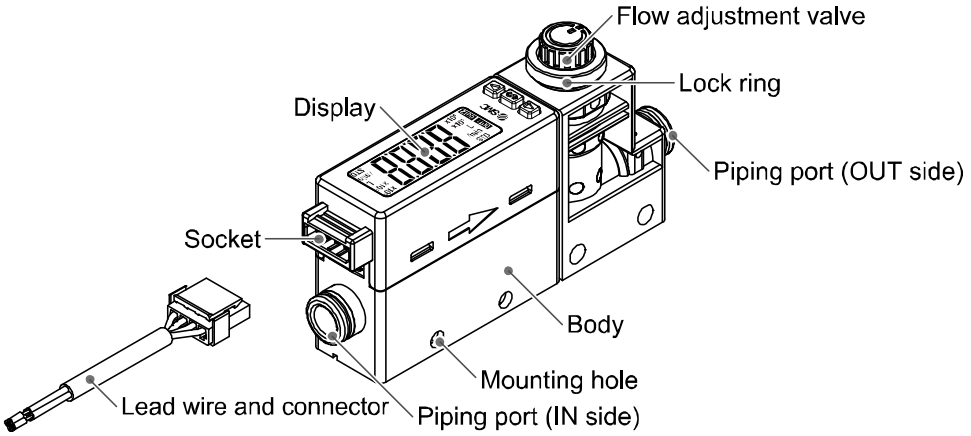
Accessories/Part number

If an accessory is required separately, order using the following part numbers.

Part number	Description	Remarks
ZS-33-D	Lead wire and connector	Length: 2 m
ZS-33-F	Connector cover (silicone rubber) 	
ZS-33-2J	Panel mount adapter (without flow adjustment valve)	
ZS-33-2JS	Panel mount adapter (with flow adjustment valve)	
ZS-33-M	Bracket (without flow adjustment valve)	Mounting screw 2 pcs.
ZS-33-MS	Bracket (with flow adjustment valve)	Mounting screw 3 pcs.
ZS-33-R#	DIN rail mounting parts ZS-33-R□ Number of stations 1: 1 station 2: 2 stations 3: 3 stations 4: 4 stations 5: 5 stations  ・DIN rail is prepared by customer.	

Summary of Product parts

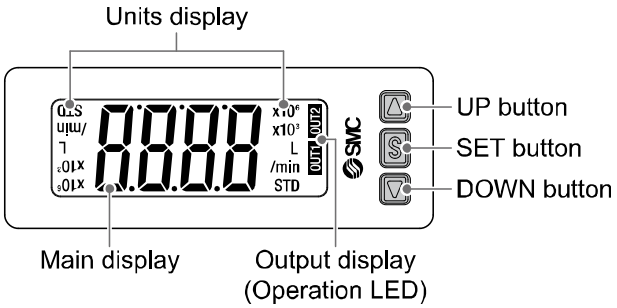
Body



Item	Description
Socket	Socket for electrical connections.
Piping port	Connected to the fluid inlet at IN side and to the fluid outlet at OUT side.
Flow adjustment valve *	Orifice mechanism to adjust the flow.
Lock ring *	Used to lock the flow adjustment valve.
Mounting hole	Used to mount the product on a DIN rail or directly to a panel.
Body	The body of the product.
Lead wire and connector	Lead wire to supply power and transmit output signals.

*: The table shows the specifications when a flow adjusting valve is included.

Display



Item	Description
UP button *	Selects the mode or increases the ON/OFF set value. Press this button to change to the peak display mode.
DOWN button *	Selects the mode or decreases the ON/OFF set value. Press this button to change to the bottom display mode.
Main display	Displays the flow value, setting mode, and error indication. Four display modes can be selected: display always in red or green, or display changing from green to red, or red to green, according to the output status (OUT1).
SET button	Press this button to change to another mode and to set a value.
Output display (Operation LED)	Displays the output status of OUT1 and OUT2. OUT1: LED is ON (Orange) when the output is ON. OUT1: LED is ON (Orange) when the output is ON. When the accumulated pulse output mode is selected, the output display is OFF.
Units display	Arbitrary units is ON based on the flow display setting (instantaneous or accumulated flow)

*: If the reversed display has been selected, the UP and DOWN button function will be reversed.

■Definition and terminology

	Terms	Meaning
A	Accumulated flow	The total amount of fluid that has passed through the device. If an instantaneous flow of 10 L/min continues for 5 minutes, the accumulated flow will be 10 × 5 = 50 L.
	Accumulated pulse output	A type of output where a pulse is generated every time a predefined accumulated flow passes. It is possible to calculate the total accumulated flow by counting the pulses.
	Accumulated-value hold time	A function to store the cumulative flow value in the product's internal memory at certain time intervals. Reads the memory data when power is supplied. Accumulation of data begins with the value read at the moment power is supplied. The time interval for memorizing can be selected from 2 or 5 minutes.
	Analogue output	Outputs a value proportional to the flow rate. When the analogue output is in the range 1 to 5 V, it will vary between 1 to 5 V according to the rate of flow. The same for analogue output of 0 to 10 V or 4 to 20 mA.
	Auto-preset	This function will automatically calculate and set the optimum flow rate based on the actual operating condition when hysteresis mode is selected.
C	Chattering	The problem of the switch output turning ON and OFF repeatedly around the set value at high frequency due to the effect of pulsation.
D	Delay time	The setting time from when the flow applied to the flow switch reaches the set value, to when the ON-OFF output actually begins working. Delay time setting can prevent the output from chattering. The response time indicates when the set value is 90% in relation to the step input.
	digit (Min. setting unit)	Shows how precisely the flow can be displayed or set by the digital flow switch. When 1 digit = 1 L/min, the flow is displayed in increments of 1 L/min, e.g., 1, 2, 3, …, 99, 100.
	Digital filter	Function to add digital filtering to the fluctuation of flow value. Smooth the fluctuation of displayed value for sharp start up or fall of the flow. When the function is valid, digital filtering is reflected to the ON/OFF of the switch output. Output chattering or flicker in the measurement mode display can be reduced by setting the digital filter.
	Display flow range	The range of measured values that can be displayed for a product with a digital display.
E	Error displayed	The code number displayed, identifying the error detected by the self-diagnosis function of the pressure switch. Refer to "Error indication" on page 65 for details of the errors.
	Error output	Switches the switch output to ON/OFF when an error is displayed. Refer to "List of output modes" on page 33 for operating conditions. Refer to "Error indication" on page 65 for details of the errors.
F	F.S. (Full span, Full scale)	Stands for "full span" or "full scale", and indicates varied display value and analogue output range at rated value. For example, when analogue output is 1 to 5 V, F.S. = 5[V] - 1[V] = 4[V], (ref. 1%F.S. = 4[V] x 1% = 0.04[V])
	Fluid temperature range	Range of fluid temperature that can be measured by the product.

	Terms	Meaning
H	Hysteresis	The difference between ON and OFF points used to prevent chattering. Hysteresis can be effective in avoiding the effects of pulsation.
	Hysteresis mode	Mode where the switch output will turn ON when the flow is greater than the set value, and will turn off when the flow falls below (set value – hysteresis value).
I	Instantaneous flow	The flow passing per unit of time. If it is 10 L/min, there is a flow of 10 L passing through the device in 1 minute.
	Insulation resistance	Insulation resistance of the product. The resistance between the electrical circuit and the case.
	Internal voltage drop	The voltage drop across the product (and therefore not applied to the load), when the switch output is ON. The voltage drop will vary with load current, and ideally should be 0 V.
K	Key-lock function	This function prevents the set value from being changed by mishandling.
M	Maximum applied voltage	The maximum voltage that can be connected to the output of an NPN device.
	Maximum load current	The maximum current that can flow to the output (output line) of the switch output.
	Max. (Min.) load impedance	The maximum (minimum) load (resistance value and impedance) which can be connected to the output (output wire)of the analogue current output.
	Measurement mode	Operating condition in which flow is being detected and displayed, and the switch function is working.
	Min. setting unit	Shows how precisely the flow can be displayed or set by the digital flow switch. When 1 digit = 1 L/min, the flow is displayed in increments of 1 L/min, e.g., 1, 2, 3, …, 99, 100.
O	Operating humidity range	Humidity range in which the product can operate.
	Operating temp. range	Ambient temperature range in which product is operable.
	Output impedance	The resistance value of a component between the voltage output element and the analogue voltage output. It is indicated as a resistance value which is converted in accordance with the condition in which resistance is directly connected to the voltage output element. There may be an error in the output voltage depending on this output impedance and the input impedance of customers' equipment. (example: If the flow switch with output impedance of 1 kΩ is connected to the A/D converter to detect the analogue output of 5 V, the detected voltage by the A/D converter becomes 5(V) x1(MΩ)/(1(kΩ) + 1(MΩ)) ≒4.995(V), and there is an error of approximate 0.005 V).

	Terms	Meaning
P	Part in contact with fluid	A part that comes into physical contact with the fluid.
	Pressure characteristics	Indicates the change in the display value and analogue output when fluid pressure changes.
	Proof pressure	Burst pressure at which the product is electrically or mechanically damaged.
R	Rated flow range	The flow range within which the product will meet all published specifications.
	Rated pressure range	The pressure range that satisfies the specifications.
	Repeatability	Reproducibility of the display or analogue output value, when the measured quantity is repeatedly increased and decreased.
	Ripple	Indicates pulsation.
S	Set flow range	The range of ON/OFF threshold values that can be set for those products with a switch output.
	Switch output	Output type that has only 2 conditions, ON or OFF. When in the ON condition an indicator light will show, and any connected load will be powered. When in the OFF condition, there will be no indicator light and no power supplied to the load.
T	Temperature characteristics	Indicates the change in the display value and analogue output caused by ambient temperature changes.
U	Unit selection function	A function to select display units other than the international unit (SI unit) specified in the new Japanese measurement law. Flow can only be displayed by SI units in Japan.
W	Window comparator mode	An operating mode in which the switch output is turned on and off depending on whether the flow is inside or outside the range of two set values.
	Withstand voltage	A measure of the product's resistance to a voltage applied between the electrical circuit and case. Durability in withstanding voltage. The product may be damaged if a voltage over this value is applied. (The withstand voltage is not the supply voltage used to power the product.)
Z	Zero-clear function	This function to adjust the displayed flow to zero.

Mounting and Installation

■Installation

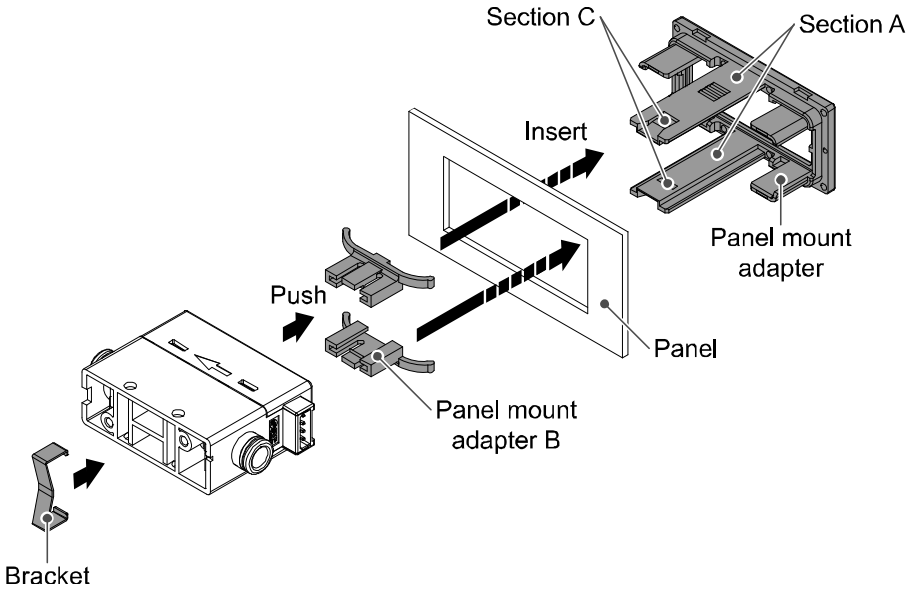
•Refer to the flow direction of the fluid indication on the product label for installation and piping.

Panel mounting

•Insert panel mount adapter B (supplied as an accessory) into section A of panel mount adapter.
Push panel mount adapter B from behind until the display is fixed onto the panel.
The pin of bracket engages the notched part of panel adapter section C to fix the display.

•The switch can be mounted on a panel with a thickness of 1 to 3.2 mm.

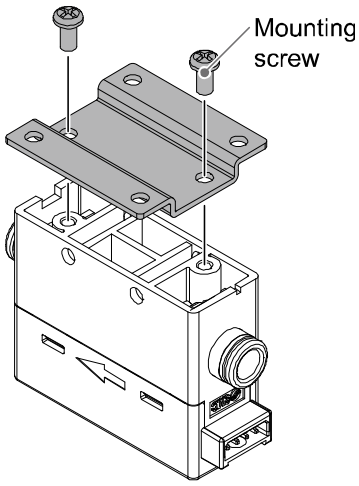
•Refer to the dimension drawing (page 73) for panel cut-out dimensions.



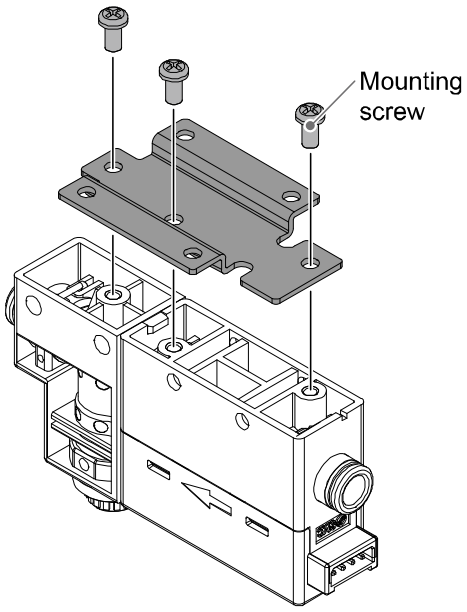
Bracket mounting

- Mount the bracket using the mounting screws supplied.
- The required tightening torque is 0.42±0.04 Nm.

Without flow adjustment valve
(using ZS-33-M)



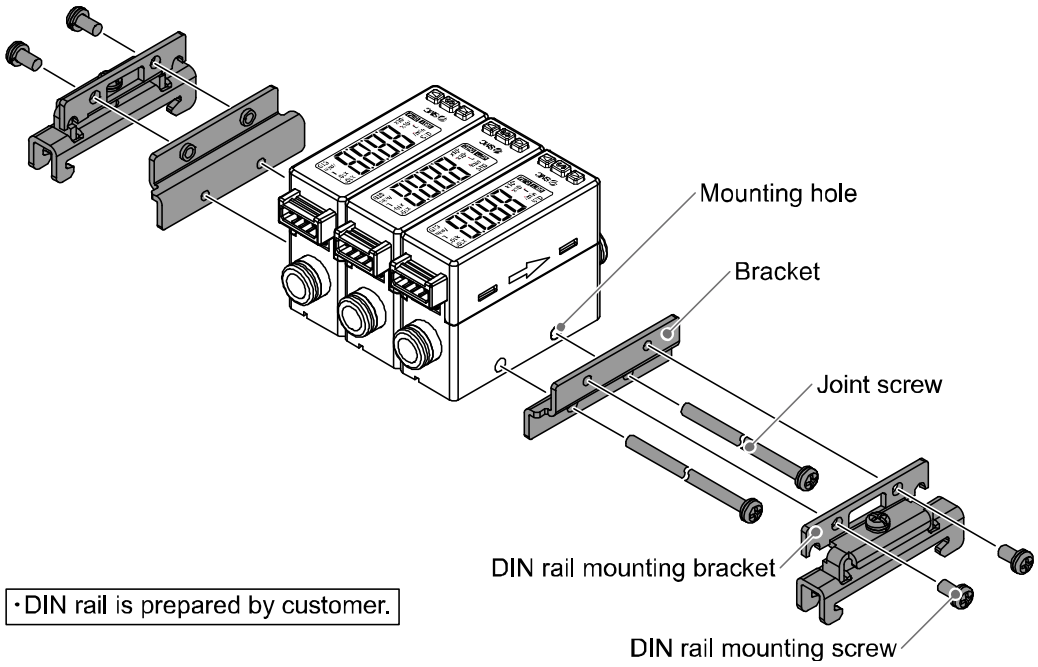
With flow adjustment valve
(using ZS-33-MS)



- Install the product (with bracket) using the M3 screws (4 pcs.).
- Bracket thickness is approximately 1.2 mm.
- Refer to the dimension drawing of the bracket (page 73) for mounting hole dimensions.

DIN rail mounting (using ZS-33-R#)

- Mount the DIN rail mounting parts using DIN rail mounting screws and joint screws supplied.
- The required tightening torque of the DIN rail mounting screws and joint screws is 0.4±0.05 Nm.



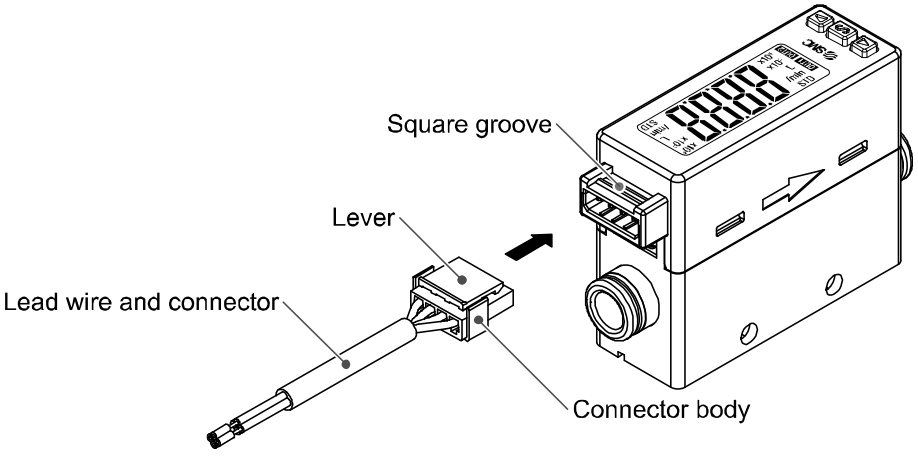
■Wiring

Wiring of connector

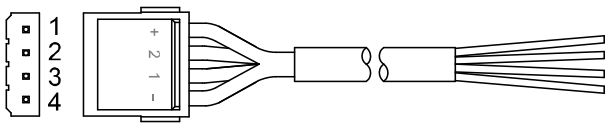
- Connections should only be made with the power supply turned off.
- Use separate routes for the product wiring and any power or high voltage wiring. Otherwise, malfunction may result due to noise.
- Ensure that the FG terminal is connected to ground when using a commercially available switch-mode power supply. When a switch-mode power supply is connected to the product, switching noise will be superimposed and the product specification can no longer be met. This can be prevented by inserting a noise filter, such as a line noise filter and ferrite core, between the switch-mode power supply and the product, or by using a series power supply instead of a switch-mode power supply.

Connecting/Disconnecting

- When mounting the connector, insert it straight into the socket, holding the lever and connector body, and push the connector until the lever hooks into the housing, and locks.
- When removing the connector, press down the lever to release the hook from the housing and pull the connector straight out.



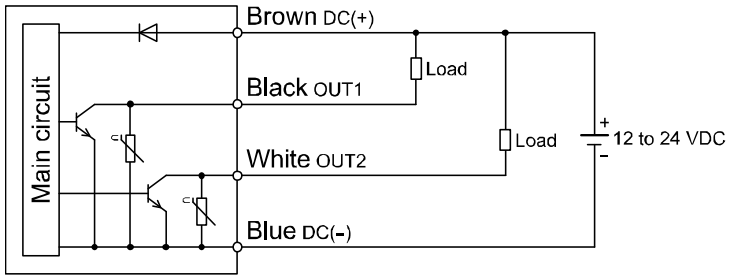
Connector pin numbers (on the lead wire)



Connector pin numbers	Wire colour	Description
1	Brown	DC(+)
2	White	OUT2/Analogue output
3	Black	OUT1
4	Blue	DC(-)

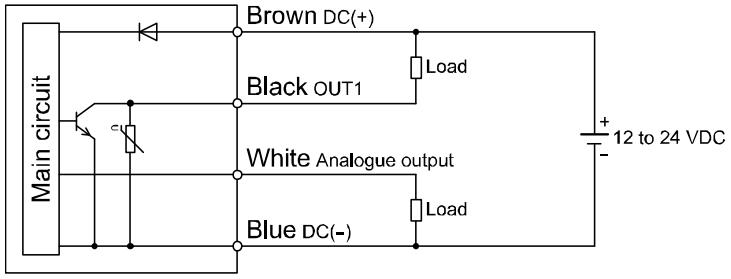
Internal circuit and wiring example

NPN (2 outputs) type
PF2M7##-#-A#-###



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

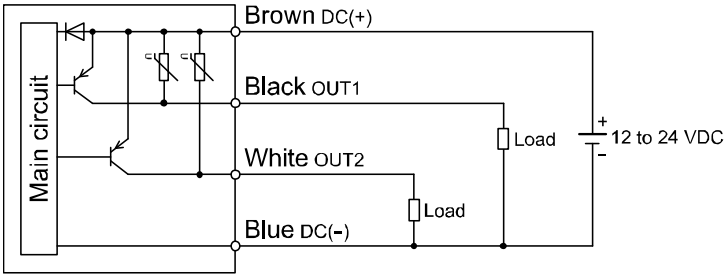
NPN (1 output) + Analogue (1 to 5 V/0 to 10 V) output type
PF2M7##-#-C#-###
NPN (1 output) + Analogue (4 to 20 mA) output type
PF2M7##-#-D#-###



Max. 28 V, 80 mA
Internal voltage drop: 1 V or less
C: Analogue output: 1 to 5 V/0 to 10 V
Output impedance: 1 kΩ
D: Analogue output: 4 to 20 mA
Max. load impedance: 600 Ω
Min. load impedance: 50 Ω

PNP (2 outputs) type

PF2M7##-#-B#-###



Max. 80 mA

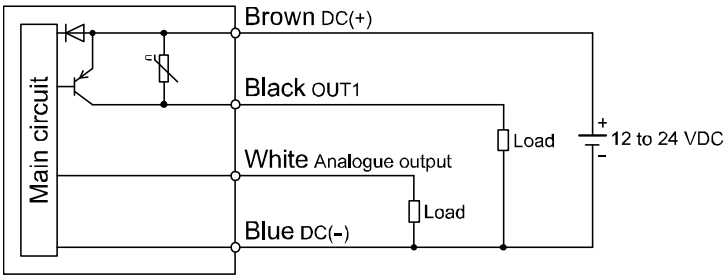
Internal voltage drop: 1.5 V or less

PNP (1 output) + Analogue (1 to 5 V/0 to 10 V) output type

PF2M7##-#-E#-###

PNP (1 output) + Analogue (4 to 20 mA) output type

PF2M7##-#-F#-###



Max. 80mA

Internal voltage drop: 1.5 V or less

E: Analogue output: 1 to 5 V/0 to 10 V

Output impedance: 1 kΩ

F: Analogue output: 4 to 20 mA

Max. load impedance: 600 Ω

Min. load impedance: 50 Ω

Outline of Settings

Power is supplied.

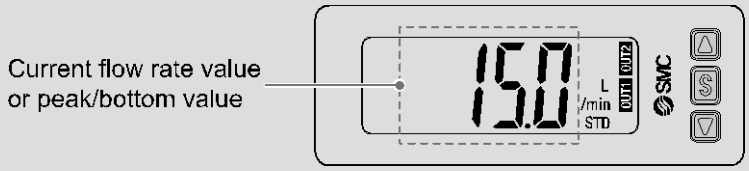
The product code is displayed for approximately 3 sec. after power is supplied.
Then, measurement mode will be displayed.

∗: After moving on to the measurement mode, the switch operation will start.

[Measurement mode]

Measurement mode is the condition where the flow is detected and displayed, and the switch function is operating.
This is the basic mode; other modes should be selected for set-point changes and other function settings.

Measurement mode screen



Press the SET button once.

Change of Set Flow and Hysteresis
(Simple setting mode)
(Refer to page 24)

Press the SET button between 2 to 5 seconds.

Change the Function Settings
(Function selection mode)
(Refer to page 25)

Press the SET button for 5 seconds or longer.

Other Settings
•Key-lock
(Refer to page 57)

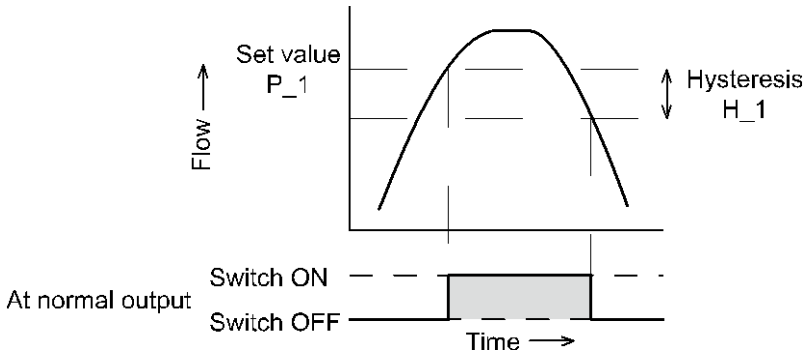
∗: The outputs will continue to operate during setting.

∗: Simple setting mode and function selection mode settings are reflected each other.

Flow Setting

Switch operation

When the flow exceeds the set value, the switch will turn ON.
When the flow falls below the set value by the amount of hysteresis or more, the switch will turn OFF.
The default setting is to turn on the flow switch when the flow reaches the center of the upper limit of the rated flow range.
If this condition, shown to the below, is acceptable, then keep these settings.



●PF2M710

Item	Default Settings
[P_1] Set value of OUT1	5.00 L/min
[H_1] Hysteresis of OUT1	0.50 L/min
[P_2] Set value of OUT2 *	5.00 L/min
[H_2] Hysteresis of OUT2 *	0.50 L/min

●PF2M725

Item	Default Settings
[P_1] Set value of OUT1	12.5 L/min
[H_1] Hysteresis of OUT1	1.3 L/min
[P_2] Set value of OUT2 *	12.5 L/min
[H_2] Hysteresis of OUT2 *	1.3 L/min

●PF2M750

Item	Default Settings
[P_1] Set value of OUT1	25.0 L/min
[H_1] Hysteresis of OUT1	2.5 L/min
[P_2] Set value of OUT2 *	25.0 L/min
[H_2] Hysteresis of OUT2 *	2.5 L/min

●PF2M711

Item	Default Settings
[P_1] Set value of OUT1	50.0 L/min
[H_1] Hysteresis of OUT1	5.0 L/min
[P_2] Set value of OUT2 *	50.0 L/min
[H_2] Hysteresis of OUT2 *	5.0 L/min

*: Only available for models with switch outputs for both OUT1 and OUT2

*: For hysteresis, please refer to [F 1] Setting of OUT1 (page 29), [F 2] Setting of OUT2 (page 34).

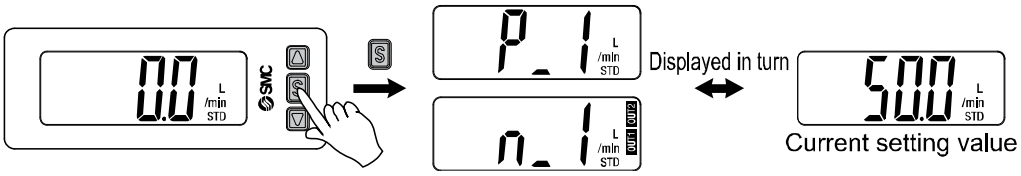
Simple Setting Mode

<Operation>

[Simple setting mode (Hysteresis mode)]

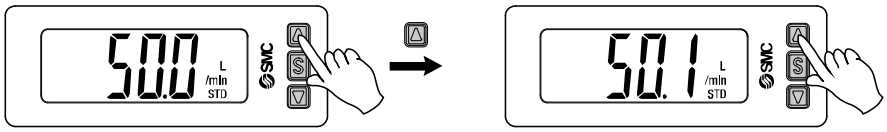
In the Simple setting mode, the set value and hysteresis can be changed.

(1) Press the SET button once in measurement mode.
[P_1] or [n_1] and the [current set value] are displayed alternately.

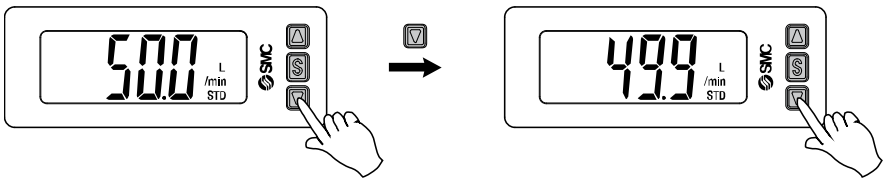


(2) Change the set value using the UP or DOWN button, and press the SET button to set the value. Then, the setting moves to hysteresis setting.
(The snap shot function can be used. (Refer to page 55))

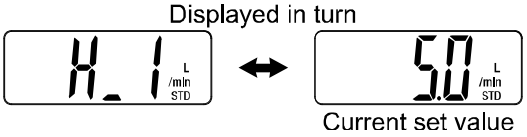
•Press the UP button continuously to keep increasing the set value.



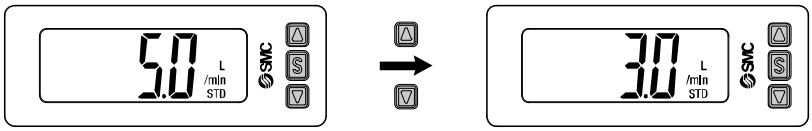
•Press the DOWN button continuously to keep decreasing the set value.



(3) [H_1] and the current set value are displayed in turn.



(4) Change the hysteresis by pressing the UP or DOWN button and press the SET button. Setting is completed and the product returns to measurement mode.
(The snap shot function can be used. (Refer to page 55))

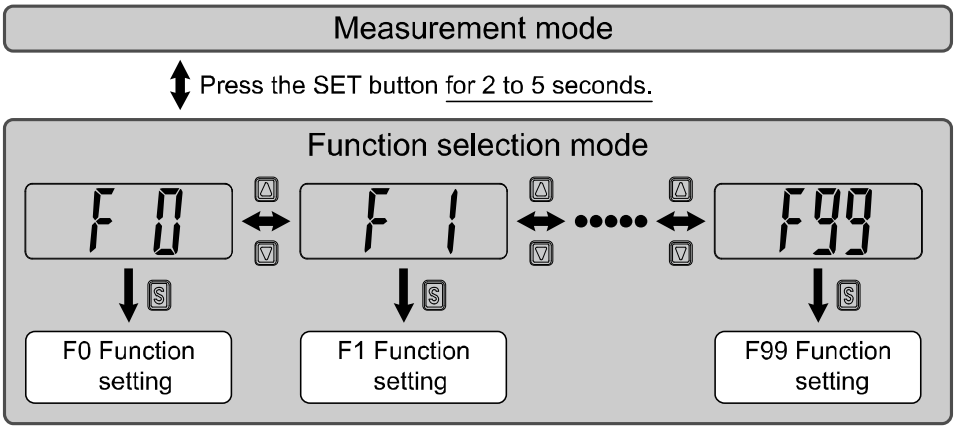


∗: For models with switch outputs for both OUT1 and OUT2, [P_2] or [n_2] will be displayed.
These are set simultaneously.
∗: After enabling the setting by pressing the SET button, it is possible to return to measurement mode by pressing the SET button for 2 seconds or longer.
∗: When hysteresis mode is not used, "Input set value" (page 46) is displayed.
∗: The set value and hysteresis settings limit each other.
∗: For more detailed setting, set each function in function selection mode (page 25).

Function Setting

Function selection mode

In measurement mode, press the SET button between 2 to 5 seconds, to display [F 0].
The [F□□] indicates the mode for changing each Function Setting.
Press the SET button for 2 seconds or longer in function selection mode to return to measurement mode.



∗: Some products do not have all the functions. If no function is available or selected due to configuration of other functions, [- - -] is displayed.

■Default setting

The default setting is as follows.
If no problem is caused by this setting, keep these settings.
To change a setting, enter function selection mode.

Item		Default setting	Page
[F 0] ⇔ [FLU]	[FLU] Switch the flow rate	[Air] Dry air, N_2	Page 27
	[rEF] Setting the units criteria	[Std] Standard condition	
	[Unit] Measurement unit switching *1	[L] L/min (L)	
[F 1] ⇔ [oUt1]	[oUt1] Setting of OUT1	[HYS] Hysteresis mode	Page 29
	[1ot] OUT1 output configuration setting	[1_P] Normal output	
	[P_1] Set value	[ ] 50% of maximums rated flow PF2M710: 5 L/min, PF2M725: 12.5 L/min PF2M750: 25 L/min, PF2M711: 50 L/min	
	[H_1] Hysteresis	[ ] 5% of maximums rated flow PF2M710: 0.5 L/min, PF2M725: 1.3 L/min PF2M750: 2.5 L/min, PF2M711: 5 L/min	
	[dt1] Delay time setting	[0.00] 0.00 s	
	[CoL] Display colour setting	[1SoG] ON: Green OFF: Red	
[F 2] ⇔ [oUt2]	[oUt2] Setting of OUT2 *2	[HYS] Hysteresis mode	Page 34
	[2ot] OUT2 output configuration setting *2	[2_P] Normal output	
	[P_2] Set value *2	[ ] 50% of maximums rated flow PF2M710: 5 L/min, PF2M725: 12.5 L/min PF2M750: 25 L/min, PF2M711: 50 L/min	
	[H_2] Hysteresis *2	[ ] 5% of maximums rated flow PF2M710: 0.5 L/min, PF2M725: 1.3 L/min PF2M750: 2.5 L/min, PF2M711: 5 L/min	
	[dt2] Delay time setting *2	[0.00] 0.00 s	
	[CoL] Display colour setting *2	[1SoG] ON: Green OFF: Red	
[F 3] ⇔ [FiL]	[FiL] Digital filter setting	[1.0] 1.0 s	Page 38
[F 4] ⇔ [PrS]	[PrS] Auto-preset function setting	[oFF] Manual	Page 39
[F10] ⇔ [FLo]	[FLo] Display mode	[inS] Instantaneous flow	Page 41
[F11] ⇔ [drE]	[drE] Display resolution setting	[1000] 1000-split	Page 42
[F13] ⇔ [rEv]	[rEv] Set Reverse display	[oFF] Not reverse	Page 43
[F14] ⇔ [CUt]	[CUt] Zero cut-off setting	[1.0] 1% of maximums rated flow PF2M710: 0.1 L/min, PF2M725: 0.3 L/min PF2M750: 0.5 L/min, PF2M711: 1 L/min	Page 44
[F22] ⇔ [AoUt]	[AoUt] Analogue output setting *3	[1-5] 1 to 5 V Voltage output (when voltage is output) [---] Analogue output is not selectable (for current type output)	Page 45
[F30] ⇔ [SAvE]	[SAvE] Accumulated flow value hold setting	[oFF] Not held	Page 47
[F80] ⇔ [diSP]	[diSP] Display OFF mode setting	[on] Normal display	Page 48
[F81] ⇔ [Pin]	[Pin] Security code	[oFF] Unused	Page 49
[F90] ⇔ [ALL]	[ALL] Setting of all functions	[oFF] Unused	Page 50
[F98] ⇔ [tESt]	[tESt] Output checking	[n] Normal output	Page 52
[F99] ⇔ [ini]	[ini] Reset to the default settings	[oFF] Not recover	Page 54

∗1: Setting is only possible for models with the units selection function.
∗2: Only available for models with switch outputs for both OUT1 and OUT2.
∗3: This function is available for models with analogue output.
Analogue free span function can be selected.

■[F 0] Fluid/Units criteria/Measurement unit setting

Set the type of operating fluid, display units criteria and measurement unit switching.

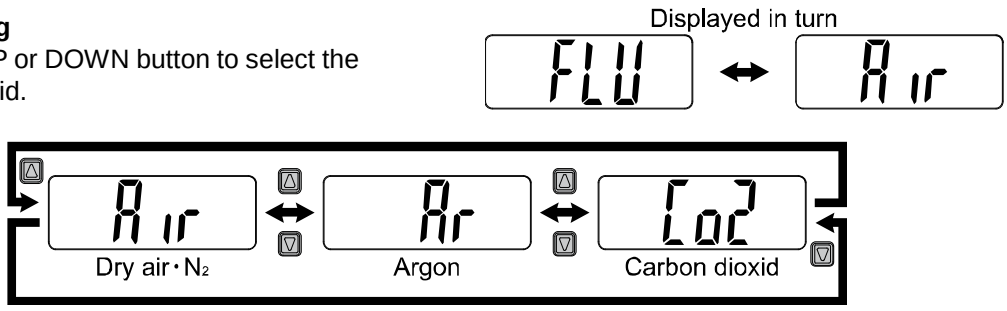
<Operation>

Press the UP or DOWN button in function selection mode to display [F 0].

Press the SET button. ⬇ Move on to the setting of fluid.

Fluid setting

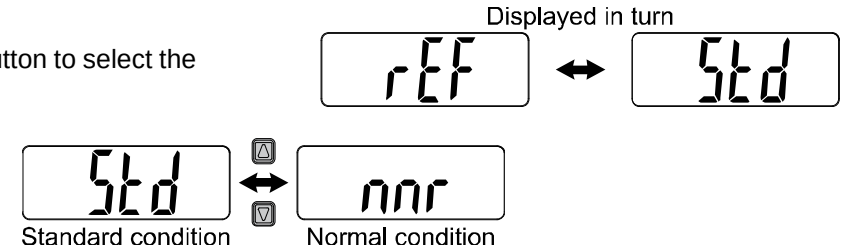
Press the UP or DOWN button to select the operating fluid.



Press the SET button to set. ⬇ Move on to the setting of units criteria.

Units criteria setting

Press the UP or DOWN button to select the reference condition.

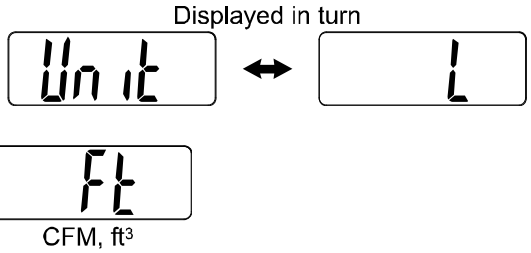


∗: Standard condition: Displayed flow rate which is converted to volume at 20 [ºC], 101.3 [kPa] (Absolute pressure), 65 [%R.H.].

∗: Normal condition: Displayed flow rate which is converted to volume at 0 [ºC], 101.3 [kPa] (Absolute pressure), 0 [%R.H.].

Press the SET button to set. ⬇ Move on to the setting of measurement unit.

Measurement unit setting
Press the UP or DOWN button to select the measurement unit.



∗: This setting is not available for models which are fixed to SI units.

Press the SET button to set. Return to function selection mode.

[F 0] Fluid/Units criteria/Measurement unit setting is completed

●Available display unit and minimum set value

Display mode	Unit	PF2M710	PF2M725	PF2M750	PF2M711
Instantaneous	L/min	0.01	0.1	0.1	0.1
	cfm	0.001	0.001	0.01	0.01
Accumulated	L	0.1	1	1	1
	ft^3	0.001	0.01	0.01	0.01

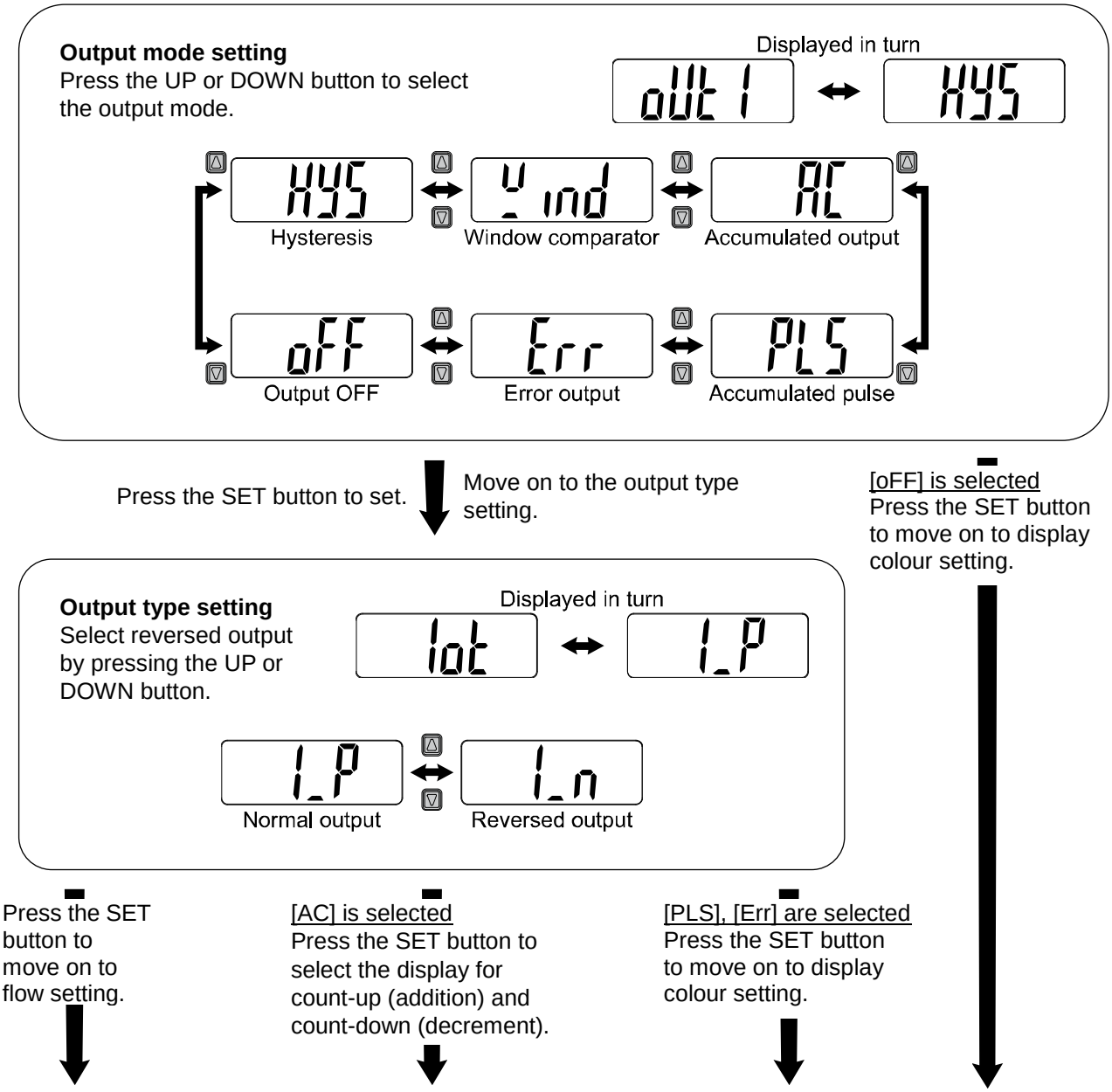
■[F 1] Setting of OUT1

Set output method of OUT1.

<Operation>

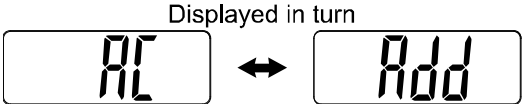
Press the UP or DOWN button in function selection mode to display [F 1].

Press the SET button. ⬇ Move on to output mode setting.

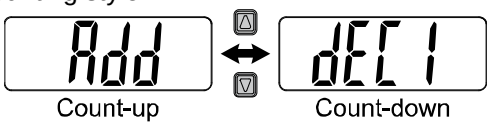


Select the display for count-up (addition) and countdown (decrement)
[AC] and the current set value are displayed in turn.

Displayed in turn



Press the UP or DOWN button to select the counting style.



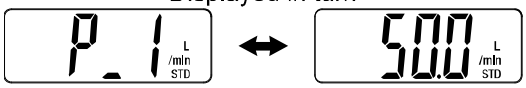
Count-up (Addition)

Count-down (Decrement)

Press the SET button to move on to flow setting.

Flow setting
Set the pressure based on the setting method on page 23.

Displayed in turn



Set value

Hysteresis mode: [P_1]
Window comparator mode: [P1L] [P1H]
Accumulated output: [P1]
"P" is changed to "n" as [P_1] → [n_1] when reversed output is selected.
The snap shot function can be used.
(Refer to page 55)

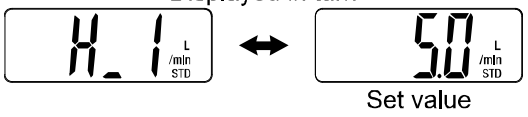
∗: Note that the set value will apply a limit to the value entered for hysteresis, and vice versa.
When the input of the set value is restricted, the restriction is removed by setting the hysteresis to 0.

Press the SET button to move on to hysteresis setting.

[AC] is selecte
Press the SET button to move on to display colour setting.

Hysteresis setting
Set the pressure referring to the setting method on page 24.

Displayed in turn



Set value

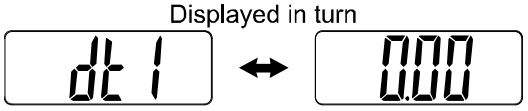
Hysteresis mode: [H_1]
Window comparator mode: [H1]
The snap shot function can be used.
(Refer to page 55)

Press the SET button to set.

Move on to delay time setting.

Delay time setting
Press the UP or DOWN button to select the delay time.

Displayed in turn



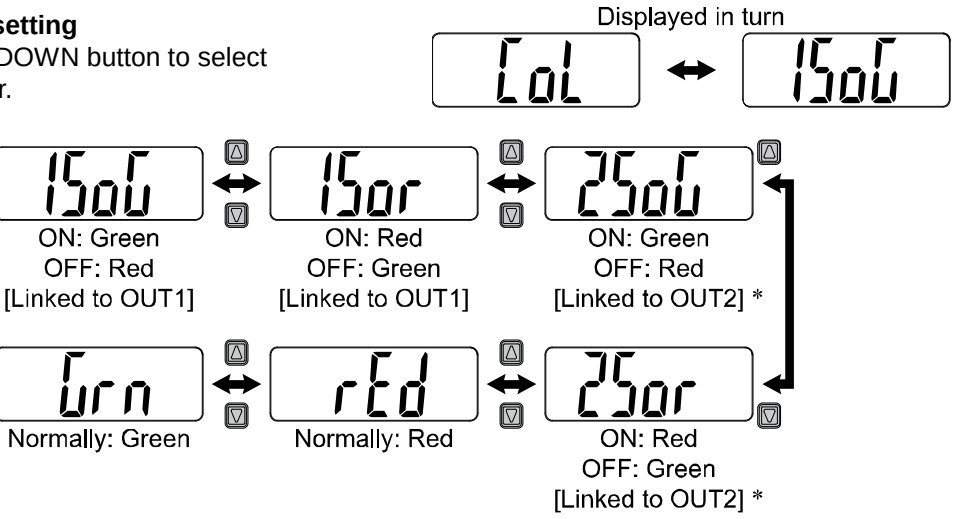
Delay time set range: 0.00 to 60.00 [s]

Press the SET button to set.

Move on to display colour setting.

Display colour setting
Press the UP or DOWN button to select the display colour.

Displayed in turn

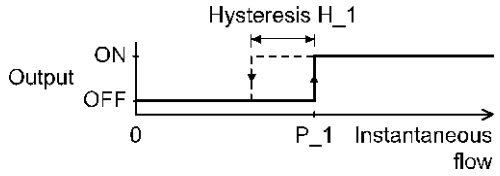
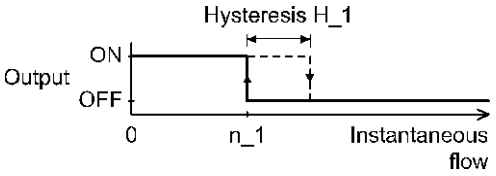
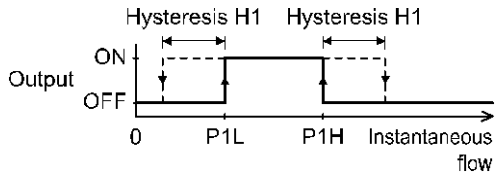
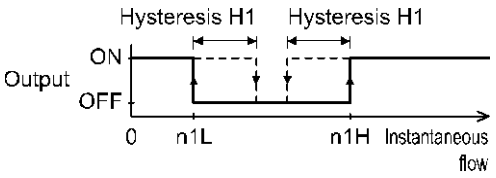
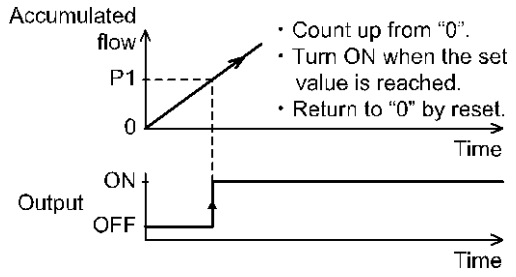
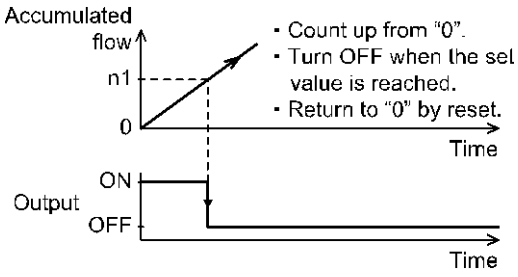
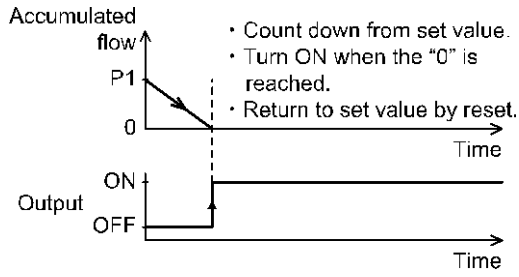
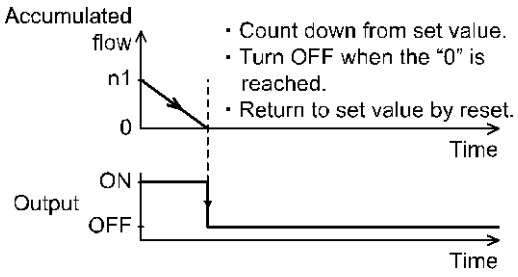
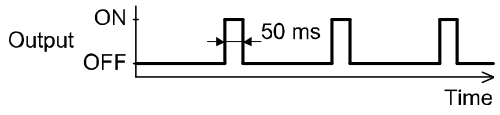
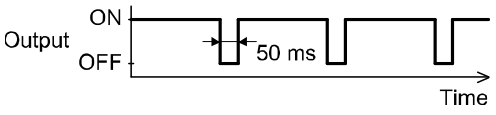
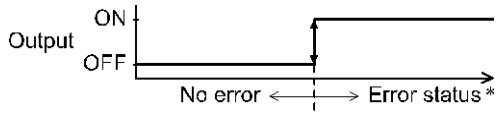
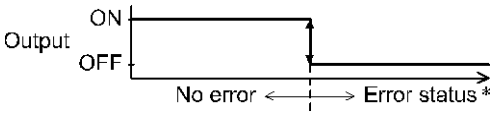
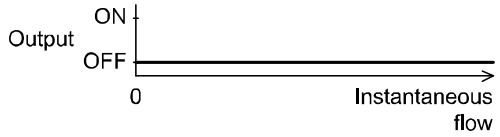


∗: Output specification: C, D, E and F are not displayed.

Press the SET button to set. ⬇ Return to function selection mode.

[F 1] Setting of OUT1 completed

●List of output modes

	Normal output	Reversed output
Hysteresis mode		
Window comparator mode		
Accumulated output mode (Addition)		
Accumulated output mode (Decrement)		
Accumulated pulse output mode		
Error output mode		
OFF mode		

∗1: The applicable errors are Er1, 2, 6, 8 and 40,

∗: The chart above shows the OUT1 operation. For OUT2, all "1" in the chart will be changed to "2". (example P_1→P_2)

If the point at which the switch output changes is outside of the set pressure range due to the selection of normal or reversed output, the hysteresis value is automatically adjusted.

■[F 2] Setting of OUT2

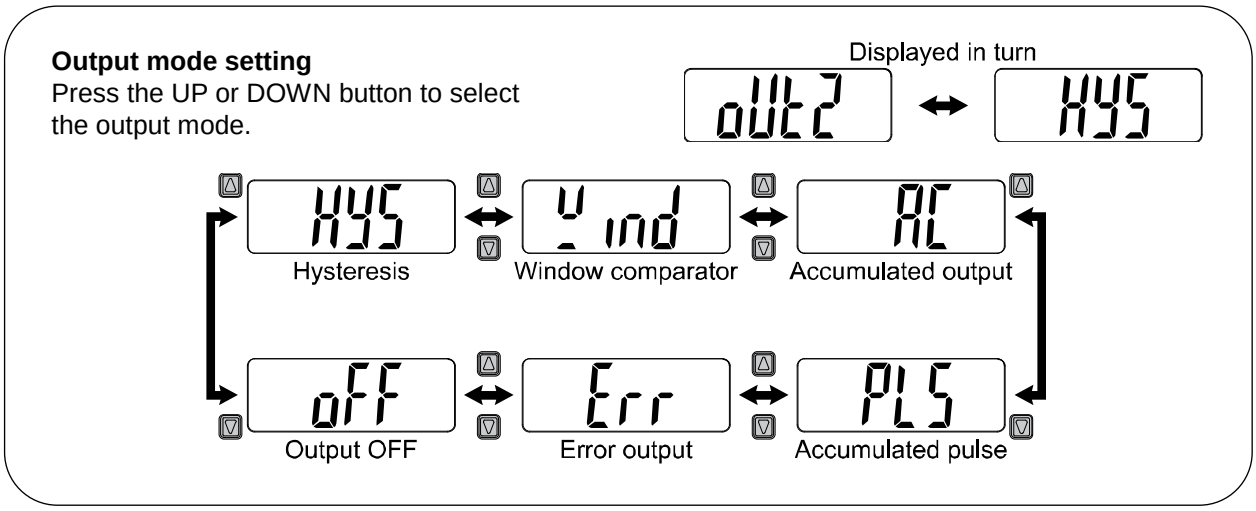
Set output method of OUT2.

∗ When the product without OUT2 (switch output) is used, [---] will be displayed and this function cannot be set.

<Operation>

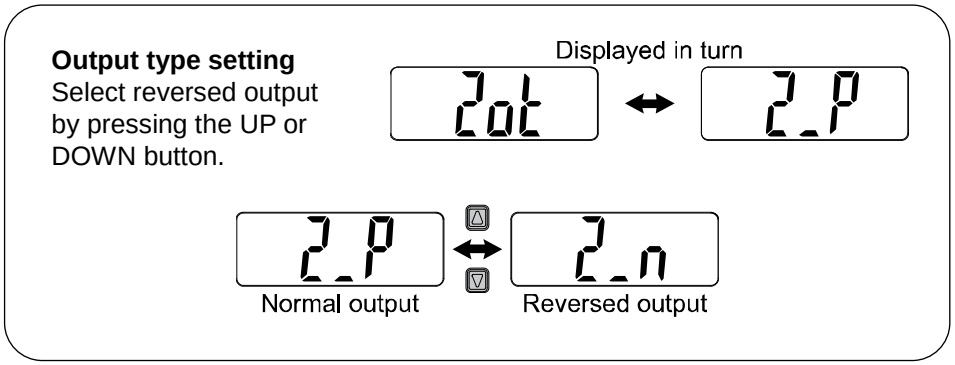
Press the UP or DOWN button in function selection mode to display [F 2].

Press the SET button. ⬇ Move on to output mode setting.



Press the SET button to set. ⬇ Move on to the output type setting.

[oFF] is selected
Press the SET button to move on to display colour setting.



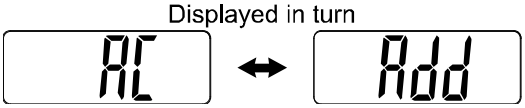
Press the SET button to move on to flow setting. ⬇

[AC] is selected
Press the SET button to select the display for count-up (addition) and count-down (decrement). ⬇

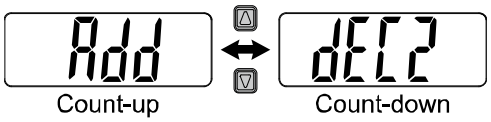
[PLS], [Err] are selected
Press the SET button to move on to display colour setting. ⬇

Select the display for count-up (addition) and countdown (decrement)
[AC] and the current set value are displayed in turn.

Displayed in turn



Press the UP or DOWN button to select the counting style.



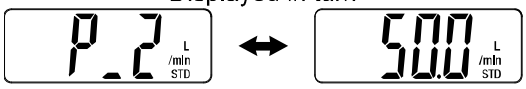
Count-up (Addition)

Count-down (Decrement)

Press the SET button to move on to flow setting.

Flow setting
Set the pressure based on the setting method on page 23.

Displayed in turn



Set value

Hysteresis mode: [P_1]
Window comparator mode: [P1L] [P1H]
Accumulated output: [P1]
"P" is changed to "n" as [P_1] → [n_1] when reversed output is selected.
The snap shot function can be used.
(Refer to page 55)

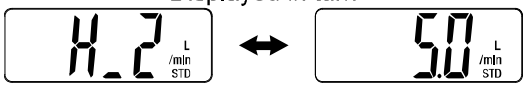
∗: Note that the set value will apply a limit to the value entered for hysteresis, and vice versa.
When the input of the set value is restricted, the restriction is removed by setting the hysteresis to 0.

Press the SET button to move on to hysteresis setting.

[AC] is selecte
Press the SET button to move on to display colour setting.

Hysteresis setting
Set the pressure referring to the setting method on page 24.

Displayed in turn



Set value

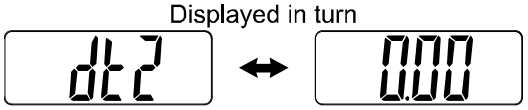
Hysteresis mode: [H_1]
Window comparator mode: [H1]
The snap shot function can be used.
(Refer to page 55)

Press the SET button to set.

Move on to delay time setting.

Delay time setting
Press the UP or DOWN button to select the delay time.

Displayed in turn



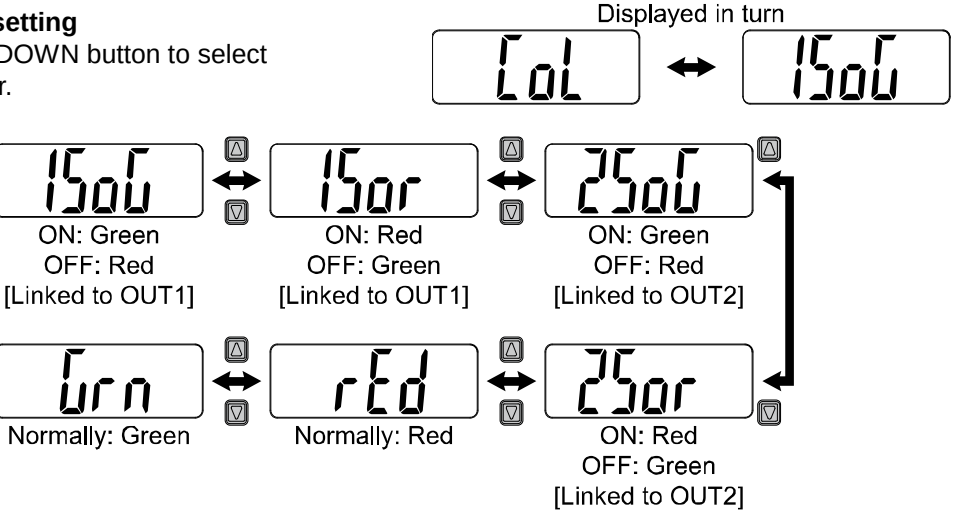
Delay time set range: 0.00 to 60.00 [s]

Press the SET button to set.

Move on to display colour setting.

Display colour setting
Press the UP or DOWN button to select the display colour.

Displayed in turn



Press the SET button to set. Return to function selection mode.

[F 2] Setting of OUT2 completed

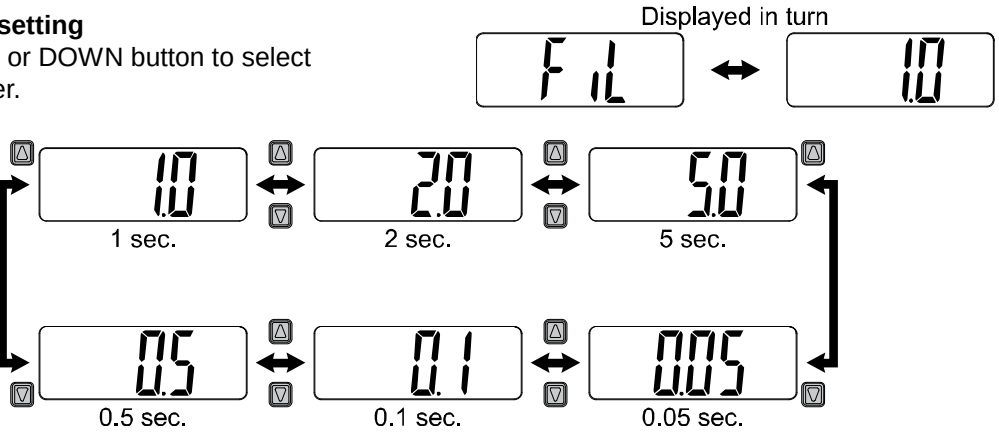
■[F 3] Digital filter setting

The digital filter can be selected to filter the flow measurement.
Output chattering or flicker in the measurement mode display can be reduced by setting the digital filter.

<Operation>
Press the UP or DOWN button in function selection mode to display [F 3].

Press the SET button. ⬇ Move on to digital filter setting.

Digital filter setting
Press the UP or DOWN button to select the digital filter.



Press the SET button to set. ⬇ Return to function selection mode.

[F 3] Digital filter setting completed

■[F 4] Auto-preset function setting

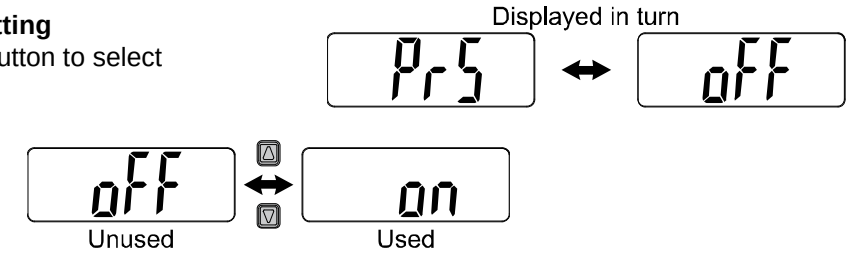
This function will automatically calculate and set the optimum pressure based on the actual operating condition, when hysteresis mode has been selected.

<Operation>

Press the UP or DOWN button in function selection mode to display [F 4].

Press the SET button. ⬇ Move on to Auto-preset function setting.

Auto-preset function setting
Press the UP or DOWN button to select the auto-preset function.



Press the SET button to set. ⬇ Return to function selection mode.

[F 4] Auto-preset function setting completed

●Auto-preset

When auto-preset is selected in function selection mode, the set value can be calculated and memorized from the measured flow. Repeating the suction and release of the workpiece to be set for several times will automatically optimize the set value.

(1) Selection of auto-preset OUT1 mode

Press the SET button in measurement mode to display [AP1].
(If setting of OUT1 is not necessary, select [AP1], and then press the UP and DOWN buttons simultaneously for 1 second or longer.
The display will move to [AP2]).

Auto-preset is ready

(2) Preparation of equipment for OUT1

Prepare the equipment for which the flow of OUT1 is to be set.

(3) Setting of auto-preset for OUT1

Press the SET button to flash [AP1].
Measurement starts. Operate the device to change the flow.
(If the UP and DOWN buttons are pressed simultaneously for 1 second or longer while "AP1" is displayed, measurement will be stopped and [AP2] will return.)

Auto-preset measurement start

(4) Selection of auto-preset OUT2 mode

Press the SET button to set [P_1], [H_1] ([n_1], [H_1] in reverse output mode) to display [AP2].
(If the setting of OUT1 is not necessary, press the UP and DOWN buttons simultaneously for 1 second or longer after [AP1] display. The display will move to measurement mode).

(5) Preparation of equipment for OUT2

Prepare equipment for which the flow of OUT2 is to be set, and set the value of OUT2 as in OUT1.
[AP2 RUn] will be flashed and measurement will start.
(If the UP and DOWN buttons are pressed simultaneously for 1 second or longer while "AP1" is displayed, measurement will be stopped and measurement mode will return.)

(6) Complete setup

Press the SET button to set the set value of [P_2] and [H_2] and complete the auto-preset mode. Then, measurement mode returns.
([n_2], [H_2] in reverse output mode.)

The settings and hysteresis in auto-preset will be as follows.

Output type	Setting items	Calculation formula	A: Maximum measured auto-preset value B: Minimum measured auto-preset value
Normal	Set value	Calculated value = $A-\frac{A-B}{4}$	
Reverse		Calculated value = $B+\frac{A-B}{4}$	
Normal Reverse	Hysteresis	Calculated value = $\frac{A-B}{2}$	

If setting is not necessary press the UP and DOWN buttons simultaneously for 1 second or longer.

■[F10] Display mode setting

Select instantaneous flow or accumulated flow to be displayed.

<Operation>

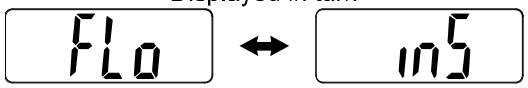
Press the UP or DOWN button in function selection mode to display [F 4].

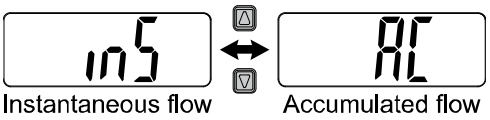
Press the SET button. ⬇ Move on to display mode setting.

Display mode setting

Press the UP or DOWN button to select the display mode setting.

Displayed in turn





Press the SET button to set. ⬇ Return to function selection mode.

[F10] Display mode setting completed

•The accumulation flow count will start when power is supplied.
Accumulated flow can be displayed within the range below.

Unit	PF2M710	PF2M725	PF2M750	PF2M711
L	99999999.9	999999999	999999999	999999999
ft^3	9999999.99	9999999.99	9999999.99	99999999.9

•Accumulated flow is displayed to the Power (x103, x106) and the first 4 digits are constantly displayed.

Accumulated flow value Unit: L	Display (Power value is displayed.)		3 types of display		
	Display screen	Units indication	Upper	Middle	Lower
0.0	0.0	LED is off	0	0	0.0
1234.0	1.234	$\times 10^3$	0	12	34.0
7654321.0	7.654	$\times 10^6$	76	543	21.0
99999999.9 or more	99.9 (flashing)	$\times 10^6$	999 (flashing)	999 (flashing)	999 (flashing)

•The accumulated value can be reset as follows.

•Reset by pressing the SET button. (Refer to page 56)

•Turn the power on.

(When using the accumulated value hold is used (page 47), reset cannot be performed even if the power is applied again.)

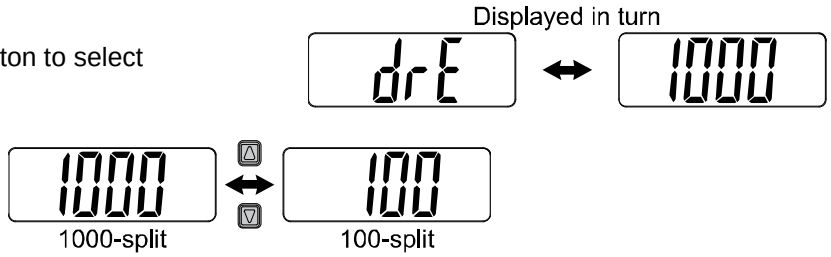
■[F11] Display resolution setting

This function is only available for the 10 and 100 L/min types.
The minimum setting unit can be changed by selecting the display resolution.

<Operation>
Press the UP or DOWN button in function selection mode to display [F11].

Press the SET button. ⬇ Move on to display resolution setting.

Display resolution setting
Press the UP or DOWN button to select the display resolution.



Press the SET button to set. ⬇ Return to function selection mode.

[F11] Display resolution setting completed

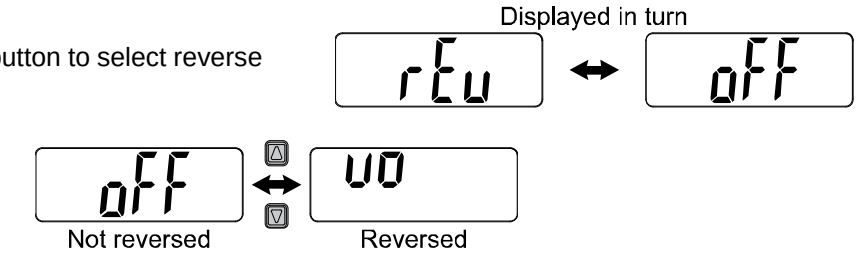
■[F13] Setting for reverse display mode

The display orientation can be changed for ease of operation.
It is used to correct the display when it is upside down due to installation of the product.

<Operation>
Press the UP or DOWN button in function selection mode to display [F13].

Press the SET button. ⬇ Move on to the setting for reverse display mode.

Reverse display setting
Press the UP or DOWN button to select reverse display function.



Press the SET button to set. ⬇ Return to function selection mode.

[F13] Setting for reverse display mode completed

■[F14] Zero cut-off setting

Forced display of zero to remove flickering at the lower limit during measurement.

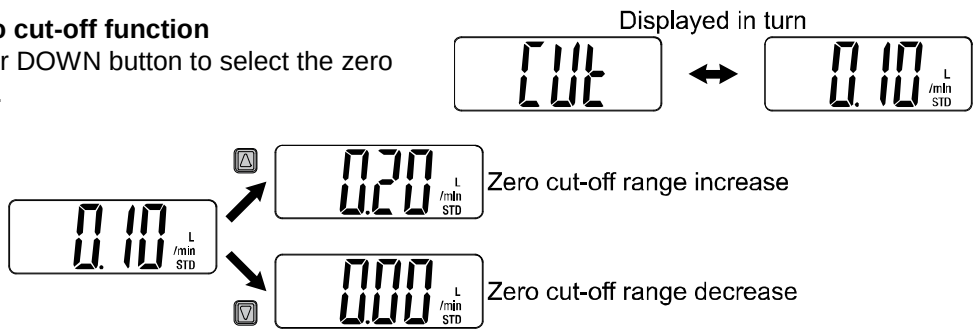
<Operation>

Press the UP or DOWN button in function selection mode to display [F14].

Press the SET button. ⬇ Move on to the setting of the zero cut-off function.

Setting of zero cut-off function

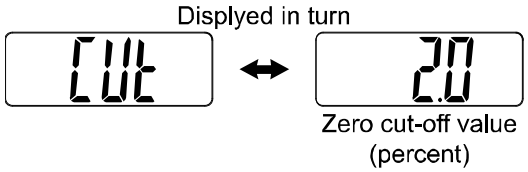
Press the UP or DOWN button to select the zero cut-off function.



Press the SET button to set. ⬇ Move on to checking the zero cut-off set value.

Check the zero cut-off set value

The set zero cut-off range is displayed in percent (%).



During the checking of the Zero cut-off set value

Press the UP and DOWN button simultaneously for 1 second or longer for resetting the set value (to the default value).

Press the SET button to set. ⬇ Return to function selection mode.

[F14] Zero cut-off setting completed

■[F22] Analogue output and analogue free span function setting

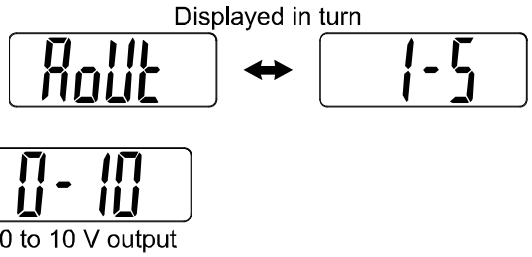
This function is available when the model includes the analogue output.
Change the analogue output set value and analogue free span.

<Operation>

Press the UP or DOWN button in function selection mode to display [F22].

Press the SET button. ⬇ Move on to the setting of analogue output.

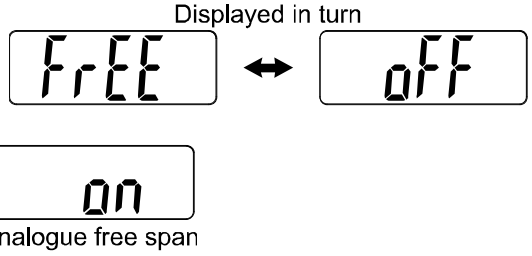
Setting of analogue output (only voltage output)
Press the UP or DOWN button to select 1 to 5 V output or 0 to 10 V output.



∗: Only 4 to -20 mA is available for current output. The display will be [---] and not settable.

Press the SET button to set. ⬇ Move on to the setting of analogue free span.

Setting of analogue free span
Press the UP or DOWN button to select analogue free span function.



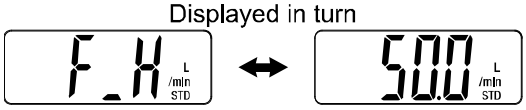
[oFF] is selected
Press the SET button to set.

[on] is selected
Press the SET button to set.

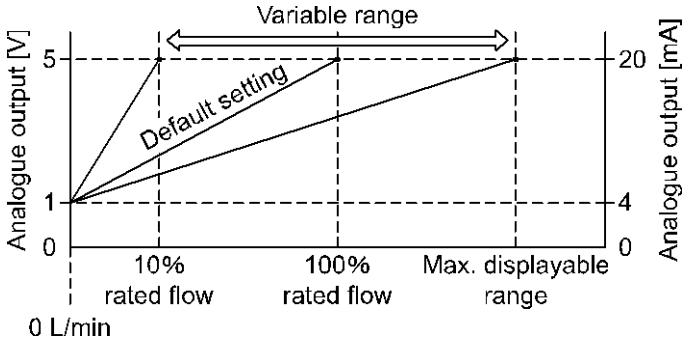
Input of set value

Press the UP or DOWN button to set the flow value that will be output, 5 V (10 V) or 20 mA.

Displayed in turn



The entered flow value can be in the range: 10% of the max. rated flow, to the upper display limit.



Press the SET button to set. ⬇ Return to function selection mode.

[F22] Analogue output analogue free span setting function setting completed

■[F30] Accumulated flow value hold setting

The accumulated flow value can be held for 2 or 5 minutes.

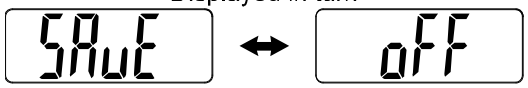
<Operation>

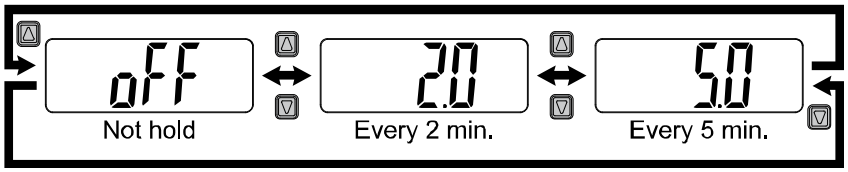
Press the UP or DOWN button in function selection mode to display [F30].

Press the SET button. ⬇ Move to the accumulated flow value hold setting.

Accumulated flow value hold setting
Press the UP or DOWN button to select the accumulate flow value hold.

Displayed in turn





Press the SET button to set. ⬇ Return to function selection mode.

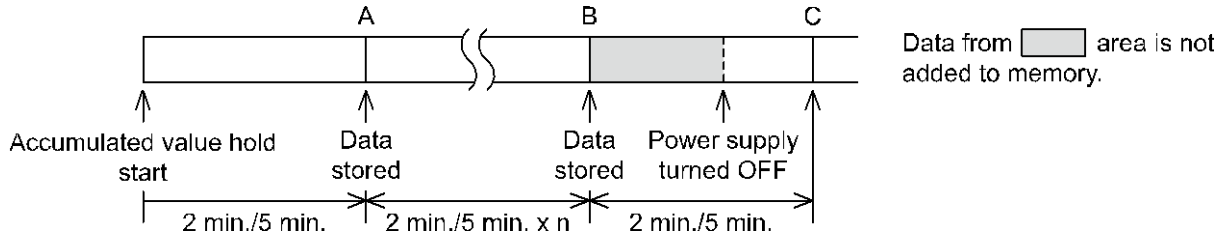
[F30] Setting of accumulated flow value hold completed

∗: When using the Accumulated flow hold function, calculate the product life according to the operating conditions, and use the product within its life. The limit of the number times the memory can be written to is 3.7 million times. If the product is operated 24 hours per day, the life will be as follows.

- Data stored every 5 minutes: 5 minutes x 3.7 million cycles = 18.5 million minutes = 35 years
- Data stored every 2 minutes: 2 minutes x 3.7 million cycles = 7.4 million minutes = 14 years

∗: The value is stored in memory every 2 or 5 minutes. If the power supply is turned off, the accumulated flow since the last time it was stored will be lost.

∗: When the power supply is turned on again, the accumulated flow count will start from the last value recorded at B.



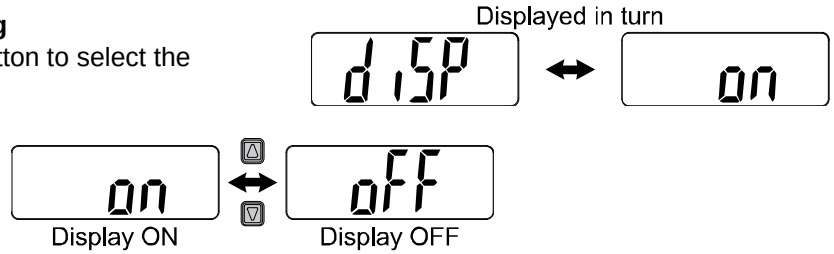
■[F80] Display OFF mode setting

Display OFF mode can be selected.
This function will turn the display OFF if no buttons are pressed for 30 seconds.

<Operation>
Press the UP or DOWN button in function selection mode to display [F30].

Press the SET button. ⬇ Move on to the setting of display OFF mode.

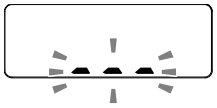
Display OFF mode setting
Press the UP or DOWN button to select the desired OFF mode.



Press the SET button to set. ⬇ Return to function selection mode.

[F80] Setting of display OFF mode completed

∗: In display OFF mode, the under bar of sub display flashes.
∗: When any button is activated, the display will turn on. If no button operation is performed within 30 seconds, the display will turn off again.



■[F81] Security code

The security code can be turned on or off and the security code can be changed when unlocked.

<Operation>

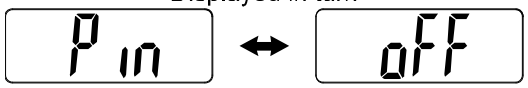
Press the UP or DOWN button in function selection mode to display [F81].

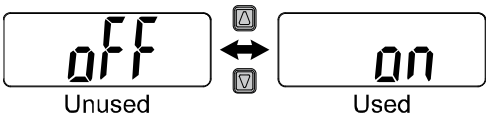
Press the SET button. ⬇ Move on to security code.

Security code

Press the UP or DOWN button to select the setting of security code.

Displayed in turn





Unused Used

[oFF] is selected
Press the SET button to return to function selection mode.

[on] is selected
Press the SET button to set. ⬇ Move on to check of the setting of security code.

Check of the setting of security code

Press the UP or DOWN button to set security code.
(The default setting is [000].)

For instructions on how to enter the security code, refer to "How to input and change the security code" on page 60.

After entry, the changed security code will flash by pressing the SET button for 1 second.
(At this point, the changing of the security code is not completed)

Press the UP or DOWN button to return to setting step.
If the security code entered is incorrect, [FAL] will be displayed, and the security code must be entered again.
If the wrong security code is entered 3 times, [LoC] is displayed.

Press the SET button to set. ⬇ Return to function selection mode.

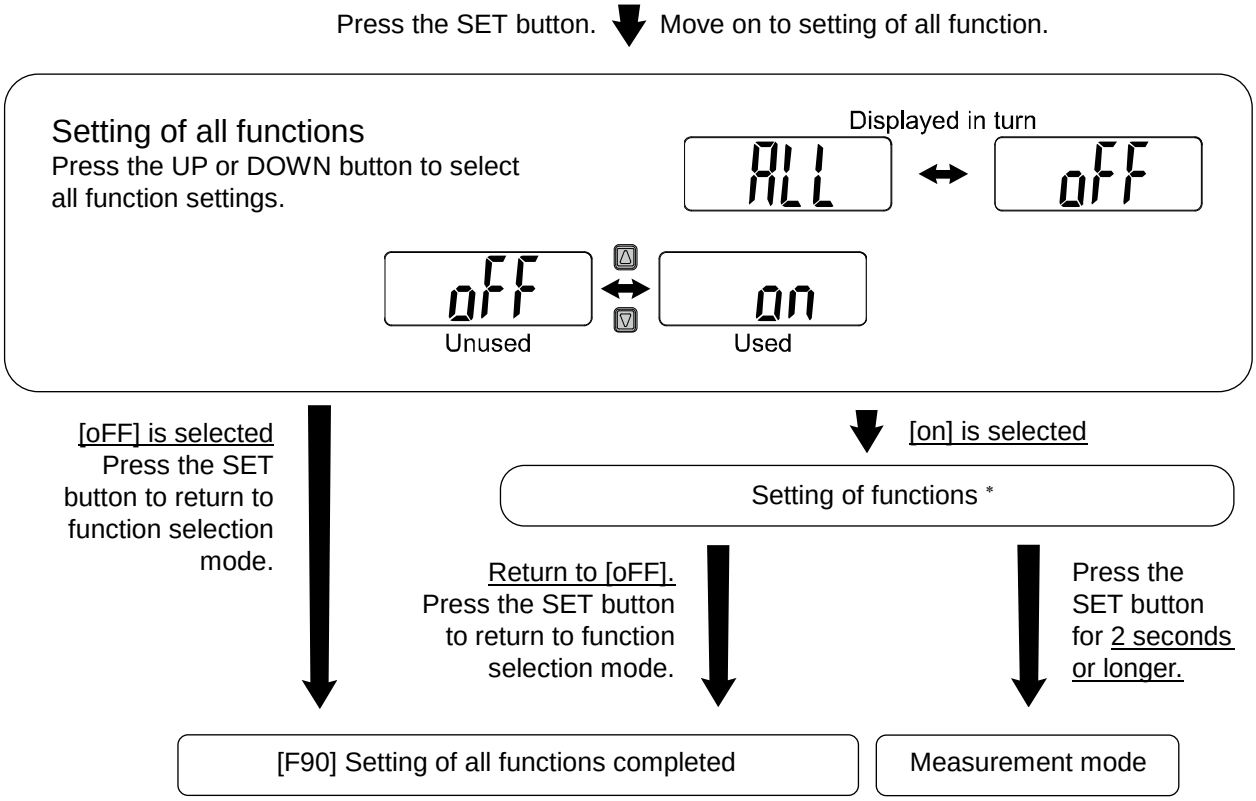
[F81] Security code completed

■[F90] Setting of all functions

Each time the S button is pressed, the function steps in the order shown in the following table.

<Operation>

Press the UP or DOWN button in function selection mode to display [F90].



*: Setting of functions

Every time the SET button is pressed, the next function is displayed in order (refer to the following table).
Set by using the UP or DOWN buttons.

Refer to each paragraph for the setting details.

●Order of Function Setting

Order	Function
1	Fluid/Units criteria/measurement unit setting
2	Setting of OUT1
3	Setting of OUT2
4	Digital filter setting
5	Auto-preset function setting
6	Display mode
7	Display resolution setting
8	Reverse display setting
9	Setting of zero cut-off function
10	Analogue output and free span function
11	Accumulated flow value hold setting
12	Set display OFF mode
13	Security code

∗: Measurement mode can return from any setting item by pressing the SET button for 2 seconds or longer.

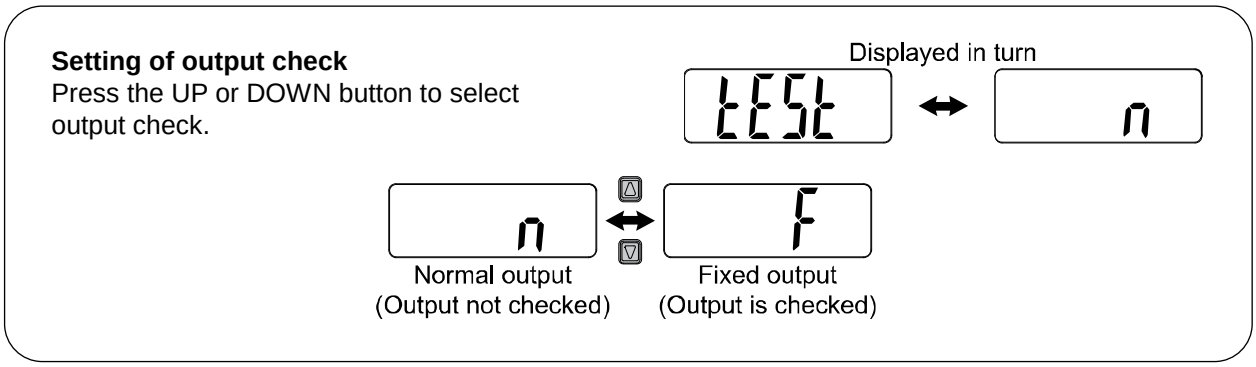
∗: Function set before returning to the measurement mode is maintained.

■[F98] Setting of output check

The switch output and analogue output can be checked.
The output can be turned ON/OFF manually.

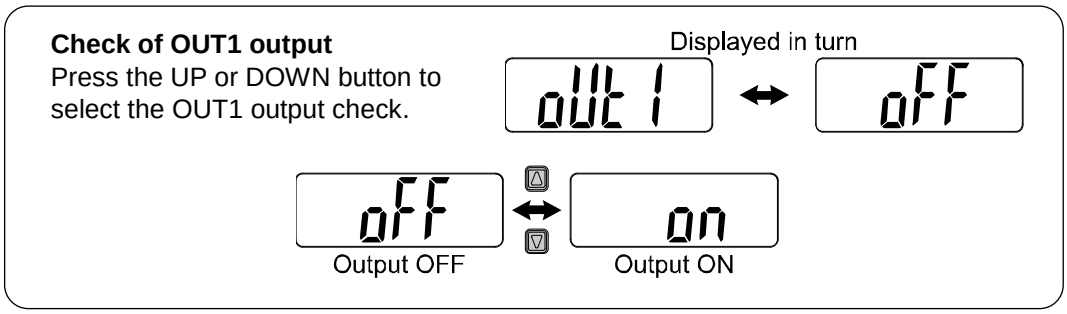
<Operation>
Press the UP or DOWN button in function selection mode to display [F98].

Press the SET button. ⬇ Move on to the setting of output check.

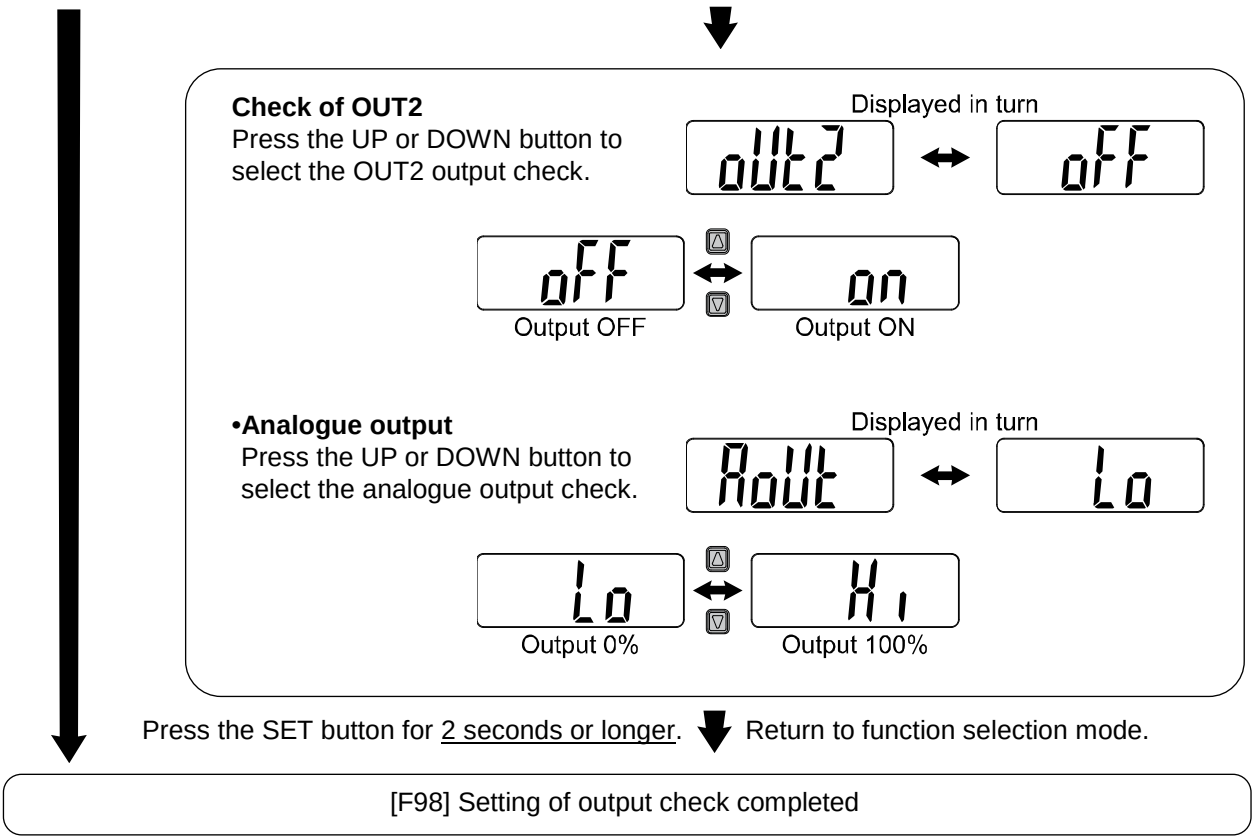


[n] (Normal output)is selected
Press the SET button to return to function selection mode.

[F] (Fixed output) is selected
Press the SET button to set. ⬇ Move on to output check of OUT1.



Press the SET button to set. ⬇ Move on the OUT2 output check.



Press the SET button for 2 seconds or longer. Return to function selection mode.

[F98] Setting of output check completed

∗: Measurement mode can return from any setting item by pressing the SET button for 2 seconds or longer.

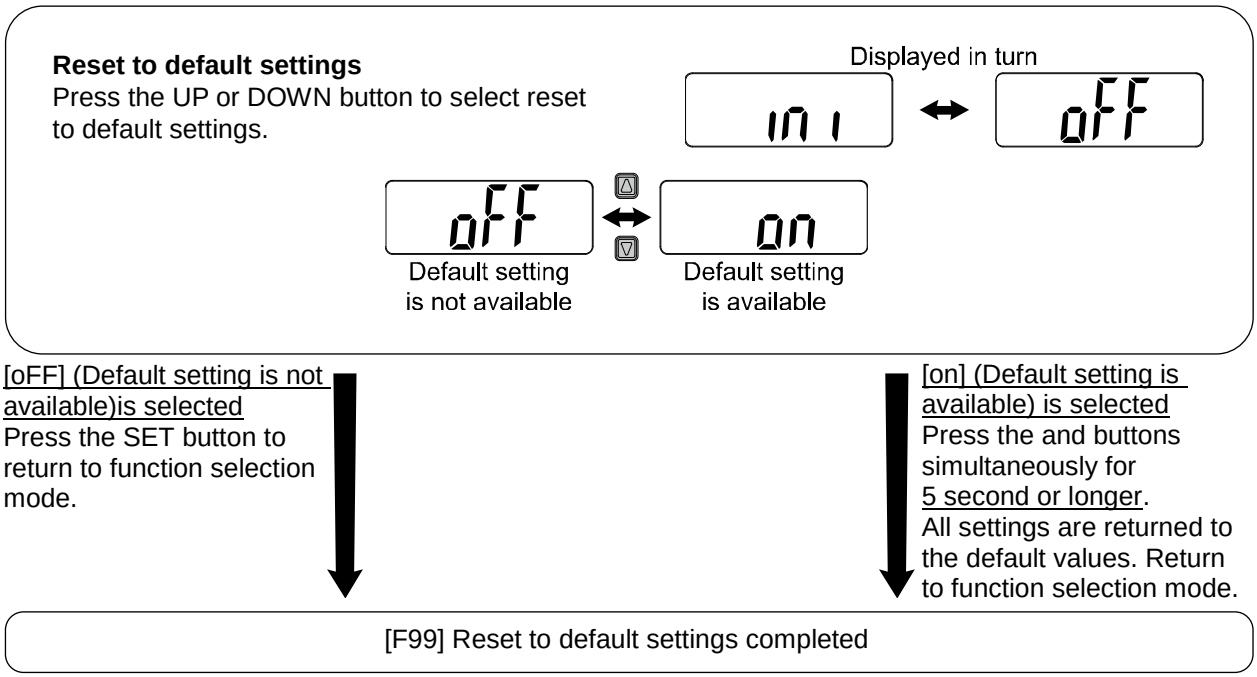
■[F99] Reset to default settings

If the product settings are uncertain, the default values can be restored.

<Operation>

Press the UP or DOWN button in function selection mode to display [F99].

Press the SET button. ⬇ Move on to reset to default settings.



[oFF] (Default setting is not available)is selected
Press the SET button to return to function selection mode.

[on] (Default setting is available) is selected
Press the and buttons simultaneously for 5 second or longer.
All settings are returned to the default values. Return to function selection mode.

[F99] Reset to default settings completed

Other Settings

●Snap shot function

The current flow value can be stored to the switch output ON/OFF set point.
When the threshold values have been selected from the table below during the setting of [F 1] OUT1 and [F 2] OUT2, in Simple setting mode or function selection mode, [---] is displayed when the UP and DOWN button are pressed simultaneously for 1 second or longer and the value according to the current flow rate is displayed automatically.

Output mode	Configurable items	Display	Snap shot function
Hysteresis mode	OUT1, OUT2 set value	P_1 (n_1), P_2 (n_2)	○
	Hysteresis	H_1, H_2	○
Window comparator mode	OUT1, OUT2 set value	P1L (n1L), P1H (n1H) P2L (n2L), P2H (n2H)	○
	Hysteresis	H1, H2	×

•OUT1set value and OUT2 set value
The value is set to the same value as the flow value (current flow value).
(There is a range which cannot be set to the current flow depending on the hysteresis. In that case, the value is set to the closest value.)

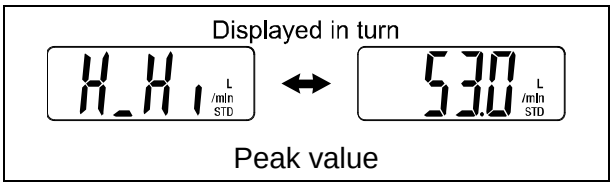
•Hysteresis
The hysteresis is calculated from the equation below and set.

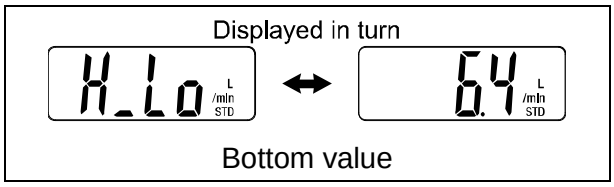
Normal output: (OUT1 (2) set value) - (current flow value)
Reverse output: (current flow value) - (OUT1 (2) set value)

If the calculation result becomes 0 or less, [Err] is displayed on the display and the set value is not changed.
Afterwards, it is possible to adjust the value by pressing the UP or DOWN button.

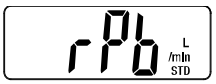
●Peak/bottom value indication

The maximum (minimum) flow when the power is supplied is detected and updated.
In peak/bottom indication mode, the current flow is displayed.
Current peak (bottom) value will be displayed by pressing the UP or DOWN button for 1 second or longer during measurement mode.





Peak/ Bottom value is cleared if the power supply is disconnected.
Current peak (bottom) value will be cleared by pressing the UP and DOWN simultaneously button for 1 second or longer while peak/bottom value is displayed.



Reset of peak/bottom value

●Reset

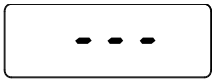
Accumulated flow rate can be reset by pressing the SET and DOWN button simultaneously for 1 second or longer during accumulated flow.

Reset of the accumulated flow value

●Zero-clear function

The measured flow rate can be cleared to zero by pressing the UP and DOWN button simultaneously for 1 second or longer during instantaneous flow.

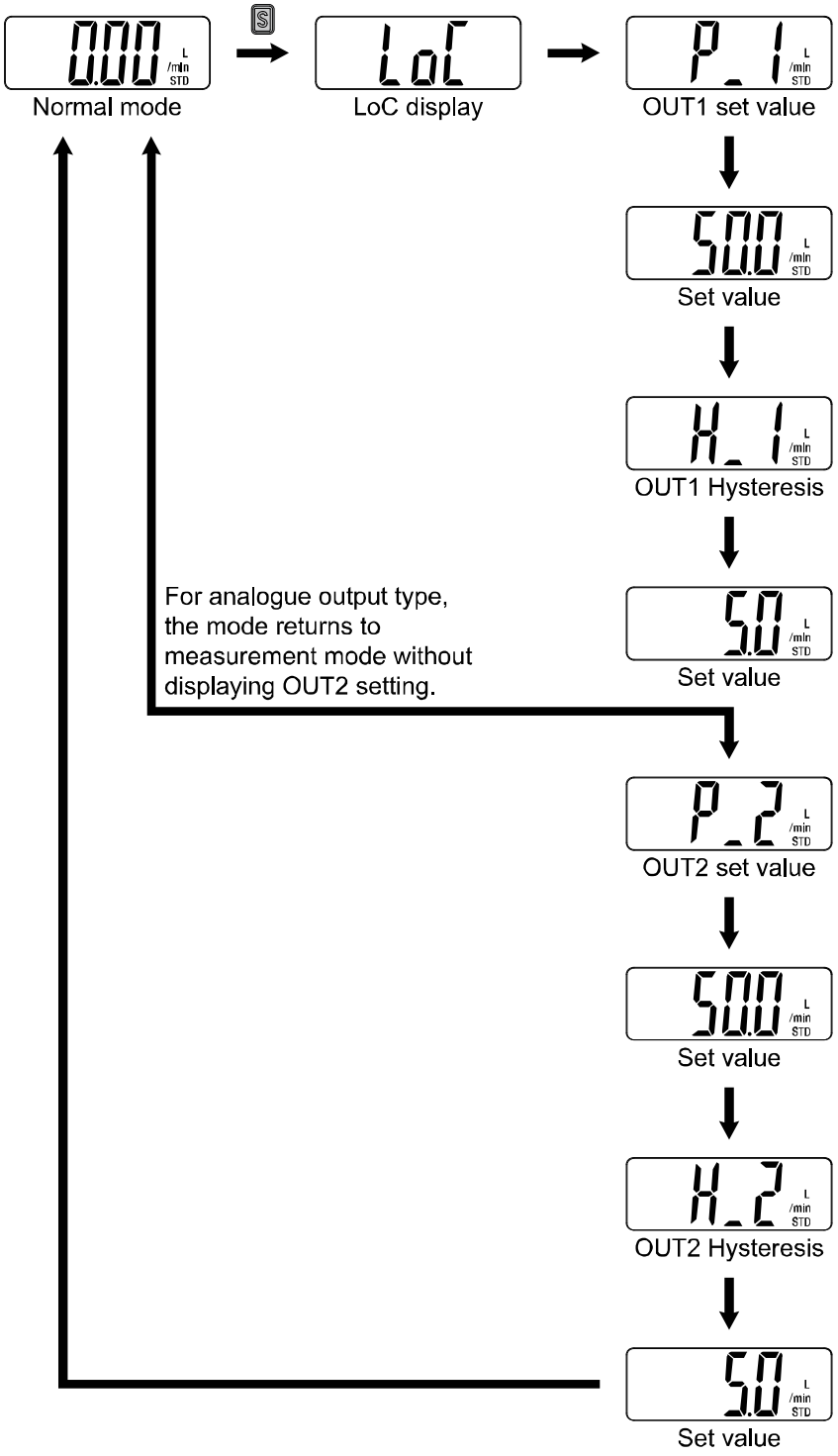
The value can be adjusted within the range +/-5% F.S. from the default condition.



Zero-clear display

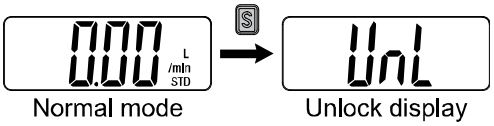
●Key-lock function

The key-lock function is used to prevent errors occurring due to unintentional changes of the set values. [LoC] is displayed on screen by pressing the SET button during key lock setting mode. Then, the current set value and hysteresis of OUT1 (OUT2) will be displayed in turn.



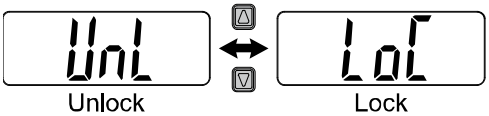
<Operation -**Without security code input**->

(1) Press the SET button for 5 seconds or longer in measurement mode. When [UnL] is displayed on the display, release the button.
(To release key-lock repeat the above operation.)



Normal mode　　Unlock display

(2) Select the key locking [LoC]/un-locking [UnLoc] with the UP or DOWN button, and press the SET button to set.

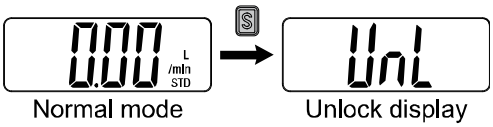


Unlock　　Lock

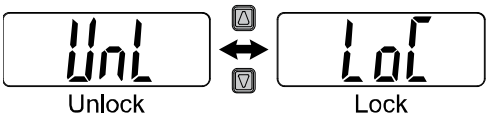
<Operation -**With security code input**->

•Locking

(1) Press the SET button for 5 seconds or longer in measurement mode. When [UnL] is displayed on the display, release the button.

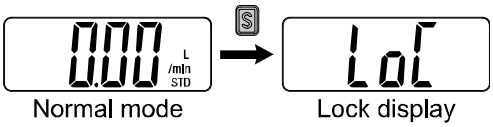


(2) Select the key [LoC] with UP or DOWN button, and press the SET button to set.

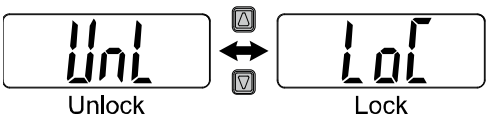


•Unlocking

(1) Press the SET button for 5 seconds or longer in measurement mode. When [LoC] is flashed on the display, release the button.



(2) Press the UP or DOWN button to select unlock [UnL] and press the SET button. The security code is required to enter.



(3) For instructions on how to enter the security code, refer to "How to input and change the security code" on page 60.

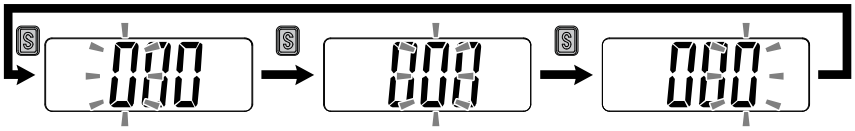
(4) When the security code is correct, [UnL] will be displayed.
If the security code entered is incorrect, [FAL] will be displayed, and the security code must be entered again. If the wrong security code is entered 3 times, [LoC] is displayed and the device returns to measurement mode.

(5) Press any of the UP, SET or DOWN buttons to release the lock and return to measurement mode.

●**How to input and change the security code**

The left most digit starts flashing.
Press the UP or DOWN button to select a value.
Press the SET button to make the next digit to the right flash.
(If the SER button is pressed at the last digit, the first digit will start flashing.)

After the setting is complete, Press and hold the SET button for 1 second or longer.
(If an operation is not performed for 30 seconds during input or change of the security code, it will return to measurement mode.)



●Zero-clear function

The displayed value can be adjusted to zero if the flow being measured is within ±5%F.S of the zero point set at the time of default settings.
(The zero clear range varies by ±1%F.S. due to variation between individual products.)
When the UP and DOWN buttons are pressed simultaneously for 1 second or longer, the displayed value is cleared to “zero”.
The display returns to measurement mode automatically.

Maintenance

How to reset the product after a power cut or forcible de-energizing

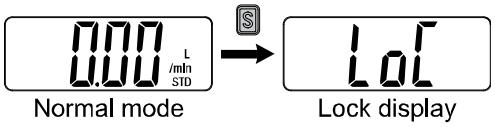
The setting of the product will be retained as it was before a power cut or de-energizing. The output condition is also basically recovered to that before a power cut or de-energizing, but may change depending on the operating environment.

Forgotten the security code

Use the procedure below when the security code has been forgotten.

<Operation>

Press the SET button for 5 seconds or longer in measurement mode. When [LoC] is flashed on the display, release the button.



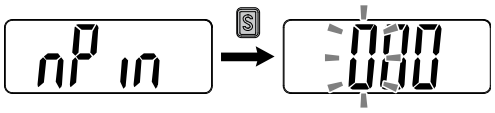
Normal mode　　Lock display

Press the UP and DOWN buttons simultaneously for 5 second or longer.
Press the SET and DOWN buttons simultaneously for 5 second or longer.

∗: Display is not changed.

(If another operation is performed or no operation is performed for 30 seconds, the display will return to measurement mode.)

Press the UP and SET buttons simultaneously for 5 second or longer.
[nPin] is displayed, and the security code change mode is available.
(If an operation is not performed for 30 seconds, the display will return to measurement mode.)



Decide on the security code referring to "How to input and change the security code" on page 60.

When input is completed, the selected security code flashes.
After checking the security code is as required, press the SET button for 1 second or longer.
Return to measurement mode.
At this time, if the UP or DOWN buttons are pressed, any security code changes are lost, and the change of security code must be repeated.

Troubleshooting

If an operation failure occurs with the product, use the chart below to find out the cause of the problem.
If a cause applicable to the troubles cannot be identified and normal operation can be recovered by replacement with a new product, this indicates that the product itself was faulty. A product can be damaged by the operating environment (system configuration etc). If the product seems to be faulty, please contact SMC.

●Faults and countermeasures

Problem		Possible cause	Item to check	Countermeasure
Display	No Display	Incorrect wiring	Check that the brown and blue wires are connected to DC (+) and DC (−) respectively.	Correct the wiring.
		Loose connector	Check the connectors.	Correct the connector wiring.
	[H_Hi] and [H_Lo] are displayed in turn.	Peak/bottom value display mode is selected	Check if the peak value or bottom value display mode has been selected.	Refer to "Peak/bottom value display" (page 55), and remove the setting.
	Display is not stable	Foreign matter has entered the flow passage or adhered to the sensor	(1) Check if any foreign matter has entered the flow passage. (2) Check if there is foreign matter on the mesh.	Install a filter or mist separator on the IN side. If there is foreign matter on the mesh, remove it completely, taking care not to damage the product.
		Piping connected backwards	Check that the fluid flow is in the same direction as marked on the product body.	Mount the product so that the flow direction is the same as the arrow indicated on the side of the body.
		Flow is pulsing	Check if there is any supply pressure fluctuation or pressure pulsation due to the characteristics of the source compressor (or pump).	Change to a pressure source with less fluctuation or install a tank which reduces the pressure fluctuation.
		Air leakage	Check if there is air leakage in the piping.	Correct the piping.

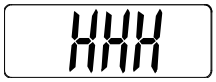
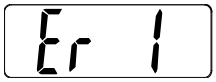
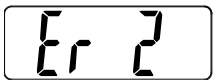
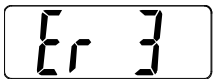
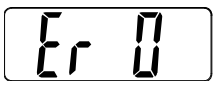
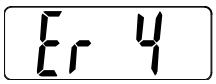
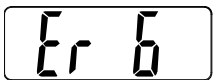
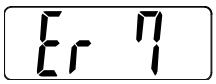
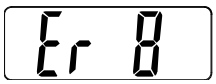
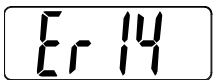
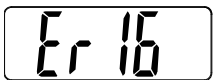
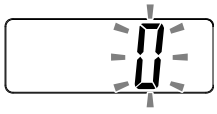
Problem		Possible cause	Item to check	Countermeasure
Display	Incorrect display	Foreign matter has entered the flow passage or adhered to the sensor	(1) Check if any foreign matter has entered the flow passage. (2) Check if there is foreign matter on the mesh.	Install a filter or mist separator on the IN side. If there is foreign matter on the mesh, remove it completely, taking care not to damage the product.
		Piping in the reverse direction	Check that the fluid flow is in the same direction as marked on the product body.	Mount the product so that the flow direction is the same as the arrow indicated on the side of the body.
		Incorrect unit selection *1)	Check the selection of the flow unit.	Select the correct unit using the unit selection function.
		Air leakage	Check if there is air leakage in the piping.	Correct the piping.
	Flow does not start.	The flow adjustment valve is locked*2	Check the flow adjustment valve lock ring.	Loosen the lock ring before adjustment.

Problem		Possible cause	Item to check	Countermeasure
Output	No output	Incorrect wiring	Check that the brown, blue, black and white wires are connected correctly.	Correct the wiring.
		Connector is disconnected	Check the connectors.	Correct the connector wiring.
	Output is unstable	Foreign matter has entered the flow passage or adhered to the sensor	(1) Check if any foreign matter has entered the flow passage. (2) Check if there is foreign matter on the mesh.	Install a filter or mist separator on the IN side. If there is foreign matter on the mesh, remove it completely, taking care not to damage the product.
		Piping in the reverse direction	Check that the fluid flow is in the same direction as marked on the product body.	Mount the product so that the flow direction is the same as the arrow indicated on the side of the body.
		Flow is pulsing	Check if there is any supply pressure fluctuation or pressure pulsation due to the characteristics of the source compressor (or pump).	Change to a pressure source with less fluctuation or install a tank which reduces the pressure fluctuation.
		Air leakage	Check if there is air leakage in the piping.	Correct the piping.
		Hysteresis value too low	Check the hysteresis set value.	Increase the hysteresis set value.
Button	No reaction when the buttons are pressed	The keys are locked	Check if [Loc] is displayed when the buttons are pressed.	Release the key-lock function. (page 57)
Flow adjustment valve	The flow adjustment valve fails to adjust the flow *2	The flow adjustment valve is locked	Check the lock ring on the flow adjustment valve.	Loosen the lock ring, and then adjust the flow adjustment valve.

∗1: Product with unit selection function

∗2: The table lists the parts when a flow adjusting valve is included.

■Error indication

Error Name	Error displayed	Description	Measures
Instantaneous flow error		Flow exceeding the upper limit of the set flow range is applied.	Reduce the flow.
		Flow exceeding the lower limit of the set flow range is applied.	Ensure the flow is in the correct direction.
OUT1 over current error		The load current applied to the switch output has exceeded the maximum value. (OUT1)	Turn the power off and remove the cause of the over current. Then turn the power on again.
OUT2 over current error		The load current applied to the switch output has exceeded the maximum value. (OUT2)	
Zero clear error		During zero clear operation, pressure greater than ±5% F.S. is applied. (The mode is returned to measurement mode automatically 1 second later).	Retry the zero clear operation without applying fluid.
System error		An internal data error has occurred.	Turn the power off and turn it on again.
			
			
			
			
			
			
			
Accumulated flow error *1	 Accumulated flow is displayed (flashing)	The accumulated flow has exceeded the accumulated flow range. (For accumulated increment)	Reset the accumulated flow. (Press the UP and DOWN buttons simultaneously for 1 second or longer) (page 56)
	 Accumulated flow is displayed (flashing)	The accumulated flow has reached the set accumulated flow. (For accumulated decrement)	

∗1: A decimal point will be displayed depending on the flow range or measurement unit setting.
∗: If the error cannot be reset after the above measures are taken, or errors other than above are displayed, please contact SMC.

Specifications

Model			PF2M710	PF2M725	PF2M750	PF2M711
Fluid	Applicable fluid *1		Dry air, N_2, Ar, CO_2 (ISO8573-1 1.1.2 to 1.6.2)			
	Fluid temperature range		0 to 50 °C			
Flow rate spec.	Detection method		Thermal type (branch flow type)			
	Rated flow range	Dry air, N_2, Ar	0.1 to 10 L/min	0.3 to 25 L/min	0.5 to 50 L/min	1 to 100 L/min
		CO_2	0.1 to 5 L/min	0.3 to 12.5 L/min	0.5 to 25 L/min	1 to 50 L/min
	Set flow range	Instantaneous flow	-5 to 105% (to maximum rated flow)			
		Accumulated flow	0.0 to 99999999.9 L	0 to 999999999 L		
	Min. setting unit	Instantaneous flow	0.01 L/min	0.1 L/min		
		Accumulated flow	0.1 L	1 L		
	Accumulated volume per pulse		0.1 L/Pulse			1 L/Pulse
	Accumulated value hold *2		Select from 2 minutes and 5 minutes			
Pressure spec.	Rated pressure range *3		-0.07 to 0.75 MPa			
	Proof pressure		1.0 MPa			
	Pressure loss		Refer to the pressure loss graph.			
	Pressure characteristics		±5%F.S. ±1 digit (0.35 MPa standard)			
Electric spec.	Power supply voltage *4		12 to 24 VDC ±10%			
	Current consumption		35 mA or less			
	Protection		Polarity protection			
Accuracy *5	Display accuracy		±3%F.S. ±1 digit			
	Analogue output accuracy		±3%F.S.			
	Repeatability		±1%F.S. ±1 digit (±2% F.S. ±1 digit when digital filter is set to 0.05 s)			
	Temperature characteristics		±3%F.S. ±1 digit (15 to 35 °C: 25 °C standard) ±5%F.S. ±1 digit (0 to 50 °C: 25 °C standard)			
Switch output	Output type		Select from NPN or PNP open collector output			
	Output mode		Select from hysteresis mode, window comparator mode, accumulated output mode, accumulated pulse output mode, error output and switch output OFF			
	Switch operation		Select from normal output and reversed output			
	Maximum load current		80 mA			
	Maximum applied voltage		28 VDC (NPN only)			
	Internal voltage drop		NPN: 1 V or less (Load current 80 mA) PNP: 1.5 V or less (Load current 80 mA)			
	Response time *6		50 mA or less			
	Delay time *7		0 to 0.10 s (0.01 s increment), 0.1 to 1.0 s (0.1 s increment), 1 to 10 s (1 s increment) Select from 20 s, 30 s, 40 s, 50 s, 60 s			
	Hysteresis *8		Variable			
	Protection		Short circuit protection			

Model			PFM710	PFM725	PFM750	PFM711
Analogue output *9	Output type		Voltage output: 1 to 5 V (or 0 to 10 V) *10, Current 4 to 20 mA			
	Impedance	Voltage	Output impedance approx.1 kΩ			
		Current	Max. load impedance Power supply voltage 24 V: 600 Ω Power supply voltage 12 V: 300 Ω			
	Response time *6		50 ms ±40%			
Display	Reference condition *11		Select from normal condition (STD) and Standard condition (NOR)			
	Output mode		Select from instantaneous flow and accumulated flow			
	Unit *12	Instantaneous flow	L/min, cfm			
		Accumulated flow	L, ft^3			
	Displayable range	Instantaneous flow	-0.5 to 10.5 L/min	-1.3 to 26.3 L/min	-2.5 to 52.5 L/min	-5 to 105 L/min
		Zero cut-off range	0 to ±10%F.S. (selected for every 1%F.S. of max. rated flow rate)			
		Accumulated flow *13	0.0 to 99999999.9 L	0 to 999999999 L		
	Display		Display type: LCD, Display colour: Red, green, Display digit: 7-segment, 4 digits			
	Operation LED		LED is ON when switch output is ON, OUT1/OUT2: Orange			
Digital filter *14			Select from 0.05 s, 0.1 s, 0.5 s, 1 s, 2 s and 5 s			
Environmental resistance	Enclosure		IP40			
	Withstand voltage		1000 VAC, 1 min. between terminals and housing			
	Insulation resistance		50 MΩ or longer (with 500 VDC) between terminals and housing			
	Operating temperature range		Operation: 0 to 50 °C, Storage: -10 to 60 °C (no freezing or condensation)			
	Operating humidity range		Operation, Storage: 35 to 85%R.H. (no freezing or condensation)			
Standards			CE marked (EMC directive, RoHS directive)			
Piping *15	Piping specification		C6 (ϕ6)			C8 (ϕ8)
	Port direction		Straight			
Material fluid contact parts			PPS, PBT, FKM, SUS304, brass (Electroless nickel plating), Si, Au, GE4F			
Weight	Body		40 g			48 g
	Flow adjustment valve		+34 g			
	Lead wire		+35 g			
	Bracket		+20 g			
	Panel mount adapter		+15 g			
	DIN rail mounting bracket		+65 g			

∗1: Refer to the recommended pneumatic circuit.
∗2: When using the Accumulated flow hold function, calculate the product life according to the operating conditions, and use the product within its life. The limit of the number times the memory can be written to is 3.7 million times. If the product is operated 24 hours per day, the life will be as follows.
▪Data stored every 5 minutes: 5 minutes x 3.7 million cycles = 18.5 million minutes = 35 years
▪Data stored every 2 minutes: 2 minutes x 3.7 million cycles = 7.4 million minutes = 14 years
∗3: Load describes the pressure on the IN side (upstream side).
∗4: When multiple products are installed closely, the upper limit of the power supply voltage is 24 VDC.
∗5: The accuracy value is based on dry air as a fluid. For other fluids, it is a reference value.
∗6: Value when the digital filter is set at 0.05 sec.
∗7: The time can be set from when the instantaneous flow reaches the set value, to when the switch output actually begins working.
∗8: If the applied voltage fluctuates around the set value, the width for setting more than the fluctuating width needs to be set. Otherwise, chattering will occur.
∗9: This function is available when the model includes an analogue output.
∗10: When selecting 0 to 10 V, refer to the analogue output graph for the allowable load current.
∗11: Standard condition (STD): 20 [ºC], 101.3 [kPa] (Absolute pressure), 65 [%R.H.]
(Flow rate in the specification is the value at standard condition)
Normal condition (NOR): 0 [ºC], 101.3 [kPa] (Absolute pressure), 0 [%R.H.]
∗12: This setting is only available for models with the units selection function.
∗13: Power value is displayed for accumulated flow. The first 4 digits of the measurement value are always displayed.
∗14: Set the time for digital filter to the sensor input. The response time indicates when the set value is 90% in relation to the step input.
∗15: Check the precautions for One-touch fitting before use. When the piping condition is changed, for example due to piping on the back of the product, use a general purpose fitting (KQ#L series).
Some piping conditions may have negative effects on the flow accuracy.
∗16: Any products with tiny scratches, smears, or display colour variation or brightness which does not affect the performance are verified as conforming products.

Cable specification: Lead wire with connector (ZS-33-D)

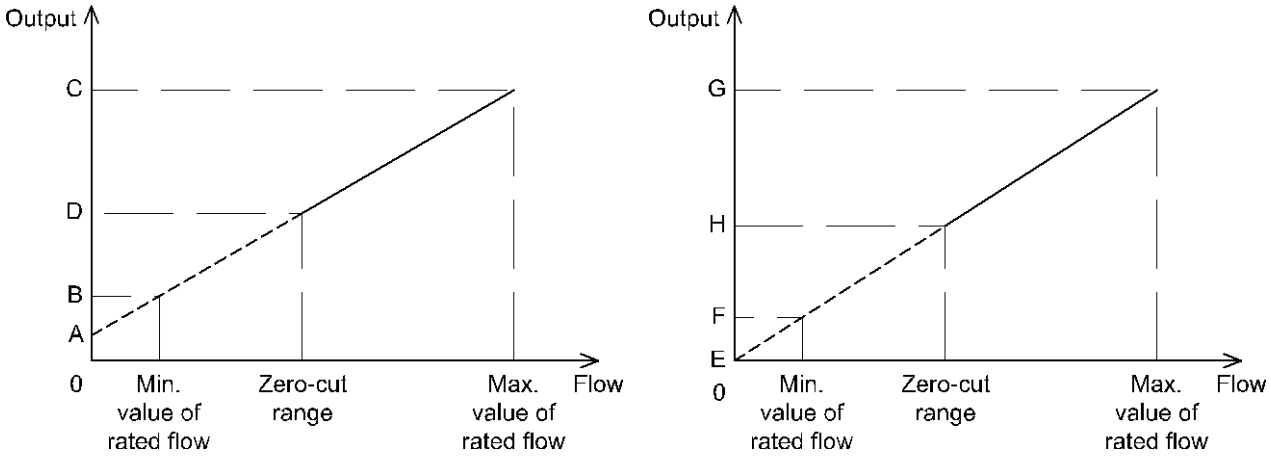
Items		Specifications
Conductor	Nominal cross section area	AWG26
Insulator	Outside diameter	Approx.1.00 mm
	Colours	Brown, White, Black, Blue
Sheath	Outer diameter	$\phi 3.5^{+0.10}_{-0.25}$

■Characteristics data

●Flow rate/Analogue output

	A	B *2		C
		PF2M710/750/711	PF2M725	
Voltage output (1 to 5 V)	1 V	1.04 V	1.05 V	5 V
Current output (4 to 20 mA)	4 mA	4.16 mA	4.19 mA	20 mA

	E	F		G
		PF2M710/750/711	PF2M725	
Voltage output (0 to 10 V) *1	0 V	0.10 V	0.12 V	10 V

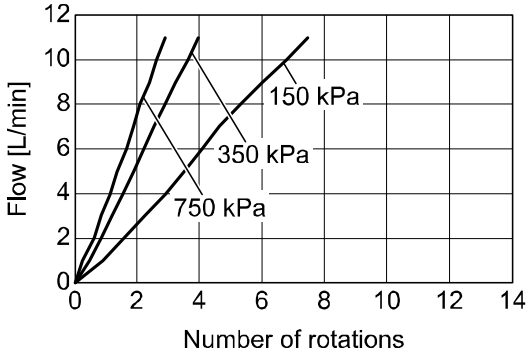


∗1: The analogue output current from the connected equipment should be 20 μA or less when selecting 0 to 10 V.
When more than 20 μA current flows, it is possible that the accuracy will not be satisfied below 0.5 V.

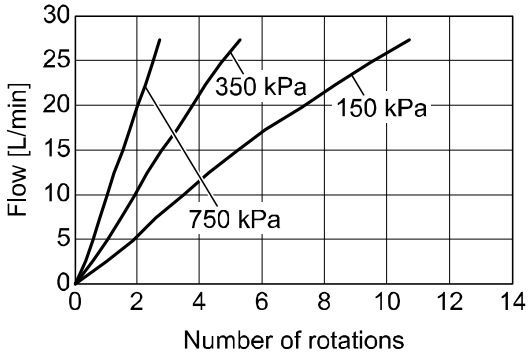
∗2: D or H changes based on the setting of the zero cut-off function.
When the zero cut-off function is set to “0”, the display starts from 0 L/min. In conditions other than horizontal installation and 0.35 MPa supply pressure, the output may not be 0 L/min.

●Flow adjustment needle revolution - Flow characteristics (reference data)

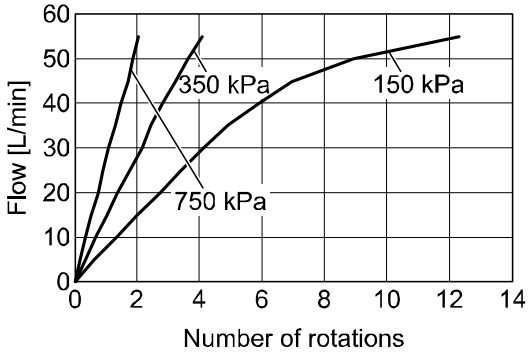
PF2M710 (10 L/min)



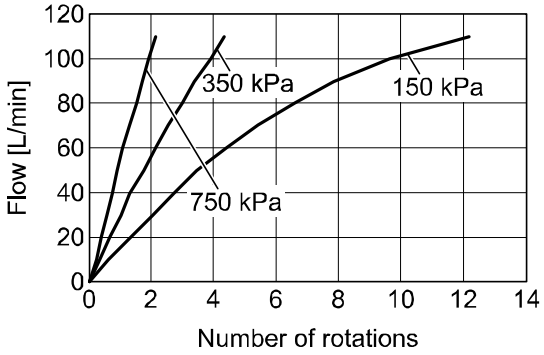
PF2M725 (25 L/min)



PF2M750 (50 L/min)

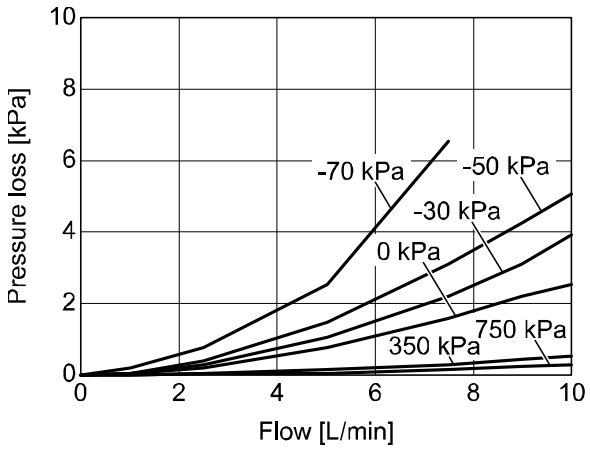


PF2M711 (100 L/min)

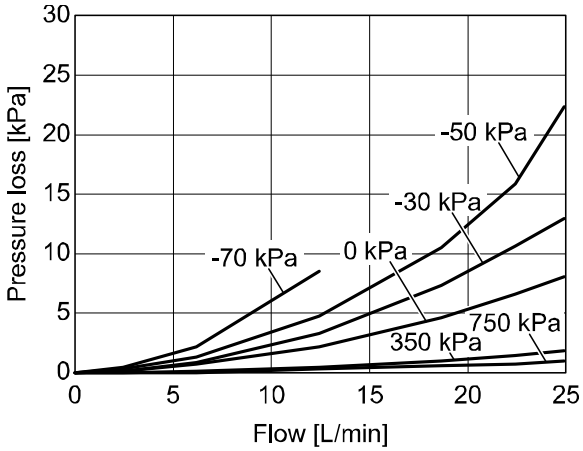


● Pressure loss (reference data): Without flow adjustment valve

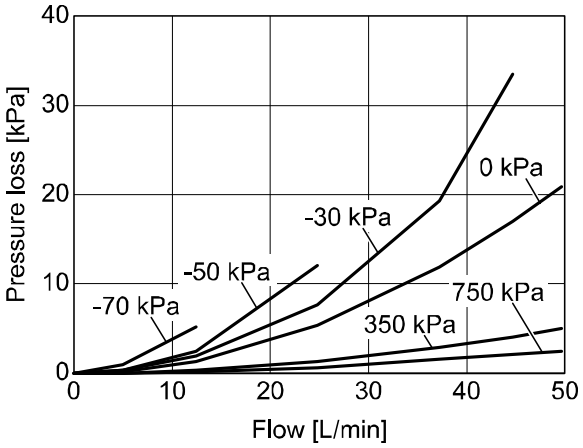
PF2M710 (10 L/min)



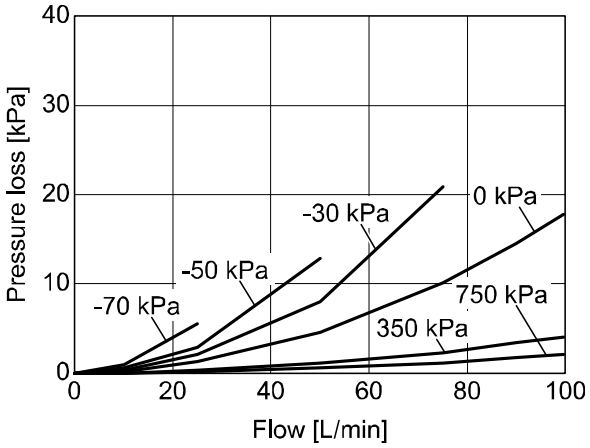
PF2M725 (25 L/min)



PF2M750 (50 L/min)



PF2M711 (100 L/min)

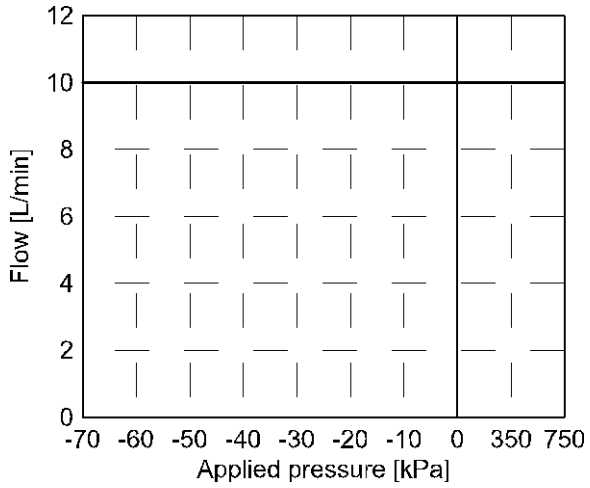


●Flow characteristic at negative pressure (reference data)

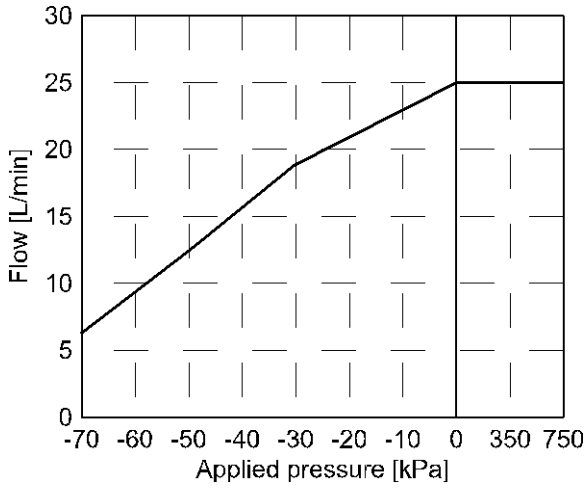
When the PF2M series is used with negative pressure (-70 to 0 kPa), the measurable range varies depending on the flow range.

Select the flow range referring to the chart below.

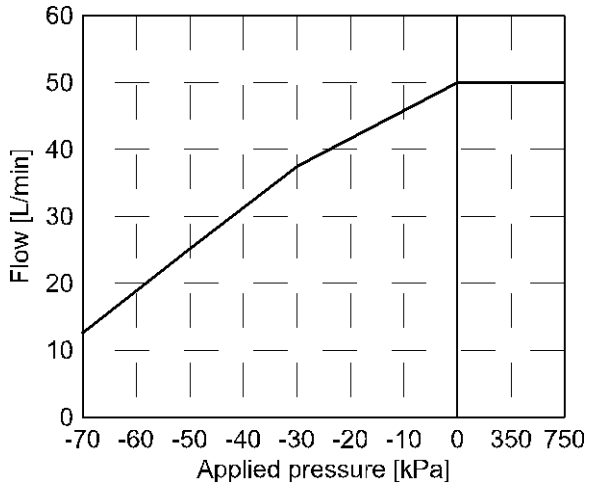
PF2M710 (10 L/min)



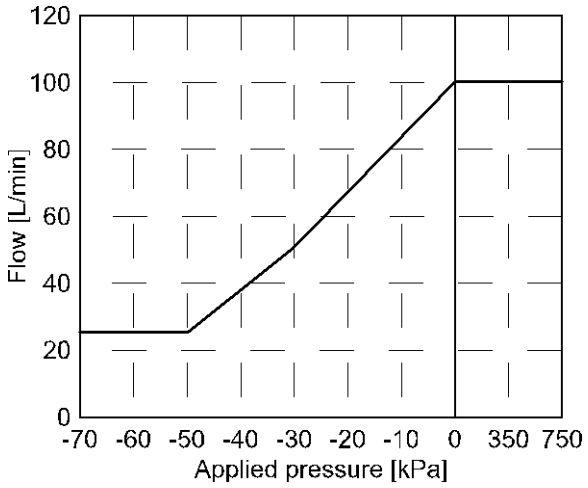
PF2M725 (25 L/min)



PF2M750 (50 L/min)

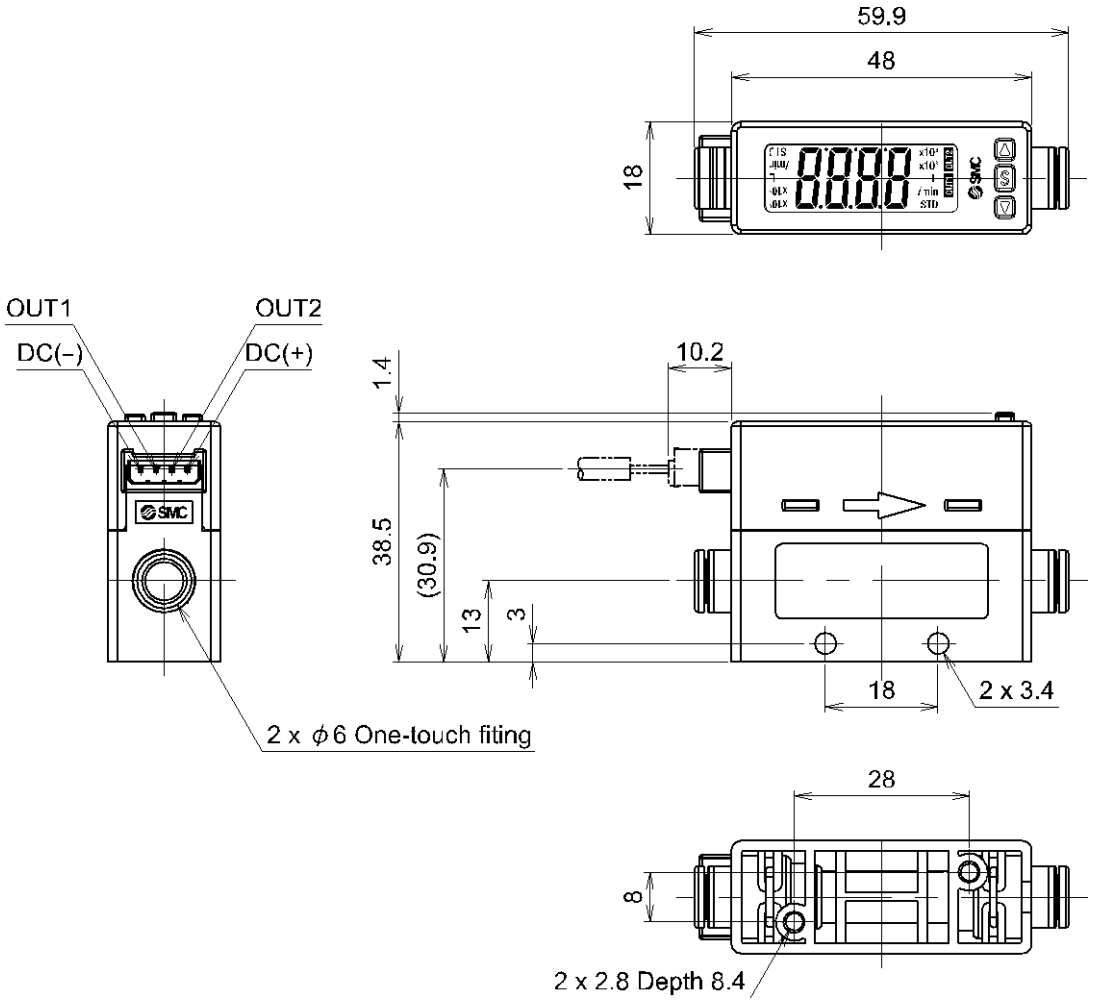


PF2M711 (100 L/min)

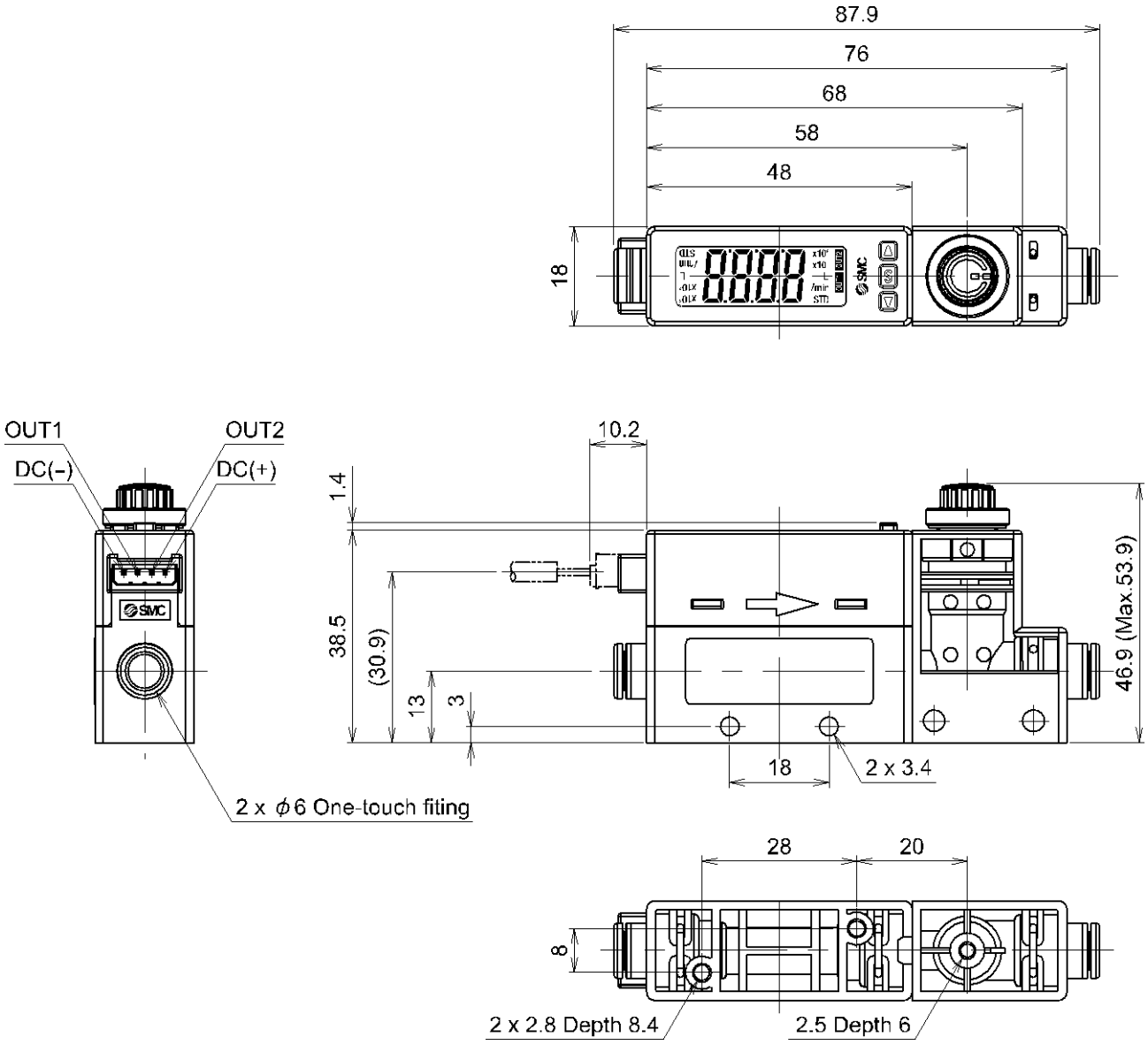


■Dimensions

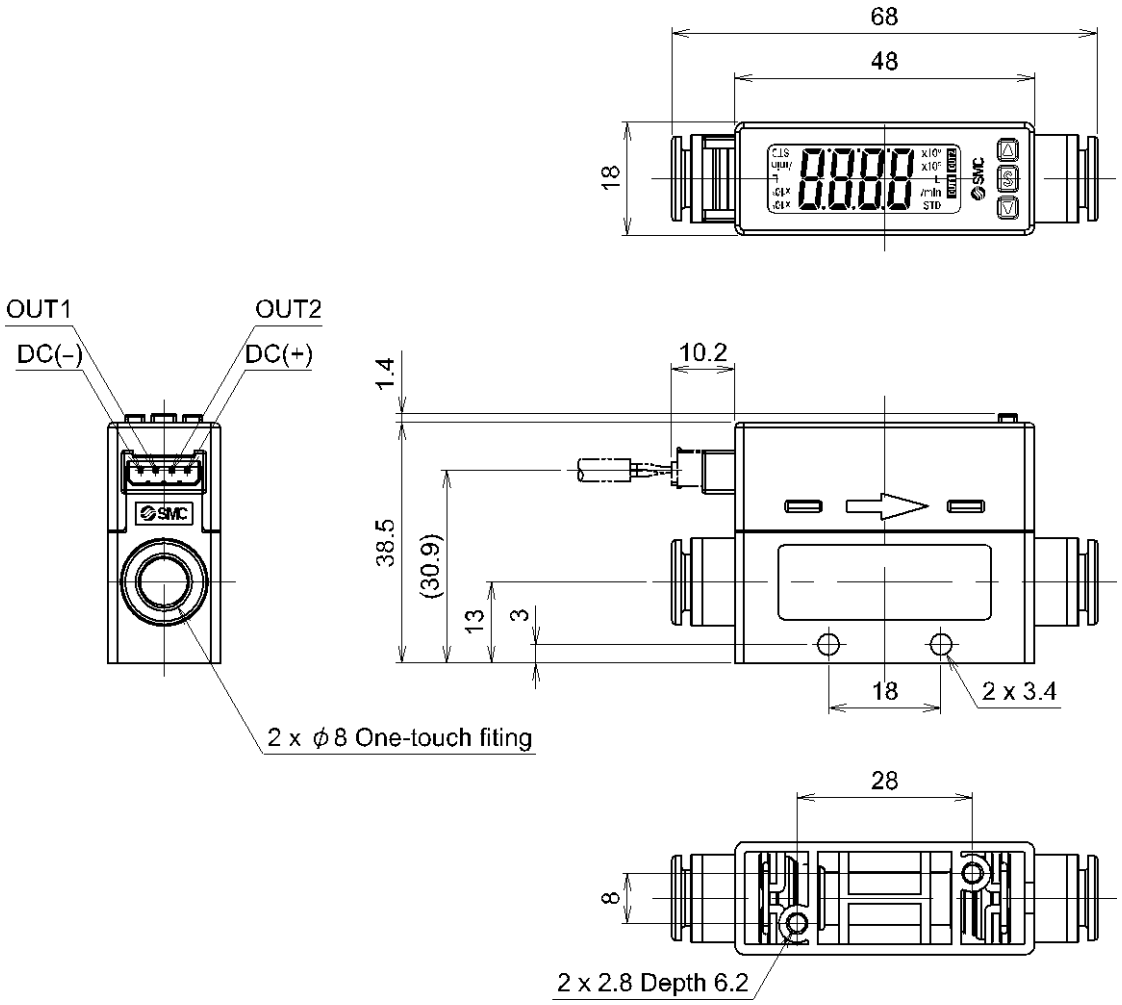
PF2M710/725/750-C6



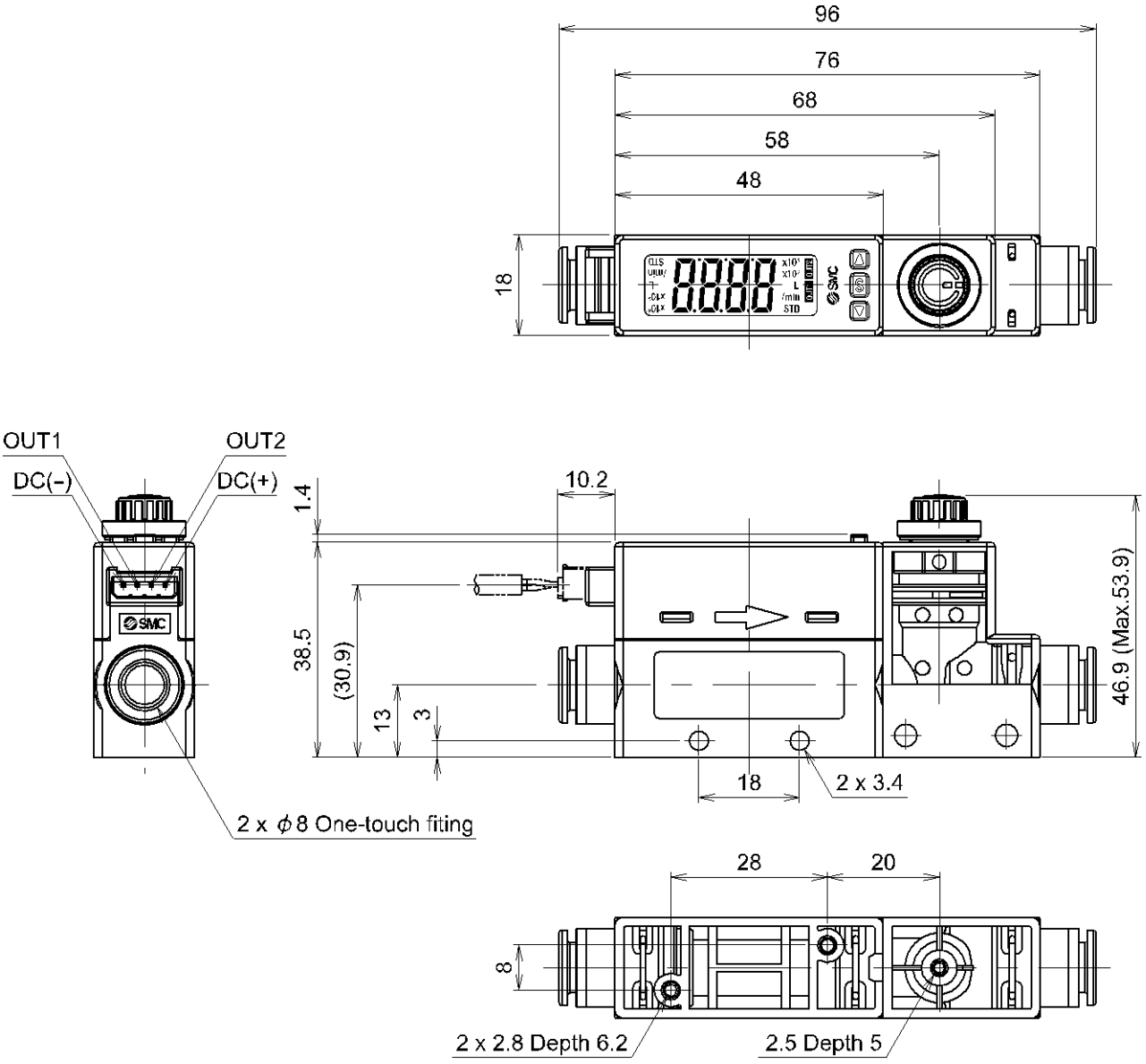
PF2M710/725/750S-C6



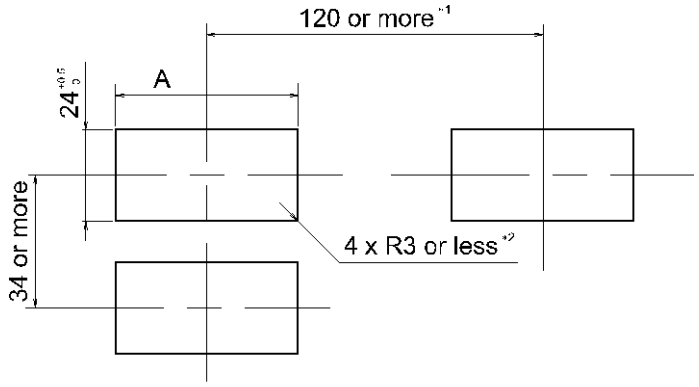
PF2M711-C8


68
48
18
OUT1
DC(–)
OUT2
DC(+)
1.4
10.2
38.5
(30.9)
13
3
18
2 x 3.4
2 x ϕ8 One-touch fiting
28
8
2 x 2.8 Depth 6.2

PF2M711S-C8


96
76
68
58
48
18
OUT1
OUT2
DC(–)
DC(+)
1.4
10.2
38.5
(30.9)
13
3
46.9 (Max.53.9)
18
2 x 3.4
2 x ϕ8 One-touch fiting
28
20
8
2 x 2.8 Depth 6.2
2.5 Depth 5

Panel cut-out dimensions

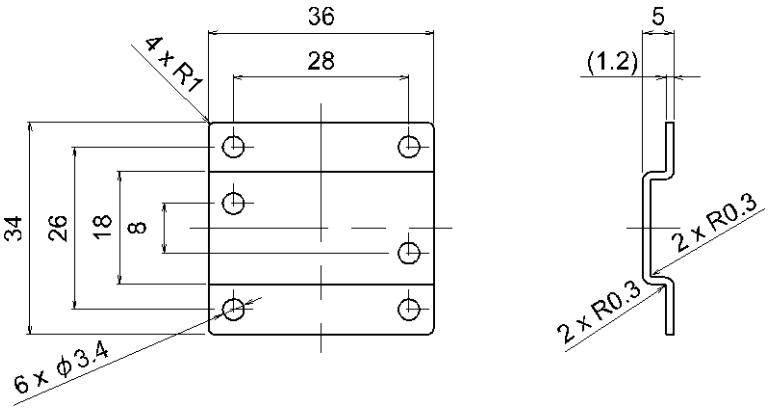


Flow adjustment valve	A
None	$54^{+0.5}_{0}$
With flow adjustment valve	$74^{+0.5}_{0}$

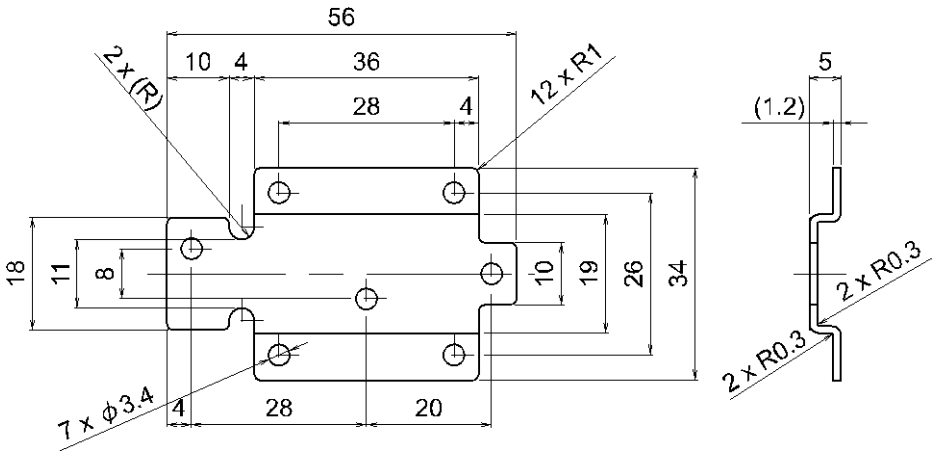
∗1: If a bend (R) is used, limit it to R3 or less.

∗2: Suitable for panel thickness of 1 to 3.2 mm.

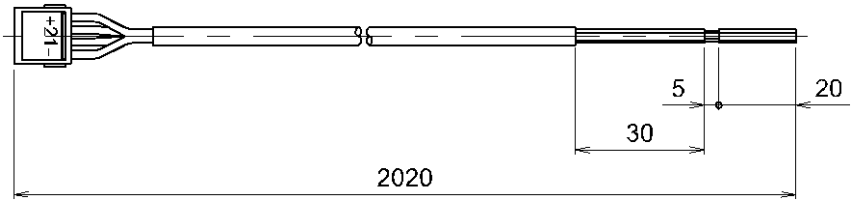
Bracket (ZS-33-M)



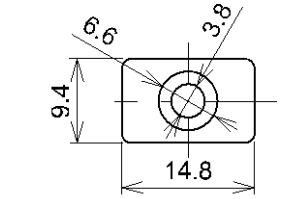
Bracket (ZS-33-MS)

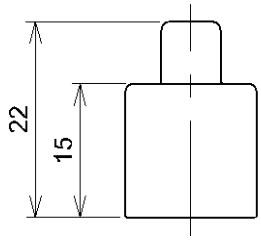


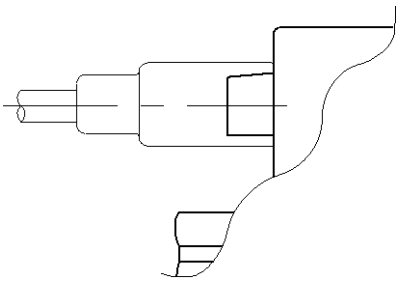
Lead wire and connector (ZS-33-D)



Connector cover (ZS-33-F)







Attached the connector cover

Revision
A: Contents are added. [July 2019]

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No.PF※※-OMW0007-A