

Digital Flow Switch Operation Manual



PF2A7□□H

Thank you for purchasing an SMC PF2A7□□H Series Digital Flow Switch. Please read this manual carefully before operating the product and make sure you understand its capabilities and limitations. Please keep this manual handy for future reference.

To obtain more detailed information about operating this product, please refer to the SMC website (URL <http://www.smcworld.com>) or contact SMC directly.

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) and other safety regulations.

- Caution:** CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
- Warning:** WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
- Danger:** DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

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.

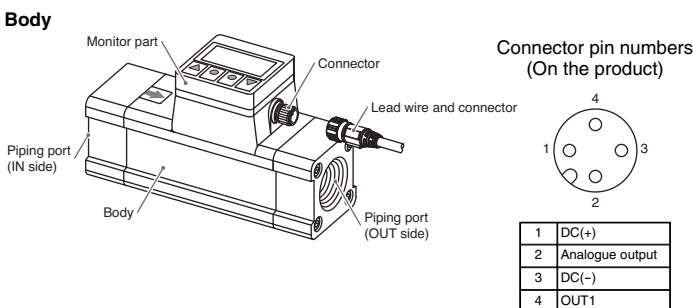
Safety Instructions

- 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.
 - 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.

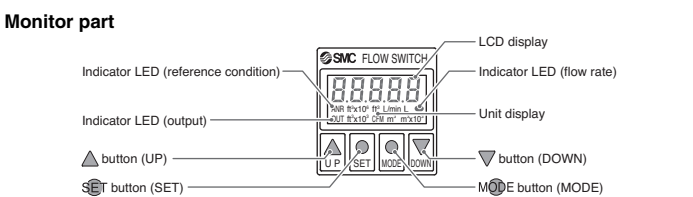
Maintenance

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. Therefore, check the safety of the whole installation before operating the product.

Summary of Product parts



Item	Description
Monitor part	See below.
Piping port	Connected to the fluid inlet at IN side and to the fluid outlet at OUT side.
Body	The body of the product.
Connector	Connector for electrical connections.
Lead wire and connector	Lead wire to supply power and transmit output signals.

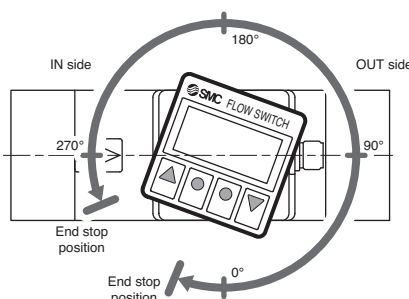


Item	Description
LCD display	Displays the flow value, setting mode, and error indication.
Indicator LED (reference condition)	Indicates the reference condition selected. LED is ON (Red) when standard condition is selected.
Indicator LED (output)	Indicates the output status of OUT1. LED is ON (Red) when OUT1 is ON. The LED flashes when an over current error occurs.
Indicator LED (flow rate)	Flashes with the cycle proportional to the flow rate.
Unit display	Display the selected unit.
▲ button (UP)	Selects the mode or increases the ON/OFF Set value.
⊞ button (SET)	Press this button to change to another mode and to set a value.
MODE button (MODE)	Moves on to the function selection mode.
▼ button (DOWN)	Selects the mode or decreases the ON/OFF Set value.

Mounting and Installation

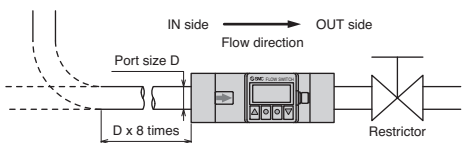
Installation

- Never mount the product in a location that will be used as a foothold.
- The rotation angle of the monitor is 270°, in steps of 90°. Rotating the display part with excessive force will damage the end stop.

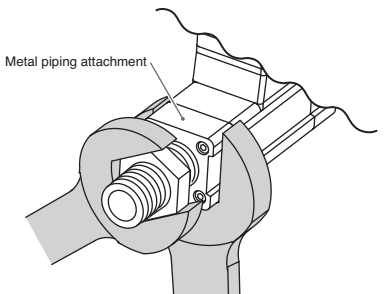


Piping

- Use the product within the specified operating pressure range and temperature range.
- Proof pressure is 2.25 MPa.
- Connect the piping to the fittings.
- Mount the product so that the fluid direction is the same as the arrow indicated on the product.
- Never mount the product upside down.
- The piping on the IN side must have a straight section of piping whose length is 8 times the piping diameter or more.
- Avoid sudden changes in the piping size on the IN side of the product.



- Connecting the piping**
 - Ensure that the metal piping attachments are tightened to the required torque (refer to the table below).
 - If the tightening torque is exceeded, the product can be broken. If the tightening torque is insufficient, the fittings may become loose.
 - When connecting piping to the product, a spanner should be used on the metal piping attachment only. Using a spanner on other parts may damage the product.
 - Avoid any sealing tape from entering inside the piping.
 - Ensure that there is no leakage from loose piping.



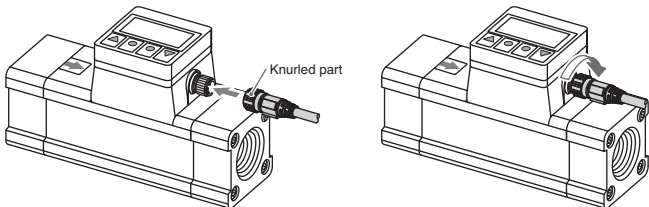
Nominal thread size	Tightening torque
Rc(NPT)1	36 to 38 Nm
Rc(NPT)1½	48 to 50 Nm

Model	Width across flats of attachment
PF2A703H	55 mm
PF2A706H	65 mm
PF2A712H	75 mm

Wiring

- 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.

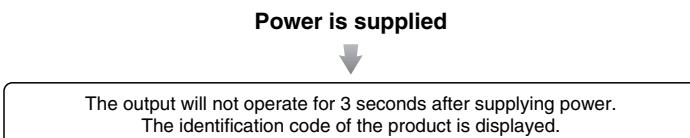
- Connecting the wiring**
 - Align the lead wire connector with the connector key groove, and insert vertically.
 - Connection is complete when the knurled part is fully tightened. Check that the connection is not loose.



- Connector Pin numbers**
When the lead wire with connector designated for the PF2A7 is used, the wire colours will apply as shown in the diagram.

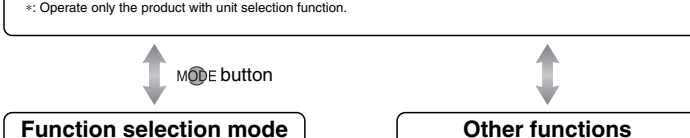
Pin number	Content	Colour
1	DC(+)	Brown
2	Analogue output	White
3	DC(-)	Blue
4	OUT1	Black

Outline of setting



Measurement mode
The mode in which the flow is detected and displayed, and the switch output is operating. This is the basic operating mode; and other modes should be selected for setting changes and other function settings. Accumulated flow can be displayed up to 999999999 L (99999999.9 ft³). The LCD display displays up to 5 digits at one time. The display is divided into three parts (upper digits, middle digits and lower digits).

Display unit	Maximum flow display value	Upper digits	Middle digits	Lower digits
L display [U_1]	999999999 L	9999 (9999 m³×10³ L)	99999 (99999 m³)	99999 (99999 L)
ft display [U_2]	99999999.9 ft³	999 (999 ft³×10³ ft³)	999 (99999 ft³)	99999 (99999 ft³)



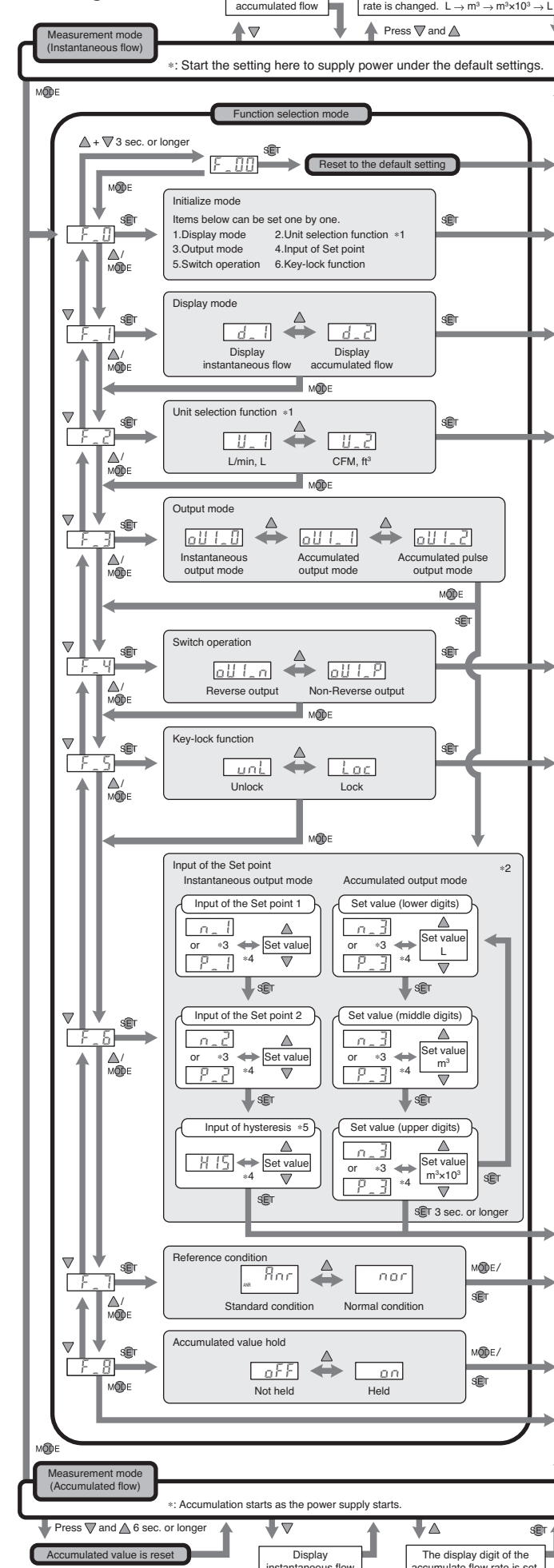
List of outputs

Find the diagram of the output required in the table below. Perform settings following the Set value column on the right.

Switch output diagram	Output mode	Switch operation	Set value
	Non-Reverse output	Hysteresis mode +2	Set point 2 ≤ Set point 1
	Instantaneous output mode	Window comparator mode	Set point 1 ≤ Set point 2
	Reverse output	Hysteresis mode +2	Set point 2 ≤ Set point 1
	Window comparator mode	Window comparator mode	Set point 1 ≤ Set point 2
	Non-Reverse output	Upper digits	P_3
	Reverse output	Middle digits	n_3
	Lower digits	Lower digits	n_3
	Non-Reverse output	No Set value input	
	Reverse output	No Set value input	

*1: Hysteresis can be set between "0" and "3% of maximum rated flow". If the difference between Set point 1 and Set point 2 is less than "6% of maximum rated flow", the maximum Set value of hysteresis is (Set point 1 - Set point 2) divided by 2.
*2: When Set point 1 = Set point 2, chattering may occur.

Setting flow chart



*1: Operate only the product with unit selection function.
*2: A set of value is not input, when accumulate pulse output mode.
*3: Depend on the setting of switch operation in initialize mode.
*4: Displayed in turn.
*5: Setting is available when Set point 1 < Set point 2.

Function selection mode

In measurement mode, press the MODE button, to display [F_0]. This [F_□] indicates the mode for changing each functional setting.

- Default settings**
The default settings are as follows. If this condition is acceptable, then keep these settings.

Item	Default Setting
[F_0] Selection of display mode	[d_1] Display instantaneous flow
Unit selection function +1	[U_1] L/min
Selection of output mode	[oU1_0] Instantaneous output mode
Input of Set point 1	50% of max. rated flow
Input of Set point 2	50% of max. rated flow
Input of hysteresis +2	[0]
Selection of switch operation	[oU1_n] Reverse output
Key-lock function	[UnL] Unlocked
[F_1] Selection of display mode	[d_1] Display instantaneous flow
[F_2] Unit selection function +1	[U_1] L/min
Selection of output mode	[oU1_0] Instantaneous output mode
[F_3] Input of Set point 1	50% of max. rated flow
Input of Set point 2	50% of max. rated flow
Input of hysteresis +2	[0]
[F_4] Selection of switch operation	[oU1_n] Reverse output
[F_5] Key-lock function	[UnL] Unlocked
[F_6] Input of Set point 1	50% of max. rated flow
Input of Set point 2	50% of max. rated flow
Input of hysteresis +2	[0]
[F_7] Selection of reference condition	[Anr] Standard condition
[F_8] Accumulated value hold	[oFF] Not held

*1: Operate only the product with unit selection function.
*2: Setting is available when Set point 1 < Set point 2.
Not displayed when Set point 1 ≥ Set point 2.

Other functions

- Reset of the accumulated flow
- Reset to the default setting

To set each of these functions, refer to the SMC website (URL <http://www.smcworld.com>) for more information about other functions in detail.

Troubleshooting

Error indication

Error Name	Display	Type	Troubleshooting
Excessive instantaneous flow	- - - -	Flow has exceeded the upper limit of the display flow range.	Reduce the flow.
Over current error	Err_1	The switch output load current is more than 80 mA (OUT1).	Turn the power off and remove the cause of the over current. Then turn the power on again.
System error	Err_2 Err_3 Err_7	The set data has been changed unexpectedly.	To reset, press the ▲ button for 6 seconds or longer while the ▼ button is pressed. Then set all data again.
Excessive accumulated flow	9999 (When [U_1] is selected) 999 (When [U_2] is selected) Accumulated flow displayed (flashing)	Exceeds the range of the 2nd. turn of flow indication.	To reset the accumulated flow value, press the ▲ button for 6 seconds or longer while the ▼ button is pressed.

*: If the error cannot be reset after the above measures are taken, then please contact SMC.

Refer to the SMC website (URL <http://www.smcworld.com>) for more information about troubleshooting.

Specifications / Outline with Dimensions

Refer to the product catalogue or SMC website (URL <http://www.smcworld.com>) for more information about the product specifications and outline dimensions.