




# Before Use

## Digital Flow Switch

### PF3A703H/PF3A706H/PF3A712H-L

Thank you for purchasing an SMC PF3A703H/PF3A706H/PF3A712H-L 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 the operation manual about this product and control unit, please refer to the SMC website (URL <https://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.

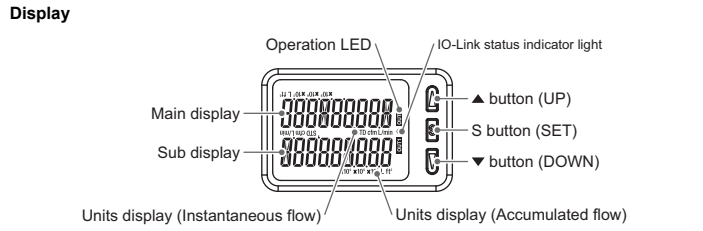
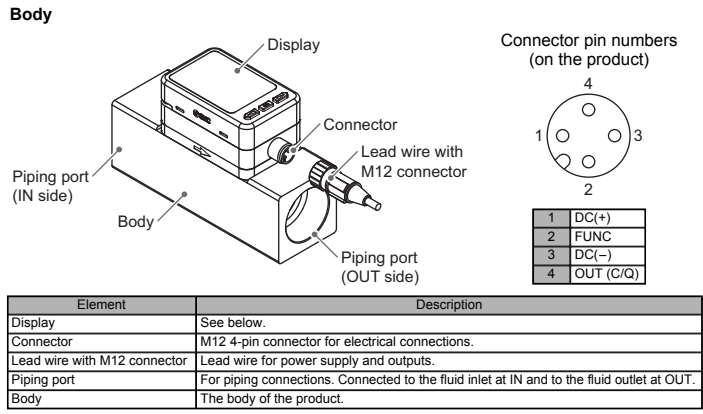
## Operator

- The 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 the 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, explosion or corrosion can result. This product is not designed to be explosion proof.
  - Do not use the product for flammable fluid. Fire or explosion can result. Only air, N<sub>2</sub>, 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
  - Stop the air supply, must 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.

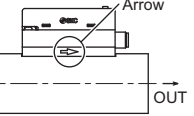
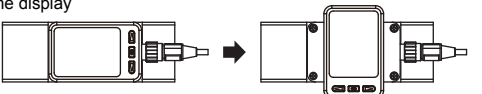
## Summary of Product parts



Element	Description
Main display	Displays the instantaneous flow value and error codes. (2 colour display)
Operation LED	Indicates the output status of OUT. When the output is ON, Orange LED is ON. When the accumulated pulse output mode is selected, the output display will turn off.
Sub display	Displays the accumulated flow, set value and peak/bottom value when in measurement mode.
▲ button (UP)	Selects the mode and the display shown on the Sub display or increases the switch point.
S button (SET)	Press this button to change the mode and to set a value.
▼ button (DOWN)	Selects the mode and the display shown on the Sub display or decreases the switch point.
Units display (Instantaneous flow)	Indicates the flow measurement units currently selected.
Units display (Accumulated flow)	Indicates the flow measurement units currently selected.
IO-Link status indicator light	LED is ON when OUT1 is used in IO-Link mode. (LED is OFF in SIO mode)

## Mounting and Installation

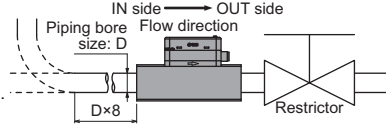
Refer to the product catalogue or SMC website (URL <https://www.smcworld.com>) for more detailed information.

- Mounting**
  - Never mount the product in a place that will be used as a mechanical support during piping.
  - Never mount the product upside down.
  - Attach the piping so that the fluid flows in the direction indicated by the arrow on the body.
  - The monitor with integrated display can be rotated.
  - Rotating the display with excessive force will damage the end stop.
  - Visibility decreases if the display is viewed from the opposite side to the buttons. Check the settings and display from in front of the display.
- Flow direction**

- Rotation of the display**


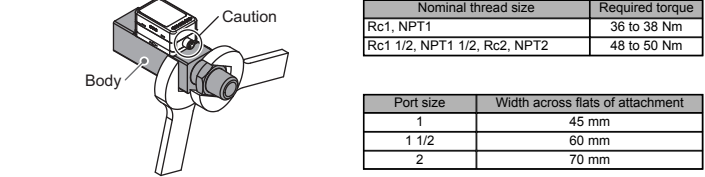
## Installation

- Direct mounting**
    - Install the product with 4 screws suitable for the product number according to the required tightening torque.
- | Product number | Suitable screws  | Tightening torque | Thread depth |
|----------------|------------------|-------------------|--------------|
| PF3A703H       | Equivalent to M4 | 1.5 Nms±10%       | 7            |
| PF3A706H       | Equivalent to M5 | 3 Nms±10%         | 8            |
| PF3A712H       | Equivalent to M6 | 5.2 Nms±10%       | 9            |
- Prepared by the user.
  - Refer to the dimension from SMC website (URL <https://www.smcworld.com>) for mounting hole size.

## Piping

- Do not connect equipment or piping which may generate a fluctuation in flow or drift at the IN side of the product.
  - When installing a regulator at the IN side of the product, make sure that hunting is not generated.
  - The piping on the IN side must have a straight section of piping whose length is 8 times the piping diameter or more.
  - If a straight section of piping is not installed, the accuracy will vary by approximately 3%F.S.
  - Avoid sudden changes to the piping size on the IN side of the product.
  - The accuracy may vary.
  - Do not release the OUT side piping port of the product directly to the atmosphere without connecting piping.
  - The accuracy may vary.
- 

- Use the correct tightening torque for piping. (Refer to the table below for the required torque values.)
- If the tightening torque is exceeded, the product can be damaged.
- If the tightening torque is insufficient, the fittings may become loose.
- Avoid any sealing tape getting inside the fluid passage.
- Ensure there is no leakage after piping.
- When mounting the fitting, a spanner should be used on the body (metal part) of the fitting only.
- Holding other parts of the product with a spanner may damage the product. Specifically, make sure that the spanner does not damage the M12 connector.



## Wiring

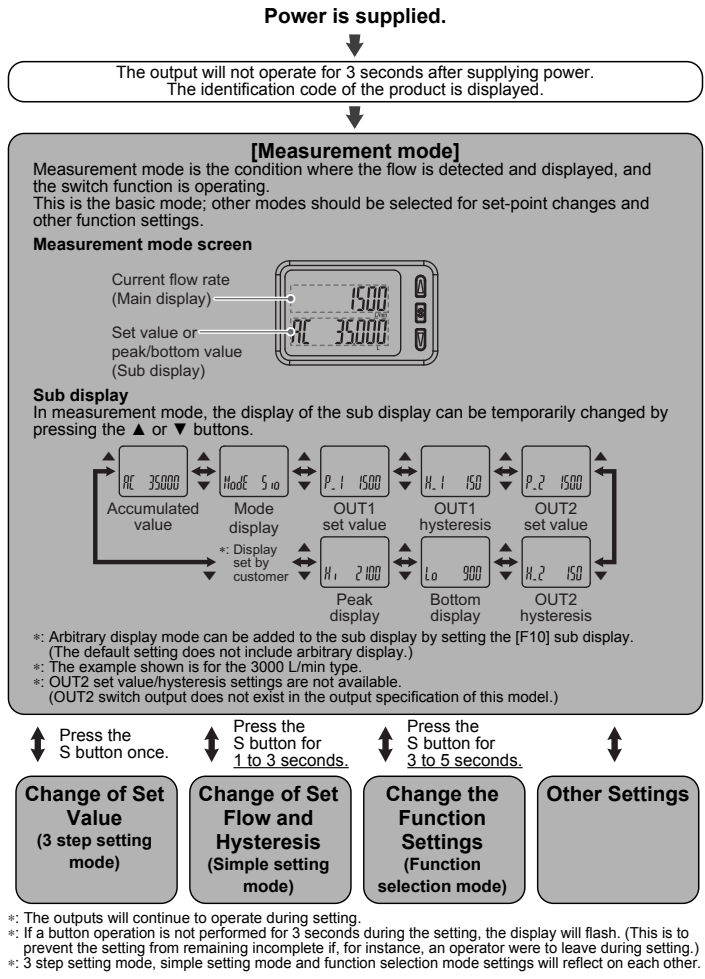
- Connection**
  - Connections should only be made with the power supply turned off.
  - Use a separate route for the product wiring and any power or high voltage wiring. If wires and cables are routed together with power or high voltage cables, malfunction may result due to noise.
  - If a commercially available switching power supply is used, be sure to ground the frame ground (FG) terminal. If the product is connected to the commercially available switching power supply, switching noise will be superimposed and the product specifications will not be satisfied. In that case, insert a noise filter such as a line noise filter/ ferrite between the switching power supplies or change the switching power supply to the series power supply.

- Connecting/Disconnecting**
  - Align the lead wire connector with the connector key groove, and insert it straight in. Turn the knurled part clockwise. Connection is complete when the knurled part is fully tightened. Check that the connection is not loose.
  - To remove the connector, loosen the knurled part and pull the connector straight out.

## Connector pin numbers (lead wire)

Pin number	Wire colour	Description	Switch output device Function	Description	IO-Link device Function
1	Brown	DC(+)	24 VDC	DC(+)	18 to 30 VDC
2	White	FUNC	Analogue output or External input	N.C./Other	Not connected/Analogue output or External input
3	Blue	DC(-)	0 V	DC(-)	0 V
4	Black	OUT	Switch output	C/O	Communication data (IO-Link)/ Switch output (SIO)

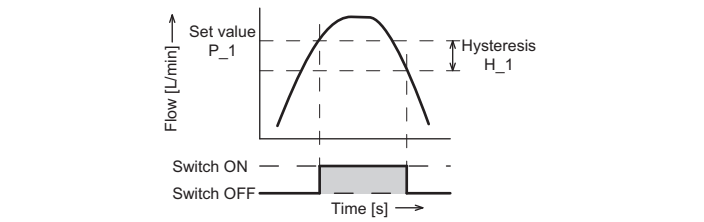
## Outline of Settings



## Change of Set Value

- 3 step setting mode**
- In the 3 step setting mode, the set value selected in the sub display and the hysteresis can be changed in just 3 steps.

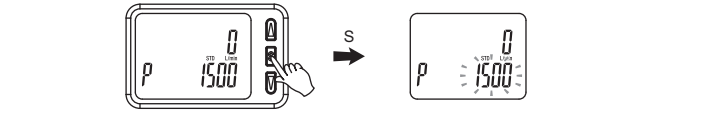
- Default settings**
- When shipped, the default setting is as follows.
- When the flow exceeds the set value [P\_1], the switch will be turned ON.
- When the flow falls below the set value by the amount of hysteresis [H\_1] or more, the switch will turn OFF.
- If the operation shown below is acceptable, then keep these settings.
- For more detailed settings, set each function in the function selection mode.



Item	PF3A703H	PF3A706H	PF3A712H
[P_1] Set value of OUT	1500 L/min	3000 L/min	6000 L/min
[H_1] Hysteresis of OUT	150 L/min	300 L/min	600 L/min

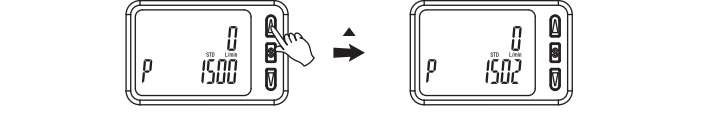
- <Operation>**
- [Hysteresis mode]
- In the 3 step setting mode, the set value (P\_1 or n\_1) and hysteresis (H\_1) can be changed.
- Set the items on the sub display (set value and hysteresis) using the ▲ or ▼ buttons.
- When changing the set value, follow the operation below. The hysteresis setting can be changed in the same way.

- Press the S button once when the item to be changed is displayed on the sub display. The set value on the sub display (right) will start flashing.



- Press the ▲ or ▼ button to change the set value. The ▲ button is to increase and the ▼ button is to decrease the set value.

- Press the ▲ button once to increase the value by one digit, press and hold to continuously increase.



- Press the ▼ button once to reduce the value by one digit, press and hold to continuously reduce.



- When ▲ and ▼ buttons are pressed simultaneously for 1 second or more, the set value is displayed as [---], and the set value will be set to the same as the displayed value automatically. Afterwards, it is possible to adjust the value by pressing ▲ or ▼.

- Press the S button to complete the setting.

To change setting, refer to the operation manual from SMC website (URL <https://www.smcworld.com>) or contact SMC.

## Change of Set Flow and Hysteresis

- Simple setting mode**
- In the simple setting mode, the set value, hysteresis and delay time can be changed while checking the current flow value (main display).

- <Operation>**
- [Hysteresis mode]
- Press the S button for 1 second or longer (but less than 3 seconds) in measurement mode. [SET] is displayed on the main display.
  - When the button is released while in the [SET] display, the current flow value is displayed on the main display, [P\_1] is displayed on the sub display (left) and the set value is displayed on the sub display (right).



- When [F 1] and [F 2] are set to accumulated pulse output, error output or output OFF [---] will be displayed in the sub screen when [SET] is displayed. It is not possible to move to the Simple setting mode.

- Change the set value using the ▲ or ▼ button, and press the SET button to set the value. Then, the setting moves to hysteresis setting.



- Change the set value with the ▲ or ▼ button, and press the S button to set the value. Then, the setting moves to the setting of OUT2.



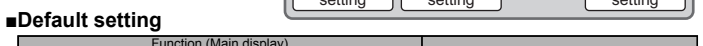
- Like the setting of OUT1, the setting returns to the setting of OUT2 by pressing the S button after setting the set value and hysteresis.

- Press and hold the S button for 2 seconds or longer to complete the simple setting. (If the button is pressed for less than 2 seconds, the setting will be returned to P\_1.)
- \*1 Selected items of (1) to (4) become valid after pressing the S button.
  - \*2 After enabling the setting by pressing the S button, it is possible to return to measurement mode by pressing the S button for 2 seconds or longer.
  - \*3 When the output mode is set to accumulated pulse, error output or output OFF, the simple setting mode cannot be used. (The setting returns to measurement mode by releasing the button when [SET] is displayed.)

To change setting, refer to the operation manual from SMC website (URL <https://www.smcworld.com>) or contact SMC.

## Change the Function Settings

- Function selection mode**
- In measurement mode, press the S button for 3 seconds or longer, to display [F 0].
- The [F 0] indicates the mode for changing each Function Setting.
- Press the S button for 2 seconds or longer in function selection mode to return to measurement mode.



- Default setting**

Function (Main display)	Left sub display	Default Settings (Right sub display)
[F 0] [rEF] Select display units	[Stg] Standard condition	[L] L/min
[NoFF] Select NPN output	[PnP] PNP output	[HYS] Hysteresis mode
[OutI] Select output mode	[1 PT] Normal output	[1500] 1500 L/min (PF3A703H)
[Tot] Select switch mode	[1 P] Normal output	[3000] 3000 L/min (PF3A706H)
[P_1] Select input switch operation	[6000] 6000 L/min (PF3A712H)	[150] 150 L/min (PF3A703H)
[H_1] Setting of Hysteresis	[300] 300 L/min (PF3A706H)	[600] 600 L/min (PF3A712H)
[dt] Delay time setting	[0.00] 0.00 s	[1S0G] Green when ON, Red when OFF (OUT1)
[F 2] *2	[FIL] Select digital filter	[1.0] 1 second
[F 3]	[FuNC] Select FUNC (switching analogue output +3(external input))	[AuOU] Analogue output
[F 5]	[SuB] Select sub display (Line name setting *3)	[dEF] Default setting
[F 10]	[rEV] Select Reverse display	[oFF] Reverse display OFF
[F 13]	[CU] Select Zero cut-off setting	[1.0] 1% F.S. cut
[F 30]	[SAVE] Accumulated value hold	[oFF] Not stored
[F 80]	[ESPI] Display OFF mode	[oN] Display ON
[F 81]	[Pin] Security code	[oFF] Not used
[F 90]	[ALL] Setting of all functions	[oFF] Not used
[F 96]	[S_in] Check of input signal	[---] No input signal
[F 98]	[RES] Setting of output check	[n] Normal output
[F 99]	[rm] Reset to the default settings	[oFF] Not used

- \*1 Setting is only possible for models with the units selection function.
- \*2 [F 2] The OUT2 setting can be set on the product screen, but since there is no OUT2 switch output function as an output specification, it is not possible to output the ON/OFF signal to an external device.
- \*3 When the 1 switch output type (output specification symbol is L) is used, [F5] is displayed as [---] and cannot be set. 1 to 5 V or 0 to 10 V can be selected when the analogue voltage output type is used. Analogue output free range function can be selected.
- \*4 When Line name is selected, a suitable line name can be input.

To change setting, refer to the operation manual from SMC website (URL <https://www.smcworld.com>) or contact SMC.

## Other Sttings

- Reset operation**
- The Accumulated Flow, Peak Value and Bottom Value can be reset. To reset the accumulated value, press the ▼ and S button for 1 second or longer.
- Snap shot function**
- The current flow rate value can be stored to the switch output ON/OFF set point. When the items on the Sub display (left) are selected in either 3 step setting mode, Simple setting mode or Setting of each function mode, by pressing the ▲ and ▼ buttons simultaneously for 1 second or longer, the value of the sub display (right) will show "----", and the values corresponding to the current flow rate are automatically displayed.
- | Output mode            | Configurable items | Sub display (left)   | Snap shot function |
|------------------------|--------------------|----------------------|--------------------|
| Hysteresis mode        | OUT set value      | P_1 (n_1), P_2 (n_2) | o                  |
|                        | Hysteresis         | H_1, H_2             | o                  |
| Window comparator mode | OUT set value      | P1L (n1L), P1H (n1H) | o                  |
|                        | Hysteresis         | P2L (n2L), P2H (n2H) | o                  |
|                        |                    | WH1, WH2             | x                  |

- Key-lock function**
- Press the S button for 5 seconds or longer in measurement mode. When [oPE] is displayed on the main display, release the button. The current setting "LoC" or "UnLoC" will be displayed on the sub display.
  - Select the key locking/un-locking using the ▲ or ▼ button, and press the S button to set.

To use each of these functions, refer to the operation manual from SMC website (URL <https://www.smcworld.com>) or contact SMC.

## Maintenance

- How to reset the product after a power loss or when the power has been unexpectedly removed**
- The settings for the product are retained in memory prior to the power loss or de-energizing of the product.
- The output condition is also recoverable to that prior to the power loss or de-energizing. However, this may change depending on the operating environment. Therefore, check the safety of the whole installation before operating the product.
- If the installation is using accurate control, wait until the product has warmed up (approximately 10 to 15 minutes) before operation.

## Specifications / Dimensions

The IODD file can be downloaded from the SMC website (URL <https://www.smcworld.com>).

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

## Troubleshooting

Error name	Error display	Description	Measures
Instantaneous flow error	ERR	Flow rate exceeding the upper limit of the settable flow range is applied.	Reset applied flow rate to a level within the settable flow range.
Over current error	Er 1	The switch output load current is 80 mA or more.	Turn the power off and remove the cause of the over current. Then supply the power again.
	Er 0		
	Er 4		
System error	}	An internal data error has occurred.	Turn the power off and on again. If the failure cannot be solved, contact SMC.
	Er 5		
	Er 6		
Accumulated flow error	ERR	The accumulated flow has exceeded the accumulated flow range. (For accumulated increment)	Reset the accumulated flow.
	ERR	The accumulated flow has reached the set accumulated flow. (For accumulated decrement)	(Press the ▼ and S buttons simultaneously for 1 second or longer)
Version does not match	Er 5	Version of master and IO-Link does not match.	Align the master IO-Link version to the device.

\*: If the error cannot be reset after the above measures are taken, or errors other than above are displayed, please contact SMC.

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