

# Before Use

## Digital Flow Switch

### PF3A801H/PF3A802H-L



Thank you for purchasing an SMC PF3A801H/PF3A802H-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.

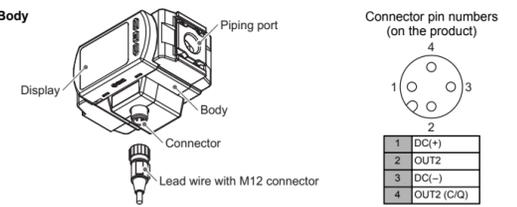
### Operator

- 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.

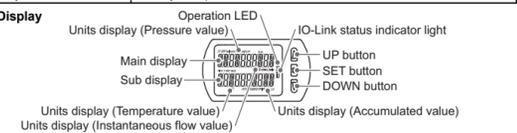
## Safety Instructions

Warning	
Do not disassemble, modify (including changing the printed circuit board) or repair. <small>An injury or failure can result.</small>	
Do not operate the product outside of the specifications. <small>Do not use for flammable or harmful fluids. Fire, malfunction or damage to the product can result. Verify the specifications before use.</small>	
Do not operate in an atmosphere containing flammable, explosive or corrosive gas. <small>Fire, explosion or corrosion can result. This product is not designed to be explosion proof.</small>	
Do not use the product for flammable fluid. <small>Fire or explosion can result. Only air, N<sub>2</sub>, are applicable.</small>	
Do not use the product in a place where static electricity is a problem. <small>Otherwise it can cause failure or malfunction of the system.</small>	
When 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. <small>Otherwise electric shock, malfunction or damage to the product can result.</small>	
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
Display	See below.
Connector	M12 connector for electrical connections.
Lead wire with M12 connector	Lead wire for power supply and outputs.
Piping port	For piping connections.
Body	The body of the product.



Element	Description
Main display	Displays the instantaneous flow value, pressure value, and error codes. (2 colour display)
Operation LED	Indicates the output status of OUT. When the accumulated pulse output mode is selected, the output display will turn off. When the output is ON: Orange LED is ON.
Sub display	Displays the accumulated flow, temperature value, set value, and peak/bottom value when in measurement mode.
UP button	Selects the mode and the display shown on the Sub display, or increases the switch point.
SET button	Press this button to change the mode and to set a value.
DOWN button	Selects the mode and the display shown on the Sub display, or decreases the switch point.
Units display (instantaneous flow value)	Indicates the flow measurement units currently selected.
Units display (Accumulated value)	Indicates the flow measurement units currently selected.
Units display (Pressure value)	Indicates the flow measurement units currently selected.
Units display (Temperature value)	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

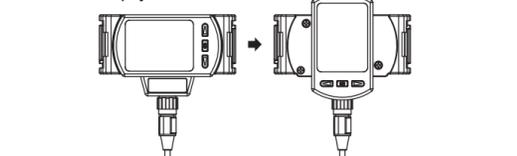
- Avoid mounting in the direction that the display faces upward.
- Never mount the product upside down.
- The monitor with integrated display can be rotated.

Rotating the display with excessive force will damage the end stop.

### Flow direction



### Rotation of the display

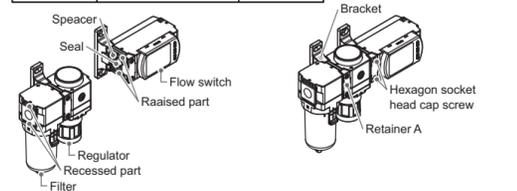


### Piping

- Fit the raised part of the spacer to the recessed part (groove for the raised part) of the product.
- Tighten the retainer A with two hexagon socket head cap screws temporarily.
- Tighten the two hexagon socket head cap screws with a hexagonal wrench evenly. Refer to the control items shown below for the tightening torque for the screws.

### Control items

Applicable model	Hexagonal wrench socket size	
	Nominal value	Tightening torque
PF3A801H PF3A802H	3	1.2±0.05 Nm



The following options are required for coupling with modular F, R, and L combinations. They are separately prepared by the user.

Digital flow switch	Air combination	Spacer	Spacer with bracket	Pipe adapter
PF3A801H	AC3#F-D	Y300-D	Y300T-D	E300-#03-D
PF3A802H	AC40#F-D	Y400-D	Y400T-D	E400-#04-D

\*: For more information about the options, refer to our website (URL <https://www.smcworld.com>).

### <Caution>

- Do not apply torsion or bending moment other than the weight of the product itself.
- External piping needs to be supported separately as it may cause damage. If a moment applied to the equipment is unavoidable during operation, the moment should be lower than the maximum moment shown below. Non-flexible piping like steel tube is susceptible to excessive moment load or vibration. Insert flexible tubes to prevent this.

Models	PF3A801H	PF3A802H
Maximum moment (M): Nm	16	19.5

Max. moment (M) = Length (L) x Load (F)

### 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 lightened. 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)

Used as switch output device			Used as IO-Link device		
Pin number	Wire colour	Description	Pin number	Wire colour	Description
1	Brown	DC(+)	1	Brown	DC(+)
2	White	OUT2	2	White	OUT2
3	Blue	DC(-)	3	Blue	DC(-)
4	Black	OUT1	4	Black	C/Q

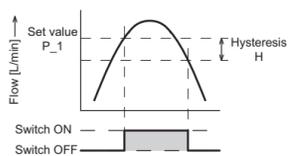
## Change of Set Value

### 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 in the diagram below is acceptable, then keep these settings. For more detailed settings, set each function in the function selection mode.

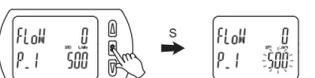


Item	PF3A801H	PF3A802H
[P_1] Set value of OUT1	500 L/min	1000 L/min
[H_1] Hysteresis of OUT1	50 L/min	100 L/min
[P_2] Set value of OUT2	500 L/min	1000 L/min
[H_2] Hysteresis of OUT2	50 L/min	100 L/min

### <Operation>

[Hysteresis mode]  
In the 3 step setting mode, the set value ([P\_1]/[P\_2] or [n\_1]/[n\_2]) and hysteresis ([H\_1]/[H\_2]) can be changed. Set the items on the display (set value and hysteresis) using the UP or DOWN buttons. When changing the set value, follow the operation below. The hysteresis setting can be changed in the same way.

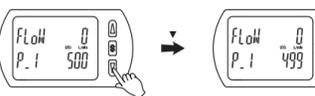
- Press the SET button once when the item to be changed is displayed on the display. The set value on the sub display (right) will start flashing.



- Press the UP or DOWN button to change the set value. The UP button is to increase and the DOWN button is to decrease the set value.



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



- If the UP and DOWN buttons are pressed simultaneously for 1 second or longer, the set value is displayed as [ - - - ], and the set value will be the same as the display value automatically. Afterwards, it is possible to adjust the value by pressing UP or DOWN button.

- Press the SET 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 and hysteresis can be changed while checking the current measured value (main display).

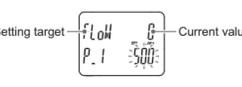
### <Operation>

- [Hysteresis mode]  
(1) Press the SET 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 measured value is displayed on the main display, [P\_1]/[P\_2] or [n\_1]/[n\_2] is displayed on the sub display (left) and the set value is displayed on the sub display (right).



\*: When OUT1 and OUT2 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 UP or DOWN button, and press the SET button to set the value. Then, the setting moves to hysteresis setting.



- Change the set value using the UP or DOWN button, and press the SET 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 SET button after setting the set value and hysteresis.

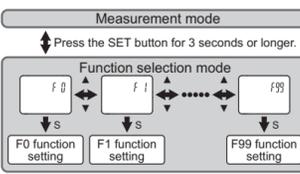
- Press and hold the SET button for 2 seconds or longer to complete the simple setting. (If the button is pressed for less than 2 seconds, the setting will be returned to [P\_1]).  
\*1: Selected items of (1) to (4) become valid after pressing the SET button.  
\*2: After enabling the setting by pressing the SET button, it is possible to return to measurement mode by pressing the SET button for 2 seconds or longer.  
\*3: When the setting target 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 SET button for 3 seconds or longer, to display [F 0]. The [F 0] 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.



### Default setting

Main display (Right)	Main display (Left)	Function	Sub display (Left)	Default Settings (Right)
	Flow	[rEF] Select display units		Standard
	rEMP	[Unit] Units selection function +1		[ L ] L/min [ C ] C [ MPA ] MPa
[F 0]		[NorP] Select NPN/PNP		[ PNP ] PNP output
	[OUT1]	Select the output of OUT1		[Flow] Flow rate
	[OUT2]	Select the output of OUT2		[Flow] Flow rate
	[Col.]	Select display colour		[rSoC] Green when ON Red when OFF (OUT1)
	[oU1]/[oU2]	[SW1] / [SW2] Select the target for setting		[Flow] Flow rate
	Flow	[ModE] Select switch mode		[HYS] Hysteresis mode
	[1ot] / [2ot]	Select switch operation		[ 1_P ] / [ 2_P ] Normal output
[F 1] / [F 2]	Flow	[P_1] / [P_2] Input the set value		[ 500 ] 500 L/min (PF3A801H) [ 1000 ] 1000 L/min (PF3A802H)
	Flow	[H_1] / [H_2] Input of hysteresis		[ 50 ] 50 L/min (PF3A801H) [ 100 ] 100 L/min (PF3A802H)
	Flow	[dH1] / [dH2] ON delay time setting		[ 0.00 ] 0 second
	Flow	[dL1] / [dL2] OFF delay time setting		[ 0.00 ] 0 second
[F 3]		[FL_] Select digital filter		[ 1.0 ] 1 second
[F 6]	rES	[FSC] Display value fine adjustment		[ 0.0 ] 0%
[F13]		[rEV_] Select reverse display		[OFF] Reverse display OFF
[F14]		[CU_] Select Zero cut-off setting		[ 1.0 ] %F.S. cut [ 0.0 ] 0%
[F16]		[MES] Measurement display setting		[dSP] Display [dSP] Display [dSP] Display
[F30]	AC	[SAV] Accumulated value hold		[OFF] Not stored
[F80]		[dSP] Display OFF mode		[ on ] Display ON
[F81]		[Pin] Security code		[OFF] Not used
[F90]		[ALL] Setting of all functions		[OFF] Not used
[F96]		[CYCL] Check of cycle time		[ - - - ] No input signal
[F98]		[TES] Setting of output check		[ n ] Normal output
[F99]		[ini] Reset to the default settings		[OFF] Not used

\*1: Setting is only possible for models with the units selection function.

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 DOWN and SET buttons for 1 second or longer. Resetting the accumulated flow is possible only when the accumulated flow is displayed. Resetting the peak value and bottom value is effective for the measurement target displayed in the peak display or bottom display.

**Snap shot function**  
The current measured 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 UP and DOWN buttons simultaneously for 1 second or longer, the value of the sub display (right) will show [ - - ], and the values corresponding to the current measured value 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) P2L (n2L), P2H (n2H)	o
	Hysteresis	WH1, WH2	x

**Display select function**  
The number of accumulated flow rate display digits can be temporarily switched when the temperature and accumulated flow rate are set in the measurement display settings.

**Zero-clear function**  
When the pressure is displayed in the measurement display setting, the displayed value can be adjusted to zero within the range of ±7%F.S. from the factory default value.

**Key-lock function**  
(1) Press the SET 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.  
(2) Select the key locking/unlocking using the UP or DOWN button, and press the SET 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

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 display

Error name	Error display	Description	Measures
Instantaneous flow error	!!!	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.
Pressure error	!!!	Pressure exceeding the upper limit of the set pressure range is applied.	Reset applied pressure to a level within the set pressure range.
	!!!	Pressure below the lower limit of the set pressure range is applied.	Reset applied pressure to a level within the settable pressure range.
Temperature error	!!!	Temperature exceeding the upper limit of the set temperature range is applied.	Reset applied temperature to a level within the settable temperature range.
	!!!	Temperature below the lower limit of the set temperature range is applied.	Reset applied temperature to a level within the settable temperature range.
Over current error	Er 1 a1	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.
System error	Er 0	An internal data error has occurred.	Turn the power off and on again. If the failure cannot be solved, contact SMC.
	Er 9 to Er 6		
Accumulated flow error	Er 7 or Er 8	The accumulated flow has exceeded the accumulated flow range. (For accumulated increment)	Reset the accumulated flow. (Press the DOWN and SET buttons simultaneously for 1 second or longer)
	Er 5 or Er 6	The accumulated flow has reached the set accumulated flow. (For accumulated decrement)	
Zero clear error	Er 3 Er 4	A pressure of 7%F.S. or more is applied during the zero clear operation. (Return to measurement mode in one second)	Select the suitable IO-Link version for the device.
	Er 5 Er 6	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, then please contact SMC.

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