



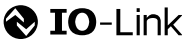
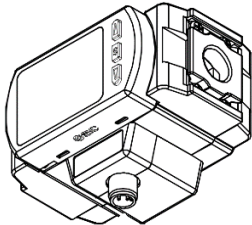
ORIGINAL INSTRUCTIONS

Instruction Manual

Digital Flow Switch – Modular type

for Pressure / Temperature

PF3A8##H-L



The intended use of the digital flow switch is to monitor and display flow information.

1 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 and safety requirements for systems and their components.
ISO 4413: Hydraulic fluid power — General rules and safety requirements for systems and their components.
IEC 60204-1: Safety of machinery - Electrical equipment of machines. Part 1: General requirements.
ISO 10218-1: Robotics - Safety requirements - Part 1: Industrial robots.
- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
 - Keep this manual in a safe place for future reference.
 - This product is class A equipment intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted or radiated disturbances.

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



Warning

- Always ensure compliance with relevant safety laws and standards.**
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.
- 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.**
Fire, malfunction or damage to the product can result.
- Do not use in an environment where flammable, explosive or corrosive gases are present.**
Otherwise fire, explosion or corrosion may occur. The product is not designed to be explosion proof.
- Do not use the product with flammable fluid.**
Fire or an explosion can result.
- If using the product in an interlocking circuit:**
Provide a double interlocking system, for example a mechanical system.
- Check the product for correct operation.**
Otherwise malfunction can result, causing an accident.
- Do not touch the terminals and connectors while the power is on.**
Otherwise electric shock, malfunction or product damage can result.
- Refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>) for more safety instructions.

2 Specifications

Model			PF3A 8R5H	PF3A 801H	PF3A 802H	PF3A 804H	PF3A 808H
Applicable fluid			Air, N ₂ , Ar, CO ₂				
Operating fluid temperature			0 to 50 °C				
Flow	Detection method		Heating sensor (branch flow)				
	Rated flow range (L/min)		5 to 500	10 to 1000	20 to 2000	40 to 4000	80 to 8000
	Set flow rate	Instantaneous flow (L/min)	5 to 750	10 to 1500	20 to 3000	40 to 6000	80 to 12000
		Accumulated flow (L)	0 to 9,999,999,990 (PF3A808H: 0 to 99,999,999,900)				
	Min. settable unit	Instantaneous flow (L/min)	1		2		5
		Accumulated flow (L)	10				100
	Accumulated volume per pulse (L/pulse)		1,10,50, 100	10,50,100,500		50,100,500,1000	
	Pulse width		Variable at 50 to 100 ms / 10 ms step				
	Accumulated value hold		2 or 5 minutes				
Pressure	Rated pressure range		0.000 to 1.000 MPa				
	Set pressure range		-0.050 to 1.050 MPa				
	Minimum resolution		0.001 MPa				
	Proof pressure		1.5 MPa				
	Pressure loss		Refer to the pressure loss graph				
Temp.	Rated temperature range		0.0 to 50.0 °C				
	Set temperature range		-10.0 to 60.0 °C				
	Minimum resolution		0.1 °C				
Electrical	Power supply voltage		21.6 to 30 VDC				
	Current consumption		150 mA or less				
	Protection		Polarity protection				
Accuracy	Flow rate		±3.0 % F.S.				
	Pressure		±3.0 % F.S.				
	Temperature		±2.5 °C				
	Repeatability		±1.0 % F.S. (flow rate / pressure)				
	Temperature characteristics		±5.0 % F.S. (flow rate / pressure) (ambient temp. 0 to 50 °C, 25 °C standard)				
	Pressure characteristics		±5.0% F.S. (flow rate) (0 to 1.0 MPa, 0.5 MPa standard)				
	Impact when modular devices are connected		±5.0 % (flow rate)				
Switch output	Output type		Select from PNP open collector or NPN open collector (2 outputs)				
	Output mode		Hysteresis mode, window comparator mode, error output, output OFF, accumulated output and accumulated pulse output (only flow rate)				
	Switch operation		Normal or reversed output				
	Maximum load current		60 mA				
	Maximum applied voltage (NPN only)		30 VDC				
	Internal voltage drop (Residual voltage)		1.5 V or less (at load current 60 mA)				
	Response time		5 ms or less				
	Delay time		Variable at 0 to 60 s / 0.01 s step				
	Hysteresis		Variable from 0				
	Protection		Over current protection				
Display	Reference condition		Standard or Normal condition				
	Units	Instantaneous flow	L/min, CFM (ft ³ /min)				
		Accumulated flow	L, ft ³				
		Pressure	MPa, KPa, kgf/cm ² , bar, psi				
		Temperature	°C, °F				
	Display range	Instantaneous flow (L/min)	0 to 750	0 to 1500	0 to 3000	0 to 6000	0 to 12000
		Accumulated flow (L)	0 to 9,999,999,990 (PF3A808H: 0 to 99,999,999,900)				
		Pressure	-0.050 to 1.050 MPa				
		Temperature	-10.0 to 60.0 °C				

2 Specifications (continued)

Model		PF3A 8R5H	PF3A 801H	PF3A 802H	PF3A 804H	PF3A 808H	
Display	Min. Display unit	Instantaneous flow	1 L/min		2 L/min		5 L/min
		Accumulated flow	10 L				100 L
		Pressure	0.001 MPa				
		Temperature	0.1 °C				
	Display	Display method: LCD Number of displays: 4 Colour (upper line): Red and Green Colour (lower line): Orange Display (upper / lower line): 10 digits (7 segment 5 digits, 11 segment 5 digits)					
	Operation LED	OUT LED: Orange is ON when output is ON					
Filter	Flow rate	1 s (2 s or 5 s can be selected)					
	Pressure	0.1 s (variable at 0 to 30 s / 0.01 s step)					
	Temperature	1 s					
Environmental	Protection	IP65					
	Withstand voltage	1000 VAC for 1 minute between terminals and housing					
	Insulation resistance	50 MΩ between terminals and housing (with 500 VDC megger)					
	Operating temperature range	Operation: 0 to 50 °C, Storage: -10 to 60 °C (no condensation or freezing)					
	Operating humidity range	Operation, Storage: 35 to 85%RH (no condensation)					
Standards		CE / UKCA, UL (CSA)					
Piping specification		Modular (body size: 20)	Modular (body size: 30)	Modular (body size: 40)	Modular (body size: 50, 60)		
Material in contact with fluid		SUS304, Aluminium alloy, PPS, HNBR (Sensor: Pt, Au, Ni, Fe, lead glass (not RoHS compliant), Al ₂ O ₃)					
Lead wire with connector		3 m					
Weight	Body	350 g	350 g	400 g	720 g	720 g	
	Lead wire	90 g					

2.1 IO-Link specifications

IO-Link type	Device
IO-Link version	V1.1
Communication speed	COM2 (38.4 kbps)
Min. cycle time	5.8 ms
Process data length	Input Data: 12 bytes, Output Data: 0 byte
On request data communication	Available
Data storage function	Available
Event function	Available
Vendor ID	131 (0x0083)
Device ID	PF3A8R5H-L2*-*-: 747 (0x02EB) PF3A801H-L2*-*-: 562 (0x0232) PF3A802H-L2*-*-: 563 (0x0233) PF3A804H-L2*-*-: 748 (0x02EC) PF3A808H-L2*-*-: 731 (0x02DB)
IODD file	SMC-PF3A8*H-L2*-*-·yyyymmdd-IODD1.1

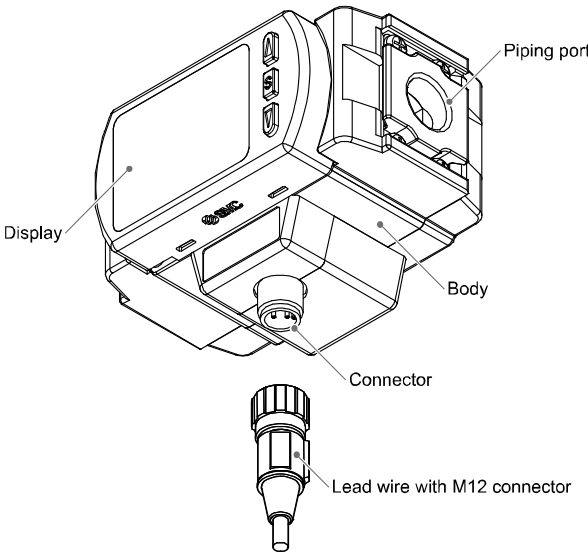


Warning

Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

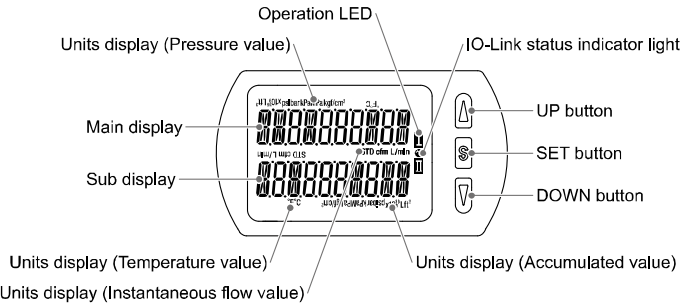
- Refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>) for more specification details.

3 Names of Individual parts



Part	Description
Display	See below
Connector	M12 4-pin 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.

3.1 Display



Part	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 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, 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)

4 Installation

4.1 Installation

Warning

- Do not install the product unless the safety instructions have been read and understood.
- Use the product within the specified operating pressure and temperature range.

4.2 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.

4.3 Mounting

- Never mount the product in a location where it will be used as a mechanical support.
- Mount the product so that the fluid flows in the direction indicated by the arrow on the side of the body.
- Avoid mounting the product with the display facing upward.
- Do not mount the product upside down.
- The monitor with integrated display can be rotated. Rotating the display with excessive force will damage the end stop.

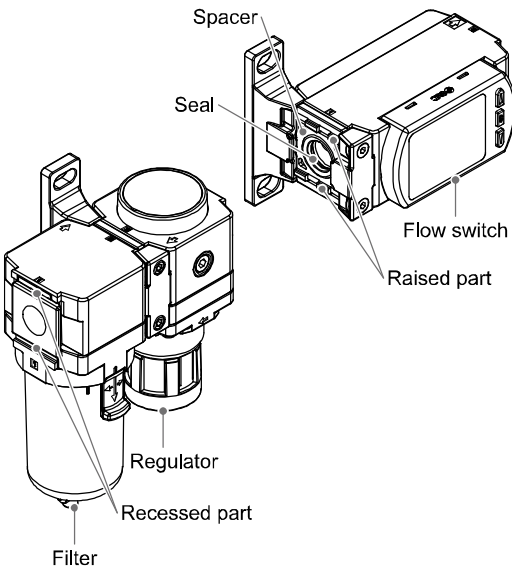
4.4 Piping

Caution

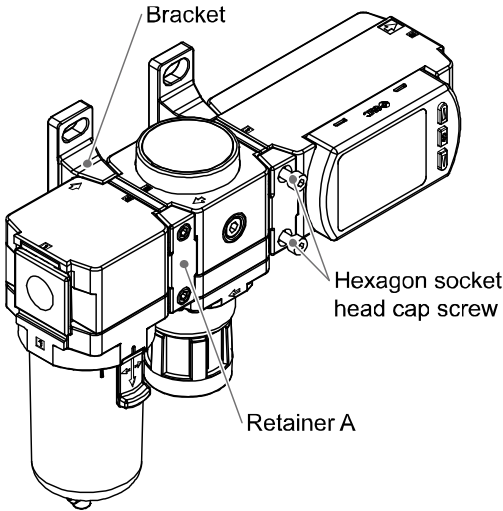
- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port.
- Fit the raised part of the spacer to the recessed part (groove for the raised part) of the product.

- Temporarily tighten the retainer A with two hexagon socket head cap screws.
- Tighten the two hexagon socket head cap screws evenly with a hexagonal wrench.
- Refer to the table below for the screw tightening torque.

Applicable model	Hex wrench socket nominal size	Tightening torque
PF3A8R5H	2	0.36 ±0.036 N•m
PF3A801H	3	1.2 ±0.05 N•m
PF3A802H		
PF3A804H	4	2.0 ±0.1 N•m
PF3A808H		



4 Installation (continued)



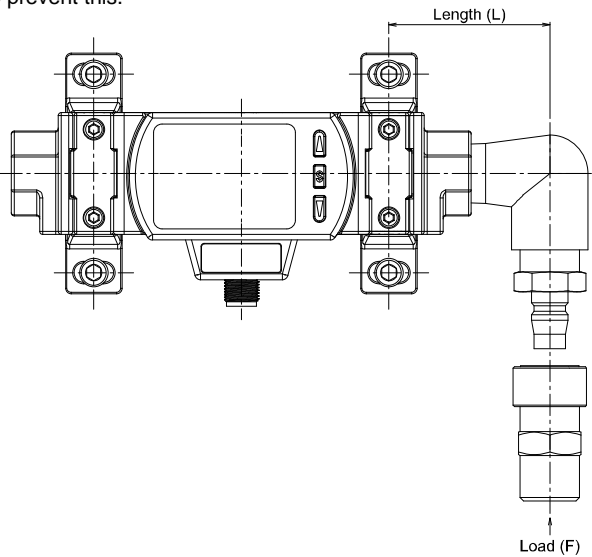
- The following options are required for coupling with modular F, R, and L combinations. They are separately prepared by the user.

Digital Flow switch	Air combination	Spacer	Spacer with bracket	Pipe adapter
PF3A8R5H	AC20#-D	Y200-D	Y200T-D	E200-#02-D
PF3A801H	AC30#-D	Y300-D	Y300T-D	E300-#03-D
PF3A802H	AC40#-D	Y400-D	Y400T-D	E400-#04-D
PF3A804H	AC50#-D	Y600-D	Y600T-D	E600-#10-D
PF3A808H	AC60#-D			

- Refer to the SMC website (URL: <https://www.smcworld.com>) for more details of options.

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.



Model	PF3A 8R5H	PF3A 801H	PF3A 802H	PF3A 804H	PF3A 808H
Maximum moment (M): N•m	14.5	16	19.5	45	

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

4 Installation (continued)

4.5 Wiring

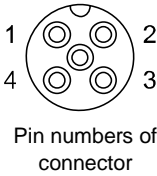
Caution

- Do not perform wiring while the power supply is ON.
- Confirm proper insulation of wiring.
- Do not route wires and cables together with power or high voltage cables.

The product can malfunction due to interference of noise and surge voltage from power and high voltage cables. Route the wires of the product separately from power or high voltage cables.

- 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.

When used as switch output device



No.	Name	Wire colour	Function
1	DC(+)	Brown	24 VDC
2	OUT2	White	Switch output
3	DC(-)	Blue	0 V
4	OUT1	Black	Switch output

When used as IO-Link device

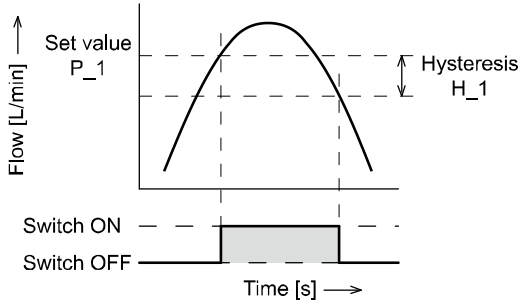
No.	Name	Wire colour	Function
1	DC(+)	Brown	24 VDC
2	OUT2	White	Switch output
3	DC(-)	Blue	0 V
4	C/Q	Black	IO-Link data / Switch output (SIO)

5 Flow Setting

5.1 Default setting

When the flow exceeds the set value [P_1], [P_2], the switch will turn ON. When the flow falls below the set value by the amount of hysteresis [H_1], [H_2], or more, the switch will turn OFF.

If the operation shown below is acceptable, then keep these settings.



Item	PF3A8R5H	PF3A801H	PF3A802H
[P_1] Set value of OUT1	250 L/min	500 L/min	1000 L/min
[H_1] Hysteresis of OUT1	25 L/min	50 L/min	100 L/min
[P_2] Set value of OUT2	250 L/min	500 L/min	1000 L/min
[H_2] Hysteresis of OUT2	25 L/min	50 L/min	100 L/min

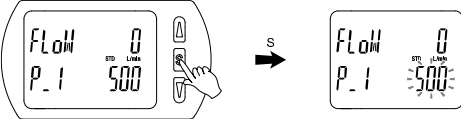
Item	PF3A804H	PF3A808H
[P_1] Set value of OUT1	2000 L/min	4000 L/min
[H_1] Hysteresis of OUT1	200 L/min	400 L/min
[P_2] Set value of OUT2	2000 L/min	4000 L/min
[H_2] Hysteresis of OUT2	200 L/min	400 L/min

6 3 step setting mode

In this mode, the set value ([P_1/P_2] or [n_1/n_2]) and hysteresis ([H_1/H_2]) can be changed in just 3 steps.

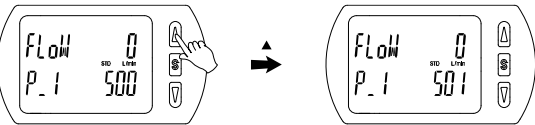
Set the items on the display (set value and hysteresis) using the UP or DOWN buttons.. The hysteresis setting can be changed in the same way. Use this mode if the product is to be used straight away, after changing only the set values.

- Press the SET button once in measurement mode to display the set values. (The item to be changed is displayed on the sub display).. The set value on the sub display (right side) 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.

- Press the UP button once to increase by one digit or press and hold to continuously increase.



- Press the DOWN button once to decrease by one digit or press and hold to continuously decrease.
- 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 automatically be set to the same as the current display value (snap shot function).

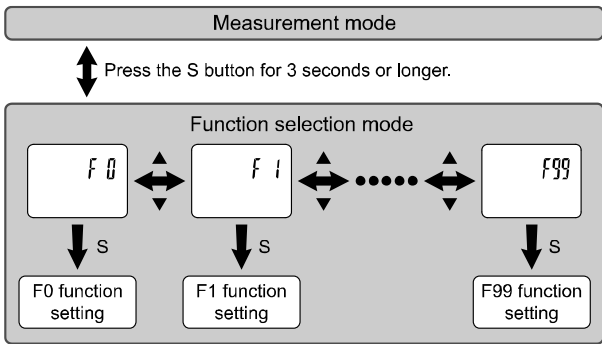
- Press the SET button to finish the setting.

7 Function Setting

7.1 Function selection mode

In measurement mode, press the SET button for 3 seconds or longer to display [F 0].

Press the UP or DOWN button to select the function to be changed. Press and hold the SET button for 2 seconds or longer in function selection mode to return to measurement mode.



Refer to the SMC website (URL: <https://www.smcworld.com>) for more setting details.

7 Function Setting (continued)

7.2 Default settings

Function			Default Settings
Main display (Right)	Main display (Left)	Sub display (Left)	
[F 0]	FLoW	[FLU] Select fluid	[Air] Air,Nitrogen
	FLoW	[rEF] Select display units	[Std] Standard condition
	FLoW	[Unit] Units selection function	[L] L/min
	tEMP		[C] °C
	PrES		[MPA] MPa
	-	[NorP] Select NPN/PNP	[PNP] PNP output
		[oUt1] Select output of OUT1	[FLoW] Flow rate
		[oUt2] Select output of OUT2	[FLoW] Flow rate
		[CoL] Select display colour	[1SoG] Green ON Red OFF (OUT1)
		[ioL] Select IO-Link enable / disable	[on] IO-Link enabled
[F 1]	oUt1	[SW1] Select the target for setting	[FLoW] Flow rate
	FLoW	[ModE] Select switch mode	[HYS] Hysteresis mode
	FLoW	[1ot] Select switch operation	[1_P] Normal output
	FLoW	[P_1] Input the set value	[250] 250 L/min (PF3A8R5H)
			[500] 500 L/min (PF3A801H)
			[1000] 1000 L/min (PF3A802H)
			[2000] 1000 L/min (PF3A804H)
			[4000] 1000 L/min (PF3A808H)
	FLoW	[H_1] Input of hysteresis	[25] 25 L/min (PF3A8R5H)
			[50] 50 L/min (PF3A801H)
			[100] 100 L/min (PF3A802H)
			[200] 200 L/min (PF3A804H)
			[400] 400 L/min (PF3A808H)
	FLoW	[dtH1] ON delay time setting	[0.00] 0 s
	FLoW	[dtL1] OFF delay time setting	[0.00] 0 s
[F 2]	oUt2	[SW2] Select the target for setting	[FLoW] Flow rate
	FLoW	[ModE] Select switch mode	[HYS] Hysteresis mode
	FLoW	[2ot] Select switch operation	[2_P] Normal output
	FLoW	[P_2] Input the set value	[250] 250 L/min (PF3A8R5H)
			[500] 500 L/min (PF3A801H)
			[1000] 1000 L/min (PF3A802H)
			[2000] 1000 L/min (PF3A804H)
			[4000] 1000 L/min (PF3A808H)
	FLoW	[H_2] Input of hysteresis	[25] 25 L/min (PF3A8R5H)
			[50] 50 L/min (PF3A801H)
			[100] 100 L/min (PF3A802H)
			[200] 200 L/min (PF3A804H)
			[400] 400 L/min (PF3A808H)
	FLoW	[dtH2] ON delay time setting	[0.00] 0 second
	FLoW	[dtL2] OFF delay time setting	[0.00] 0 second

7 Function Setting (continued)

Function			Default Settings
Main display (Right)	Main display (Left)	Sub display (Left)	
[F 3]	FLoW PrES	[FiL] Select digital filter	[1.0] 1 second [0.10] 0.1 second
[F 6]	PrES	[FSC] Display value fine adjustment	[0.0] 0%
[F13]	-	[rEv] Select reverse display	[oFF] Reverse display OFF
[F14]	FLoW PrES	[CUt] Select Zero cut-off setting	[1.0] 1%F.S. cut [0.0] 0%
[F16]	PrES	[MES] Measurement display setting	[diSP] Display
	tEMP		[diSP] Display
	AC		[diSP] Display
[F30]	AC	[SAVe] Accumulated value hold	[oFF] Not stored
[F80]	-	[diSP] 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]		[tESt] Setting of output check	[n] Normal output
[F99]		[ini] Reset to the default settings	[oFF] Not used

8 Other Settings

- Reset operation
- Snap shot function
- Digital select function
- Zero clear function
- Key lock function

Refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>) for setting these functions.

9 How to Order

Refer to the SMC website (URL: <https://www.smcworld.com>) for more How to Order details.

10 Outline Dimensions (mm)

Refer to the SMC website (URL: <https://www.smcworld.com>) for details of Outline dimensions.

11 Maintenance

11.1 General Maintenance



Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.
- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.

11 Maintenance (continued)

- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.
- Remove condensate periodically.
If condensate enters the secondary side, it can cause operating failure of pneumatic equipment.
- Do not use solvents such as benzene, thinner etc. to clean the product.
This may damage the surface of the body or erase the markings on the body.
Use a soft cloth to remove stains.
For heavy stains, use a damp cloth that has been soaked with diluted neutral detergent and fully squeezed, then wipe up the stains again with a dry cloth.
- How to reset the product after a power cut or when the power has been unexpectedly removed
The settings of the product are retained from before the power cut or de-energizing.
The output condition also recovers to that before the power cut or de-energizing, but may change depending on the operating environment.
Therefore, check the safety of the whole system before operating the product.

12 Limitations of Use

10.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

13 Product disposal

This product should not be disposed of as municipal waste. Check your local regulations and guidelines to dispose of this product correctly, in order to reduce the impact on human health and the environment.

14 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor/importer.

SMC Corporation

URL: <https://www.smcworld.com> (Global) <https://www.smc.eu> (Europe)
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