



**Instruction Manual**  
**Digital Flow Sensor - Remote Monitor (4 ch)**  
**PF2A20# / PF2W20# / PF2D20# series**



The intended use of the remote flow monitor is to monitor and display flow information provided from a digital flow sensor.

**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) <sup>(1)</sup>, and other safety regulations.

- <sup>(1)</sup> 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 10218-1: Manipulating industrial robots -Safety, etc.
- 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.

<b>Caution</b>	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
<b>Warning</b>	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
<b>Danger</b>	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious 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.
- 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.
- Refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>) for more safety instructions.

**Warning**

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

**2 Specifications**

**2.1 PF2A20# specifications (for Air)**

Model		PF2A200 / PF2A201				
Applicable sensor		PF2A 510	PF2A 550	PF2A 511	PF2A 521	PF2A 551
Flow	Rated flow range (L/min)	1 to 10	5 to 50	10 to 100	20 to 200	50 to 500
	Instantaneous					
	Flow setting range (L/min)	0.5 to 10.5	2.5 to 52.5	5 to 105	10 to 210	25 to 525
	Min. setting / unit (L/min)	0.1	0.5	1.0	2.0	5.0
Accumulated	Display flow rate range	0 to 999999 L				
	Min. setting / display unit	1 L				
Switch output	Output type	NPN or PNP open collector output				
	Output mode	Instantaneous flow output (hysteresis, window comparator mode) Accumulated flow output, Accumulated pulse output				
	Switch operation	Normal output, Reversed output				
	Max. load current	80 mA				
	Max. applied voltage	30 VDC (NPN output)				
	Internal volt. drop	1 V or less (at 80 mA)				
	Response time	1 s or less				
	Repeatability	±1% F.S. max.				
	Accuracy	±5% F.S. max.				
	Hysteresis	Hysteresis mode: Variable Window comparator mode: Fixed (3 digits)				
Output protection	Short circuit protection					
Accumulated pulse width	50 ms					
Accumulated pulse conversion	0.1 L/pulse	0.5 L/pulse	1 L/pulse	2 L/pulse	5 L/pulse	

**2.2 PF2W20# specifications (for Water)**

Model		PF2W200 / PF2W201			
Applicable sensor		PF2W504(T) PF3W504	PF2W520(T) PF3W520	PF2W540(T) PF3W540	PF2W511(T) PF3W511
Flow	Rated flow range (L/min)	0.5 to 4.0	2 to 16	5 to 40	10 to 100
	Instantaneous				
	Flow setting range (L/min)	0.35 to 4.50	1.7 to 17.0	3.5 to 45.0	7 to 110
	Min. setting / unit (L/min)	0.05	0.1	0.5	1
Accumulated	Display flow rate range	0 to 999999 L			
	Min. setting / display unit	1 L			
Switch output	Output type	NPN or PNP open collector output			
	Output mode	Instantaneous flow output (hysteresis, window comparator mode) Accumulated flow output, Accumulated pulse output			
	Switch operation	Normal output, Reversed output			
	Max. load current	80 mA			
	Max. applied voltage	30 VDC (NPN output)			
	Internal volt. drop	1 V or less (at 80 mA)			
	Response time	1 s or less			
	Repeatability	±1% F.S. max.			
	Accuracy	±5% F.S. max.			
	Hysteresis	Hysteresis mode: Variable Window comparator mode: Fixed (3 digits)			
Output protection	Short circuit protection				
Accumulated pulse width	50 ms				
Accumulated pulse conversion	0.05 L/pulse	0.1 L/pulse	0.5 L/pulse	1 L/pulse	

**2 Specifications (continued)**

**2.3 PF2D20# specifications (for Pure water / Chemical fluids)**

Model		PF2D200 / PF2D201		
Applicable sensor		PF2D504	PF2D520	PF2D540
Flow	Rated flow range (L/min)	0.4 to 4.0	1.8 to 20.0	4 to 20
	Instantaneous			
	Flow setting range (L/min)	0.25 to 4.50	1.3 to 21.0	2.5 to 45.0
	Min. setting / unit (L/min)	0.05	0.1	0.5
Accumulated	Display flow rate range	0 to 999999 L		
	Min. setting / display unit	1 L		
Switch output	Output type	NPN or PNP open collector output		
	Output mode	Instantaneous flow output (hysteresis, window comparator mode) Accumulated flow output, Accumulated pulse output		
	Switch operation	Normal output, Reversed output		
	Max. load current	80 mA		
	Max. applied voltage	30 VDC (NPN output)		
	Internal volt. drop	1 V or less (at 80 mA)		
	Response time	1 s or less		
	Repeatability	±1% F.S. max.		
	Accuracy	±5% F.S. max.		
	Hysteresis	Hysteresis mode: Variable Window comparator mode: Fixed (3 digits)		
Output protection	Short circuit protection			
Accumulated pulse width	50 ms			
Accumulated pulse conversion	0.05 L/pulse	0.1 L/pulse	0.5 L/pulse	

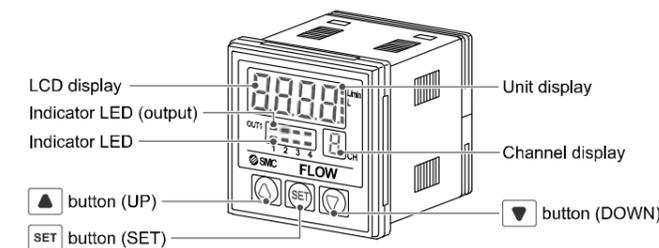
**2.4 Common specifications**

Item	Specification	
Display	Display part	Digit: 4 digits 7 segments, Colour: Orange
	Channel display	Digit: 1 digit 7 segments, Colour: Red
	Indicator LED	Output is ON, Red LED is ON
Supply voltage	24 VDC±10%	
Power consumption	55 mA or less (no load)	
Environment	Enclosure	Front: IP65 (panel mounting), Other: IP40
	Temperature range	Operation: 0 to 50 °C, Storage: -10 to 60 °C (no freezing or condensation)
	Humidity range	Operation, Storage: 35 to 85%R.H. (no condensation)
	Temperature characteristics	±2% F.S. max. (0 to 50°C, 25°C reference)
	Withstand voltage	1000 VAC, for 1minute between external terminals and case
Insulation resistance	50 MΩ or more (with 500 VDC mega meter) between external terminals and case	
Materials	Body: PBT, Display: PET, Rubber cover for rear: CR	
Product weight	60 g	

**2.5 Cable specifications**

Conductor	Nominal cross section	approx. 0.15 mm <sup>2</sup>
	Individual wire diameter	approx. 0.5 mm
Insulator	Outside diameter	approx. 0.9 mm
	Wire colours	Brown, Black, Grey, Red, Green, Blue, White, Yellow
Sheath	Material	Heat resistant polyethylene
	Outer diameter	approx. φ4.8 mm
Cable weight	65 g	

**3 Name and function of parts**



Item	Description
Unit display	Indicates the unit currently selected, and automatically displays instantaneous or accumulated flow units according to the display mode.
LCD display	Displays the flow value, setting mode, and error indication.
Indicator LED (output)	Indicates the switch output status. LED is ON when the output is ON.
Indicator LED	Indicates the reference condition selected. LED is ON (Red) when normal condition is selected. (only the PF2A##)
Channel display	Indicates the channel selected (CH1 to CH4).
▲ button (UP)	Selects the mode or increases the ON/OFF Set value.
SET button (SET)	Press this button to change the mode and to set a value.
▼ button (DOWN)	Selects the mode or decreases the ON/OFF Set value.

**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 rated flow, operating pressure and temperature range.
- Tighten to the specified tightening torque. If the tightening torque is exceeded the mounting screws, brackets and the product can be broken. Insufficient torque can cause displacement of the product from its correct position.
- Do not drop, hit or apply excessive shock to the product.

**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.
- Do not use the product in areas subject to large temperature cycle.
- Do not operate close to a heat source, or in a location exposed to radiant heat.

**4.3 Mounting**

- Never mount the product in a location that will be used as a foothold.
- Refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>) for mounting dimensions.

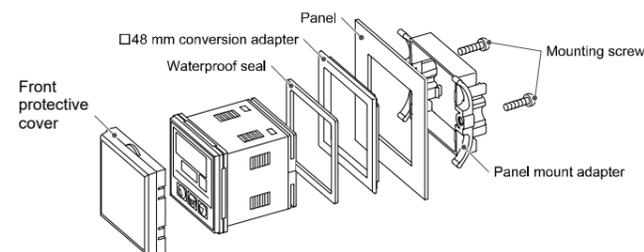
## 4 Installation (continued)

### 4.4 Mounting with Panel mount adapter

Mount the product as shown below. The □48 mm conversion adapter (ZS-46-D) is available if required.

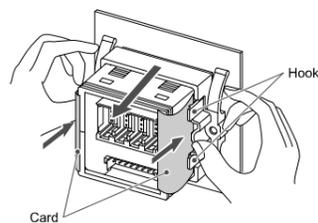
- The panel mount adapter and the front cover can be rotated 90° for mounting.
- Fix the panel mount adapter to the product using the mounting screws (3 x 8 L, 2 pcs.) supplied.
- The front protective cover for panel mounting satisfies IP65 (when □48 mm conversion adapter is used, it satisfies IP40). However, if the panel mount adapter is not fixed securely or the instrument is not seated correctly, water might enter. After the product makes contact with the panel, the screws should be further tightened 1/4 to 1/2 turn.
- The self-tapping screws cannot be re-used.
- Suitable for panel thickness of 0.5 to 8 mm.

- Panel mount adapter (Part No.: ZS-46-B)
- Front protective cover (Part No.: ZS-46-01)
- Panel mount adapter + Front protective cover (Part No.: ZS-46-D)



### Removing the panel mount adapter

- The product with panel mount adapter can be removed from the installation by removing 2 screws and releasing the hooks at the sides. The hooks can be released by inserting a suitable thin card.
- Pull the panel mount adapter to the front and remove the product.
- If the panel mount adapter is pulled with the hook engaged, the product or the panel mount adapter will be damaged.



## 5 Wiring

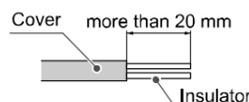
### 5.1 Wiring

#### Caution

- Wiring should only be performed with the power supply turned OFF.
- Confirm proper insulation of wiring.
- Use separate routes for the product wiring and any power or high voltage wiring. Otherwise, malfunction may result due to noise.
- Keep wiring as short as possible to prevent interference from electromagnetic noise and surge voltage.
- Ensure that the FG terminal is connected to ground when using a commercially available switch-mode power supply. 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.

### 5.2 Sensor Connector wiring

- Attaching the sensor wire. The sensor wire should be stripped as shown. Do not cut the insulator.



Insert the corresponding wire colour shown in the table into the pin number printed on the sensor connector, to the bottom.

## 5 Wiring (continued)

### 5.2.1 Sensor (e-CON) connector pin layout

Pin no.	PF2#5##		PF3W5##	
	Wire colour	Signal	Wire colour	Signal
1	Brown	DC (+)	Brown	DC (+)
2	N.C.	-	N.C.	-
3	Blue	DC (-)	Blue	DC (-)
4	White	Sensor input (1 to 5 V)	Black	Sensor input (1 to 5 V)

- Check that the above-mentioned wire preparation has been performed correctly, then part A shown in the figure is pushed in by hand to make temporary connection.



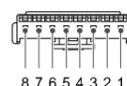
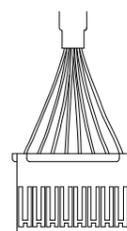
- Part A centre should be pressed straight in using a suitable tool, such as pliers. The e-CON connector cannot be re-used once it has been completely crimped.
- In case of connection failure or when a pin is mis-wired, always use a new e-CON connector.
- If the connector is not wired correctly [----] will be displayed.
- The wire colours are applicable for an SMC sensor lead wire.

### 5.2.2 Sensor (e-CON) connector details

SMC Part No.	Applicable sensor	Description
ZS-28-CA-4	Sensor connector for PF2A5##, PF2W5##, PF3W5##	Wire O.D.: φ1.15 to 1.35, Cover colour: Blue
ZS-28-CA-2	Sensor connector for PF2D5##	Wire O.D.: φ0.9 to 1.0, Cover colour: Red

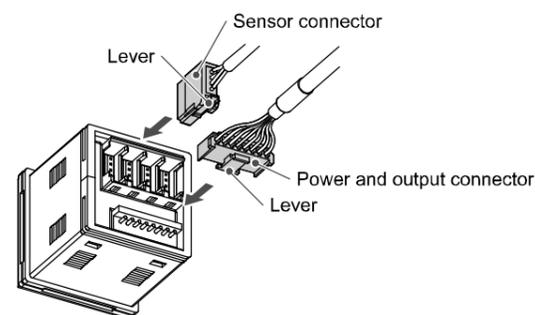
### 5.3 Power and Output Connector pin layout

Pin no.	Wire colour	Description
1	Brown	DC (+)
2	Blue	DC (-)
3	Black	CH1_OUT1
4	White	N.C.
5	Grey	CH2_OUT1
6	Red	CH3_OUT1
7	Green	CH4_OUT1
8	Yellow	N.C.



### 5.4 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.



## 6 Outline of Setting

### Power is supplied

The output will not operate for 3 seconds after power is supplied. The identification code of the product is displayed.

### Measurement mode

### Initialization mode

Select the Connected sensor, Display mode (instantaneous or accumulate flow), Unit selection, Output mode, Switch operation and Reference condition

### Flow rate setting

Select a set value for the flow rate and switch output.

### Measurement mode

The mode in which the flow is detected and displayed, and the switch function is operating. Display of instantaneous flow or accumulated flow can be selected.

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

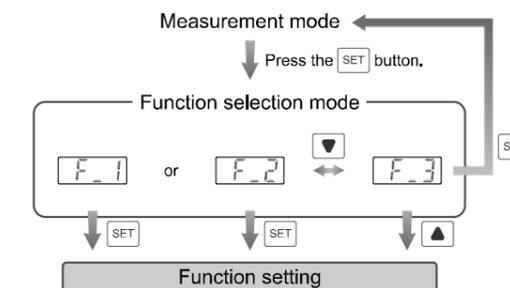
## 7 Initialization

- Select the channel required by pressing the UP button, then press and hold the SET button for 2 seconds or more. When the display changes from [F\_1], [F\_2] to [F\_3] then to one of the following displays, press the SET button.
- Select the flow rate range according to the flow sensor connected. Press the UP and DOWN button to select the flow rate range, then press the SET button.

Product	Display	Flow rate range	Sensor
PF2A20#	10L	1 to 10 L/min	PF2A510
	50L	5 to 50 L/min	PF2A550
	11L	10 to 100 L/min	PF2A511
	21L	20 to 200 L/min	PF2A521
PF2W20#	04L	0.5 to 4 L/min	PF2W504(T)
		0.5 to 4 L/min	PF3W504
	20L	2 to 16 L/min	PF2W520(T)
		2 to 16 L/min	PF3W520
PF2D20#	40L	5 to 40 L/min	PF2W540(T)
		5 to 40 L/min	PF3W540
	11L	10 to 100 L/min	PF2W511(T)
		10 to 100 L/min	PF3W511
PF2D20#	04d	0.4 to 4 L/min	PF2D504
	20d	1.8 to 20 L/min	PF2D520
	40d	4 to 40 L/min	PF2D540

## 8 Function selection mode

- In measurement mode, press the SET button, to display [F\_#].
- This [F\_#] indicates the mode for changing each function setting.



\*: When the output mode is set to instantaneous output mode, [F\_1] is displayed. When the output mode is set to accumulated output mode, [F\_2] is displayed. When the output mode is set to accumulated pulse output mode, [F\_3] is displayed.

### 8.1 Default settings

Item	Default Setting
[F_1] Input Set value of instantaneous output	[n_1] * Input Set point 1 50% of max. rated flow PF2A20#: [ 5.0] L/min (PF2A510) PF2W20#: [2.00] L/min (PF#W504) PF2D20#: [2.00] L/min (PF2D504)
[F_2] Input Set value of accumulated output	[1nL] * Input Set value for lower 3 digits [ 0]
[F_3] Copy function	[1nH] * Input Set value for upper 3 digits [ 0]

## 9 Other functions

- Channel scan function
- Peak / Bottom display function
- Key-lock function

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

## 10 Troubleshooting

### 10.1 Error indication

Error Name	Error Display	Error Type	Troubleshooting Method
Excessive instantaneous flow	---	Flow has exceeded the upper limit of the display flow range.	Reduce the flow.
Over current error	Er 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.
System error	Er 0 Er 5 Er 6 Er 7 Er 10	Internal data error.	Contact SMC to repair.
Excessive accumulated flow	999 (flashing)	The display flow range of accumulated flow has been exceeded.	To reset the accumulated flow value, press and hold the SET button and DOWN button for 4 sec. or more.

If the error cannot be reset then please contact SMC.

## 11 How to Order

Refer to the operation manual or catalogue on the SMC website (URL: <https://www.smcworld.com>) for How to order information.

## 12 Outline Dimensions (mm)

Refer to the operation manual or catalogue on the SMC website (URL: <https://www.smcworld.com>) for Outline Dimensions.

## 13 Maintenance

### 13.1 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.
- 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.

- **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.

## 14 Limitations of Use

### 14.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

## 15 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.

## 16 Contacts

Refer to [www.smcworld.com](https://www.smcworld.com) or [www.smc.eu](https://www.smc.eu) for your local distributor / importer.

# SMC Corporation

URL: <https://www.smcworld.com> (Global) <https://www.smceu.com> (Europe)  
 SMC Corporation, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, Japan  
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