3-Color Display Digital Flow Switch for Water

3-color/2-screen display

*4 Excludes -X445
*4 Output specification: Excludes JT/KT

RoHS

IP65

Main screen	Instantaneous flow rate*1
Sub screen *3	Set value

Instantaneous flow rate*1			
Accumulated value	Peak/Bottom value	Line name	Fluid temperature*2

*1 Main screen shows the instantaneous flow rate only.
*2 Fluid temperature can be displayed only when the digital flow switch with a temperature sensor is selected.
*3 Sub screen can be turned off.

New Output specification variations have been added.

PF3W7 — Analog voltage 2-output type (flow rate + temperature)
Analog current 2-output type (flow rate + temperature)

New 3-Screen Display
4-Channel Flow Monitor
***PFG200* Series** p. 3

Variations

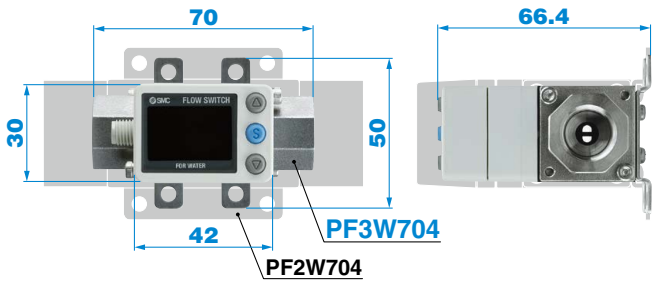
Type	Applicable fluid	Rated flow range [L/min]	Flow adjustment valve/Temperature sensor: None	Flow adjustment valve	Temperature sensor	Flow adjustment valve + Temperature sensor	Port size Rc, NPT, G
p. 11 Integrated; Remote Sensor; Monitor p. 31	Water; Ethylene glycol aqueous solution	0.5 to 4	●	●	●	●	3/8
		2 to 16	●	●	●	●	3/8, 1/2
		5 to 40	●	●	●	●	1/2, 3/4
		10 to 100	●	—	●	—	3/4, 1
		50 to 250	●	—	●	—	1 1/4, 1 1/2
PVC piping type Integrated p. 24; Remote Sensor; Monitor p. 31	Deionized water	10 to 100	●	—	—	—	25A
	Chemical liquids	30 to 250	●	—	—	—	30A

PF3W Series

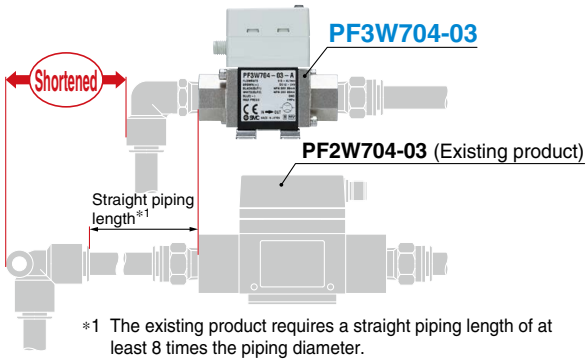
SMC

CAT.ES100-80D

40% smaller than the existing product



Reduced required piping space



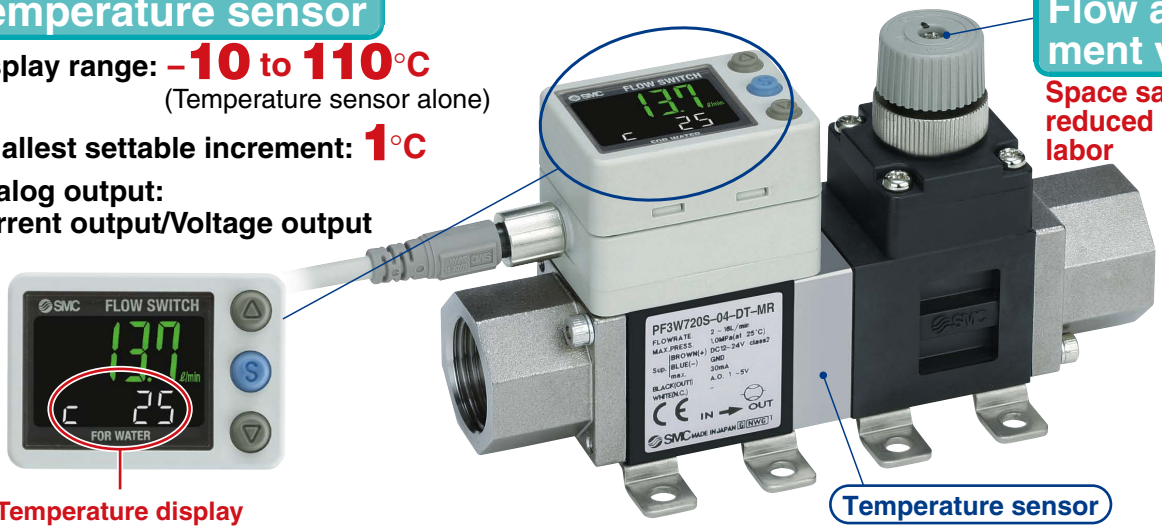
*1 The existing product requires a straight piping length of at least 8 times the piping diameter.
Refer to straight piping length and accuracy on pages 15 and 26.

Temperature sensor

Display range: –10 to 110°C
(Temperature sensor alone)

Smallest settable increment: 1°C

Analog output:
Current output/Voltage output



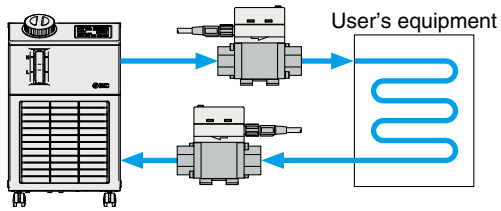
Flow adjustment valve

Space saving with reduced piping labor

Fluid temperature: 0 to 90°C

Ethylene glycol aqueous solution can be used.

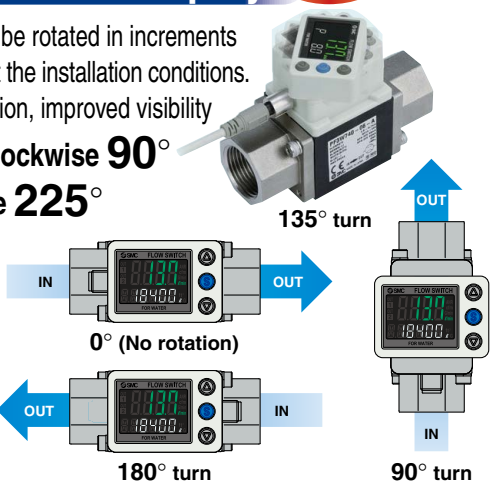
Example) Flow control of the circulating fluid in a chiller



Rotatable display

Display can be rotated in increments of 45° to suit the installation conditions.
Easy operation, improved visibility

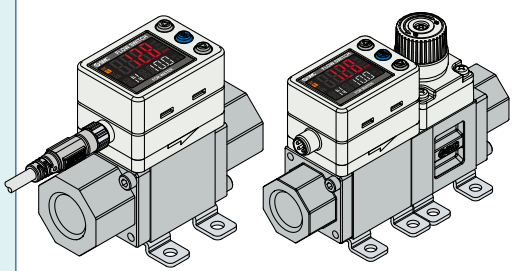
Counterclockwise 90°
Clockwise 225°



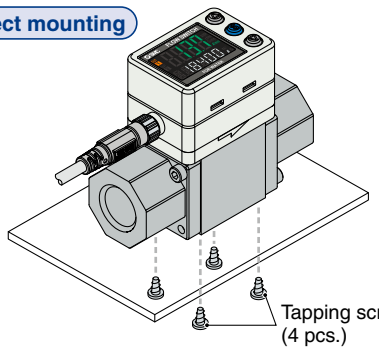
Non-grease

◎Mounting

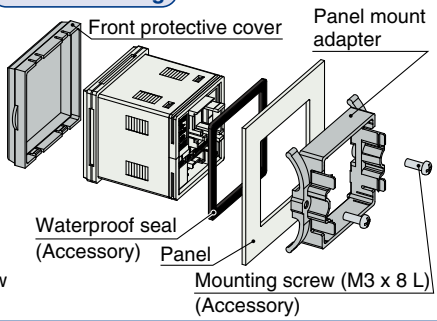
Bracket mounting



Direct mounting

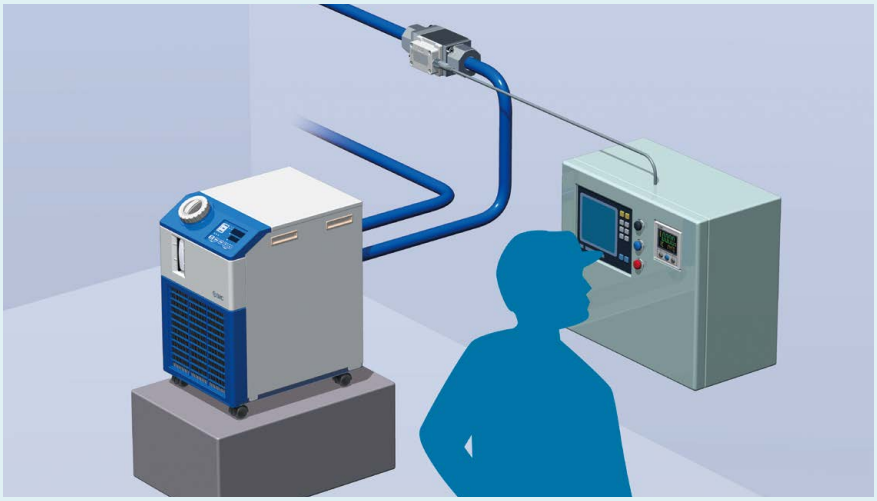


Panel mounting



New Compatible with the analog 2-output type (flow rate + temperature)

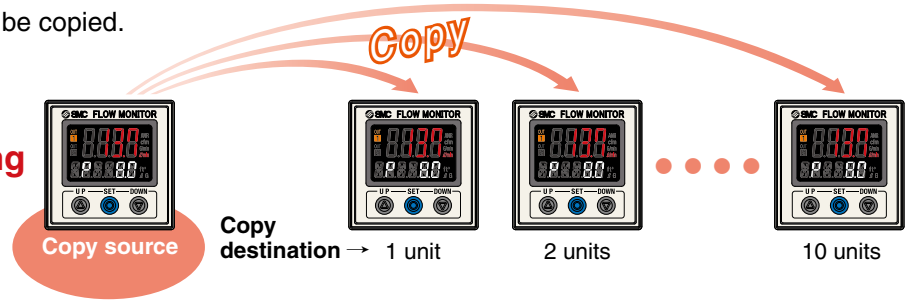
Enables the monitoring of flow rate and temperature conditions not only at the installation site but also remotely



3-color display Digital flow monitor: The set value can be copied to up to 10 flow monitors simultaneously.

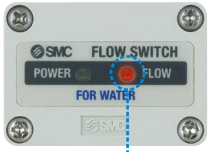
The set values of the monitor can be copied.

- **Reduced setting labor**
- **Minimized risk of setting mistakes**



Indicator

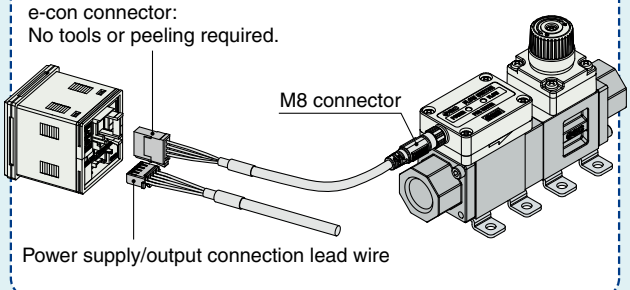
Visually check the status of the sensor via the indicator.



Flow rate: High	Blinking green/Fast
Flow rate: Low	Blinking green/Slow
Rated flow or less	OFF
Rated flow or more	Red ON

Connector reduces wiring labor

e-con connector:
No tools or peeling required.



PVC piping type

Wetted Parts

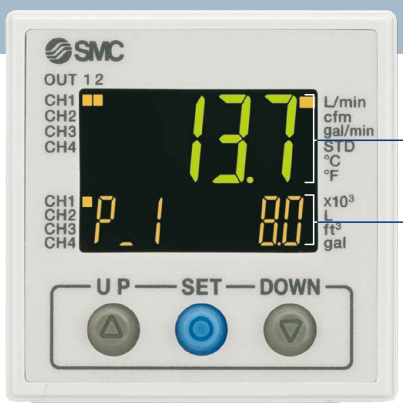
Pipe	CPVC (Heat-resistant PVC)
Body	PPS
Seal	FKM

3-Screen Display

4-Channel Flow Monitor

PFG200 Series

Up to **4** flow sensors can be connected!



It is possible to change the settings while checking the measured value.

Main screen	Measured value (Current flow value)	
Sub screen	Left side: Label (Display item)	Right side: Set value (Threshold value)

- Input Range Selection

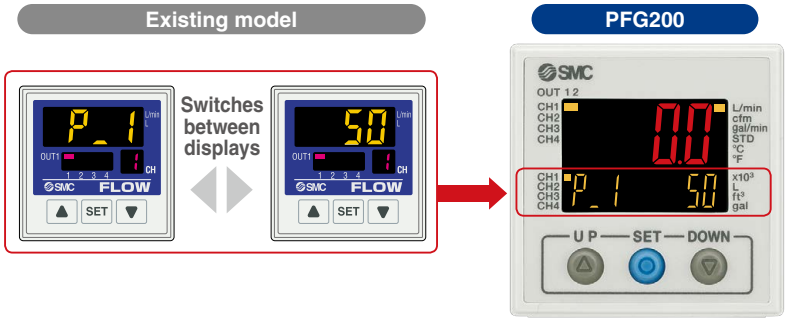
Visualization of Settings

Set value (Threshold value)	P_1	Hysteresis value	H_1	Peak value	H_H
Bottom value	H_Lo	Channel display	CH_1		

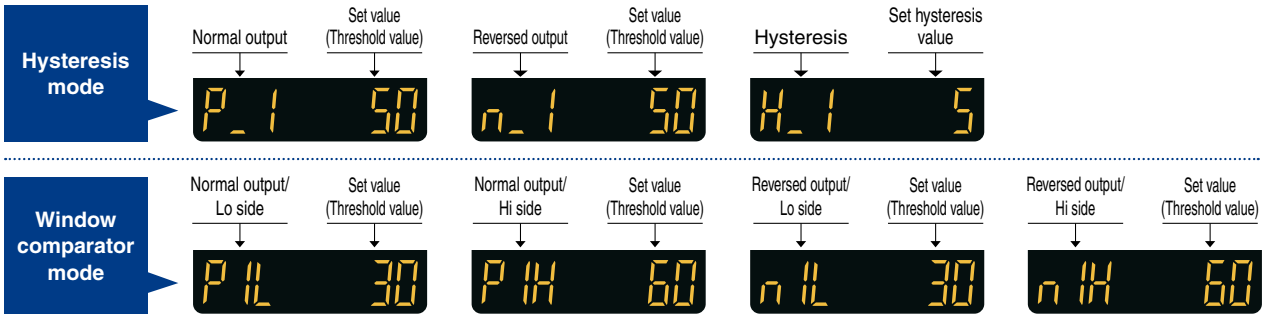
SMC

Visualization of Settings

Item and set value are displayed together.
Easy to confirm the displayed item

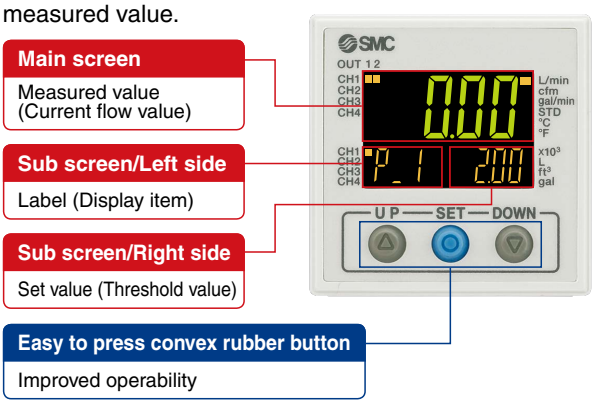


Mode Examples

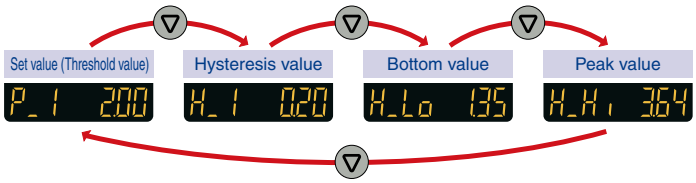


Easy Screen Switching

It is possible to change the settings while checking the measured value.



The sub screen can be switched by pressing the down buttons.



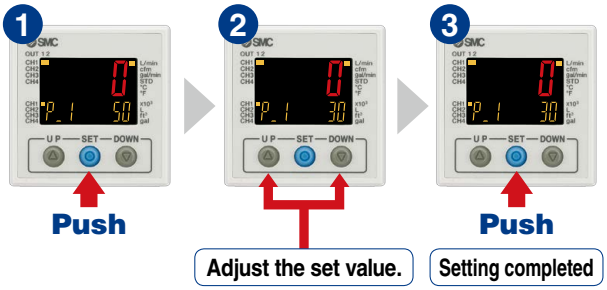
∗ One additional arbitrary display mode can be added via the function settings.

CH display | Other channel | Customer defined label | Display OFF

Simple 3-Step Setting

After selecting the channel, when the SET button is pressed and the set value (P_1) is displayed, the set value (threshold value) can be set.

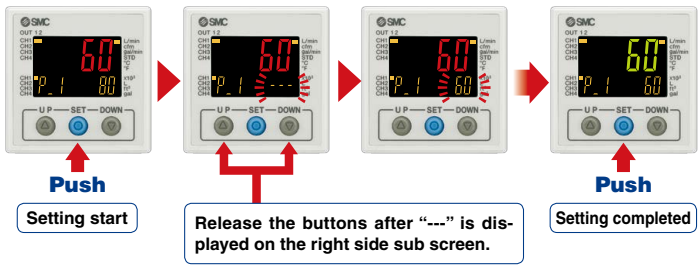
When the SET button is pressed and the hysteresis (H_1) is being displayed, the hysteresis value can be set.



Now with a snap shot function for set value reading

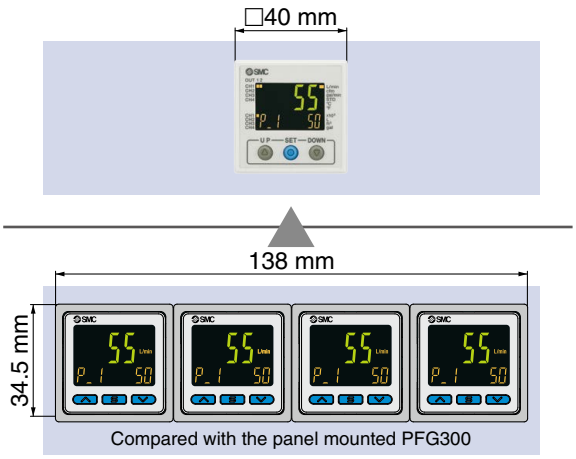
Snap shot function

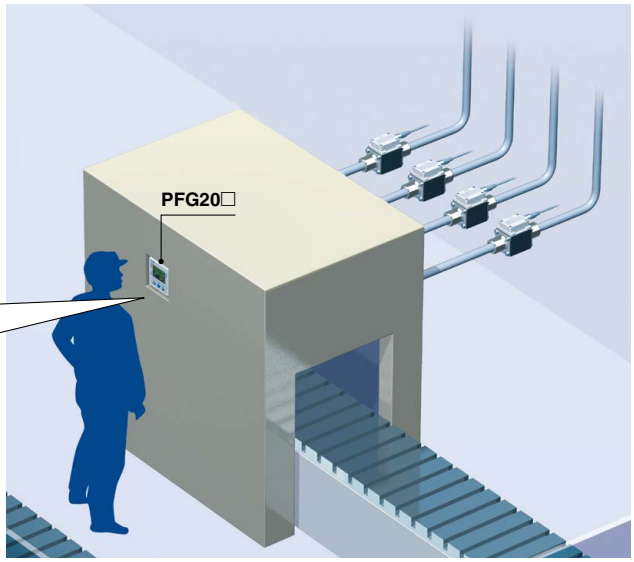
Pressing the △ and ▽ buttons simultaneously for a minimum of 1 second will make the set value (threshold value) the same as the current pressure value.



Centralized Control Saves Installation Space.

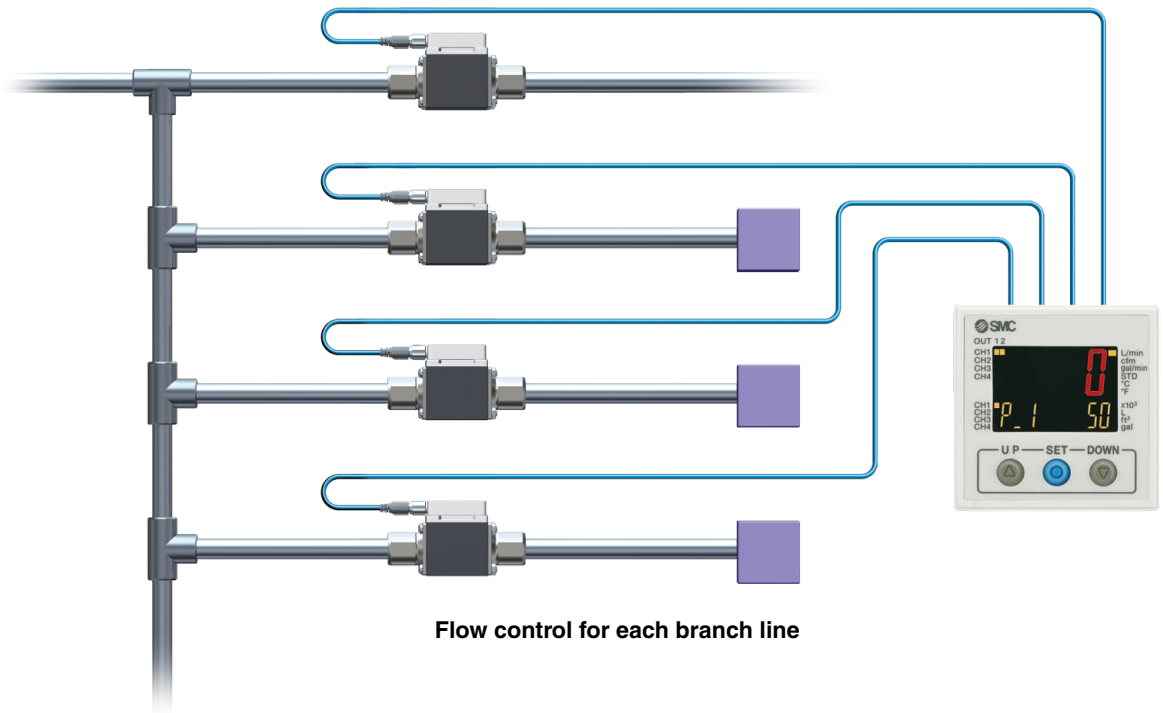
66 % reduction in installation space (Compared with the panel mounted PFG20□)





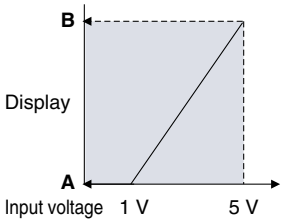
Accumulated Flow Measurement

A single product can manage the accumulated flow in four lines.



Flow control for each branch line

Input Range Selection (for Pressure/Flow rate)



The sensor input range can be set to the required value and displayed. (Voltage input: 1 to 5 V)
Pressure switch/Flow switch can be displayed.

A is displayed for 1 V. B is displayed for 5 V.
The range can be set as required.
Refer to page 36 for the specification of the sensors which can be connected.
For the individual specifications of each connectable sensor, refer to the **Web Catalog**.

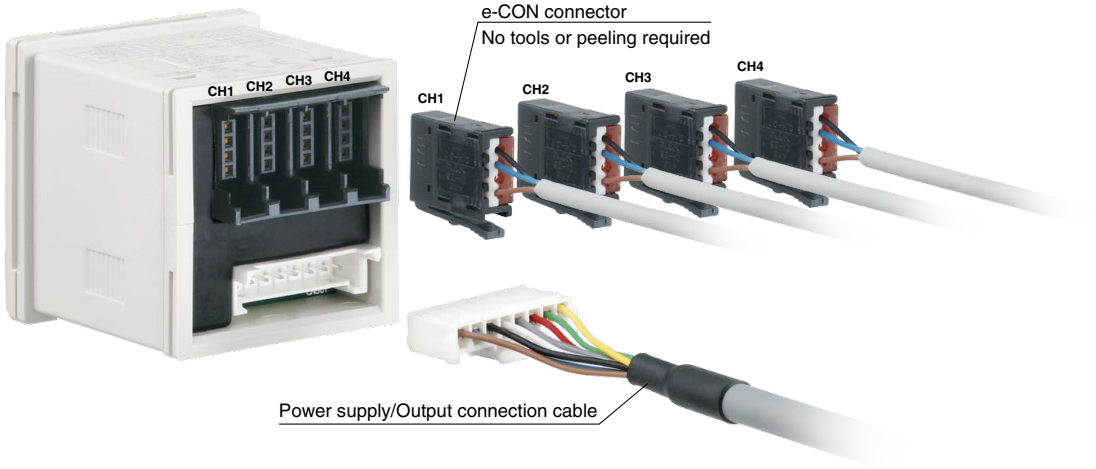
■ For Pressure Sensor for General Fluids / PSE56□

	A	B
PSE560	0.000	1.000
PSE561	0	−101
PSE562	0	101
PSE563	−101	101

Set A and B to the values shown in the table.

Connectors

Connection and removal of wiring is easy.



Functions

■ Peak/Bottom value indication function
This function constantly detects and updates the max. (min.) flow when the power is supplied, and allows to hold the max. (min.) flow value.

■ Key-lock function
This function prevents operation errors such as accidentally changing setting values.

■ External input function
The accumulated value, peak value, and bottom value can be reset remotely.

■ Error display function
This function displays error location and content when a problem or error has occurred.

■ Delay time setting
The time from when the instantaneous flow reaches the set value to when the switch output operates can be set.

■ Zero-cut setting
When the flow display value is close to zero, this function forces the display to zero.

■ Selection of power-saving mode
Power-saving mode can be selected.
It shifts to power-saving mode automatically when there is no button operation for 30 seconds.

■ Setting of security code
Users can select whether a security code must be entered to release the key lock.

■ Accumulated value hold
The accumulated value is not cleared even when the power supply is turned OFF.

■ Snap shot function
The current flow rate value can be stored to the switch output ON/OFF set point.

■ Output check function
It is possible to check the switch output operation and process data value.

■ Channel to channel copy function
The set values can be copied to other channel.

■ Channel select function
Flow value for the selected channel is displayed.

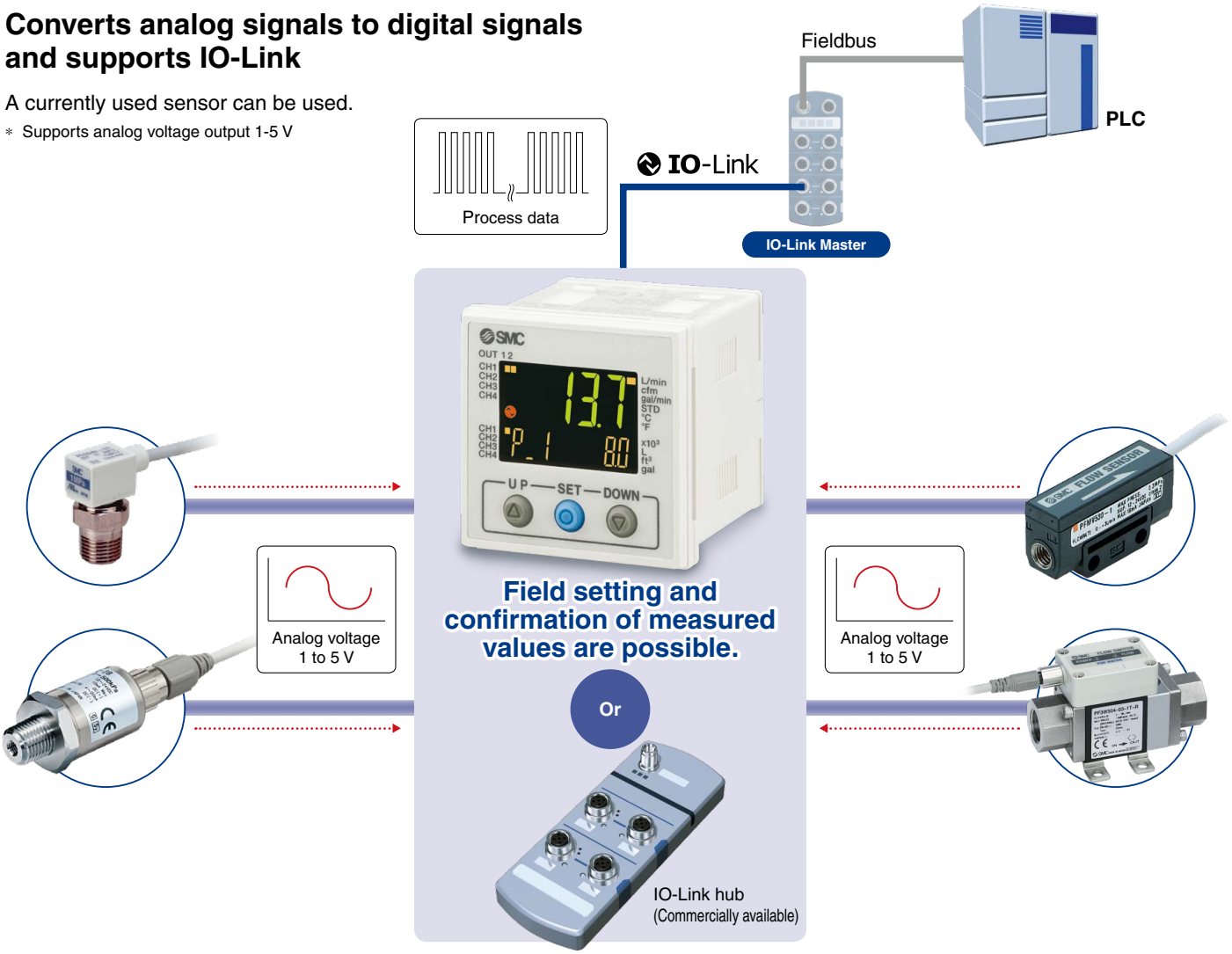
■ Channel scan function
Flow values for each channel are displayed in turn every 2 seconds.

Hub Function

Converts analog signals to digital signals and supports IO-Link

A currently used sensor can be used.

∗ Supports analog voltage output 1-5 V



Process Data

Bit offset	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
Item	CH1 measured value: 16-bit signed integer															
Bit offset	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
Item	CH2 measured value: 16-bit signed integer															
Bit offset	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
Item	CH3 measured value: 16-bit signed integer															
Bit offset	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Item	CH4 measured value: 16-bit signed integer															

Measurement data of sensors for 4 channels are combined and cyclically sent as a process data.

Bit offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Item	Error	System error	Fixed output	Reservation	CH4 diagnosis	CH3 diagnosis	CH2 diagnosis	CH1 diagnosis	CH4 OUT2	CH4 OUT1	CH3 OUT2	CH3 OUT1	CH2 OUT2	CH2 OUT1	CH1 OUT2	CH1 OUT1

Each channel has 2 outputs∗1.

Diagnosis item	· Internal product malfunction · Outside of zero-clear range

Diagnosis item	· Output overcurrent

Diagnosis item	· Display upper and lower limits are exceeded. · The accumulated flow upper and lower limits are exceeded

Implement diagnostic bits in the process data.

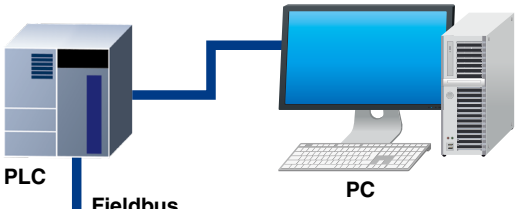
∗1 During SIO mode, only CH1 has 2 switch outputs. CH2-4 has one output each.

IO-Link Compatible PF3W7□-X445

p. 23

Supports the IO-Link communication protocol

IO-Link is an open communication interface technology between the sensor/actuator and the I/O terminal that is an international standard, IEC61131-9.

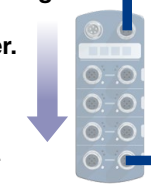


Configuration File (IODD File*1)
• Manufacturer • Product part no. • Set value

*1 **IODD File:**
IODD is an abbreviation of IO Device Description. This file is necessary for setting the device and connecting it to a master. Save the IODD file on the PC to be used to set the device prior to use.

Device settings can be set by the master.
• Threshold value
• Operation mode, etc.

Read the device data.
• Switch ON/OFF signal and analog value
• Device information:
Manufacturer, Product part number, Serial number, etc.
• Normal or abnormal device status
• Cable breakage



IO-Link Master

IO-Link Compatible Device: Digital Flow Switch for Water

Implement diagnostic bits in the process data.

The diagnostic bit in the cyclic process data makes it easy to find problems with the equipment.
It is possible to find problems with the equipment in real time using the cyclic (cycle) data and to monitor such problems in detail with the noncyclic (aperiodic) data.

Process Data

Bit offset	Item	Note
0	OUT1 output	0: OFF 1: ON
1	OUT2 output	0: OFF 1: ON
8	Diagnosis (error)	0: OFF 1: ON
9	Diagnosis (flow rate)	0: OFF 1: ON
10	Diagnosis (temperature)	0: OFF 1: ON
16 to 31	Measured temperature value	Signed 16 bit
32 to 47	Measured flow rate value	Signed 16 bit

Diagnosis items
• Over current error
• Above the rated flow range
• Accumulated flow error
• Above the rated temperature range
• Below the rated temperature range
• Internal product malfunction
• Temperature sensor failure

Bit offset	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
Item	Measured flow rate value (PD)															

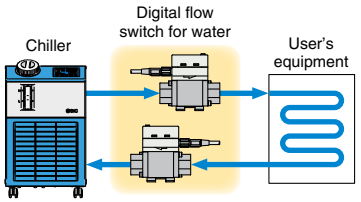
Bit offset	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Item	Measured temperature value (PD)															

Bit offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Item	Reservation					Temperature	Flow rate	Error	Reservation						OUT2	OUT1
						Diagnosis									Switch output	

Application Examples

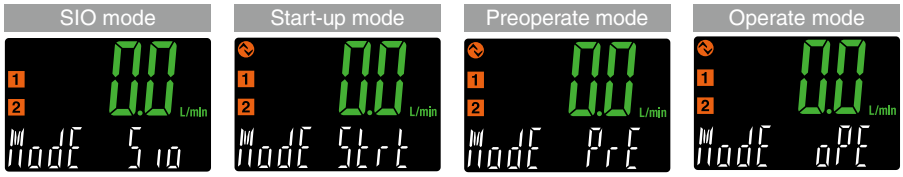
For the predictive maintenance of cooling water problems

Monitors flow rate and temperature's "switch ON/OFF signals" and "analog values" to determine the cooling status
The process and cooling status can be compared.



Display function

Displays the output communication status and indicates the presence of communication data



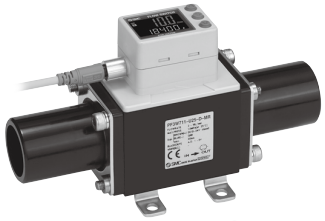
Operation and Display

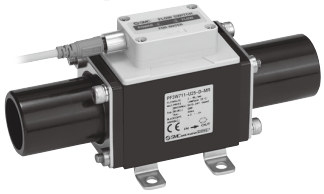
Communication with master	IO-Link status indicator light	Status			Screen display	Description
Yes	*1	IO-Link mode	Normal	Operate	MODE OPE	Normal communication status (readout of measured value)
				Start up	MODE STRT	At the start of communication
				Preoperate	MODE PRE	
	*1 (Flashing)		Abnormal	Version does not match	Er 15 M 1.0	The IO-Link version does not match that of the master. The master uses version 1.0.
				Lock	MODE LOC	Backup and restore required due to data storage lock.
No				Communication disconnection	MODE OPE / MODE STRT / MODE PRE	Normal communication was not received for 1 second or longer.
	OFF	SIO mode			MODE SIO	General switch output

*1 In IO-Link mode, the IO-Link indicator will be ON or flashing.

CONTENTS

3-Color Display Digital Flow Switch for Water *PF3W Series*
3-Color Display Digital Flow Switch for PVC Piping *PF3W Series*
3-Color Display Digital Flow Monitor for Water *PF3W3 Series*
3-Screen Display 4-Channel Flow Monitor *PFG200 Series*





3-Color Display
Digital Flow Switch for Water
PF3W Series

RoHS

How to Order

Remote sensor unit **Output specification/Temperature sensor**

For how to order the remote monitor unit, refer to page 31.

Symbol	OUT1	OUT2	Temperature sensor
	Flow rate	Temperature	
1	Analog 1 to 5 V	—	None
2	Analog 4 to 20 mA	—	
1T	Analog 1 to 5 V	Analog 1 to 5 V	With temperature sensor

∗ To use in combination with the remote monitor (PFG200/PF3W3 series), select 1 to 5 V for the flow rate analog output (output symbol "-1" or "-1T").
∗ The 4 to 20 mA analog output type with a temperature sensor is only available as a made to order. (Refer to page 22.)

Remote sensor unit/Unit printed on label

Symbol	Instantaneous flow	Temperature
Nil	L/min	°C
G∗1	L/min (gal/min)	°C/°F

∗1 Under the New Measurement Act, units other than SI (symbol "Nil") cannot be used in Japan.
∗ G: Made to order
Reference: 1 [L/min] ↔ 0.2642 [gal/min]
1 [gal/min] ↔ 3.785 [L/min]
°F = 9/5°C + 32

Remote sensor unit PF3W **5** **04** □ – □ **03** – **1T** □ – □ □ □ – □

Integrated display PF3W **7** **04** □ – □ **03** – **AT** □ – **M** □ □ – □

❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾ ❿ ⓫

❶ Type

5	Remote sensor unit
7	Integrated display

❷ Rated flow range (Flow range)

Symbol	Rated flow range
04	0.5 to 4 L/min
20	2 to 16 L/min
40	5 to 40 L/min
11	10 to 100 L/min
21	50 to 250 L/min

❸ Flow adjustment valve

Symbol	With/without flow adjustment valve	Rated flow range				
		04	**20**	**40**	**11**	**21**
Nil	Without	●	●	●	●	●
S	With	●	●	●	—	—

∗ 100 and 250 L/min types with flow adjustment valves are not available.
∗ The flow adjustment valve of this product is not suitable for applications which require the constant adjustment of the flow rate.

❹ Thread type

Nil	Rc
N	NPT
F	G∗1

∗1 ISO 228 equivalent

❺ Port size

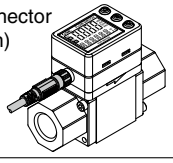
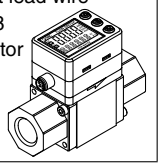
Symbol	Port size	Rated flow range				
		04	**20**	**40**	**11**	**21**
03	3/8	●	●	—	—	—
04	1/2	—	●	●	—	—
06	3/4	—	—	●	●	—
10	1/1	—	—	—	●	—
12	1 1/4	—	—	—	—	●
14	1 1/2	—	—	—	—	●

❻ Integrated display Output specification/Temperature sensor

Symbol	OUT1	OUT2		Temperature sensor
	Flow rate	Flow rate	Temperature	
A	NPN	NPN	—	None
B	PNP	PNP	—	
C	NPN	Analog 1 to 5 V	—	
D	NPN	Analog 4 to 20 mA	—	
E	PNP	Analog 1 to 5 V	—	
F	PNP	Analog 4 to 20 mA	—	
G	NPN	External input∗1	—	
H	PNP	External input∗1	—	
AT	NPN	(NPN) ⇄∗2 NPN		With temperature sensor
BT	PNP	(PNP) ⇄∗2 PNP		
CT	NPN	(Analog 1 to 5 V) ⇄∗2 Analog 1 to 5 V		
DT	NPN	(Analog 4 to 20 mA) ⇄∗2 Analog 4 to 20 mA		
ET	PNP	(Analog 1 to 5 V) ⇄∗2 Analog 1 to 5 V		
FT	PNP	(Analog 4 to 20 mA) ⇄∗2 Analog 4 to 20 mA		
JT∗4	Analog 1 to 5 V∗3	—	Analog 1 to 5 V∗3	
KT∗4	Analog 4 to 20 mA∗3	—	Analog 4 to 20 mA∗3	

∗1 External input: The accumulated value, peak value, and bottom value can be reset.
∗2 For units with a temperature sensor, OUT2 can only be set as either temperature output or flow rate output. The setting when shipped is for temperature output.
∗3 For the analog 2-output type, the analog output is as follows: OUT1 = flow rate and OUT2 = temperature.
∗4 Output types "JT" and "KT" are not UL (CSA) compliant.

❼ Lead wire (Option)

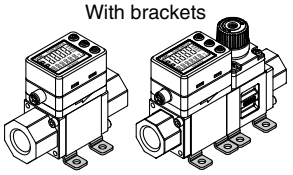
Nil	**N**
With lead wire with M8 connector (3 m) 	Without lead wire with M8 connector 

❽ Integrated display/Unit specification

Symbol	Instantaneous flow	Accumulated flow	Temperature
M	L/min	L	°C
G	gal/min	gal	°C
F	gal/min	gal	°F
J	L/min	L	°F

∗ Under the New Measurement Act, units other than SI (symbol "M") cannot be used in Japan.
∗ G, F, J: Made to order
Reference: 1 [L/min] ↔ 0.2642 [gal/min]
1 [gal/min] ↔ 3.785 [L/min]
°F = 9/5°C + 32

❾ Brackets (Option)

Nil	None
R	With brackets 

∗ Brackets are not available for the 250 L/min type.

❿ Calibration certificate (Only for flow rate)

Nil	None
A	With calibration certificate

∗ The certificate is written in both Japanese and English. The integrated display type with a temperature sensor can only display the flow rate.

⓫ Made to order

X109	EPDM seal material
X128	Analog 4 to 20 mA 2-output type∗1
X143	Brass piping material specification
X445	IO-Link compatible∗2

∗1 Applicable only for the remote type with a temperature sensor (Refer to page 22.)
∗2 Integrated display type only

Options/Part Nos.

When only optional parts are required, order with the part numbers listed below.

Description	Part no.	Qty.	Note	
Bracket∗1	**ZS-40-K**	1	For PF3W704/720/504/520	With 4 tapping screws (3 x 8)
	ZS-40-L	1	For PF3W740/540	With 4 tapping screws (3 x 8)
	ZS-40-M	1	For PF3W711/511	With 4 tapping screws (4 x 10)
Lead wire with M8 connector	**ZS-40-A**	1	Lead wire length: 3 m	

∗1 For units with a flow adjustment valve, 2 brackets are required.

For flow switch precautions and specific product precautions, refer to the "Operation Manual" on the SMC website.

Specifications (Integrated Display)

Model			PF3W704	PF3W720	PF3W740	PF3W711	PF3W721
Applicable fluid			Water and ethylene glycol aqueous solution (with a viscosity of 3 mPa·s [3 cP] or less)*1				
Detection method			Karman vortex				
Rated flow range			0.5 to 4 L/min	2 to 16 L/min	5 to 40 L/min	10 to 100 L/min	50 to 250 L/min
Display flow range			0.35 to 5.50 L/min (Flow under 0.35 L/min is displayed as "0.00.")	1.7 to 22.0 L/min (Flow under 1.7 L/min is displayed as "0.0.")	3.5 to 55.0 L/min (Flow under 3.5 L/min is displayed as "0.0.")	7 to 140 L/min (Flow under 7 L/min is displayed as "0.")	20 to 350 L/min (Flow under 20 L/min is displayed as "0.")
Set flow range			0.35 to 5.50 L/min	1.7 to 22.0 L/min	3.5 to 55.0 L/min	7 to 140 L/min	20 to 350 L/min
Smallest settable increment			0.01 L/min	0.1 L/min		1 L/min	2 L/min
Conversion of accumulated pulse (Pulse width: 50 ms)			0.05 L/pulse	0.1 L/pulse	0.5 L/pulse	1 L/pulse	2 L/pulse
Fluid temperature			0 to 90°C (No freezing or condensation)				0 to 70°C (No freezing or condensation)
Display unit			Instantaneous flow: L/min, Accumulated flow: L				
Accuracy			Display value: ±3% F.S. Analog output: ±3% F.S.				
Repeatability			±2% F.S.*2				
Temperature characteristics			±5% F.S. (25°C standard)				
Operating pressure range*3			0 to 1 MPa				
Proof pressure*3			1.5 MPa				
Pressure loss (without flow adjustment valve)			45 kPa or less at the max. flow				60 kPa or less at the max. flow
Accumulated flow range*4			99999999.9 L		999999999 L		
			By 0.1 L	By 0.5 L	By 1 L		
Switch output			NPN or PNP open collector output				
	Max. load current		80 mA				
	Max. applied voltage		28 VDC				
	Internal voltage drop		NPN: 1 V or less (at load current of 80 mA) PNP: 1.5 V or less (at load current of 80 mA)				
	Response time*2, 5		0.5 s/1 s/2 s				
	Output protection		Short-circuit protection				
	Output mode	**Flow rate**	Select from Hysteresis, Window comparator, Accumulated output, or Accumulated pulse output modes.				
		Temperature	Select from Hysteresis mode or Window comparator mode.				
Analog output	**Response time***6		0.5 s/1 s/2 s (linked with the switch output)				
	Voltage output		Voltage output: 1 to 5 V Output impedance: 1 kΩ				
	Current output		Output current: 4 to 20 mA Max. load impedance: 300 Ω for 12 VDC, 600 Ω for 24 VDC				
Hysteresis			Variable				
External input			Voltage free input: 0.4 V or less (reed or solid state), input for 30 ms or longer				
Display method			2-screen display (Main screen: 4-digit, 7-segment, 2-color, Red/Green Sub screen: 6-digit, 11-segment, White) Display values updated 5 times per second				
Indicator light			Output 1, Output 2: Orange				
Power supply voltage			12 to 24 VDC ±10%				
Current consumption			50 mA or less				
Environment	**Enclosure**		IP65				
	Operating temperature range		0 to 50°C (No freezing or condensation)				
	Operating humidity range		Operation, Storage: 35 to 85% R.H. (No condensation)				
	Withstand voltage*7		1000 VAC for 1 min between terminals and housing				
	Insulation resistance		50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing				
Standards and regulations			CE/UKCA marking, UL (CSA)				
Wetted parts material*8			PPS, Stainless steel 304, FKM, SCS13				
			Non-grease				
Piping port size*9			3/8	3/8, 1/2	1/2, 3/4	3/4, 1	1 1/4, 1 1/2
Weight	**Without temperature sensor/Without flow adjustment valve**		210 g	260 g	410 g	720 g	890 g
	With temperature sensor/Without flow adjustment valve		285 g	335 g	530 g	860 g	1075 g
	Without temperature sensor/With flow adjustment valve		310 g	360 g	610 g	—	—
	With temperature sensor/With flow adjustment valve		385 g	435 g	730 g	—	—
	With lead wire with connector		+85 g				

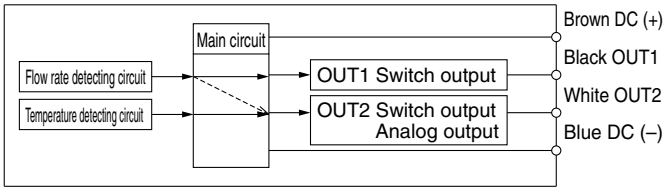
∗1 Refer to the "Measurable Range for Ethylene Glycol Aqueous Solution" graph on page 16. Measurement is possible as long as the fluid does not corrode the wetted parts and the viscosity is 3 mPa·s (3 cP) or less. Be aware that water leakage may occur due to internal seal shrinkage or swelling depending on the type of fluid.
∗2 If 0.5 s is selected for the response time of the switch output, the repeatability will be ±3% F.S.
∗3 The operating pressure range, proof pressure, and available flow range vary depending on the fluid temperature. Refer to the graphs on page 14.
∗4 It is cleared when the power supply is turned OFF. The hold function can be selected. (Intervals of 2 or 5 mins can be selected.)
If the 5-min interval is selected, the life of the memory element (electronic part) is limited to 1 million times. (If energized for 24 hours, life is calculated as 5 mins x 1 million = 5 million mins = about 9.5 years.) Therefore, if using the hold function, calculate the memory life for your operating conditions, and use within this life.
∗5 The response time when the set value is 90% in relation to the step input (The response time is 7 s when it is output by the temperature sensor.)
∗6 The response time until the set value reaches 90% in relation to the step input (The response time is 7 s when it is analog output by the temperature sensor.)
∗7 When the temperature sensor is used, it will be 250 VAC.
∗8 For details, refer to the "Wetted Parts Construction" on page 16.
∗9 When the piping diameter or piping passage is restricted, the specifications may not be satisfied.
∗ Products with tiny scratches, marks, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Temperature Sensor Specifications

Rated temperature range	0 to 100°C*1
Set/Display temperature range	–10 to 110°C
Smallest settable increment	1°C
Display unit	°C
Display accuracy	±2°C
Analog output accuracy	±3% F.S.
Response time	7 s*2
Ambient temperature characteristics	±5% F.S.

∗1 The rated temperature range refers solely to that of the temperature sensor. The fluid temperature range specification of the flow switch as a whole is **0 to 90°C**.
∗2 The response time refers solely to that of the temperature sensor.

The output related to the temperature sensor is OUT2 only.



OUT2 can output either the temperature or flow rate by button operation.

For flow switch precautions and specific product precautions, refer to the "Operation Manual" on the SMC website.

Specifications (Remote Sensor Unit)

Refer to page 32 for monitor unit specifications.

Model		PF3W504	PF3W520	PF3W540	PF3W511	PF3W521
Applicable fluid		Water and ethylene glycol aqueous solution (with a viscosity of 3 mPa·s [3 cP] or less)*1				
Detection method		Karman vortex				
Rated flow range		0.5 to 4 L/min	2 to 16 L/min	5 to 40 L/min	10 to 100 L/min	50 to 250 L/min
Fluid temperature		0 to 90°C (No freezing or condensation)				0 to 70°C (No freezing or condensation)
Accuracy		±3% F.S.				
Repeatability		±2% F.S.				
Temperature characteristics		±5% F.S. (25°C standard)				
Operating pressure range*2		0 to 1 MPa*2				
Proof pressure*2		1.5 MPa				
Pressure loss (without flow adjustment valve)		45 kPa or less at the max. flow				60 kPa or less at the max. flow
Analog output	Response time*3	1 s				
	Voltage output	Voltage output: 1 to 5 V Output impedance: 1 kΩ				
	Current output	Output current: 4 to 20 mA Max. load impedance: 300 Ω for 12 VDC, 600 Ω for 24 VDC				
Indicator light		For power supply status, flow rate indicator (Blinking speed changes in response to flow rate.), and other error indicator				
Power supply voltage		12 to 24 VDC ±10%				
Current consumption		30 mA or less				
Environment	Enclosure	IP65				
	Operating temperature range	0 to 50°C (No freezing or condensation)				
	Operating humidity range	Operation, Storage: 35 to 85% R.H. (No condensation)				
	Withstand voltage*4	1000 VAC for 1 min between terminals and housing				
	Insulation resistance	50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing				
Standards and regulations		CE/UKCA marking, UL (CSA)				
Wetted parts material*5		PPS, Stainless steel 304, FKM, SCS13				
		Non-grease				
Piping port size*6		3/8	3/8, 1/2	1/2, 3/4	3/4, 1	1 1/4, 1 1/2
Weight	Without temperature sensor/Without flow adjustment valve	195 g	245 g	395 g	705 g	875 g
	With temperature sensor/Without flow adjustment valve	270 g	320 g	515 g	840 g	1060 g
	Without temperature sensor/With flow adjustment valve	295 g	345 g	595 g	—	—
	With temperature sensor/With flow adjustment valve	370 g	415 g	715 g	—	—
	With lead wire with connector	+85 g				

*1 Refer to the "Measurable Range for Ethylene Glycol Aqueous Solution" graph on page 16. Measurement is possible as long as the fluid does not corrode the wetted parts and the viscosity is 3 mPa·s (3 cP) or less. Be aware that water leakage may occur due to internal seal shrinkage or swelling depending on the type of fluid.
*2 The operating pressure range and proof pressure may change according to the fluid temperature. Refer to the graphs on page 8.
*3 The response time until the set value reaches 90% in relation to the step input (The response time is 7 s when it is analog output by the temperature sensor.)
*4 When the temperature sensor is used, it will be 250 VAC.
*5 For details, refer to the "Wetted Parts Construction" on page 16.
*6 When the piping diameter or piping passage is restricted, the specifications may not be satisfied.
* Products with tiny scratches, marks, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Temperature Sensor Specifications

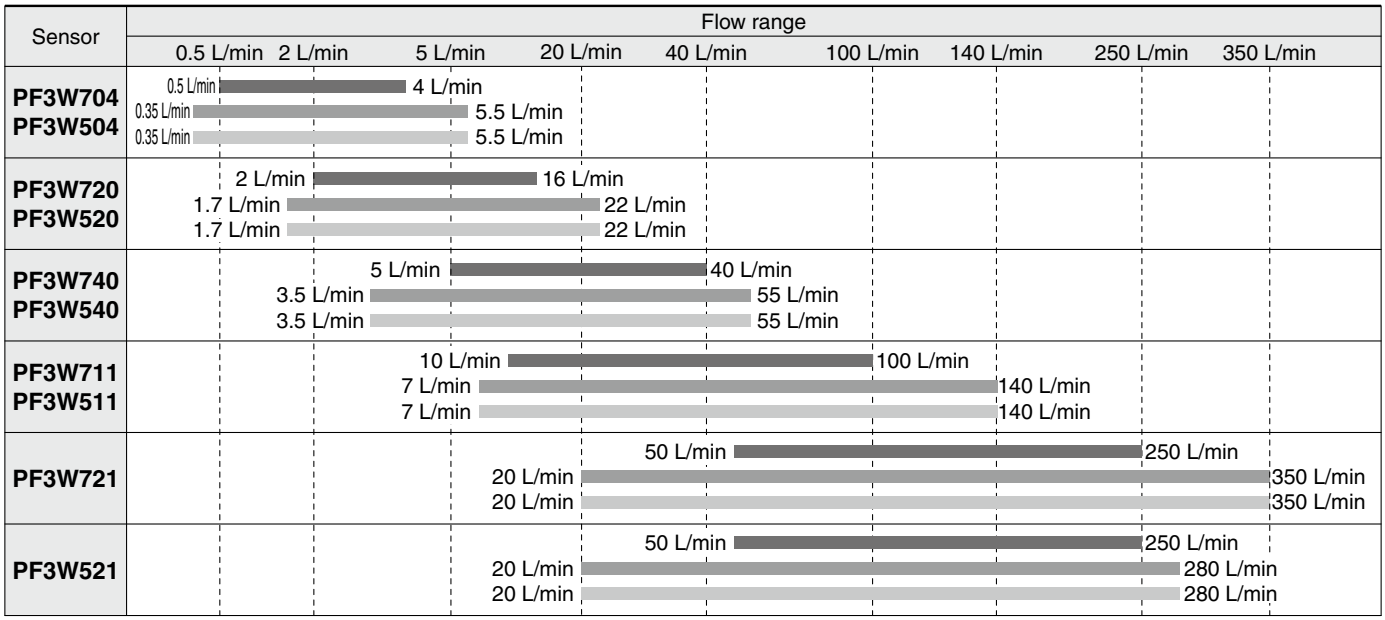
Rated temperature range	0 to 100°C*1
Analog output accuracy	±3% F.S.
Response time	7 s*2
Ambient temperature characteristics	±5% F.S.

*1 The rated temperature range refers solely to that of the temperature sensor. The fluid temperature range specification of the flow switch as a whole is **0 to 90°C**.
*2 The response time refers solely to that of the temperature sensor.

Set Flow Range and Rated Flow Range

⚠Caution **Set the flow rate within the rated flow range.**

The set flow range is the range of flow rate within which setting is possible.
The rated flow range is the range within which the sensor specifications (accuracy, etc.) are satisfied.
It is possible to set a value outside of the rated flow range if it is within the set flow range. However, the satisfaction of the specifications cannot be guaranteed.



* For the PF3W5 series, the display flow range and set flow range are the same as those of the flow monitor PF3W3 series.

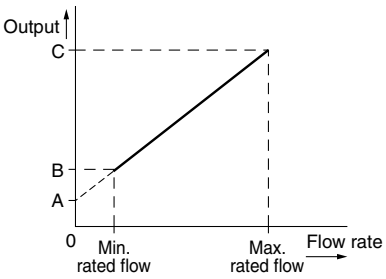
Rated flow range Display flow range Set flow range

Analog Output

Flow rate/Analog output

	A	B			C
		4/16/40	100	250	
Voltage output	1 V	1.5 V	1.4 V	1.8 V	5 V
Current output	4 mA	6 mA	5.6 mA	7.2 mA	20 mA

Model	Rated flow [L/min]	
	Min.	Max.
PF3W704/504	0.5	4
PF3W720/520	2	16
PF3W740/540	5	40
PF3W711/511	10	100
PF3W721/521	50	250

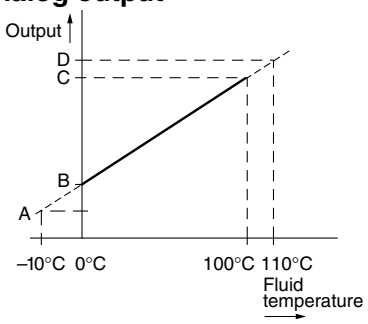


Fluid temperature/Analog output

PF3W7/5

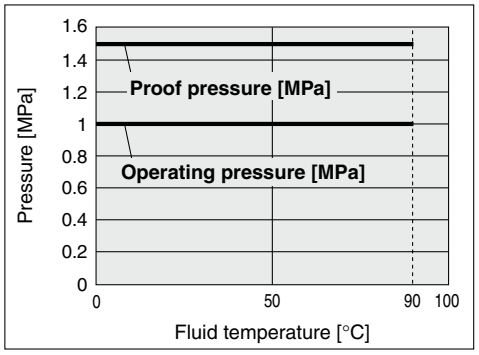
	A	B
Voltage output	0.6 V	1 V
Current output	2.4 mA	4 mA

	C	D
Voltage output	5 V	5.4 V
Current output	20 mA	21.6 mA

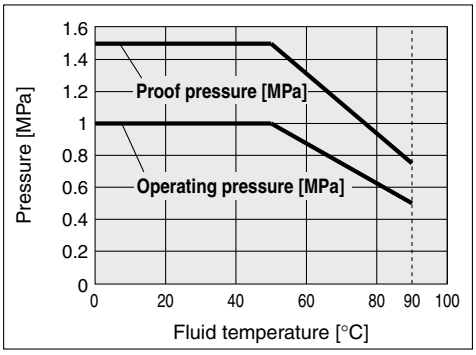


Operating Pressure and Proof Pressure

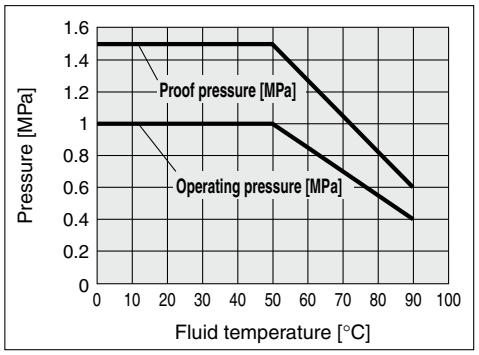
PF3W704/720/740/504/520/540



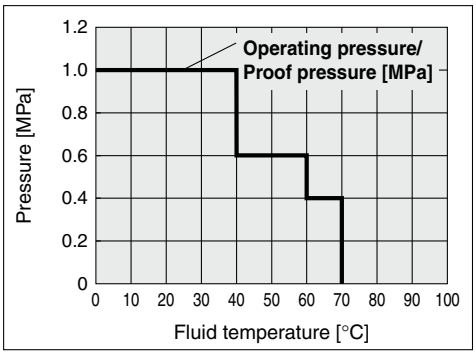
PF3W704S/720S/740S/504S/520S/540S



PF3W711/511



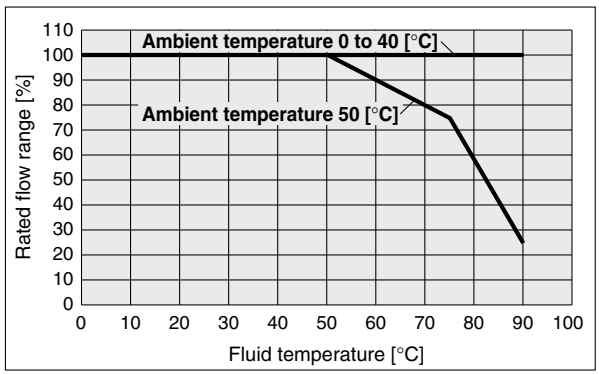
PF3W721/521



Available Flow Range

* For the analog current 2-output type (symbol: "KT") only (Includes the analog voltage 2-output type (symbol: "JT"), excludes other specifications)

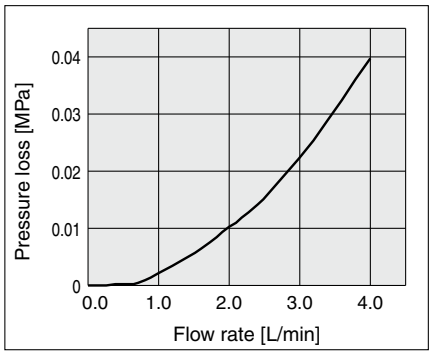
PF3W704/720/740/711/721



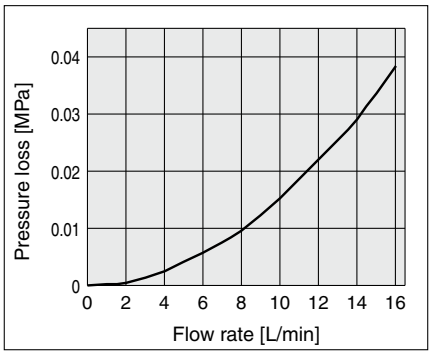
* For the PF3W721, up to 70 [°C] of the operating fluid
* If the analog current 2-output type is installed in an environment with high temperatures, the temperature of the product may rise. In such a case, be sure to cool the product.

Flow Rate Characteristics (Pressure Loss: Without Flow Adjustment Valve)

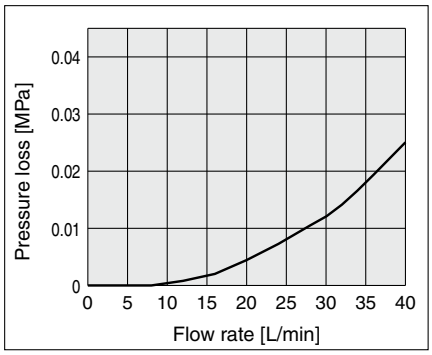
PF3W704/504



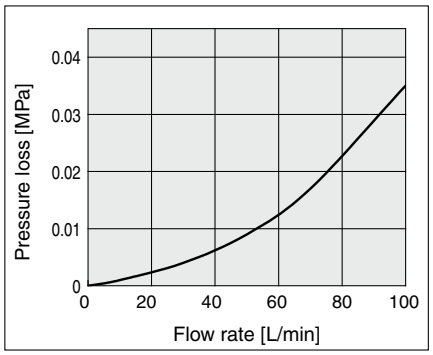
PF3W720/520



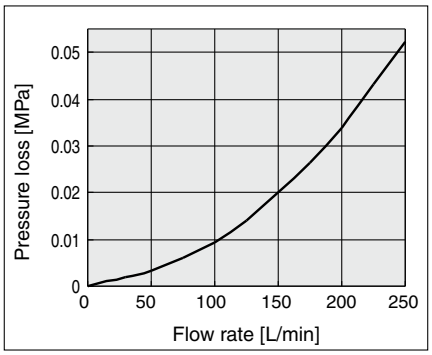
PF3W740/540



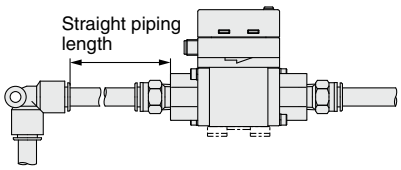
PF3W711/511



PF3W721/521



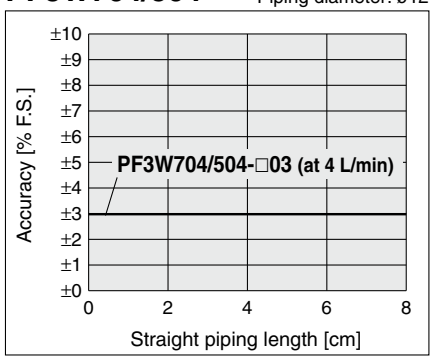
Straight Piping Length and Accuracy (Reference Value)



- The smaller the piping size, the more the product is affected by the straight piping length.
- Fluid pressure has almost no affect.
- Low flow rate lessens the effect of the straight piping length.
- Use a straight pipe that is 8 cm or longer in length to satisfy the ±3% F.S. specification. (11 cm or longer for 100 L/min and 250 L/min types)

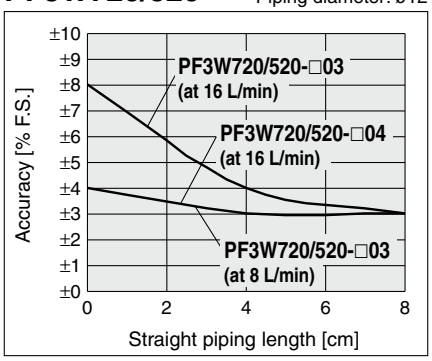
PF3W704/504

Pressure: 0.3 MPa
Piping diameter: ø12



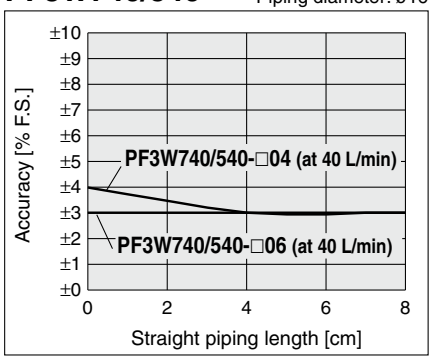
PF3W720/520

Pressure: 0.3 MPa
Piping diameter: ø12



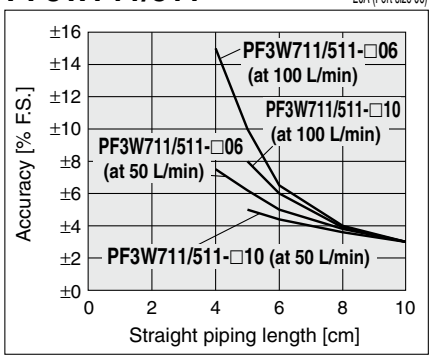
PF3W740/540

Pressure: 0.3 MPa
Piping diameter: ø16



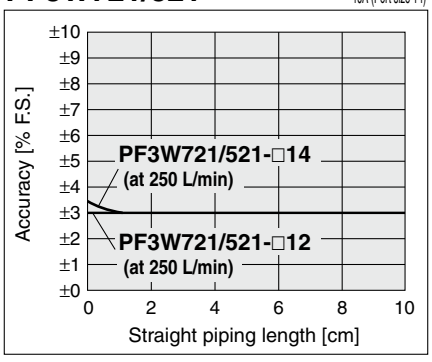
PF3W711/511

Pressure: 0.3 MPa Piping diameter: 25A (Port size 10)
20A (Port size 06)



PF3W721/521

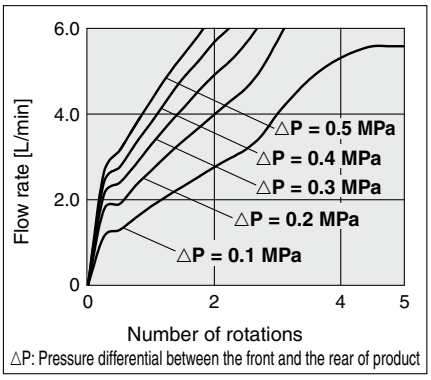
Pressure: 0.3 MPa Piping diameter: 32A (Port size 12)
40A (Port size 14)



∗ No data for 4 cm, or for under 5 cm, as these cannot be used due to piping dimensions.

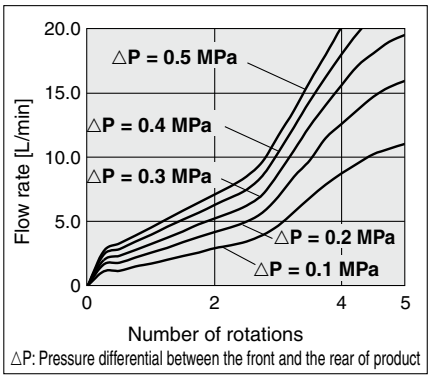
Flow Rate Characteristics of Flow Adjustment Valve

PF3W704S/504S



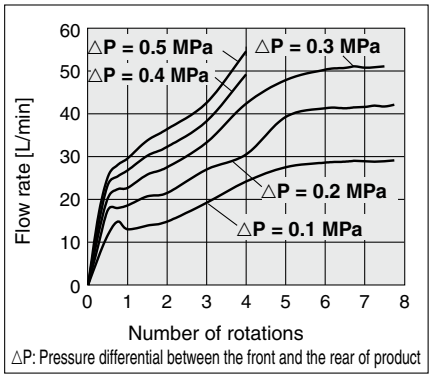
△P: Pressure differential between the front and the rear of product

PF3W720S/520S



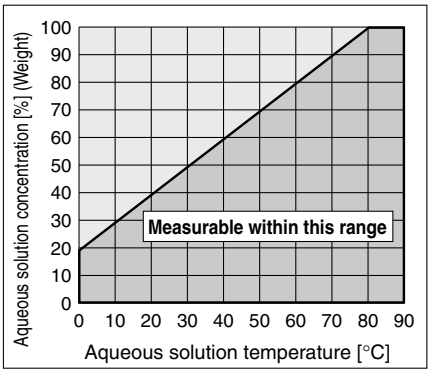
△P: Pressure differential between the front and the rear of product

PF3W740S/540S

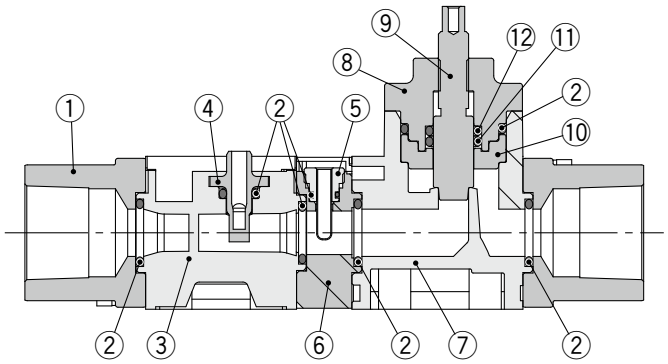


△P: Pressure differential between the front and the rear of product

Measurable Range for Ethylene Glycol Aqueous Solution (Reference Value)



Wetted Parts Construction



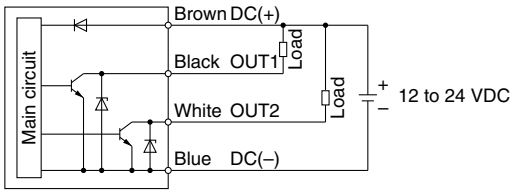
Component Parts

No.	Description	Material	Note
1	**Attachment**	SCS13	Stainless steel 304 equivalent PF3W704/720/740/711/504/520/540/511
		Stainless steel 304	PF3W721/521
2	**Seal**	FKM	
3	**Body**	PPS	
4	**Sensor**	PPS	
5	**Temperature sensor**	Stainless steel 304	
6	**Temperature sensor body**	Stainless steel 304	
7	**Flow adjustment valve body**	PPS	
8	**Flow adjustment valve cover**	PPS	
9	**Flow adjustment valve shaft**	Stainless steel 304	
10	**Shaft support**	PPS	
11	**Seal**	FKM	
12	**Seal**	FKM	

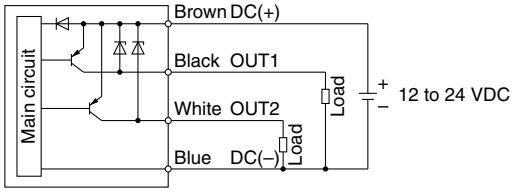
Internal Circuits and Wiring Examples

PF3W7□□

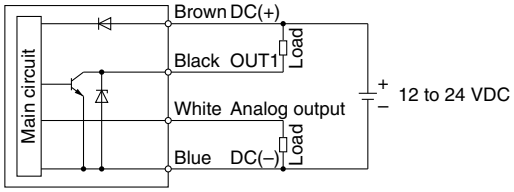
-A(T)
NPN (2 outputs)



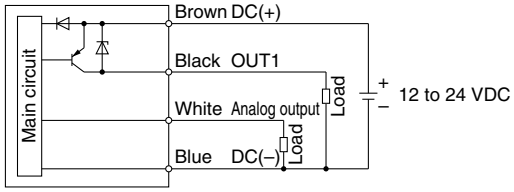
-B(T)
PNP (2 outputs)



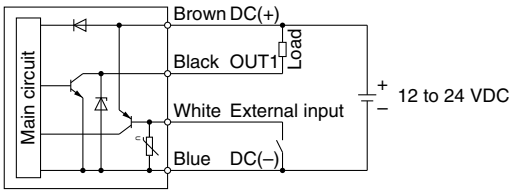
-C(T)/D(T)
C(T): NPN + Analog voltage output
D(T): NPN + Analog current output



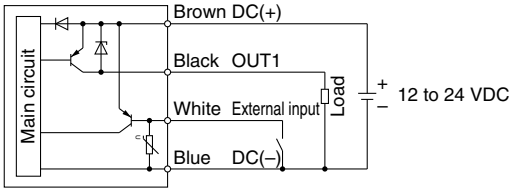
-E(T)/F(T)
E(T): PNP + Analog voltage output
F(T): PNP + Analog current output



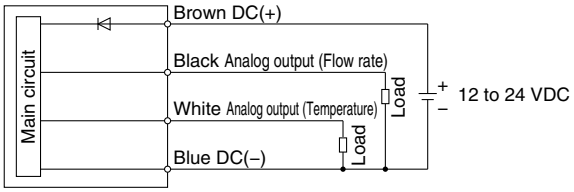
-G
NPN + External input



-H
PNP + External input



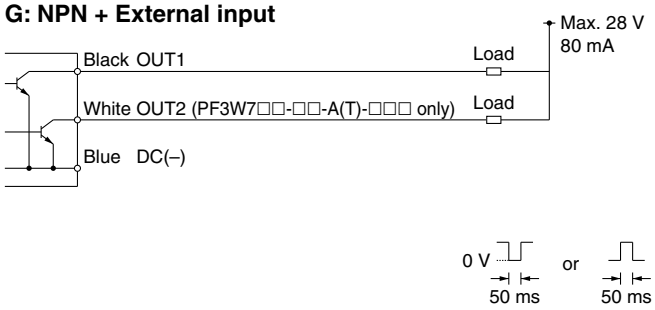
-JT/KT
JT: Analog voltage output + Analog voltage output
KT: Analog current output + Analog current output



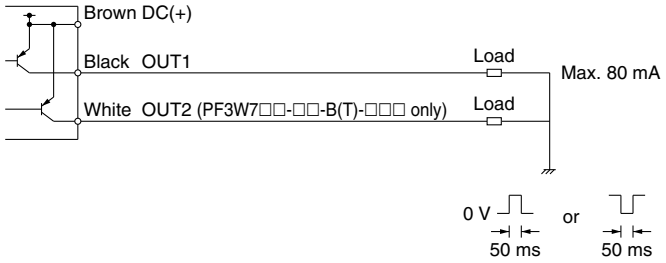
Internal Circuits and Wiring Examples

Accumulated pulse output wiring examples

-A(T)/C(T)/D(T)/G
A(T): NPN (2 outputs)
C(T), D(T): NPN + Analog output
G: NPN + External input

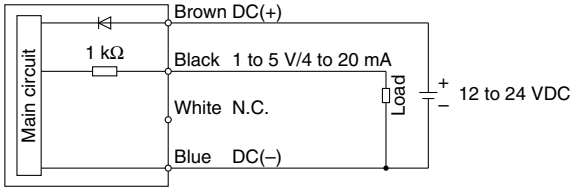


-B(T)/E(T)/F(T)/H
B(T): PNP (2 outputs)
E(T), F(T): PNP + Analog output
G: PNP + External input

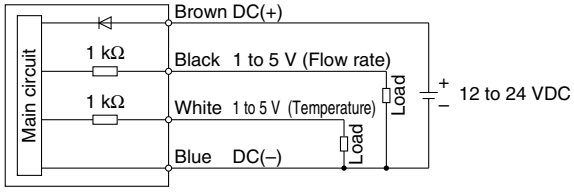


PF3W5□□

-1/2
1: Analog voltage output
2: Analog current output



-1T
1T: Analog voltage output + Analog voltage output

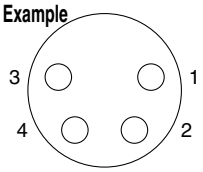


Dimensions

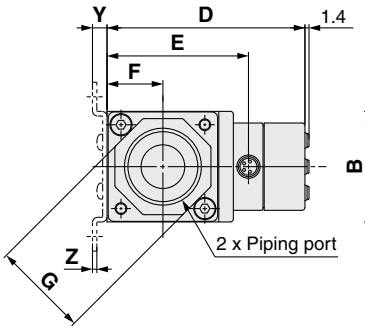
PF3W704/720/740/711/721
Integrated display

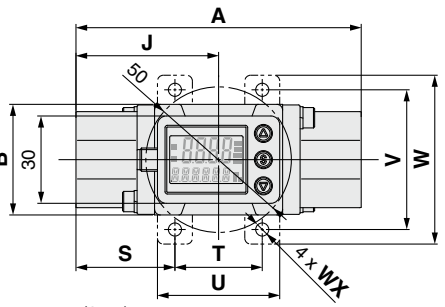
Connector pin number

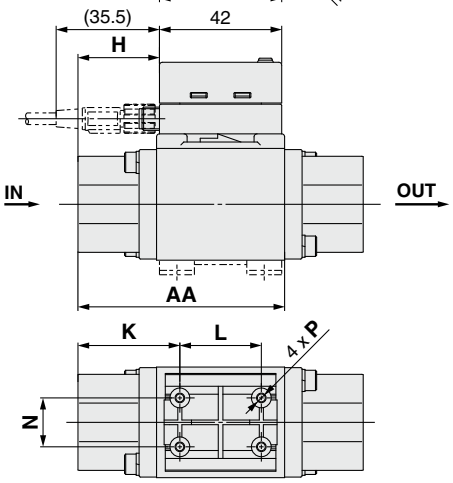
Example



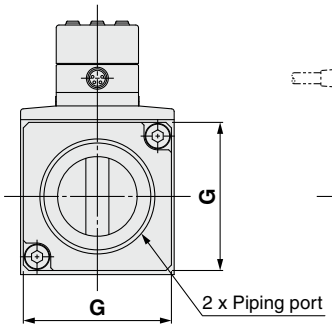
Pin no.	Pin name
1	DC (+)
2	OUT2
3	DC (–)
4	OUT1

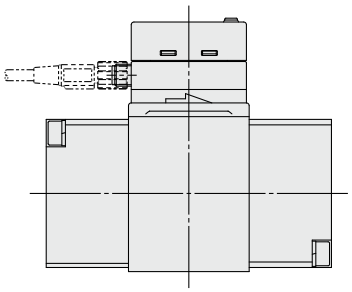




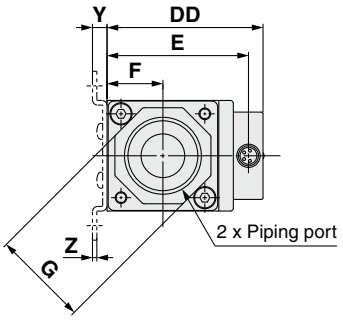


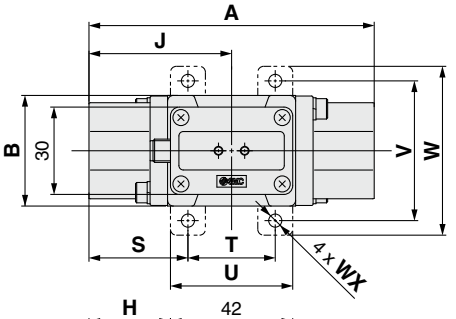
For PF3W721

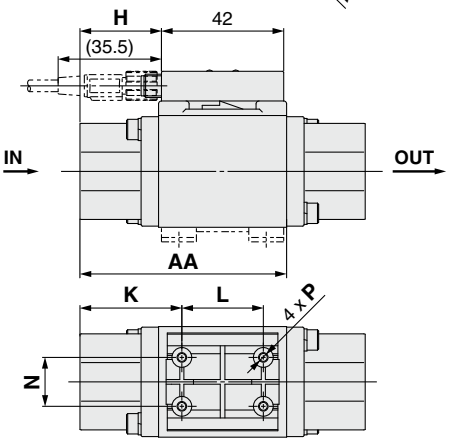




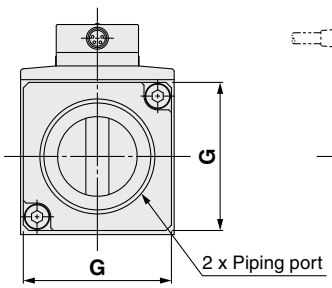
PF3W504/520/540/511/521
Remote sensor unit

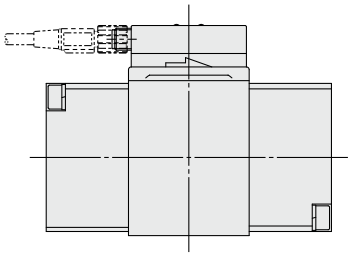






For PF3W521



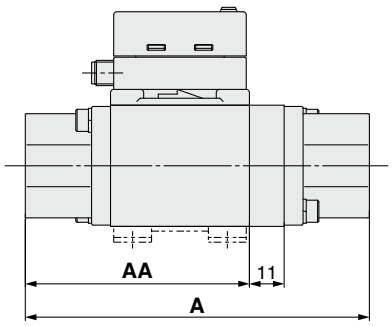


[mm]

Model	Port size (Rc, NPT, G)	A	AA	B	D	DD	E	F	G	H	J	K	L	N	P	Bracket dimensions							
																S	T	U	V	W	WX	Y	Z
PF3W704/504	3/8	70	50	30	60	45.6	40.6	15.2	24	14	35	26	18	13.6	ø2.7 depth 14	24	22	32	40	50	4.5	5	1.5
PF3W720/520	3/8, 1/2	78	54	30	60	45.6	40.6	15.2	27	18	39	30	18	13.6	ø2.7 depth 12	28	22	32	40	50	4.5	5	1.5
PF3W740/540	1/2, 3/4	98	71	38	68	53.6	48.6	19.2	32	28	49	35	28	16.8	ø2.7 depth 12	34	30	42	48	58	4.5	5	1.5
PF3W711/511	3/4, 1	124	92	46	77	62.6	57.6	23.0	41	42	63	48	28	18.0	ø3.5 depth 14	44	36	48	58	70	5.5	7	2.0
PF3W721/521	1 1/4, 1 1/2	104	74	56	91	76.6	71.6	28.5	54	31	52	39.5	25	27.5	ø3.5 depth 14	—	—	—	—	—	—	—	—
	G1 1/4	108	76							33	54	41.5											
	G1 1/2	112	78							35	56	43.5											

Dimensions

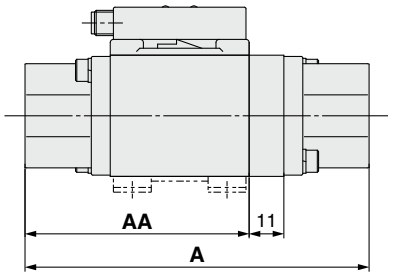
PF3W704/720/740/711/721-□-□T
Integrated display: With temperature sensor



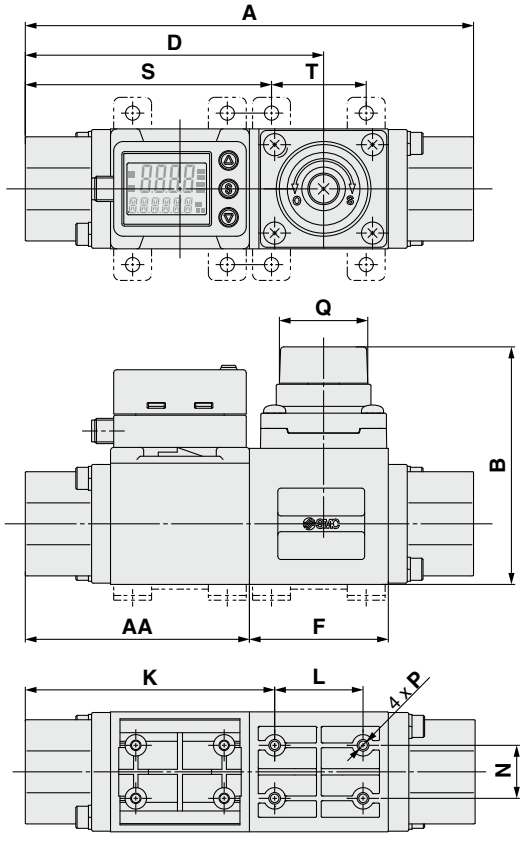
[mm]

Model	A	AA
PF3W704/504-□-□T	81	50
PF3W720/520-□-□T	89	54
PF3W740/540-□-□T	109	71
PF3W711/511-□-□T	135	92
PF3W721/521-□-□T	115	74
PF3W721/521-F12-□T	119	76
PF3W721/521-F14-□T	123	78

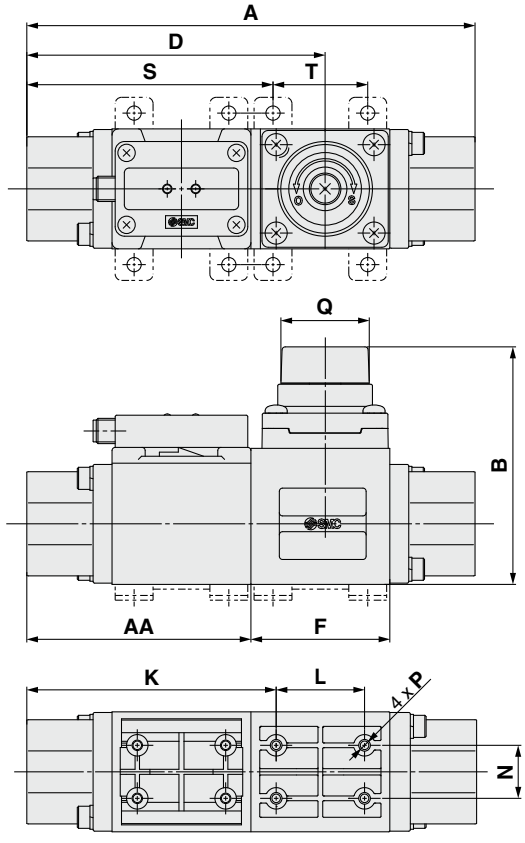
PF3W504/520/540/511/521-□-□T
Remote sensor unit: With temperature sensor



PF3W704S/720S/740S
Integrated display: With flow adjustment valve



PF3W504S/520S/540S
Remote sensor unit: With flow adjustment valve

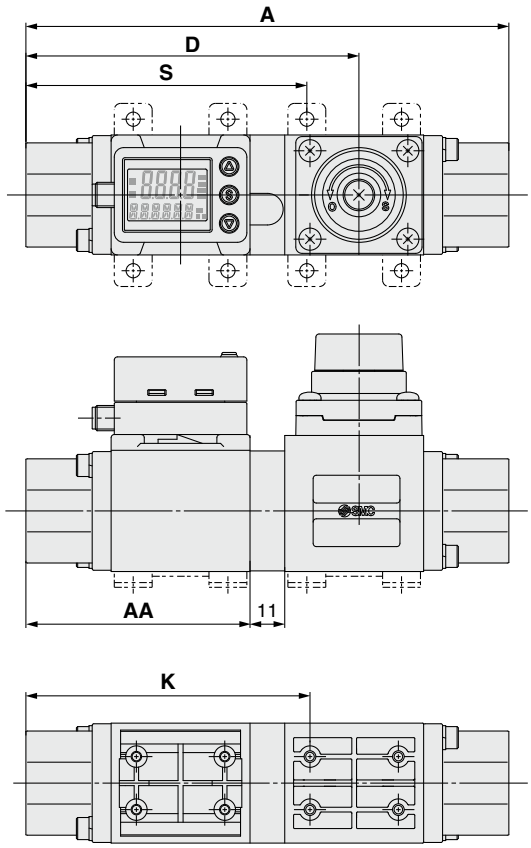


[mm]

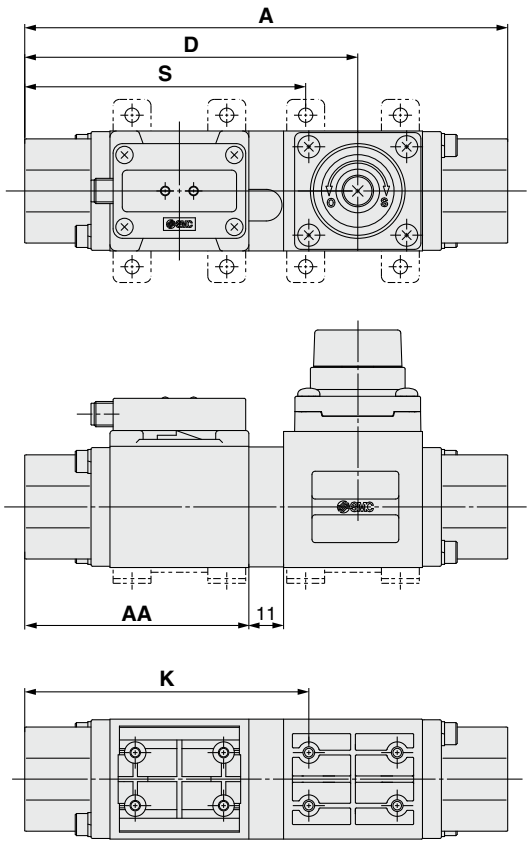
Model	A	AA	B	D	F	K	L	N	P	Q	Q number of rotations	Bracket dimensions S	Bracket dimensions T
PF3W704S/504S	104	50	63.6 (Max. 68.6)	70.2	34	58.5	18	13.6	ø2.7 depth 10	ø19	6	56.5	22
PF3W720S/520S	112	54	63.6 (Max. 68.6)	74.2	34	62.5	18	13.6	ø2.7 depth 10	ø19	6	60.5	22
PF3W740S/540S	142	71	75.25 (Max. 81)	94.5	44	79.0	28	16.8	ø2.7 depth 10	ø28	7	78.0	30

Dimensions

PF3W704S/720S/740S-□-□T
Integrated display: With temperature sensor and flow adjustment valve



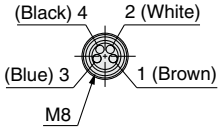
PF3W504S/520S/540S-□-□T
Remote sensor unit: With temperature sensor and flow adjustment valve

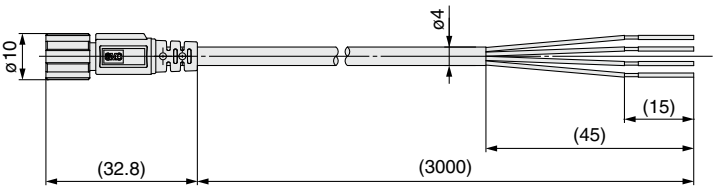


[mm]

Model	A	AA	D	K	S
PF3W704S/504S-□-□T	115	50	81.2	69.5	67.5
PF3W720S/520S-□-□T	123	54	85.2	73.5	71.5
PF3W740S/540S-□-□T	153	71	105.5	90.0	89.0

ZS-40-A
Lead wire with M8 connector





Pin no.	Pin name	Wire color
1	DC (+)	Brown
2	OUT2	White
3	DC (–)	Blue
4	OUT1	Black

Lead Wire Specifications

Conductor	**Nominal cross section**	AWG23
	O.D.	Approx. 0.7 mm
Insulator	**Material**	Heat-resistant PVC
	O.D.	Approx. 1.1 mm
	Color	Brown, White, Black, Blue
Sheath	**Material**	Heat- and oil-resistant PVC
Finished O.D.		ø4

∗ 4-wire type lead wire with M8 connector used for the PF3W series
∗ For wiring, refer to the “Operation Manual” on the SMC website.

PF3W Series
Made to Order

Please contact SMC for detailed dimensions, specifications, and lead times.

Made to Order

1 EPDM seal material

Symbol **-X109**

Seal material for wetted parts changed to EPDM

PF3W5 □□ - □□ - □□ - □□□ - **X109**
PF3W7 □□ - □□ - □□ - □□□ - **X109**

EPDM seal material

Refer to page 11 for details of How to Order.

2 Analog 4 to 20 mA 2-output type

Symbol **-X128**

Output specification of remote type with a temperature sensor: Analog 4 to 20 mA 2 outputs

PF3W5 □□ - □□ - **2T** □ - □□□ - **X128**

Analog 4 to 20 mA 2-output type

Refer to page 11 for details of How to Order.

∗ Cannot be ordered in combination with the standard remote monitor unit
Please special-order separately.

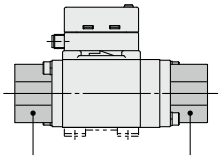
3 Brass piping material specification

Symbol **-X143**

Piping (attachment) material changed to brass

PF3W5 □ - □□ - □□ - □□□ - **X143**
PF3W7 □ - □□ - □□ - □□□ - **X143**

Brass piping (attachment) material specification



Piping (attachment)

Refer to page 11 for details of How to Order.

∗ Not compatible with units with a flow adjustment valve
Please special-order separately.
Surface treatment is not applied on piping.

Symbol
4 IO-Link compatible -X445

Supports the IO-Link communication protocol

How to Order

PF3W 7 20 – ❑ 04 – LT Q – M ❑ ❑ – X445

Integrated display ❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ IO-Link compatible

❶ Rated flow range (Flow range)

04	0.5 to 4 L/min
20	2 to 16 L/min
40	5 to 40 L/min
11	10 to 100 L/min
21	50 to 250 L/min

❷ Thread type

Nil	Rc
N	NPT
F	G*1

*1 ISO 228 compliant

❸ Piping port size

Symbol	Port size	Applicable flow range				
		04	20	40	11	21
03	3/8	●	●	—	—	—
04	1/2	—	●	●	—	—
06	3/4	—	—	●	●	—
10	1	—	—	—	●	—
12	1 1/4	—	—	—	—	●
14	1 1/2	—	—	—	—	●

❹ Output specification/Temperature sensor

Symbol	Output specification		Temperature sensor
	OUT1	OUT2	
LT	IO-Link: Switch output (N/P)	—	Yes

❺ Lead wire (Option)

Nil	With lead wire with M8 connector (3 m)
N	Without lead wire with M8 connector
Q	With M12-M8 conversion lead wire (0.1 m)*2

*2 A cable (3 m) with an M12 connector is also available separately.
For details, refer to the **Web Catalog**.

❻ Unit specification

Symbol	Instantaneous flow	Accumulated flow	Temperature
Nil	gal/min	gal	°C
M	L/min	L	°C

* Under the New Measurement Act, units other than SI (symbol "M") cannot be used in Japan.
* Reference: 1 [L/min] = 0.2642 [gal/min]
1 [gal/min] = 3.785 [L/min]

❼ Bracket (Option)

Nil	None
R	With bracket

❽ Calibration certificate (Only for flow rate)

Nil	None
A	Yes

* The certificate is written in both Japanese and English. The integrated display type with a temperature sensor can only display the flow rate. The temperature sensor is not calibrated.

Specifications

Model			PF3W704	PF3W720	PF3W740	PF3W711	PF3W721
Accumulated flow range*1			999999999.9 L		9999999999 L		
			By 0.1 L		By 1 L		
Switch output	Maximum applied voltage		30 V (NPN output)				
	Internal voltage drop		1.5 V or less (at load current of 80 mA)				
	Delay time*2		3.5 ms Variable from 0 to 60 s/0.01 s increments				
	Output mode	Flow rate	Select from Hysteresis, Window comparator, Accumulated output, Accumulated pulse output, Error output, or Switch output OFF modes.				
Power supply voltage	When used as a switch output device		12 to 24 VDC, including ripple (p-p) 10%				
	When used as an IO-Link device		18 to 30 VDC, including ripple (p-p) 10%				
Digital filter*3			Select from 0.5 s, 1.0 s, 2.0 s, 5.0 s, 10.0 s, 15.0 s, 20.0 s, or 30.0 s.				
Environment	Withstand voltage		250 VAC for 1 min between external terminals and case				
Standards and regulations			CE/UKCA marking, UL (CSA)				

*1 It is cleared when the power supply is turned OFF. The hold function can be selected. If the 5-min interval is selected, the life of the memory element (electronic part) is limited to 3.7 million times. (If energized for 24 hours, life is calculated as 5 mins x access times (3.7 million) = 18.5 million mins = about 35 years.) Therefore, if using the hold function, calculate the memory life for your operating conditions, and use within this life.
*2 Does not include the value of the digital filter
*3 The response time until the set value reaches 90% in relation to the step input (The response time is 7 s when it is output by the temperature sensor.)

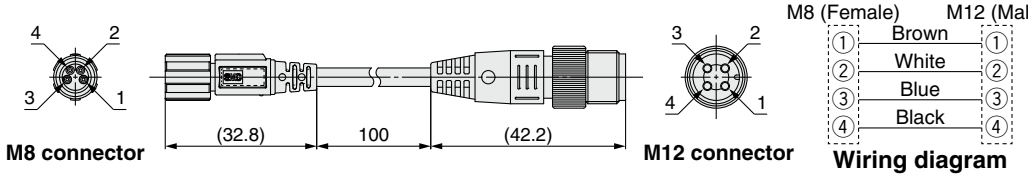
Communication Specifications (IO-Link mode)

IO-Link type	Device
IO-Link version	V1.1
Communication speed	COM2 (38.4 kbps)
Configuration file	IODD file*1
Minimum cycle time	3.5 ms
Process data length	Input data: 6 bytes, Output data: 0 byte
On request data communication	Yes
Data storage function	Yes
Event function	Yes
Vendor ID	131 (0x0083)
Device ID*2	PF3W704-❑-LT❑-M-X445: 330 (0x014A) PF3W720-❑-LT❑-M-X445: 310 (0x0136) PF3W740-❑-LT❑-M-X445: 317 (0x013D) PF3W711-❑-LT❑-M-X445: 331 (0x014B) PF3W721-❑-LT❑-M-X445: 332 (0x014C)

*1 The configuration file can be downloaded from the SMC website.
*2 The device ID differs according to each product type (flow range, whether or not a temperature sensor is provided, etc.).

Other specifications and dimensions that are not indicated are the same as those of the standard product. For details, refer to page 12 and later.

ZS-40-M12M8-A
M12-M8 conversion lead wire



* For wiring, refer to the "Operation Manual" on the SMC website..

3-Color Display

Digital Flow Switch for PVC Piping

PF3W Series

RoHS

How to Order

For how to order the remote monitor unit, refer to page 31.

Remote sensor unit

Output specification

Symbol	OUT1
1	Analog 1 to 5 V
2	Analog 4 to 20 mA

∗ To use in combination with the remote monitor (PFG200/ PF3W3 series), select 1 to 5 V for the flow rate analog output (output symbol "-1").

Remote sensor unit/Unit printed on label

Symbol	Instantaneous flow
Nil	L/min
G∗1	L/min (gal/min)

∗1 Under the New Measurement Act, units other than SI (symbol "Nil") cannot be used in Japan.

∗ G: Made to order
Reference: 1 [L/min] ↔ 0.2642 [gal/min]
1 [gal/min] ↔ 3.785 [L/min]

Calibration certificate (Only for flow rate)

Nil	None
A	With calibration certificate

∗ The certificate is written in both Japanese and English.
The integrated display type with a temperature sensor can only display the flow rate.

Remote sensor unit **PF3W 5 □ – U □ – 1 □ – □ □ □ – □**

Integrated display **PF3W 7 11 – U 25 – A □ – M □ □ – □**

Type

5	Remote sensor unit
7	Integrated display

Rated flow range (Flow range)

Symbol	Rated flow range
11	10 to 100 L/min
21	30 to 250 L/min

Connection type

U	PVC pipe

PVC pipe O.D.

Symbol	Port size	Rated flow range 11	Rated flow range 21	Pipe O.D.∗1
25	25A	●	—	32 mm
30	30A	—	●	38 mm

∗1 JIS K 6742 equivalent

Integrated display

Output specification

Symbol	OUT1	OUT2
A	NPN	NPN
B	PNP	PNP
C	NPN	Analog 1 to 5 V
D	NPN	Analog 4 to 20 mA
E	PNP	Analog 1 to 5 V
F	PNP	Analog 4 to 20 mA
G	NPN	External input
H	PNP	External input

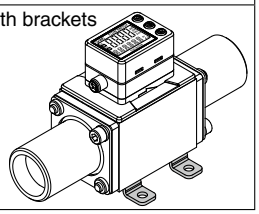
External input: The accumulated value, peak value, and bottom value can be reset.

Made to order

X109	EPDM seal material

(Refer to page 30.)

Brackets (Option)

Nil	None
R	With brackets 

∗ Brackets are not available for the 250 L/min type.

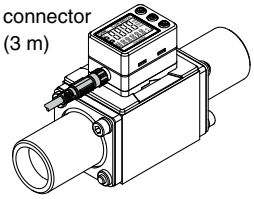
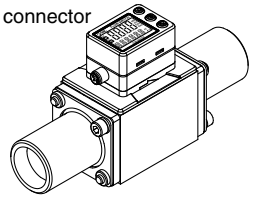
Integrated display/Unit specification

Symbol	Instantaneous flow	Accumulated flow
M	L/min	L
G	gal/min	gal

∗ Under the New Measurement Act, units other than SI (symbol "M") cannot be used in Japan.

∗ G: Made to order
Reference: 1 [L/min] ↔ 0.2642 [gal/min]
1 [gal/min] ↔ 3.785 [L/min]

Lead wire (Option)

Nil	N
With lead wire with M8 connector (3 m) 	Without lead wire with M8 connector 

Options/Part Nos.

When only optional parts are required, order with the part numbers listed below.

Description	Part no.	Qty.	Note	
Bracket	**ZS-40-M**	1	For PF3W711/511	With 4 tapping screws (4 x 10)
Lead wire with M8 connector	**ZS-40-A**	1	Lead wire length: 3 m	

For flow switch precautions and specific product precautions, refer to the "Operation Manual" on the SMC website.

Specifications (Integrated Display)

Model			PF3W711	PF3W721
Applicable fluid			Water and ethylene glycol aqueous solution (with a viscosity of 3 mPa·s [3 cP] or less)*1	
Detection method			Karman vortex	
Rated flow range			10 to 100 L/min	30 to 250 L/min
Display flow range			7 to 140 L/min (Flow under 7 L/min is displayed as "0.")	20 to 350 L/min (Flow under 20 L/min is displayed as "0.")
Set flow range			7 to 140 L/min	20 to 350 L/min
Smallest settable increment			1 L/min	2 L/min
Conversion of accumulated pulse			1 L/pulse	2 L/pulse
Fluid temperature			0 to 70°C (No freezing or condensation)	
Display unit			Instantaneous flow: L/min, Accumulated flow: L, Display values updated 5 times per second	
Accuracy			Display value: ±3% F.S. Analog output: ±3% F.S.	
Repeatability			±2% F.S.*2	
Temperature characteristics			±5% F.S. (25°C standard)	
Operating pressure range*3			0 to 1 MPa	
Proof pressure*3			1 MPa	
Pressure loss			45 kPa or less at the max. flow	
Accumulated flow range*4			999999999 L	
			By 1 L	
Switch output			NPN or PNP open collector output	
	Max. load current		80 mA	
	Max. applied voltage		28 VDC	
	Internal voltage drop		NPN: 1 V or less (at load current of 80 mA) PNP: 1.5 V or less (at load current of 80 mA)	
	Response time*2, 5		0.5 s/1 s/2 s	
	Output protection		Short-circuit protection	
	Output mode	Flow rate	Select from Hysteresis, Window comparator, Accumulated output, or Accumulated pulse output modes.	
Analog output	**Response time***6		0.5 s/1 s/2 s (linked with the switch output)	
	Voltage output		Voltage output: 1 to 5 V Output impedance: 1 kΩ	
	Current output		Output current: 4 to 20 mA Max. load impedance: 300 Ω for 12 VDC, 600 Ω for 24 VDC	
Hysteresis			Variable	
External input			Voltage free input: 0.4 V or less (reed or solid state), input for 30 ms or longer	
Display method			2-screen display (Main screen: 4-digit, 7-segment, 2-color, Red/Green Sub screen: 6-digit, 11-segment, White)	
Indicator light			Output 1, Output 2: Orange	
Power supply voltage			12 to 24 VDC ±10%	
Current consumption			50 mA or less	
Environment	**Enclosure**		IP65	
	Operating temperature range		0 to 50°C (No freezing or condensation)	
	Operating humidity range		Operation, Storage: 35 to 85% R.H. (No condensation)	
	Withstand voltage		1000 VAC for 1 min between terminals and housing	
	Insulation resistance		50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing	
Standards and regulations			CE/UKCA marking, UL (CSA)	
Wetted parts material*7			PPS, FKM, CPVC	
			Non-grease	
Piping port size*8			25A	30A
Weight	**Without lead wire with connector**		285 g	340 g
	With lead wire with connector		370 g	425 g

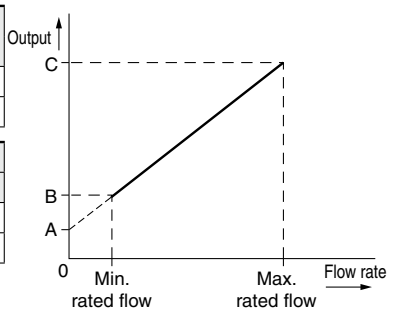
*1 Refer to the "Measurable Range for Ethylene Glycol Aqueous Solution" graph on page 16. Measurement is possible as long as the fluid does not corrode the wetted parts and the viscosity is 3 mPa·s (3 cP) or less. Refer to the list of applicable fluids on page 44. Be aware that water leakage may occur due to internal seal shrinkage or swelling depending on the type of fluid.
*2 If 0.5 s is selected for the response time of the switch output, the repeatability will be ±3% F.S.
*3 The operating pressure range and proof pressure may change according to the fluid temperature. Refer to the graph below.
*4 It is cleared when the power supply is turned OFF. The hold function can be selected. (Intervals of 2 or 5 mins can be selected.)
If the 5-min interval is selected, the life of the memory element (electronic part) is limited to 1 million times. (If energized for 24 hours, life is calculated as 5 mins x 1 million = 5 million mins = about 9.5 years.) Therefore, if using the hold function, calculate the memory life for your operating conditions, and use within this life.
*5 The response time when the set value is 90% in relation to the step input
*6 The response time until the set value reaches 90% in relation to the step input
*7 For details, refer to the "Wetted Parts Construction" on page 27.
*8 When the piping diameter or piping passage is restricted, the specifications may not be satisfied.
* Products with tiny scratches, marks, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Analog Output

Flow rate/Analog output

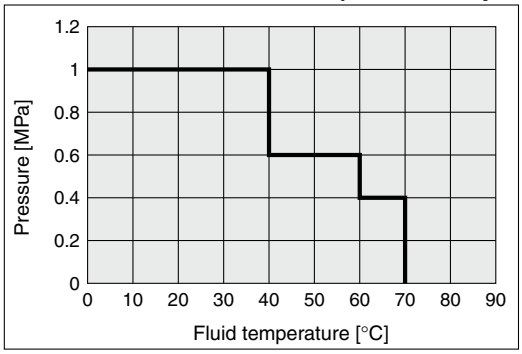
	A	B		C
		11	21	
Voltage output	1 V	1.4 V	1.5 V	5 V
Current output	4 mA	5.6 mA	5.9 mA	20 mA

Model	Rated flow [L/min]	
	Min.	Max.
PF3W711/511	10	100
PF3W721/521	30	250



Operating Pressure and Proof Pressure

PF3W711/721/511/521 (for PVC Piping)



For flow switch precautions and specific product precautions, refer to the "Operation Manual" on the SMC website.

Specifications (Remote Sensor Unit)

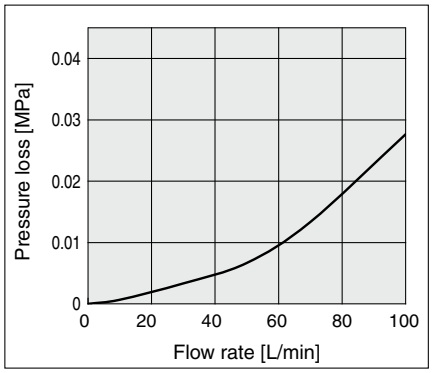
Refer to page 32 for monitor unit specifications.

Model		PF3W511	PF3W521
Applicable fluid		Water and ethylene glycol aqueous solution (with a viscosity of 3 mPa·s [3 cP] or less)*1	
Detection method		Karman vortex	
Rated flow range		10 to 100 L/min	30 to 250 L/min
Fluid temperature		0 to 70°C (No freezing or condensation)	
Accuracy		±3% F.S.	
Repeatability		±2% F.S.	
Temperature characteristics		±5% F.S. (25°C standard)	
Operating pressure range*2		0 to 1 MPa*2	
Proof pressure*2		1 MPa	
Pressure loss		45 kPa or less at the max. flow	
Analog output	**Response time***3	1 s	
	Voltage output	Voltage output: 1 to 5 V Output impedance: 1 kΩ	
	Current output	Output current: 4 to 20 mA Max. load impedance: 300 Ω for 12 VDC, 600 Ω for 24 VDC	
Indicator light		For power supply status, flow rate indicator (Blinking speed changes in response to flow rate.), and other error indicator	
Power supply voltage		12 to 24 VDC ±10%	
Current consumption		30 mA or less	
Environment	**Enclosure**	IP65	
	Operating temperature range	0 to 50°C (No freezing or condensation)	
	Operating humidity range	Operation, Storage: 35 to 85% R.H. (No condensation)	
	Withstand voltage	1000 VAC for 1 min between terminals and housing	
	Insulation resistance	50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing	
Standards and regulations		CE/UKCA marking, UL (CSA)	
Wetted parts material*4		PPS, FKM, CPVC	
		Non-grease	
Piping port size*5		25A	30A
Weight	**Without lead wire with connector**	270 g	325 g
	With lead wire with connector	355 g	410 g

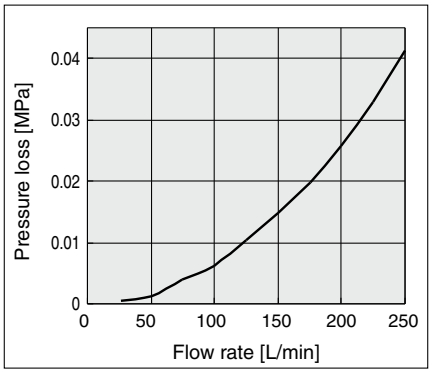
*1 Refer to the "Measurable Range for Ethylene Glycol Aqueous Solution" graph on page 16. Measurement is possible as long as the fluid does not corrode the wetted parts and the viscosity is 3 mPa·s (3 cP) or less. Refer to the list of applicable fluids on page 44.
*2 The operating pressure range and proof pressure may change according to the fluid temperature. Refer to the graphs below.
*3 The response time until the set value reaches 90% in relation to the step input
*4 For details, refer to the "Wetted Parts Construction" on page 27.
*5 When the piping diameter or piping passage is restricted, the specifications may not be satisfied.
* Products with tiny scratches, marks, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Flow Rate Characteristics (Pressure Loss)

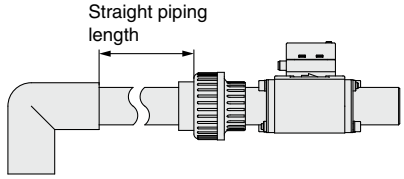
PF3W711/511



PF3W721/521



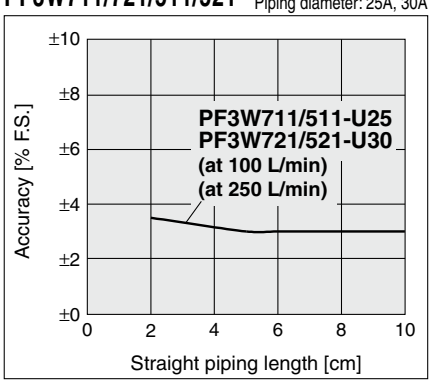
Straight Piping Length and Accuracy (Reference Value)



- Fluid pressure has almost no effect.
- To maintain ±3% F.S. in the specifications, use a straight pipe that is 11 cm or longer in length.

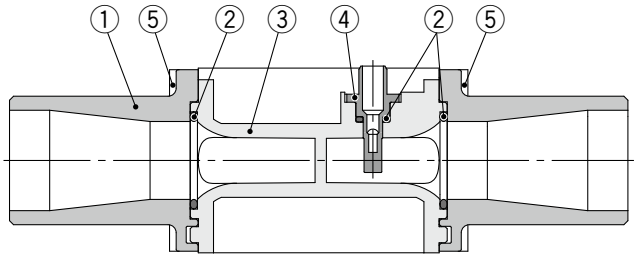
PF3W711/721/511/521

Pressure: 0.3 MPa
Piping diameter: 25A, 30A



For measurable range for ethylene glycol aqueous solution (reference values), refer to page 16.

Wetted Parts Construction



Component Parts

No.	Description	Material	Note
1	**PVC pipe**	CPVC	
2	**Seal**	FKM	
3	**Body**	PPS	
4	**Sensor**	PPS	

Replacement Parts

No.	Description	Part no.	Qty.
1	**PVC pipe (25A)**	ZS-40-U25	1
	PVC pipe (30A)	ZS-40-U30	1
5	**25A retaining plate (With two M5 x 80 hexagonal socket head cap screws)**	ZS-40-U25-A	1
	30A retaining plate (With two M5 x 65 hexagonal socket head cap screws)	ZS-40-U30-A	1

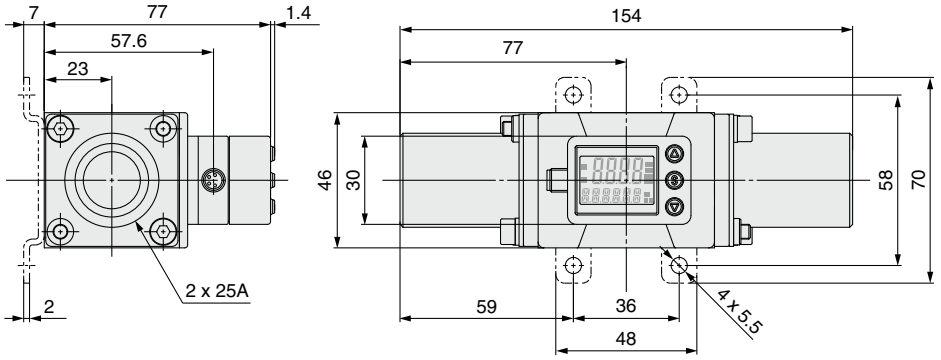
∗ Replacing the PVC pipe may cause accuracy to fluctuate by 1 to 2%.

Internal Circuits and Wiring Examples

Refer to pages 17 and 18.

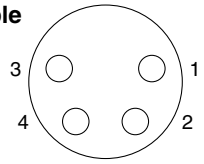
Dimensions

PF3W711-U25
Integrated display

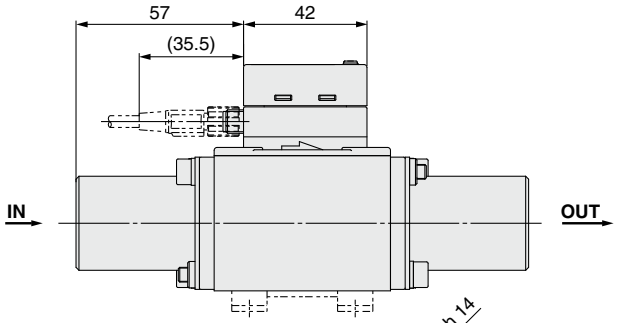


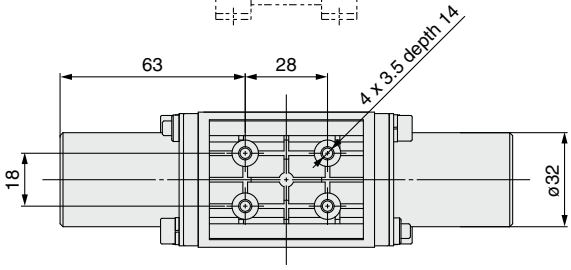
Connector pin number

Example

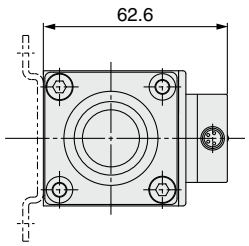


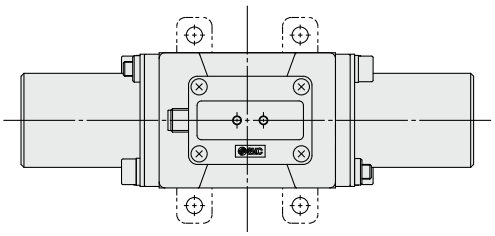
Pin no.	Pin name
1	DC (+)
2	OUT2
3	DC (–)
4	OUT1

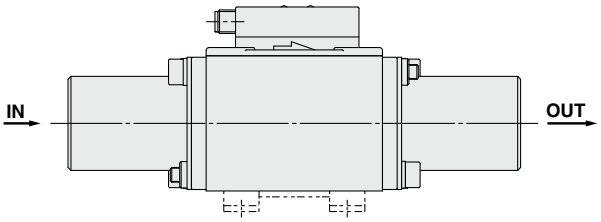




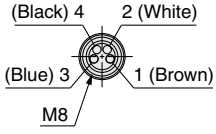
PF3W511-U25
Remote sensor unit



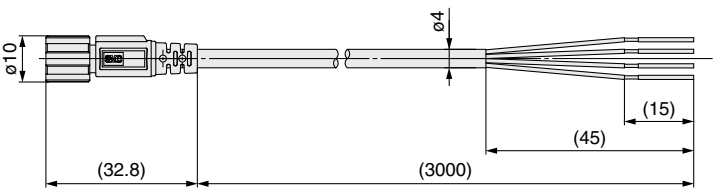




ZS-40-A
Lead wire with M8 connector



Pin no.	Pin name	Wire color
1	DC (+)	Brown
2	OUT2	White
3	DC (–)	Blue
4	OUT1	Black



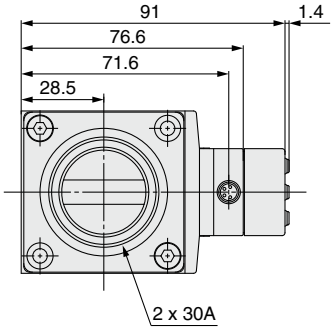
∗ 4-wire type lead wire with M8 connector used for the PF3W series
∗ For wiring, refer to the “Operation Manual” on the SMC website .

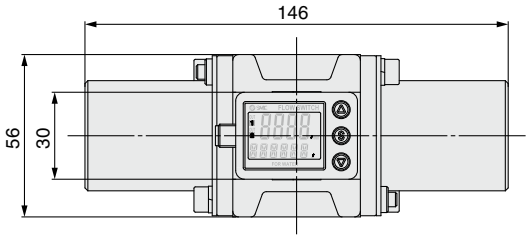
Lead Wire Specifications

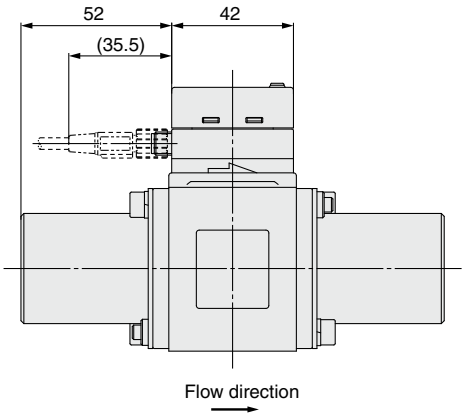
Conductor	**Nominal cross section**	AWG23
	O.D.	Approx. 0.7 mm
Insulator	**Material**	Heat-resistant PVC
	O.D.	Approx. 1.1 mm
	Color	Brown, White, Black, Blue
Sheath	**Material**	Heat- and oil-resistant PVC
Finished O.D.		ø4

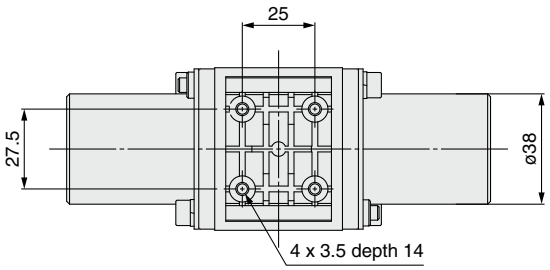
Dimensions

PF3W721-U30
Integrated display

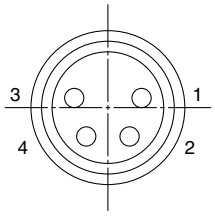






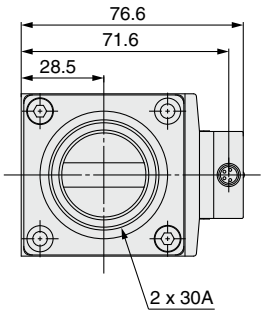


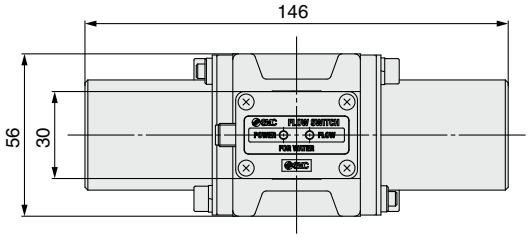
Body side
Connector pin number

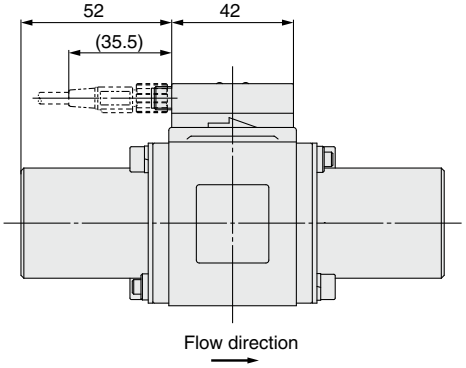


Pin no.	Pin name
1	DC (+)
2	OUT2
3	DC (–)
4	OUT1

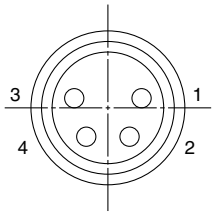
PF3W521-U30
Remote sensor unit







Body side
Connector pin number



Pin no.	Pin name
1	DC (+)
2	Not used
3	DC (–)
4	OUT1

PF3W Series
Made to Order

Please contact SMC for detailed dimensions, specifications, and lead times.

Made to Order

1 EPDM seal material

Symbol: **-X109**

Seal material for wetted parts changed to EPDM

PF3W5□-U□-□□-□□□-X109

PF3W7□-U□-□□-□□□-X109

X109: EPDM seal material

Refer to page 24 for details of How to Order.

3-Color Display

Digital Flow Monitor for Water

PF3W3 Series

How to Order

PF3W 3 0 A □ – M V C □

Type

3	Remote monitor unit

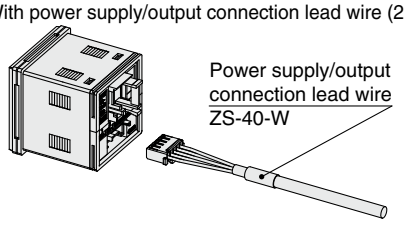
For remote sensor units, select the analog output 1 to 5 V type.
Applicable sensors: PF3W5□□-□□-1(T)

Output specification

Symbol	OUT1	OUT2
A	NPN	NPN
B	PNP	PNP
C	NPN	Analog 1 to 5 V
D	NPN	Analog 4 to 20 mA
E	PNP	Analog 1 to 5 V
F	PNP	Analog 4 to 20 mA
G	NPN	External input
H	PNP	External input
J	Analog 1 to 5 V	Analog 1 to 5 V
K	Analog 4 to 20 mA	Analog 4 to 20 mA

In combination with the remote sensor unit with a temperature sensor, only OUT2 can be set for temperature sensor output.

Lead wire

Nil	With power supply/output connection lead wire (2 m) 
N	Without power supply/output connection lead wire

The lead wire does not come connected, but it is shipped together with the product.

Remote monitor unit/Unit specification

Symbol	Instantaneous flow	Accumulated flow	Temperature
M	L/min	L	°C
G	gal/min	gal	°C
F	gal/min	gal	°F
J	L/min	L	°F

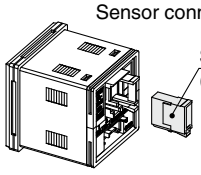
∗ Under the New Measurement Act, units other than SI (symbol "M") cannot be used in Japan.
∗ G, F, J: Made to order
Reference: 1 [L/min]↔0.2642 [gal/min]
1 [gal/min]↔3.785 [L/min]
°F = 9/5°C + 32

Calibration certificate (Only flow monitor)

Nil	None
A	With calibration certificate

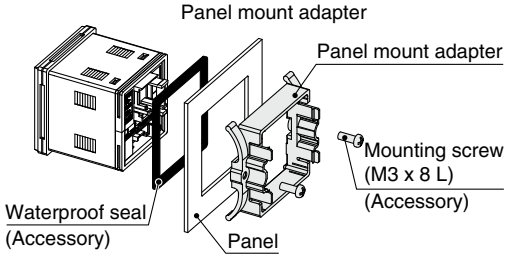
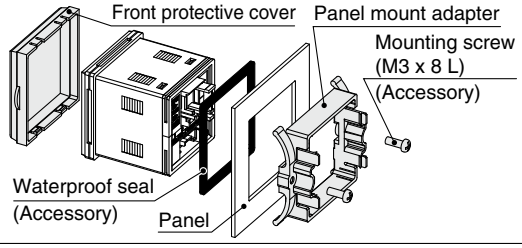
∗ The certificate is written in both Japanese and English.

Option 2

Nil	None
C	Sensor connector (1 pc.) 

The connector does not come connected, but it is shipped together with the product.

Option 1

Nil	None
T	Panel mount adapter 
V	Front protective cover + Panel mount adapter 

Options/Part Nos.

When only optional parts are required, order with the part numbers listed below.

Description	Part no.	Note
Panel mount adapter	**ZS-26-B**	With waterproof seal and screws
Front protective cover + Panel mount adapter	**ZS-26-C**	With waterproof seal and screws
Front protective cover only	**ZS-26-01**	Separately order panel mount adapter, etc.
Power supply/output connection lead wire	**ZS-40-W**	Lead wire length: 2 m
Sensor connector (e-con)	**ZS-28-CA-4**	1 pc.
Lead wire with connector for copying	**ZS-40-Y**	Connect up to 10 copy destination units

For flow switch precautions and specific product precautions, refer to the "Operation Manual" on the SMC website.

Specifications

Model			PF3W30□				
Display flow range			0.35 to 4.50 L/min (Flow under 0.35 L/min is displayed as "0.00.")	1.7 to 18.0 L/min (Flow under 1.7 L/min is displayed as "0.0.")	3.5 to 45.0 L/min (Flow under 3.5 L/min is displayed as "0.0.")	7 to 112 L/min (Flow under 7 L/min is displayed as "0.")	20 to 280 L/min (Flow under 20 L/min is displayed as "0.")
Set flow range			0.35 to 4.50 L/min	1.7 to 18.0 L/min	3.5 to 45.0 L/min	7 to 112 L/min	20 to 280 L/min
Smallest settable increment			0.01 L/min	0.1 L/min		1 L/min	2 L/min
Conversion of accumulated pulse			0.05 L/pulse	0.1 L/pulse	0.5 L/pulse	1 L/pulse	2 L/pulse
Display unit			Instantaneous flow: L/min, Accumulated flow: L				
Accuracy			Display value: ±0.5% F.S. Analog output: ±0.5% F.S.				
Repeatability			±0.5% F.S.				
Temperature characteristics			±0.5% F.S. (25°C standard)				
Accumulated flow range∗1			99999999.9 L		999999999 L		
			By 0.1 L	By 0.5 L	By 1 L		
Switch output			NPN or PNP open collector output				
	Max. load current		80 mA				
	Max. applied voltage		28 VDC				
	Internal voltage drop		NPN: 1 V or less (at load current of 80 mA) PNP: 1.5 V or less (at load current of 80 mA)				
	Response time∗2		1 s/2 s				
	Output protection		Short-circuit protection				
	Output mode	**Flow rate**	Select from Hysteresis, Window comparator, Accumulated output, or Accumulated pulse output modes.				
		Temperature	Select from Hysteresis mode or Window comparator mode.				
Analog output	**Response time**∗3		1 s/2 s (linked with the switch output)				
	Voltage output		Voltage output: 1 to 5 V Output impedance: 1 kΩ				
	Current output		Output current: 4 to 20 mA Max. load impedance: 300 Ω for 12 VDC, 600 Ω for 24 VDC				
Hysteresis			Variable				
External input			Voltage free input: 0.4 V or less (reed or solid state), input for 30 ms or longer				
Input/output			Input for copy mode				
Display method			2-screen display (Main screen: 4-digit, 7-segment, 2-color, Red/Green Sub screen: 6-digit, 11-segment, White), Display values updated 5 times per second				
Indicator light			Output 1, Output 2: Orange				
Power supply voltage			12 to 24 VDC ±10%				
Current consumption			50 mA or less				
Connection			Power supply output 5P connector, sensor connection 4P connector (e-con)				
Environment	**Enclosure**		IP40 (Only front face of the panel is IP65 when panel mount adapter and waterproof seal of optional parts are used.)				
	Operating temperature range		0 to 50°C (No freezing or condensation)				
	Operating humidity range		Operation, Storage: 35 to 85% R.H. (No condensation)				
	Withstand voltage		1000 VAC for 1 min between terminals and housing				
	Insulation resistance		50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing				
Standards and regulations			CE/UKCA marking, UL (CSA)				
Weight	**Without power supply/output connection lead wire**		50 g				
	With power supply/output connection lead wire		100 g				

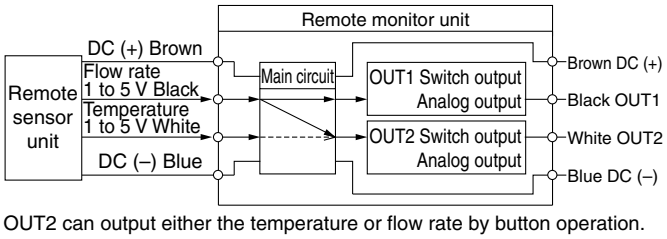
∗1 It is cleared when the power supply is turned OFF. The hold function can be selected. (Intervals of 2 or 5 mins can be selected.)
If the 5-min interval is selected, the life of the memory element (electronic part) is limited to 1 million times. (If energized for 24 hours, life is calculated as 5 mins x 1 million = 5 million mins = about 9.5 years.) Therefore, if using the hold function, calculate the memory life for your operating conditions, and use within this life.
∗2 The response time when the set value is 90% in relation to the step input (The response time is 7 s when it is output by the temperature sensor.)
∗3 The response time until the set value reaches 90% in relation to the step input (The response time is 7 s when it is analog output by the temperature sensor.)
∗ Products with tiny scratches, marks, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Temperature Sensor Specifications

Rated temperature range	0 to 100°C∗1
Set/Display temperature range	–10 to 110°C
Smallest settable increment	1°C
Display unit	°C
Analog output accuracy	±3% F.S.
Response time	7 s∗2
Ambient temperature characteristics	±5% F.S.

∗1 The rated temperature range refers solely to that of the temperature sensor. The fluid temperature range specification of the flow switch as a whole is **0 to 90°C**.
∗2 The response time refers solely to that of the temperature sensor.

The output related to the temperature sensor is OUT2 only.



OUT2 can output either the temperature or flow rate by button operation.

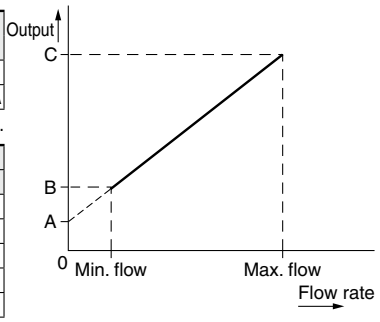
Analog Output

Flow rate/Analog output

	A	B			C
		04/20/40	11	21	
Voltage output	1 V	1.5 V	1.4 V	1.5 V	5 V
Current output	4 mA	6 mA	5.6 mA	5.9 mA	20 mA

The values of B vary according to the range.

Model	Flow rate [L/min]	
	Min.	Max.
PF3W504	0.5	4
PF3W520	2	16
PF3W540	5	40
PF3W511	10	100
PF3W521	30	250

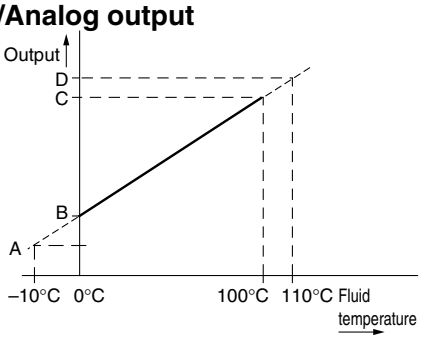


Fluid temperature/Analog output

	A	B
Voltage output	0.6 V	1 V
Current output	2.4 mA	4 mA

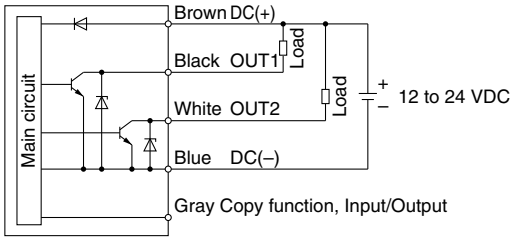
	C	D
Voltage output	5 V	5.4 V
Current output	20 mA	21.6 mA

Be sure to use in combination with the remote sensor unit with a temperature sensor.

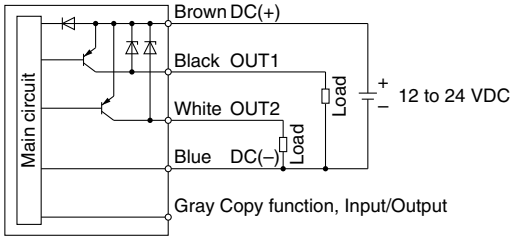


Internal Circuits and Wiring Examples

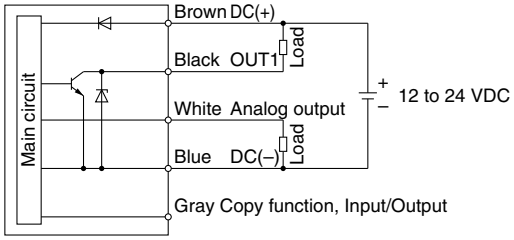
-A
NPN (2 outputs)



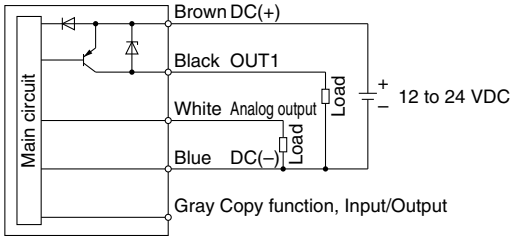
-B
PNP (2 outputs)



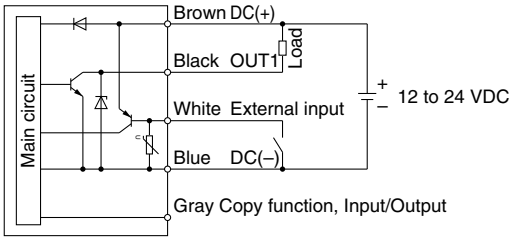
-C/D
C: NPN + Analog voltage output
D: NPN + Analog current output



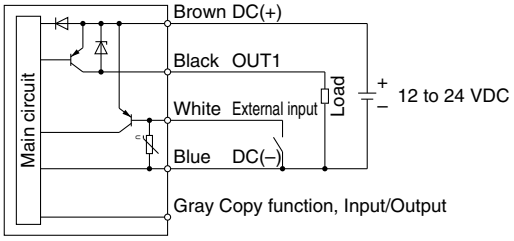
-E/F
E: PNP + Analog voltage output
F: PNP + Analog current output



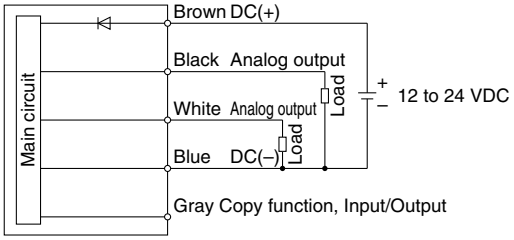
-G
NPN + External input



-H
PNP + External input

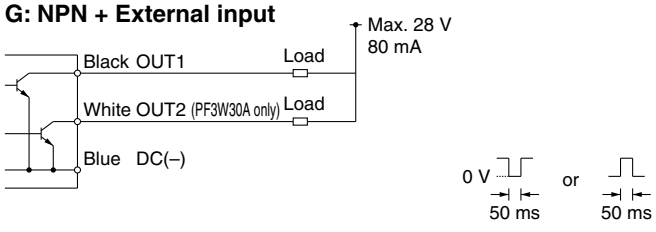


-J/K
J: Analog voltage output
K: Analog current output

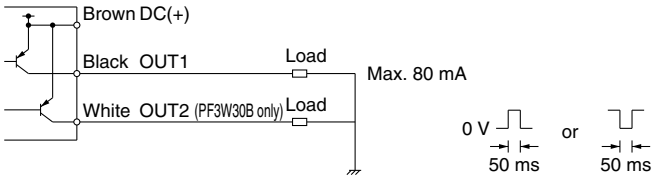


Accumulated pulse output wiring examples

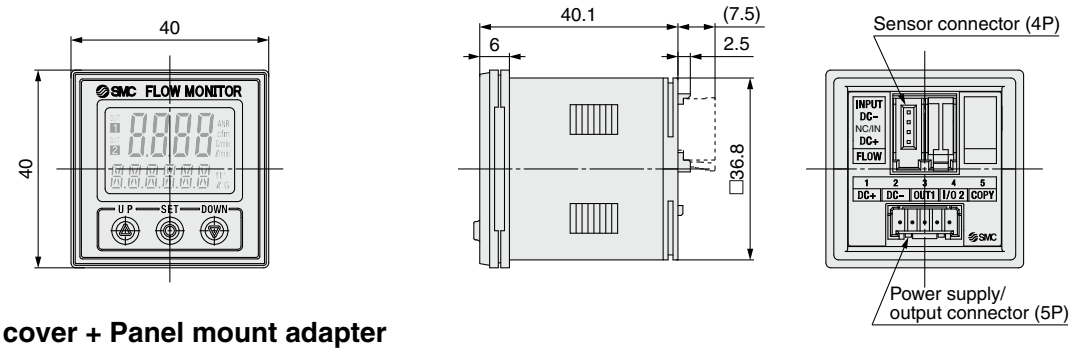
-A/C/D/G
A: NPN (2 outputs)
C, D: NPN + Analog output
G: NPN + External input



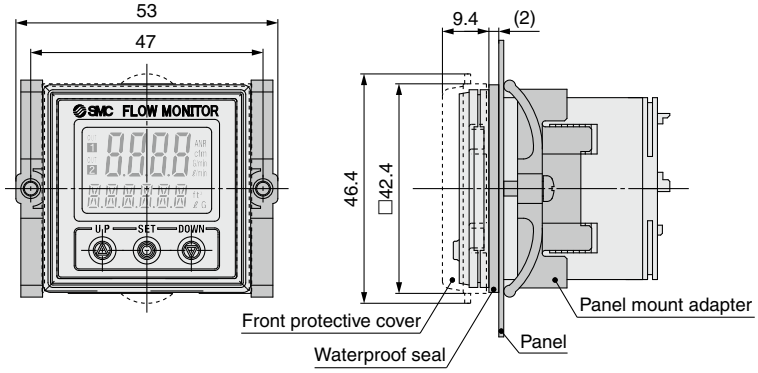
-B/E/F/H
B: PNP (2 outputs)
E, F: PNP + Analog output
G: PNP + External input



Dimensions

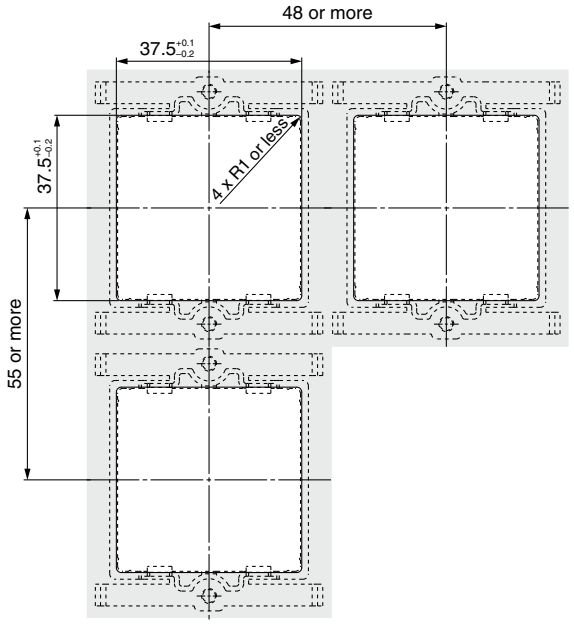


Front protective cover + Panel mount adapter

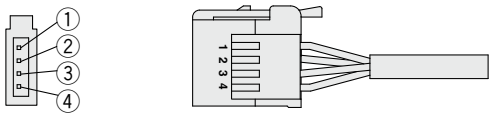


Panel fitting dimensions

Applicable panel thickness:
0.5 to 8 mm (Without waterproof seal)
0.5 to 6 mm (With waterproof seal)



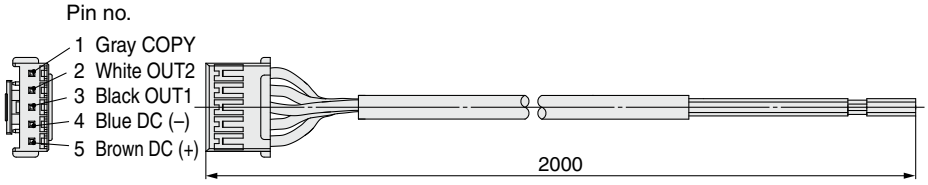
Sensor connector



Pin no.	Terminal	Connector no.	Lead wire color*1
①	DC (+)	1	Brown
②	N.C./IN	2	White (Not used/Temperature sensor 1 to 5 V input)
③	DC (–)	3	Blue
④	INPUT	4	Black (Flow rate sensor 1 to 5 V input)

*1 When using the lead wire with M8 connector included with the PF3W5 series

Power supply/output connection lead wire



Lead Wire Specifications

Conductor	Nominal cross section	AWG26
	O.D.	Approx. 0.5 mm
Insulator	Material	Cross-linked vinyl
	O.D.	Approx. 1.0 mm
	Color	Brown, Blue, Black, White, Gray
Sheath	Material	Oil- and heat-resistant vinyl
Finished O.D.		ø3.5

* For wiring, refer to the "Operation Manual" on the SMC website.

3-Screen Display
4-Channel Flow Monitor
PFG200 Series

How to Order

PFG20 0 – M □ □ □

Input/Output specification

Symbol	Description
0	NPN 5 outputs + External input
1	PNP 5 outputs + External input
2∗1	IO-Link + NPN 4 outputs or NPN 5 outputs (SIO mode)
3∗1	IO-Link + PNP 4 outputs or PNP 5 outputs (SIO mode)

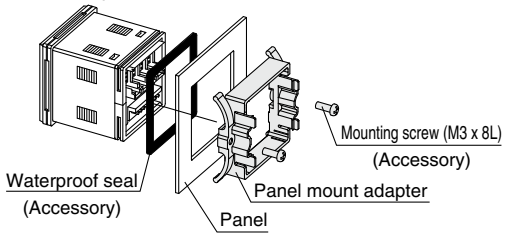
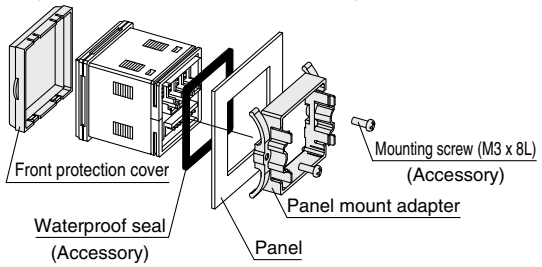
∗1 When the flow monitor is used as an IO-Link device, the total power supply current of the connected sensors should be 200 mA or less.

Unit specification

Nil	With unit selection function∗2
M	SI units only∗3

∗2 Under the New Measurement Act, switches with the unit selection function are no longer allowed for use in Japan.
∗3 Fixed unit: Instantaneous flow: L/min
Accumulated flow : L

Option 1

Nil	None
A	Panel mount adapter 
B	Front protection cover + Panel mount adapter 

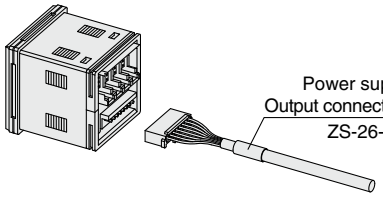
∗ Options are not assembled, but shipped together.

Option 2

Nil	None
4C	Sensor connector (4 pcs.) ∗ For PF2/3W5□

∗ Connector is not connected, but shipped together.

Option 3

Nil	Power supply/Output connection cable (2 m) 
N	None

∗ Cable is shipped together, but not connected.

Options/Part Nos.

When only optional parts are required, order with the part numbers listed below.

Description	Part no.	Note
Power supply/Output connection cable	ZS-26-L	Length: 2 m
For PF2W5□□, PF3W5□□ Sensor connector (e-CON)	ZS-28-CA-4	1 pc., Finished O.D.: ø1.15 to ø1.35, Cover color: Blue
Panel mount adapter	ZS-26-B	Mounting screw (M3 x 8 L, 2 pcs.), With waterproof seal
Panel mount adapter + Front protection cover	ZS-26-C	Mounting screw (M3 x 8 L, 2 pcs.), With waterproof seal
Front protection cover	ZS-26-01	—
Power supply with M12 connector cable (Made to Order)	ZS-26-LM12	For use when using an M12 connector for IO-Link communication

For flow switch precautions and specific product precautions, refer to the "Operation Manual" on the SMC website.

Specifications

Series			PFG20□ Series				
Applicable SMC flow sensor			**PF2(3)W504**	**PF2(3)W520**	**PF2(3)W540**	**PF2(3)W511**	**PF3W521**
Rated flow range			0.5 to 4 L/min	2 to 16 L/min	5 to 40 L/min	10 to 100 L/min	50 to 250 L/min
Instantaneous flow rate display/Set flow rate range			0.35 to 4.50 L/min (Flow under 0.35 L/min is displayed as "0.00.")	1.7 to 17.0 L/min (Flow under 1.7 L/min is displayed as "0.0.")	3.5 to 45.0 L/min (Flow under 3.5 L/min is displayed as "0.0.")	7 to 110 L/min (Flow under 7 L/min is displayed as "0.")	20 to 280 L/min (Flow under 20 L/min is displayed as "0.")
Instantaneous flow rate display/Min. setting unit			0.05 L/min	0.1 L/min	0.5 L/min	1 L/min	2 L/min
Accumulated flow display/Set flow rate range			0 to 99,999,999.9 L	0 to 999,999,999 L	0 to 999,999,999 L		
Accumulated flow display/Min. setting unit			0.1 L	1 L	1 L		
Accumulated pulse flow rate exchange value			0.05 L	0.1 L	0.5 L	1 L	2 L
Unit			L/min, gal/min (depends on selected range)				
Electrical	Power supply voltage	**When used as a switch output device**	12 to 24 VDC ±10% with 10% ripple (p-p) or less				
		When used as an IO-Link device	18 to 30 VDC, including ripple (p-p) 10%*1				
	Current consumption		55 mA or less				
	Protection		Polarity protection				
	Power supply voltage for sensor*1		[Power supply voltage] −1.5 V				
	Power supply current for sensor*2		Max. 110 mA (However, the total power supply current for the four inputs is 440 mA or less, and the total power supply current when used as an IO-Link device is 200 mA or less).				
Accuracy	**Display accuracy (Linearity)**		±5.0% F.S. Max.*4				
	Repeatability		±3.0% F.S. Max.*4				
	Temperature characteristics		±0.5% F.S. Max. (Reference: 25°C)				
Switch output (SIO mode)	**Output type**		NPN or PNP open collector output: 5 outputs				
	Output mode		Hysteresis mode, Window comparator mode, Accumulated output, Accumulated pulse output, Error output, Output OFF				
	Switch operation		Normal output, Reversed output				
	Max. load current		80 mA				
	Max. applied voltage (NPN only)		30 VDC				
	Internal voltage drop (Residual voltage)		1.5 V or less (at load current of 80 mA)				
	Delay time*3		5 ms or less, variable from 0 to 60 s/0.01 s increments				
	Hysteresis		Variable from 0*5				
	Protection		Over current protection				
Analog input	**Input type**		Voltage input: 1 to 5 VDC (Input impedance: 1 MΩ)				
	Number of inputs		4 inputs (Check the "Internal Circuits and Wiring Examples" on pages 37 to 39.)				
	Connection method		e-CON				
	Protection		Over voltage protection (up to a voltage of 26.4 VDC)				
External input*8			Voltage free input: 0.4 V or less (reed or solid state) for 30 ms or longer				
Display	**Display type**		LCD				
	Number of screens		3-screen display (Main screen, Sub screen x 2)				
	Display color		Main screen: Red/Green, Sub screen: Orange				
	Number of display digits		Main screen: 4 digits (7 segments), Sub screen (Left): 4 digits (some digits are 11-segments, 7 segments for other), Sub screen (Right): 5 digits (some digits are 11-segments, 7 segments for other)				
	Indicator light		Lights up when switch output is turned ON. OUT1, OUT2: Orange				
Digital filter*6			Variable from 0 to 30 s/0.01 s increments				
Environment	**Enclosure**		Front face: IP65 (when panel-mounted), Others: IP40				
	Withstand voltage		1000 VAC for 1 min between terminals and housing				
	Insulation resistance		50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing				
	Operating temperature range		Operating: 0 to 50°C, Stored: −10 to 60°C (No condensation)				
	Operating humidity range		Operating/Stored: 35 to 85% RH (No condensation)				
Standards			CE/UKCA marking				
Weight	**Body**		51 g (Excludes power supply and output cable)				
	Power supply/Output cable		60 g				
	e-CON (1 pc.)		2 g				
Communication (IO-Link mode)	**IO-Link type**		Device				
	IO-Link version		V1.1				
	Communication speed		COM2 (38.4 kbps)				
	Configuration file		IODD file*7				
	Minimum cycle time		4.8 ms				
	Process data length		Input data: 10 bytes, Output data: 0 bytes				
	On request data communication		Yes				
	Data storage function		Yes				
	Event function		Yes				
	Vendor ID		131 (0 x 0083)				

*1 Check the power supply voltage range of the connected sensor.
*2 Over current on DC (+) side and DC (−) side of the sensor input connector results in breakage of the product.
*3 Value without digital filter (at 0 ms)
*4 The system accuracy when combined with an applicable flow sensor.
*5 If the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the amount of fluctuation, or chattering will occur.
*6 The response time indicates when the set value is 90% in relation to the step input.
*7 The configuration file can be downloaded from the SMC website.
*8 This setting is only possible for the PFG200/PFG201.
*Products with tiny scratches, marks, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Applicable Flow Sensors

Applicable SMC flow sensor	Rated flow range [L/min]
	0.5 1 2 4 5 10 20 40 50 100 200 250
PF2(3)W504	0.5 – 4
PF2(3)W520	2 – 16
PF2(3)W540	5 – 40
PF2(3)W511	10 – 100
PF3W521	50 – 250

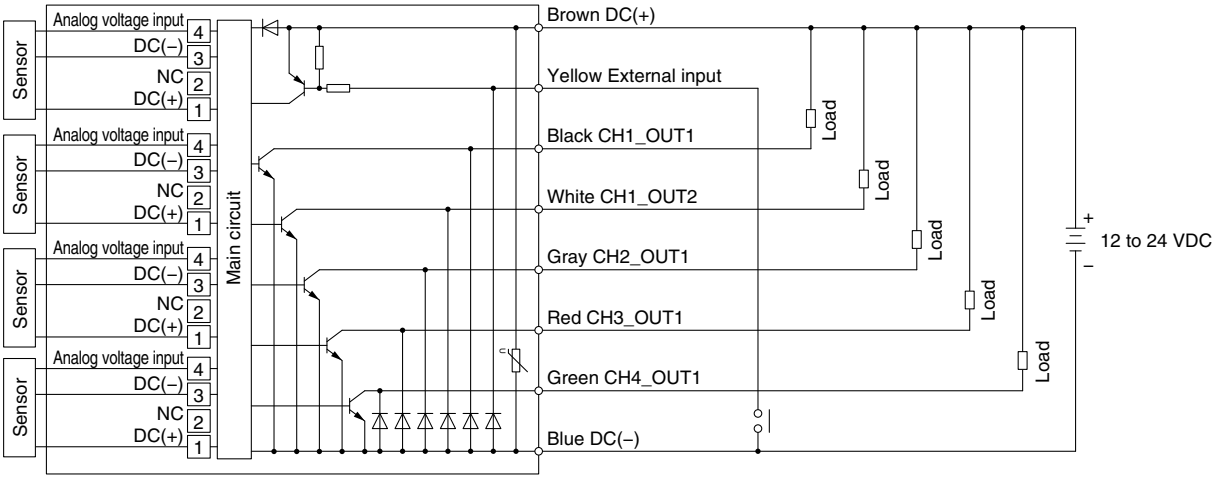
Internal Circuits and Wiring Examples

PFG20□–□□□□

Input/Output specifications

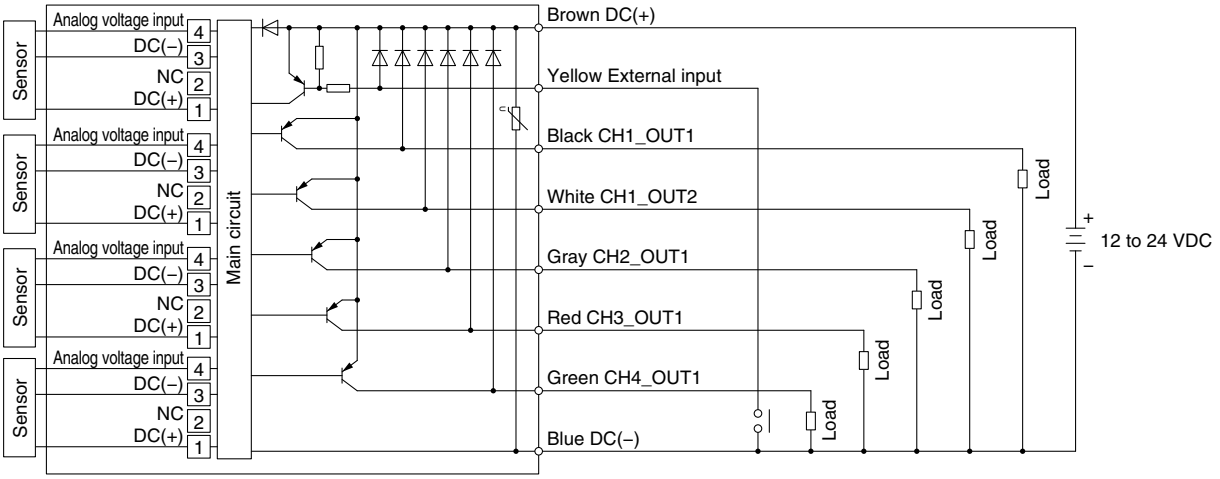
0

· NPN open collector 5 outputs + External input



1

· PNP open collector 5 outputs + External input



Internal Circuits and Wiring Examples

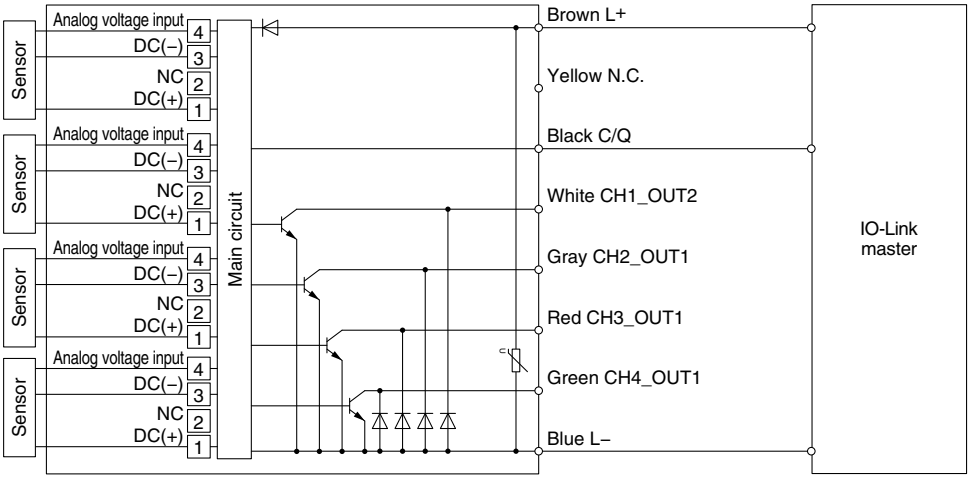
PFG20□–□□□□

• Input/Output specifications

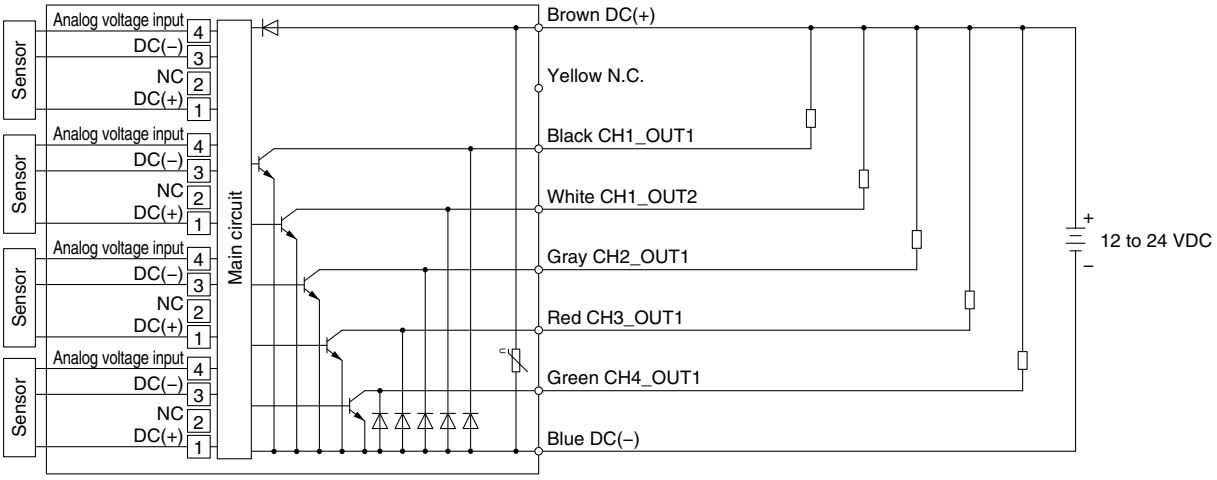
2

· IO-Link/NPN open collector 1 output + NPN open collector 4 outputs

When used as an IO-Link device



When used as a switch output device



Internal Circuits and Wiring Examples

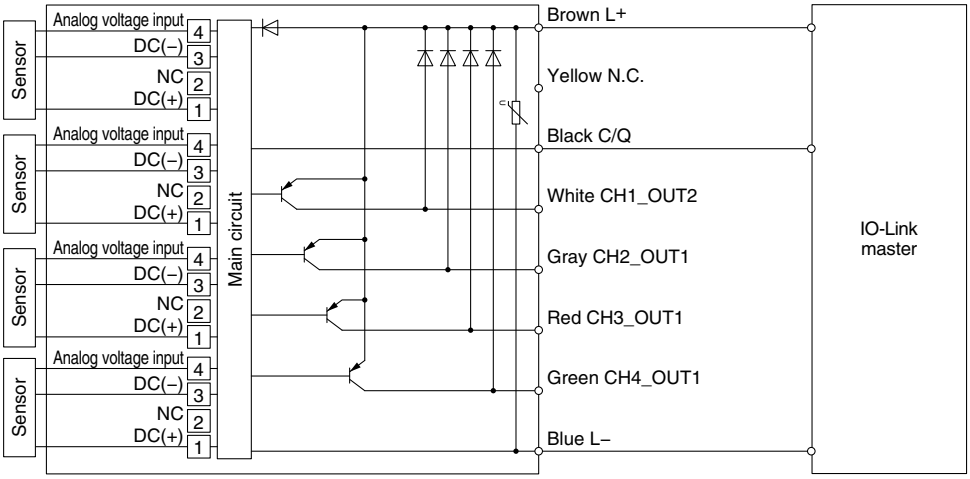
PFG20□–□□□□

• Input/Output specifications

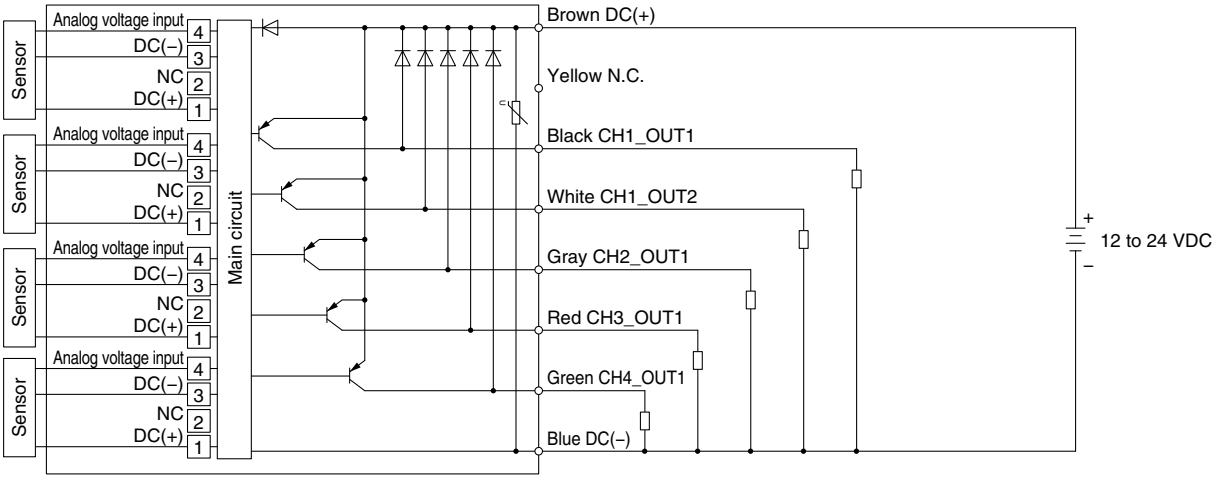
3

· IO-Link/PNP open collector 1 output + PNP open collector 4 outputs

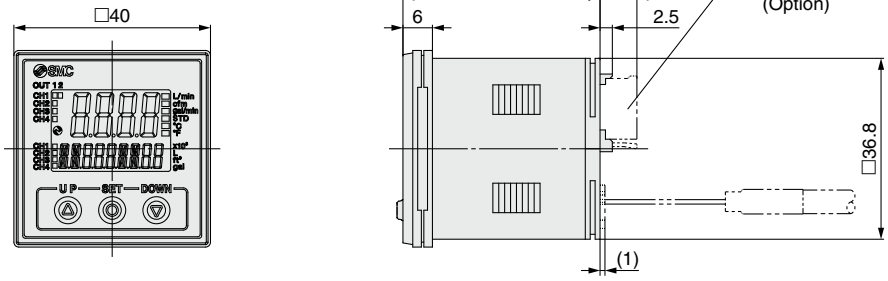
When used as an IO-Link device

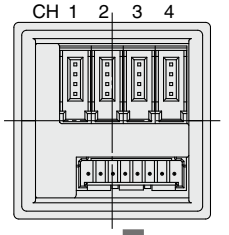


When used as a switch output device

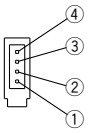


Dimensions



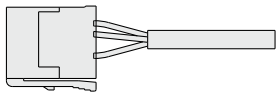


Sensor connector (4P x 4)

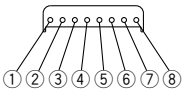


Pin no.	Terminal
①	DC (+)
②	N.C
③	DC (–)
④	IN (1 to 5 V)

Connector (Option)

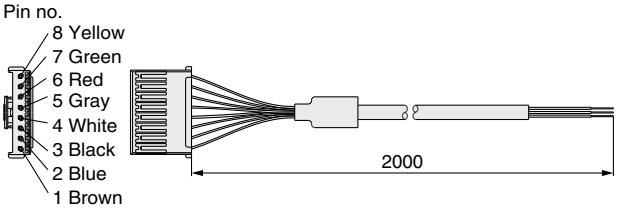


Power supply/Output connector (8P)



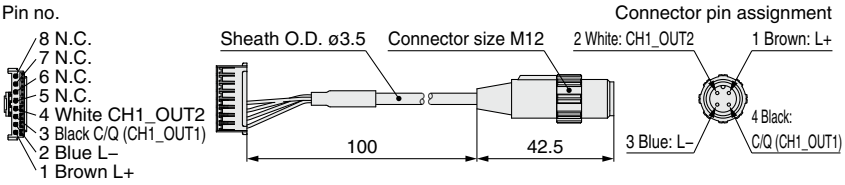
Pin no.	Terminal	
	PFG200/PFG201	PFG202/PFG203
①	DC (+)	L+
②	DC (–)	L–
③	CH1_OUT1	C/Q (CH1_OUT1)
④	CH1_OUT2	
⑤	CH2_OUT1	
⑥	CH3_OUT1	
⑦	CH4_OUT1	
⑧	Auto-shift input	N.C.

Power supply/Output connection cable (Accessory)

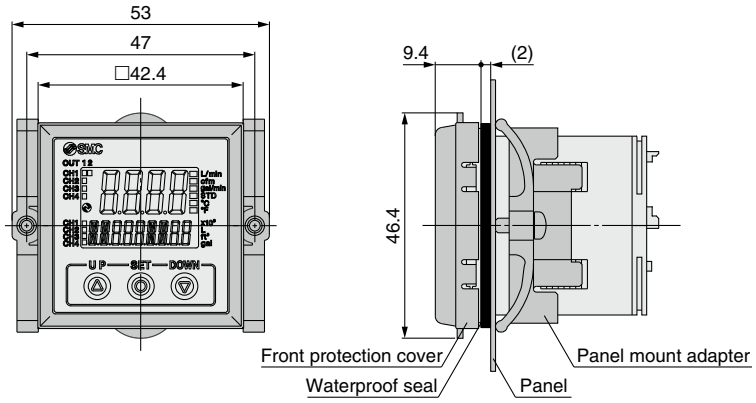


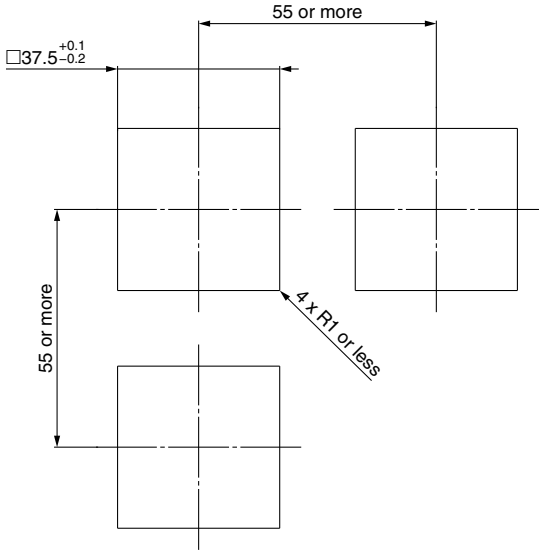
Power supply with M12 connector/Output cable (Made to Order)

∗ For use when using an M12 connector for IO-Link communication



Front protection cover + Panel mount adapter





Panel fitting dimensions
Applicable panel thickness:
0.5 to 8 mm

Function Details

Integrated Display (PF3W7 series)/Remote Monitor Unit (PF3W3 series)

■ Output operation

The output operation can be selected from the following:
Output (hysteresis mode and window comparator mode) corresponding to instantaneous flow rate, output corresponding to accumulated flow, or accumulated pulse output.

* At the time of shipment from the factory, it is set to hysteresis mode and normal output.

When a temperature sensor is attached, the output to the temperature sensor is selectable only for OUT2.
(Refer to "How to Order" for details.)

■ Display color

The display color can be selected for each output condition. The selection of the display color provides visual identification of abnormal values. (The display color depends on OUT1 setting.)

Green for ON, Red for OFF
Red for ON, Green for OFF
Red all the time
Green all the time

■ Response time

The response time can be selected to suit the application. (1 second for default setting)
Abnormalities can be detected more quickly by setting the response time to 0.5 seconds.
The effect of the pump fluctuation and flickering of the display can be reduced by setting the response time to 2 seconds.

* The temperature sensor output is fixed to 7 seconds.

Response time	Applicable model	
	Integrated display PF3W7 series	**Remote monitor unit PF3W3 series**
0.5 seconds	●	—
1 second	●	●
2 seconds	●	●

■ External input function

This function can be used only when the optional external input is present. The accumulated flow, peak value, and bottom value can be reset remotely.
Accumulated value external reset: A function to reset the accumulated flow value when an external input signal is applied.
In accumulated increment mode, the accumulated value will reset to and increase from zero.
In accumulated decrement mode, the accumulated value will reset to and decrease from the set value.

* When the accumulated value is stored to memory, every time the accumulated value external reset is activated, the memory (EEPROM) will be accessed. Take into consideration that the maximum number of times the memory can be accessed is 1 million times. The total number of external inputs and the accumulated value memorizing time interval should not exceed 1 million times.

Peak/Bottom value reset: Peak and bottom value are reset.

■ Forced output function

The output is turned on/off in a fixed state when starting the system or during maintenance. This enables the confirmation of wiring and prevents system errors due to unexpected output.
For the analog output type, when ON the output will be 5 V or 20 mA, and when OFF, it will be 1 V or 4 mA.

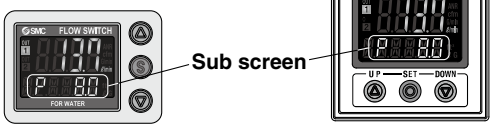
* Also, an increase or decrease of the flow and temperature will not change the on/off status of the output while the forced output function is activated.

■ Accumulated value hold

The accumulated value is not cleared even when the power supply is turned off.
The accumulated value is memorized every 2 or 5 minutes during measurement and continues from the last memorized value when the power supply is turned on again.
The life time of the memory device is 1 million access times. Take this into consideration before using this function.

■ Selection of display on sub screen

The display on the sub screen in measuring mode can be set.



Integrated display **Remote monitor unit**

Set value display	Accumulated value display	Peak value display	Bottom value display
Displays the set value (The set value of OUT2 cannot be displayed.)	Displays the accumulated value (The accumulated value of OUT2 cannot be displayed.)	Displays the peak value	Displays the bottom value
Line name display	**Fluid temperature display**	**OFF**	
Displays the line name (Up to 6 alphanumeric characters can be input.)	Displays the fluid temperature (When the temperature sensor type is selected.)	Displays nothing	

* The above are examples of integrated displays. (Same as remote monitor unit)

■ Power-saving mode

The display can be turned off to reduce power consumption.
In power-saving mode, only decimal points blink.
If any button is pressed during power-saving mode, the display is recovered for 30 seconds to check the flow, etc.

■ Setting of security code

The user can select whether a security code must be entered to release the key lock. At the time of shipment from the factory, it is set such that a security code is not required.

■ Peak/Bottom value display

The maximum (minimum) flow rate is detected and updated from when the power supply is turned on. In peak (bottom) value display mode, this maximum (minimum) flow rate is displayed.

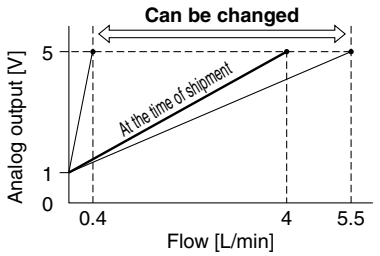
■ Keylock function

Prevents operation errors such as accidentally changing setting values

Integrated Display (PF3W7 series)/Remote Monitor Unit (PF3W3 series)

■ Analog output free range function

This function allows a flow that generates an output of 5 V or 20 mA to be changed. (This function is not available for the analog output to the temperature.) This function is available if the analog output type is used. The value can be changed between 10% of the maximum value of the rated flow and the maximum value of the display range.

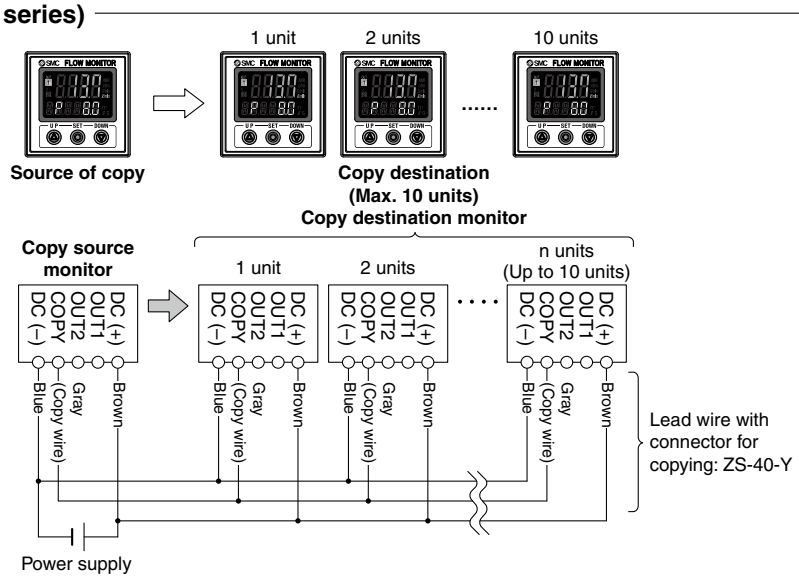


For 4 L/min type (Integrated display)

■ Copy function (Remote monitor unit/PF3W3 series)

The set values of the monitor can be copied.
This can reduce setting labor and minimize the risk of setting mistakes.

The set value can be copied to up to 10 flow monitors simultaneously.
(Maximum transmission distance: 4 m)



■ Error display function

When an error or abnormality arises, the location and contents are displayed.

Display	Description	Contents	Action	Applicable model	
				Integrated display PF3W7 series	Remote monitor unit PF3W3 series
Er 1	OUT1 over current error	A load current of 80 mA or more is applied to the switch output (OUT1).	Eliminate the cause of the over current by turning off the power supply and then turning it on again.	●	●
Er2	OUT2 over current error	A load current of 80 mA or more is applied to the switch output (OUT2).		●	●
HHH	Instantaneous flow error	The flow rate has exceeded the display flow range (rated flow x approx. 1.4).	Decrease the flow rate.	●	●
LLL	Unconnected sensor error	Remote sensor unit is not connected to the monitor unit. Or, sensor output is less than 0.6 V.	Connect the sensor or check the sensor output voltage.	—	●
999999999 (Alternately displays [999] and [999999])	Accumulated flow error	The flow rate exceeds the accumulated flow rate range. (Decimal points start blinking due to the flow range.)	Clear the accumulated flow rate. (This error is irrelevant when accumulated flow is not being used.)	●	●
cHHH	Over upper limit of temperature	Fluid temperature exceeds 110°C.	Lower the fluid temperature.	●	●
cLLL	Under lower limit of temperature	Fluid temperature is under –10°C.	Raise the fluid temperature.	●	●
	Unconnected temperature sensor error	Temperature sensor output wire is not connected.	Connect the temperature output wire.	—	●
		Temperature sensor is not connected to the remote sensor unit.	Check if or not the remote sensor unit is connected to a temperature sensor.		
	Temperature sensor failure	If the above actions to correct the lower limit of fluid temperature and unconnected sensor are taken and error message still appears, the temperature sensor of the remote sensor unit may be damaged.	Please contact SMC for investigation.	—	●
Er0	System error	Internal data error	Turn the power off and then on again. If the error cannot be rectified, please contact SMC for investigation.	●	●
Er4					
Er6					
Er8					
Er12	Temperature sensor failure	Temperature sensor may be damaged.		●	—

If the error cannot be solved after the instructions above are performed, please contact SMC for investigation.

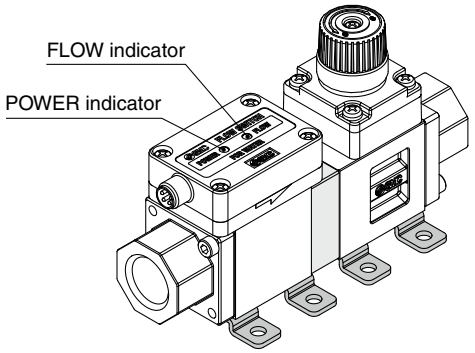
Remote Sensor Unit (PF3W5 series)

■POWER indicator function

It is possible to check whether power supply is reaching the product. When power is supplied to the product, the indicator lights up green.

■FLOW indicator function

Status of the flow rate can be checked visually. When the flow rate increases, the green lamp blinks faster. When below the measurable lower limit of flow rate, the lamp turns off, when above the measurable upper limit of flow rate, red lamp turns on.



■Error display function

When an error or abnormality arises, the location and contents are displayed.

LED display	Description	Contents	Action
POWER Green Red FLOW FLOW indicator: Red ON	Over upper limit of flow rate	Flow is approximately 110% or more of the rated flow.	Decrease the flow rate.
POWER Red POWER indicator: Blinking red	Temperature measurement range error	Fluid temperature is either under –10°C or over 110°C.	Adjust the fluid temperature within the measurable temperature range.
POWER Red Red FLOW POWER indicator: Blinking red FLOW indicator: Red ON	Over upper limit of flow rate and temperature measurement range error	Refer to above.	Refer to above.

LED display	Description	Contents	Action
POWER Red Red FLOW POWER indicator: Red ON FLOW indicator: Red ON	System error	Internal data error or other errors occur.	Turn the power off and then on again. If the error cannot be rectified, please contact SMC for investigation.
POWER Red Red FLOW POWER indicator: Red ON FLOW indicator: Blinking red			
POWER Red FLOW POWER indicator: Red ON FLOW indicator: OFF		Temperature sensor may be damaged.	

If the error cannot be solved after the above instructions are performed, please contact SMC for investigation.

Applicable Fluids

Material and Fluid Compatibility Check List (Guide)

Chemical		Compatibility
Ammonium hydroxide		×
Isobutyl alcohol		×*3
Isopropyl alcohol		○*1, 2
Hydrochloric acid	Concentration 30% or less	○*2
Hydrogen peroxide	Concentration 5% or less	○
Nitric acid (except fuming nitric acid)	Concentration 10% or less	○*2
Deionized water		○
Sodium hydroxide (caustic soda)	Concentration 50% or less	×*3
Sulfuric acid (except fuming sulfuric acid)	Concentration 30% or less	○
Phosphoric acid	Concentration 50% or less	○

The material and fluid compatibility check list provides reference values as a guide only, therefore we do not guarantee the application to our product.

∗1 Since static electricity may be generated, implement suitable countermeasures.

∗2 Fluid may pass through. Fluid that has passed through may have an impact on components made of different materials.

∗3 Karman vortex measurement cannot be carried out due to high viscosity.

• SMC is not responsible for its accuracy and any damage happened because of this data.

Table symbols
○: Can be used
○: Can be used under certain conditions
×: Cannot be used

⚠ 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.

⚠ 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.

*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: Robots and robotic devices - Safety requirements for industrial robots - Part 1:Robots
etc.

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/ equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

⚠ Caution

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not covered.
Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.
The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Revision History

Edition B	∗ The remote type has been added.	
	∗ Units with a flow adjustment valve have been added.	
	∗ The 100 L/min type has been added.	
	∗ The PVC piping type has been added.	
	∗ Number of pages has been increased from 16 to 32.	PR
Edition C	∗ The 250 L/min type has been added.	
	∗ The analog 4 to 20 mA 2-output type (-X128) has been added to made to order options.	
	∗ The brass piping material specification (-X143) has been added to made to order options.	
	∗ Number of pages has been decreased from 32 to 28.	QW
Edition D	∗ The PF3W7□-X445 has been added.	
	∗ Number of pages has been increased from 28 to 36.	WU

⚠ Safety Instructions Be sure to read the "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" before use.

SMC Corporation