Diversified

Five types of gases can be measured with just one unit

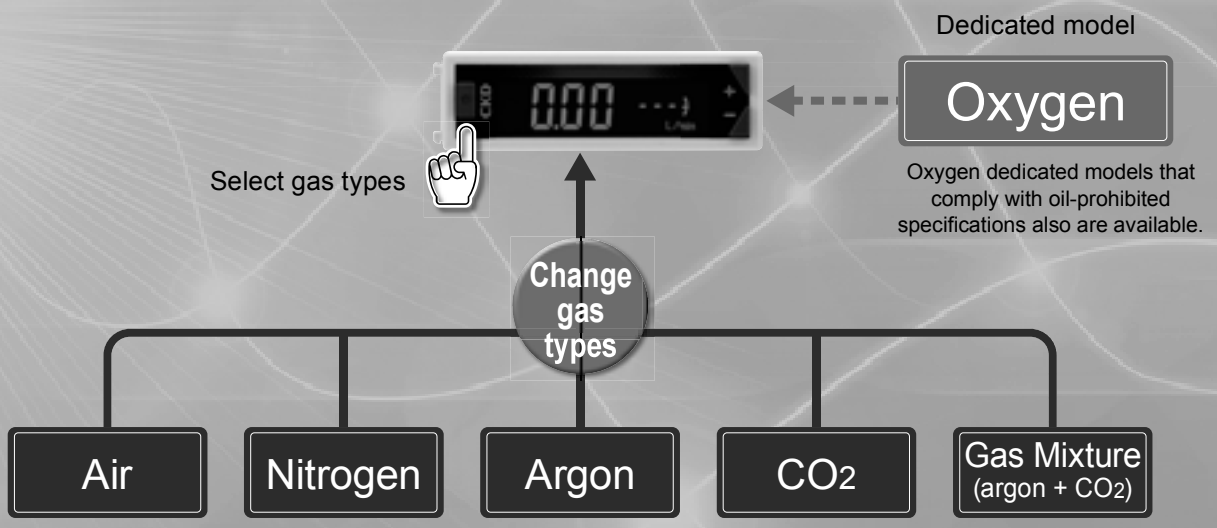
Gas type switching function (LCD display, IO-Link) (full scale flow rate 200 L/min or less model)

Air, nitrogen, argon, carbon dioxide, gas mixture (mixture of Ar: CO2 (8:2)) supported with this single flow rate sensor.

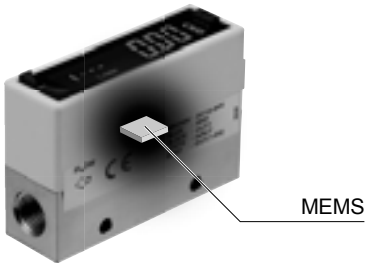
Gas types can be switched by operating buttons on the body.

In the IO-Link specifications, the gas type can be changed remotely from a host controller.

* For details on mixing ratios, contact CKD.



High performance



MEMS stands for Micro Electro Mechanical Systems or the technology of microscopic devices to which microprocessing technology, that is used in the manufacture of semiconductor, is applied.

Clean-room specifications

Anti-dust generation packaging (P70) and oil-prohibited specifications (P80) are included in the product lineup as standard

Sensors can be used selectively according to the grade of the apparatus.

Compatible with outgas

Stainless steel body does not use resin in the flow path, making it ideal for processes that are difficult to outgas.

High precision/high-speed response

Repeatability: Within ±1% F.S.

Display accuracy: Within ±3% F.S.

Response time: 50 msec

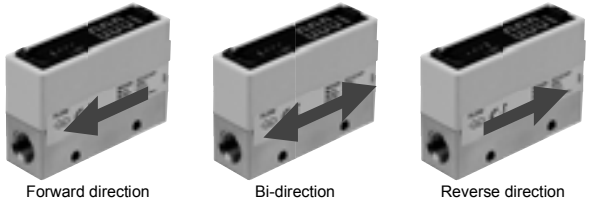
Reduced pressure loss

A re-designed flow path results in up to a 50% reduction

Bi-directional fluid measurement

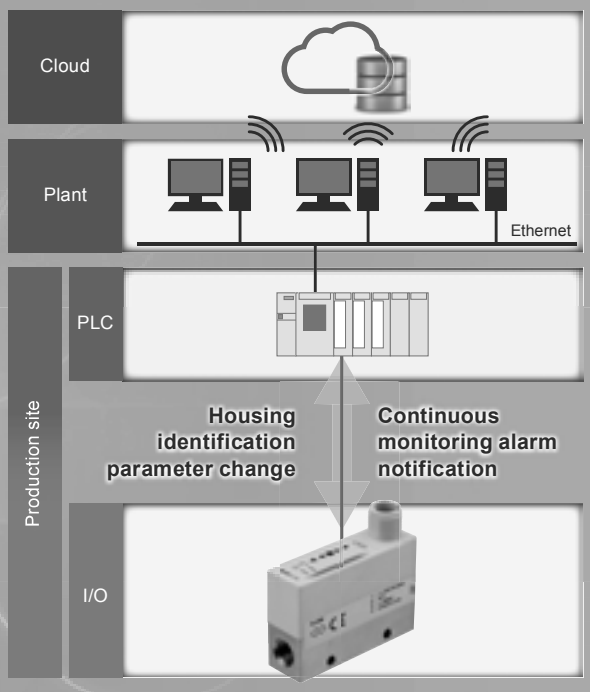
Contributes to reducing tact time

The flow direction can be measured as desired.



IO-Link model now included in series

IO-Link is a digital communication specification for on-site sensors and actuators in plants. (IEC61131-9)
This enables the transmission of parameters and event data that could not be transmitted by analog communication.



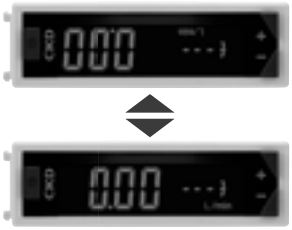
Features of IO-Link

- **Digital signals** — Continuous monitoring is enabled by the use of digital data.
- **Parameter remote control** — Parameters can be set or changed via a network, allowing apparatus to be remote-controlled.
- **Housing identification** — The model No., serial No. or other unit-unique information can be confirmed on the network.
- **Plug & Play** — Settings can be copied from a master (scanner) unit. This frees the operator from the trouble of having to reset parameters during maintenance.
- **Abnormality detection** — Device failures and disconnections can be confirmed.
- **Connection to field bus** — It is possible to connect by changing to an Ethernet network, enabling the creation of an IoT system.

User-friendly

LCD can be rotated for ease of viewing

The display can be inverted.



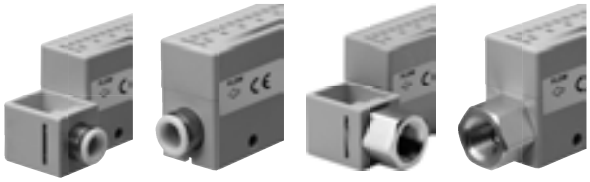
Easy mounting (option)

DIN rail mount

Panel mount

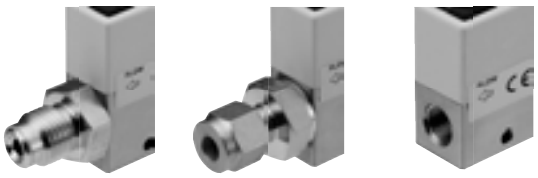
Wide selection of fittings

Resin body



Push-in elbow | Push-in straight | Screw-in elbow | Screw-in straight

Stainless steel body



JXR barbed fitting | Double barbed fitting | Screw-in

Leakage inspection

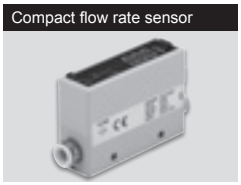
The drinking water container is filled with gas to detect leaks.

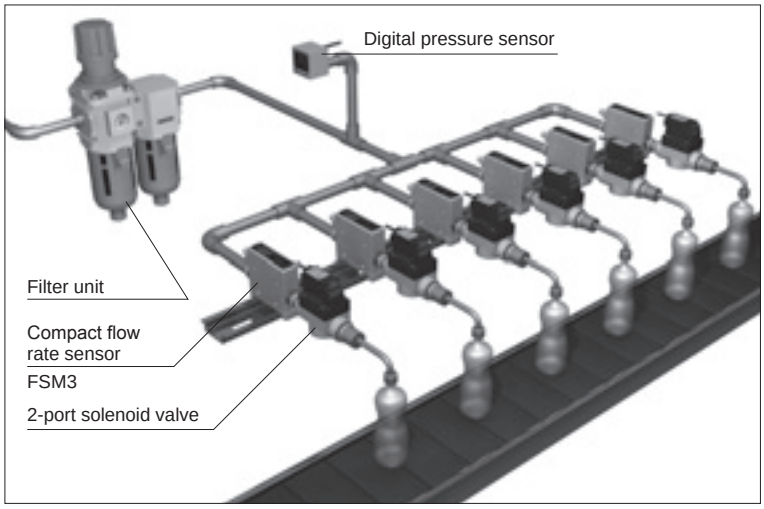
Filter unit

Digital pressure sensor

2-port solenoid valve

Compact flow rate sensor





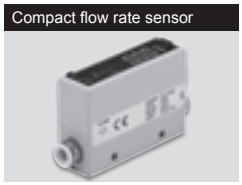
Air consumption management

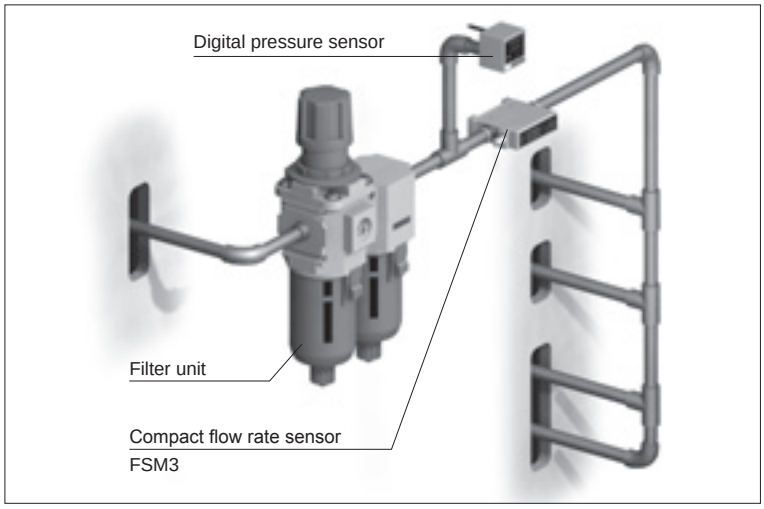
The air consumption of facilities that use pneumatic devices is monitored.

Filter unit

Digital pressure sensor

Compact flow rate sensor





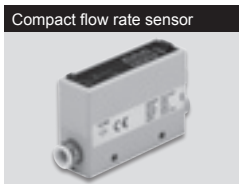
Painting air flow rate control

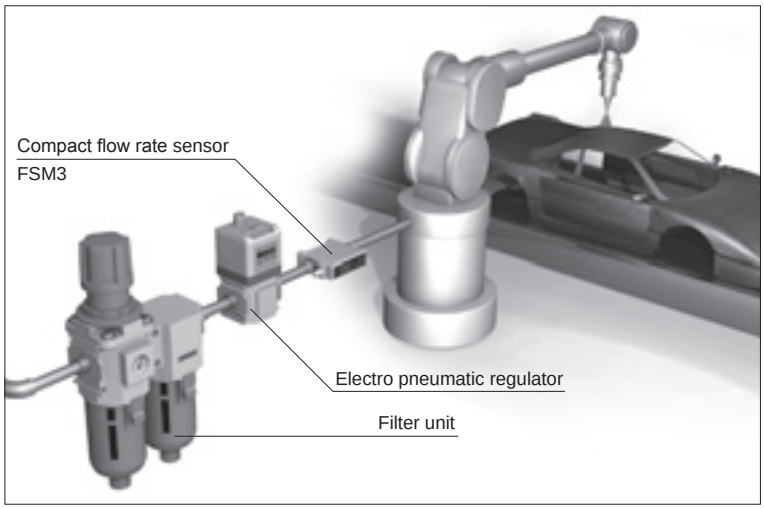
Change the air pressure and controls flow rate used during coating with the electro-pneumatic regulator.

Filter unit

Electro pneumatic regulator

Compact flow rate sensor





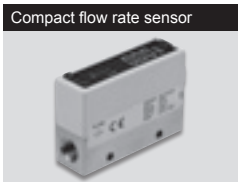
Biochemical culture apparatus

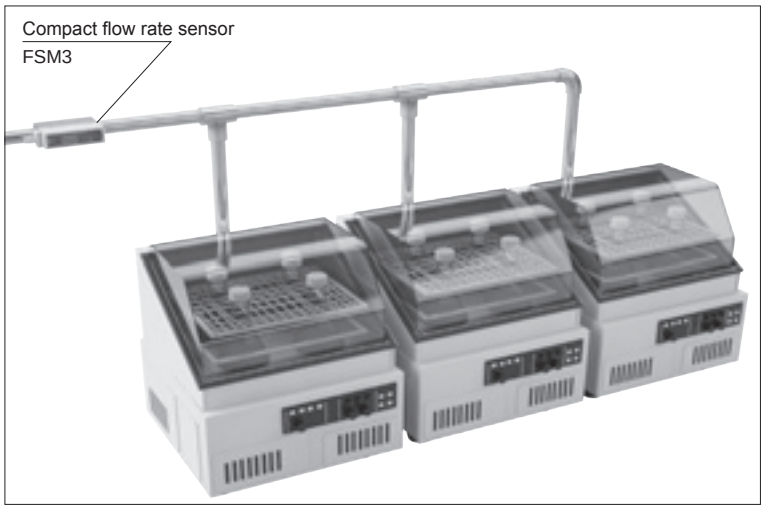
CO_2 flow rate is measured to promote the photosynthesis of organisms.

Inline clean filter

Digital pressure sensor

Compact flow rate sensor





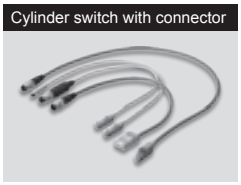
Arc welding

Manages argon, gas mixtures (argon + carbon dioxide), and other shielding gases.

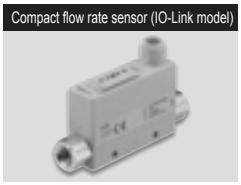
Rotary clamp cylinder

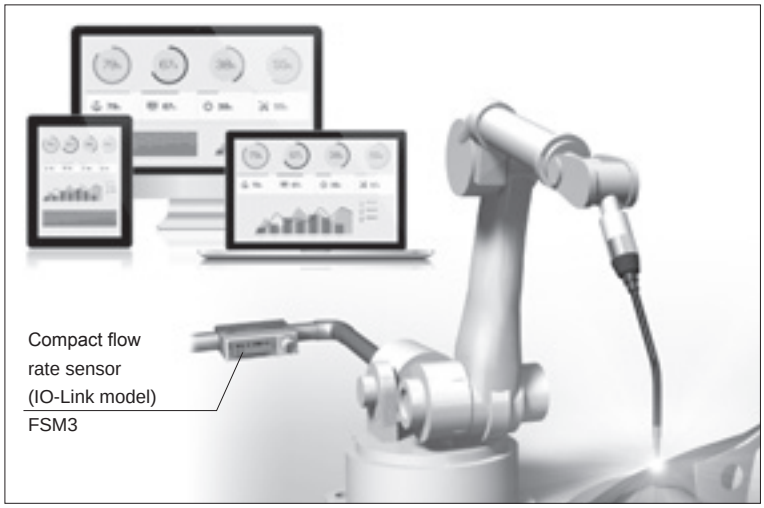
Guided cylinder

Cylinder switch with connector



Compact flow rate sensor (IO-Link model)



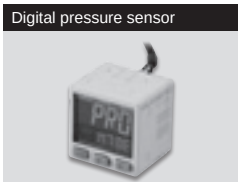


Electronic part installation

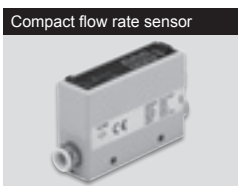
Control the tension of gold wire for installing electronic parts.

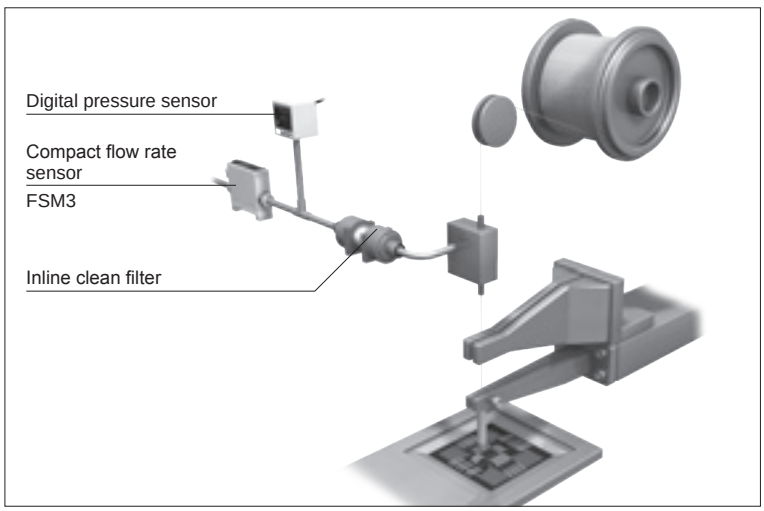
Inline clean filter

Digital pressure sensor



Compact flow rate sensor





Series variation

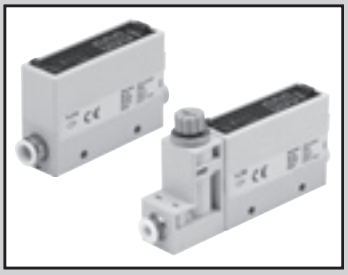
Compact flow rate sensor (RAPIFLOW) FSM3 Series

	Appearance	Applicable fluid	Flow rate adjustment valve *1	
Resin body	LCD display 	Air Nitrogen Carbon dioxide Argon Gas mixture (argon + carbon dioxide)	●	
			●	
			●	
			●	
			●	
			●	
			●	
			●	
			●	
			●	
			●	
			●	
Stainless steel body	LCD display 	(1) Air Nitrogen Carbon dioxide Argon Gas mixture (argon + carbon dioxide) (2) Oxygen	●	
			●	
			●	
			●	
			●	
			●	
			●	
			●	

*1: Compatible with LCD display
*2: Compatible with LCD display and bar display

Clean-room specifications		Port size	Max. flow rates (L/min)											Page
P70	P80		0.5	1	2	5	10	20	50	100	200	500	1000	
●	●	ø4	●	●	●	●	●	●						• LCD display Page 1052 • Bar display* Page 1060 • IO-Link Page 1066
●	●	ø6	●	●	●	●	●	●	●					
●		ø8							●	●	●			
●		ø10								●	●			
●		ø1/4"	●	●	●	●	●	●	●					
●		ø3/8"								●	●			
●	●	Rc1/8	●	●	●	●	●	●	●					
●	●	Rc1/4							●	●	●			
●	●	Rc1/2										●*	●*	
●	●	NPT1/8	●	●	●	●	●	●	●					
●	●	NPT1/4							●	●	●			
●	●	NPT1/2										●*	●*	
●	●	G1/8	●	●	●	●	●	●	●					
●	●	G1/4							●	●	●			
●	●	G1/2										●*	●*	
●	●	Rc1/8	●	●	●	●	●	●	●					• LCD display Page 1072 • Bar display* Page 1080 • IO-Link Page 1086
●	●	Rc1/4							●	●	●			
●	●	Rc1/2										●*	●*	
●	●	G1/8	●	●	●	●	●	●	●					
●	●	G1/4							●	●	●			
●	●	G1/2										●*	●*	
●	●	NPT1/8	●	●	●	●	●	●	●					
●	●	NPT1/4							●	●	●			
●	●	NPT1/2										●*	●*	
●	●	1/4" double barbed fitting	●	●	●	●	●	●	●	●	●			
●	●	1/4" JXR male fitting	●	●	●	●	●	●	●	●	●			

* The only applicable fluids are air and nitrogen.



Compact flow rate sensor RAPIFLOW

FSM3 Series

LCD display

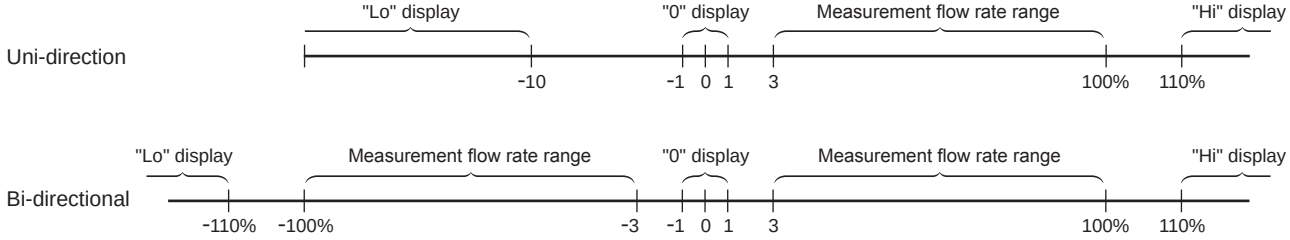
● Resin body (flow rate range: 500 mL/min to 1000 L/min)

CE RoHS

LCD display specifications

Item			FSM3-[A][B][C][D][E][F][G][H][I]-[ ]										
			[B]										
			005	010	020	050	100	200	500	101	201	501	102
Flow direction	[C]	U	Uni-direction										
		B	Bi-direction										
Measurement flow rate range (□/min) *1	[B]	U	15 to 500 mL	30 to 1000 mL	0.06 to 2.00 L	0.15 to 5.00 L	0.30 to 10.00 L	0.6 to 20.0 L	1.5 to 50.0 L	3.0 to 100.0 L	6 to 200 L	15 to 500 L	30 to 1000 L
		B	−500 to −15, 15 to 500 mL	−1000 to −30, 30 to 1000 mL	−2.00 to −0.06, 0.06 to 2.00 L	−5.00 to −0.15, 0.15 to 5.00 L	−10.00 to −0.30, 0.30 to 10.00 L	−20.0 to −0.6, 0.6 to 20.0 L	−50.0 to −1.5, 1.5 to 50.0 L	−100.0 to −3.0, 3.0 to 100.0 L	−200 to −6, 6 to 200 L	−500 to −15, 15 to 500 L	−1000 to −30, 30 to 1000 L
Display			4 digit + 4 digit 2 color LCD										
Flow rate display range (□/min) *2	[B]	U	−49 to 549 mL	−99 to 1099 mL	−0.19 to 2.19 L	−0.49 to 5.49 L	−0.99 to 10.99 L	−1.9 to 21.9 L	−4.9 to 54.9 L	−9.9 to 109.9 L	−19 to 219 L	−49 to 549 L	−99 to 1099 L
		B	−549 to 549 mL	−1099 to 1099 mL	−2.19 to 2.19 L	−5.49 to 5.49 L	−10.99 to 10.99 L	−21.9 to 21.9 L	−54.9 to 54.9 L	−109.9 to 109.9 L	−219 to 219 L	−549 to 549 L	−1099 to 1099 L
Integration display *3		Display range	0 to ±9999999 mL		0.00 to ±99999.99 L			0.0 to ±999999.9 L			0 to ±9999999 L		
		Pulse output rate	5 mL	10 mL	0.02 L	0.05 L	0.1 L	0.2 L	0.5 L	1 L	2 L	5 L	10 L
Working conditions		Applicable fluid *4	Clean air (JIS B 8392-1:2012 1.1.1 to 5.6.2), compressed air (JIS B 8392-1:2012 1.1.1 to 1.6.2)										
			nitrogen, argon, carbon dioxide, gas mixture (argon + carbon dioxide)									-	
		Temperature range	0 to 50°C (no condensation)										
		Pressure range	−0.09 to 0.75 MPa										
		Proof pressure	1 MPa										
Operating ambient temperature/humidity			0 to 50 °C, 90% RH or less										
Storage temperature			−10 to 60°C										
Accuracy *5 (Fluid: in dry air)		Accuracy *6	Within ±3% F.S. (Secondary side released to atmosphere) (The scope of warranty is in accordance with the "measurement flow rate range.")										
		Repeatability *7	Within ±1% F.S. (Secondary side released to atmosphere)										
		Temperature characteristics	Within ±0.2% F.S./°C (15 to 35°C, base temperature 25°C)										
		Pressure characteristics	Within ±5% F.S. (where secondary side is released to atmosphere)								Within ±5% F.S. (0.35 MPa standard)		
Response time		*8	50 msec or less (setting response time OFF)										
Switch output	[G]	A, B, E, F	NPN open collector output (50 mA or less, voltage drop 2.4 V or less)										
		C, D, G, H	PNP open collector output (50 mA or less, voltage drop 2.4 V or less)										
Analog output *9		A, B, C, D	1 to 5 V voltage output (connecting load impedance 50 kΩ or more)										
		E, F, G, H	4 to 20 mA current output (connecting load impedance 0 to 300 Ω)										
Power supply voltage *10		A, B, C, D	12 to 24 VDC (10.8 to 26.4 V) ripple rate 1% or less										
		E, F, G, H	24 VDC (21.6 to 26.4 V) ripple rate 1% or less										
Current consumption		*11	45 mA or less										
Lead wire			ø3.7, AWG26 or equivalent × 5-conductor (connector), insulator O.D. ø1.0										
Functions		*12	① Gas type selection, ② setting copy function, ③ flow rate integration, ④ peak hold, etc.										
Degree of protection			IP40 or equivalent (IEC standard)										
Protection circuit		*13	Power reverse connection protection, switch output reverse connection protection, switch output load short-circuit protection										
Vibration resistance			10 to 150 Hz, 100 m/s^2, 2 hours each in X, Y, Z directions										
EMC Directive			EN55011, EN61000-6-2, EN61000-4-2/3/4/6/8										
Mounting		Mounting orientation *14	Unrestricted in vertical/horizontal direction										
		Straight piping section *15	Not required										

*1: The value converted to volumetric flow rate at standard condition (20°C, 1 barometric pressure (101 kPa), 65%RH). (20°C, 1 atmospheric pressure (101 kPa), 0%RH with a type of gas other than air.)
*2: Display at each flow rate is as follows.



*3: The integrated flow is a calculated (reference) value. When using the integrated save function, take care to prevent the number of saves from exceeding the access count limit of the storage device (1 million times). (Changes to the settings are counted in number of accesses.)

$$\text{Number of saves} = \frac{\text{Usage time}}{5\ \text{mins}} < 1\ \text{million times}$$

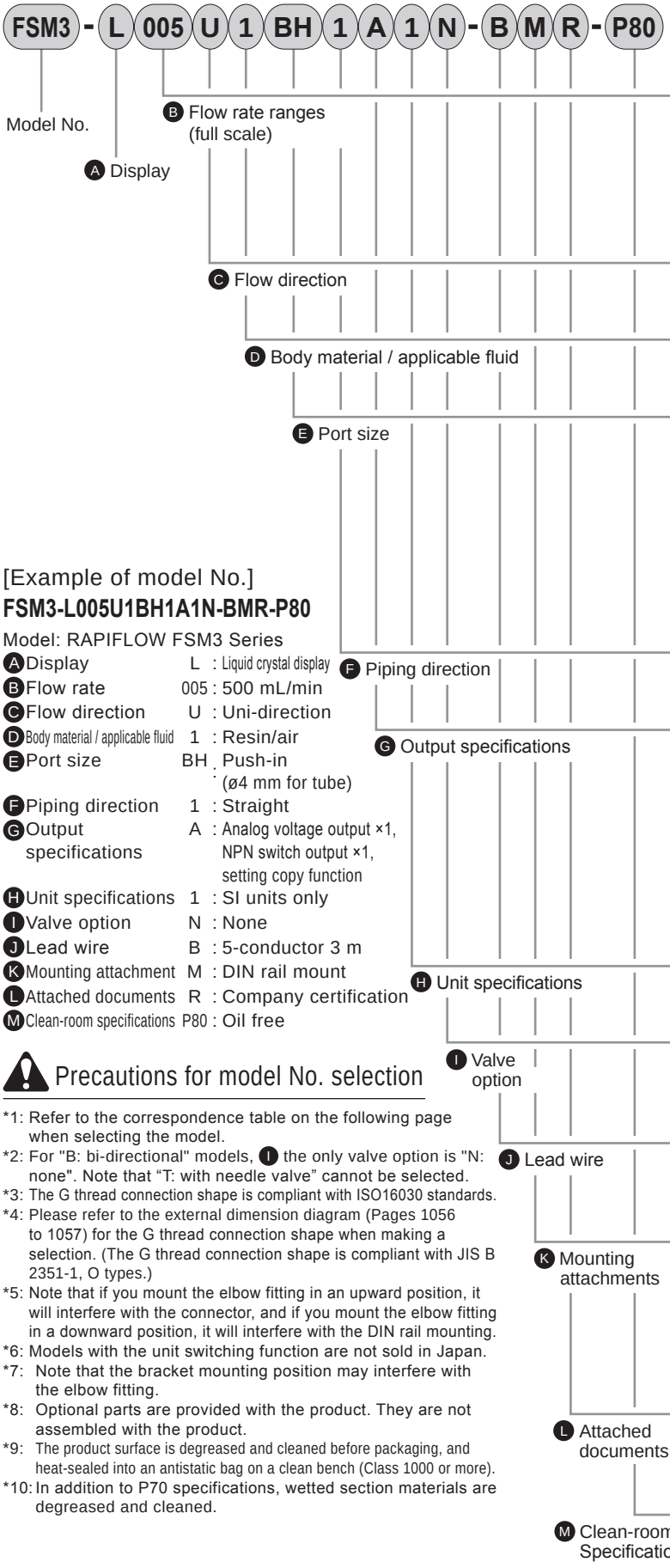
When the instantaneous flow rate is 1% or less, the flow rate is counted as integrated flow rate.
*4: Use dry gas which does not contain corrosive elements such as chlorine, sulfur or acids, and which is clean and does not contain dust or oil mist. When using compressed air, use clean air that complies with JIS B 8392-1:2012 Class 1.1.1 to 1.6.2. Compressed air from the compressor contains drainage (water, oil oxides, foreign matter, etc.). To maintain the function of this product, install a filter, air dryer (min. pressure dew point 10˚C or less), and oil mist filter (max. oil content 0.1 mg/m^3) on the primary side (upstream side) of this product. (Refer to page 1119 for details on recommended circuit.)
*5: Compressed air is used for adjusting and inspecting this product. Accuracy for gas types other than air is a guideline.
*6: Accuracy is based on a CKD standard flow rate meter. It does not indicate absolute accuracy.
Repeatability, temperature characteristics, and pressure characteristics are not included for an accuracy of ±3% F.S.
Consider separately according to the working environment and working conditions.
*7: Repeatability calculated during a short time. Change over time is not included. (Refer to the product specifications for details.)
*8: The actual response time changes depending on the piping conditions. As a guideline, the response time setting can be selected within the range 50 msec to 1.5 sec.
*9: The output impedance of the output impedance of the analog output voltage output is approximately 1 kΩ. If the impedance of the connecting load is small, output and error increase. Check error with the impedance of the connecting load before using.
*10: The power supply voltage specifications differ for the voltage output and current output types.
*11: Current for when 24 VDC is connected, and no load is applied. The current consumption will vary depending on how the load is connected.
*12: The gas type switching function enables switching to argon, carbon dioxide and a gas mixture of argon 80% + carbon dioxide 20%. The full scale flow rate and analog output after changing are as follows. (Note that the 500 L/min and 1,000 L/min models do not have a gas change function.)

Gas	Flow direction	Measured flow rate range (□/min)							
		005	010	020	100	200	500	101	201
・Air ・Nitrogen ・Argon ・Argon80%+ Carbon dioxide20%	Uni-direction	15~500mL	30~1000mL	0.06~2.00L	0.30~10.00L	0.6~20.0L	1.5~50.0L	3.0~100.0L	6~200L
	Bi-direction	-500~-15mL	-1000~-30mL	-2.00~-0.06L	-10.00~-0.30L	-20.0~-0.6L	-50.0~-1.5L	-100.0~-3.0L	-200~-6L
		15~500mL	30~1000mL	0.06~2.00L	0.30~10.00L	0.6~20.0L	1.5~50.0L	3.0~100.0L	6~200L
・Carbon dioxide	Uni-direction	15~250mL	30~500mL	0.06~1.00L	0.30~5.00L	0.6~10.0L	1.5~25.0L	3.0~50.0L	6~100L
	Bi-direction	-250~-15mL	-500~-30mL	-1.00~0.06L	-5.00~0.30L	-10.0~-0.6L	-25.0~-1.5L	-50.0~-3.0L	-100~-6L
		15~250mL	30~500mL	0.06~1.00L	0.30~5.00L	0.6~10.0L	1.5~25.0L	3.0~50.0L	6~100L

Gas	Flow direction	Analog output			
		Output A		Output B	
		Voltage	Current	Voltage	Current
・Carbon dioxide	Uni-direction	1~3V	4~12mA	1~5V	4~20mA
	Bi-direction	2~4V	8~16mA	1~5V	4~20mA

The "Setting copy function" setting is selected at "Ⓖ Output specifications".
Note that the "External input" function is not available on models on which the "Setting copy function" is enabled.
*13: This product's protection circuit is effective only for specific misconnections and load short-circuits. It does not provide protection for all misconnections.
*14: This product measures changes in heat distribution that are caused by flow.
When this product is mounted in a vertical orientation, convective flow may affect heat distribution or cause the zero point to deviate.
*15: Accuracy may be affected by the piping conditions. To perform measurement with greater accuracy, install a straight pipe with a piping I.D. ten times larger. With the 500 L/min and 1,000 L/min models, use piping with an internal diameter of 9 mm or more. If it is less than 9 mm, accuracy may be negatively affected.
*16: Refer to page 1106 for weight.

How to order



[Example of model No.]

FSM3-L005U1BH1A1N-BMR-P80

Model: RAPIFLOW FSM3 Series

A Display	L	: Liquid crystal display
B Flow rate	005	: 500 mL/min
C Flow direction	U	: Uni-direction
D Body material / applicable fluid	1	: Resin/air
E Port size	BH	: Push-in (ø4 mm for tube)
F Piping direction	1	: Straight
G Output specifications	A	: Analog voltage output ×1, NPN switch output ×1, setting copy function
H Unit specifications	1	: SI units only
I Valve option	N	: None
J Lead wire	B	: 5-conductor 3 m
K Mounting attachment	M	: DIN rail mount
L Attached documents	R	: Company certification
M Clean-room specifications	P80	: Oil free

Precautions for model No. selection

*1: Refer to the correspondence table on the following page when selecting the model.
*2: For "B: bi-directional" models, I the only valve option is "N: none". Note that "T: with needle valve" cannot be selected.
*3: The G thread connection shape is compliant with ISO16030 standards.
*4: Please refer to the external dimension diagram (Pages 1056 to 1057) for the G thread connection shape when making a selection. (The G thread connection shape is compliant with JIS B 2351-1, O types.)
*5: Note that if you mount the elbow fitting in an upward position, it will interfere with the connector, and if you mount the elbow fitting in a downward position, it will interfere with the DIN rail mounting.
*6: Models with the unit switching function are not sold in Japan.
*7: Note that the bracket mounting position may interfere with the elbow fitting.
*8: Optional parts are provided with the product. They are not assembled with the product.
*9: The product surface is degreased and cleaned before packaging, and heat-sealed into an antistatic bag on a clean bench (Class 1000 or more).
*10: In addition to P70 specifications, wetted section materials are degreased and cleaned.

Code	Description
A Display	
L	Liquid crystal display

B Flow rate ranges (full scale)

005	500 mL/min	500	50 L/min
010	1000 mL/min	101	100 L/min
020	2 L/min	201	200 L/min
050	5 L/min	501	500 L/min
100	10 L/min	102	1000 L/min
200	20 L/min		

C Flow direction *2

U	Uni-direction
B	Bi-direction

D Body material / applicable fluid

	Body material	Applicable fluid
1	Resin	Air (gas switchable)

E Port size

BH	Push-in (for ø4 mm tube)	AF	G1/8	*3
CH	Push-in (for ø6 mm tube)	BF	G1/4	*3
DH	Push-in (for ø8 mm tube)	CF	G1/2	*3
EH	Push-in (for ø10 mm tube)	AB	G1/8	*4
HH	Push-in (for ø1/4" tube)	BB	G1/4	*4
JH	Push-in (for ø3/8" tube)	CB	G1/2	*4
AA	Rc1/8	AC	NPT1/8	
BA	Rc1/4	BC	NPT1/4	
CA	Rc1/2	CC	NPT1/2	

F Piping direction

1	Straight
2	Elbow *5

G Output specifications

	Analog output	Switch output	Setting copy function
A	1 point (Voltage output) 1-5 V	1 point (NPN)	With
B		2 points (NPN)	–
C		1-point output (PNP)	With
D		2-points output (PNP)	–
E	1 point Current output 4-20 mA	1 point (NPN)	With
F		2 points (NPN)	–
G		1-point output (PNP)	With
H		2-points output (PNP)	–

H Unit specifications

1	SI units only
2	With unit switching function (overseas models only) *6

I Valve option *2

N	None
T	With needle valve (only for models 200 L or less)

J Lead wire

Blank	None
A	5-conductor 1 m
B	5-conductor 3 m

K Mounting attachments *7, *8

Blank	None
H	Bracket 1 (for models 200 L or less)
J	Bracket 2 (for 500 or 1000 L models)
K	Panel mounting (for sensor products of models 200 L or less)
L	Panel mounting (for needle valves of models 200 L or less)
M	DIN rail mounting (for models 200 L or less)

L Attached documents

Blank	None
R	Company certification
S	Company certification + Traceability certification

M Clean-room specifications

Blank	None	
P70	Anti-dust generation	*9
P80	Oil free	*10

Compatibility table of flow rate range, port size, and needle valve options

Ⓑ Flow rate code	Ⓔ Port sizes Ⓕ Piping direction															
	BH1	CH1	DH1	EH1	HH1	JH1	BH2	CH2	DH2	EH2	HH2	JH2	AA1	BA1	CA1	AA2
005	●○	●○			●○		●○	●○			●○		●○			●○
010	●○	●○			●○		●○	●○			●○		●○			●○
020	●○	●○			●○		●○	●○			●○		●○			●○
050	●○	●○			●○		●○	●○			●○		●○			●○
100	●○	●○			●○		●○	●○			●○		●○			●○
200	●○	●○			●○		●○	●○			●○		●○			●○
500		●○	●○		●○			●○	●○		●○		●○	●○		●○
101			●○	●○		●○			●○	●○		●○		●○		
201			●○	●○		●○			●○	●○		●○		●○		
501															●	
102															●	
	BA2	AF1	BF1	CF1	AF2	BF2	AB1	BB1	CB1	AB2	BB2	AC1	BC1	CC1	AC2	BC2
005		●○			●○		●○			●○		●○			●○	
010		●○			●○		●○			●○		●○			●○	
020		●○			●○		●○			●○		●○			●○	
050		●○			●○		●○			●○		●○			●○	
100		●○			●○		●○			●○		●○			●○	
200		●○			●○		●○			●○		●○			●○	
500	●○	●○	●○		●○	●○	●○	●○		●○	●○	●○	●○		●○	●○
101	●○		●○			●○		●○			●○		●○			●○
201	●○		●○			●○		●○			●○		●○			●○
501				●					●					●		
102				●					●					●		

●: Port compatibility ○: Needle valve option compatibility

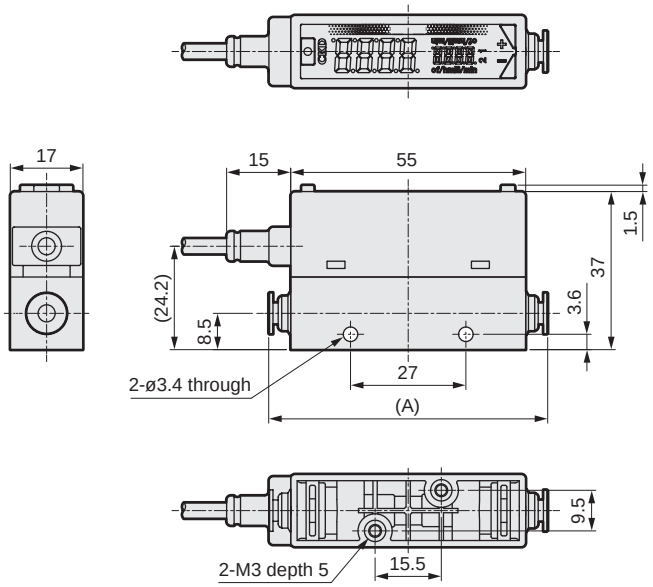
Compatibility table of port sizes and clean-room specifications

Ⓜ Clean-room specifications	Ⓔ Port size Ⓕ Piping direction															
	BH1	CH1	DH1	EH1	HH1	JH1	BH2	CH2	DH2	EH2	HH2	JH2	AA1	BA1	CA1	AA2
Blank	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P70	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P80	●	●					●	●					●	●	●	●
	BA2	AF1	BF1	CF1	AF2	BF2	AB1	BB1	CB1	AB2	BB2	AC1	BC1	CC1	AC2	BC2
Blank	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P70	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P80	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

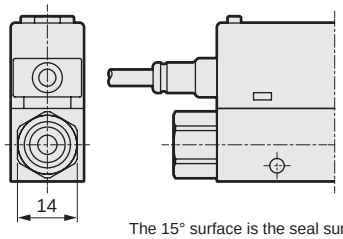
Dimensions (LCD display)

Port sizes: Straight ø4 mm, ø6 mm, ø1/4", Rc1/8, G1/8, NPT1/8

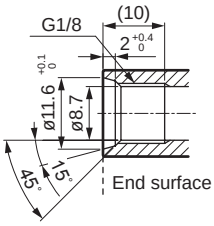
● FSM3−L□□1/BH1/CH1/HH1/AA1/AF1/AB1/AC1-P70/P80 (Full scale flow rates: 500 mL/min,1, 2, 5,10, 20, 50 L/min)



Rc1/8, NPT1/8, G1/8 (AB1)

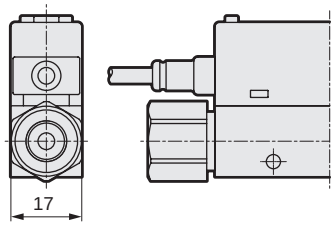


G thread shape (AB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

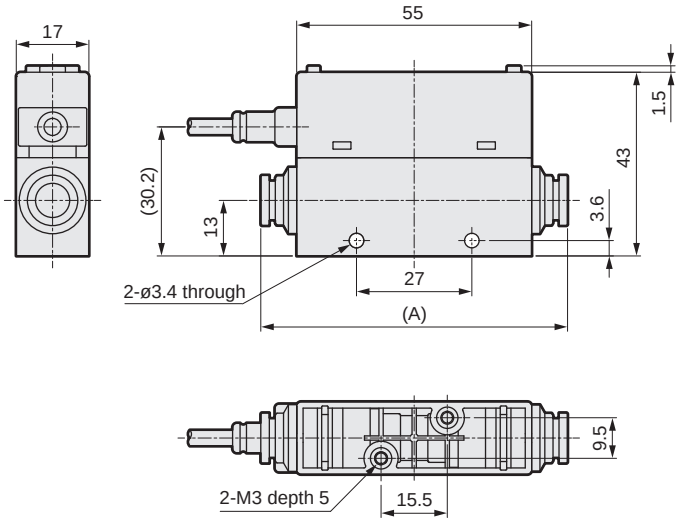
G1/8 (AF1)



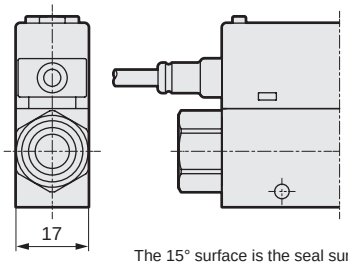
Model No.	Fitting	Dimension (A)
FSM3-L□□1BH1	Push-in ø4 mm	(65)
FSM3-L□□1CH1	Push-in ø6 mm	(67.2)
FSM3-L□□1HH1	Push-in 1/4"	(70.4)
FSM3-L□□1AA1	Rc1/8	(75)
FSM3-L□□1AF1	G1/8	(87)
FSM3-L□□1AB1	G1/8	(87)
FSM3-L□□1AC1	NPT1/8	(75)

Port sizes: Straight ø8 mm, ø10 mm, ø3/8", Rc1/4, G1/4, NPT1/4

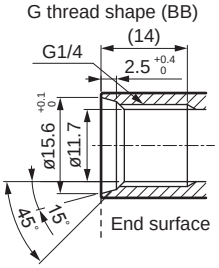
● FSM3−L□□1/DH1/EH1/JH1/BA1/BF1/BB1/BC1-P70/P80(Full scale flow rates: 50, 100, 200 L/min)



Rc1/4,NPT1/4,G1/4 (BB1)

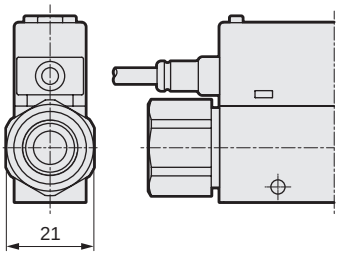


G thread shape (BB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

G1/4 (BF1)

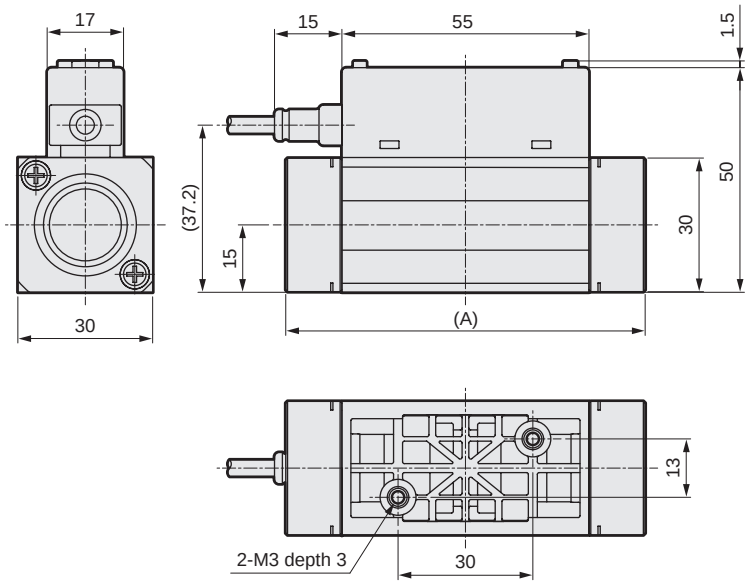


Model No.	Fitting	Dimension (A)
FSM3-L□□1DH1	Push-in ø8 mm	(70.6)
FSM3-L□□1EH1	Push-in ø10 mm	(82.1)
FSM3-L□□1JH1	Push-in 3/8"	(83.4)
FSM3-L□□1BA1	Rc1/4	(75)
FSM3-L□□1BF1	G1/4	(89)
FSM3-L□□1BB1	G1/4	(89)
FSM3-L□□1BC1	NPT1/4	(75)

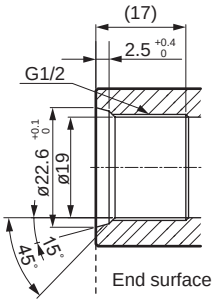
Dimensions (LCD display)

Port sizes: Straight Rc1/2, G1/2, NPT1/2

● FSM3−L□□1/CA1/CF1/CB1/CC1-P70/P80 (Full scale flow rates: 500, 1000 L/min)

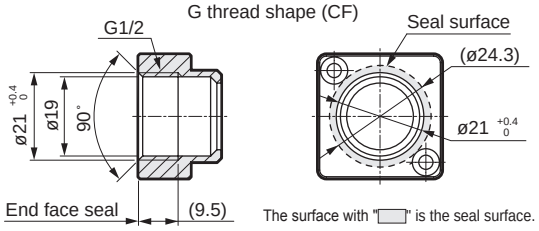


G thread shape (CB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

G thread shape (CF)

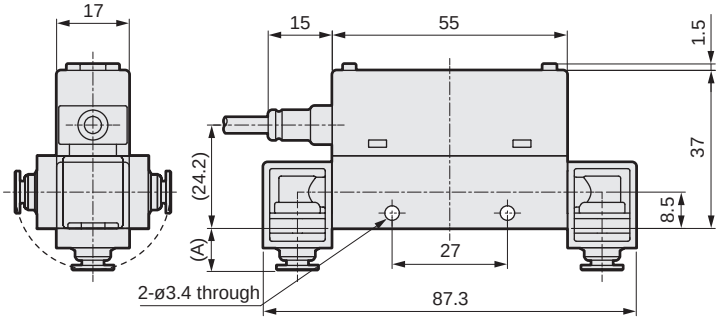


The surface with "▭" is the seal surface.

Model No.	Fitting	Dimension (A)
FSM3-L□□1CA1	Rc1/2	(80)
FSM3-L□□1CF1	G1/2	(80)
FSM3-L□□1CB1	G1/2	(95.4)
FSM3-L□□1CC1	NPTG1/2	(80)

Port sizes: Elbow ø4 mm, ø6 mm, ø1/4", Rc1/8, G1/8, NPT1/8

● FSM3−L□□1/BH2/CH2/HH2/AA2/AF2/AB2/AC2-P70/P80 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



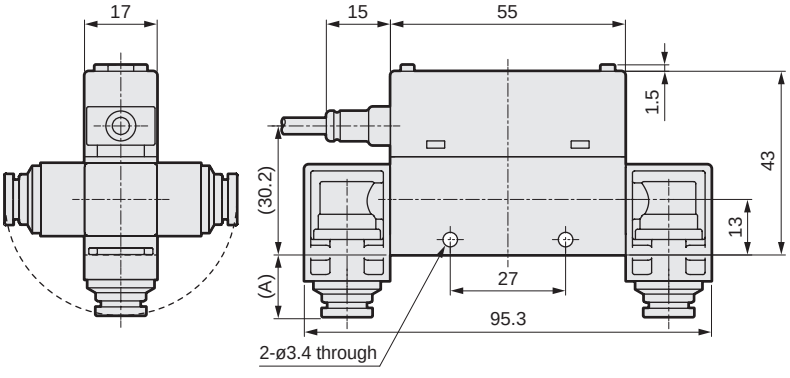
* The shapes of the upper surface and lower surface of the main body are the same as that of the straight type.

Model No.	Fitting	Dimension (A)
FSM3-L□□1BH2	Push-in ø4 mm	(9.5)
FSM3-L□□1CH2	Push-in ø6 mm	(10.6)
FSM3-L□□1HH2	Push-in 1/4"	(12.2)
FSM3-L□□1AA2	Rc1/8	(14.5)
FSM3-L□□1AF2	G1/8 *	(20.5)
FSM3-L□□1AB2	G1/8 *	(20.5)
FSM3-L□□1AC2	NPT1/8	(14.5)

*Please refer to the straight type for the G thread shape.

Port sizes: Elbow ø8 mm, ø10 mm, ø3/8", Rc1/4, G1/4, NPT1/4

● FSM3−L□□1/DH2/EH2/JH2/BA2/BF2/BB2/BC2-P70/P80 (Full scale flow rates: 50, 100, 200 L/min)



* The shapes of the upper surface and lower surface of the main body are the same as that of the straight type.

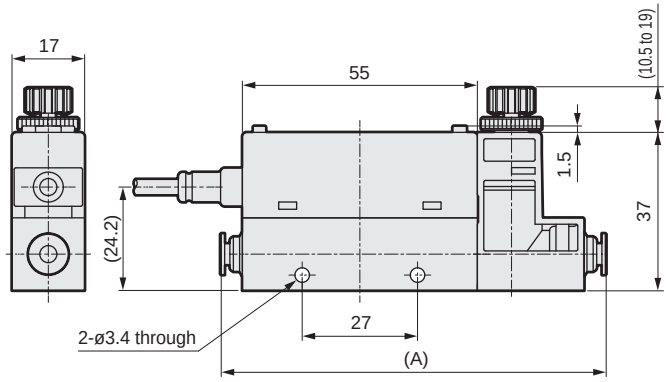
Model No.	Fitting	Dimension (A)
FSM3-L□□1DH2	Push-in ø8 mm	(13.6)
FSM3-L□□1EH2	Push-in ø10 mm	(19.3)
FSM3-L□□1JH2	Push-in 3/8"	(20.0)
FSM3-L□□1BA2	Rc1/4	(15.8)
FSM3-L□□1BF2	G1/4 *	(22.8)
FSM3-L□□1BB2	G1/4 *	(22.8)
FSM3-L□□1BC2	NPT1/4	(15.8)

*Please refer to the straight type for the G thread shape.

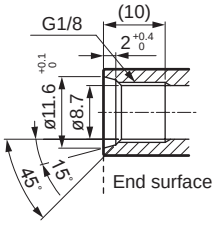
Solenoid valve with needle dimensions

Port sizes: ø4 mm, ø6 mm, ø1/4", Rc1/8, G1/8, NPT1/8

● FSM3−L□□1/BH1/CH1/HH1/AA1/AF1/AB1/AC1/□□T-P70/P80 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



G thread shape (AB)



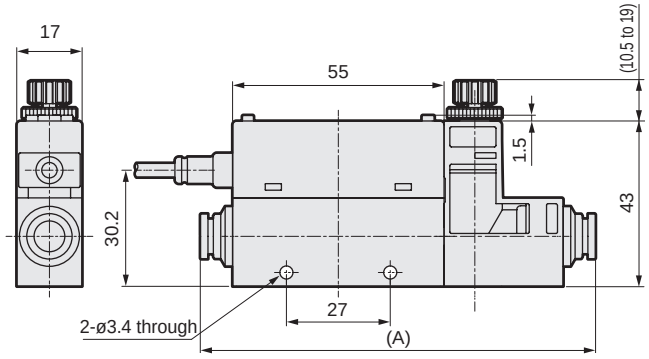
The 15° surface is the seal surface. Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

* The shapes of the upper surface and lower surface of the main body are the same as that of the straight type.

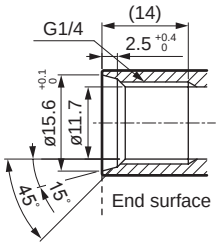
Model No.	Fitting	Dimension (A)
FSM3-L□□1BH1	Push-in ø4 mm	(90)
FSM3-L□□1CH1	Push-in ø6 mm	(92.2)
FSM3-L□□1HH1	Push-in 1/4"	(95.4)
FSM3-L□□1AA1	Rc1/8	(100)
FSM3-L□□1AF1	G1/8	(112)
FSM3-L□□1AB1	G1/8	(112)
FSM3-L□□1AC1	NPT1/8	(100)

Port sizes: ø8 mm, ø10 mm, ø3/8", Rc1/4, G1/4, NPT1/4

● FSM3−L□□1/DH1/EH1/JH1/BA1/BF1/BB1/BC1/□□T-P70/P80 (Full scale flow rates: 50, 100, 200 L/min)



G thread shape (BB)

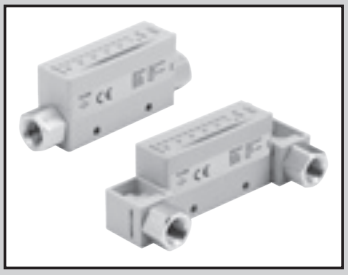


The 15° surface is the seal surface. Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

* The shapes of the upper surface and lower surface of the main body are the same as that of the straight type.

Model No.	Fitting	Dimension (A)
FSM3-L□□1DH1	Push-in ø8 mm	(101.6)
FSM3-L□□1EH1	Push-in ø10 mm	(113.1)
FSM3-L□□1JH1	Push-in 3/8"	(114.4)
FSM3-L□□1BA1	Rc1/4	(106)
FSM3-L□□1BF1	G1/4	(120)
FSM3-L□□1BB1	G1/4	(120)
FSM3-L□□1BC1	NPT1/4	(106)

MEMO



Compact flow rate sensor RAPIFLOW

FSM3 Series

Bar display

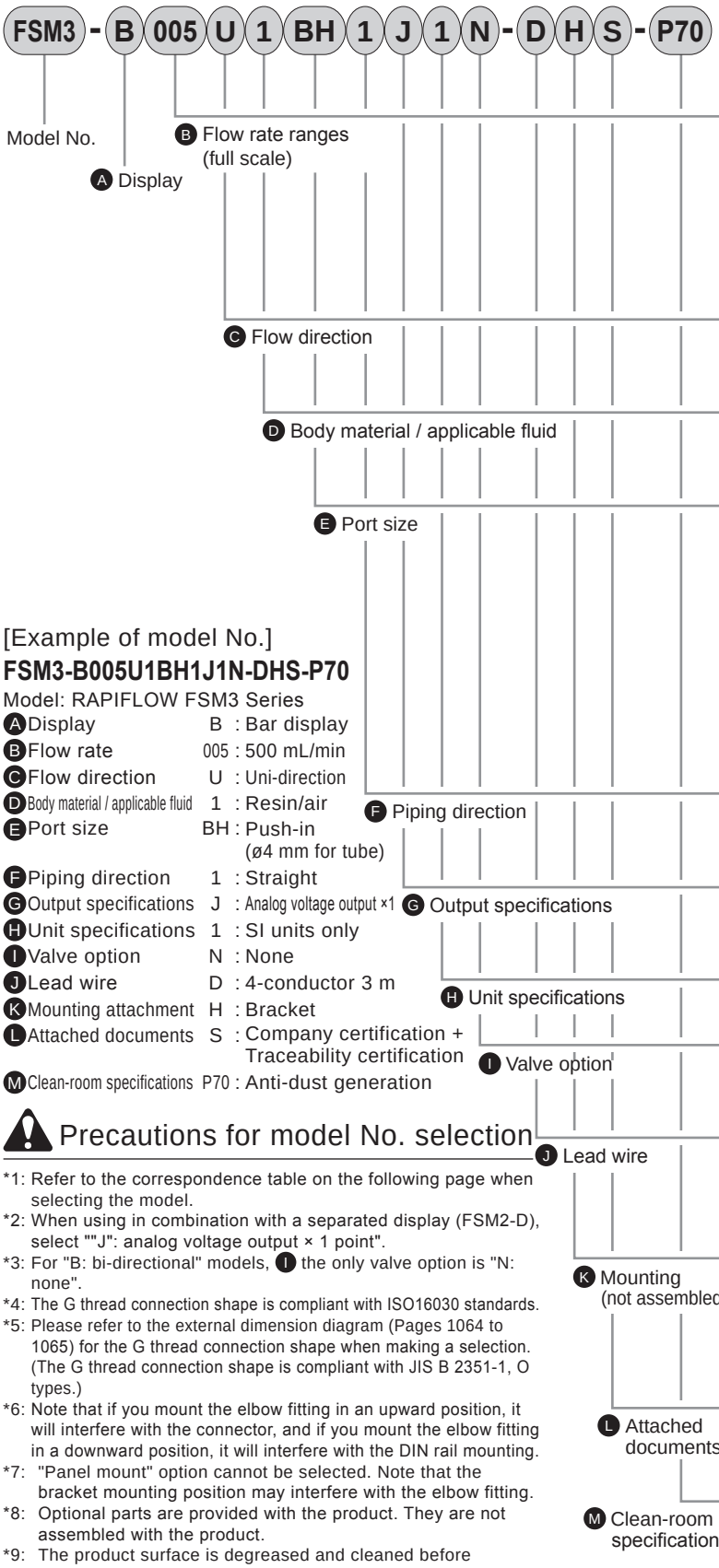
● Resin body (flow rate range: 500 mL/min to 1000 L/min)

Bar display specifications

Item			FSM3-[A][B][C][D][E][F][G][H][I]-[ ]										
			[B]										
			005	010	020	050	100	200	500	101	201	501	102
Flow direction	[C]	U	Uni-direction										
		B	Bi-direction										
Measurement flow rate range (□/min) *1	[B]	U	15 to 500 mL	30 to 1000 mL	0.06 to 2.00 L	0.15 to 5.00 L	0.30 to 10.00 L	0.6 to 20.0 L	1.5 to 50.0 L	3.0 to 100.0 L	6 to 200 L	15 to 500 L	30 to 1000 L
		B	−500 to −15, 15 to 500 mL	−1000 to −30, 30 to 1000 mL	−2.00 to −0.06, 0.06 to 2.00 L	−5.00 to −0.15, 0.15 to 5.00 L	−10.00 to −0.30, 0.30 to 10.00 L	−20.0 to −0.6, 0.6 to 20.0 L	−50.0 to −1.5, 1.5 to 50.0 L	−100.0 to −3.0, 3.0 to 100.0 L	−200 to −6, 6 to 200 L	−500 to −15, 15 to 500 L	−1000 to −30, 30 to 1000 L
Display			LED bar display										
Working fluid		Applicable fluid *2	Clean air (JIS B 8392-1:2012 1.1.1 to 5.6.2), compressed air (JIS B 8392-1:2012 1.1.1 to 1.6.2), nitrogen gas										
		Temperature range	0 to 50°C (no condensation)										
		Pressure range	−0.09 to 0.75 MPa										
		Proof pressure	1 MPa										
Operating ambient temperature/humidity			0 to 50°C, 90% RH or less										
Storage temperature			−10 to 60°C										
Accuracy		Accuracy *3	Within ±3% F.S. (Secondary side released to atmosphere) (The scope of warranty is in accordance with the "measurement flow rate range.")										
		Repeatability *4	Within ±1% F.S. (Secondary side released to atmosphere)										
		Temperature characteristics	Within ±0.2% F.S./°C (15 to 35°C, base temperature 25°C)										
		Pressure characteristics	Within ±5% F.S. (where secondary side is released to atmosphere)								Within ±5% F.S. (0.35 MPa standard)		
Response time		*5	50 msec or less										
Analog output *6	[G]	J	1 to 5 V voltage output (connecting load impedance 50 kΩ or more)										
		K	4 to 20 mA current output (connecting load impedance 0 to 300 Ω)										
Power supply voltage *7		J	12 to 24 VDC (10.8 to 26.4 V) ripple rate 1% or less										
		K	24 VDC (21.6 to 26.4 V) ripple rate 1% or less										
Current consumption		*8	45 mA or less										
Lead wire			ø3.7, AWG26 or equivalent × 4-conductor (connector), insulator O.D. ø1.0										
Degree of protection			IP40 or equivalent (IEC standard)										
Protection circuit		*9	Power supply reverse connection protection										
Vibration resistance			10 to 150 Hz, 100 m/s^2, 2 hours each in X, Y, Z directions										
EMC Directive			EN55011, EN61000-6-2, EN61000-4-2/3/4/6/8										
Mounting		Mounting orientation *10	Unrestricted in vertical/horizontal direction										
		Straight piping section *11	Not required										

*1: The value converted to volumetric flow rate at standard condition (20°C 1 barometric pressure (101 kPa) 65%RH)
*2: Use dry gas which does not contain corrosive elements such as chlorine, sulfur or acids, and which is clean and does not contain dust or oil mist. When using compressed air, use clean air that complies with JIS B 8392-1:2012 Class 1.1.1 to 1.6.2. Compressed air from the compressor contains drainage (water, oil oxides, foreign matter, etc.). To maintain the function of this product, install a filter, air dryer (min. pressure dew point 10˚C or less), and oil mist filter (max. oil content 0.1 mg/m^3) on the primary side (upstream side) of this product. (Refer to page 1118 for details on recommended circuit.)
*3: Accuracy is based on a CKD standard flow rate meter. It does not indicate absolute accuracy.
Repeatability, temperature characteristics, and pressure characteristics are not included for an accuracy of ±3% F.S.
Consider separately according to the working environment and working conditions.
*4: Repeatability calculated during a short time. Change over time is not included. (Refer to the product specifications for details.)
*5: The actual response time changes depending on the piping conditions.
*6: The output impedance of the output impedance of the analog output voltage output is approximately 1 kΩ. If the impedance of the connecting load is small, output and error increase. Check error with the impedance of the connecting load before using.
*7: The power supply voltage specifications differ for the voltage output and current output types.
*8: Current for when 24 VDC is connected, and no load is applied. The current consumption will vary depending on how the load is connected.
*9: This product's protection circuit is effective only for specific misconnections and load short-circuits. It does not provide protection for all misconnections.
*10: This product measures changes in heat distribution that are caused by flow.
When this product is mounted in a vertical orientation, convective flow may affect heat distribution or cause the zero point to deviate.
*11: Accuracy may be affected by the piping conditions. To perform measurement with greater accuracy, install a straight pipe with a piping I.D. ten times larger. With the 500 L/min and 1,000 L/min models, use piping with an internal diameter of 9 mm or more. If it is less than 9 mm, accuracy may be negatively affected.
*12: Refer to page 1106 for weight.

How to order



[Example of model No.]

FSM3-B005U1BH1J1N-DHS-P70

Model: RAPIFLOW FSM3 Series

A Display	B	: Bar display
B Flow rate	005	: 500 mL/min
C Flow direction	U	: Uni-direction
D Body material / applicable fluid	1	: Resin/air
E Port size	BH	: Push-in (ø4 mm for tube)
F Piping direction	1	: Straight
G Output specifications	J	: Analog voltage output ×1
H Unit specifications	1	: SI units only
I Valve option	N	: None
J Lead wire	D	: 4-conductor 3 m
K Mounting attachment	H	: Bracket
L Attached documents	S	: Company certification + Traceability certification
M Clean-room specifications	P70	: Anti-dust generation

Precautions for model No. selection

*1: Refer to the correspondence table on the following page when selecting the model.
*2: When using in combination with a separated display (FSM2-D), select ""J": analog voltage output × 1 point".
*3: For "B: bi-directional" models, I the only valve option is "N: none".
*4: The G thread connection shape is compliant with ISO16030 standards.
*5: Please refer to the external dimension diagram (Pages 1064 to 1065) for the G thread connection shape when making a selection. (The G thread connection shape is compliant with JIS B 2351-1, O types.)
*6: Note that if you mount the elbow fitting in an upward position, it will interfere with the connector, and if you mount the elbow fitting in a downward position, it will interfere with the DIN rail mounting.
*7: "Panel mount" option cannot be selected. Note that the bracket mounting position may interfere with the elbow fitting.
*8: Optional parts are provided with the product. They are not assembled with the product.
*9: The product surface is degreased and cleaned before packaging, and heat-sealed into an antistatic bag on a clean bench (Class 1000 or more).
*10: In addition to P70 specifications, wetted section materials are degreased and cleaned.

Code	Description
A Display	
B	Bar display

B Flow rate ranges (full scale)

005	500 mL/min	500	50 L/min
010	1000 mL/min	101	100 L/min
020	2 L/min	201	200 L/min
050	5 L/min	501	500 L/min
100	10 L/min	102	1000 L/min
200	20 L/min		

C Flow direction *3

U	Uni-direction
B	Bi-direction

D Body material / applicable fluid

	Body material	Applicable fluids
1	Resin	Air

E Port size

BH	Push-in (for ø4 mm tube)	AF	G1/8	*4
CH	Push-in (for ø6 mm tube)	BF	G1/4	*4
DH	Push-in (for ø8 mm tube)	CF	G1/2	*4
EH	Push-in (for ø10 mm tube)	AB	G1/8	*5
HH	Push-in (for ø1/4" tube)	BB	G1/4	*5
JH	Push-in (for ø3/8" tube)	CB	G1/2	*5
AA	Rc1/8	AC	NPT1/8	
BA	Rc1/4	BC	NPT1/4	
CA	Rc1/2	CC	NPT1/2	

F Piping direction

1	Straight
2	Elbow *6

G Output specifications *2

J	Analog voltage output x 1 point
K	Analog current output x 1 point

H Unit specifications

1	SI units only

I Valve option *3

N	None

J Lead wire

Blank	None
C	4-conductor 1 m
D	4-conductor 3 m

K Mounting (not assembled) *7, *8

Blank	None
H	Bracket 1 (for models 200 L or less)
J	Bracket 2 (for 500 or 1000 L models)
M	DIN rail mounting (for models 200 L or less)

L Attached documents

Blank	None
R	Company certification
S	Company certification + Traceability certification

M Clean-room specifications

P70	Anti-dust generation	*9
P80	Oil free	*10

Compatibility table of flow rate range and port size

Ⓑ Flow rate codes	Ⓔ Port sizes Ⓕ Piping direction															
	BH1	CH1	DH1	EH1	HH1	JH1	BH2	CH2	DH2	EH2	HH2	JH2	AA1	BA1	CA1	AA2
005	●	●			●		●	●			●		●			●
010	●	●			●		●	●			●		●			●
020	●	●			●		●	●			●		●			●
050	●	●			●		●	●			●		●			●
100	●	●			●		●	●			●		●			●
200	●	●			●		●	●			●		●			●
500		●	●		●			●	●		●		●	●		●
101			●	●		●			●	●		●		●		
201			●	●		●			●	●		●		●		
501															●	
102															●	
	BA2	AF1	BF1	CF1	AF2	BF2	AB1	BB1	CB1	AB2	BB2	AC1	BC1	CC1	AC2	BC2
005		●			●		●			●		●			●	
010		●			●		●			●		●			●	
020		●			●		●			●		●			●	
050		●			●		●			●		●			●	
100		●			●		●			●		●			●	
200		●			●		●			●		●			●	
500	●	●	●		●	●	●	●		●	●	●	●		●	●
101	●		●			●		●			●		●			●
201	●		●			●		●			●		●			●
501				●					●					●		
102				●					●					●		

● : Port compatibility

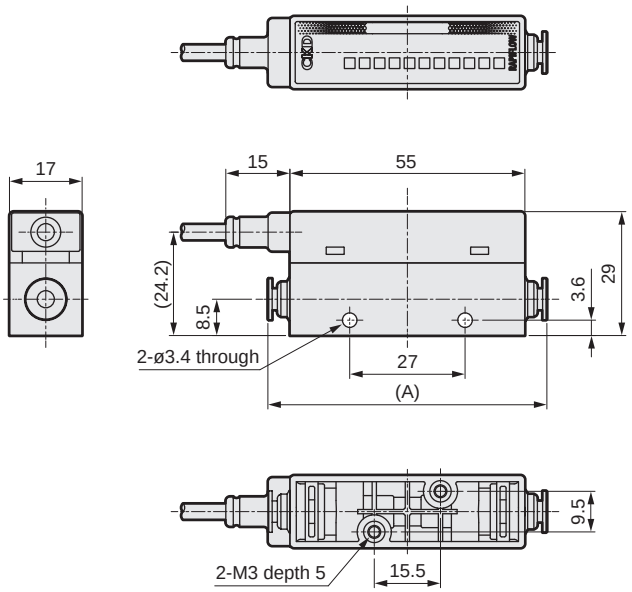
Compatibility table of port sizes and clean-room specifications

Ⓜ Clean-room specifications	Ⓔ Port size Ⓕ Piping direction															
	BH1	CH1	DH1	EH1	HH1	JH1	BH2	CH2	DH2	EH2	HH2	JH2	AA1	BA1	CA1	AA2
Blank	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P70	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P80	●	●					●	●					●	●	●	●
	BA2	AF1	BF1	CF1	AF2	BF2	AB1	BB1	CB1	AB2	BB2	AC1	BC1	CC1	AC2	BC2
Blank	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P70	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P80	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

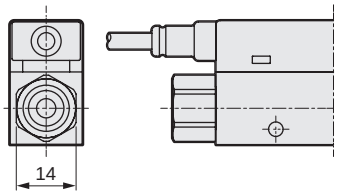
Dimensions (bar display)

Port sizes: Straight ø4 mm, ø6 mm, ø1/4", Rc1/8, G1/8, NPT1/8

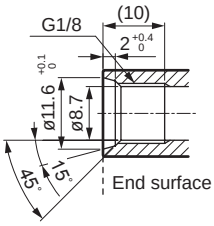
● FSM3−B□□1/BH1/CH1/HH1/AA1/AF1/AB1/AC1-P79/P80 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



Rc1/8, NPT1/8, G1/8 (AB1)

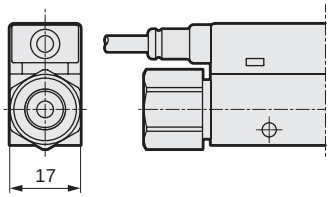


G thread shape (AB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

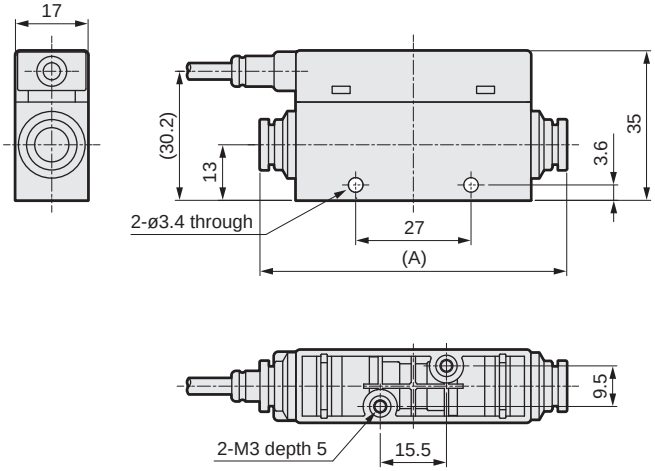
G1/8 (AF1)



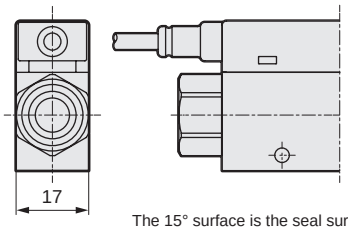
Model No.	Fitting	Dimension (A)
FSM3-B□□1BH1	Push-in ø4 mm	(65)
FSM3-B□□1CH1	Push-in ø6 mm	(67.2)
FSM3-B□□1HH1	Push-in 1/4"	(70.4)
FSM3-B□□1AA1	Rc1/8	(75)
FSM3-B□□1AF1	G1/8	(87)
FSM3-B□□1AB1	G1/8	(87)
FSM3-B□□1AC1	NPT1/8	(75)

Port sizes: Straight ø8 mm, ø10 mm, ø3/8", Rc1/4, G1/4, NPT1/4

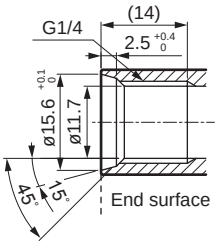
● FSM3−B□□1/DH1/EH1/JH1/BA1/BF1/BB1/BC1-P79/P80 (Full scale flow rates: 50, 100, 200 L/min)



Rc1/4, NPT1/4, G1/4 (BB1)

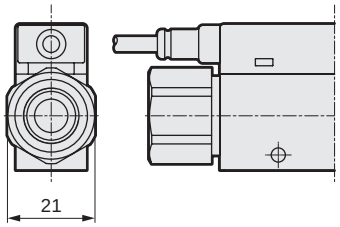


G thread shape (BB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

G1/4 (BF1)

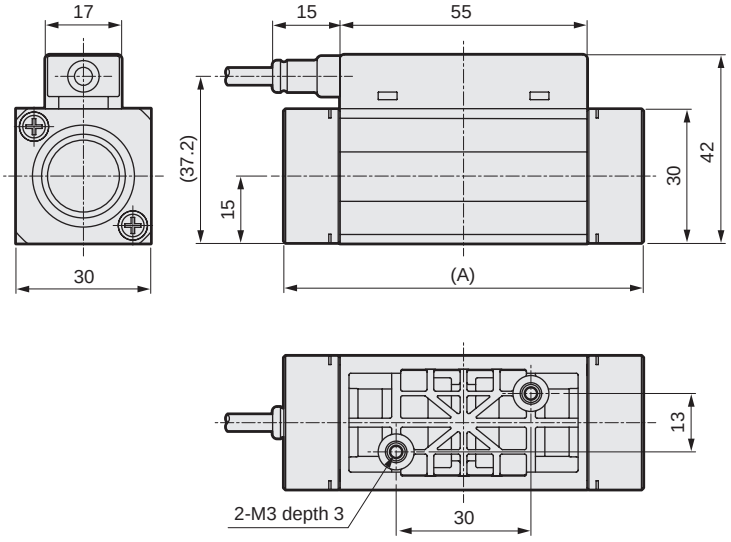


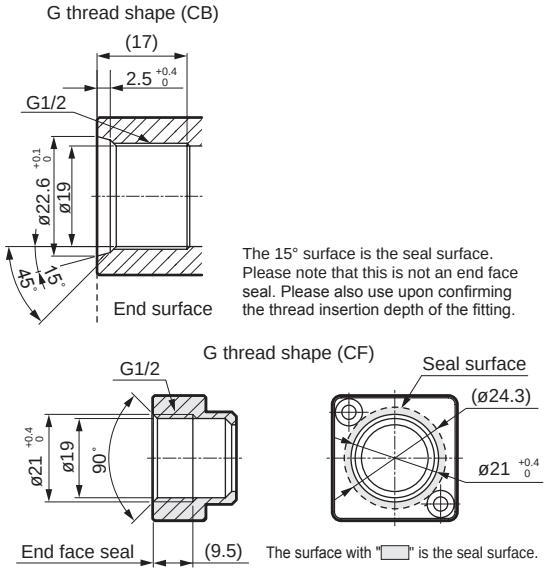
Model No.	Fitting	Dimension (A)
FSM3-B□□1DH1	Push-in ø8 mm	(70.6)
FSM3-B□□1EH1	Push-in ø10 mm	(82.1)
FSM3-B□□1JH1	Push-in 3/8"	(83.4)
FSM3-B□□1BA1	Rc1/4	(75)
FSM3-B□□1BF1	G1/4	(89)
FSM3-B□□1BB1	G1/4	(89)
FSM3-B□□1BC1	NPT1/4	(75)

Dimensions (bar display)

Port sizes: Straight Rc1/2, G1/2, NPT1/2

● FSM3−B□□1/CA1/CF1/CB1/CC1-P79/P80 (Full scale flow rates: 500, 1000 L/min)

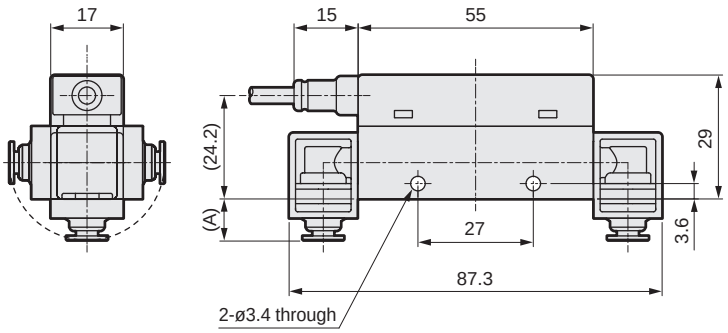




Model No.	Fitting	Dimension (A)
FSM3-B□□1CA1	Rc1/2	(80)
FSM3-B□□1CF1	G1/2	(80)
FSM3-B□□1CB1	G1/2	(95.4)
FSM3-B□□1CC1	NPT1/2	(80)

Port sizes: Elbow ø4 mm, ø6 mm, ø1/4", Rc1/8, G1/8, NPT1/8

● FSM3−B□□1/BH2/CH2/HH2/AA2/AF2/AB2/AC2-P79/P80 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



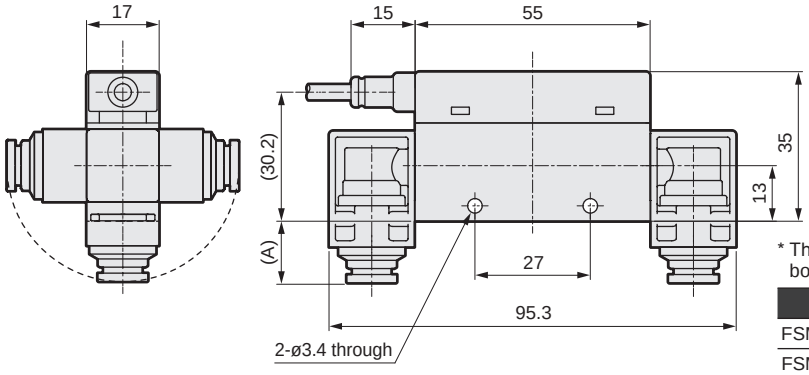
* The shapes of the upper surface and lower surface of the main body are the same as that of the straight type.

Model No.	Fitting	Dimension (A)
FSM3-B□□1BH2	Push-in ø4 mm	(9.5)
FSM3-B□□1CH2	Push-in ø6 mm	(10.6)
FSM3-B□□1HH2	Push-in 1/4"	(12.2)
FSM3-B□□1AA2	Rc1/8	(14.5)
FSM3-B□□1AF2	G1/8 *	(20.5)
FSM3-B□□1AB2	G1/8 *	(20.5)
FSM3-B□□1AC2	NPT1/8	(14.5)

*Please refer to the straight type for the G thread shape.

Port sizes: Elbow ø8 mm, ø10 mm, ø3/8", Rc1/4, G1/4, NPT1/4

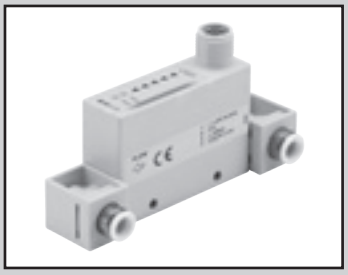
● FSM3−B□□1/DH2/EH2/JH2/BA2/BF2/BB2/BC2-P79/P80 (Full scale flow rates: 50, 100, 200 L/min)



* The shapes of the upper surface and lower surface of the main body are the same as that of the straight type.

Model No.	Fitting	Dimension (A)
FSM3-B□□1DH2	Push-in ø8 mm	(13.6)
FSM3-B□□1EH2	Push-in ø10 mm	(19.3)
FSM3-B□□1JH2	Push-in 3/8"	(20.0)
FSM3-B□□1BA2	Rc1/4	(15.8)
FSM3-B□□1BF2	G1/4 *	(22.8)
FSM3-B□□1BB2	G1/4 *	(22.8)
FSM3-B□□1BC2	NPT1/4	(15.8)

*Please refer to the straight type for the G thread shape.



Compact flow rate sensor RAPIFLOW

FSM3 Series

IO-Link

● Resin body (flow rate range: 500 mL/min to 1000 L/min)

IO-Link specifications

Item			FSM3-[A][B][C][D][E][F][G][H][I]-[ ]										
			[B]										
			005	010	020	050	100	200	500	101	201	501	102
Flow direction	[C]	U	Uni-direction										
		B	Bi-direction										
Measurement flow rate range (□/min) *1	[B]	U	15 to 500 mL	30 to 1000 mL	0.06 to 2.00 L	0.15 to 5.00 L	0.30 to 10.00 L	0.6 to 20.0 L	1.5 to 50.0 L	3.0 to 100.0 L	6 to 200 L	15 to 500 L	30 to 1000 L
		B	−500 to −15, 15 to 500 mL	−1000 to −30, 30 to 1000 mL	−2.00 to −0.06, 0.06 to 2.00 L	−5.00 to −0.15, 0.15 to 5.00 L	−10.00 to −0.30, 0.30 to 10.00 L	−20.0 to −0.6, 0.6 to 20.0 L	−50.0 to −1.5, 1.5 to 50.0 L	−100.0 to −3.0, 3.0 to 100.0 L	−200 to −6, 6 to 200 L	−500 to −15, 15 to 500 L	−1000 to −30, 30 to 1000 L
Display			LED display (power and status indicators)										
Working fluid		Applicable fluid *2	Clean air (JIS B 8392-1:2012 1.1.1 to 5.6.2), compressed air (JIS B 8392-1:2012 1.1.1 to 1.6.2)										
			nitrogen, argon, carbon dioxide, gas mixture (argon + carbon dioxide)									-	
		Temperature range	0 to 50°C (no condensation)										
		Pressure range	−0.09 to 0.75 MPa										
		Proof pressure	1 MPa										
Operating ambient temperature/humidity			0 to 50°C, 90% RH or less										
Storage temperature			−10 to 60°C										
Accuracy *3 (Fluid: in dry air)		Accuracy *4	Within ±3% F.S. (Secondary side released to atmosphere) (The scope of warranty is in accordance with the "measurement flow rate range.")										
		Repeatability *5	Within ±1% F.S. (Secondary side released to atmosphere)										
		Temperature characteristics	Within ±0.2% F.S./°C (15 to 35°C, base temperature 25°C)										
		Pressure characteristics	Within ±5% F.S. (where secondary side is released to atmosphere)								Within ±5% F.S. (0.35 MPa standard)		
Response time		*6	50 msec or less										
Power supply voltage			18 to 30 VDC (ripple rate 1% or less)										
Current consumption		*7	45 mA or less										
Lead wire		*8	M12 both-end connector lead wire (3 m), AWG#23 or equivalent, 4-conductor										
Functions		*9	① Gas type selection, ② flow rate integration, ③ peak hold, etc.										
Degree of protection			IP40 or equivalent (IEC standard)										
Protection circuit		*10	Power supply reverse connection protection										
Vibration resistance		*11	10 to 150 Hz, 100 m/s^2, 2 hours each in X, Y, Z directions										
EMC Directive			EN55011, EN61000-6-2, EN61000-4-2/3/4/6/8										
Mounting		Mounting orientation *12	Unrestricted in vertical/horizontal direction										
		Straight piping section *13	Not required										

* Refer to page 1112 for communication specifications.

*1: The value converted to volumetric flow rate at standard condition (20°C 1 barometric pressure (101 kPa) 65%RH)
(20°C, 1 atmospheric pressure (101 kPa), 0%RH with a type of gas other than air.)

*2: Use dry gas which does not contain corrosive elements such as chlorine, sulfur or acids, and which is clean and does not contain dust or oil mist. When using compressed air, use clean air that complies with JIS B 8392-1:2012 Class 1.1.1 to 1.6.2. Compressed air from the compressor contains drainage (water, oil oxides, foreign matter, etc.). To maintain the function of this product, install a filter, air dryer (min. pressure dew point 10˚C or less), and oil mist filter (max. oil content 0.1 mg/m^3) on the primary side (upstream side) of this product. (Refer to page 1118 for details on recommended circuit.)

*3: Compressed air is used for adjusting and inspecting this product. Accuracy for gas types other than air is a guideline.

*4: Accuracy is based on a CKD standard flow rate meter. It does not indicate absolute accuracy.
Repeatability, temperature characteristics, and pressure characteristics are not included for an accuracy of ±3% F.S.
Consider separately according to the working environment and working conditions.

*5: Repeatability calculated during a short time. Change over time is not included. (Refer to the product specifications for details.)

*6: The actual response time changes depending on the piping conditions.

*7: Current for when 24 VDC is connected, and no load is applied. The current consumption will vary depending on how the load is connected.

*8: The male end is straight, and the female end is angled. (Refer to page 1114.)
Tighten the M12 connector at a torque of 0.5 N·m or less.
Note, however, that using excessive force to tighten the connector can cause it to break.

*9: The gas type switching function enables switching to argon, carbon dioxide and a gas mixture of argon 80% + carbon dioxide 20%.
The measurement flow rate ranges after switching are as follows. (Note that the 500 L/min and 1,000 L/min models do not have a gas change function.)

Gas type	Flow direction	Measurement flow rate range (□/min)							
		005	010	020	100	200	500	101	201
• Air • Nitrogen • Argon • Argon 80% + carbon dioxide 20%	Uni-direction	15 to 500 mL	30 to 1000 mL	0.06 to 2.00 L	0.30 to 10.00 L	0.6 to 20.0 L	1.5 to 50.0 L	3.0 to 100.0 L	6 to 200 L
	Bi-direction	−500 to −15 mL	−1000 to −30 mL	−2.00 to −0.06 L	−10.00 to −0.30 L	−20.0 to −0.6 L	−50.0 to −1.5 L	−100.0 to −3.0 L	−200 to −6 L
		15 to 500 mL	30 to 1000 mL	0.06 to 2.00 L	0.30 to 10.00 L	0.6 to 20.0 L	1.5 to 50.0 L	3.0 to 100.0 L	6 to 200 L
• Carbon dioxide	Uni-direction	15 to 250 mL	30 to 500 mL	0.06 to 1.00 L	0.30 to 5.00 L	0.6 to 10.0 L	1.5 to 25.0 L	3.0 to 50.0 L	6 to 100 L
	Bi-direction	−250 to −15 mL	−500 to −30 mL	−1.00 to −0.06 L	−5.00 to −0.30 L	−10.0 to −0.6 L	−25.0 to −1.5 L	−50.0 to −3.0 L	−100 to −6 L
		15 to 250 mL	30 to 500 mL	0.06 to 1.00 L	0.30 to 5.00 L	0.6 to 10.0 L	1.5 to 25.0 L	3.0 to 50.0 L	6 to 100 L

The integrating flow is a reference value.
When using the integrated save function, take care to prevent the number of saves from exceeding the access count limit of the storage device (1 million times).
(Changes to the settings are counted in number of accesses.)

$$\text{Number of saves} = \frac{\text{Usage time}}{\text{5 mins}} < \text{1 million times}$$

*10: This product's protection circuit is effective only for specific misconnections and load short-circuits. It does not provide protection for all misconnections.

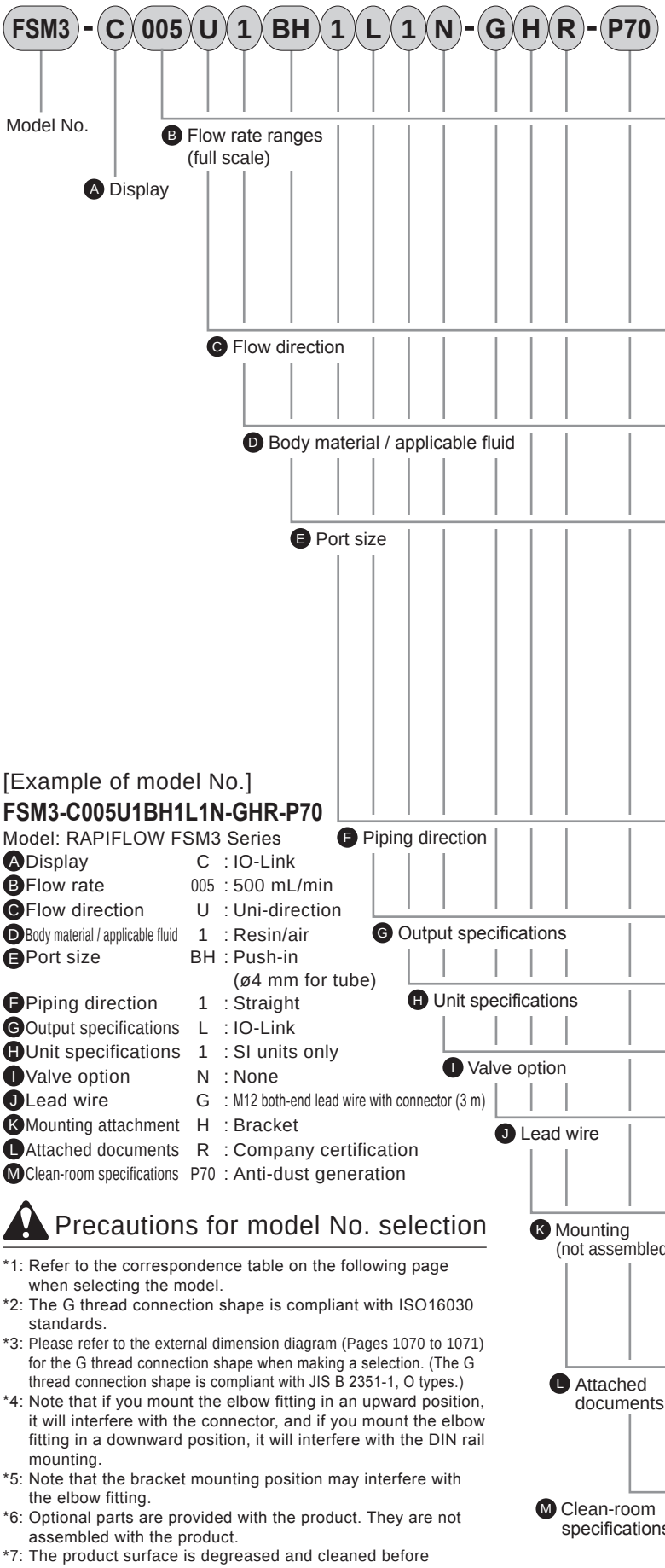
*11: A communication error might occur depending on the vibration conditions. Install this product as far as possible in a place not subject to vibration.

*12: This product measures changes in heat distribution that are caused by flow.
When this product is mounted in a vertical orientation, convective flow may affect heat distribution or cause the zero point to deviate.

*13: Accuracy may be affected by the piping conditions. To perform measurement with greater accuracy, install a straight pipe with a piping I.D. ten times larger. With the 500 L/min and 1,000 L/min models, use piping with an internal diameter of 9 mm or more. If it is less than 9 mm, accuracy may be negatively affected.

*14: Refer to page 1106 for weight.

How to order



[Example of model No.]

FSM3-C005U1BH1L1N-GHR-P70

Model: RAPIFLOW FSM3 Series

A Display	C	: IO-Link
B Flow rate	005	: 500 mL/min
C Flow direction	U	: Uni-direction
D Body material / applicable fluid	1	: Resin/air
E Port size	BH	: Push-in (ø4 mm for tube)
F Piping direction	1	: Straight
G Output specifications	L	: IO-Link
H Unit specifications	1	: SI units only
I Valve option	N	: None
J Lead wire	G	: M12 both-end lead wire with connector (3 m)
K Mounting attachment	H	: Bracket
L Attached documents	R	: Company certification
M Clean-room specifications	P70	: Anti-dust generation

Code	Description
A Display	
C	IO-Link

B Flow rate ranges (full scale)			
005	500 mL/min	**500**	50 L/min
010	1000 mL/min	**101**	100 L/min
020	2 L/min	**201**	200 L/min
050	5 L/min	**501**	500 L/min
100	10 L/min	**102**	1000 L/min
200	20 L/min		

C Flow direction	
U	Uni-direction
B	Bi-direction

D Body material / applicable fluid		
	Body material	Applicable fluid
1	Resin	Air (gas switchable)

E Port size				
BH	Push-in (for ø4 mm tube)	**AF**	G1/8	*2
CH	Push-in (for ø6 mm tube)	**BF**	G1/4	*2
DH	Push-in (for ø8 mm tube)	**CF**	G1/2	*2
EH	Push-in (for ø10 mm tube)	**AB**	G1/8	*3
HH	Push-in (for ø1/4" tube)	**BB**	G1/4	*3
JH	Push-in (for ø3/8" tube)	**CB**	G1/2	*3
AA	Rc1/8	**AC**	NPT1/8	
BA	Rc1/4	**BC**	NPT1/4	
CA	Rc1/2	**CC**	NPT1/2	

F Piping direction	
1	Straight
2	Elbow *4

G Output specifications	
L	IO-Link communication

H Unit specifications	
1	SI units only

I Valve option	
N	None

J Lead wire	
Blank	None
G	M12 both-end lead wire with connector (3 m)

K Mounting (not assembled) *5, *6	
Blank	None
H	Bracket 1 (for models 200 L or less)
J	Bracket 2 (for 500 or 1000 L models)
M	DIN rail mounting (for models 200 L or less)

L Attached documents	
Blank	None
R	Company certification
S	Company certification + Traceability certification

M Clean-room specifications		
P70	Anti-dust generation	*7
P80	Oil free	*8

Precautions for model No. selection

*1: Refer to the correspondence table on the following page when selecting the model.
*2: The G thread connection shape is compliant with ISO16030 standards.
*3: Please refer to the external dimension diagram (Pages 1070 to 1071) for the G thread connection shape when making a selection. (The G thread connection shape is compliant with JIS B 2351-1, O types.)
*4: Note that if you mount the elbow fitting in an upward position, it will interfere with the connector, and if you mount the elbow fitting in a downward position, it will interfere with the DIN rail mounting.
*5: Note that the bracket mounting position may interfere with the elbow fitting.
*6: Optional parts are provided with the product. They are not assembled with the product.
*7: The product surface is degreased and cleaned before packaging, and heat-sealed into an antistatic bag on a clean bench (Class 1000 or more).
*8: In addition to P70 specifications, wetted section materials are degreased and cleaned.

Flow rate ranges and port sizes

Ⓑ Flow rate codes	Ⓔ Port sizes Ⓕ Piping direction															
	BH1	CH1	DH1	EH1	HH1	JH1	BH2	CH2	DH2	EH2	HH2	JH2	AA1	BA1	CA1	AA2
005	●	●			●		●	●			●		●			●
010	●	●			●		●	●			●		●			●
020	●	●			●		●	●			●		●			●
050	●	●			●		●	●			●		●			●
100	●	●			●		●	●			●		●			●
200	●	●			●		●	●			●		●			●
500		●	●		●			●	●		●		●	●		●
101			●	●		●			●	●		●		●		
201			●	●		●			●	●		●		●		
501															●	
102															●	
	BA2	AF1	BF1	CF1	AF2	BF2	AB1	BB1	CB1	AB2	BB2	AC1	BC1	CC1	AC2	BC2
005		●			●		●			●		●			●	
010		●			●		●			●		●			●	
020		●			●		●			●		●			●	
050		●			●		●			●		●			●	
100		●			●		●			●		●			●	
200		●			●		●			●		●			●	
500	●	●	●		●	●	●	●		●	●	●	●		●	●
101	●		●			●		●			●		●			●
201	●		●			●		●			●		●			●
501				●					●					●		
102				●					●					●		

● : Port size compatibility

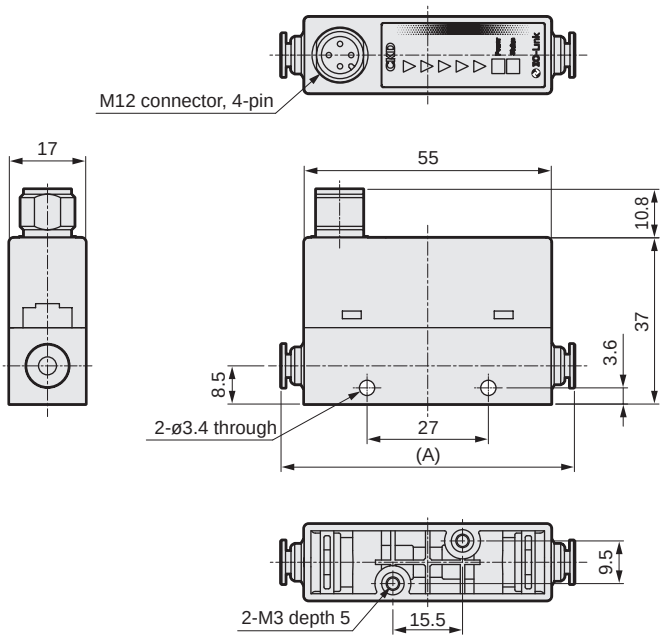
Compatibility table of port sizes and clean-room specifications

Ⓜ Clean-room specifications	Ⓔ Port sizes Ⓕ Piping direction															
	BH1	CH1	DH1	EH1	HH1	JH1	BH2	CH2	DH2	EH2	HH2	JH2	AA1	BA1	CA1	AA2
Blank	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P70	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P80	●	●					●	●					●	●	●	●
	BA2	AF1	BF1	CF1	AF2	BF2	AB1	BB1	CB1	AB2	BB2	AC1	BC1	CC1	AC2	BC2
Blank	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P70	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
P80	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

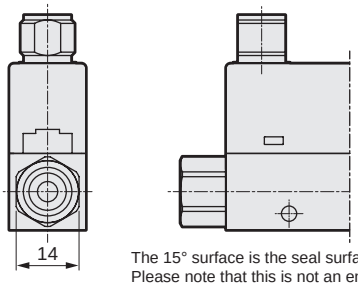
Dimensions (IO-Link)

Port sizes: Straight ø4 mm, ø6 mm, ø1/4", Rc1/8, G1/8, NPT1/8

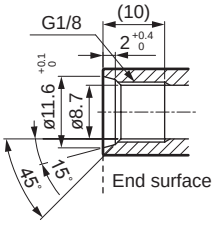
● FSM3−C□□1/BH1/CH1/HH1/AA1/AF1/AB1/AC1-P70/P80 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



Rc1/8, NPT1/8, G1/8 (AB1)

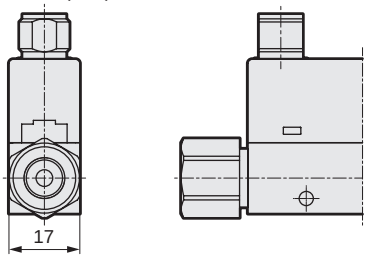


G thread shape (AB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

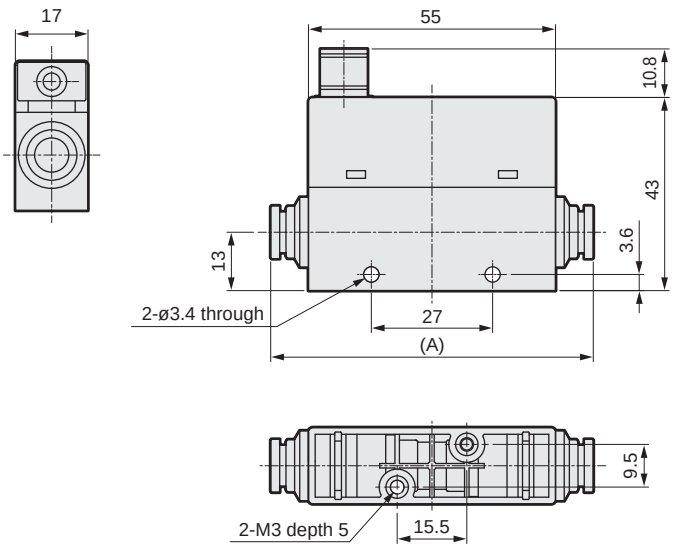
G1/8 (AF1)



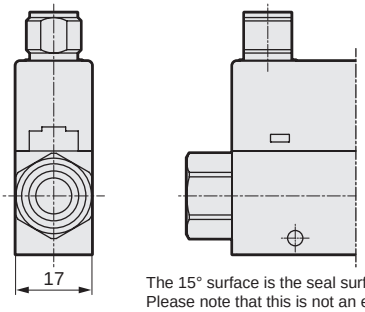
Model No.	Fitting	Dimension (A)
FSM3-C□□1BH1	Push-in ø4 mm	(65)
FSM3-C□□1CH1	Push-in ø6 mm	(67.2)
FSM3-C□□1HH1	Push-in 1/4"	(70.4)
FSM3-C□□1AA1	Rc1/8	(75)
FSM3-C□□1AF1	G1/8	(87)
FSM3-C□□1AB1	G1/8	(87)
FSM3-C□□1AC1	NPT1/8	(75)

Port sizes: Straight ø8 mm, ø10 mm, ø3/8", Rc1/4, G1/4, NPT1/4

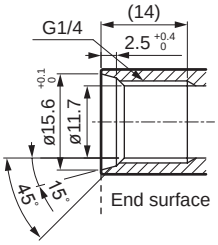
● FSM3−C□□1/DH1/EH1/JH1/BA1/BF1/BB1/BC1-P70/P80 (Full scale flow rates: 50, 100, 200 L/min)



Rc1/4, NPT1/4, G1/4 (BB1)

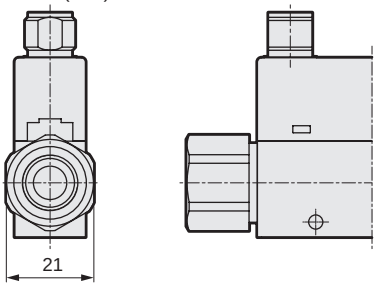


G thread shape (BB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

G1/4 (BF1)

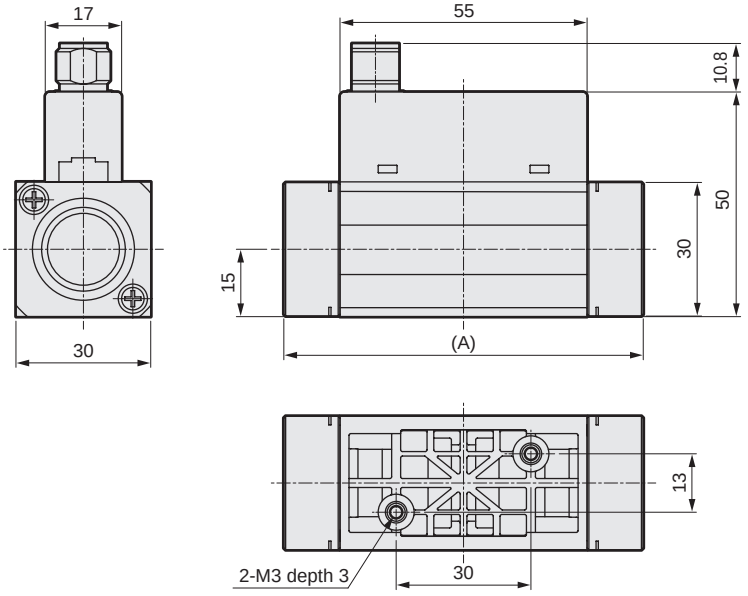


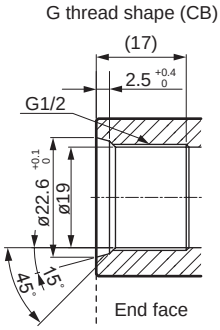
Model No.	Fitting	Dimension (A)
FSM3-C□□1DH1	Push-in ø8 mm	(70.6)
FSM3-C□□1EH1	Push-in ø10 mm	(82.1)
FSM3-C□□1JH1	Push-in 3/8"	(83.4)
FSM3-C□□1BA1	Rc1/4	(75)
FSM3-C□□1BF1	G1/4	(89)
FSM3-C□□1BB1	G1/4	(89)
FSM3-C□□1BC1	NPT1/4	(75)

Dimensions (IO-Link)

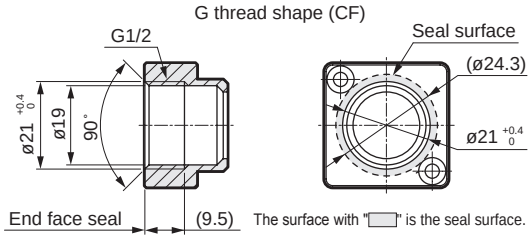
Port sizes: Straight Rc1/2, G1/2, NPT1/2

● FSM3−C□□1/CA1/CF1/CB1/CC1-P70/P80 (Full scale flow rates: 500, 1000 L/min)





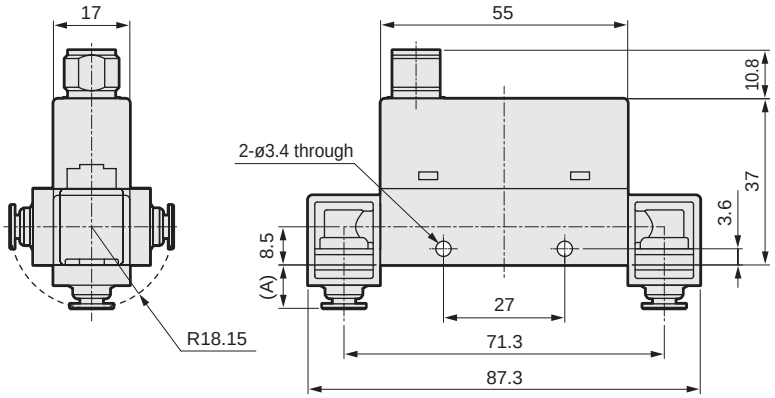
The 15° surface is the seal surface. Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.



Model No.	Fitting	Dimension (A)
FSM3-C□□1CA1	Rc1/2	(80)
FSM3-C□□1CF1	G1/2	(80)
FSM3-C□□1CB1	G1/2	(95.4)
FSM3-C□□1CC1	NPT1/2	(80)

Port sizes: Elbow ø4 mm, ø6 mm, ø1/4", Rc1/8, G1/8, NPT1/8

● FSM3−C□□1/BH2/CH2/HH2/AA2/AF2/AB2/AC2-P70/P80 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



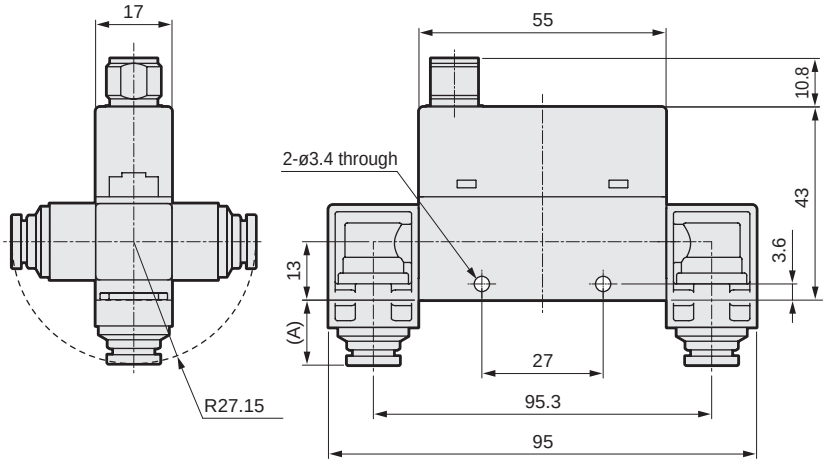
* The shapes of the upper surface and lower surface of the main body are the same as that of the straight type.

Model No.	Fitting	Dimension (A)
FSM3-C□□1BH2	Push-in ø4 mm	(9.5)
FSM3-C□□1CH2	Push-in ø6 mm	(10.6)
FSM3-C□□1HH2	Push-in 1/4"	(12.2)
FSM3-C□□1AA2	Rc1/8	(14.5)
FSM3-C□□1AF2	G1/8 *	(20.5)
FSM3-C□□1AB2	G1/8 *	(20.5)
FSM3-C□□1AC2	NPT1/8	(14.5)

*Please refer to the straight type for the G thread shape.

Port sizes: Elbow ø8 mm, ø10 mm, ø3/8", Rc1/4, G1/4, NPT1/4

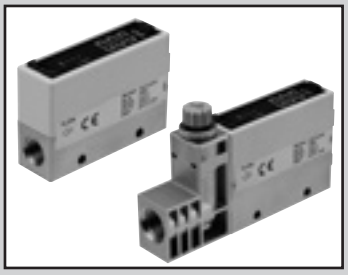
● FSM3−C□□1/DH2/EH2/JH2/BA2/BF2/BB2/BC2-P70/P80 (Full scale flow rates: 50, 100, 200 L/min)



* The shapes of the upper surface and lower surface of the main body are the same as that of the straight type.

Model No.	Fitting	Dimension (A)
FSM3-C□□1DH2	Push-in ø8 mm	(13.6)
FSM3-C□□1EH2	Push-in ø10 mm	(19.3)
FSM3-C□□1JH2	Push-in 3/8"	(20.0)
FSM3-C□□1BA2	Rc1/4	(15.8)
FSM3-C□□1BF2	G1/4 *	(22.8)
FSM3-C□□1BB2	G1/4 *	(22.8)
FSM3-C□□1BC2	NPT1/4	(15.8)

*Please refer to the straight type for the G thread shape.



Compact flow rate sensor RAPIFLOW

FSM3 Series

LCD display

● Stainless steel body (flow rate range: 500 mL/min to 1000 L/min)

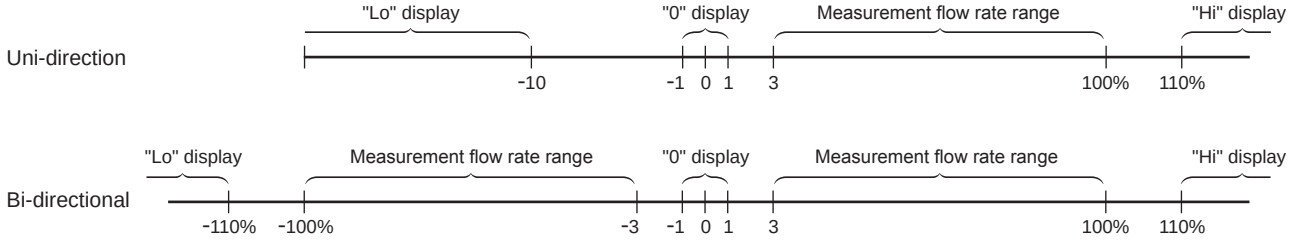
CE RoHS

LCD display specifications

Item			FSM3-[A][B][C][D][E][F][G][H][I]-[ ]										
			[B]										
			005	010	020	050	100	200	500	101	201	501	102
Flow direction	[C]	U	Uni-direction										
		B	Bi-direction										
Measurement flow rate range (□/min) *1	[B]	U	15 to 500 mL	30 to 1000 mL	0.06 to 2.00 L	0.15 to 5.00 L	0.30 to 10.00 L	0.6 to 20.0 L	1.5 to 50.0 L	3.0 to 100.0 L	6 to 200 L	15 to 500 L	30 to 1000 L
		B	−500 to −15, 15 to 500 mL	−1000 to −30, 30 to 1000 mL	−2.00 to −0.06, 0.06 to 2.00 L	−5.00 to −0.15, 0.15 to 5.00 L	−10.00 to −0.30, 0.30 to 10.00 L	−20.0 to −0.6, 0.6 to 20.0 L	−50.0 to −1.5, 1.5 to 50.0 L	−100.0 to −3.0, 3.0 to 100.0 L	−200 to −6, 6 to 200 L	−500 to −15, 15 to 500 L	−1000 to −30, 30 to 1000 L
Display			4 digit + 4 digit 2 color LCD										
Flow rate display range (□/min) *2	[B]	U	−49 to 549 mL	−99 to 1099 mL	−0.19 to 2.19 L	−0.49 to 5.49 L	−0.99 to 10.99 L	−1.9 to 21.9 L	−4.9 to 54.9 L	−9.9 to 109.9 L	−19 to 219 L	−49 to 549 L	−99 to 1099 L
		B	−549 to 549 mL	−1099 to 1099 mL	−2.19 to 2.19 L	−5.49 to 5.49 L	−10.99 to 10.99 L	−21.9 to 21.9 L	−54.9 to 54.9 L	−109.9 to 109.9 L	−219 to 219 L	−549 to 549 L	−1099 to 1099L
Integration display *3		Display range	0 to ±9999999 mL		0.00 to ±99999.99 L			0.0 to ±999999.9 L			0 to ±9999999 L		
		Pulse output rate	5 mL	10 mL	0.02 L	0.05 L	0.1 L	0.2 L	0.5 L	1 L	2 L	5 L	10 L
Working conditions		Applicable fluid *4	Clean air (JIS B 8392-1:2012 1.1.1 to 5.6.2), compressed air (JIS B 8392-1:2012 1.1.1 to 1.6.2), nitrogen gas										
			Argon, carbon dioxide, and gas mixture (argon + carbon dioxide)									–	
			Oxygen (When oxygen specifications are selected, the clean-room specifications of Ⓜ cannot be selected. Specifications automatically become oil-prohibited specifications.)									–	
		Temperature range	0 to 50°C (no condensation)										
		Pressure range	−0.09 to 1.00 MPa									−0.09 to 0.75 MPa	
		Proof pressure	1.5 MPa										
Operating ambient temperature/humidity			0 to 50°C, 90% RH or less										
Storage temperature			−10 to 60°C										
Accuracy *5 (Fluid: in dry air)		Accuracy *6	Within ±3% F.S. (Secondary side released to atmosphere) (The scope of warranty is in accordance with the "measurement flow rate range.")										
		Repeatability *7	Within ±1% F.S. (Secondary side released to atmosphere)										
		Temperature characteristics	Within ±0.2% F.S./°C (15 to 35°C, base temperature 25°C)										
		Pressure characteristics	Within ±5% F.S. (where secondary side is released to atmosphere)								Within ±5% F.S. (0.35 MPa standard)		
Response time		*8	50 msec or less (setting response time OFF)										
Switch output	[G]	A, B, E, F	NPN open collector output (50 mA or less, voltage drop 2.4 V or less)										
		C, D, G, H	PNP open collector output (50 mA or less, voltage drop 2.4 V or less)										
Analog output *9		A, B, C, D	1 to 5 V voltage output (connecting load impedance 50 kΩ or more)										
		E, F, G, H	4 to 20 mA current output (connecting load impedance 0 to 300 Ω)										
Power supply voltage *10		A, B, C, D	12 to 24 VDC (10.8 to 26.4 V) ripple rate 1% or less										
		E, F, G, H	24 VDC (21.6 to 26.4 V) ripple rate 1% or less										
Current consumption		*11	45 mA or less										
Lead wire			ø3.7, AWG26 or equivalent x 5-conductor (connector), insulator O.D. ø1.0										
Functions		*12	① Gas type selection, ② Setting copy function, ③ Flow rate integration, ④ Peak hold, etc.										
Degree of protection			IP40 or equivalent (IEC standard)										
Protection circuit		*13	Power reverse connection protection, switch output reverse connection protection, switch output load short-circuit protection										
Vibration resistance			10 to 150 Hz, 100 m/s^2, 2 hours each in X, Y, Z directions										
EMC Directive			EN55011, EN61000-6-2, EN61000-4-2/3/4/6/8										
Mounting		Mounting orientation *14	Unrestricted in vertical/horizontal direction										
		Straight piping section *15	Not required										

*1: The value converted to volumetric flow rate at standard condition (20°C 1 barometric pressure (101 kPa) 65%RH).
(20°C, 1 atmospheric pressure (101 kPa), relative humidity 0%RH with a type of gas other than air.)

*2: Display at each flow rate is as follows.



*3: The integrated flow is a calculated (reference) value. When using the integrated save function, take care to prevent the number of saves from exceeding the access count limit of the storage device (1 million times). (Changes to various settings also are counted in the access count.)

$$\text{Number of saves} = \frac{\text{Usage time}}{\text{5 mins}} < \text{1 million times}$$

When the instantaneous flow rate is 1% or less, the flow rate is counted as integrated flow rate.

*4: Use dry gas which does not contain corrosive elements such as chlorine, sulfur or acids, and which is clean and does not contain dust or oil mist. When using compressed air, use clean air that complies with JIS B 8392-1:2012 Class 1.1.1 to 1.6.2. Compressed air from the compressor contains drainage (water, oil oxides, foreign matter, etc.). To maintain the function of this product, install a filter, air dryer (min. pressure dew point 10°C or less), and oil mist filter (max. oil content 0.1 mg/m^3) on the primary side (upstream side) of this product. (Refer to page 1118 for details on recommended circuit.)
The sensor for oxygen gas is a custom model. To prevent ignition accidents, do not allow oxygen to flow again when a fluid other than oxygen has flown even once.

*5: Compressed air is used for adjusting and inspecting this product. Accuracy for gas types other than air is a guideline.

*6: Accuracy is based on a CKD standard flow rate meter. It does not indicate absolute accuracy.
Repeatability, temperature characteristics, and pressure characteristics are not included for an accuracy of ±3% F.S.
Consider separately according to the working environment and working conditions.

*7: Repeatability calculated during a short time. Change over time is not included. (Refer to the product specifications for details.)

*8: The actual response time changes depending on the piping conditions. As a guideline, the response time setting can be selected within the range 50 msec to 1.5 sec.

*9: The output impedance of the output impedance of the analog output voltage output is approximately 1 kΩ. If the impedance of the connecting load is small, output and error increase. Check error with the impedance of the connecting load before using.

*10: The power supply voltage specifications differ for the voltage output and current output types.

*11: Current for when 24 VDC is connected, and no load is applied. The current consumption will vary depending on how the load is connected.

*12: The gas type switching function enables switching to argon, carbon dioxide and a gas mixture of argon 80% + carbon dioxide 20%. The full scale flow rate and analog output after changing are as follows. (Note that the gas change function cannot be set with the 500 L/min, and 1000 L/min oxygen models.)

Gas	Flow direction	Measured flow rate range (□/min)							
		005	010	020	100	200	500	101	201
・Air ・Nitrogen ・Argon ・Argon80%+ Carbon dioxide20%	Uni-direction	15 to 500mL	30 to 1000mL	0.06 to 2.00L	0.30 to 10.00L	0.6 to 20.0L	1.5 to 50.0L	3.0 to 100.0L	6 to 200L
	Bi-direction	-500 to -15mL	-1000 to -30mL	-2.00 to -0.06L	-10.00 to -0.30L	-20.0 to -0.6L	-50.0 to -1.5L	-100.0 to -3.0L	-200 to -6L
		15 to 500mL	30 to 1000mL	0.06 to 2.00L	0.30 to 10.00L	0.6 to 20.0L	1.5 to 50.0L	3.0 to 100.0L	6 to 200L
・Carbon dioxide	Uni-direction	15 to 250mL	30 to 500mL	0.06 to 1.00L	0.30 to 5.00L	0.6 to 10.0L	1.5 to 25.0L	3.0 to 50.0L	6 to 100L
	Bi-direction	-250 to -15mL	-500 to -30mL	-1.00 to 0.06L	-5.00 to 0.30L	-10.0 to -0.6L	-25.0 to -1.5L	-50.0 to -3.0L	-100 to -6L
		15 to 250mL	30 to 500mL	0.06 to 1.00L	0.30 to 5.00L	0.6 to 10.0L	1.5 to 25.0L	3.0 to 50.0L	6 to 100L

Gas	Flow direction	Analog output			
		Output A		Output B	
		Voltage	Current	Voltage	Current
・Carbon dioxide	Uni-direction	1 to 3V	4 to 12mA	1 to 5V	4 to 20mA
	Bi-direction	2 to 4V	8 to 16mA	1 to 5V	4 to 20mA

The "Setting copy function" setting is selected at "Ⓒ Output specifications".
Note that the "External input" function is not available on models on which the "Setting copy function" is enabled.

*13: This product's protection circuit is effective only for specific misconnections and load short-circuits. It does not provide protection for all misconnections.

*14: This product measures changes in heat distribution that are caused by flow.
When this product is mounted in a vertical orientation, convective flow may affect heat distribution or cause the zero point to deviate.

*15: Accuracy may be affected by the piping conditions. To perform measurement with greater accuracy, install a straight pipe with a piping I.D. ten times larger. With the 500 L/min and 1,000 L/min models, use piping with an internal diameter of 9 mm or more. If it is less than 9 mm, accuracy may be negatively affected.

*16: Refer to page 1106 for weight.

How to order

FSM3 - L 005 U 2 AA 1 A 1 N - B M R - P80

Model No. FSM3
Ⓐ Display: L
Ⓑ Flow rate ranges (full scale): 005
Ⓒ Flow direction: U
Ⓓ Body material / applicable fluid: 2
Ⓔ Port size: AA
Ⓕ Piping direction: 1
Ⓖ Output specifications: A
Ⓗ Unit specifications: 1
Ⓘ Valve option: N
Ⓙ Lead wire: B
Ⓚ Mounting (not assembled): M
Ⓛ Attached documents: R
Ⓜ Clean-room specifications: P80

[Example of model No.]
FSM3-L005U2AA1A1N-BMR-P80
Model: RAPIFLOW FSM3 Series

ⒶDisplay	L	: Liquid crystal display
ⒷFlow rate	005	: 500 mL/min
ⒸFlow direction	U	: Uni-direction
ⒹBody material / applicable fluid	2	: SUS/air
ⒺPort size	AA	: Rc1/8
ⒻPiping direction	1	: Straight
ⒼOutput specifications	A	: Analog voltage output ×1, NPN switch output ×1, setting copy function
ⒽUnit specifications	1	: SI units only
ⒾValve option	N	: None
ⒿLead wire	B	: 5-conductor 3 m
ⓀMounting attachment	M	: DIN rail mount
ⓁAttached documents	R	: Company certification
ⓂClean-room specifications	P80	: Oil free

Precautions for model No. selection

*1: Refer to the correspondence table on the following page when selecting the model.
*2: The only Ⓘ valve option is "N: None" with models where the flow direction is "B: Bidirectional" and models where the applicable fluid is oxygen.
*3: "3: Oxygen" cannot be selected with 500 L/min and 1000 L/min models.
*4: The G thread connection shape is compliant with ISO16030 standards.
*5: Please refer to the external dimension diagram (Page 1076) for the G thread connection shape when making a selection. (The G thread connection shape is compliant with JIS B 2351-1, O types.)
*6: Models with the unit switching function are not sold in Japan.
*7: Optional parts are provided with the product. They are not assembled to the product.
*8: The product surface is degreased and cleaned before packaging, and heat-sealed into an antistatic bag on a clean bench (Class 1000 or more).
*9: In addition to P70 specifications, wetted section materials are degreased and cleaned.
*10: No oxygen type can be selected (None only).

Code	Description
Ⓐ Display	
L	Liquid crystal display

Ⓑ Flow rate ranges (full scale)

005	500 mL/min	500	50 L/min
010	1000 mL/min	101	100 L/min
020	2 L/min	201	200 L/min
050	5 L/min	501	500 L/min
100	10 L/min	102	1000 L/min
200	20 L/min		

Ⓒ Flow direction *2

U	Uni-direction
B	Bi-direction

Ⓓ Body material / applicable fluid

	Body material	Applicable fluid
2	SUS	Air (gas switchable)
3	SUS	Oxygen (oil-prohibited specifications) *3

Ⓔ Port size

AA	Rc1/8
BA	Rc1/4
CA	Rc1/2
AF	G1/8 *4
BF	G1/4 *4
CF	G1/2 *4
AB	G1/8 *5
BB	G1/4 *5
CB	G1/2 *5
AC	NPT1/8
BC	NPT1/4
CC	NPT1/2
AD	1/4" double barbed fitting (50 L/min or less)
BD	1/4" double barbed fitting (50 to 200 L/min)
AE	1/4" JXR male fitting (50 L/min or less)
BE	1/4" JXR male fitting (50 to 200 L/min)

Ⓕ Piping direction

1	Straight

Ⓖ Output specifications

	Analog output	Switch output	Setting copy function
A	1 point (Voltage output) 1-5 V	1 point (NPN)	With
B		2 points (NPN)	–
C		1-point output (PNP)	With
D		2-points output (PNP)	–
E	1 point (Current output) 4-20 mA	1 point (NPN)	With
F		2 points (NPN)	–
G		1-point output (PNP)	With
H		2-points output (PNP)	–

Ⓗ Unit specifications

1	SI units only
2	With unit switching function (overseas models only) *6

Ⓘ Valve option *2, *10

N	None
T	With needle valve (only for models 200 L or less)

Ⓙ Lead wire

Blank	None
A	5-conductor 1 m
B	5-conductor 3 m

Ⓚ Mounting (not assembled) *7

Blank	None
H	Bracket 1 (for models 200 L or less)
J	Bracket 2 (for 500 or 1000 L models)
K	Panel mounting (for sensor products of models 200 L or less)
L	Panel mounting (for needle valves of models 200 L or less)
M	DIN rail mounting (for models 200 L or less)

Ⓛ Attached documents

Blank	None
R	Company certification
S	Company certification + Traceability certification

Ⓜ Clean-room specifications *10

P70	Anti-dust generation	*8
P80	Oil free	*9

Flow rate ranges and port sizes

B Flow rate codes	E Port sizes															
	AA	BA	CA	AF	BF	CF	AB	BB	CB	AC	BC	CC	AD	BD	AE	BE
	Rc1/8	Rc1/4	Rc1/2	G1/8	G1/4	G1/2	G1/8	G1/4	G1/2	NPT1/8	NPT1/4	NPT1/2	1/4" Double barbed fitting		1/4" JXR Male fitting	
005	●○			●○			●○			●○			●○		●○	
010	●○			●○			●○			●○			●○		●○	
020	●○			●○			●○			●○			●○		●○	
050	●○			●○			●○			●○			●○		●○	
100	●○			●○			●○			●○			●○		●○	
200	●○			●○			●○			●○			●○		●○	
500	●○	●○		●○	●○		●○	●○		●○	●○		●○	●○	●○	●○
101		●○			●○			●○			●○			●○		●○
201		●○			●○			●○			●○			●○		●○
501			●			●			●			●				
102			●			●			●			●				

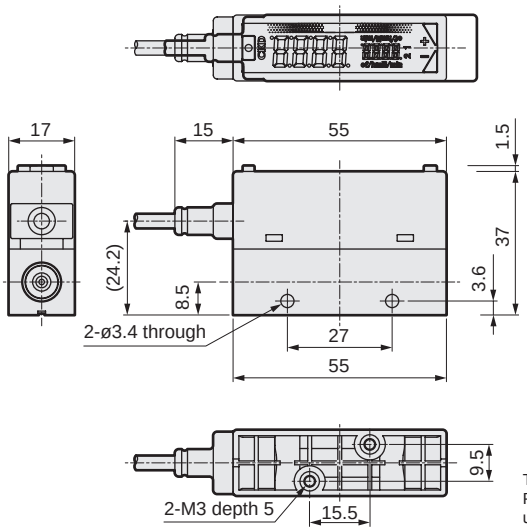
●: Port size compatibility ○: Needle valve option compatibility

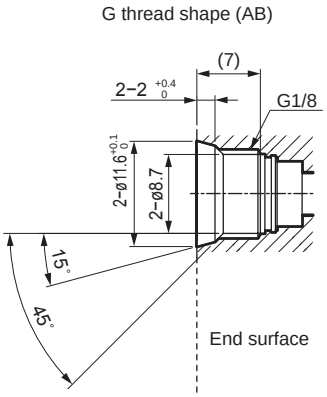
Dimensions (LCD display) (flow rate range: 500 mL/min to 50 L/min)

Port sizes: Straight Rc1/8, G1/8, NPT1/8

● FSM3−L□□$^{2}_{3}$/AA1/AB1/AC1-P70/P80

(Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



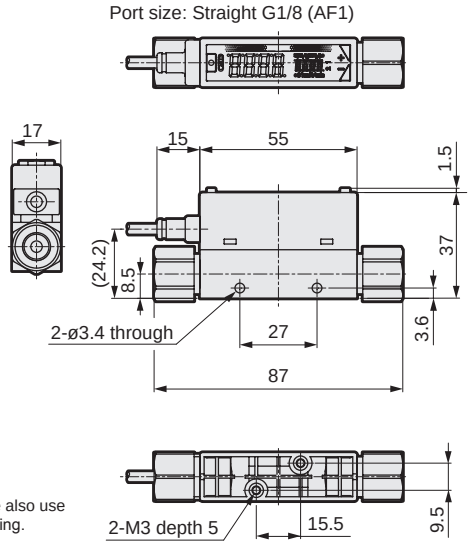


The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

Port size: Straight G1/8

● FSM3−L□□$^{2}_{3}$/AF1

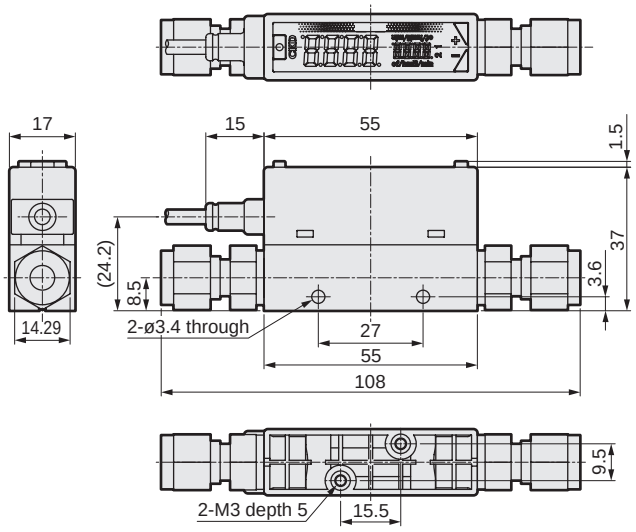
(Full scale flow rates: 500mL/min, 1, 2, 5, 10, 20, 50L/min)



Port size: Straight 1/4" double barbed fitting

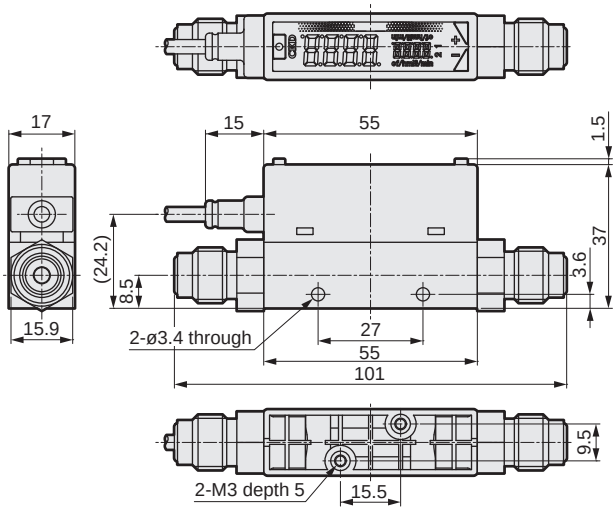
● FSM3−L□□$^{2}_{3}$/AD1-P70/P80

(Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



Port size: Straight 1/4" JXR male fitting

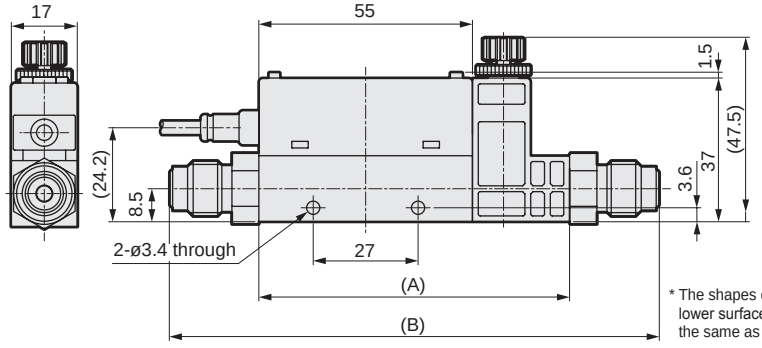
● FSM3−L□□$^{2}_{3}$/AE1 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



Solenoid valve with needle dimensions

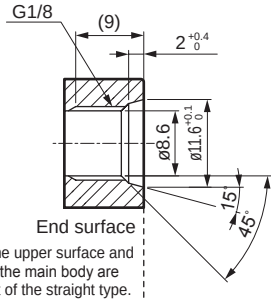
Port sizes: Rc1/8, G1/8, NPT1/8, 1/4" double barbed fitting, 1/4" JXR male fitting

● FSM3−L□□$^{2}_{3}$/AA1AF1/AB1/AC1/AD/AE□□T-P70/P80 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



G thread shape (AB *needle valve side)

*Refer to the figure above for the G thread shape (AB) on the sensor side.



* The shapes of the upper surface and lower surface of the main body are the same as that of the straight type.

The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

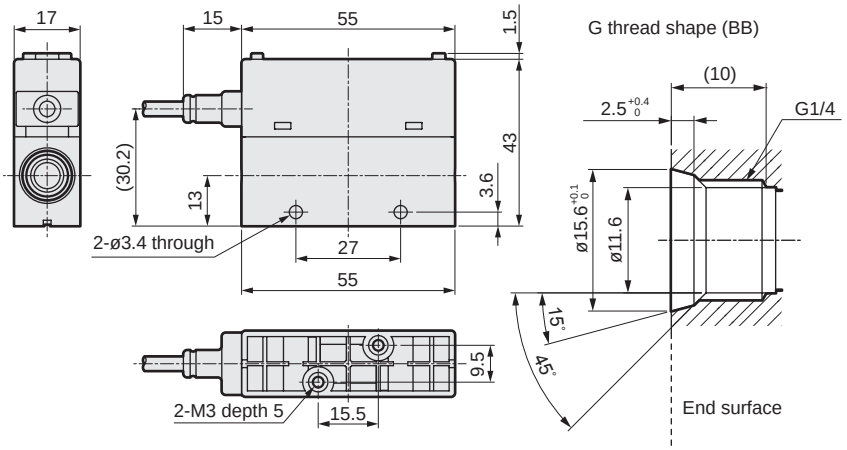
Port size	Dimension (A)	Dimension (B)
Rc 1/8	80	–
G 1/8 (AF1)	80	132
G 1/8 (AB1)	80	–
NPT 1/8	80	–
1/4" Double barbed fitting	80	133
1/4" JXR male fitting	80	126

Dimensions (LCD display) (flow rate range: 50 L/min to 200 L/min)

Port sizes: Straight Rc1/4, G1/4, NPT1/4

● FSM3−L□□$^{2}_{3}$/BA1/BB1/BC1-P70/P80

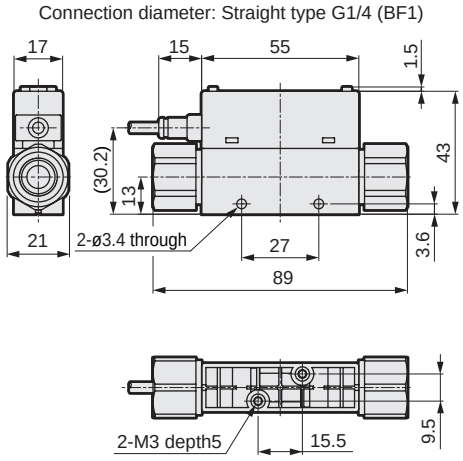
(Full scale flow rates: 50, 100, 200 L/min)



Port size: Straight G1/4 (BF1)

● FSM3−L□□$^{2}_{3}$/BF1

(Full scale flow rates: 50, 100, 200 L/min)

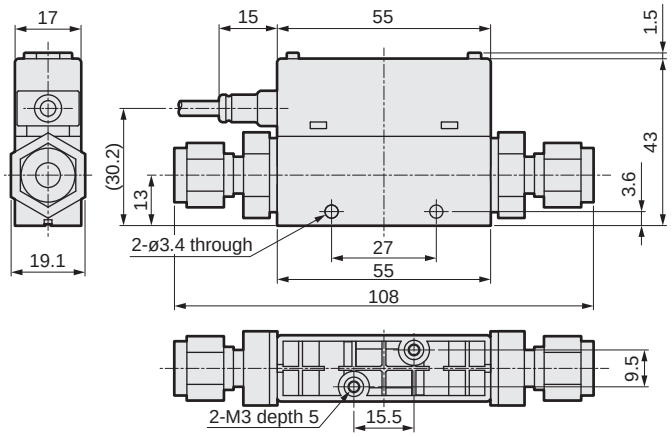


The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

Port size: Straight 1/4" double barbed fitting

● FSM3−L□□$^{2}_{3}$/BD1-P70/P80

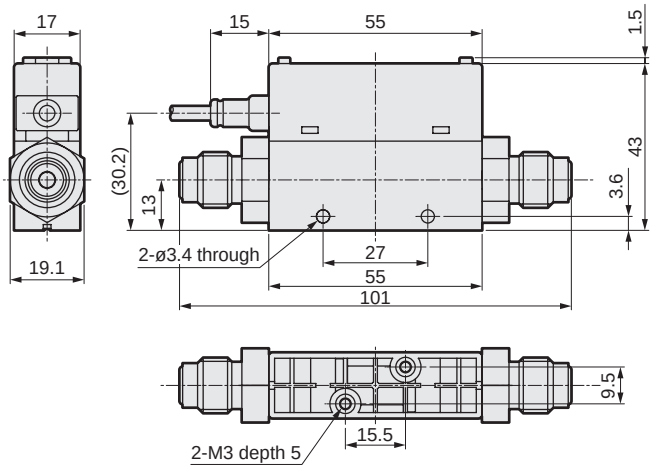
(Full scale flow rates: 50, 100, 200 L/min)



Port size: Straight 1/4" JXR male fitting

● FSM3−L□□$^{2}_{3}$/BE1

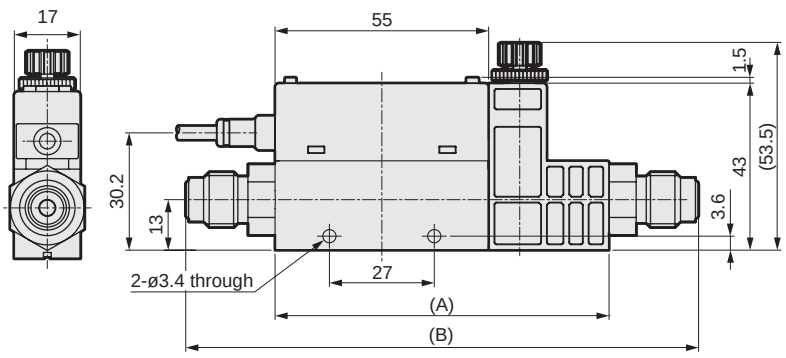
(Full scale flow rates: 50, 100, 200 L/min)



Solenoid valve with needle dimensions

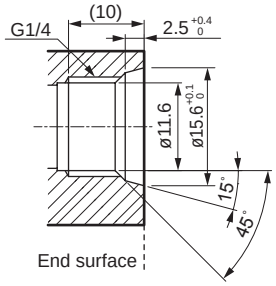
Port sizes: Rc1/4, G1/4, NPT1/4, 1/4" double barbed fitting, 1/4" JXR male fitting

● FSM3−L□□$^{2}_{3}$/BA1/BF1/BB1/BC1/BD/BE□□T-P70/P80 (Full scale flow rates: 50, 100, 200 L/min)



G thread shape (BB *needle valve side)

*Please refer to the diagram above for details on the G thread shape (BB) on the sensor side.



* The shapes of the upper surface and lower surface of the main body are the same as that of the straight type.

The 15° surface is the seal surface. Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

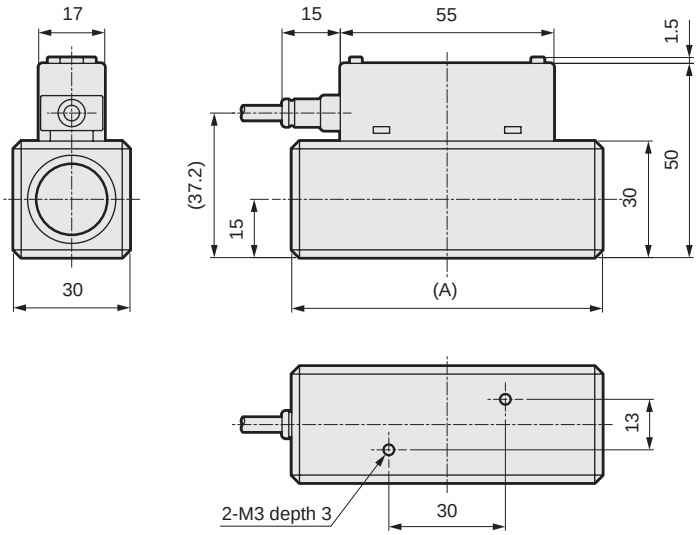
Port size	Dimension (A)	Dimension (B)
Rc 1/8	86	–
G 1/4 (BF1)	86	120
G 1/4 (BB1)	86	–
NPT 1/4	86	–
1/4" Double barbed fitting	86	139
1/4" JXR male fitting	86	132

Dimensions (LCD display) (flow rate range: 500 L/min to 1000 L/min)

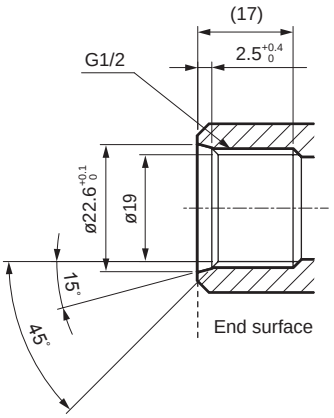
Port sizes: Straight Rc1/2, G1/2, NPT1/2

● FSM3−L B C 2/CA1/CF1/CB1/CC1-P70/P80

(Full scale flow rates: 500,1000L/min)



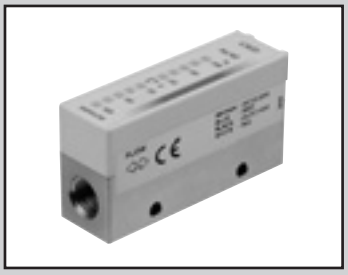
G thread shape (CB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

Model No.	Port size	Dimension (A)
FSM3-L□□2CA1	Rc1/2	(80)
FSM3-L□□2CF1	G1/2	(80)
FSM3-L□□2CB1	G1/2	(95.4)
FSM3-L□□2CC1	NPT1/2	(80)

MEMO



Compact flow rate sensor RAPIFLOW

FSM3 Series

Bar display

● Stainless steel body (flow rate range: 500 mL/min to 1000 L/min)

Bar display specifications

Item			FSM3-[A][B][C][D][E][F][G][H][I]-[ ]										
			[B]										
			005	010	020	050	100	200	500	101	201	501	102
Flow direction	[C]	U	Uni-direction										
		B	Bi-direction										
Measurement flow rate range (□/min) *1	[B]	U	15 to 500 mL	30 to 1000 mL	0.06 to 2.00 L	0.15 to 5.00 L	0.30 to 10.00 L	0.6 to 20.0 L	1.5 to 50.0 L	3.0 to 100.0 L	6 to 200 L	15 to 500 L	30 to 1000 L
		B	−500 to −15, 15 to 500 mL	−1000 to −30, 30 to 1000 mL	−2.00 to −0.06, 0.06 to 2.00 L	−5.00 to −0.15, 0.15 to 5.00 L	−10.00 to −0.30, 0.30 to 10.00 L	−20.0 to −0.6, 0.6 to 20.0 L	−50.0 to −1.5, 1.5 to 50.0 L	−100.0 to −3.0, 3.0 to 100.0 L	−200 to −6, 6 to 200 L	−500 to −15, 15 to 500 L	−1000 to −30, 30 to 1000 L
Display			LED bar display										
Working conditions		Applicable fluid *2	Clean air (JIS B 8392-1:2012 1.1.1 to 5.6.2), compressed air (JIS B 8392-1:2012 1.1.1 to 1.6.2), nitrogen gas										
			Oxygen (When oxygen specifications are selected, the clean-room specifications of Ⓜ cannot be selected. Specifications automatically become oil-prohibited specifications.)									–	
		Temperature range	0 to 50°C (no condensation)										
		Pressure range	−0.09 to 1.00 MPa									−0.09 to 0.75 MPa	
		Proof pressure	1.5 MPa										
Operating ambient temperature/humidity			0 to 50°C, 90% RH or less										
Storage temperature			−10 to 60°C										
Accuracy		Accuracy *3	Within ±3% F.S. (Secondary side released to atmosphere) (The scope of warranty is in accordance with the "measurement flow rate range.")										
		Repeatability *4	Within ±1% F.S. (Secondary side released to atmosphere)										
		Temperature characteristics	Within ±0.2% F.S./°C (15 to 35°C, base temperature 25°C)										
		Pressure characteristics	Within ±5% F.S. (where secondary side is released to atmosphere)								Within ±5% F.S. (0.35 MPa standard)		
Response time		*5	50 msec or less										
Analog output *6	[G]	J	1 to 5 V voltage output (connecting load impedance 50 kΩ or more)										
		K	4 to 20 mA current output (connecting load impedance 0 to 300 Ω)										
Power supply voltage *7		J	12 to 24 VDC (10.8 to 26.4 V) ripple rate 1% or less										
		K	24 VDC (21.6 to 26.4 V) ripple rate 1% or less										
Current consumption		*8	45 mA or less										
Lead wire			ø3.7, AWG26 or equivalent × 4-conductor (connector), insulator O.D. ø1.0										
Degree of protection			IP40 or equivalent (IEC standard)										
Protection circuit		*9	Power supply reverse connection protection										
Vibration resistance			10 to 150 Hz, 100 m/s^2, 2 hours each in X, Y, Z directions										
EMC Directive			EN55011, EN61000-6-2, EN61000-4-2/3/4/6/8										
Mounting		Mounting orientation *10	Unrestricted in vertical/horizontal direction										
		Straight piping section *11	Not required										

*1: The value converted to volumetric flow rate at standard condition (20°C 1 barometric pressure (101 kPa) 65%RH).
(20°C, 1 atmospheric pressure (101kPa), relative humidity 0%RH with a gas other than air.)

*2: Use dry gas which does not contain corrosive elements such as chlorine, sulfur or acids, and which is clean and does not contain dust or oil mist. When using compressed air, use clean air that complies with JIS B 8392-1:2012 Class 1.1.1 to 1.6.2. Compressed air from the compressor contains drainage (water, oil oxides, foreign matter, etc.). To maintain the function of this product, install a filter, air dryer (min. pressure dew point 10˚C or less), and oil mist filter (max. oil content 0.1 mg/m^3) on the primary side (upstream side) of this product. (Refer to page 1118 for details on recommended circuit.)
The sensor for oxygen gas is a custom model. To prevent ignition accidents, do not allow oxygen to flow again when a fluid other than oxygen has flown even once.

*3: Accuracy is based on a CKD standard flow rate meter. It does not indicate absolute accuracy.
Repeatability, temperature characteristics, and pressure characteristics are not included for an accuracy of ±3% F.S.
Consider separately according to the working environment and working conditions.

*4: Repeatability calculated during a short time. Change over time is not included. (Refer to the product specifications for details.)

*5: The actual response time changes depending on the piping conditions.

*6: The output impedance of the output impedance of the analog output voltage output is approximately 1 kΩ. If the impedance of the connecting load is small, output and error increase. Check error with the impedance of the connecting load before using.

*7: The power supply voltage specifications differ for the voltage output and current output types.

*8: Current for when 24 VDC is connected, and no load is applied. The current consumption will vary depending on how the load is connected.

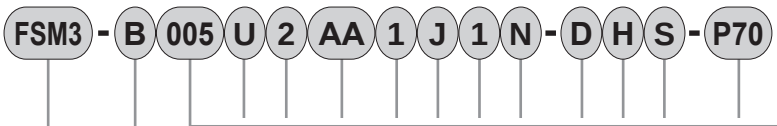
*9: This product's protection circuit is effective only for specific misconnections and load short-circuits. It does not provide protection for all misconnections.

*10: This product measures changes in heat distribution that are caused by flow.
When this product is mounted in a vertical orientation, convective flow may affect heat distribution or cause the zero point to deviate.

*11: Accuracy may be affected by the piping conditions. To perform measurement with greater accuracy, install a straight pipe with a piping I.D. ten times larger. With the 500 L/min and 1,000 L/min models, use piping with an internal diameter of 9 mm or more. If it is less than 9 mm, accuracy may be negatively affected.

*12: Refer to page 1106 for weight.

How to order



Model No.
A Display
B Flow rate ranges (full scale)
C Flow direction
D Body material / applicable fluid
E Port size
F Piping direction
G Output specifications
H Unit specifications
I Valve option
J Lead wire
K Mounting (not assembled)
L Attached documents
M Clean-room specifications

Code	Description
A Display	
B	Bar display

B Flow rate ranges (full scale)			
005	500 mL/min	**500**	50 L/min
010	1000 mL/min	**101**	100 L/min
020	2 L/min	**201**	200 L/min
050	5 L/min	**501**	500 L/min
100	10 L/min	**102**	1000 L/min
200	20 L/min		

C Flow direction	
U	Uni-direction
B	Bi-direction

D Body material / applicable fluid		
	Body material	Applicable fluid
2	SUS	Air
3	SUS	Oxygen (oil-prohibited specifications) *3

E Port size	
AA	Rc1/8
BA	Rc1/4
CA	Rc1/2
AF	G1/8 *4
BF	G1/4 *4
CF	G1/2 *4
AB	G1/8 *5
BB	G1/4 *5
CB	G1/2 *5
AC	NPT1/8
BC	NPT1/4
CC	NPT1/2
AD	1/4" double barbed fitting (50 L/min or less)
BD	1/4" double barbed fitting (50 to 200 L/min)
AE	1/4" JXR male fitting (50 L/min or less)
BE	1/4" JXR male fitting (50 to 200 L/min)

F Piping direction	
1	Straight

G Output specifications *2	
J	Analog voltage output × 1 point
K	Analog current output × 1 point

H Unit specifications	
1	SI units only

I Valve option	
N	None

J Lead wire	
Blank	None
C	4-conductor 1 m
D	4-conductor 3 m

K Mounting (not assembled) *6	
Blank	None
H	Bracket 1 (for models 200 L or less)
J	Bracket 2 (for 500 or 1000 L models)
M	DIN rail mounting (for models 200 L or less)

L Attached documents	
Blank	None
R	Company certification
S	Company certification + Traceability certification

M Clean-room specifications *9		
P70	Anti-dust generation	*7
P80	Oil free	*8

[Example of model No.]

FSM3-B005U2AA1J1N-DHS-P70

Model: RAPIFLOW FSM3 Series

A Display	B	: Bar display
B Flow rate	005	: 500 mL/min
C Flow direction	U	: Uni-direction
D Body material / applicable fluid	2	: SUS/air
E Port size	AA	: Rc1/8
F Piping direction	1	: Straight
G Output specifications	J	: Analog voltage output ×1
H Unit specifications	1	: SI units only
I Valve option	N	: None
J Lead wire	D	: 4-conductor 3 m
K Mounting attachment	H	: Bracket
L Attached documents	S	: Company certification + Traceability certification
M Clean-room specifications	P70	: Anti-dust generation

Precautions for model No. selection

*1: Refer to the correspondence table on the following page when selecting the model.
*2: When using in combination with a separated display (FSM2-D), select "J".
*3: "3: Oxygen" cannot be selected with 500 L/min and 1000 L/min models.
*4: The G thread connection shape is compliant with ISO16030 standards.
*5: Please refer to the external dimension diagram (Page 1084) for the G thread connection shape when making a selection. (The G thread connection shape is compliant with JIS B 2351-1, O types.)
*6: Optional parts are provided with the product. They are not assembled with the product.
*7: The product surface is degreased and cleaned before packaging, and heat-sealed into an antistatic bag on a clean bench (Class 1000 or more).
*8: In addition to P70 specifications, wetted section materials are degreased and cleaned.
*9: This cannot be selected on an oxygen type (blank only).

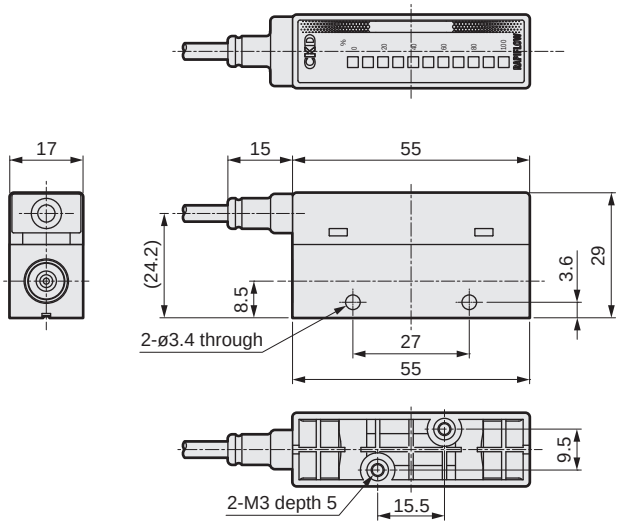
Flow rate ranges and port sizes

		Ⓔ Port sizes															
		AA	BA	CA	AF	BF	CF	AB	BB	CB	AC	BC	CC	AD	BD	AE	BE
		Rc1/8	Rc1/4	Rc1/2	G1/8	G1/4	G1/2	G1/8	G1/4	G1/2	NPT1/8	NPT1/4	NPT1/2	1/4" Double barbed fitting		1/4" JXR Male fitting	
Ⓑ Flow rate codes	005	●			●			●			●			●		●	
	010	●			●			●			●			●		●	
	020	●			●			●			●			●		●	
	050	●			●			●			●			●		●	
	100	●			●			●			●			●		●	
	200	●			●			●			●			●		●	
	500	●	●		●	●		●	●		●	●		●	●	●	●
	101		●			●			●			●			●		●
	201		●			●			●			●			●		●
	501			●			●			●			●				
	102			●			●			●			●				

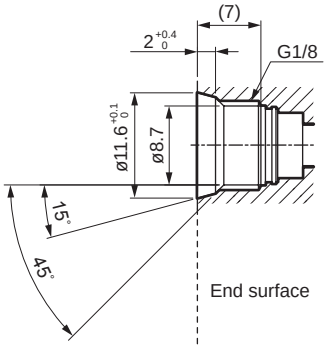
Dimensions (bar display) (flow rate range: 500 mL/min to 50 L/min)

Port sizes: Straight Rc1/8, G1/8, NPT1/8

● FSM3−B□C$^{2}_{3}$/AA1/AB1/AC1-P70/P80 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



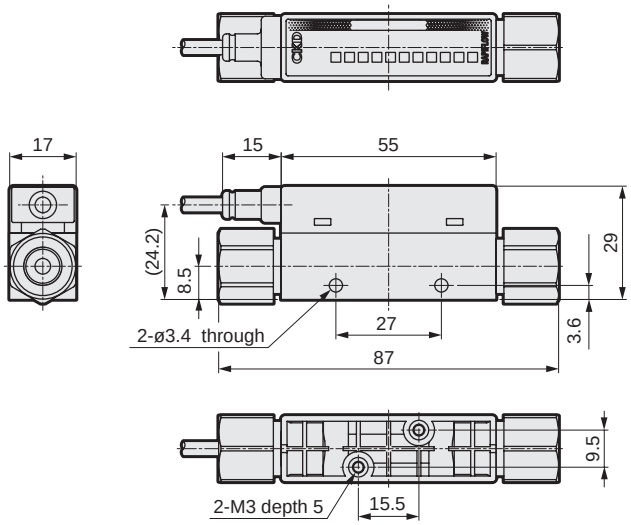
G thread shape (AB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

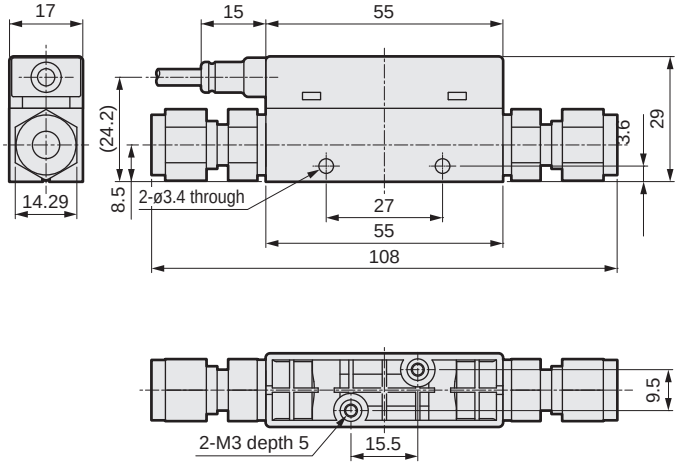
Port size: Straight G1/8

● FSM3−B□C$^{2}_{3}$/AF1-P70/P80 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



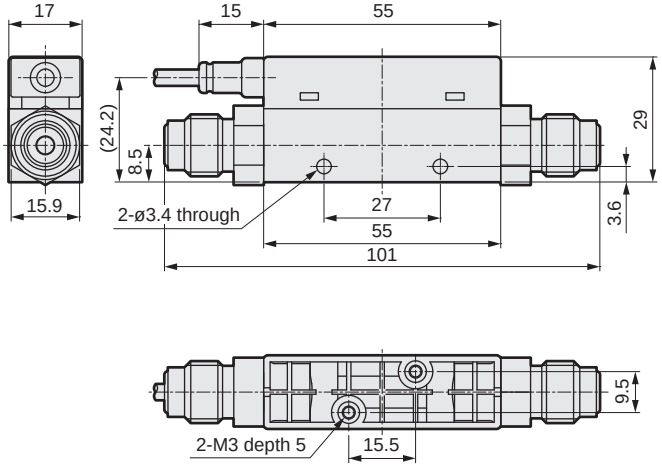
Port size: Straight 1/4" double barbed fitting

● FSM3−B□C$^{2}_{3}$/AD1-P70/P80
(Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



Port size: Straight 1/4" JXR male fitting

● FSM3−B□C$^{2}_{3}$/AE1-P70/P80
(Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)

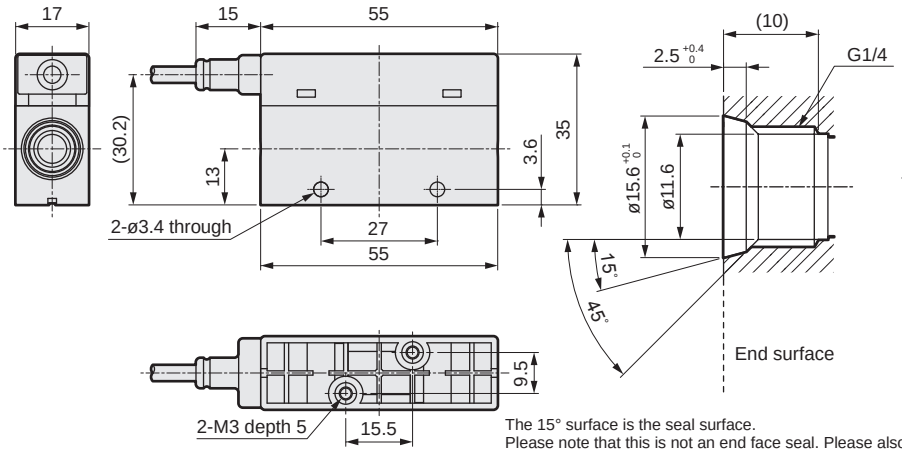


Dimensions (bar display) (flow rate range: 50 L/min to 1000 L/min)

Port sizes: Straight Rc1/4, G1/4, NPT1/4

● FSM3−B□□$^{2}_{3}$/BA1/BB1/BC1-P70/P80 (Full scale flow rates: 50, 100, 200 L/min)

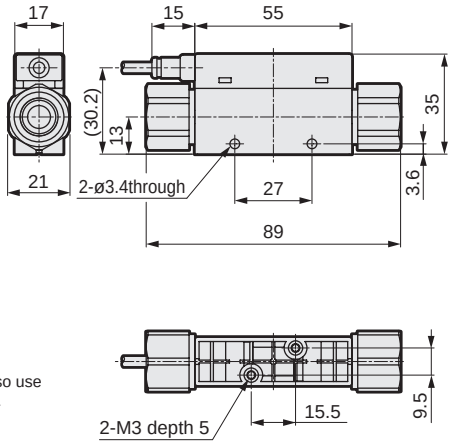
G thread shape (BB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

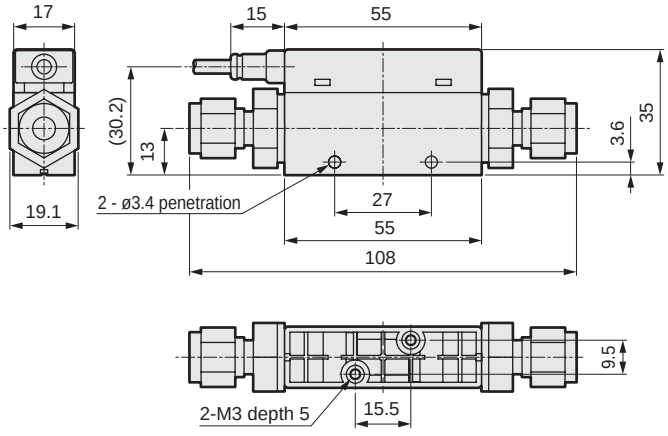
Port size: Straight G1/4

● FSM3−B□□$^{2}_{3}$/BF1-P70/P80
(Full scale flow rates: 50, 100, 200 L/min)



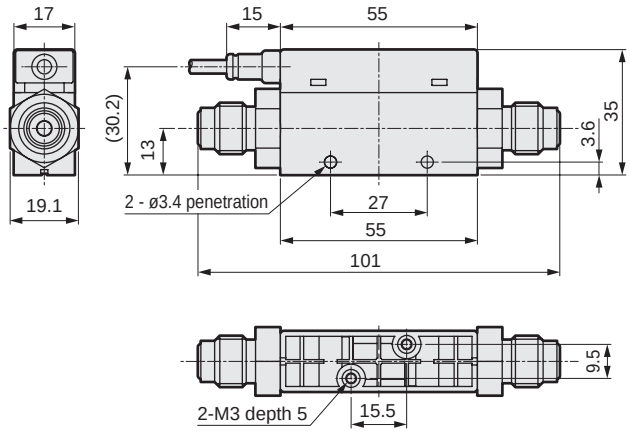
Port size: Straight 1/4" double barbed fitting

● FSM3−B□□$^{2}_{3}$/BD1-P70/P80 (Full scale flow rates: 50, 100, 200 L/min)



Port size: Straight 1/4" JXR male fitting

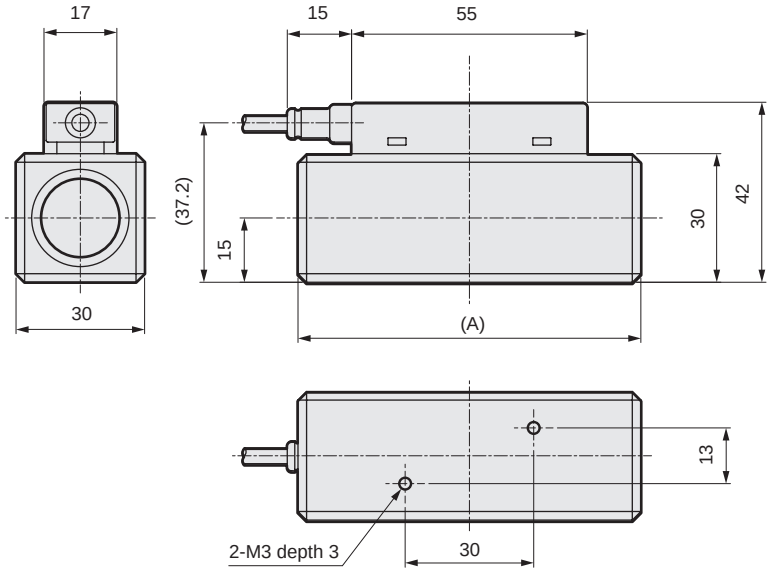
● FSM3−B□□$^{2}_{3}$/BE1-P70/P80 (Full scale flow rates: 50, 100, 200 L/min)

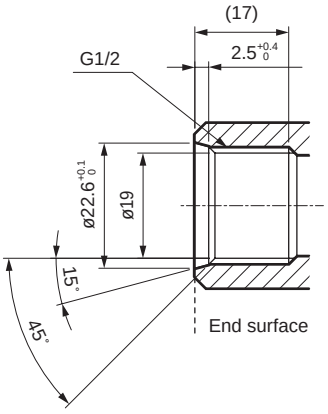


Port sizes: Straight Rc1/2, G1/2, NPT1/2

● FSM3−B□□2/CA1/CF1/CB1/CC1-P70/P80 (Full scale flow rates: 500,1000L/min)

G thread shape (CB)





The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

Model No.	Port size	Dimension (A)
FSM3-B□□2CA1	Rc1/2	(80)
FSM3-B□□2CF1	G1/2	(80)
FSM3-B□□2CB1	G1/2	(95.4)
FSM3-B□□2CC1	NPT1/2	(80)

Compact flow rate sensor RAPIFLOW

FSM3 Series

IO-Link

● Stainless steel body (flow rate range: 500 mL/min to 1000 L/min)

IO-Link specifications

Item			FSM3-[A][B][C][D][E][F][G][H][I]-[ ]										
			[B]										
			005	010	020	050	100	200	500	101	201	501	102
Flow direction	[C]	U	Uni-direction										
		B	Bi-direction										
Measurement flow rate range (□/min) *1	[B]	U	15 to 500 mL	30 to 1000 mL	0.06 to 2.00 L	0.15 to 5.00 L	0.30 to 10.00 L	0.6 to 20.0 L	1.5 to 50.0 L	3.0 to 100.0 L	6 to 200 L	15 to 500 L	30 to 1000 L
		B	−500 to −15, 15 to 500 mL	−1000 to −30, 30 to 1000 mL	−2.00 to −0.06, 0.06 to 2.00 L	−5.00 to −0.15, 0.15 to 5.00 L	−10.00 to −0.30, 0.30 to 10.00 L	−20.0 to −0.6, 0.6 to 20.0 L	−50.0 to −1.5, 1.5 to 50.0 L	−100.0 to −3.0, 3.0 to 100.0 L	−200 to −6, 6 to 200 L	−500 to −15, 15 to 500 L	−1000 to −30, 30 to 1000 L
Display			LED display (power and status indicators)										
Working conditions		Applicable fluid *2	Clean air (JIS B 8392-1:2012 1.1.1 to 5.6.2), compressed air (JIS B 8392-1:2012 1.1.1 to 1.6.2), nitrogen gas										
			Argon, carbon dioxide, and gas mixture (argon + carbon dioxide)									–	
			Oxygen (When oxygen specifications are selected, the clean-room specifications of Ⓜ cannot be selected. Specifications automatically become oil-prohibited specifications.)									–	
		Temperature range	0 to 50°C (no condensation)										
		Pressure range	−0.09 to 1.00 MPa									−0.09 to 0.75 MPa	
		Proof pressure	1.5 MPa										
Operating ambient temperature/humidity			0 to 50°C, 90% RH or less										
Storage temperature			−10 to 60°C										
Accuracy *3		Accuracy *4	Within ±3% F.S. (Secondary side released to atmosphere) (The scope of warranty is in accordance with the "measurement flow rate range.")										
		Repeatability *5	Within ±1% F.S. (Secondary side released to atmosphere)										
		Temperature characteristics	Within ±0.2% F.S./°C (15 to 35°C, base temperature 25°C)										
		Pressure characteristics	Within ±5% F.S. (where secondary side is released to atmosphere)								Within ±5% F.S. (0 to 0.75 MPa, 0.35 MPa standard)		
Response time *6			50 msec or less										
Power supply voltage			18 to 30 VDC (ripple rate 1% or less)										
Current consumption *7			45 mA or less										
Lead wire *8			M12 both-end connector lead wire (3 m), AWG#23 or equivalent, 4-conductor										
Functions *9, *10			① Gas type selection, ② Flow rate integration, ③ Peak hold, etc.										
Degree of protection			IP40 or equivalent (IEC standard)										
Protection circuit *11			Power supply reverse connection protection										
Vibration resistance *12			10 to 150 Hz, 100 m/s^2, 2 hours each in X, Y, Z directions										
EMC Directive			EN55011, EN61000-6-2, EN61000-4-2/3/4/6/8										
Mounting		Mounting orientation *13	Unrestricted in vertical/horizontal direction										
		Straight piping section *14	Not required										

* Refer to page 1112 for communication specifications.

*1: The value converted to volumetric flow rate at standard condition (20°C 1 barometric pressure (101 kPa) 65%RH).
(20°C, 1 atmospheric pressure (101kPa), 0%RH with a gas other than air.)

*2: Use dry gas which does not contain corrosive elements such as chlorine, sulfur or acids, and which is clean and does not contain dust or oil mist. When using compressed air, use clean air that complies with JIS B 8392-1:2012 Class 1.1.1 to 1.6.2. Compressed air from the compressor contains drainage (water, oil oxides, foreign matter, etc.). To maintain the function of this product, install a filter, air dryer (min. pressure dew point 10˚C or less), and oil mist filter (max. oil content 0.1 mg/m^3) on the primary side (upstream side) of this product. (Refer to page 1118 for details on recommended circuit.)
The sensor for oxygen gas is a custom model. To prevent ignition accidents, do not allow oxygen to flow again when a fluid other than oxygen has flown even once.

*3: Compressed air is used for adjusting and inspecting this product. Accuracy for gas types other than air is a guideline.

*4: Accuracy is based on a CKD standard flow rate meter. It does not indicate absolute accuracy.
Repeatability, temperature characteristics, and pressure characteristics are not included for an accuracy of ±3% F.S.
Consider separately according to the working environment and working conditions.

*5: Repeatability calculated during a short time. Change over time is not included. (Refer to the product specifications for details.)

*6: The actual response time changes depending on the piping conditions.

*7: Current for when 24 VDC is connected, and no load is applied. The current consumption will vary depending on how the load is connected.

*8: The male end is straight, and the female end is angled. (Refer to page 1114.)
Tighten the M12 connector at a torque of 0.5 N·m or less.
Note, however, that using excessive force to tighten the connector can cause it to break.

*9: The gas type switching function enables switching to argon, carbon dioxide and a gas mixture of argon 80% + carbon dioxide 20%.
The measurement flow rate ranges after switching are as follows. (Note that the gas change function cannot be set with the 500 L/min, and 1000 L/min oxygen models.)

Gas type	Flow direction	Measurement flow rate range (□/min)							
		005	010	020	100	200	500	101	201
• Air • Nitrogen • Argon • Argon 80% + carbon dioxide 20%	Uni-direction	15 to 500 mL	30 to 1000 mL	0.06 to 2.00 L	0.30 to 10.00 L	0.6 to 20.0 L	1.5 to 50.0 L	3.0 to 100.0 L	6 to 200 L
	Bi-direction	−500 to −15 mL	−1000 to −30 mL	−2.00 to −0.06 L	−10.00 to −0.30 L	−20.0 to −0.6 L	−50.0 to −1.5 L	−100.0 to −3.0 L	−200 to −6 L
		15 to 500 mL	30 to 1000 mL	0.06 to 2.00 L	0.30 to 10.00 L	0.6 to 20.0 L	1.5 to 50.0 L	3.0 to 100.0 L	6 to 200 L
• Carbon dioxide	Uni-direction	15 to 250 mL	30 to 500 mL	0.06 to 1.00 L	0.30 to 5.00 L	0.6 to 10.0 L	1.5 to 25.0 L	3.0 to 50.0 L	6 to 100 L
	Bi-direction	−250 to −15 mL	−500 to −30 mL	−1.00 to −0.06 L	−5.00 to −0.30 L	−10.0 to −0.6 L	−25.0 to −1.5 L	−50.0 to −3.0 L	−100 to −6 L
		15 to 250 mL	30 to 500 mL	0.06 to 1.00 L	0.30 to 5.00 L	0.6 to 10.0 L	1.5 to 25.0 L	3.0 to 50.0 L	6 to 100 L

*10: The integrated flow is a calculated (reference) value. When using the integrated save function, take care to prevent the number of saves from exceeding the access count limit of the storage device (1 million times). (Changes to various settings also are counted in the access count.)

$$\text{Number of saves} = \frac{\text{Usage time}}{5 \text{ mins}} < 1 \text{ million times}$$

When the instantaneous flow rate is 1% or less, the flow rate is counted as integrated flow rate.

*11: This product's protection circuit is effective only for specific misconnections and load short-circuits. It does not provide protection for all misconnections.

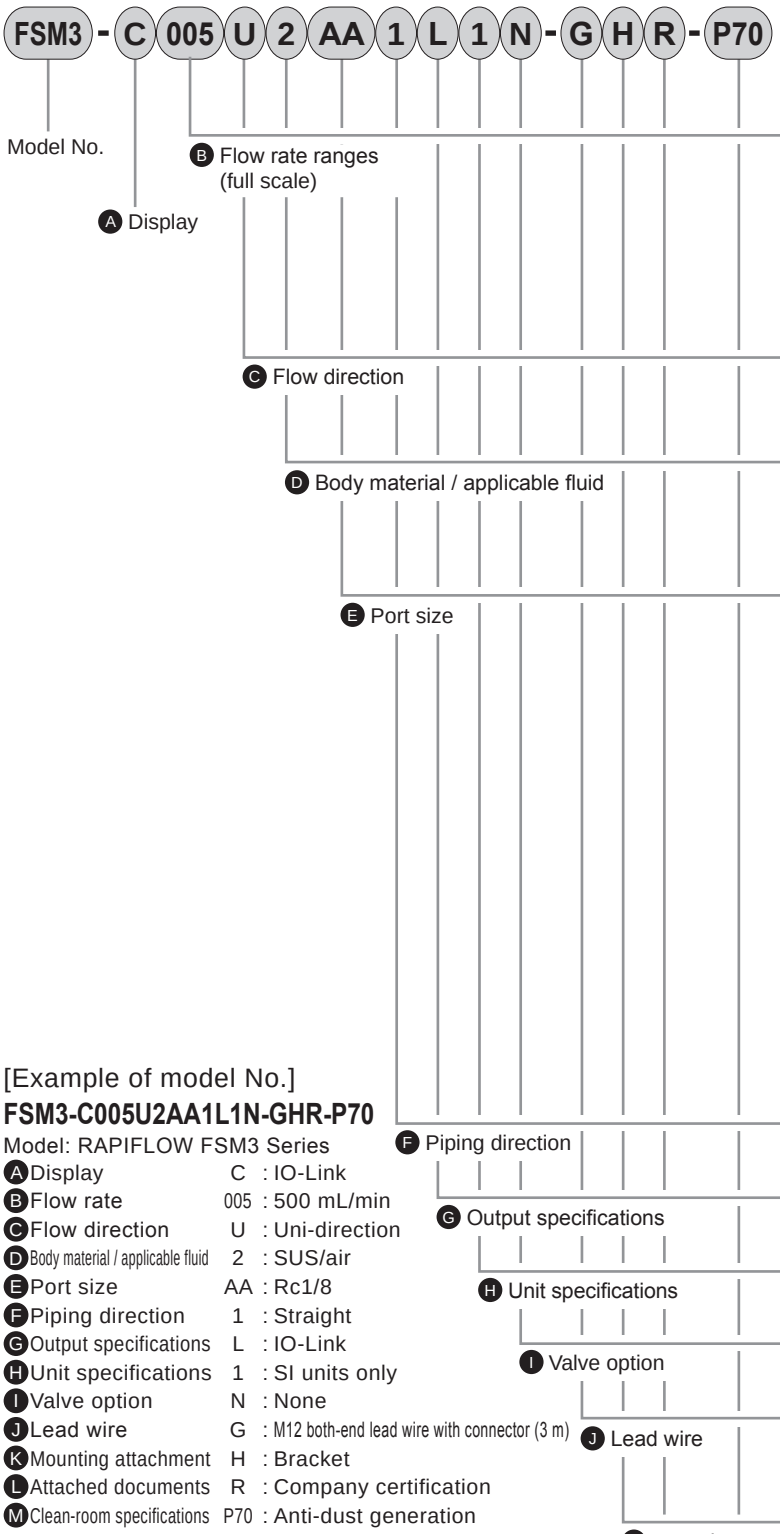
*12: A communication error might occur depending on the vibration conditions. Install this product as far as possible in a place not subject to vibration.

*13: This product measures changes in heat distribution that are caused by flow.
When this product is mounted in a vertical orientation, convective flow may affect heat distribution or cause the zero point to deviate.

*14: Accuracy may be affected by the piping conditions. To perform measurement with greater accuracy, install a straight pipe with a piping I.D. ten times larger. With the 500 L/min and 1,000 L/min models, use piping with an internal diameter of 9 mm or more. If it is less than 9 mm, accuracy may be negatively affected.

*15: Refer to page 1106 for weight.

How to order



Code	Description
A Display	
C	IO-Link

B Flow rate ranges (full scale)			
005	500 mL/min	**500**	50 L/min
010	1000 mL/min	**101**	100 L/min
020	2 L/min	**201**	200 L/min
050	5 L/min	**501**	500 L/min
100	10 L/min	**102**	1000 L/min
200	20 L/min		

C Flow direction	
U	Uni-direction
B	Bi-direction

D Body material / applicable fluid		
	Body material	Applicable fluid
2	SUS	Air (gas switchable)
3	SUS	Oxygen (oil-prohibited specifications) *2

E Port size	
AA	Rc1/8
BA	Rc1/4
CA	Rc1/2
AF	G1/8 *3
BF	G1/4 *3
CF	G1/2 *3
AB	G1/8 *4
BB	G1/4 *4
CB	G1/2 *4
AC	NPT1/8
BC	NPT1/4
CC	NPT1/2
AD	1/4" double barbed fitting (50 L/min or less)
BD	1/4" double barbed fitting (50 to 200 L/min)
AE	1/4" JXR male fitting (50 L/min or less)
BE	1/4" JXR male fitting (50 to 200 L/min)

F Piping direction	
1	Straight

G Output specifications	
L	IO-Link communication

H Unit specifications	
1	SI units only

I Valve option	
N	None

J Lead wire	
Blank	None
G	M12 both-end lead wire with connector (3 m)

K Mounting (not assembled) *5	
Blank	None
H	Bracket 1 (for models 200 L or less)
J	Bracket 2 (for 500 or 1000 L models)
M	DIN rail mounting (for models 200 L or less)

L Attached documents	
Blank	None
R	Company certification
S	Company certification + Traceability certification

M Clean-room specifications *8		
P70	Anti-dust generation	*6
P80	Oil free	*7

[Example of model No.]

FSM3-C005U2AA1L1N-GHR-P70

Model: RAPIFLOW FSM3 Series

A Display	C	: IO-Link
B Flow rate	005	: 500 mL/min
C Flow direction	U	: Uni-direction
D Body material / applicable fluid	2	: SUS/air
E Port size	AA	: Rc1/8
F Piping direction	1	: Straight
G Output specifications	L	: IO-Link
H Unit specifications	1	: SI units only
I Valve option	N	: None
J Lead wire	G	: M12 both-end lead wire with connector (3 m)
K Mounting attachment	H	: Bracket
L Attached documents	R	: Company certification
M Clean-room specifications	P70	: Anti-dust generation

Precautions for model No. selection

*1: Refer to the correspondence table on the following page when selecting the model.
*2: "3: Oxygen" cannot be selected with 500 L/min and 1000 L/min models.
*3: The G thread connection shape is compliant with ISO16030 standards.
*4: Please refer to the external dimension diagram (Page 1090) for the G thread connection shape when making a selection. (The G thread connection shape is compliant with JIS B 2351-1, O types.)
*5: Optional parts are provided with the product. They are not assembled with the product.
*6: The product surface is degreased and cleaned before packaging, and heat-sealed into an antistatic bag on a clean bench (Class 1000 or more).
*7: In addition to P70 specifications, wetted section materials are degreased and cleaned.
*8: This cannot be selected on an oxygen type (blank only).

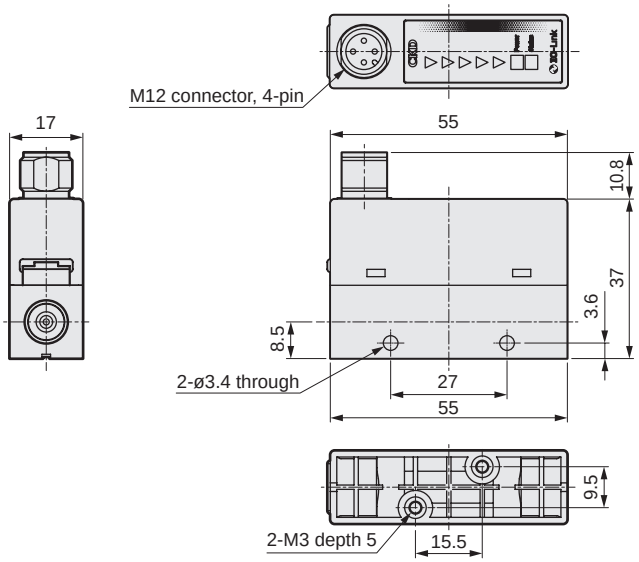
Flow rate ranges and port sizes

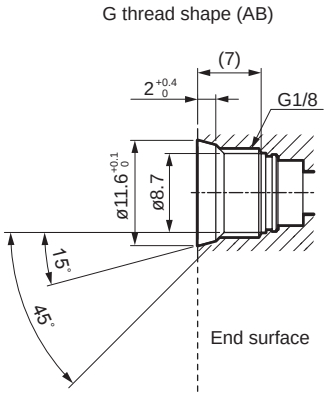
B Flow rate codes	E Port sizes															
	AA	BA	CA	AF	BF	CF	AB	BB	CB	AC	BC	CC	AD	BD	AE	BE
	Rc1/8	Rc1/4	Rc1/2	G1/8	G1/4	G1/2	G1/8	G1/4	G1/2	NPT1/8	NPT1/4	NPT1/2	1/4" Double barbed fitting		1/4" JXR Male fitting	
005	●			●			●			●			●		●	
010	●			●			●			●			●		●	
020	●			●			●			●			●		●	
050	●			●			●			●			●		●	
100	●			●			●			●			●		●	
200	●			●			●			●			●		●	
500	●	●		●	●		●	●		●	●		●	●	●	●
101		●			●			●			●			●		●
201		●			●			●			●			●		●
501			●			●			●			●				
102			●			●			●			●				

Dimensions (IO-Link) (flow rate range: 500 mL/min to 50 L/min)

Port sizes: Straight Rc1/8, G1/8, NPT1/8

● FSM3−C[B][C]$^{2}_{3}$/AA1/AB1/AC1-P70/P80 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)

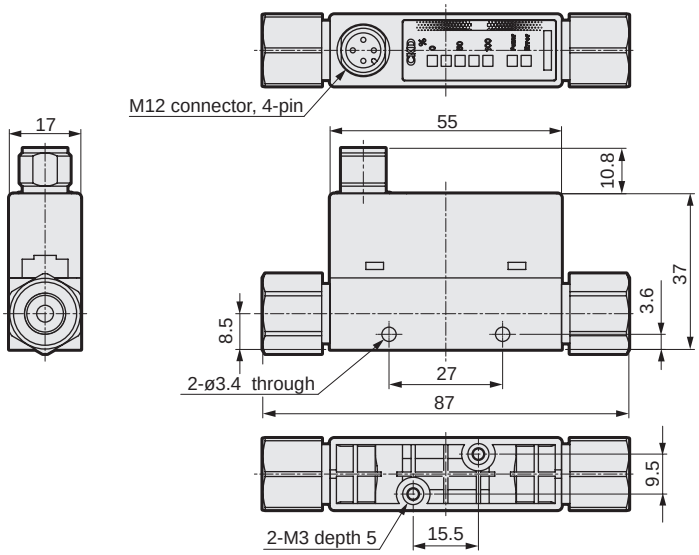




The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

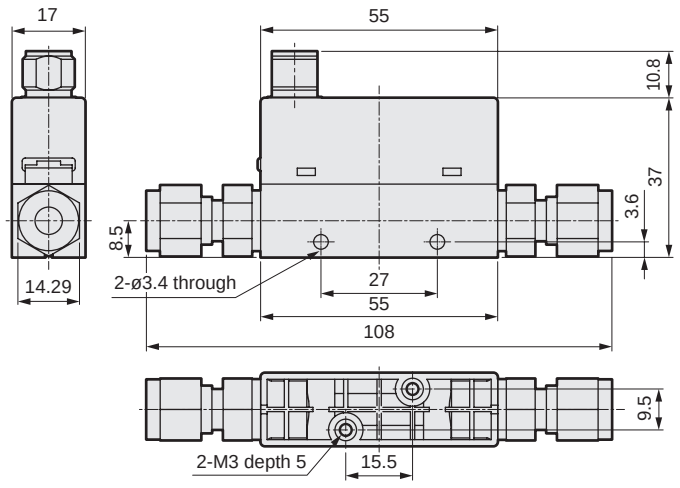
Port size: Straight G1/8

● FSM3−B[B][C]$^{2}_{3}$/AF1-P70/P80 (Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



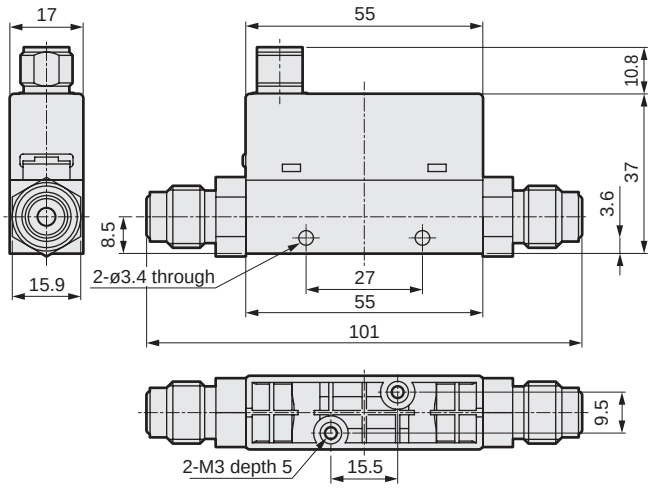
Port size: Straight 1/4" double barbed fitting

● FSM3−C[B][C]$^{2}_{3}$/AD1-P70/P80
(Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



Port size: Straight 1/4" JXR male fitting

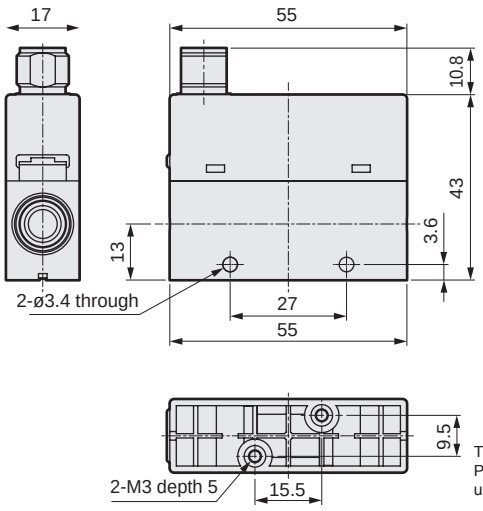
● FSM3−C[B][C]$^{2}_{3}$/AE1-P70/P80
(Full scale flow rates: 500 mL/min, 1, 2, 5, 10, 20, 50 L/min)



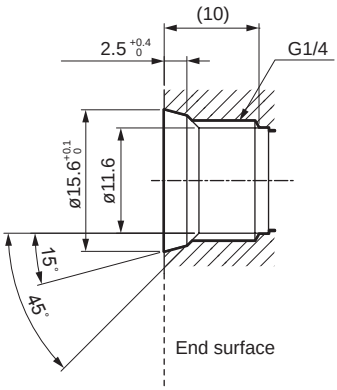
Dimensions (IO-Link) (flow rate range: 50 L/min to 1000 L/min)

Port sizes: Straight Rc1/4, G1/4, NPT1/4

● FSM3−C[B][C]$^{2}_{3}$/BA1/BB1/BC1-P70/P80 (Full scale flow rates: 50, 100, 200 L/min)



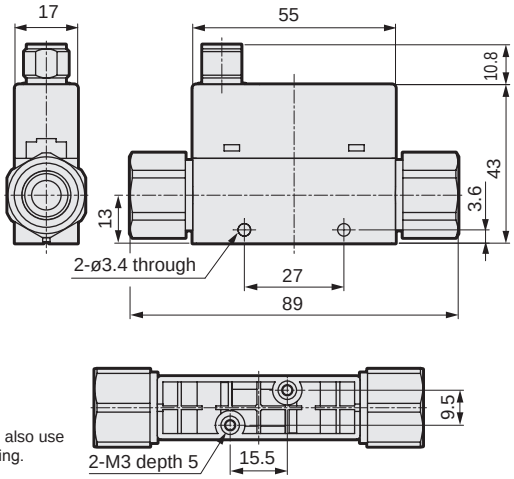
G thread shape (BB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

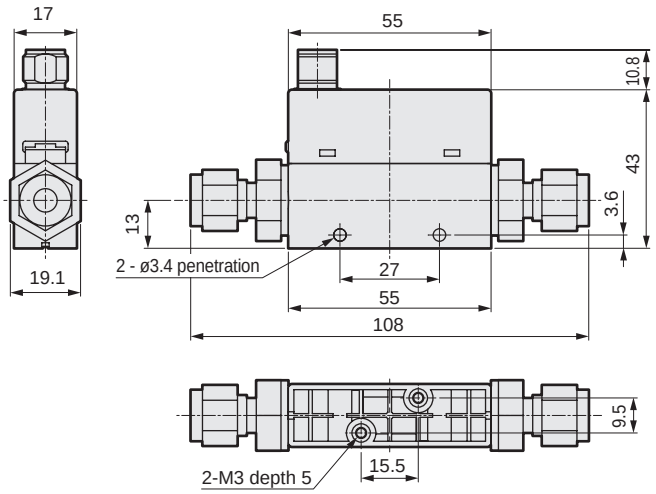
Port sizes: Straight G1/4

● FSM3−C[B][C]$^{2}_{3}$/BF1-P70/P80
(Full scale flow rates: 50, 100, 200 L/min)



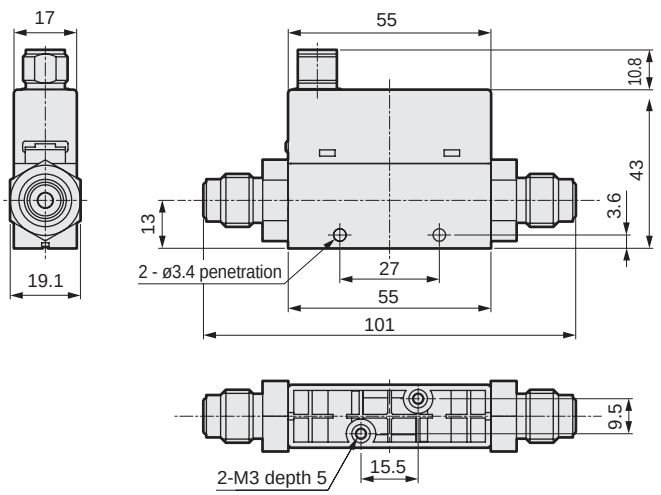
Port sizes: Straight 1/4" double barbed fitting

● FSM3−C[B][C]$^{2}_{3}$/BD1-P70/P80 (Full scale flow rates: 50, 100, 200 L/min)



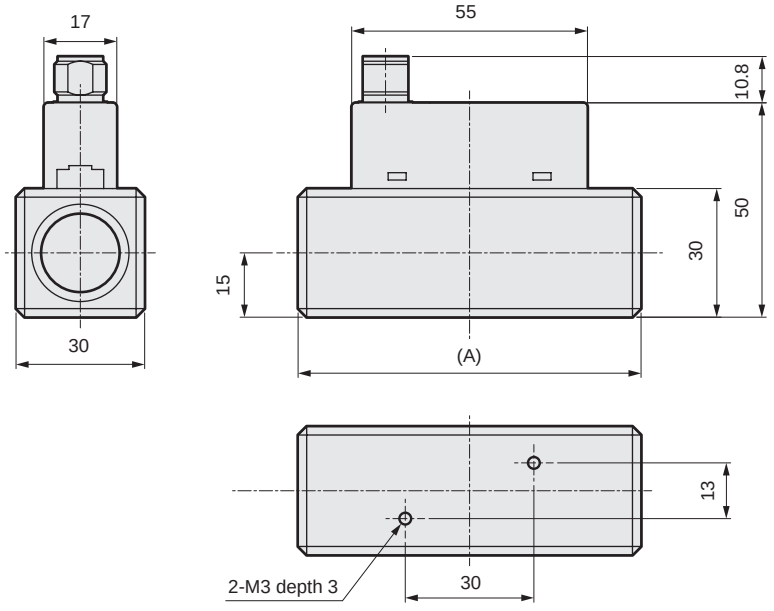
Port size: Straight 1/4" JXR male fitting

● FSM3−C[B][C]$^{2}_{3}$/BE1-P70/P80 (Full scale flow rates: 50, 100, 200 L/min)

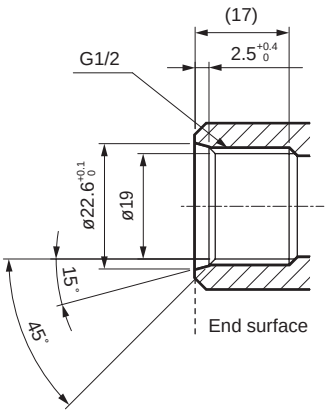


Port sizes: Straight Rc1/2, G1/2, NPT1/2

● FSM3−C[B][C]2/CA1/CF1/CB1/CC1-P70/P80 (Full scale flow rates: 500,1000L/min)



G thread shape (CB)



The 15° surface is the seal surface.
Please note that this is not an end face seal. Please also use upon confirming the thread insertion depth of the fitting.

Model No.	Port size	Dimension (A)
FSM3-C□□2CA1	Rc1/2	(80)
FSM3-C□□2CF1	G1/2	(80)
FSM3-C□□2CB1	G1/2	(95.4)
FSM3-C□□2CC1	NPT1/2	(80)

Compact flow rate sensor RAPIFLOW

FSM2 Series

Separated display

RoHS

Separated display specifications

Item				Separated display FSM2−D−[*1][*2]−□−[*3]	
Settable flow rate range			*1	mL	5, 10, 50, 100, 500, 1000
				L	2, 4, 5, 10, 12, 20, 25, 32, 50, 100, 200, 500, 1000
				m^3	1.5
Operating ambient temperature/humidity				0 to 50°C	
Display				4 digit + 4 digit 2 color LCD	
Input voltage				1 to 5 V	
Output	Switch output	*1	N	Output 2 points (NPN open collector output, 50 mA or less, voltage drop 2.4 V or less)	
			P	Output 2 points (PNP open collector output, 50 mA or less, voltage drop 2.4 V or less)	
	Analog output	*2	V	1 to 5 V voltage output 1 point (connecting load impedance 50 kΩ or more) *6	
			A	4 to 20 mA current output 1 point (connecting load impedance 0 to 300 Ω)	
Power supply voltage		*2	V	12 to 24 VDC (10.8 to 26.4 V)	
			A	24 VDC (21.6 to 26.4 V)	
Current consumption			*2	40 mA or less (when 24 VDC is connected, and no load is connected)	
Lead wire				ø3.7, AWG26 or equivalent × 5-conductor (connector), insulator O.D. ø1.0	
Functions				Flow rate display, flow rate display peak hold, switch output, analog output	
Degree of protection				IEC standards IP40 or equivalent	
Protection circuit			*3	Power supply reverse connection protection	
EMC Directive				EN55011, EN61000-6-2, EN61000-4-2/3/4/6/8	
Accessory				1 sensor connection connector (e-con), conforming cable AWG24 to 26, insulator O.D. ø1.0 to 1.2	
Weight (main body only)				Approx. 40 g	
Clean-room specifications *4		*3	P70	Anti-dust generation	

*1: The flow rate range, flow direction, and gas type are automatically recognized only when the FSM3 bar display type and FSM2 separated display type are connected. (Default state)
The FSM-H Series, FSM-V Series and WFK3000 Series flow rate ranges are supported in addition, but automatic recognition is not. Always set the product's flow rate range, flow direction and gas type before use.
The connectable flow rate ranges are shown in "Display for each flow rate range" below.
The "Gas Type Setting" function of this product is not a "Gas Type Switching" function that switches the sensor characteristics to match the gas type. If a "Gas Type Switching" function is required, use the LCD display type.
When the sensor section is changed, the previous flow rate range settings, etc., will still be recorded. Always reset the settings before using.
*2: Current for when 24 VDC is connected, and no load is connected. The current consumption varies depending on how the load is connected.
*3: This product's protection circuit is effective only for specific mis-connections and a load short-circuit. It does not provide protection against various mis-connections.
*4: [P70] Anti-dust generation (product surface is degreased and cleaned before packing. Heat sealed into antistatic bag in clean bench (Class 1000 or higher).)
*5: When connecting to the FSM-V Series or WFK3000 Series, the lead wire size is different so a separate compatible sensor connection connector (e-con) will be required. Contact your nearest CKD sales office or dealer.
The attached sensor connection connector (e-con) can be used with the FSM2 Series, FSM3 Series and FSM-H Series.
*6: The output impedance of the analog output section is approx. 1 kΩ. If the impedance of the connecting load is small, output and error increase. Check error with the impedance of the connecting load before using.
*7: The gas type display shows “Ai” (air, N2) when a connection is made with FSM3 bar display type oxygen specifications, but it can still be used without any problems.

Display for each flow rate range

Flow rate display																								
	Display range	One way	0 to 500 mL/min	0 to 1000 mL/min	0 to 2.00 L/min	0 to 4.00 L/min	0 to 5.00 L/min	0 to 10.00 L/min	0 to 12.0 L/min	0 to 20.0 L/min	0 to 25.0 L/min	0 to 32.0 L/min	0 to 50.0 L/min	0 to 100.0 L/min	0 to 200 L/min	0 to 500 L/min	0 to 1000 L/min	0 to 1.50 m^3/min	0 to 5.00 mL/min	0 to 10.00 mL/min	0 to 50.0 mL/min	0 to 100.0 mL/min
		Bi-direction	−500 to 500 mL/min	−1000 to 1000 mL/min	−2.00 to 2.00 L/min	-	−5.00 to 5.00 L/min	−10.00 to 10.00 L/min	-	−20.0 to 20.0 L/min	-	-	−50.0 to 50.0 L/min	−100.0 to 100.0 L/min	−200 to 200 L/min	−500 to 500 L/min	−1000 to 1000 L/min	−1.50 to 1.50 m^3/min	−5.00 to 5.00 mL/min	−10.00 to 10.00 mL/min	−50.0 to 50.0 mL/min	−100.0 to 100.0 mL/min
	Display resolution		1 mL/min		0.01 L/min				0.1 L/min						1 L/min			0.01 m^3/min	0.01 mL/min		0.1 mL/min	
Integrating functions*2	Display range		9999999 mL		99999.99 L				999999.9 L						9999999 L			99999.99 m^3	99999.99 mL		999999.9 mL	
	Display resolution		1 mL		0.01 L				0.1 L						1 L			0.01 m^3	0.01 mL		0.1 mL	
	Integrated pulse output rate		5 mL	10 mL	0.02 L	0.04 L	0.05 L	0.1 L	0.12 L	0.2 L	0.25 L	0.32 L	0.5 L	1 L	2 L	5 L	10 L	15 L	0.05 mL	0.1 mL	0.5 mL	1 mL

* The corresponding sensor is the voltage (1 to 5 V) type. If the current output or other voltage output is connected, it will not operate properly.

*1: The flow rate display is rounded off at approximately ±1% or less (forced zero).
*2: The accumulated flow is a calculated (reference) value. It is reset when the power is turned OFF.

How to order

FSM2 - D - N V - 3 P - P70

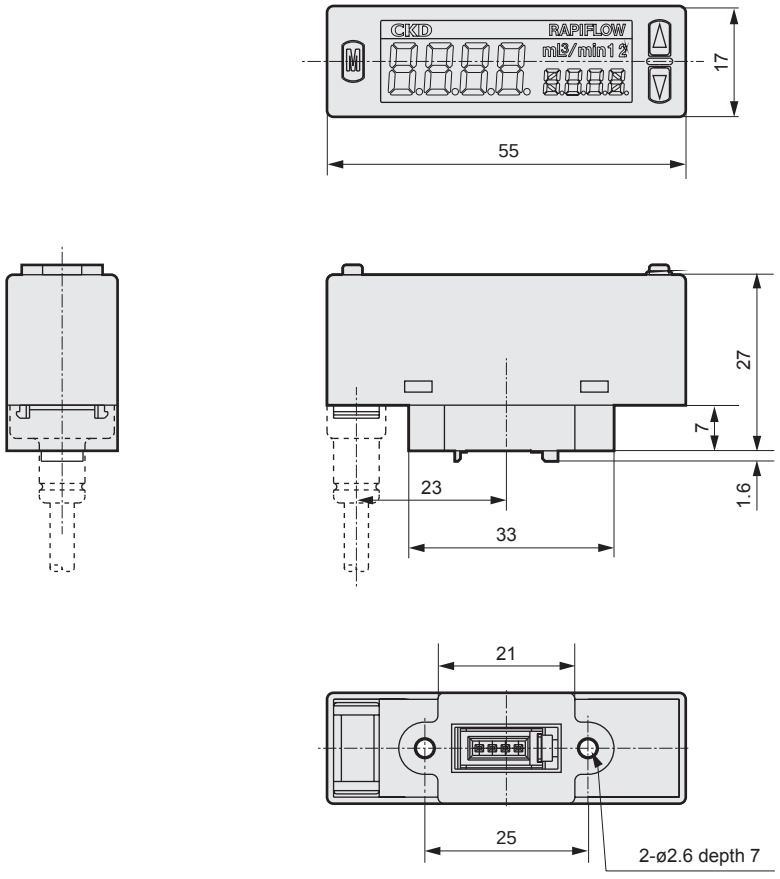
Ⓐ Output
Ⓑ Analog output
Ⓒ Lead wire
Ⓓ Bracket
Ⓔ Clean-room specifications

Code	Description
Ⓐ Output	
N	Switch output (NPN) 2 points, analog output 1 point
P	Switch output (PNP) 2 points, analog output 1 point
Ⓑ Analog output	
V	Voltage output (1-5 V)
A	Current output (4 to 20 mA)
Ⓒ Lead wire	
Blank	None
1	1 m
3	3 m
Ⓓ Bracket	
Blank	None
P	Panel mounting kit
Ⓔ Clean-room specifications	
P70	Anti-dust generation

CAUTION

The corresponding sensor is the voltage (1 to 5 V). If the current output type or other voltage output type is connected, it doesn't operate properly. When using the FSM3, use the bar display type voltage output type.

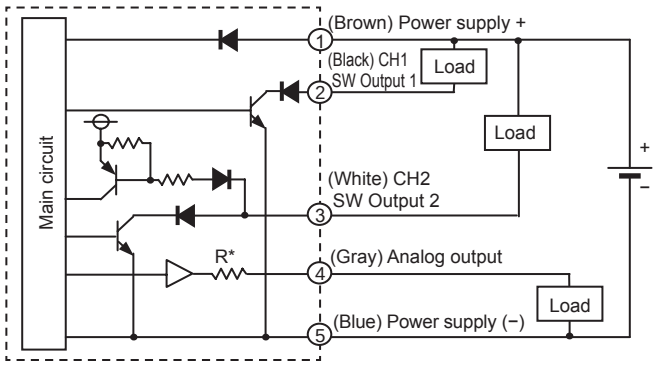
Dimensions



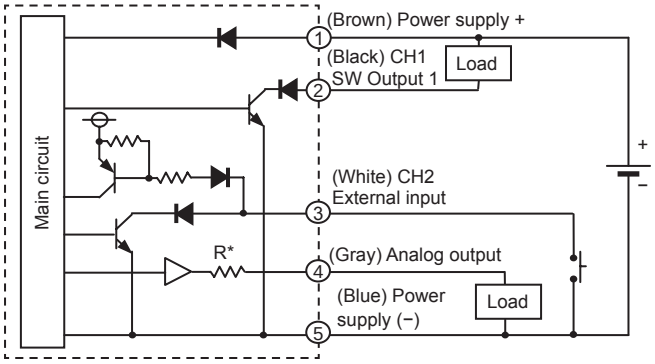
Example of internal circuit and load connection

●FSM3-L□□□□□B/F/□□ (LCD display NPN output)

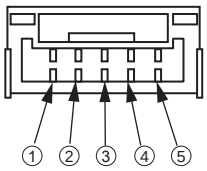
[CH2 is used as SW output]



[CH2 is used as external input]



* Analog output voltage output R: approx. 1 kΩ
Current output R: approx. 100 Ω

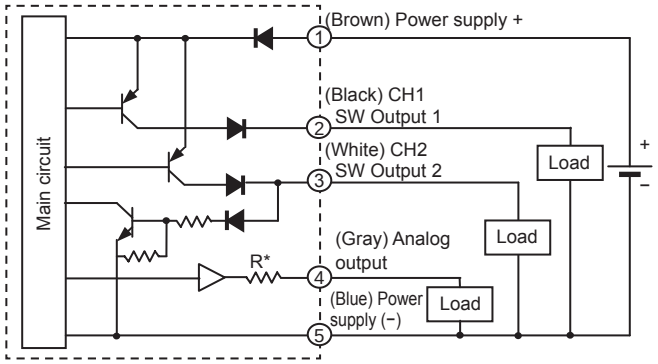


(FSM3 side)

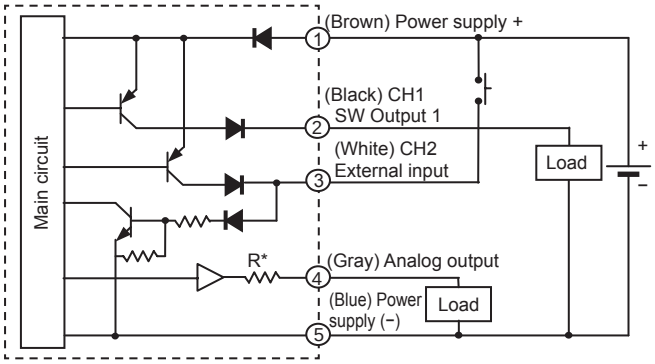
Terminal No.	Option lead wire color	Name
①	Brown	Power supply (+) (voltage output: 12 to 24 V, current output: 24 V)
②	Black	CH1 (switch output 1: max. 50 mA)
③	White	CH2 (switch output 2: max. 50 mA, or external input)
④	Gray	Analog output Voltage output: 1 to 5 V load impedance 50 kΩ or more Current output: 4 to 20 mA load impedance 300 Ω or less
⑤	Blue	Power supply − (GND)

●FSM3-L□□□□□D/H/□□ (LCD display PNP output)

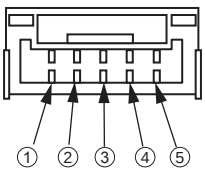
[CH2 is used as SW output]



[CH2 is used as external input]



* Analog output voltage output R: approx. 1 kΩ
Current output R: approx. 100 Ω

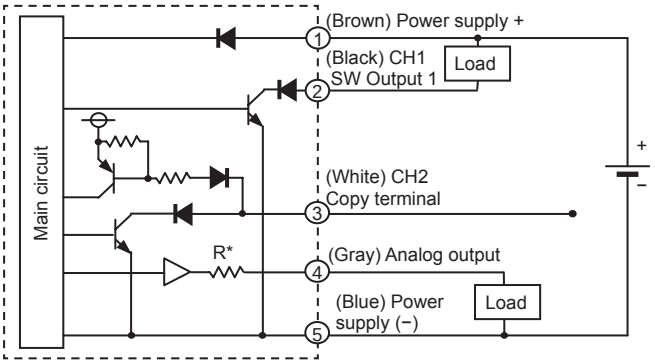


(FSM3 side)

Terminal No.	Option lead wire color	Name
①	Brown	Power supply (+) (voltage output: 12 to 24 V, current output: 24 V)
②	Black	CH1 (switch output 1: max. 50 mA)
③	White	CH2 (switch output 2: max. 50 mA, or external input)
④	Gray	Analog output Voltage output: 1 to 5 V load impedance 50 kΩ or more Current output: 4 to 20 mA load impedance 300 Ω or less
⑤	Blue	Power supply − (GND)

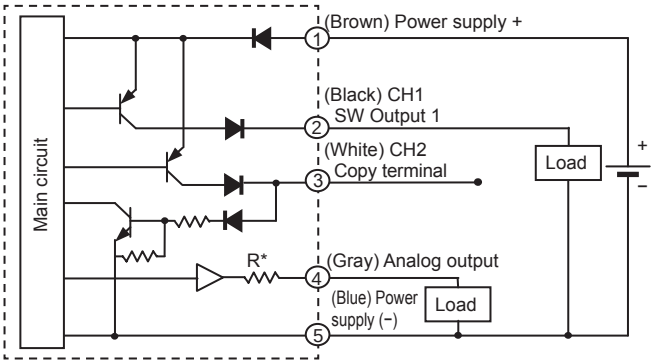
Example of internal circuit and load connection

●FSM3-L□□□□□A/E/□□
(LCD display, NPN output, with setting copy function)

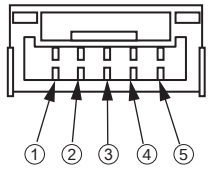


* Analog output voltage output R: approx. 1 kΩ
Current output R: approx. 100 Ω

●FSM3-L□□□□□C/G/□□
(LCD display, PNP output, with setting copy function)



* Analog output voltage output R: approx. 1 kΩ
Current output R: approx. 100 Ω

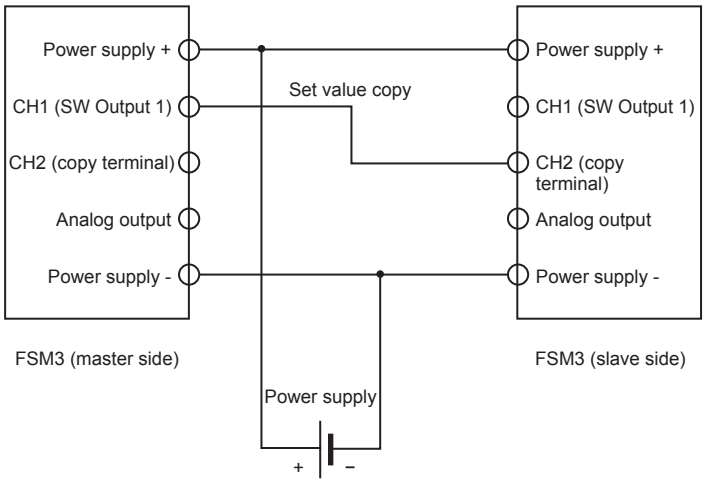


(FSM3 side)

Terminal No.	Option lead wire color	Name
①	Brown	Power supply (+) (voltage output: 12 to 24 V, current output: 24 V)
②	Black	CH1 (switch output 1: max. 50 mA)
③	White	CH2 (copy terminal)
④	Gray	Analog output Voltage output: 1 to 5 V load impedance 50 kΩ or more Current output: 4 to 20 mA load impedance 300 Ω or less
⑤	Blue	Power supply − (GND)

●FSM3-L□□□□□A/C/E/G/□□ (LCD display, with setting copy function)

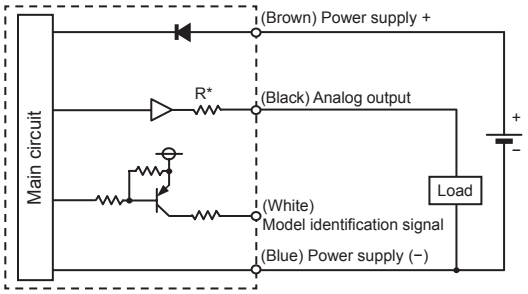
[When using setting copy function]



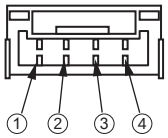
Connect CH1 (SW output 1) on the master side to CH2 (copy terminal) on the slave side and power ON the sensor to use the setting copy function (F93).
Please be sure to make this connection only when using the setting copy function.
If copying is done while load is connected with the CH1, or switching is done while connected with the CH1 and CH2 as described in the load connection example above, there may be unexpected behavior on the equipment side or malfunctioning with the equipment and FSM3.
Please be sure to never use it when it is connected to a copy terminal.

Example of internal circuit and load connection

●FSM3-B□□□□□J/K/□□ (bar display)



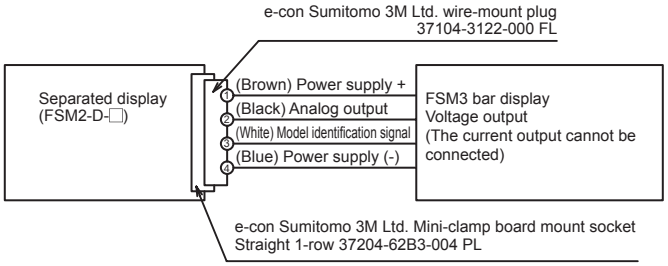
*Analog output voltage output R: approx. 1 kΩ
Analog output current output R: approx. 100 kΩ



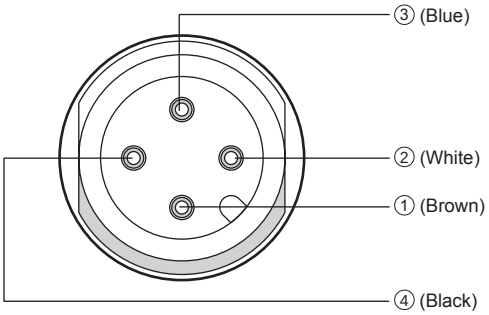
(FSM3 side)

Terminal No.	Option lead wire color	Name
①	Brown	Power supply (+) (voltage output: 12 to 24 V, current output: 24 V)
②	Black	Analog output Voltage output: 1-5 V Load impedance 50 kΩ and over Current output: 4 to 20 mA Load impedance 300 Ω or less
③	White	Model identification signal It will not connect during use with a single unit.
④	Blue	Power supply − (GND)

●Connecting the separated display and FSM3 bar display

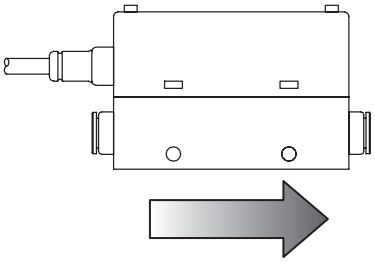
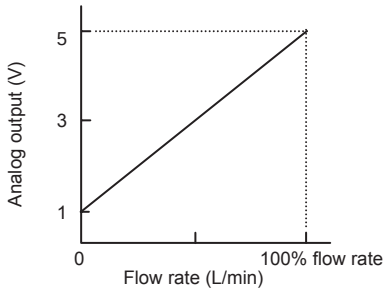
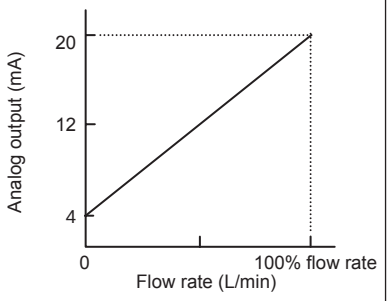
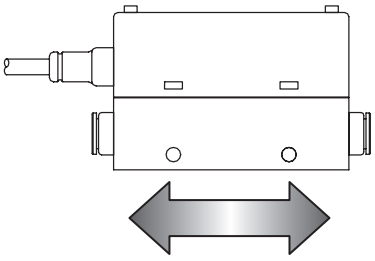
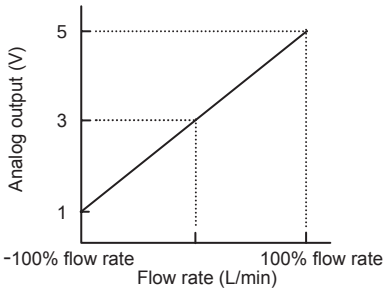
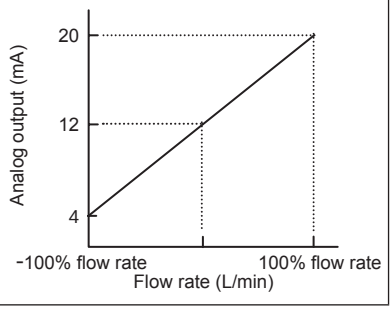


●FSM3-C□□□□□L□□ (IO-Link)



Terminal No.	Lead wire color	Name
①	Brown	Power supply + (18 to 30 V)
②	White	N.C.
③	Blue	Power supply − (GND)
④	Black	C/Q (IO-Link)

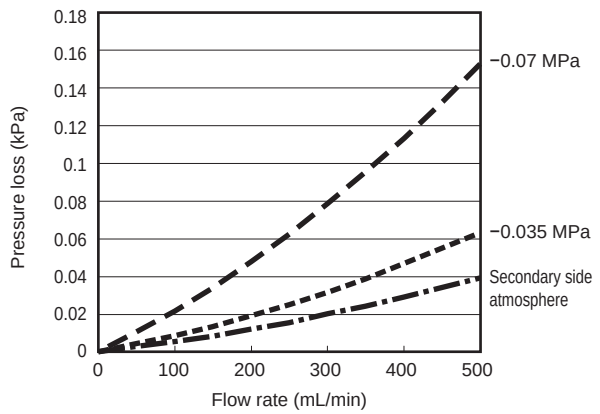
Analog output characteristics

Flow direction	Voltage output	Current output
[Uni-directional] 		
[Bi-directional] 		

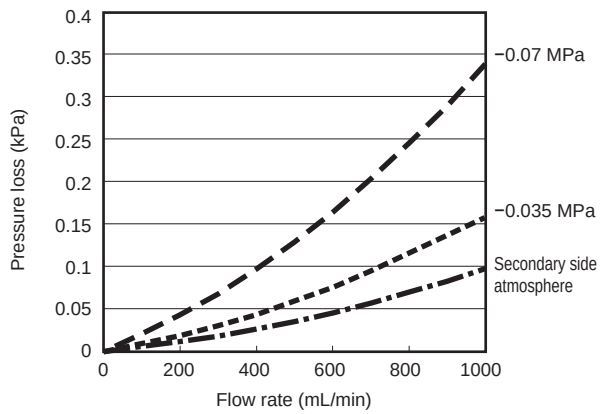
*1: The full scale of the uni-directional type is 0 to 100%, and full scale of the bi-directional type is −100% to 100%. With the display integrated bi-directional type, output can be switched to uni-directional with the button settings. The value after switching is a reference value. Refer to page 1087 for details.
*2: Refer to page 1053 for details of analog output when carbon dioxide is switched to.
*3: Outputs are made even outside the measurement flow range with analog outputs. Although accuracy is not guaranteed, outputs can be made with a voltage type with a minimum of about 0.6 V and a maximum of about 5.4 V, and with a current type with a minimum of about 2.4 mA and a maximum of about 21.6 mA.

Pressure loss characteristics (resin body, air)

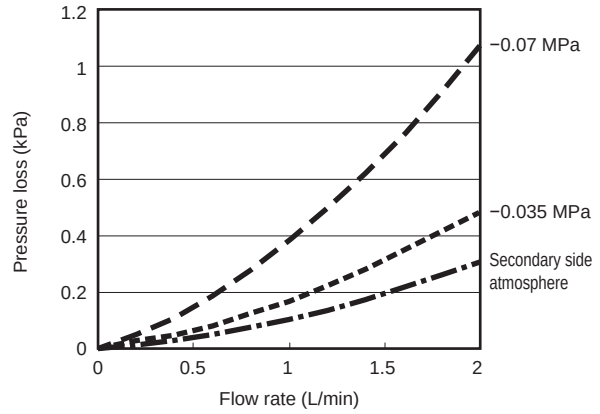
FSM3-□005□1



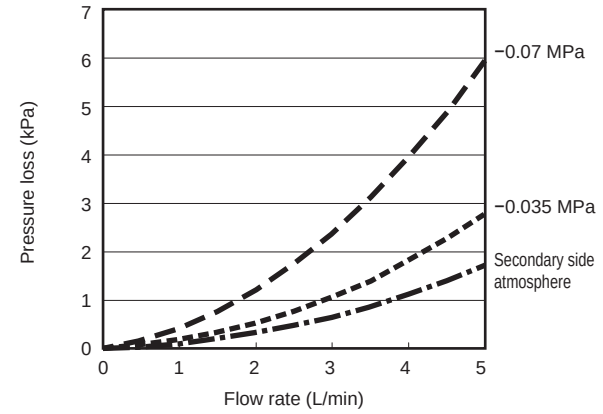
FSM3-□010□1



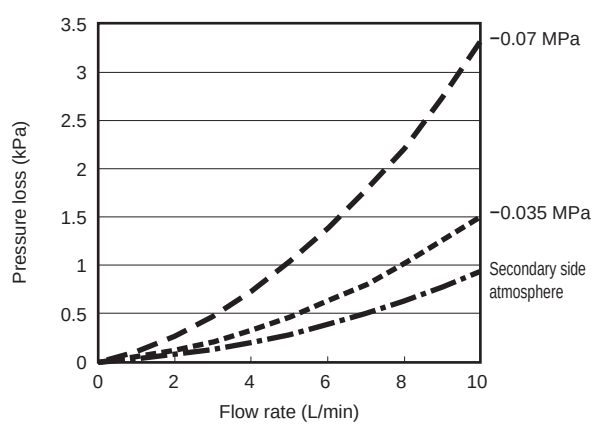
FSM3-□020□1



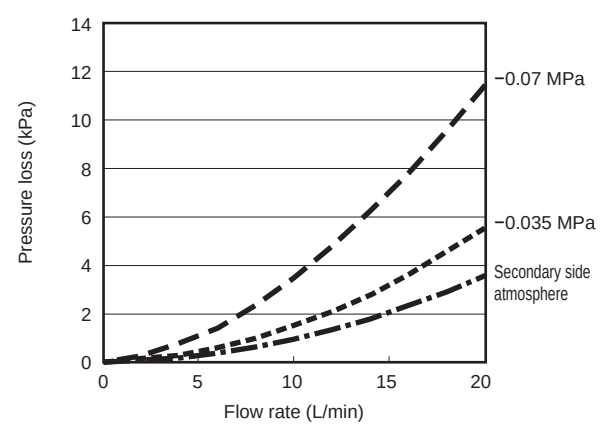
FSM3-□050□1



FSM3-□100□1

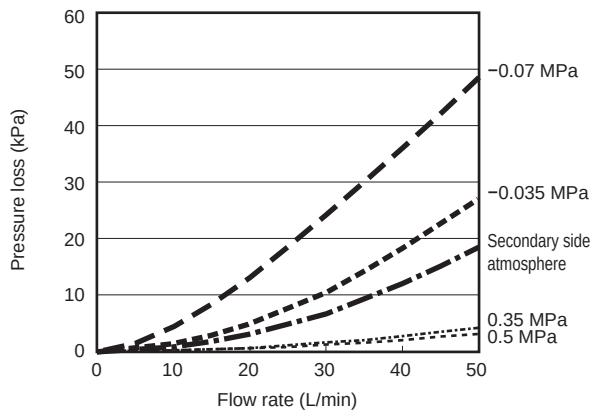


FSM3-□200□1

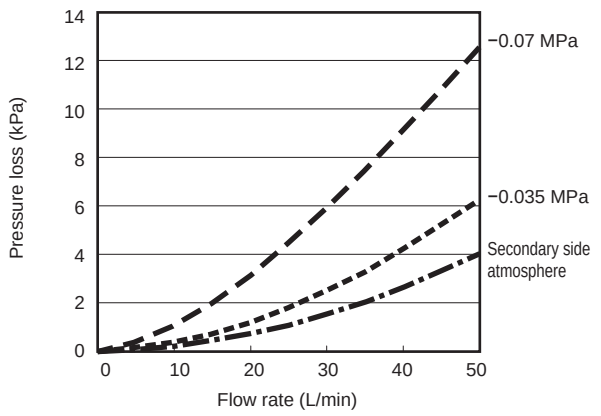


Pressure loss characteristics (resin body, air)

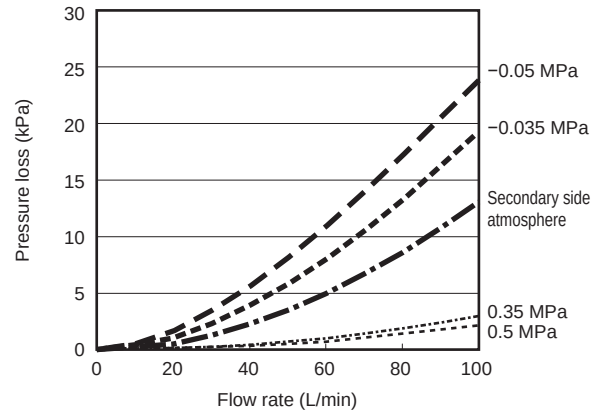
FSM3-□500□1 (small body)



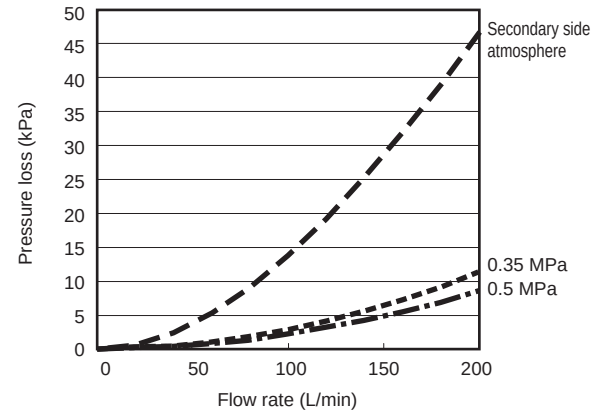
FSM3-□500□1 (medium body)



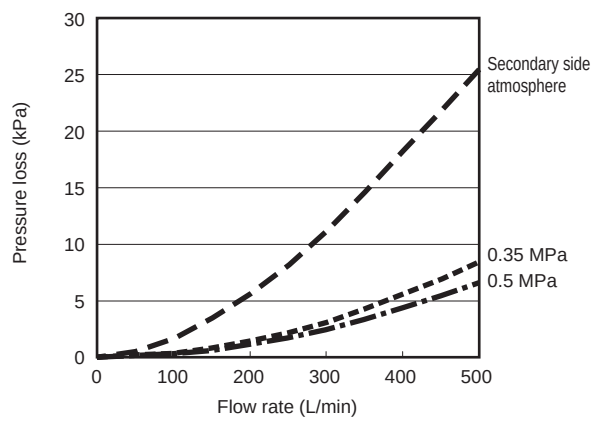
FSM3-□101□1



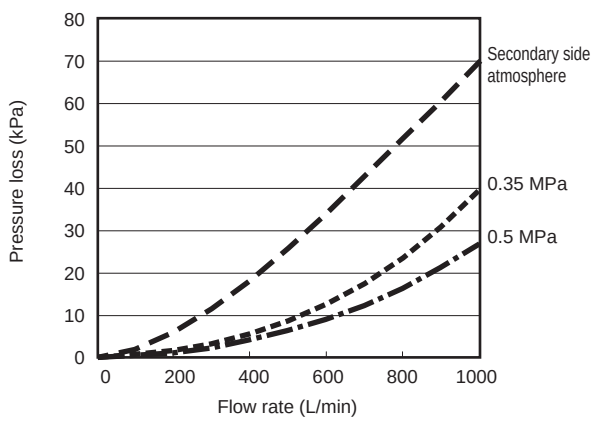
FSM3-□201□1



FSM3-□501□1

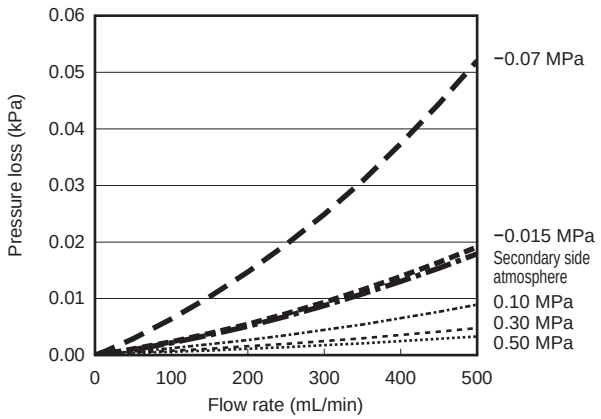


FSM3-□102□1

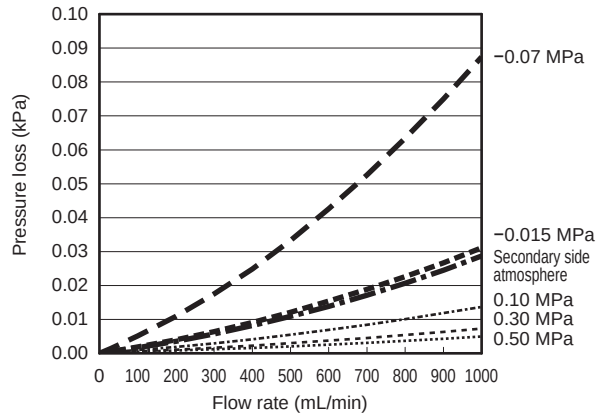


Pressure loss characteristics (stainless steel body, air)

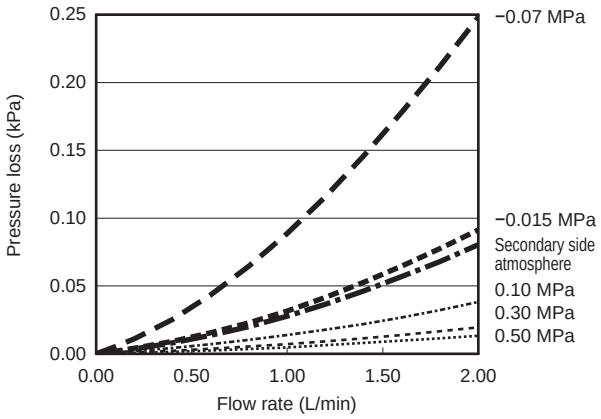
FSM3-□005U2□



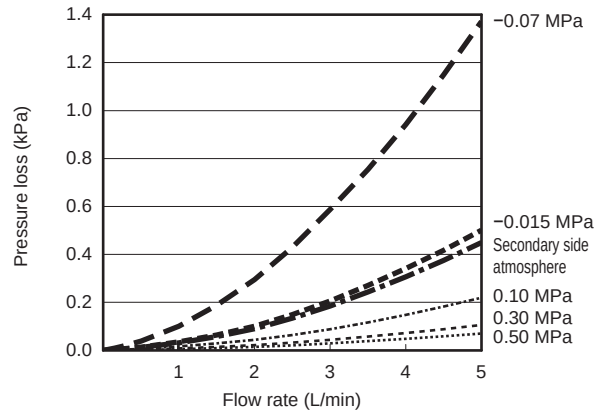
FSM3-□010U2□



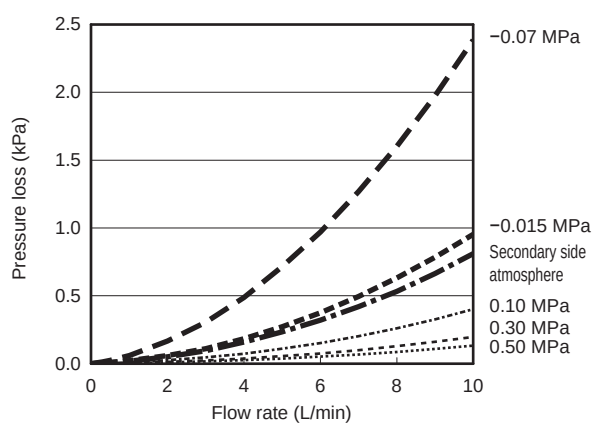
FSM3-□020U2□



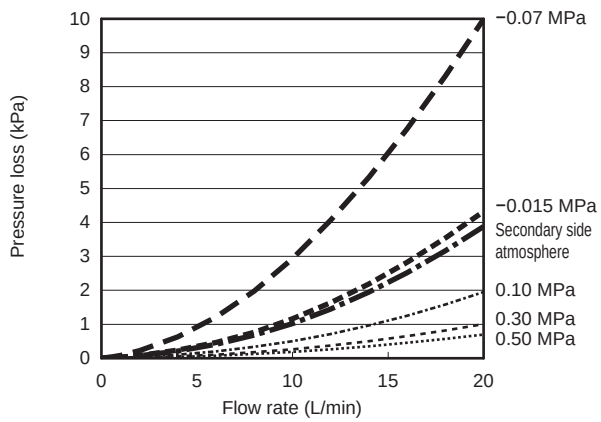
FSM3-□050U2□



FSM3-□100U2□

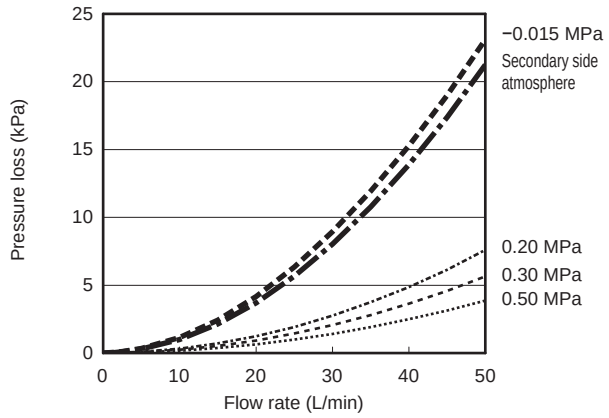


FSM3-□200U2□

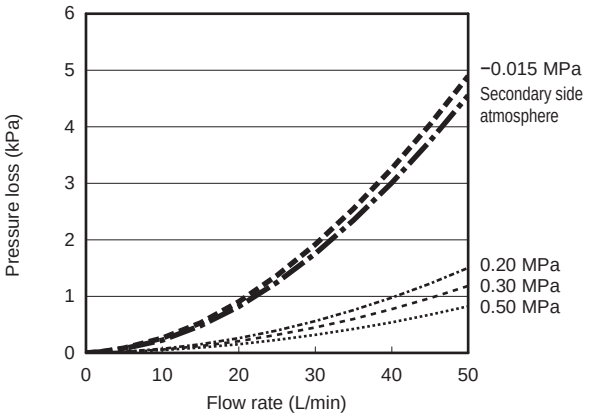


Pressure loss characteristics (stainless steel body, air)

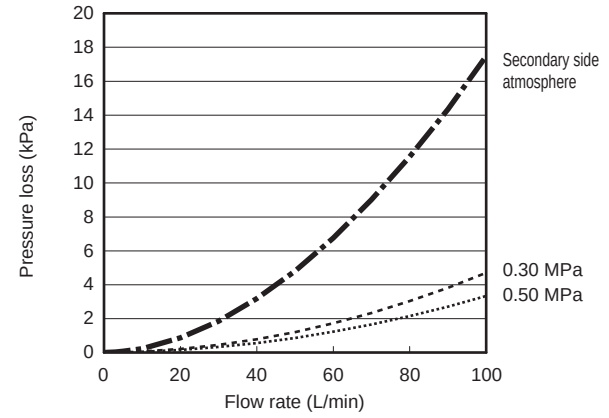
FSM3-□500U2□ (small body)



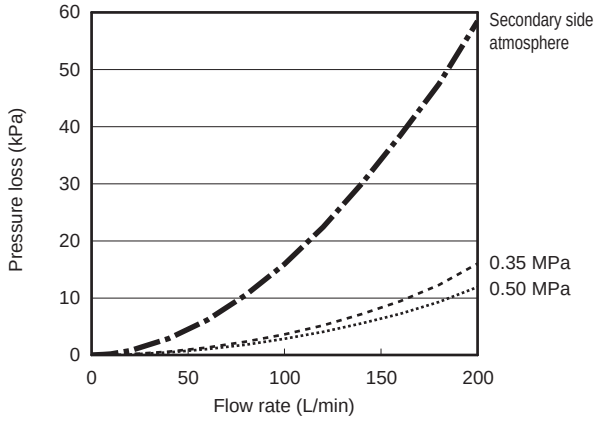
FSM3-□500U2□ (medium body)



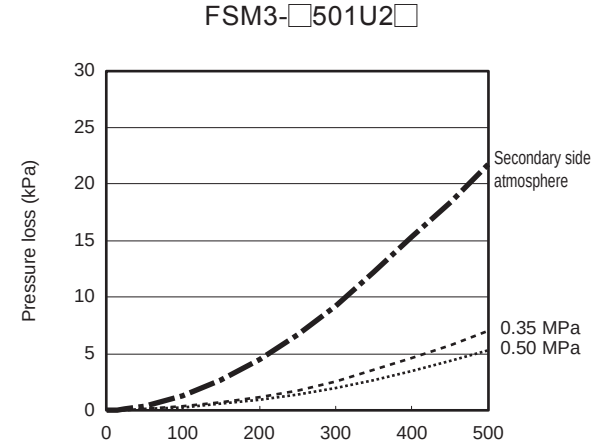
FSM3-□101U2□



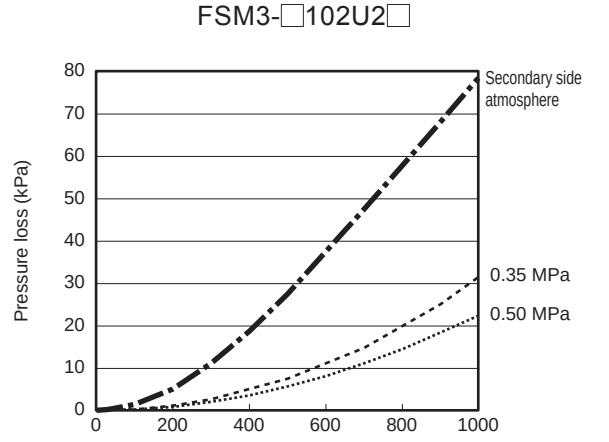
FSM3-□201U2□



FSM3-□501U2□



FSM3-□102U2□



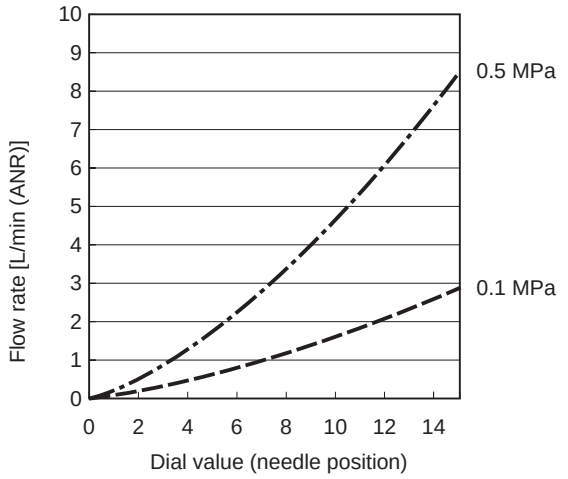
Pressure loss characteristics

The graph shows the data obtained in air.
With gases other than air, as a guideline multiply specific gravity as follows.

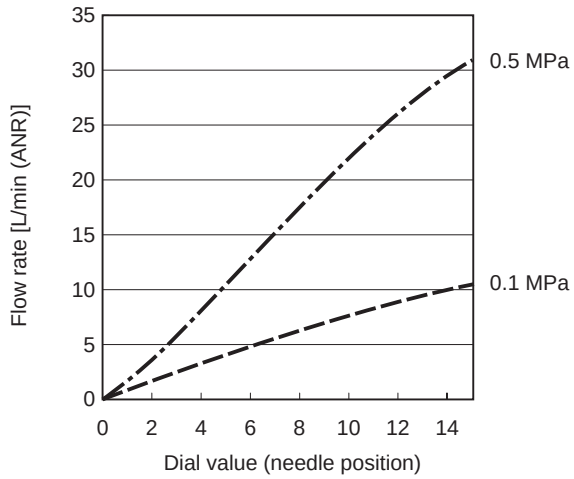
Gas	Specific gravity
Argon	1.38
Carbon dioxide	1.53
Argon 80% Carbon dioxide 20%	1.41

Needle valve flow characteristics (resin body) (for air, nitrogen gas)

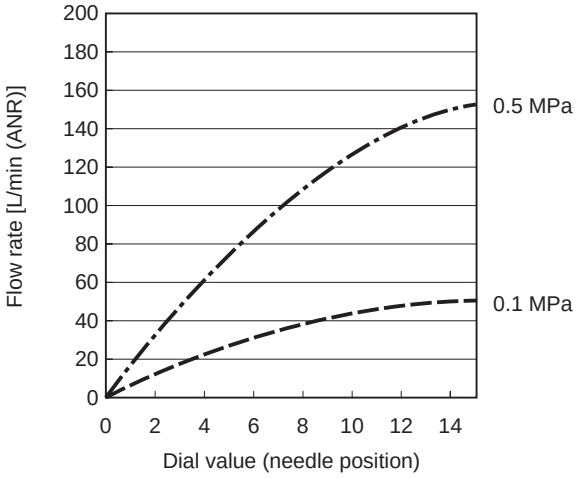
● FSM3-L005/010/020



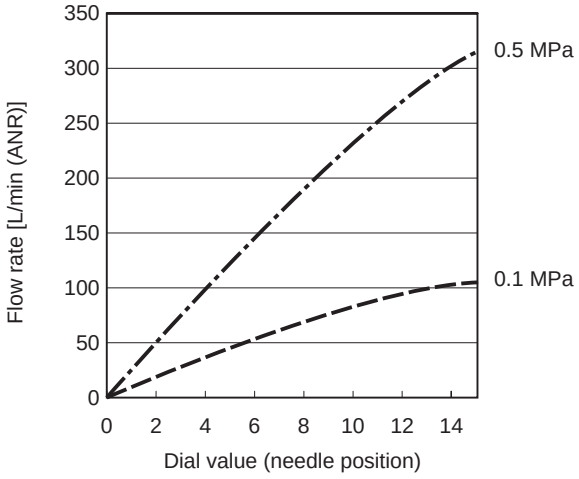
● FSM3-L050/100



● FSM3-L200/500-H04/H06

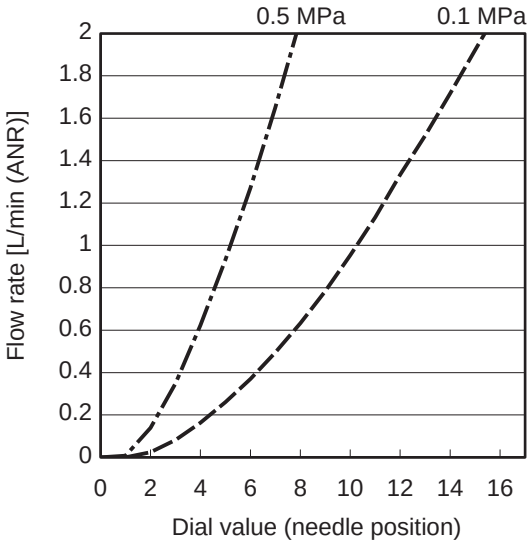


● FSM3-L500/101/201-H08/H10

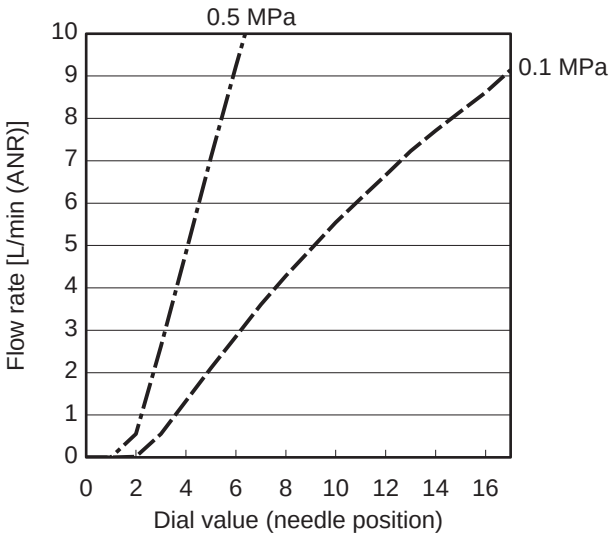


Needle valve flow characteristics (stainless steel body) (for air, nitrogen gas)

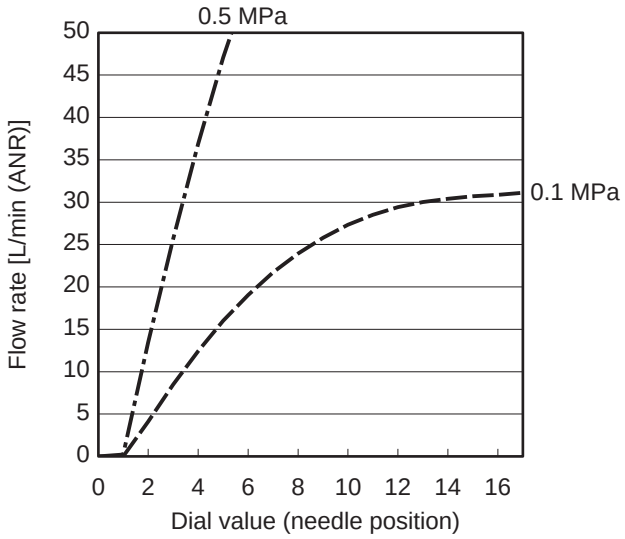
● FSM3-L005/010/020U2AA



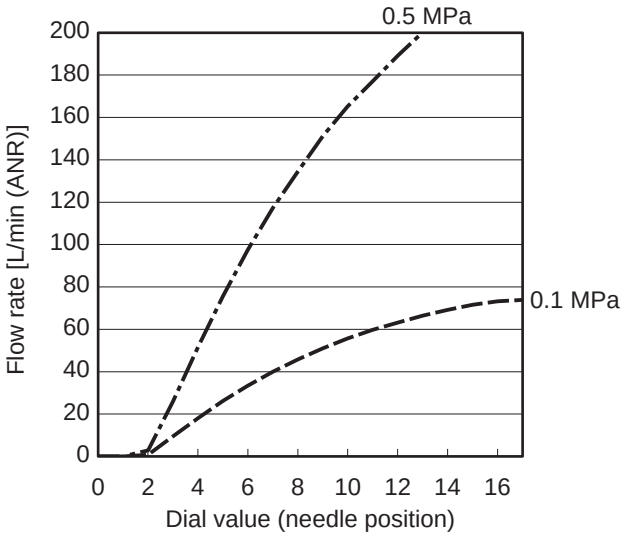
● FSM3-L050/100U2AA



● FSM3-L200/500U2AA



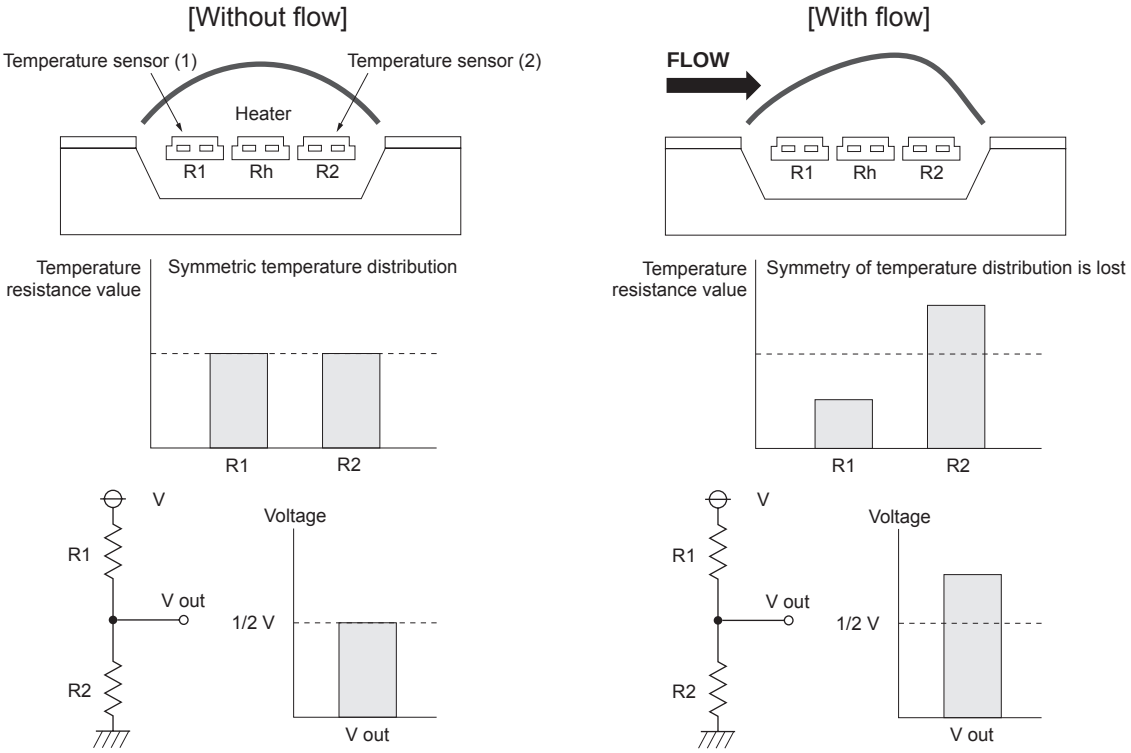
● FSM3-L500/101/201U2BA



Measurement principle of FSM3 Series

The FSM3 Series incorporates a platinum sensor chip machined with silicon micro-machining. The sensor is thermally insulated from the silicon substrate. The heating capacity is extremely low, enabling high sensitivity with a high-speed response.

At the sensor, two temperature sensors are arranged with a heater in between. Platinum, which has a resistance that changes based on temperature, is used for the temperature sensor. When the heater is turned ON and heating occurs, the temperature distribution is symmetrical to the center of the heater if there is no flow. When flow is received, the symmetrical property of the temperature distribution is lost, temperature upstream from the heater drops, and temperature downstream rises. This temperature difference appears as the difference in temperature sensor resistance, and varies with the flow rate. When the flow is reversed, the temperature difference (difference in resistance) is inverted. By using this method, the bi-directional flow rate can be detected. This method is suitable for detecting a relatively small flow rate.



1 Flow rate sensor selection method

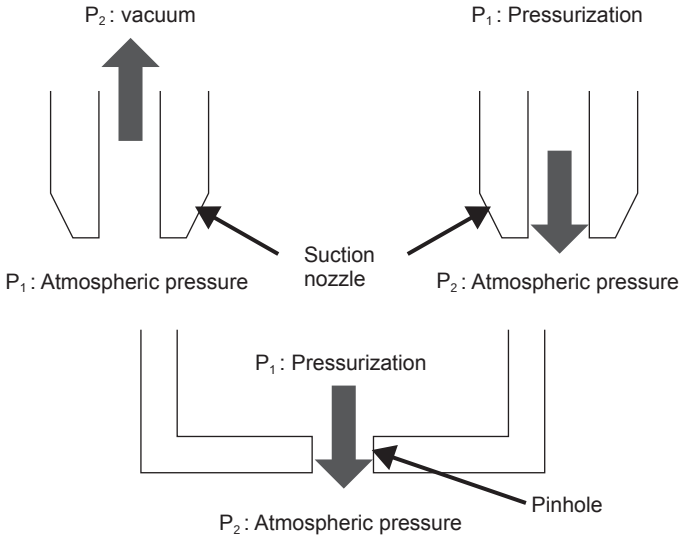
Use as a guide for selection of the flow rate range when using the flow rate sensor for suction/unload confirmation or leakage inspection, etc., with the suction nozzle.

The flow rate can be calculated using the effective cross-sectional area of nozzle (pinhole) and the pressure difference inside and outface of nozzle.

● For P1 ≥ 1.89P_2 (acoustic velocity)
$Q = 113.2 \times S \times P_1$

● For P1 < 1.89P_2 (subsonic velocity)
$Q = 226.4 \times S \times \sqrt{P_2 (P1 - P_2)}$

Q : Flow rate L/min
P_1 : Primary side absolute pressure MPa
P_2 : Secondary side absolute pressure MPa
S : Effective cross-sectional area of nozzle (pinhole) mm^2



● Example of calculation

The figure below shows the calculated value of flow rate when the nozzle diameter is ø0.1 to 2 and P2 is varied.

	P_1 (MPa) Absolute pressure	P_1 (MPa) Gauge pressure	P_2 (MPa) Absolute pressure	P_2 (MPa) Gauge pressure	Acoustic velocity/subsonic velocity	Calculated flow rate value (L/min)								
						ø0.1	ø0.2	ø0.3	ø0.4	ø0.5	ø0.7	ø1	ø1.5	ø2
Vacuum	0.1013	0	0.0313	−0.07	Acoustic velocity	0.090	0.360	0.810	1.440	2.250	4.411	9.002	20.254	36.007
	0.1013	0	0.0413	−0.06	Acoustic velocity	0.090	0.360	0.810	1.440	2.250	4.411	9.002	20.254	36.007
	0.1013	0	0.0513	−0.05	Acoustic velocity	0.090	0.360	0.810	1.440	2.250	4.411	9.002	20.254	36.007
	0.1013	0	0.0613	−0.04	Subsonic velocity	0.088	0.352	0.792	1.408	2.200	4.312	8.800	19.801	35.202
	0.1013	0	0.0713	−0.03	Subsonic velocity	0.082	0.329	0.740	1.315	2.055	4.028	8.220	18.494	32.878
	0.1013	0	0.0813	−0.02	Subsonic velocity	0.072	0.287	0.645	1.147	1.792	3.512	7.166	16.125	28.666
	0.1013	0	0.0913	−0.01	Subsonic velocity	0.054	0.215	0.483	0.859	1.343	2.631	5.370	12.083	21.480
Blow (leakage inspection)	0.1113	0.01	0.1013	0	Subsonic velocity	0.057	0.226	0.509	0.905	1.414	2.772	5.657	12.727	22.626
	0.1213	0.02	0.1013	0	Subsonic velocity	0.080	0.320	0.720	1.280	2.000	3.920	8.000	17.999	31.998
	0.1413	0.04	0.1013	0	Subsonic velocity	0.113	0.453	1.018	1.810	2.828	5.543	11.313	25.454	45.252
	0.1613	0.06	0.1013	0	Subsonic velocity	0.139	0.554	1.247	2.217	3.464	6.789	13.856	31.175	55.423
	0.1813	0.08	0.1013	0	Subsonic velocity	0.160	0.640	1.440	2.560	4.000	7.840	15.999	35.998	63.996
	0.2013	0.1	0.1013	0	Acoustic velocity	0.179	0.716	1.610	2.862	4.472	8.765	17.888	40.248	71.552
	0.3013	0.2	0.1013	0	Acoustic velocity	0.268	1.071	2.410	4.284	6.694	13.119	26.774	60.242	107.096
	0.4013	0.3	0.1013	0	Acoustic velocity	0.357	1.426	3.209	5.706	8.915	17.474	35.660	80.236	142.641
	0.5013	0.4	0.1013	0	Acoustic velocity	0.445	1.782	4.009	7.127	11.137	21.828	44.547	100.230	178.186
	0.6013	0.5	0.1013	0	Acoustic velocity	0.534	2.137	4.809	8.549	13.358	26.182	53.433	120.224	213.731

(CAUTION)
● When there is a leakage in the piping, etc., the actual flow rate becomes larger than the calculated value. When selecting the flow rate, consider the amount of leakage in the piping.
● When there is a portion narrower than the suction nozzle diameter in the middle of the piping, the flow rate may be reduced to lower than the calculated value.
In addition, suction confirmation, etc., may become impossible.
● The effective cross-sectional area is just a guideline. When the nozzle is long and thin, the effective cross-sectional area becomes smaller than the opening area.
● The response time is determined by the inner volume of the piping from the flow rate sensor to suction nozzle (pinhole). For high-speed detection, reduce the inner volume of the piping as much as possible by installing a flow rate sensor near the suction nozzle, etc.

Product weight

■ Resin body

[Unit: g]

Fitting		LCD display		Bar display	IO-Link
Model No.	Description	Without needle valve	With needle valve		
BH1	Push-in (for ø4 mm straight)	60	90	50	50
CH1	Push-in (for ø6 mm straight)	50	80	40	50
DH1	Push-in (for ø8 mm straight)	80	120	70	80
EH1	Push-in (for ø10 mm straight)	80	120	70	80
HH1	Push-in (for ø1/4" straight)	60	90	50	50
JH1	Push-in (for ø3/8" straight)	80	120	70	80
AA1	Rc1/8 Straight	60	90	50	50
BA1	Rc1/4 Straight	60	100	50	60
CA1	Rc1/2 Straight	120	–	110	120
AF1	G1/8 Straight	70	100	60	70
BF1	G1/4 Straight	85	125	75	85
CF1	G1/2 Straight	120	–	110	120
AB1	G1/8 Straight	60	90	50	60
BB1	G1/4 Straight	70	110	60	70
CB1	G1/2 Straight	140	–	130	140
AC1	NPT1/8 Straight	50	80	50	50
BC1	NPT1/4 Straight	60	100	50	60
CC1	NPT1/2 Straight	120	–	110	120
BH2	Push-in (for ø4 mm elbow)	70	100	60	60
CH2	Push-in (for ø6 mm elbow)	60	90	50	60
DH2	Push-in (for ø8 mm elbow)	100	140	90	90
EH2	Push-in (for ø10 mm elbow)	100	140	90	100
HH2	Push-in (for ø1/4" elbow)	70	100	60	60
JH2	Push-in (for ø3/8" elbow)	100	140	90	100
AA2	Rc1/8 Elbow	70	100	60	60
BA2	Rc1/4 Elbow	80	120	70	80
AF2	G1/8 Elbow	80	110	70	80
BF2	G1/4 Elbow	105	145	95	105
AB2	G1/8 Elbow	70	100	60	70
BB2	G1/4 Elbow	90	130	80	90
AC2	NPT1/8 Elbow	70	100	60	60
BC2	NPT1/4 Elbow	80	120	70	80

■ Stainless steel body

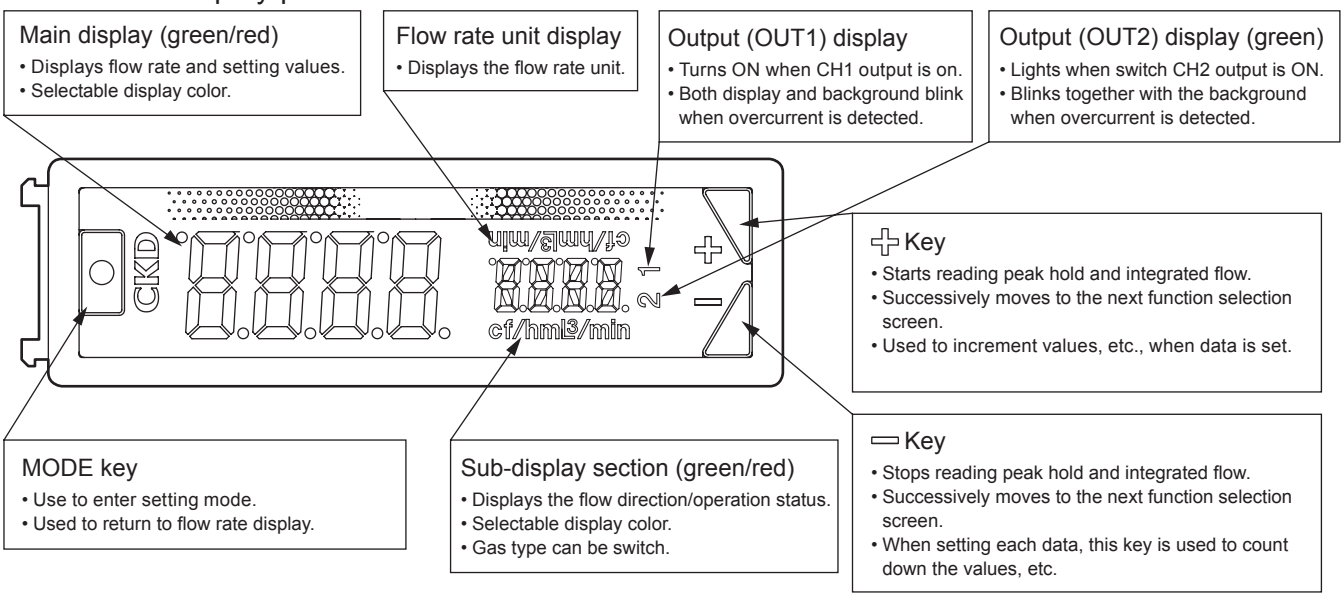
[Unit: g]

Fitting		LCD display		Bar display	IO-Link
Model No.	Description	Without needle valve	With needle valve		
AA1	Rc1/8 Straight	100	165	90	95
BA1	Rc1/4 Straight	115	200	105	110
CA1	Rc1/2 Straight	420	–	410	420
AF1	G1/8 Straight	155	220	145	150
BF1	G1/4 Straight	190	275	180	185
CF1	G1/2 Straight	420	–	410	420
AB1	G1/8 Straight	100	165	90	95
BB1	G1/4 Straight	110	195	100	105
CB1	G1/2 Straight	440	–	430	440
AC1	NPT 1/8 Straight	100	165	90	95
BC1	NPT 1/4 Straight	115	200	105	110
CC1	NPT 1/2 Straight	420	–	410	420
AD1	1/4" double barbed fitting (500 mL/min to 50 L/min)	155	220	145	150
BD1	1/4" double barbed fitting (50 L/min to 200 L/min)	190	275	180	190
AE1	1/4" JXR male fitting (500 mL/min to 50 L/min)	155	220	145	150
BE1	1/4" JXR male fitting (50 L/min to 200 L/min)	190	275	180	190

MEMO

Names and functions of display/operation section (LCD display)

● Names of display parts



● Error code

Error code	Cause	Countermeasures
	The flow rate exceeds the flow rate display range.	Reduce the instantaneous flow rate value to within the flow rate range.
	Sensor has failed.	Confirm that the flow rate is within the flow rate range, and turn power ON again. If the error is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	The flow rate is below the lower limit of the flow rate display range.	Increase the instantaneous flow rate value to within the flow rate range.
	Sensor has failed.	Confirm that the flow rate is within the flow rate range, and turn power ON again. If the error is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	An error occurred during CPU processing.	Then turn power ON again. If the abnormality is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	The zero adjustable range has been exceeded.	Make sure to set the flow rate to zero, and then perform the zero adjustment.
	An error occurred during EEPROM reading or writing operation.	Then turn power ON again. If the abnormality is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	An error occurred during memory reading or writing.	Then turn power ON again. If the abnormality is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	Sensor abnormality has occurred.	Then turn power ON again. If the abnormality is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
	Copying of settings failed.	Check connections and perform the operation again.
	Button operation is locked.	Release the lock before operating the buttons.
	A password is set.	Enter the set password. *Take care not to forget your password.
Blinking of output display (Switch output is not output)	The switch output's overcurrent protection circuit has operated.	Check whether load current exceeds the rating. Correctly connect, then turn the power ON again.

Names and functions of display/operation section (LCD display)

The functions and various settings are made during the normal flow rate display and during each mode.
Each mode is divided into a maintenance mode, SET mode and setting monitor mode according to the frequency of use.

● Normal operation (RUN mode)

Item	Explanation	Default setting
Instantaneous flow rate display	The instantaneous flow rate is displayed.	Display (measuring)
Peak hold function	Max. and min. values for the flow rate within a set interval are displayed.	Non-display (stopped)
CO_2 discharge display	By setting the power, discharge pressure, and flow rate of the compressor, as well as the power to CO2 conversion coefficient, you can learn how much CO2 is being discharged. (reference value obtained by calculation) This is available only when the gas type is set to air.	Non-display (stopped)
Integrating flow display	The integrated flow can be displayed. The switch output function includes a function to turn the switch ON/OFF at a level higher than the recommended cumulative value, and an integrated pulse function to output the pulse at a set cumulative value.	Non-display (measuring)

● SET Mode

No.	Item	Explanation	Default setting
F.01	Selection of CH1 operation	Select the CH1 setting. Switch output operation and integrated pulse can be set.	Without switch output
F.02	Selection of CH2 operation	Select the CH2 setting. Select whether to use CH2 as a switch output, or to use as an external input (integrated value reset/auto reference).	Without switch output
F.03	Integrating function settings	Whether to continuously acquire integrated flow values or set a time can be selected. Whether or not to hold that data also can be selected.	Continuous acquisition: Data hold OFF
F.04	Sub-screen display setting	Set the sub-display section's display method. The display can be switched to "flow direction", "reference state", "gas type", or "numbering display".	Flow direction
F.05	Display color setting	Set the display color. (red, green) The color for a normal display and for switch output ON can be set.	At normal: Green At switch ON: Red
F.06	Setting of flow rate direction (Bi-directional type)	Setting the flow rate direction. Setting available for bi-directional, one-side forward direction or one-side reverse direction.	Bi-direction
F.07	Display inversion function	The LCD display can be flipped vertically.	Standard display
F.08	Reference state setting	Whether to set standard state or reference state can be selected. Standard state (ANR): Converted into volumetric flow rate at 20°C, 1 barometric pressure, 65%RH (For gas types other than air: 20°C, 1 barometric pressure, 0% RH) Reference state (NOR): Converted into volumetric flow rate at 0°C, 1 barometric pressure, 0%RH	ANR
F.09	Unit setting (overseas models only)	The unit can be set. Can be selected from L/min and cf/h (cf/min).	Domestic model: L/min Overseas model: L/min
F.10	Display cycle setting	The digital display refresh cycle can be set in three stages from 0.25 sec to 1 sec. If the display flickers, it may be improved by setting a longer display refresh cycle.	0.25 sec
F.11	Analog output Setting response time	Set the response time. Analog output can be set in seven steps from 0.05 sec to approx. 1.50 sec. Chattering and mis-operation caused by sudden flow rate changes or noise are prevented.	0.5 sec
F.12	Numbering setting	Numbering can be set.	0000
F.13	Gas type switch	The measured gas can be switched. (Model with full scale flow rate of 200 L/min or below) (The gas type cannot be switched on an oxygen type.)	Air
F.14	Setting ECO mode	ECO mode can be set. If the buttons are not operated for approx. one minute, the ECO mode will activate and turn OFF the display's backlight. Current consumption can be reduced with this mode.	OFF
F.15	CO_2 discharge calculation setting	The CO_2 discharge calculation can be set. Set you compressor power, discharge pressure, flow rate, and CO_2 conversion coefficient.	• Power: 0.20 KW • Pressure : 0.10 MPa • Flow rate: 100 L/min • Conversion factor: 0.000 kg (CO_2) /kwh
F.16	Lock setting	The key lock and password methods can be set. Use these selectively depending on the working environment.	OFF
F.17	Peak hold setting	Whether to continuously acquire peak hold values or set a time can be selected. Whether or not to hold that data also can be selected.	Continuous acquisition: Data hold OFF

● Maintenance mode

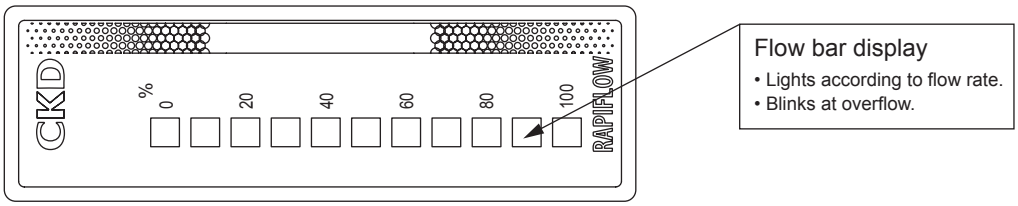
No.	Item	Explanation	Default setting
F.91	Forced output function	Use this function to forcibly turn the switch output ON and confirm the wiring connection or initial operation of the input device.	–
F.92	Zero adjustment	The zero point deviation is corrected.	Adjust value: 000
F.93	Setting copy function	Set values can be copied if the model supports copying between two FSM3's. (Copying is possible only between products with the same model No.)	–
F.99	Reset function	Returns settings to their default states.	–

● Setting monitor mode

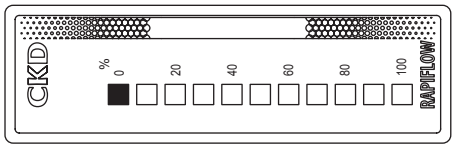
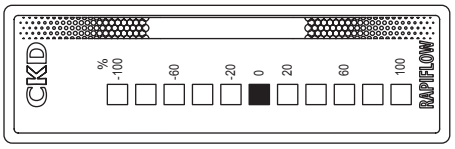
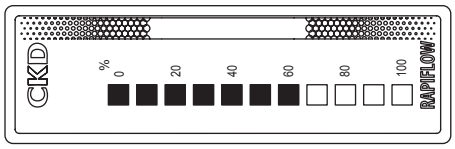
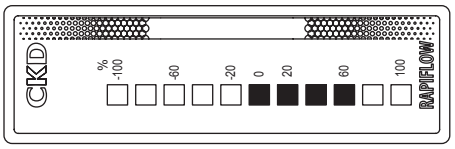
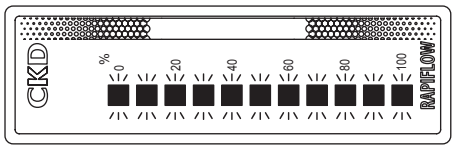
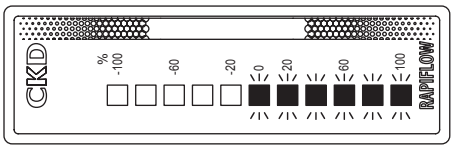
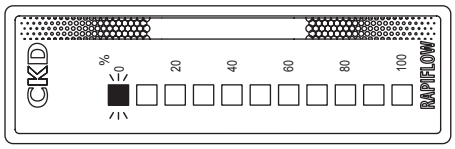
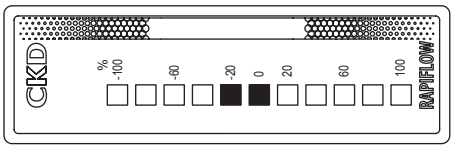
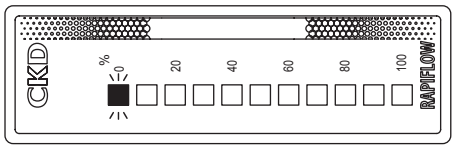
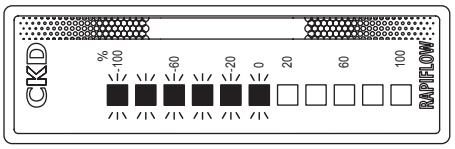
Item	Explanation	Default setting
Setting monitor function	Details set in the SET mode can be confirmed. (Setting details cannot be edited.)	–

Names and functions of display/operation section (bar display type)

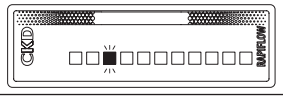
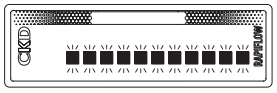
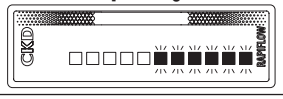
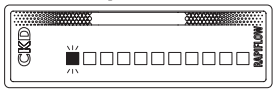
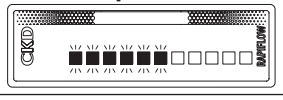
● Names of display parts



[Example] Display in the case of FSM3-B101□□□□□□□.

Flow rate	Uni-direction	Bi-directional
0%		
+60% (Forward direction)		
+110% (Forward direction) Blinks at overflow. *Blinks at +110% F.S. or more.		
−10% (Reverse direction)		
−110% (Reverse direction)		

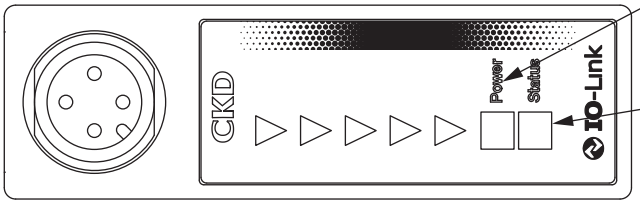
● Error code

Error code	Cause	Countermeasures
The third from left blinks 	An abnormality occurred during memory reading or writing.	Then turn power ON again. If the abnormality is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
[Uni-direction] All blink 	The flow rate exceeds the flow rate display range.	Reduce the instantaneous flow rate value to within the flow rate range.
[Bi-directional] The right half blinks 	Sensor failure	Confirm that the flow rate is within the flow rate range, and turn power ON again. If the error is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.
[Uni-direction] The leftmost blinks 	The flow rate is below the lower limit of the flow rate display range.	Increase the instantaneous flow rate value to within the flow rate range.
[Bi-directional] The left half blinks 	Sensor failure	Confirm that the flow rate is within the flow rate range, and turn power ON again. If the error is not resolved, a probable cause is a product failure. Replace the product. If you feel that there is an abnormality with the product, stop use and contact your CKD branch or dealer.

MEMO

Names and functions of display/operation section (IO-Link)

● IO-Link



Power lamp (green)
- Lights when power supply is ON.
- Blinks during IO-Link communication.

Status lamp (green, orange, red)
- Green ..... Lights when the flow rate is within the specified range.
- Orange .... On when the flow rate exceeds 100% F.S. and is 110% F.S. or below.
- Red..... On when the flow rate exceeds 110% F.S. Lights when an error occurs.

* The lamp turns off when the flow rate is under ±3% F.S.

● Communication specifications

Item	Details
Communication protocol	IO-Link
Communication protocol version	V1.1
Transmission bit rate	COM2 (38.4 kbps)
Port	Class A
Process data length (input)	4 bytes
Process data length (output)	0 byte
Min. cycle time	5 ms
Data storage	1 kbyte
SIO mode support	None

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Data name	MSB															LSB
	Instantaneous flow rate															
Data range	Refer to Table 1															
Format	Integer 16															

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Data name	Error	WARNING	-	-	-	-	Switch output		Vacant							
							2	1								
Data range	True/False															
Format	Boolean															

Data range (Table 1)

			005	010	020	050	100	200	500	101	201	501	102
Data range (□/min)	[B]	U	−50 to 550 mL	−100 to 1100 mL	−0.20 to 2.20 L	−0.50 to 5.50 L	−1.00 to 11.00 L	−2.0 to 22.0 L	−5.0 to 55.0 L	−10.0 to 110.0 L	−20 to 220 L	−50 to 550 L	−100 to 1100 L
		B	−550 to 550 mL	−1100 to 1100 mL	−2.20 to 2.20 L	−5.50 to 5.50 L	−11.00 to 11.00 L	−22.0 to 22.0 L	−55.0 to 55.0 L	−110.0 to 110.0 L	−220 to 220 L	−550 to 550 L	−1100 to 1100 L

* The data range changes when CO_2 is set as the gas type. Refer to page 1087.
* Download the IO-Link configuration files (IODD) from the CKD website (https://www.ckd.co.jp/en/).

● Explanation of functions (IO-Link)

Item	Explanation	Default setting
Instantaneous flow rate display	The instantaneous flow rate is displayed.	–
Integrating flow display	Displays the integrating flow counted after indicating to start logging.	Stop
Instantaneous flow rate peak value display (Peak hold function)	Displays the maximum and minimum instantaneous flow rate values during the period between indicating to start logging and stop logging.	Stop
Error display	Displays the error details.	–
Warning display (WARNING)	Displays the warning details.	–
Power ON time display	Displays the total power ON time from the start of use. This time is not reset even if the power turns OFF. (Also not reset when using the reset setting)	–
Operation for switch output function	The switch output operation function can be set. This function can be used to monitor whether the flow rate is within the set range or monitor whether it exceeds the set flow rate.	Not set
Flow rate standard setting	The flow rate standard can be selected. Standard condition (ANR): Converted into volumetric flow rate at 20°C, 1 barometric pressure, 65% RH (For gas types other than air: 20°C, 1 barometric pressure, 0% RH) Standard condition (NOR): Converted into volumetric flow rate at 0°C, 1 barometric pressure, 0% RH	ANR
Gas type switch	The measured gas can be switched. (Model with full scale flow rate of 200 L/min or below. The gas type cannot be switched on an oxygen type)	Air
Change travel average (Setting response time)	The travel average when measuring can be set. The average can be set in seven steps from 50 msec to 1500 msec. Chattering and mis-operation caused by sudden flow rate changes or noise are prevented.	50msec
Lock setting	Parameter Lock can be set, which disables changing the parameters of the unit. Data Storage Lock can be set, which prohibits uploading and downloading set values to the master. (Parameter Lock and Data Storage Lock and be set simultaneously)	Not set
Zero adjustment	The zero point deviation is compensated. (within ±10% F.S.)	Not set
Data storage function	Uploading set values to the master and downloading set values from the master are possible. (Can be copied by the same model No.)	–
Reset function	Returns the settings to the factory settings. (Cannot reset while Parameter Lock is enabled)	–
Unit identification function	The model No., serial No. or other unit-unique information can be confirmed on the network.	–

Optional products

Discrete option model No. method

FSM3 - **K** - **P70**

Ⓐ Option

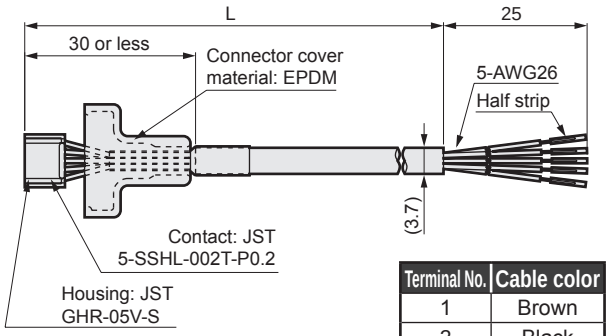
Ⓑ Clean-room specifications

Code	Description
Ⓐ Option	
A	5-conductor lead wire 1 m (for LCD display)
B	5-conductor lead wire 3 m (for LCD display)
C	4-conductor lead wire 1 m (for bar display)
D	4-conductor lead wire 3 m (for bar display)
G	M12 both-end lead wire with connector (3 m) (for IO-Link)
H	Bracket 1 (for models with a flow rate range below 200 L/min)
J	Bracket 2 (for models with a flow rate range of 500 L/min or 1000 L/min)
K	Panel mounting kit 1 (for sensor unit models with a flow rate range below 200 L/min)
L	Panel mounting kit 2 (for needle valve integrated models with a flow rate range below 200 L/min)
M	DIN rail mounting kit (for models with a flow rate range below 200 L/min)
Ⓑ Clean-room specifications	
P70	Anti-dust generation (FSM3-G-P70 cannot be selected.)

Lead wire dimensions

● FSM3−A, B-P70

5-conductor lead wire (for LCD display, for separated display)



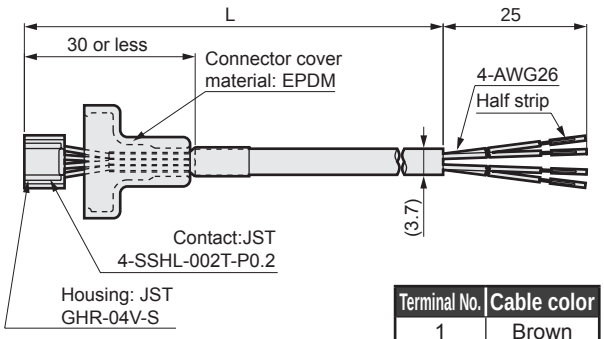
Model No.	L dimensions	Weight g
FSM3-A	1040 ±20	21
FSM3-B	3040 ±20	57

Terminal No.	Cable color
1	Brown
2	Black
3	White
4	Gray
5	Blue

Lead wire dimensions

● FSM3−C, D-P70

4-conductor lead wire (for bar display)

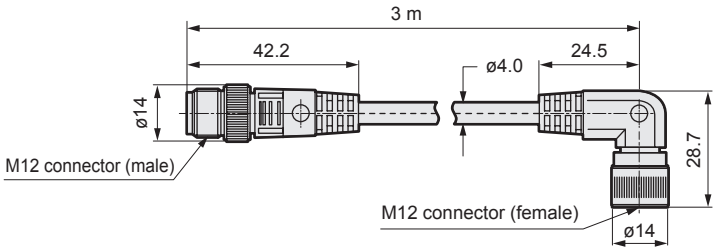


Model No.	L dimensions	Weight g
FSM3-C	1040 ±20	19
FSM3-D	3040 ±20	52

Terminal No.	Cable color
1	Brown
2	Black
3	White
4	Blue

● FSM3−G-P70

(M12 both-end lead wire with connector)

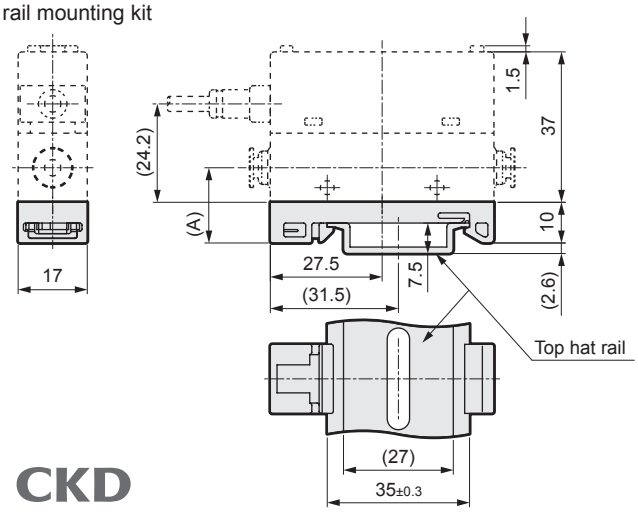


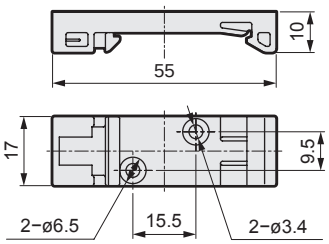
Terminal No.	Cable color
1	Brown
2	White
3	Blue
4	Black

Dimensions with options

● FSM3-M-P70

DIN rail mounting kit



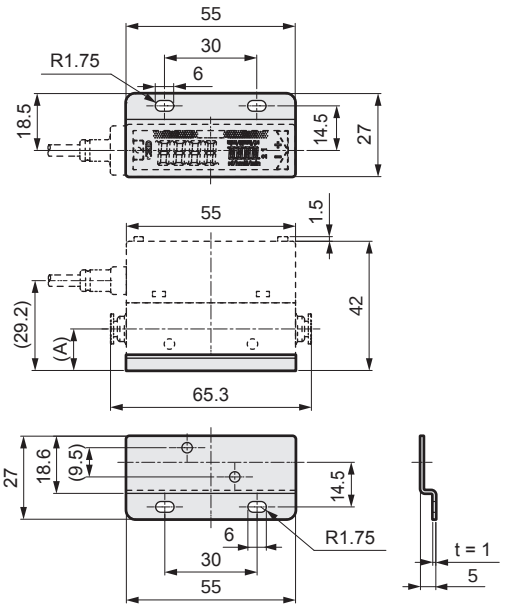


Model No.	Dimension (A)
FSM3-□□□1/BH1/CH1/HH1/AA1/AB1/AC1	18.5
FSM3-□□□1/DH1/EH1/JH1/BA1/BB1/BC1	23.0

Dimensions with options

● FSM3-H-P70

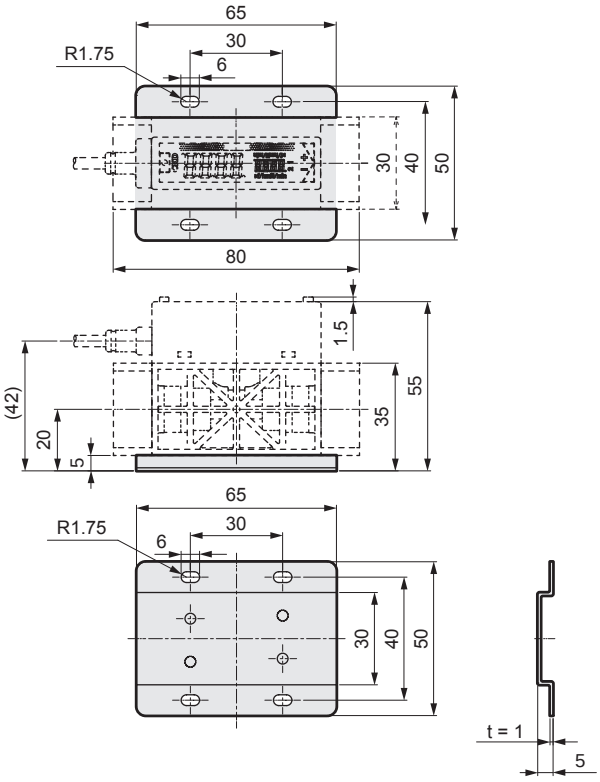
Bracket 1 (for models 200 L or less)



Model No.	Dimension (A)
FSM3-□□□1/BH1/CH1/HH1/AA1/AB1/AC1	13.5
FSM3-□□□1/DH1/EH1/JH1/BA1/BB1/BC1	18.0

● FSM3-J-P70

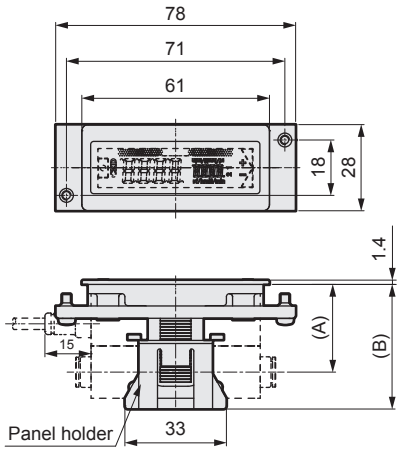
Bracket 2 (for models 500 or 1000 L)



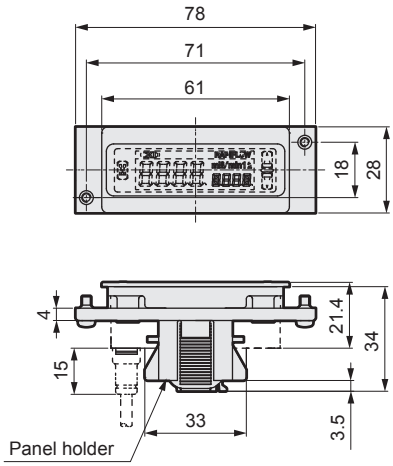
● FSM3-K-P70

Panel mounting kit 1 (for LCD display, separated display)

• LCD display

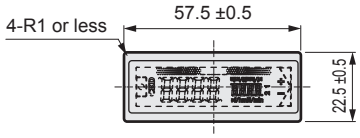


• Separated display

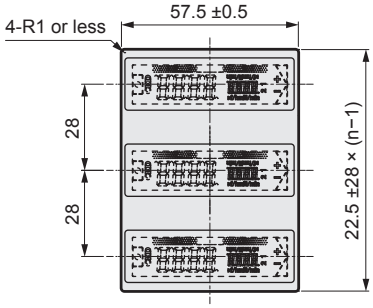


[Panel cut dimension]

In case of single installation



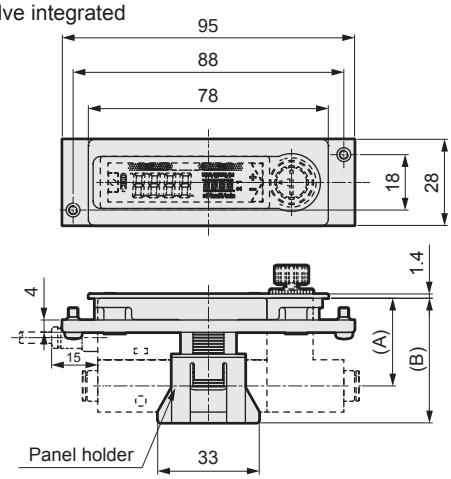
For continuous installation



● FSM3-L-P70

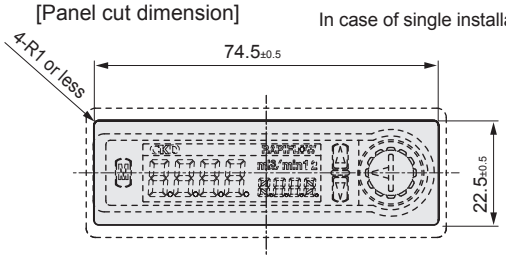
Panel mounting kit 2 (for needle valve integrated)

• Needle valve integrated



[Panel cut dimension]

In case of single installation



Model No.	Dimension (A)	Dimension (B)
FSM3-□□□1/BH2/CH2/HH2/AA2/AB2/AC2/□□□/N/T	28.5	40.5
FSM3-□□□1/DH2/EH2/JH2/BA2/BB2/BC2/□□□/N/T	30	46.5