

Miniature flow sensor  
 Small size flow sensor  
 Analog output type/switch output type

# FSM-V Series (air/nitrogen gas)

● Flow rate range:  $\pm 0.05, \pm 0.1, \pm 0.5, \pm 1, \pm 5, \pm 10$  l/min.



## Sensor specifications

Model no.	Analog output type						Switch output type						
	FSM-V-A -R0005	FSM-V-A -R0010	FSM-V-A -R0050	FSM-V-A -R0100	FSM-V-A -R0500	FSM-V-A -R1000	FSM-V-N/P -R0005	FSM-V-N/P -R0010	FSM-V-N/P -R0050	FSM-V-N/P -R0100	FSM-V-N/P -R0500	FSM-V-N/P -R1000	
<b>Descriptions</b>													
<b>Flow rate range (l/min)</b> <sup>Note 7</sup>	-0.05 to +0.05	-0.1 to +0.1	-0.5 to +0.5	-1 to +1	-5 to +5	-10 to +10	-0.05 to +0.05	-0.1 to +0.1	-0.5 to +0.5	-1 to +1	-5 to +5	-10 to +10	
Ref.: Applicable nozzle for suction/release applications	$\phi 0.1$ nozzle	$\phi 0.2$ nozzle	$\phi 0.3$ nozzle	Collet nozzle		$\phi 0.1$ nozzle		$\phi 0.2$ nozzle	$\phi 0.3$ nozzle	Collet nozzle			
<b>Working conditions</b>	<b>Working fluid</b>	Clean air (JIS B 8392-1. 1. 1 to 5. 6. 2), compressed air (JIS B 8392-1. 1. 1 to 1. 6. 2) <sup>Note 1</sup> , nitrogen gas											
	<b>Max. working pressure</b> MPa	0.2											
	<b>Min. working pressure</b> MPa	-0.1											
	<b>Withstanding pressure</b> MPa	0.3											
	<b>Ambient temperature/humidity</b> °C	0 to 50, 90%RH or less (with no dew condensation)											
	<b>Working fluid temperature</b> °C	0 to 50											
<b>Display</b>	Power display (green)						Power display (green), switch output display (yellow)						
<b>Output</b>	Analog output 1 point <sup>Note 2</sup>						Switch output 2 points <sup>Note 3</sup>						
	(1-5V voltage output, connected load impedance 50K $\Omega$ and over)						(NPN or PNP open collector output, 30 VDC 50mA or less, PLC/relay compatible)						
<b>Analog output precision</b>	<b>Linearity</b>	$\pm 5\%$ F.S. or less (0.1MPa, 25°C, flow rate range $\pm 100\%$ F.S.)						—					
	<b>Pressure characteristics</b>	$\pm 5\%$ F.S. or less (-0.09 to 0.2MPa, where 0.1MPa is reference)						—					
	<b>Temperature characteristics</b>	$\pm 0.2\%$ F.S./°C or less (15 to 35°C, where 25°C is reference)						—					
	<b>Repeatability (repeatability)</b>	$\pm 1\%$ F.S. or less			$\pm 2\%$ F.S. or less			$\pm 2\%$ F.S. or less					
<b>Responsiveness</b>	5ms or less (when discrete sensor is reaching 90% of ultimate output voltage) <sup>Note 5</sup>												
<b>Power voltage</b>	12/24 VDC (10.8 to 26.4V)												
<b>Current consumption</b>	30mA or less												
<b>Lead wire</b>	$\phi 2.6$ 0.15mm <sup>2</sup> x 3-conductor (3m)						$\phi 2.6$ 0.15mm <sup>2</sup> x 4-conductor (3m)						
<b>Installation</b>	<b>Installation attitude</b>	Free											
	<b>Strait piping section</b>	Not required											
<b>Protective structure</b>	IEC standards IP40												
<b>Vibration resistance</b>	10 to 150 Hz, double amplitude 1.5 mm, maximum 10 G, two hours each in X, Y, Z directions												
<b>EMC directive</b>	EN55011, EN61000-6-2, EN1000-4-2/3/4/6/8												
<b>Weight</b> g	Approx. 8 (excluding leads, joints)												

Note 1: Refer to the Compressed air quality classes according to JIS B 8392-1:2003 on page 1281.

Note 2: Analog output indicate 3 V when the flow is 0, and changes to the 5 V side when the lead when gas flows to the right looking at the unit with leads on the right. Analog output changes to the 1 V side when the flow is reversed.

Note 3: The Fixed hysteresis 1 boundary value judgment type switch output is used. The Output can be set within the full flow range by turning the trimmer. OUT1 and OUT2 operation modes are opposite.

Note 4: F.S. (full scale) in these specifications indicates the flow range. For example, F.S. for flow rate -10 to +10 l/min is 20 l/min.

Note 5: Response time varies depending on the piping conditions.

Note 6: When using this product to confirm suction, be sure to insert an air filter (filtration rate 30 $\mu$ m or less) between the suction nozzle and this product to prevent foreign matter from being sucked in.

A filter for drainage removal must be inserted on the primary (upstream) side when compressed air is used.

Note 7: Converted to volumetric flow at 20°C 1 barometric pressure (101 kPa).

Refrigerating type dryer

Desiccant type dryer

High polymer membrane dryer

Air filter

Auto. drain / others

F.R.L. (Module unit)

F.R.L. (Separate)

Compact F.R.

Precise regulator

F.R.L. (Related products)

Clean F.R.

Electro pneumatic regulator

Air booster

Speed control valve

Silencer

Check valve / others

Joint / tube

Vacuum filter

Vacuum regulator

Suction plate

Magnetic spring buffer

Mechanical pressure SW

Electronic pressure SW

Contact / close contact conf. SW

Air sensor

Pressure SW for coolant

Small flow sensor

Small flow controller

Flow sensor for air

Flow sensor for water

Total air system

Total air system (Gamma)

Ending

### Separated display specifications (analog output dedicated) Note 8

Model no.	Separate indicator					
Descriptions	FSM-V-DN/P-R0005	FSM-V-DN/P-R0010	FSM-V-DN/P-R0050	FSM-V-DN/P-R0100	FSM-V-DN/P-R0500	FSM-V-DN/P-R1000
Connectable analog output	FSM-V-A-R0005	FSM-V-A-R0010	FSM-V-A-R0050	FSM-V-A-R0100	FSM-V-A-R0500	FSM-V-A-R1000
Indicator	Type of display	Flow display (7-segment 3-digit, orange), run and switch output display (orange)				
	Display min. unit <small>Note 9</small>	0.1mL/min. <small>Note 7</small>	1mL/min. <small>Note 7</small>	0.01L/min. <small>Note 7</small>	0.1L/min. <small>Note 7</small>	
Output	Switch output 2 points (NPN or PNP open collector output, 30 VDC and 50 mA or less, voltage drop of 2.4 V or less, PLC- and relay-compatible) Analog output 1 point (1-5V voltage output, connected load impedance 50KΩ and over)					
Power voltage	12/24 VDC (10.8 to 26.4V)					
Current consumption	50mA or less (only indicator)					
Lead wire	φ 3.7 0.2mm <sup>2</sup> x 5 conductor (1m)					
Functions	Flow display, flow display peak hold, switch output, analog output					
Ambient temperature/humidity	0 to 50 °C, 85%RH or less (no dew)					
Protective structure	IEC standards IP40					
EMC directive	EN55011, EN61000-6-2, EN1000-4-2/3/4/6/8					
Weight	g Approx. 70 (including lead wire 1m)					

Note 8: The separate display is dedicated to analog output type. It must not be connected to switch output.

Note 9: This indicates the minimum display for the flow, and does not guarantee display accuracy.

Refrigerating type dryer
Desiccant type dryer
High polymer membrane dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

Miniature Flow sensor

## How to order

### ● Sensor

**FSM** - **V** - **A** **H** **3** - **R0005** - **H2**

Model no.

**A** Output type

**B** Lead wire direction

**C** Lead wire length

**D** Flow rate range

**E** Joint type

Symbol	Descriptions
<b>A Output type</b>	
<b>A</b>	Analog output
<b>N</b>	Switch output (NPN)
<b>P</b>	Switch output (PNP)
<b>B Lead wire direction</b>	
<b>H</b>	Axial
<b>V</b>	Radial
<b>C Lead wire length</b>	
<b>3</b>	3m
<b>D Flow rate range</b>	
<b>R0005</b>	± 0.05 l/min.
<b>R0010</b>	± 0.1 l/min.
<b>R0050</b>	± 0.5 l/min.
<b>R0100</b>	± 1 l/min.
<b>R0500</b>	± 5 l/min.
<b>R1000</b>	± 10 l/min.
<b>E Joint type</b>	
<b>H2</b>	Straight φ1.8 fiber tube
<b>H4</b>	Straight φ4 push-in
<b>HL4</b>	L type φ4 push-in
<b>M5</b>	Port size M5

### ● Separate indicator (analog output type dedicated)

**FSM** - **V** - **D** **N** - **R0050**

Model no.

**A** Switch output type

**B** Flow rate range

Symbol	Descriptions
<b>A Switch output type</b>	
<b>N</b>	NPN output
<b>P</b>	PNP output
<b>B Flow rate range</b>	
<b>R0005</b>	± 0.05 l/min.
<b>R0010</b>	± 0.1 l/min.
<b>R0050</b>	± 0.5 l/min.
<b>R0100</b>	± 1 l/min.
<b>R0500</b>	± 5 l/min.
<b>R1000</b>	± 10 l/min.

\* Refer to pages 1314 to 1321 for the operation dimensions, etc.

### ● Bracket for separate indicator

**PPD3** - **KL-D**

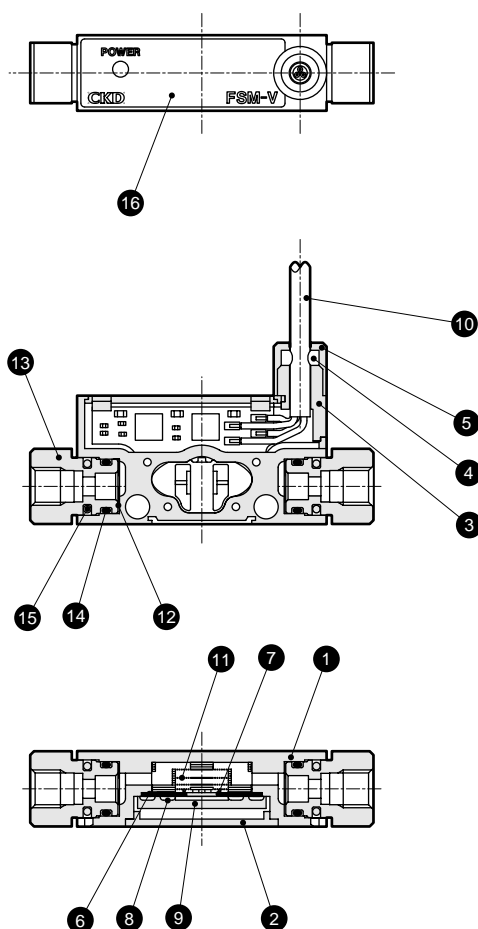
**A** Bracket kit

Symbol	Descriptions
<b>A Bracket kit</b>	
<b>KL-D</b>	Single foot bracket (L type)
<b>KD-D</b>	Both sides foot bracket (parallel)
<b>KHS-D</b>	Panel mount bracket set with cover
<b>KC</b>	Operation protective cover

\* Refer to page 1314 and 1315 for dimensions and mounting size of bracket.

### Internal structure and parts list

- For FSM-V-\*\*3-R\*-M5/analog output type  
(The switch output type internal structure is also the same.)



No.	Parts name	Material	No.	Parts name	Material
1	Body	PBT (glass fiber 30%)	9	Electron circuit board	Glass epoxy resin
2	Case	PBT (glass fiber 30%)	10	Lead wire	Halogen-free polyethylene resin blended one
3	Lead wire holder	PBT (glass fiber 30%)	11	Rectifier	Stainless steel
4	Bush	Nitrile rubber	12	Filter	Stainless steel
5	Bush holder	Aluminum alloy	13	Cartridge joint (M5)	Aluminum alloy
6	Sensor gasket	Fluoro rubber	14	O ring	Nitrile rubber
7	Sensor chip	Silicone	15	Joint fixing pin	Stainless steel
8	P tight screw	Iron steel (zinc plating)	16	Front seat	Polyester film

Note 1: Appearances of a front seat section differ in an analog output type/switch output type.

- Separate indicator FSM-V-D\*-R \*

Refer to Page 1314 for internal structure.

Refrigerating type dryer
Desiccant type dryer
High polymer membrane dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

Miniature Flow sensor

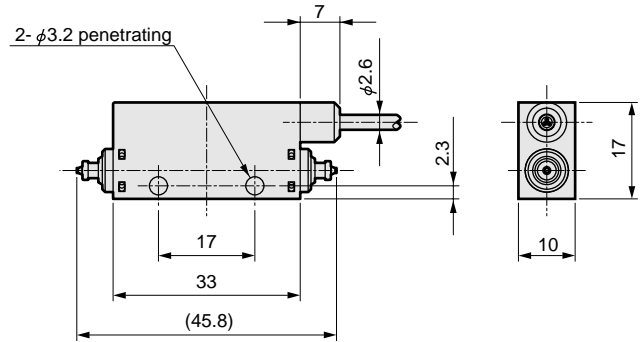
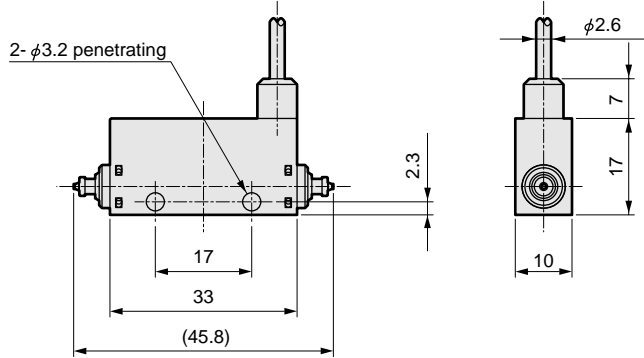
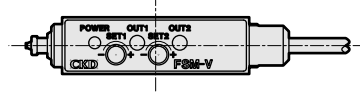
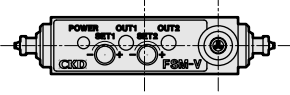


## Dimensions (analog output type, switch output type common)

Refrigerating type dryer
Desiccant type dryer
High polymer membrane dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact conf. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)
Ending

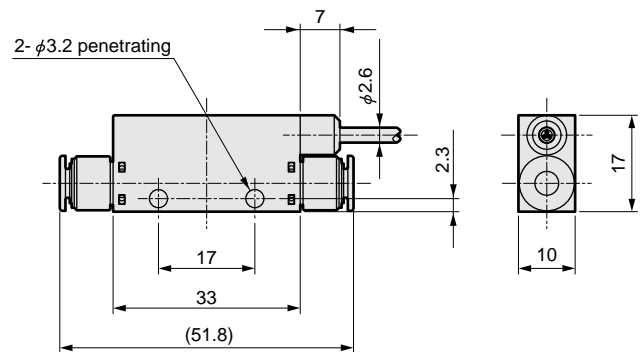
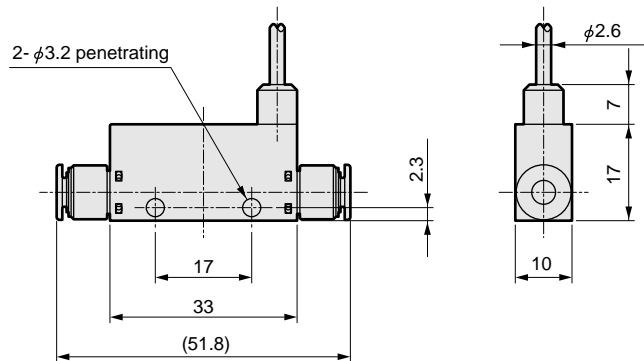
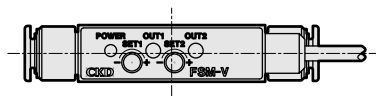
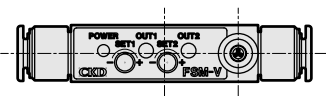
- FSM-V-\*V3-R\*-H2  
(Radial lead wire, straight  $\phi 1.8$  fiber tube)

- FSM-V-\*H3-R\*-H2  
(Axial lead wire, straight  $\phi 1.8$  fiber tube)



- FSM-V-\*V3-R\*-H4  
(Radial lead wire, straight  $\phi 4$  push-in)

- FSM-V-\*H3-R\*-H4  
(Axial lead wire, straight  $\phi 4$  push-in)

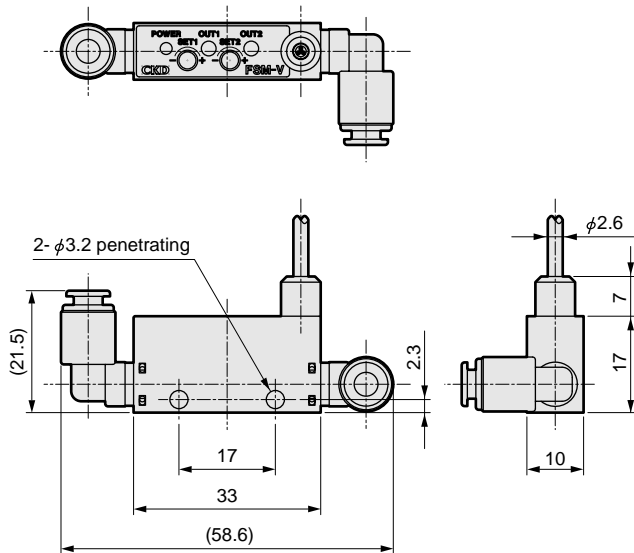


\* Appearances of a front seat section differ in an analog output type/switch output type.

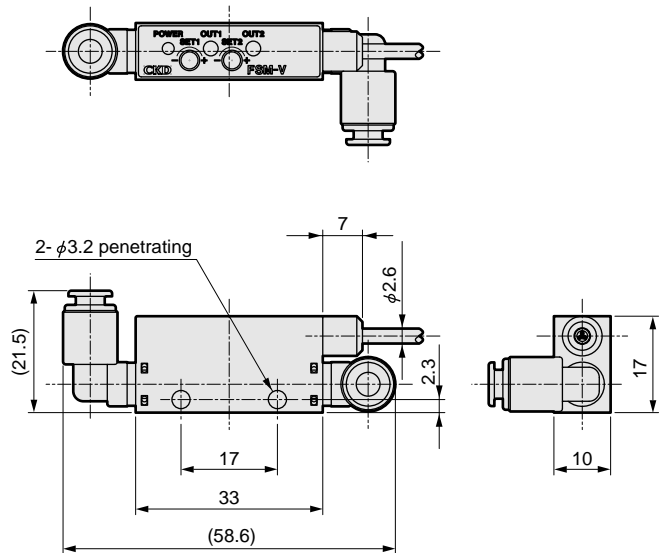
### Dimensions



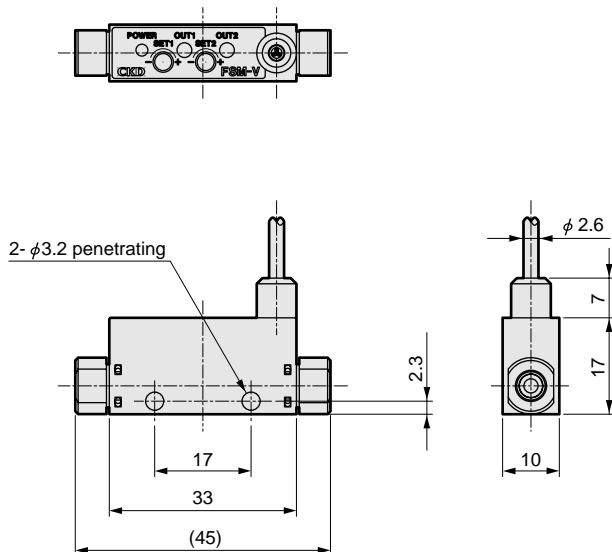
- FSM-V-\*V3-R\*-HL4  
(Radial lead wire, L type  $\phi 4$  push-in)



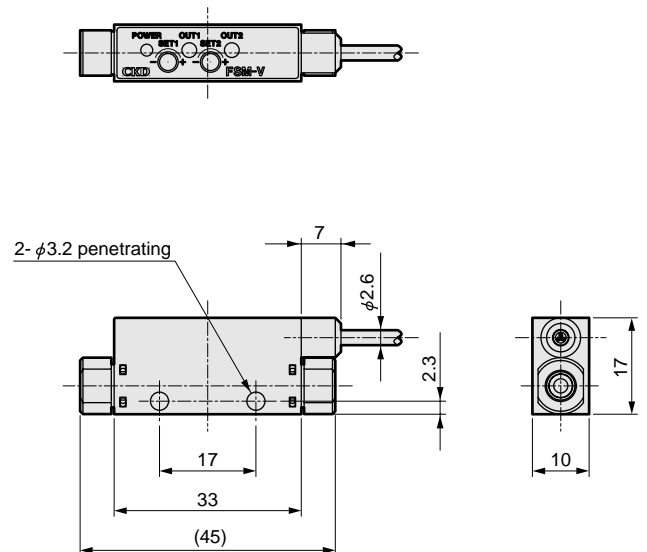
- FSM-V-\*H3-R\*-HL4  
(Radial lead wire, L type  $\phi 4$  push-in)



- FSM-V-\*V3-R\*-M5  
(Radial lead wire, port size M5)



- FSM-V-\*H3-R\*-M5  
(Axial lead wire, port size M5)



\* Appearances of a front seat section differ in an analog output type/switch output type.

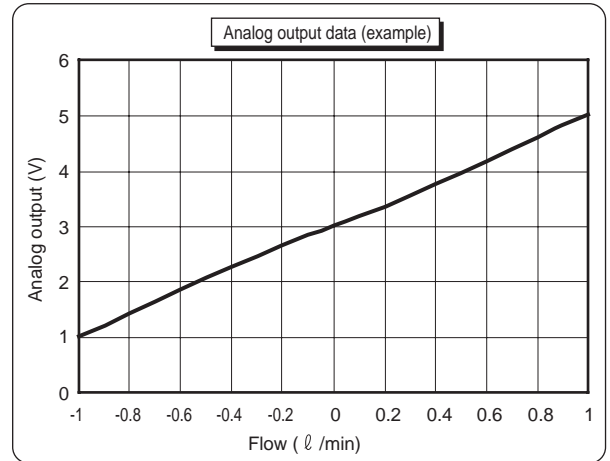
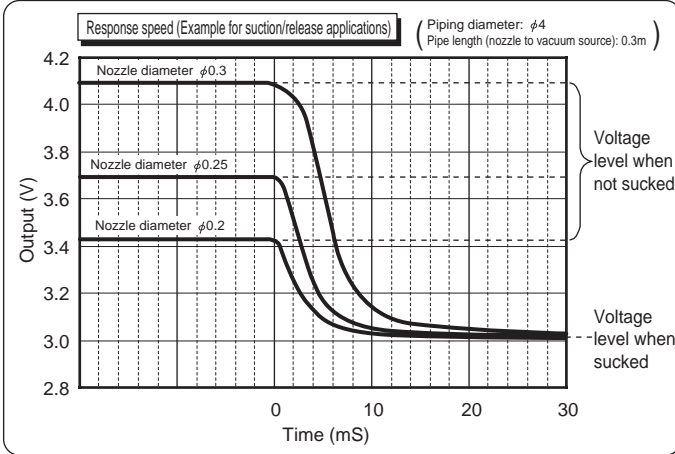
Refrigerating type dryer
Desiccant type dryer
High polymer membrane dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

Miniature Flow sensor

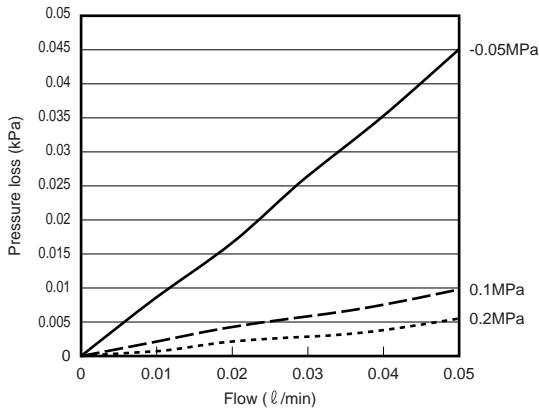
## Analog output characteristics

### ● FSM-V-A-R0100

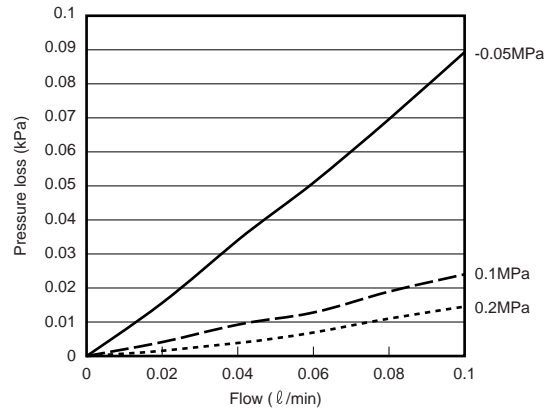


## Pressure loss characteristics

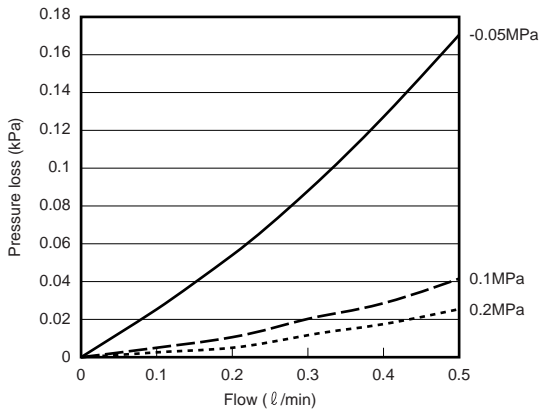
### ● FSM-V-\*-R0005-H4



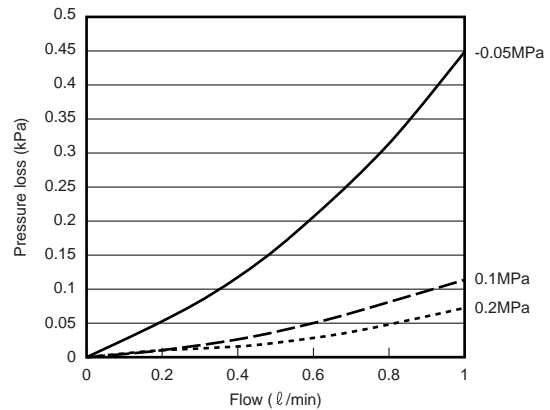
### ● FSM-V-\*-R0010-H4



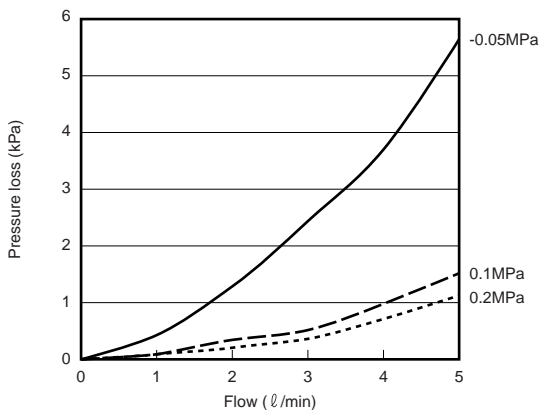
### ● FSM-V-\*-R0050-H4



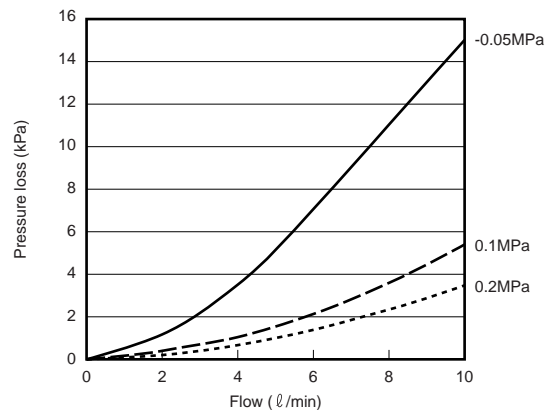
### ● FSM-V-\*-R0100-H4



### ● FSM-V-\*-R0500-H4



### ● FSM-V-\*-R1000-H4

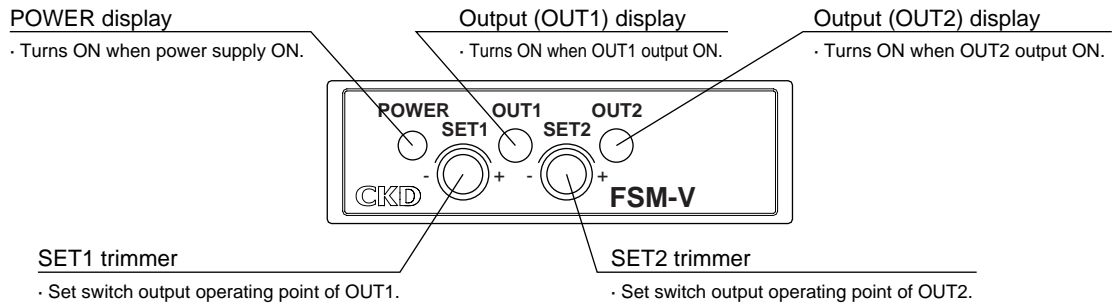


\* When using the fiber tube, the pressure loss may increase depending on the piping conditions.

- Refrigerating type dryer
- Desiccant type dryer
- High polymer membrane dryer
- Air filter
- Auto. drain / others
- F.R.L (Module unit)
- F.R.L (Separate)
- Compact F.R.
- Precise regulator
- F.R.L (Related products)
- Clean F.R.
- Electro pneumatic regulator
- Air booster
- Speed control valve
- Silencer
- Check valve / others
- Joint / tube
- Vacuum filter
- Vacuum regulator
- Suction plate
- Magnetic spring buffer
- Mechanical pressure SW
- Electronic pressure SW
- Contact / close contact conf. SW
- Air sensor
- Pressure SW for coolant
- Small flow sensor
- Small flow controller
- Flow sensor for air
- Flow sensor for water
- Total air system
- Total air system (Gamma)
- Ending

### Operation section names / functions and setting

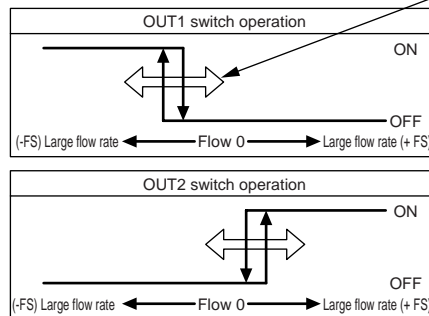
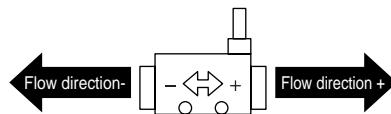
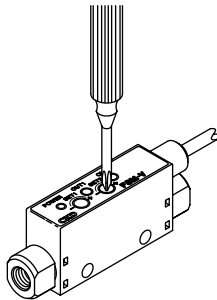
#### ● Switch output type



#### How to set switch (switch operation and fluid flow directions)

- Turn SET1 and SET2 trimmers to turn the two switch output points (OUT1 and OUT2) on or off.
- 2-point output has different switch operations as shown at right.

- Use 0 bit (+) driver.



#### Setting trimmer



- (Cautions)
- Switch output hysteresis is fixed (10%F.S. or less).
  - Do not press the trimmer forcibly with a screwdriver. The trimmer could break.

#### ● Separate indicator

Refer to page 1318 for details on the separated display's display and operation section names, functions, and operation.

Refrigerating type dryer
Desiccant type dryer
High polymer membrane dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

Miniature Flow sensor