PISCO® HIR0056-00

INSTRUCTION MANUAL

Small Size Flow Sensor FUS 8 series

・Please be sure to read this user’ s manual before using the sensor.
・If mistakenly handled, the sensor does not work properly or an accident may occur. Please keep this manual handy with care so you can refer to it whenever necessary.

Cautions

・On use, evaluate the sensor enough and consider quality, performance and safety.
・Please use it for vacuum adsorption verification only.
・Do not stress the sensor when it works. Doing so may change the output of fluid flow.
・Do not apply stress on the connector during operation. Internal board and sensor body may be deformed and cause leakage.

Cautions

- Since the sensor is not conformed to the Measurement Law, please use it for industrial purpose not commercial purpose.
- When using this product with adsorption verification, etc., always install an air filter onto the upstream of suction side to prevent suction of foreign materials.
- When using this product with adsorption verification, etc., consider the dew point of the atmosphere and ambient temperature and keep this product in the condition that inside of the pipe does not condense dew.
- When using this product by vacuum uses such as air intake, do not bend it in the vicinity of a tube fitting joint part. In case the tubing in the vicinity of a tube fitting joint is stressed, apply a tube insert ring, and insert the tubing into the tube fitting joint.
- When the sensor is exposed to the vibration or shock of over 10G(100m/sec2), flow-output characteristics may fluctuate and the sensor may drop out of the holder. Therefore, do not apply excessive vibration or shock to the sensor.
- Explosion prevention environment
  Do not use the product in flammable gas environment.
  Since explosion-protection is not taken, explosion or fire may be caused.
- Corrosive environment
  Do not use the product in an environment containing corrosive gas such as sulphur dioxide, etc.
- Ambient and fluid temperature
  Use the product within the ambient and fluid temperature ranges 0 to 50 °C. Even in the specified temperature range, do not use the product where ambient and fluid temperatures will change suddenly, and form dew condensation.
- Maximum working pressure and working flow rate
  Use the sensor in accordance with specifications. If used over the maximum working pressure and below the minimum working pressure and out of the working flow range, it may result in failures.
- Dew condensation prevention environment
  Do not install the product where moisture, salt, dust or swarf is contained, or where pressurized, or depressurized, neither.
  It is not possible to use the sensor as a failure caused by dew condensation in the main body may arise in the place where the temperature change is intense or in the environment of the high humidity.

Fluid medium

- A flammable fluid must not be used.
- This flow sensor is designed for air and nitrogen gas.
  Do not use the product with other than applicable fluid medium, or the accuracy cannot be guaranteed.
- Use dry air that dose not contain any corrosion such as chloride,sulfur,acid,and clean air that dose not contain dust and oil mist.
- Install a filter, an air dryer and an oil mist filter (micro alescer) onto the primary side (inlet side) of the sensor since the compressed air from the compressor contains drain (water, oil oxide and foreign material, etc.)
  The mesh (woven wire) inside this sensor is installed for the purpose of rectifying flow inside and not for the purpose of getting rid of foreign materials. As such, please install filter separately.
- If any valve should be attached on the primary side (inlet side) of the sensor, use oil-free valve. Since some valves may generate abrasive dust,use it with filter.

Usage & maintenance

- Output accuracy is affected by self-exoergic reaction caused by energizing other than temperature characteristics. When using, stand-by time (5 minutes and over after energizing) must be provided.
- Maintain this product once in one year and confirm that works normally. The output voltage varies by below ±6%F.S.for one-way direction type and ±3%F.S. for bi-directional type from our initial setting value.(The variation definition by our reliability test) As such, periodic operation check is recommended.
- Do not take apart and convert this product because it causes failures.
- The case is made of resin. Thus, do not use solvent, alcohol, detergent etc. to clean it because they may dissolve the materials.
- For wiring, stop control unit/machinery and equipment, and turn off the power supply.
- This product and wiring must be installed as far away as possible from noise source such as strong electric line, etc..
- Please be careful to counter-currents and surge currents because this product may result in failures.

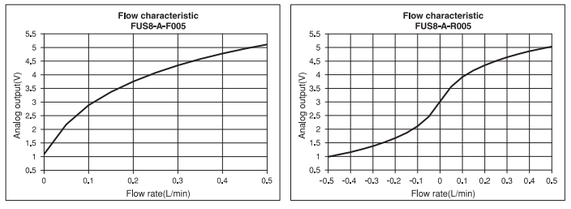
- Use DC stabilized power supply based on the rating in the specifications and isolated from AC. The power supply that is not isolated has a risk of electrical shock. If power supply is not stabilized power, this product may be broken or deteriorated the precision because the voltage peak is over rated value.
- Avoid bending or stretching the lead wire repeatedly because it causes disconnection.

Specifications

Description		Model code: Analog output type							
		FUS8-A-R005	FUS8-A-R010	FUS8-A-R050	FUS8-A-R100	FUS8-A-F005	FUS8-A-F010	FUS8-A-F050	FUS8-A-F100
Full scale rate (L/min)		–0.5~0.5	–1~1	–5~5	–10~10	0~0.5	0~1	0~5	0~10
Working conditions	Working Fluid (MPa)	Clean air (JIS B 8392-1, 1.1.1～6.2) , Nitrogen							
	Working pressure range(MPa)	–0.09～0.2							
	Withstanding pressure(MPa)	0.3							
	Ambient temperature/humidity	0～50℃, 80%RH or less							
	Working fluid temperature(℃)	0～50 (no dew condensation)							
Preservation Temperature (℃)		–20～–60 (no dew condensation)							
Analog output accuracy	Linearity	Non linear analog output 1-5V (Note)							
	Pressure characteristics	±5%F.S. or less (–0.09～0.2Mpa,25℃,0.1Mpa				±10%F.S. or less (–0.09～0.2Mpa,25℃,0.1Mpa			
	Temperature characteristics	±0.3%F.S./℃ or less (0～50℃,25℃				±0.6%F.S./℃ or less (0～50℃,25℃			
	Repeatability	±2%F.S. or less							
	Power supply voltage fluctuation	±2%F.S. or less (DC24V ±10%)							
Response time		5ms or less		8ms or less		5ms or less		8ms or less	
Current consumption		30mA or less							
Power supply voltage		DC24V ±10% ripple 1% or less							

Note) Bi-directional type outputs 3V when the flow is 0,analog output will change to 5V when fluid flow left to right (from the view that connector is on the right side)

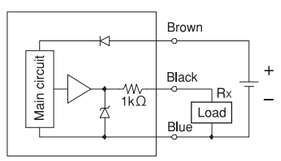
Flow characteristic chart (Reference)



Note) The accuracy is guaranteed in the range of 0 flow to full scale flow .(forward direction)

Circuit

Line Color	Contents
Brown	Power supply+ DC24V±10%
Blue	Power supply- GND
Black	Analog output (1 ～ 5V)



Analog output impedance is 1kΩ. In the case the impedance of connected load is low, there is a large margin of output error. Thus, check the margin of connected load impedance before use.

■Calculation example
・Output impedance Ro=1kΩ ・Load inside impedance Rx=1MΩ
・Output value=(1－(Ro/(Ro＋Rx)))x100%=(1－(1kΩ/(1kΩ＋1MΩ)))X100%≒99.9%
→Output margin= about 0.1%

Model Designation

FUS8 － A － R 005 － 4 4 － 3 － NH
① ② ③ ④⑤ ⑥ ⑦

① Output type		④ IN side port size ⑤ OUT side port size		⑧ Lead wire length	
A	Analog output	No code	Sensor head	No code	No cable
② Flow direction		180	φ1.8 tube fitting(*1)	3	With cabe (3 cores, 3m)
F	One-way direction	2	φ2 tube fitting(*2)	⑦ Holder	
R	Bi- directional	3	φ3 tube fitting	No code	With holder
③ Flow range		4	φ4 tube fitting	NH	Without holder
005	fill-scale: 0.5l/min	6	φ6 Minimal fitting		
010	fill-scale: 1l/min	M5	M5 female screw		
050	fill-scale: 5l/min	N4	Plug straight cartridge φ4		
100	fill-scale: 10l/min	N6	Plug straight cartridge φ6		

*1. When Φ1.8 tube fitting is selected, only up to 4l/min flow is secured.
*2. When Φ2mm tube fitting is selected, only up to 5l/min flow is secured.

FUS8 － C33

Cable Option
C33 3-core cable,length:3m

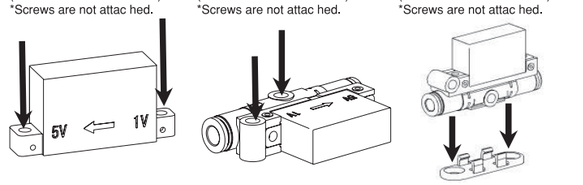
Mounting and Installation

Please install it using two places of through-bores.

M2
Tightening torque：0.2～0.3N･m
(Recommended screw size)
*Screws are not attac hed.

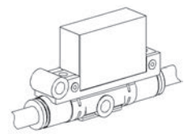
M3
Tightening torque：0.2～0.4N･m
(Recommended screw size)
*Screws are not attac hed.

M3 flat head screw
Tightening torque：0.2～0.4N･m
(Recommended screw size)
*Screws are not attac hed.

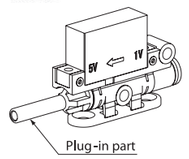


Piping

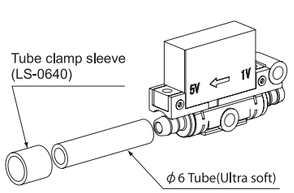
- Pipe and install the sensor, while matching the flow direction and direction specified on the body. Do not give extreme pull or bending to the piping tube. Doing so may cause breakage of the sensor, leakage and dropout from the holder.
- When piping quick fitting joint type, insert the tube to the fitting part. Please insert the tube certainly and make sure it will not come out by pulling the tube before use. Cut the tube at right angle by with the dedicating tube cutter.

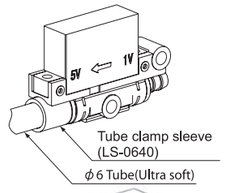


- When piping plug-in fitting type, attach the plug-in part to the output port of vacuum generator or any other pneumatic equipment.
  When the sensor is used under vibration or shocks, avoid applying vibration or shocks to the plug-in part by fixing it to the holder.

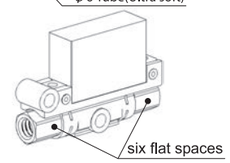


- When barb fitting is used, please insert the tube certainly to the base part of barb fitting. If the tube is not connected properly, it may cause tube fall out and cause air leakage. When using ultra soft tube to connect to a barb fitting, make sure to apply tube clamp sleeve (LS-0640). Otherwise, the may fall out to cause leakage.



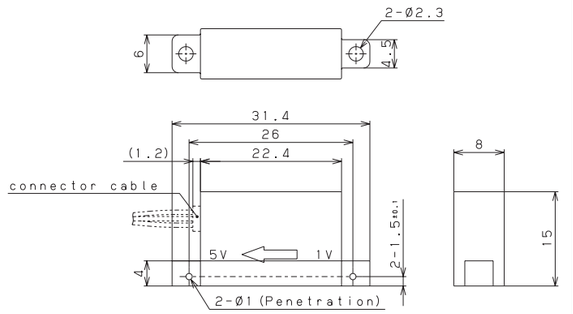


- When a fitting is connected to the female fitting part, make sure to apply a spanner or other tools on the outer six flat spaces of the female fitting part. Using tools on any other part may cause breakage or performance loss. Apply same screw tightening torque as the connecting fitting torque to female fitting part.

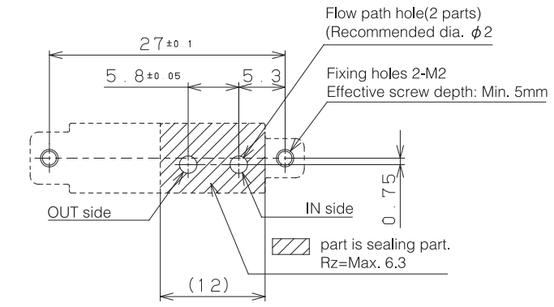


- Flow characteristics may be varied according to flow path structure, make sure the flow rate and the output characteristics before use.
- When bi-directional type is used, make sure to arrange piping as flow direction changes from 0 to forward direction at adsorption state.

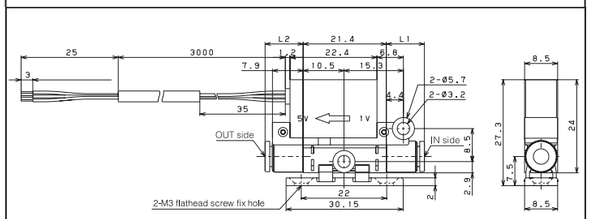
Sensor head unit



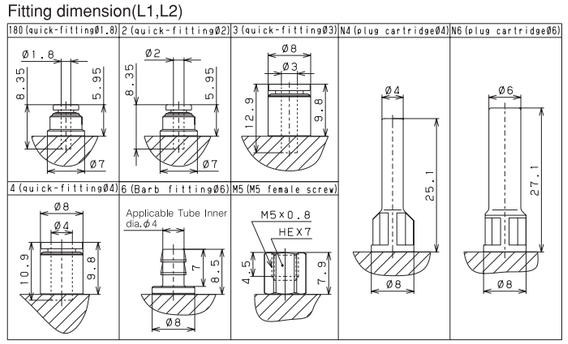
Recommended Direct mount fixing part dimensions



Equipped with fitting block



Fitting dimension(L1,L2)



* Please make inquiry about other details to the following.

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