CKD

F2-463100-A

INSTRUCTION MANUAL

SMALL SIZE FLOW SENSOR
FSM-H-N/P series

- Read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

⚠ Precaution

- This product is designed for air and compressed dry air and N_2. Do not use it with corrosive and inflammable gases.
- Do not touch electric wiring connections (bare live parts): this will cause an electric shock. During wiring, keep the power off. Also, do not touch these live parts with wet hands.

1. CAUTION

① The product can not be used as a business mater. Not conformed to the Measurement Law, do not use the product for the commercial purpose. Use the product as an industrial sensor.

② In installation, please be sure to hold the product's main body to prevent any impact to body and stress to the flying lead.

③ Do not use the product with other than applicable working fluids, or the accuracy can not be guaranteed.

④ Install a filter, an air dryer and an oil mist filter (micro alescer) onto the primary side(upstream) of the sensor since the compressed air from the compressor contains drain(water, oil oxide and foreign material, etc.) Mesh(wire net) in a sensor is used to rectify the flow in the pipe. Always install a filter since this mesh is not a filter to remove foreign materials, etc.

⑤ Even if twice as much as overflow as each series measuring range is applied to the sensor, it is no problem, however, if dynamic pressure is applied near to the maximum working pressure, (when the pressure applied to the primary side with the secondary side released.), the sensor may fail. When feeding workpieces during leakage inspection, if dynamic pressure is applied, always provide a by-pass circuit or a needle valve to avoid dynamic pressure applying to the sensor.

2. Specifications

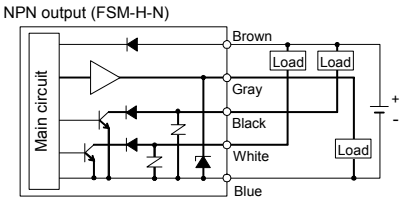
Descriptions			FSM−H−N/P−□*1ML−□*2
Flow rate range (mℓ/min)*3	*1	005	0.25～5
		010	0.5～10
		050	2.5～50
		100	5～100
Port size (Body materials)	*2	6A	Rc1/8 (Stainless body)
		6G	G1/8 (Stainless body)
Working conditions: Applicable fluid (media)			Compressed air (JIS B 8392-1.1.1 to 5.6.2) Cleaned air (JIS B 8392-1.1.1 to1.6.2), N_2
Working conditions: Max. working pressure			1.0Mpa
Working conditions: Min. working pressure			-0.09Mpa
Working conditions: Withstanding pressure			1.5MPa
Working conditions: Ambient temperature			0…50 °C, 90%RH or less (No dew condensation allowed)
Working conditions: Fluid temperature			0…50 °C (No dew condensation allowed)
Accuracy: Linearity			±3%F.S. or less (0.1MPa, 25 °C, 10…100%F.S.)
Accuracy: Pressure characteristic			±3%F.S. or less (-0.09…1.0MPa, 25 °C, at 0.1MPa standard)
Accuracy: Temperature characteristic			±0.2%F.S./ °C or less(15…35 °C, at 25 °C standard)
Repeatability			±0.5%F.S. or less
Response time			50msec
Display			3 1/2 digits, LED display RUN-MODE, 2-output indication
Switch output			PNP/NPN transistor open collector output 2 point DC30V 50mA Voltage drop (2.4V or lower)
Analog output			1…5 V(Impedance of load : over 50kΩ)
Power supply voltage			DC12…24V ±10% (10.8…26.4V)
Current consumption			50mA or less
Lead wire			ϕ3.7 5-core, 0.2mm² 1m
Installation attitude			Vertically or horizontally
Installation strait piping section			Not required
Protective structure			IEC standards IP40
EMC directive			EN55011, EN61000-6-2, EN61000-4-2/3/4/6/8
Mass			Approx. 150g

*3The flow rate of this product is measured with mass flow that is not influenced by temperature and pressure.
The flow rate unit is "L /min". This is the indication of the mass flow converted to volumetric flow at 20 °C and 1 atmospheric pressure (101 kPa).

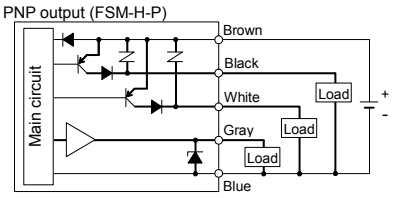
3. Wiring

Wire color	Descriptions
Brown	DC12…24V
Blue	0V(GND)
Gray	Analog output (1…5V)
Black	OUT1
White	OUT2

NPN output (FSM-H-N)



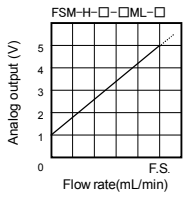
PNP output (FSM-H-P)



(Precautions for wiring)

- Wiring
  For wiring, turn off the power supply. Discharge static electricity built in body, tool and equipment before and during work. Use a wire elasticity as wire for robot connection in the movable part.
- Wiring installation
  This product and wiring must be installed as far away as possible from noise source such as strong electric line, etc. Take other countermeasures for a surge on the power supply line.
- Power voltage
  Do not use the product put of power supply voltage range. If voltage more than usage range is applied, or if alternating current power(AC100V) applied, causing damage or burn.
- Short-circuiting
  Do not short-circuit a load, otherwise, or causing damage or burn.
- Incorrect wiring
  Connect wires to the correct poles or terminals, otherwise, wires may be damaged or burned.
- FG connection
  Use DC safety power supply thoroughly insulated from the AC primary side for a power supply for the metal body type, while connecting either + or – side on the power supply to F.G. High potential and insulation resistance tests between the inside power circuit of metal body type and the metal body must not be done.

4. Analog output voltage – flow rate characteristics



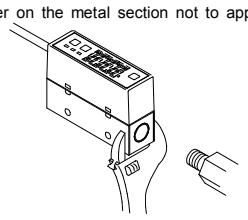
(Precautions)

・Output accuracy is affected by self exoergics caused by energizing other than temperature characteristics. When using, stand-by time (5 minutes and over after energizing) must be provided.
If out of flow rate range, the output will reach up to max 8V.

5. Piping

(Precautions for piping)

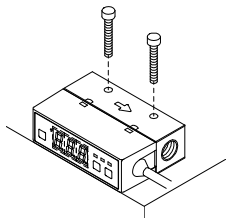
- This product must be piped, while matching the flow direction and direction specified on the body.
- When piping, apply a spanner on the metal section not to apply forces onto the resin section.



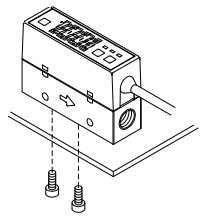
- When piping, care must be taken that sealing tape and adhesive must not enter into the inside.
- Connect a joint to the Stainless body type even when it is used with OUT port open, to prevent the port filter from falling down
- When a valve is used in the primary side of the sensor, an oil-prohibited valve must be used. The sensor may malfunction or be destroyed by splash of grease and oil, etc.
- When piping in a resin tube, fix the piping as much as possible. When the piping moves during the flow control, abnormality of the flow output is caused as internal gas moves.

6.Installation

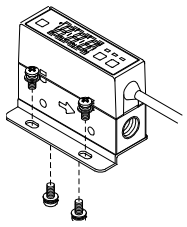
Horizontal (through hole)



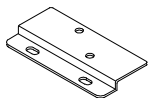
Vertical (female thread on the bottom)

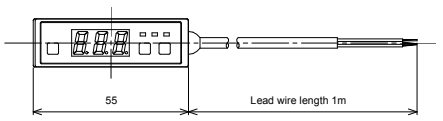


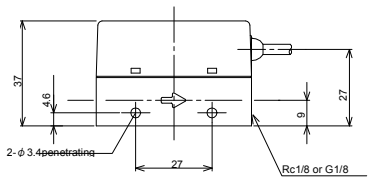
Bracket installation (* bracket use)

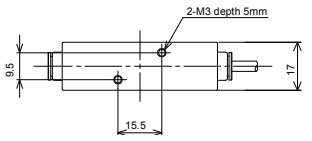


*Bracket(separate sales) is provided.
(model no.: FSM-LB1)









8. How to order

F S M − H − □ − □ M L − □ − □

① ② ③ ④

①Output type
- N : NPN output 2points and analog output 1 point
- P : PNP output 2 points and analog output 1 point

②Flow rate range (mℓ/min)
- 005 : 0.25～5
- 010 : 0.5～10
- 050 : 2.5～50
- 100 : 5～100

③Port size
- 6A : Rc1/8 (Stainless steel body)
- 6G : G1/8 (Stainless steel body)

④Option
- Blank : None
- K : Company certification attached
- T : Traceability attestation, company certification and traceability system configuration are attached.

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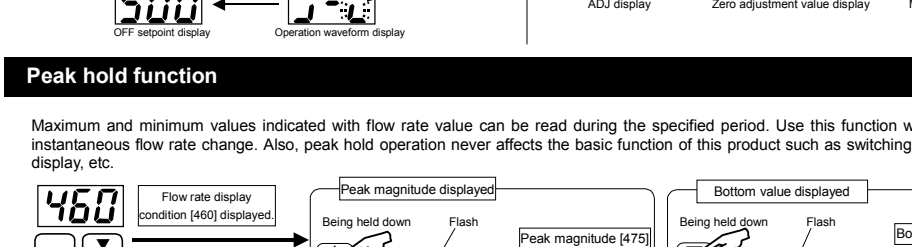
Name and functions of display/controls



Switch output function

Switching mode

Operation pattern name and LED display	Operation waveform
Window operation 1 (Range inside ON)	1%F.S. 3%F.S. or more 1%F.S. ON OFF 0 ON setpoint OFF setpoint flow rate
Window operation 2 (Range out ON)	1%F.S. 3%F.S. or more 1%F.S. ON OFF 0 OFF setpoint ON setpoint flow rate
Hysteresis operation 1 (Flow rate small side ON)	3%F.S. or more ON OFF 0 ON setpoint OFF setpoint flow rate
Hysteresis operation 2 (Flow rate large side ON)	1%F.S. or more ON OFF 0 OFF setpoint ON setpoint flow rate
Switch output OFF	ON The output is turned off not depending on ON and OFF setpoint. OFF 0 flow rate

Note:

1.Maintain intervals more than 3% F.S. between two setpoints during window operation. Hysteresis of 1% F.S. is provided on each ON and OFF sides automatically.

2.Maintain intervals more than 1% F.S. between two setpoints when hysteresis operation.

3.If the differential between above 2 setpoints is not satisfied, it may result in not operated or unstable operation. If a switch is activated in unstable flow rate state such as a fluid pulsation, etc., unstable operation may be provided. In this case, maintain the difference between two setpoints satisfactorily, use the product after checking that switching is stabilized.

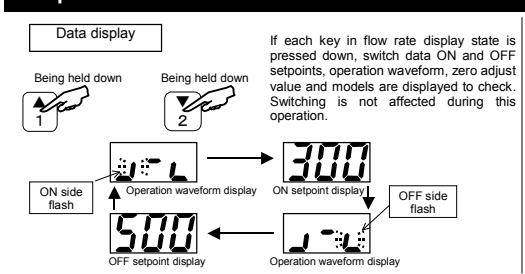
4.In operation waveform, left side shows minus side, while, right shows plus side.

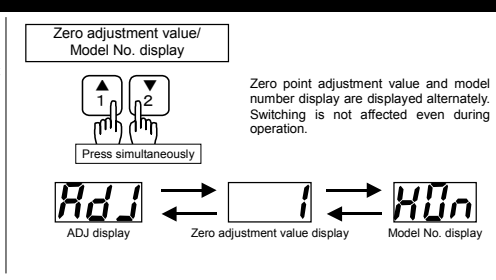
5.If waveform pattern is decided, magnitude of ON and OFF setpoints is decided, and the reverse magnitude is not allowed. However, in this product, operation with specified operation pattern has precedence over all things. When the two setpoints are inputted, the magnitude is identified automatically, processing the proper identification as ON and OFF setpoints. As result, even if ON and OFF setpoints are inputted reversely, re-recognized as correct ON and OFF setpoints, always operating with the specified operation pattern.

Set example

CH	Waveform	ON setpoint	OFF setpoint
1		200	350
2		300	250

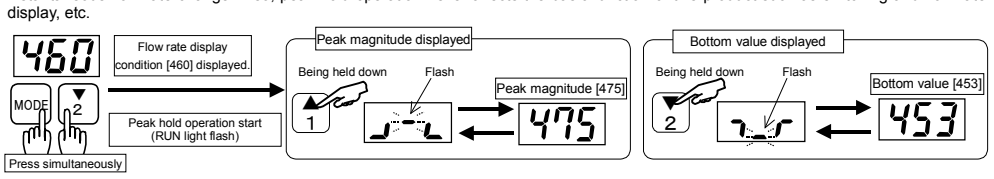
Setpoint verification method





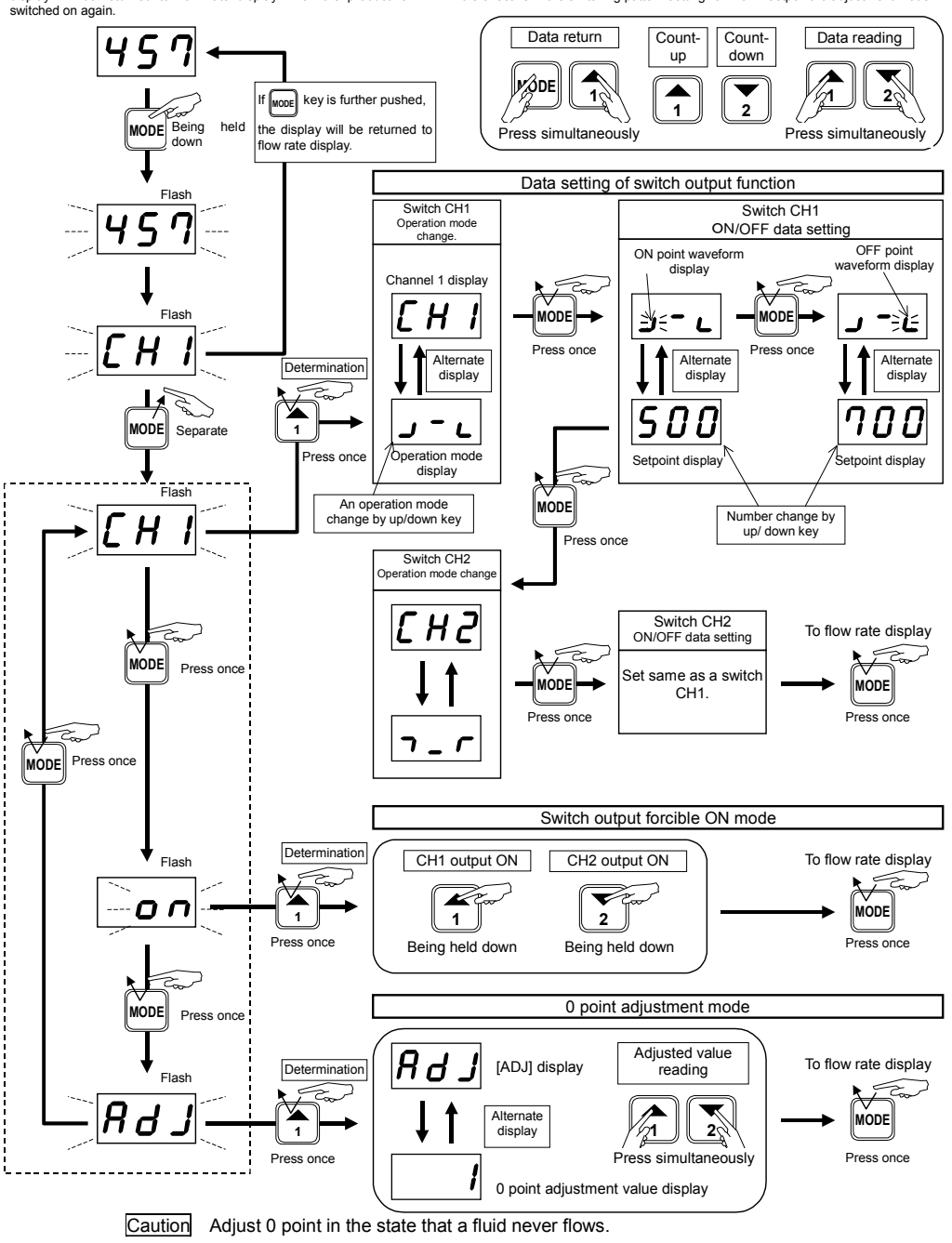
Peak hold function

Maximum and minimum values indicated with flow rate value can be read during the specified period. Use this function when checking instantaneous flow rate change. Also, peak hold operation never affects the basic function of this product such as switching and flow rate display, etc.



Switch output function/forcible output function/0 point adjustment operation

If key operation is not done more than 2 seconds before confirming mode, the display will be returned to flow rate display for safety. If switching off during operation (state of each setting mode), the display will be returned to flow rate display when the product is switched on again.



Caution Adjust 0 point in the state that a fluid never flows.