

—— Sensor and controller ——

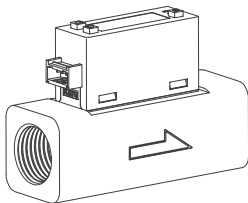
■ Flow ■ pressure ■ temperature ■ level ■ position

KATU 卡图

Operation instruction

Gas flow sensor

FM350 Series



Safety instruction

Safety instructions are intended to protect users from dangerous situations and /or prevent material damage.

In the operating instructions, the severity of the potential risk can be indicated by the following signal words:



danger

An imminent danger to the user. Failure to comply may result in fatal injury.



warning

An identifiable hazard.

Failure to comply may result in fatal injury and damage to equipment or plant parts.



caution

It means a danger.

Non-compliance may result in minor injury and material damage to the sensor (switch) and/or plant.



important

Information that is important to the user.



Deal with

Sensors (switches) must be handled correctly in accordance with national or local regulations for electrical/electronic equipment.

Sensors (switches) cannot be disposed of with household waste!

Principle characteristics

Thermal principle, gas mass flowmeter, display direction can be reversed 180°, easy to set and view 4-digit LED display.

Technical specification

Display accuracy $\pm 3\%$ F.S.

Repeatability $\pm 3\%$ F.S.

Electronic display of instantaneous flow rate

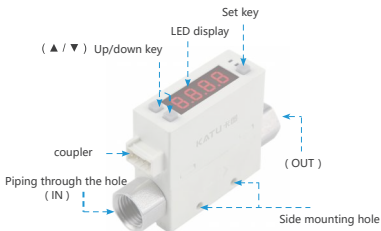
View accumulated traffic

With switch output NPN/PNP output function

Analog: Voltage output 1~5 V

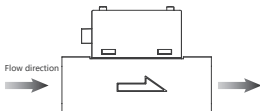
Analog output: Current output 4~20 mA

Panel diagram



Piping installation instructions

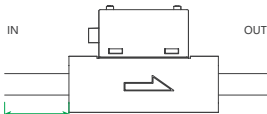
Please arrange the pipes in accordance with the flow direction of the fluid and the direction indicated by the main body



Please install a straight pipe of 8cm or more (with an inner diameter of 9mm or more) on the IN side of the product. Bending of the piping or changes in the cross-sectional area may result in an accuracy of $\pm 2\%$ F.S. The changes.

Do not directly discharge the product into the atmosphere when there is no piping on the OUT side, as it will affect the accuracy.

(500L-2000L requires pipes with an inner diameter of 9 or more.)



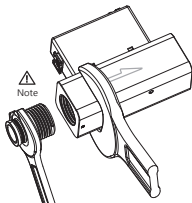
The straight pipe should be over 8cm in length and over 9mm in inner diameter

When piping a metal body, please refer to the table below for the applicable torque.

When the joint part is tightened beyond the appropriate torque, there is a possibility of damage to the product. When the locking torque is insufficient, the thread of the connecting pipe may loosen and cause air leakage.

After installation is completed, add gas and connect the power supply. Perform appropriate operations and leakage tests to verify if the installation is correct.

Takeover specifications	Applicable torque
Rc1/2", G1/2"	28 ~ 30 N. m
Rc3/4", G3/4"	



Switching function

If the switch is higher or lower than the set switching limit (SP, rP), its switching state is changed.
The following switch functions can be selected:

- Hysteresis function normally open: = [Hno] (→ Figure 1)
- Hysteresis function normally closed: = [Hnc] (→ Figure 1)

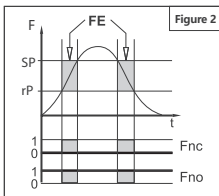
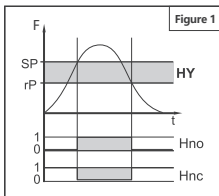
First set the switch point: (SP), Then set the reset point: (rP).

If SP changes again, the hysteresis will change with it.

- Window function usually open: = [Fno] (→ Figure 2)
- Window function normally closed: = [Fnc] (→ Figure 2)

The width of the window can be set by the difference between SP and rP.

SP = Upper limit value, rP = Lower limit value.



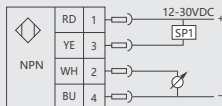
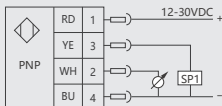
F = Flow; HY = lag; FE = window

Wiring diagram

One switch + one analog

RD	1	Power supply positive (+)
WH	2	Analog (mA/V)

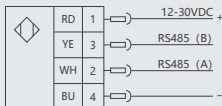
YE	3	Switch Output (SP1)
BU	4	Power supply negative (-)



RS485 communication

RD	1	Power supply positive (+)
WH	2	RS485 (A)

YE	3	RS485 (B)
BU	4	Power supply negative (-)



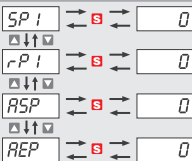
debugging and operation

Level 1 menu		
sp1	Switch alarm value (factory default: 20% of the range)	
rp1	Switch reset value (factory default: 90% of the SP1 range value)	
asp	Lower range limit (factory default is lower range limit)	factory data reset Range reference value
aep	Range upper limit (factory default is range upper limit)	
EF	Expand functionality/Open the Level 2 menu	

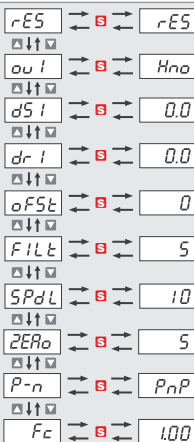
Level 2 menu	
res	factory data reset
ou1	Switch signal: (Factory default is HNO) Hysteresis function: HNO (normally open) /HNC (normally closed) Window function: FNO (normally open) /FNC (normally closed)
ds1	The start delay of OUT1. (Factory default is 0s)
dr1	Shutdown delay for OUT1. (Factory default is 0s))
ofst	Display value compensation(factory default is 0)
filt	The filter coefficient is adjustable from 1 to 50(factory default is 5)
spdl	Display value The reaction rate increases/decreases(factory default is 10)
zeao	Zero cut value (full scale L/min) (factory default is 5)
P-n	PNP/NPN switch (Factory default PNP)
Fc	Flow coefficient correction (factory default 1.00)
EF	Expand functionality/Open the Level 2 menu

Display menu

↓ **S** Level 1 menu



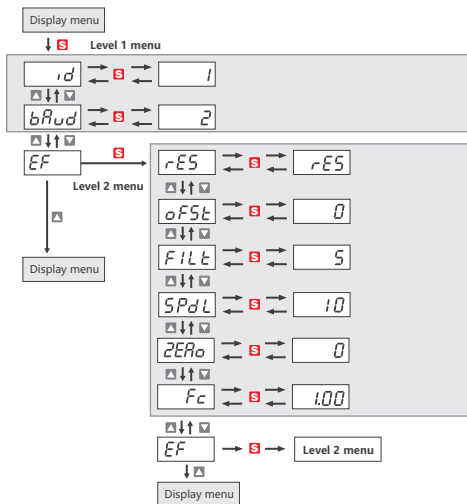
Display menu



RS485 debugging and operation

Level 1 menu	
id	Address (system default is 1)
baud	Baud rate setting (system default is 2)
EF	Expand functionality/Open the Level 2 menu

Level 2 menu	
res	Cumulant clears to zero
ofst	Display value compensation(factory default is 0)
filt	The filter coefficient is adjustable from 1 to 50. (factory default is 5)
spdl	Display value The reaction rate increases/decreases(factory default is 10)
zeao	Zero cut value (full scale L/min)
Fc	Flow coefficient correction (factory default 1.00)
EF	Expand functionality/Open the Level 2 menu



Maintenance/cleaning

Sensors (switches) do not require maintenance.



warning

Periodically check whether the switch is working properly.

If the switch does not work properly, stop the operation immediately.



caution

Use of improper cleaning agent may damage the switch.

The following cleaning agents can be used to clean polycarbonate: mild soap or detergent Isopropyl alcohol

Immediately after cleaning, rinse with water. Do not leave cleaner on the surface of the product. Do not clean products in high heat or direct sunlight.

The following cleaning agents are known to affect the integrity of polycarbonate components and should not be used: ZEP Fast 505, Pinesol, Formula 409

Halogenated solvents (benzene, gasoline, acetone or carbon tetrachloride)

Strong alkalinity

Methyl ethyl ketone

Abrasive substance

disassemble



danger

Only remove the switch in case of power failure (electrical, hydraulic/pneumatic).

Switch disconnection from pressure and power supply must be performed by trained or directed personnel in accordance with the most advanced standards.



warning

Be aware that the surface of the shell may become very hot if the operating temperature is higher!

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