Safety Precautions

Be sure to read this section before use.
For general pneumatic components precautions, refer to Intro 17 for details.

Product-specific cautions: Compact flow rate sensor separated display FSM2-D Series

Design / Selection

Working environment

DANGER

■Flammable environment
Never use this product in an explosive gas atmosphere. The structure is not explosion-proof, and explosions or fires could occur.

WARNING

■Corrosive environment
Do not use this product in an atmosphere containing corrosive gases such as sulfur dioxide.

■Ambient temperature
Use at ambient temperatures within the specified range of 0 to 50°C. Even if the temperature is within the specified range, do not use this product if the ambient temperature could suddenly change and cause dew to condense.

■Drip-proof environment
The degree of protection of this product is equivalent to IP40. Do not install this product where water, salt, dust, or swarf is present or in a pressurized or depressurized environment. The product cannot be used with large temperature variations or high temperature/ humidity since condensation may occur inside the body.

Mounting

CAUTION

■The LCD display-type flow rate meter uses a liquid crystal display. This may be difficult to read depending on the angle.

■Do not install multiple product bodies in close contact. The generation of heat on each part could cause the product's temperature to rise, hastening changes in characteristics or deterioration of the resin material. When using the products in a row, set intervals of distance of 10 mm and over.

Wiring

WARNING

■Use a DC stabilized power supply within the specified rating, insulated from the AC power supply. A non-isolated power supply could result in electrical shock. If power is not stabilized, the peak value could be exceeded. This could damage the product or impair accuracy.

■Always attach the connector bar after connecting the connector.

■Check that stress (7 N and over) is not directly applied to cable leadouts or connectors.

■Connecting load
The output impedance of the analog output section is approx. 1 kΩ. If the impedance of the connecting load is small, output error increases. Check error with the impedance of the connecting load before using. (The analog/current output type is excluded.)

Example of calculation

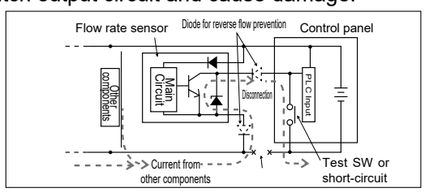
(FSM2-□V output impedance: Ro=1 KΩ
Load internal impedance: Rx = 1 MΩ

$$\text{Output value} = \left(1 - \frac{Ro}{Ro + Rx}\right) \times 100\%$$

$$= \left(1 - \frac{1\ k\Omega}{1\ k\Omega + 1\ M\Omega}\right) \times 100\% \Rightarrow \text{Output value error approx. } 0.1\%$$

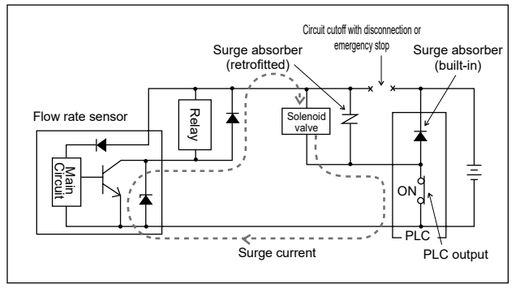
CAUTION

■Pay attention to reverse currents caused by disconnected wires and wiring resistance. If other devices, including a flow rate sensor, are connected to the same power supply as the flow rate sensor, and the switch output wire and power cable negative (-) side are short-circuited to check the operation of the control panel input unit, or if the power cable negative (-) side is disconnected, reverse current could flow to the flow rate sensor's switch output circuit and cause damage.

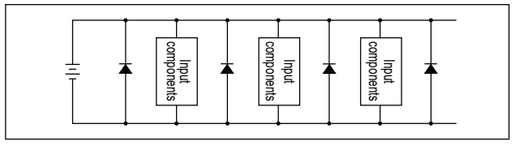


■Take the following measures to prevent damage caused by reverse current:
①Avoid centralizing current at the power cable, especially the minus side power cable, and use as thick a cable as possible.
②Limit the number of devices connected to the same power source as the flow rate sensor.
③Insert a diode parallel to the flow rate sensor's output line to prevent reverse current.
④Insert a diode parallel to the flow rate sensor power wire's negative (-) side to prevent reverse current.

■Pay attention to surge current flow-around. When flow rate sensor power is shared with an inductive load that generates surges, such as a solenoid valve or relay, if the circuit is cut off while the inductive load is functioning, surge current could enter the switch output circuit and cause damage depending on where the surge absorber is installed.



Take the measures below to prevent damage from sneak surge current.
①Separate the power supply for output including the inductive load, such as the solenoid valve and relay, and input, such as the flow rate sensor.
②If a separate power supply cannot be used, directly install a surge absorption element for all inductive loads. Consider that the surge absorber connected to the PLC, etc., protects only the individual device.
③In addition, connect surge absorbing elements at various locations in the power supply wiring as shown in the figure below to prepare for disconnection at unspecified locations.



When the devices are connected to a connector, the output circuit could be damaged by the above phenomenon if the connector is disconnected while the power is ON. Turn power OFF before connecting or disconnecting the connector.

Other

WARNING

■Output accuracy is affected by temperature characteristics and heat generated when energized. Provide a standby time (5 minutes or more) after turning the power ON for use.

■Immediately after power is turned ON, flow rate detection switch operation is not performed for approx. 4 seconds to complete self-diagnosis. Provide a control circuit/program that ignores signals for at least two seconds after power is turned ON.

CAUTION

■Analog output continues even if the flow rate range is exceeded. Hi or "Lo" will be displayed. Note that this is outside the guaranteed precision.

■CE-compliance working conditions
This product is CE-marked, indicating conformity with the EMC Directives. The standard for the immunity for industrial environments applied to this product is EN61000-6-2; the following requirements must be satisfied in order to conform to this standard:
Conditions
●The evaluation of this product is performed by using a cable that has a power supply line and a signal line paired to assess the product's performance.
●This product is not equipped with surge protection. Implement surge protection measures on the system side.

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

■It does not have the function to detect signal interruption due to cable disconnection or the state of connection with the sensor. If detection is required, the customer must prepare it separately.

For precautions during mounting, installation, adjustment, use and maintenance, refer to the CKD Components Product Site (https://www.ckd.co.jp/kiki/en/) → "Model No.→ Instruction Manual