CKD

New Products

New product

Multi monitor
MD Series

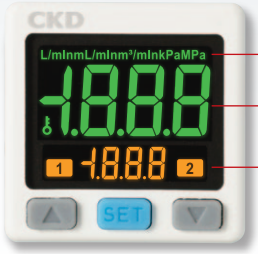
FLOW / PRESSURE MONITOR MD SERIES

All-in-one unit monitors flow rate and pressure

Flow rate/pressure supported by any sensor

Multi monitor

Readings/set values can be checked simultaneously. Supports any type of sensor, displaying both flow rates and pressures.



Units that can be displayed

ℓ/min | mℓ/min | m³/min | kPa | MPa

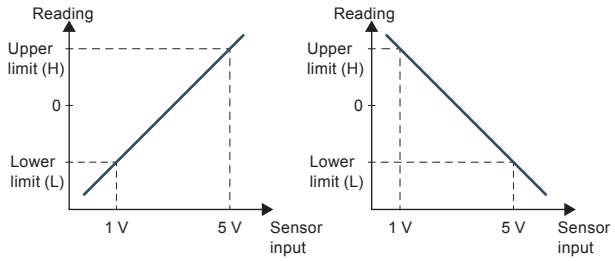
Main display: Reading value

Sub-display: Set value

Display units of the range can be user set

Scaling function

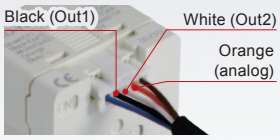
Sensor input can be converted to an arbitrary value. Decimal points can also be moved.



Analog output proportional to reading values

Equipped with 2 switch outputs + 1 analog output

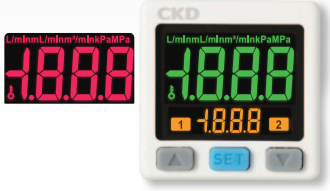
Analog signal proportional to the input signal from the sensor is sent to the PLC, etc.



Easy-to-read display

3-color display

Readings/set values are displayed in 3 colors.



Avoid misoperations

Lock function

Prevents mistakes, such as clicking the wrong keys.

Auto OFF display saves energy (except during time setting)

Energy-saving mode function

While setting to the energy-saving mode, the display goes to the energy-saving mode after 30 seconds from the last button activation.

* Environmental survey can be conducted only for “ROHS Certification” and “REACH Certification.” Descriptive data for individual parts is not available.

Multi monitor

MD Series

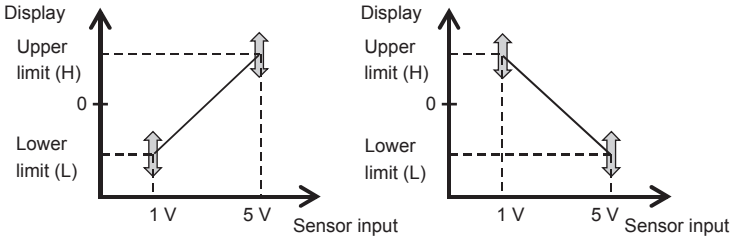
Specifications

Display	Range of flow rate/ pressure (*)	Upper limit (H) / Lower limit (L)	-100.0 to 0	1.000 to 0	1.50 to 0	2.00 to 0	4.00 to 0	5.00 to 0	10.00 to 0	12.0 to 0	20.0 to 0	25.0 to 0
		Resolution	0.1	0.001	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1
		Upper limit (H) / Lower limit (L)	32.0 to 0	50.0 to 0	60.0 to 0	100.0 to 0	200 to 0	300 to 0	500 to 0	1000 to 0	1.000 to -1.000	2.00 to -2.00
		Resolution	0.1	0.1	0.1	0.1	1	1	1	1	0.001	0.01
		Upper limit (H) / Lower limit (L)	5.00 to -5.00	10.00 to -10.00	20.0 to -20.0	50.0 to -50.0	100.0 to -100.0	200 to -200	500 to -500	1000 to -1000	300 to -100	980 to -100
		Resolution	0.01	0.01	0.1	0.1	0.1	1	1	1	1	1
		Resolution	Scaling function equipped									
	Units (*)		MPa, kPa, mℓ /min, ℓ /min, m^3/min									
Power supply voltage			12 to 24 VDC ±10%, ripple (P-P) 10% or less									
Current consumption			40 mA or less (with no load)									
Sensor input			1 to 5 V									
Sensor power supply current			MAX 100 mA									
Switch output			NPN: transistor, open collector 2 points Max. load current: 125 mA Max. power voltage: 30 VDC Internal voltage drop: 1.5 V or less					PNP: transistor, open collector 2 points Max. load current: 125 mA Max. power voltage: 24 VDC Internal voltage drop: 1.5 V or less				
Repeatability (Switch output)			±0.1% F.S. ±1 digit or less									
Hysteresis	One point mode / Hysteresis mode / Wind comparator mode		Adjustable (*)									
Response time			2.5 ms or less (chattering protection: selectable from 25 ms, 100 ms, 250 ms, 500 ms, 1000 ms, 1500 ms)									
Switch output load short-circuit protection			Yes									
Display			Main display, Unit indicator: 2 colors (red & green), Sub-display: orange (sampling rate: 5 times/sec.)									
Display accuracy			±1% F.S. ±1 digit or less (reference temp.: 25 ±3°C)									
Indicator light			Orange (OUT1, OUT2)									
Analog output (voltage output)			Output voltage: 1 to 5 V ±2% F.S. or less (rated pressure range) Linearity: ±1% F.S. Output impedance: 1 kΩ approximately									
Analog output (current output)			Output current: 4 to 20 mA ±2% F.S. or less (rated pressure range) Linearity: ±1% F.S. Max. load impedance: 250 Ω (12 V), 600 Ω (24 V) Min. load impedance: 50 Ω									
Environ-mental resistance	Degree of protection		IP40									
	Ambient temperature		Operating temperature: 0 to 50°C, Storage temperature: -10 to 60°C (non-condensing and non-freezing)									
	Ambient humidity		Operating/Storage: 35 to 85% RH (non-condensing)									
	Withstand voltage		1000 VAC, 1 min. (between case and lead wire)									
	Insulation resistance		50 MΩ or less (500 VDC, between case and lead wire)									
	Vibration resistance		Double amplitude 1.5 mm, 1 min. at 10 Hz-55 Hz-10 Hz, 2 hr. in each direction of X, Y, and Z									
	Shock resistance		100 m/s^2 (10 G), 3 times in each direction of X, Y, and Z									
Temperature characteristics			±0.5 F.S. or less (reference 25°C), Temperature range: 0 to 50°C									
Lead wire			Oil-resistant cable (0.15 mm^2)									
Weight			67 g approximately (including a lead wire of 2 m)									

* A range of flow rate/pressure is selectable from 30 patterns. Using the scaling function, the range can be set to any values.
* In the one point mode and the wind comparator mode, a hysteresis is adjustable within 1-8 digits.
* A units is selectable from 5 types: “MPa”, “kPa”, “mℓ/min”, “ℓ/min”, and “m^3/min”.

Scaling function

Using the scaling function, a range of flow rate/ pressure can be set to any value.
The number of decimal places is also changeable.
(Note) Upper limit (H) and lower limit (L) can be set in a range of ± 1999. The values of upper limit (H) and lower limit (L), however, cannot have the same polarity sign (“+” or “-”).



How to order

●Multi monitor Model No.

MD - N V A

Ⓐ Output type
Ⓑ Analog output style
Ⓒ Supported sensor

Code	Descriptions
Ⓐ Output type	
N	Switch output (NPN) x 2 points
P	Switch output (PNP) x 2 points
Ⓑ Analog output style	
V	Voltage output (1-5 V)
A	Current output (4-20 mA)
Ⓒ Supported sensor	
A	FSM-V, PPE, PPD3-A
B	WFK3000
C	WFK5/6/7000, WFC

(Note) The supported sensors have an output voltage from 1 to 5V.

(Standard accessories)
• 5 wire connector cable 2 m … 1
• Connector for connecting sensor (e-CON) ... 1

Ⓒ	AWG	Outside diameter	Cover color	Sumitomo 3M Model No.
A	24-26	ø1.0-1.2	Yellow	37104-3122-000 FL
B	24-26	ø1.2-1.6	Orange	37104-3163-000 FL
C	20-22	ø1.6-2.0	Gray	37104-2206-000 FL

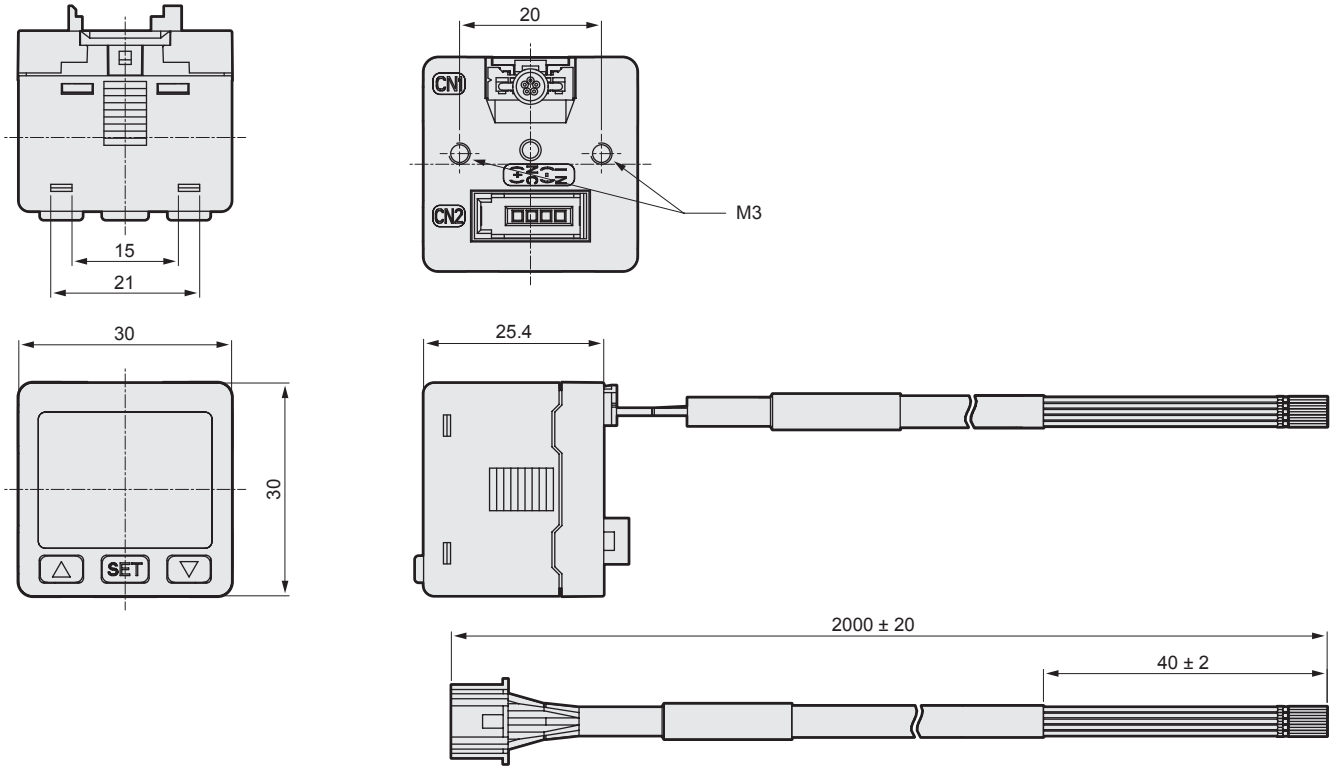
●Option part Model No.

MD - KD

Ⓐ Option

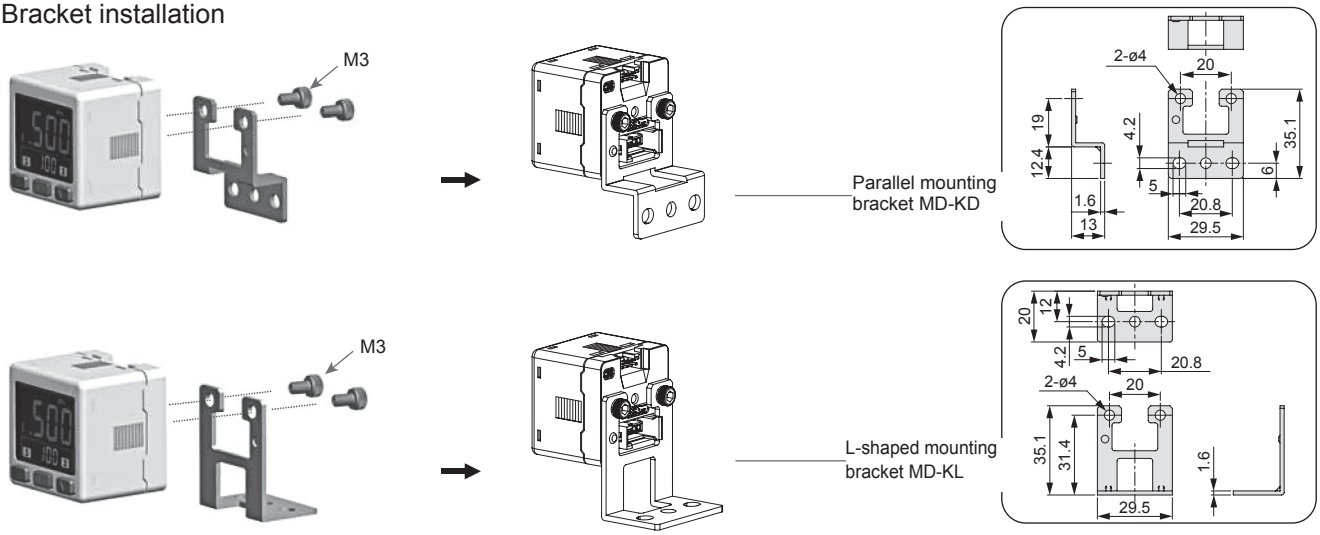
Code	Descriptions
Ⓐ Option	
KD	Parallel mounting bracket (fixing screws included)
KL	L-shaped mounting bracket (fixing screws included)
KHS	Panel adapter
KHSCB	Panel adapter + Front face protective cover
C2	5 wire connector cable 2 m

Dimensions

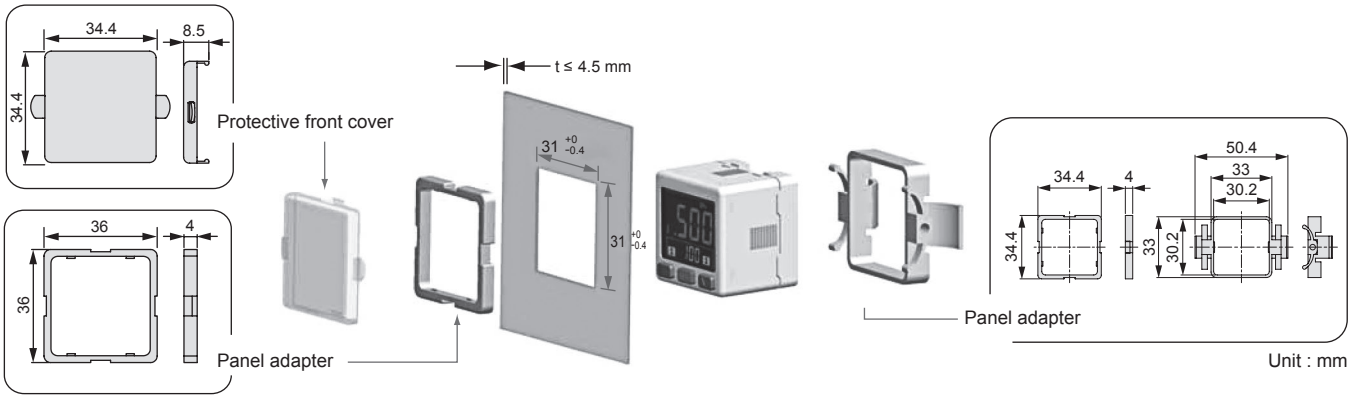


Dimensions with options

●Bracket installation



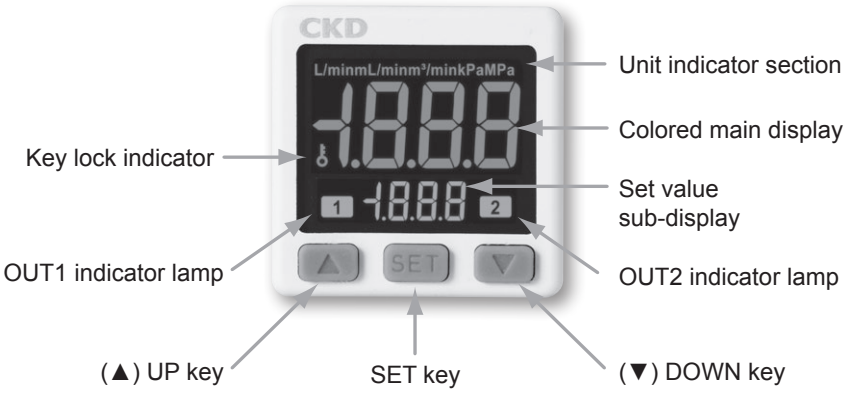
●Panel installation



Unit : mm

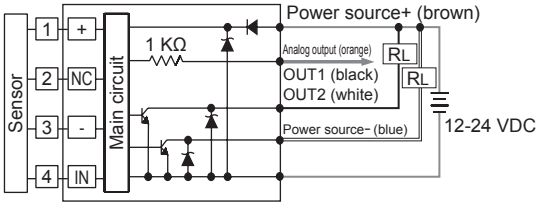
CKD

Display part description

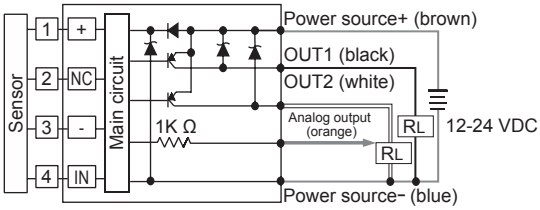


Internal circuit and connection method

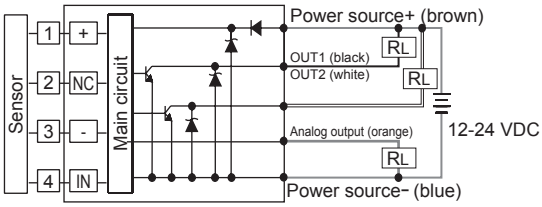
●MD-NV
2 NPN + Analog output (1-5 V)



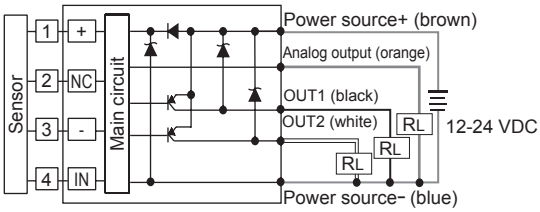
●MD-PV
2 PNP + Analog output (1-5 V)



●MD-NA
2 NPN + Analog output (4-20 mA)

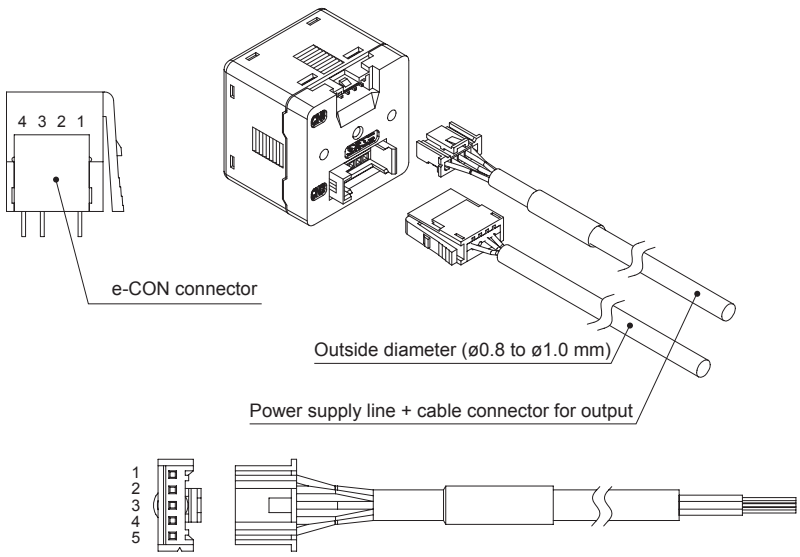


●MD-PA
2 PNP + Analog output (4-20 mA)



PIN No.	Sensor wiring
1	Power source+
2	N.C.
3	Power source-
4	Sensor input (1-5 V)

PIN No.	Cable color
1	Brown (power source+)
2	Orange (analog output)
3	White (OUT2)
4	Black (OUT1)
5	Blue (power source-)



Safety Precautions

Always read this section before use.

When designing and manufacturing equipment that employs CKD products, you are responsible for checking that the equipment's mechanism, pneumatic control circuit, hydraulic control circuit, and the electrical controls for these parts to ensure safety. You are also responsible for manufacturing safe equipment.
It is important to select, use, handle, and maintain the product appropriately to ensure that the CKD products are used safely.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured to manufacture safe devices.

WARNING

1 This product was designed and manufactured to be used as equipment and parts for general industrial machinery.
It must be handled by an operator having sufficient knowledge and experience in handling.

2 Use this product in accordance with specifications.

This product must be used within the stated specifications. Do not attempt to modify or additionally machine the product.
This product is intended for use as a general-purpose industrial device or part. Therefore it is assumed to be beyond the scope of application when using outdoors (except those for use outdoors) or under the following conditions or environment.
(If you consult CKD upon adoption and consent to CKD product specification, it will be applicable; however, safeguards should be adopted that will circumvent dangers in the event of failure.)

❶ Usage with or within components or applications that come into direct contact with nuclear energy, railroad, aviation, ships, vehicles, medical devices, beverage, and food. Usage in applications where safety is required such as amusement equipment, emergency shutoff circuit, press machine, brake circuit, and safeguards.
❷ Use for applications where life or assets could be adversely affected, and special safety measures are required.

3 Observe the corporate standards and regulations, etc., related to the safety of device design and control, etc.

ISO 4414, JIS B 8370 (pneumatic system rules)
JFPS 2008 (Principles for pneumatic cylinder selection and use)
Including High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, body standards and regulations, etc.

4 Do not handle, pipe, or remove devices before confirming safety.

❶ Inspect and service the machine and devices after confirming safety of the entire system related to this product.
❷ Note that there may be hot or charged sections even after operation is stopped.
❸ When inspecting or servicing the device, turn off the energy source (air supply or water supply), and turn off power to the facility. Discharge any compressed air from the system, and pay attention to possible water leakage and leakage of electricity.
❹ When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.

5 Observe warnings and cautions on the pages below to prevent accidents.

■ The safety cautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

DANGER: When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.
WARNING: When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.
CAUTION: When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Items listed under "Caution" can also possibly lead to serious results depending on the situation.
Important details are listed for each; please make sure to follow them.

Precautions when ordering

1 Warranty period

"Warranty Period" is one year from the first delivery to the customer.

2 Scope of warranty

In the case where any defect attributable to CKD is found during the Warranty Period, CKD shall, at its own discretion, repair the defect or replace the relevant product in whole or in part without charge.
Note that the following faults are excluded from the warranty term:
① Product abuse/misuse contrary to conditions/environment recommended in its catalogs/specifications
② Failure caused by a reason other than this product
③ Used for other than intended use
④ Third-party repair/modification
⑤ Faults caused by a reason that is unforeseeable with technology put into practical use at the time of delivery
⑥ Failure attributable to force majeure, such as a natural disaster or other disaster situations
The warranty mentioned here covers the delivered product itself. The scope of warranty shall not cover losses induced by the failure of the delivered product.

3 Compatibility confirmation

In no event shall CKD be liable for merchantability or fitness for a particular purpose, notwithstanding any disclosure to CKD of the use to which the product is to be put.

Safety precautions

Refer to “Pneumatics, Vacuum, Auxiliary Components (No.CB-024SA)” for additional safety information.

⚠ WARNING

■Design & Selection

● Use this product properly in accordance with specifications.

- If used outside of the specifications of usage, load current, voltage, temperature, impact, and other environmental conditions, the product may suffer damage or malfunction.

● Power supply voltage

- Do not use the products over the power supply voltage. Applying a voltage over the operating range or AC power source (100 VAC) may cause an explosion or a fire.

● Load short-circuit

- Do not short-circuit the load. It may cause an explosion or a fire.

■Installation and adjustment

● Connection work

- Before starting a connection work, be sure to turn off the power supply.
- Do not make a wiring mistake. It may cause damage or malfunction.
- Use a low-noise and stabilized power supply with a ripple factor of 10% or less.
- The product and its wiring must be placed farther away from a source of noise such as a strong electric conductor. Measures against a surge on the power line derived from an inductive load should be taken separately.
- After wiring, wait for an adequate time period before starting up the control equipment/mechanical devices. Setting a wrong value other than intended ones may generate an unexpected signal. While keeping the control equipment/ mechanical devices stopped, perform a continuity test and switch settings for its intended use.

⚠ CAUTION

■Design & Selection

● Usage environment

- Avoid using the product at the place where a vibration of 100 m/S^2 or over or an impact will affect.
- Avoid using the product at the place where it is exposed to water droplets, oil droplets, and dust.

● The set values should be determined considering deviations derived from accuracy or temperature characteristics.

● When using for an interlock circuit, extra care must be taken.

- When using this product for interlock signals requiring a high degree of reliability, a mechanical protective function or an additional switch (sensor) other than this product should be installed as insurance against failure to establish double interlock system.

● Supported sensors

- Supported sensors are the types of output voltage from 1 to 5 V. Note that connecting this product to a current output type or other voltage output types results in malfunction.
- The supply current to the sensor is 100 mA max. Confirm the specification of the sensor to be connected.
- As an applicable type of e-CON varies depending on the sensor type, check the model no. described in “How to order” on page 2.
- A display-separated type sensor in FSM2 series cannot be used as it is because it has a different pin array of e-CON wiring.

● Use conditions for CE compliant

To comply with EN61000-6-2, which is the immunity standard applied to CE-compliant products, the following conditions must be met.

Conditions

- This product is evaluated in term of a signal line using a cable composed of a power supply line and a signal line.
- This product offers no surge immunity so that the measures against a surge should be taken on the equipment side.

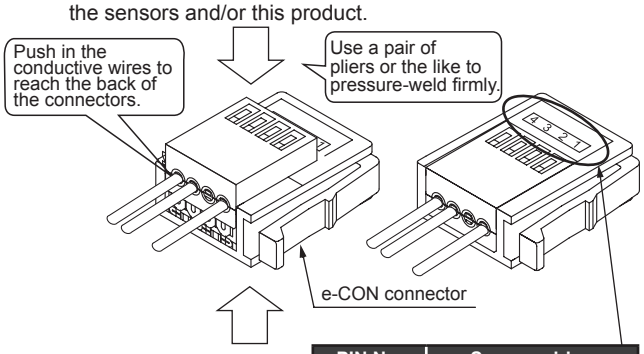
■Installation and Adjustment

● Range setting

- Before using this product, ranges and units must be specified.

● Do not forget to protect the main unit and lead wires from damage.

- Be sure that the pullout and/or connector parts of the cable are not subject to direct stress.
- Use a wiring material with a flexing resistance, such as those for robots, to the movable parts.
- For wiring of the e-CON connector, a tip of the sensor lead wire must be cut before use. Conductive wires must be pushed to reach the back of the connectors and then pressure-welded firmly using a tool, such as a pair of pliers. Cable sheathing does not need to be removed.
- As the color of the analog voltage output lead wire sheath varies depending on the sensor type, check the specifications of the sensor to perform e-CON wiring. At pressure welding, check the pin number and sensor wiring to prevent misoperations. Mis-wiring should cause damage, failure, or malfunction to the sensors and/or this product.



PIN No.	Sensor wiring
1	Power source+
2	N.C.
3	Power source-
4	Sensor input (1-5 V)

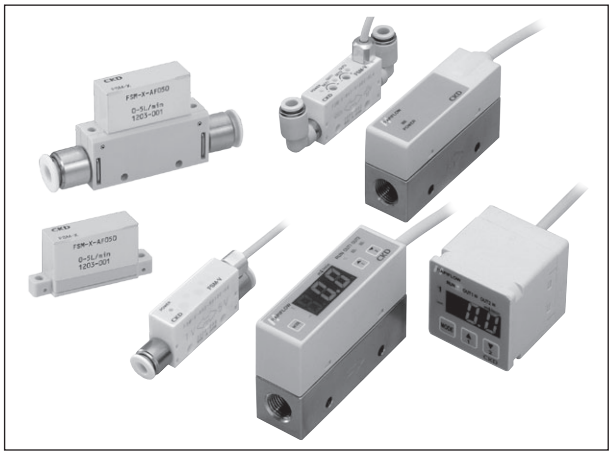
■Use & Maintenance

- Before connecting a sensor, always make sure to turn off the power supply for safety.
- The sensors to be connected must be used according to the safety instructions described in the applicable sensor manuals.

Related products

Small size flow sensor RAPIFLOW FSM series

Catalog No. CC-687A



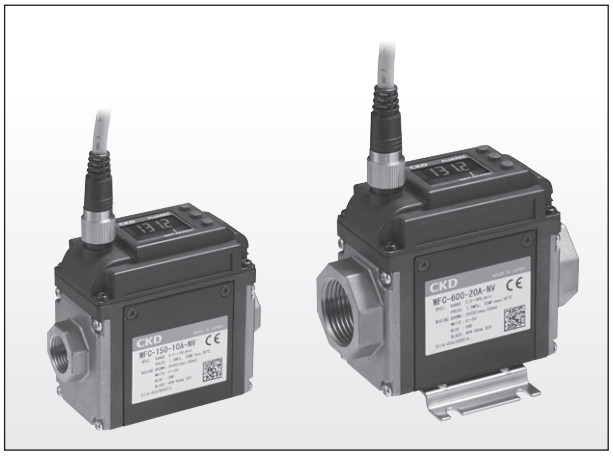
■Micro-miniature, light weight, quick response FSM-X series
- Weight 4 g, narrowest width 8 mm attained
- Two-way flow measurement achieved
- Flow rate range ±0.5, ±1, ±5, ±10, 0.5, 1, 5, 10 ℓ/min

■Micro-miniature, ultra-quick response FSM-V series
- Owing to its micro-miniature size, installable on a narrow place
- Both analog output type and switch output type offered
- Implementing analog output of flow-rate-proportional type
- Flow rate range ±0.05, ±0.1, ±0.5, ±1, ±5, ±10 ℓ/min

■Small size, fast, minuscule flow rate FSM-H series
- Instantaneous detection of a minuscule flow of 1 mℓ/min or less
- Best for leakage test/pinhole test
- Flow range 5, 10, 50, 100 mℓ/min

Capacitance type electromagnetic flow sensor WFC series

Catalog No. CC-1230A



■Implementing a flow through structure allows application to poor water quality.

■Adopting an electrostatic capacitance method avoids detection errors due to foreign matter built up on the electrode.

■Repetition accuracy ensured for elbow piping

■Neither stabilized power supply nor ferrite core for noise reduction required

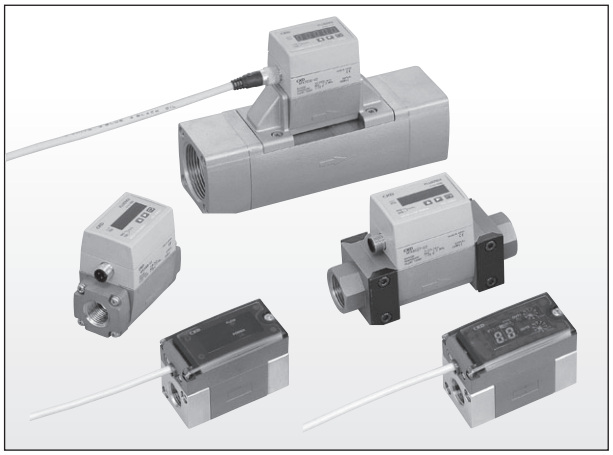
■Zero point adjustment controlled by external input

■Inverse function for turning the display 180 degrees provided

■Reverse flow detection function installed

Karman's vortex type flow sensor WFK series

Catalog No. CB-024SA



■Adopting Karman's vortex detection method allows application to poor water quality in a carefree manner.

■Large effective cross section and low pressure loss achieved

■Contributing to energy saving of water supply pump

■Quick response of 1.0 second attained by unique vortex shedding frequency processing technology

■One touch switching between the displays of instantaneous flow rate and integrating flow rate

■5 digits digital display equipped for quickly checking integrating flow rate per day (WFK5027, 6027)

■Not only an alarm output but also an analog output convenient for record management provided as standard