

Karman's vortex type flow sensor for water WFK (display integrated type flow sensor)

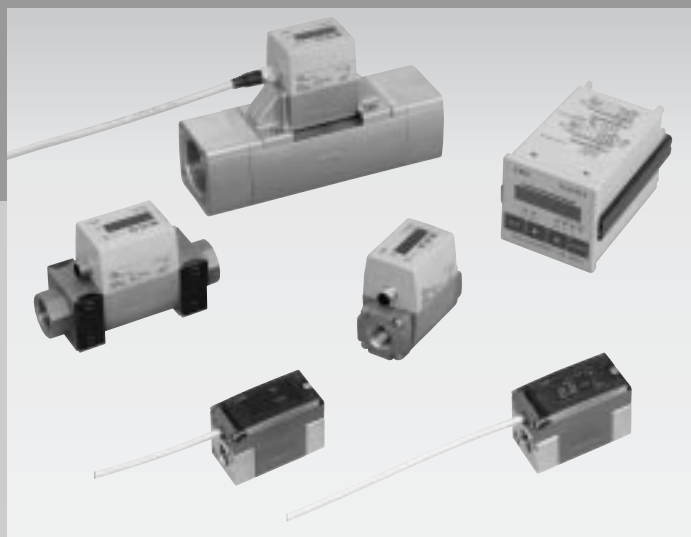
■ Water cooling device related products / flow sensor for water

Overview

Used Karman's vortex detection method, movable section is eliminated from flow path. This allows stable measuring/control in poor working environment where iron rust and foreign matter, etc. are entrained in water.

Features

- (1) Rust water
The product can be used with poor water quality
- (2) Low pressure loss = energy saving
Large effective sectional area and low pressure loss
Contributing to energy saving of water supply pump
- (3) Quick response
High speed response; 1.0 second realized by original vortex street frequency processing technology
- (4) Integrated flow is also push-in
Display of instantaneous flow and integrating flow rates is switched by one touch
- (5) Convenient 5 digits display for integrating
Integrating flow rate per day is quickly checked with 5 digits digital display (WFK5000, 6000, 7000)
- (6) With analog output
In addition to alarm output, convenient analog output is provided for records management as standard



C O N T E N T S

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Wiring method and functional explanation (WFK ⁵ / ₇ 000)	1466
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Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)
Ending

Karman's vortex provided!!

High reliable, easy-to-use flow sensor for water

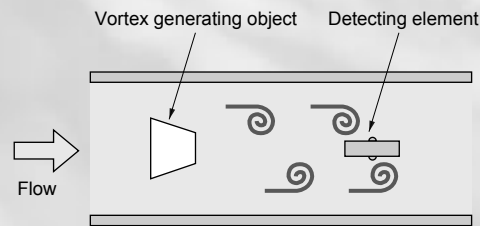
Reliability

Eliminate problems

Karman's vortex (*) is incorporated. The Karman's vortex method has no moving parts, unlike an impeller, so problems caused by dirt and rust in piping are eliminated. This sensor can be used safely even with poor water quality, such as industrial water.

* What is Karman's vortex ?

When an obstacle is placed in the flow, fluid viscosity generates regular and alternate vortices on both sides of the object. This vortex is called Karman's vortex. As shown below, vortex are arranged asymmetrically downstream from the object. These vortices are detected with the detector's piezoelectric element.



High performance

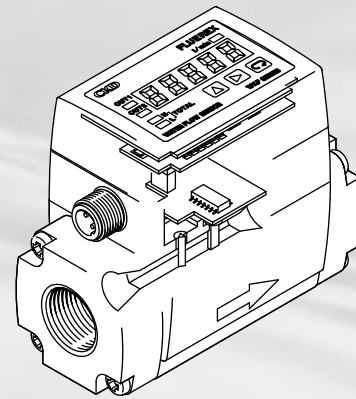
Alarm output response time 1.0 second (using CKD measurement method ^{Note 1})

A response time of 1.0 second is realized by treating the Karman's vortex frequency with CKD's original computing. This sensor is usable even for applications requiring a high-speed response such as tip dislocation detection of a spot welder.

Note 1) Time for alarm to be output when alarm is set to 70% of constant (working fluid) flow and speed is set to zero in an instant.

Precision ±2.5%F.S.

The effect of turbulence can be minimized, so accuracy of ±2.5% F.S. is realized with our original flow path shape.



Easy piping work

Stainless steel is used for the body and piping adapter. Water leakage resulting from deformation or damage by strain applied when tightening does not occur even if steel pipes are used.

CE marking CE

This sensor is compatible with EMC Directives. WFK3000 to WFK7000

Series

Flow sensor for water Series	WFK3000 series		WFK5000 series		WFK6000 series		WFK7000 series					
	Compact ideal for device assembly		Standard type for different applications		Module type, enabling maintenance without disconnecting piping		Large flow capable of handling up to 200 L/min.					
Flow L/min.	0.5 to 4.0 1.5 to 12 4.0 to 32		1 to 8 3 to 27		1 to 8 3 to 27		10 to 50	20 to 100	40 to 200	10 to 50	20 to 100	40 to 200
Piping type	SUS female thread		SUS female thread		SUS female thread		SUS female thread					
Port size	Rc	NPT	Rc	NPT	Rc	NPT	Rc					
	3/8(10)	●	○	●	●	●	●	●	●	●	●	●
	1/2(15)	●	○	●	●	●	●	●	●	●	●	●
	3/4(20)	●	○	●	●	●	●	●	●	●	●	●
	1(25)	●	○	●	●	●	●	●	●	●	●	●
11/4(32)	●	○	●	●	●	●	●	●	●	●	●	
11/2(40)	●	○	●	●	●	●	●	●	●	●	●	

* ○ indicates custom order part.

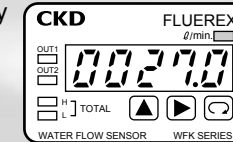
WFK5000 to WFK7000

Easy to use

See the flow rate in an instant

The display and sensor are integrated into a compact body. The 5-digit digital display enables the day's integrated flow to be viewed at a glance. Display of integration for longer periods are viewed by changing the display.

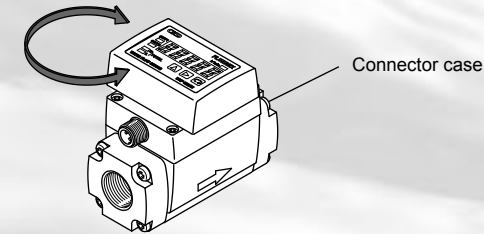
Main body display



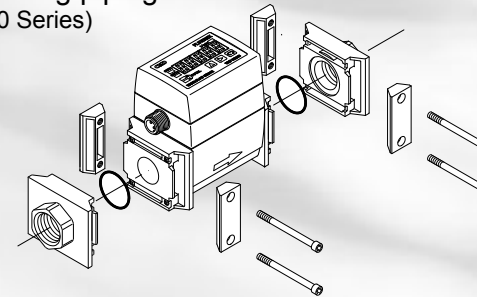
Remote display using analog output (0 to 5VDC) is possible at difficult-to-access places.

Random installation positions

- The display is freely rotated 270° so flow can be checked regardless of sensor installation position.
- Connector wiring can be led out analog piping so wires do not protrude and get in the way.
- The connector can be faced to the IN or OUT side by turning the connector case 180°.

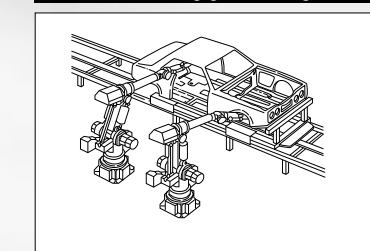


- The modular piping adapter makes it possible to remove and install the sensor without disconnecting piping. (WFK6000 Series)

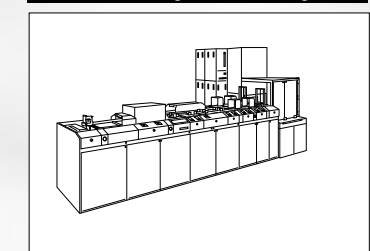


Applications

Control of welding gun cooling water



Control of etching device cooling water



Control of dry vacuum pump cooling water



WFK3000 NEW

Easy to use

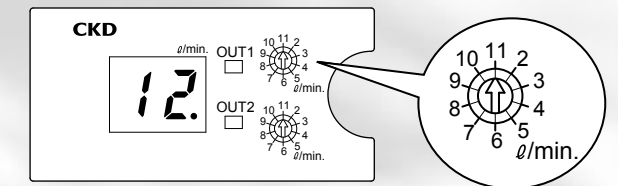
Select model by application.

Sensor type (WFK3000S)
Flow is controlled with analog output.

Switch type with display (WFK3000M)
Cooling errors are output with an alarm.

- Compact and lightweight, ideal for device assembly with semiconductor manufacturing devices.

- Simply wire to start use.
Set the flow with the rotary switch.



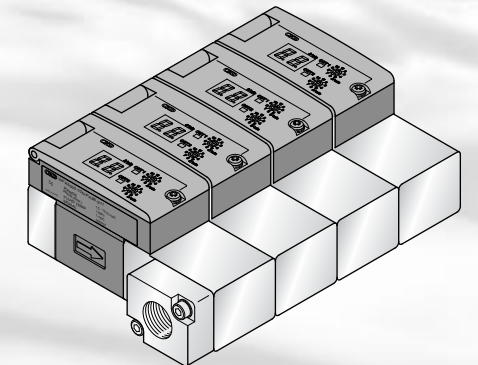
Built-in water temperature measurement function

A water temperature measurement function can be incorporated into the sensor type. The water temperature can be measured without extra equipment or space. (Option)

Protective structure IP65 or equivalent

This sensor can be safely installed even where waterproofing is required, such as in food equipment.

- When using for multirows, common piping is possible with a module block. * Custom order





Refrigeration unit component (component for water)

Safety precautions

Always read this section before starting use.

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)
Ending

Design & Selection

1. Working fluid

⚠ DANGER

- Do not use for drinking water. This product does not comply with food product health laws, and must not be used to measure water that could be consumed in human body. Use this as an industrial sensor.

- Do not use this product for flammable fluids.

⚠ WARNING

- This product cannot be used as a business meter. This product does not comply with Measurement Laws, and cannot be used for commercial business. Use this as an industrial sensor.

- This product is compatible with water (industrial water, clean water). Do not use for other fluids.

- The integrated flow rate includes error, so use as a reference.

2. Working environment

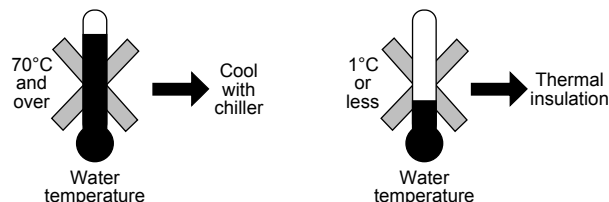
⚠ DANGER

- Flammable environment Do not use this product in flammable atmosphere. It does not have an explosion-proof structure, so flame or fires could occur.

⚠ WARNING

- Corrosive environment Do not use this product in an environment containing corrosive gases such as sulfurous acid.

- Fluid temperature The fluid temperature must be between 1 and 70°C. If the fluid temperature exceeds 70°C, cool with a cooling device such as a chiller. If there is risk of freezing, drain water or provide insulation so water does not freeze. Even if the temperature is within the specified range, do not use this product if the ambient temperature could suddenly change.



- Maximum working pressure This product fails if pressure exceeding the maximum working pressure is used. Check that the pressure is less than the maximum working pressure. Take the following measures to prevent maximum working pressure from being exceeded by a water hammer.

- (1) Use a water hammer proof valve, etc., and ease valve opening.
- (2) Use elastic piping material such as rubber hose and accumulator to absorb impact pressure.
- (3) Keep the pipe as short as possible.

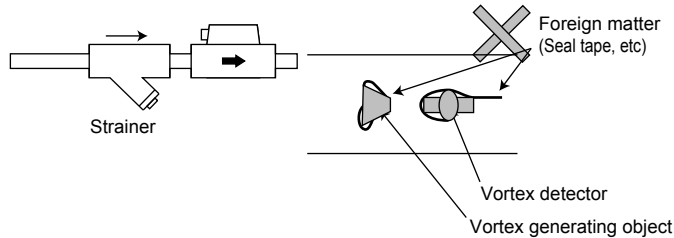
- Drip-proof environment This product is dust proof and drip proof structure enables this product to be used worry-free even if water could come in contact during maintenance or cleaning. Avoid use where water is in constant contact, or where water or oil could splatter intensely.

Component for water

Cautions

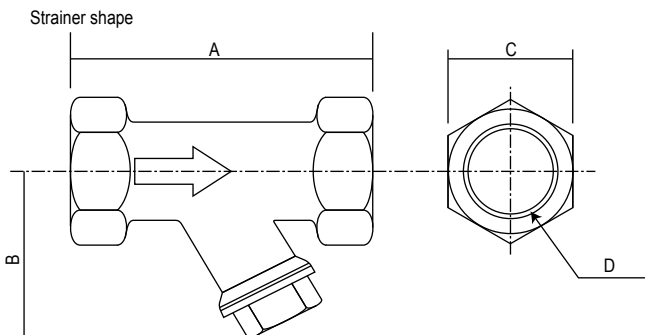
CAUTION

- Install a filter (strainer) on the primary side if foreign substances could enter the fluid. Correct measurement is not possible if foreign substances stick to the vortex generating object or vortex detector.



Strainer specifications

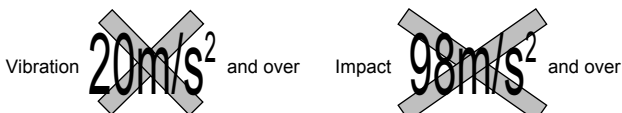
Descriptions	Specifications
Working fluid	Water
Withstanding pressure MPa	2
Working pressure range MPa	0 to 1
Ambient temperature range °C	1 to 90
Main materials	Specifications
Body	Bronze casting
Strainer	Stainless steel



Model no.	A	B	C	D
WF-FL-280730	70	44	23	Rc 3/8
WF-FL-280731	80	49	28	Rc 1/2
WF-FL-280732	100	57	35	Rc 3/4
WF-FL-280733	115	72	43	Rc1
WF-FL-280734	135	82	52	Rc 1 1/4
WF-FL-280735	160	98	59	Rc 1 1/2

Vibration and shock

Avoid using with vibration exceeding 20m/s² or impact exceeding 98m/s². Karman vortex is used for detection so these levels could result in malfunction or damage.

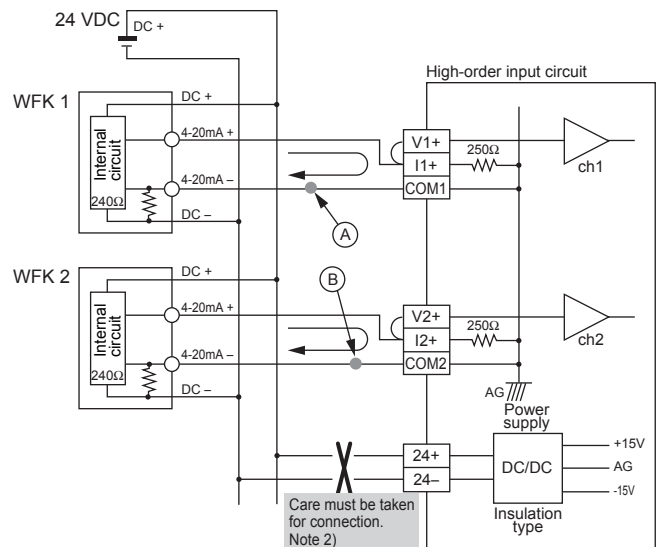


Ambient temperature

Use within an ambient temperature range 0 to 50°C.

3. Connection of analog output A1 (4-20mA)

CAUTION



Note 1) If more than one analog output 4-20 mA sensor is connected to the same common input circuit (host computer, programmable controller, etc.) as shown above, signals will interfere and operation will not be correct. Use the voltage output type (standard, A2, A3) in this case.

* A and B point voltage is connected inside the input circuit, and have the same potential. This causes an error in analog output.

Note 2) If the host input circuit power supply (24 VDC) is not insulated, separate the input circuit and sensor power

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

Karman's vortex type for water Flow sensor

Installation & Adjustment

1. Wiring

⚠ DANGER

- Use power voltage and output within the specified voltage. If voltage exceeding the specified voltage is applied, the sensor could malfunction or be damaged, or electrical shock or fire could occur. Do not use a load exceeding the output rating. Failure to observe this could result in output damage or fire.

⚠ WARNING

- Check the wire color and terminal numbers when wiring. An overcurrent protection circuit for the output transistor and a protective circuit against incorrect wiring with a reverse connection prevention diode, etc., are provided, but these are not compatible with all incorrect wiring. Incorrect wiring could result in sensor damage, problems, and malfunctions. Check wire color and terminal numbers against the instruction manual before wiring.

- Check wiring insulation. Check that wires do not contact other circuits and that there are no ground faults or insulation faults across terminals. Overcurrent could flow in and damage the sensor.

⚠ CAUTION

- Separate the cable from sources of noise such as power distribution wires. Failure to do so could result in malfunctions caused by noise.
- Check that wires not used do not contact other wires.
- Do not short-circuit the output contact. If the load is short-circuited, the overcurrent protection circuit protects the output transistor. If left as is too long, the output transistor could break. Over current protection: Approximate 70mA

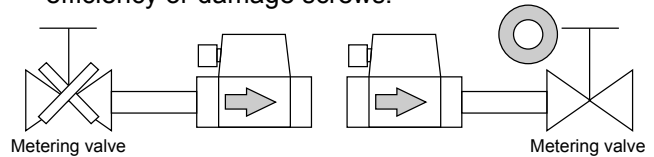
- Do not use this product for loads generating surge voltage. A surge protection element is provided but could break under repeated surges. Use a type with an integrated surge absorption element, such as a relay or solenoid valve. Similarly, use surge countermeasures if there is a source of surge in the power supply line.

- Do not repeatedly bend or tension to leads or wires could disconnect.

2. Piping

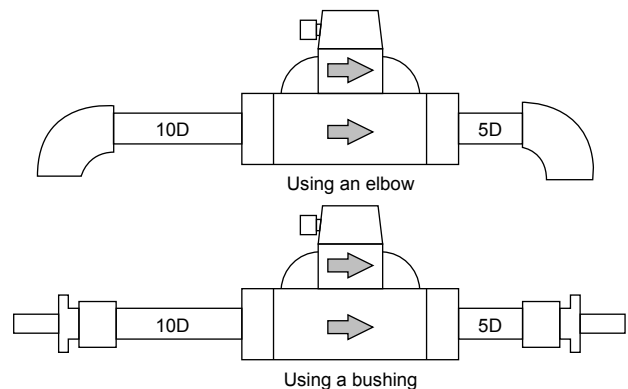
⚠ CAUTION

- This sensor can be installed vertically, horizontally, or in any other position. Pipe so that fluids constantly fill pipes and flow. This sensor can be installed vertically, horizontally, or in any other position. Pipe so that fluids constantly fill pipes and flow.
- Cavitation could form in pipe if it narrows just before the sensor or if the primary side is restricted with a valve, etc. This prevents correct measurement. Pipe to the sensor's secondary side in this case. Cavitation: Vapor bubbles form when static pressure at the back is smaller than water vapor pressure, such as with a boat screw. This may decrease efficiency or damage screws.



Note that if the pump is operated while the secondary side valve is closed, the flow sensor may detect a pressure wave from the pump and incorrectly display it. In this case, install the valve on the primary side and provide a straight piping section between the valve and flow sensor that is 10 times or longer than the pipe diameter.

- When using an elbow or bush in the piping for the WFK7000 Series, install a 10D or longer straight piping section on IN side and 5D or longer straight piping section on OUT side. Note that the bore can be changed up to one rank upward with a bushing. If there is no straight piping section, a drift (turbulent flow) could occur and adversely affect measurement accuracy. (No need to provide a straight piping section for WFK3000/5000/6000 Series. Straight sipping should be used to ensure stable measurement.)



* "D" here refers to the piping material bore. Refer to the following table for actual values:

Port size	Rc3/4 (20A)	Rc1 (25A)	Rc11/4 (32A)	Rc11/2 (40A)
5D	100mm	125mm	160mm	200mm
10D	200mm	250mm	320mm	400mm

Component for water

Cautions

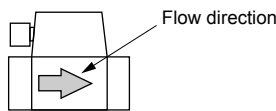
- Apply adequate torque when connecting pipes.
 - To prevent water leakage and screw damage.
 - First tighten the screw by hand to prevent damage to screw threads, then use a tool.

(Recommended value)

Port thread	Tightening torque N·m
Rc3/8	31 to 33
Rc1/2	41 to 43
Rc3/4	62 to 65
Rc1	83 to 86
Rc11/4	97 to 100
Rc11/2	104 to 108

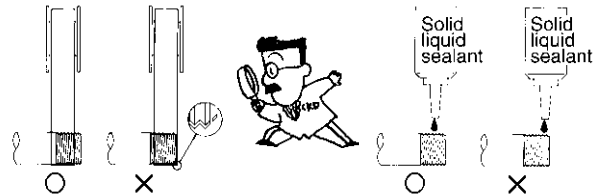


- Check that the fluid direction matches the direction indicated on the body when piping. The flow rate is displayed as zero or lower than the actual value of connected in reverse.



- Clean pipes with compressed air to remove foreign substances or cutting chips, etc., before piping.

- Check that force is not applied to resin parts when piping.
- Check that sealing tape or adhesive does not get inside when piping.
- Dew condenses if the difference between ambient and fluid temperature is large. Operation could fail if this dew enters the electrical section. If dew could condense, install the flow sensor so it is horizontal and the display faces upward.
- When connecting pipes, wrap sealing tape in the opposite direction from threads starting 2 mm inside from the end of piping threads.
 - If sealing tape protrudes from pipe threads, it could be cut when screwed in. This could cause the tape to enter the solenoid valve and lead to faults.



- When using a liquid sealing agent, check that it does not get on resin parts. Otherwise resin could be damaged.

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High polymer membrane type dryer
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Flow sensor for water
Total air system
Total air system (Gamma)

Ending

Karmar's vortex type for water Flow sensor

During Use & Maintenance

1. Common

⚠ CAUTION

■ If a failure occurs during operation, turn power OFF immediately and stop use. Contact your dealer. Slight heating (40°C) of the display section is not problem.

■ Internal settings, such as the hardware check, are made in the first 2 seconds after power is turned ON. The display and output do not function correctly during this time. If an interlock circuit is established with control system devices using transistor output, an abnormal stop could occur, so mask the output during this time.

■ If the output setting value is changed, control system devices could operate unintentionally. Stop devices before changing settings.

■ Do not apply excessive torque to the display. The display can be freely rotated 270° so turn it to an easy-to-see position. The stopper could be damaged if the display is rotated with excessive force. (Excluding WFK3000 Series)

■ Regularly inspect and check that operation is correct.

■ Turn power OFF, check that water pressure is stopped and safety ensured before removing the device.

■ Do not disassemble or modify this product. Doing so could result in faults.

■ Use a nonpolluting cleaning solution, such as a neutral detergent, for cleaning.

2. Working fluid

⚠ CAUTION

■ Observe the following precautions for the applicable fluid to be measured. If the following water quality standards are not met, performance may deteriorate.

■ The quality of applicable fluid must meet the water quality standards in "Refrigerating and Air Conditioning Device Water Quality Guideline" (water quality standards: cooling water system -circulation -circulating water) established by the Japan Society of Refrigerating and Air Conditioning Engineers.

Descriptions	Chemical formula	Unit	Water quality standards
pH	-	pH (25°C)	6.5 to 8.2
Electric conductivity	-	mS/m (25°C)	0.2 to 80 *1
Chloride ion	Cl ⁻	mg/L (ppm)	200 or less
Sulfate ion	SO ₄ ²⁻	mg/L (ppm)	200 or less
Acid consumption (pH4.8)	CaCO ₃	mg/L (ppm)	100 or less
Total hardness	CaCO ₃	mg/L (ppm)	200 or less
Calcium hardness	CaCO ₃	mg/L (ppm)	150 or less
Ionic silica	SiO ₂	mg/L (ppm)	50 or less
Iron	Fe	mg/L (ppm)	1.0 or less
Copper	Cu	mg/L (ppm)	0.3 or less
Sulfide ion	S ²⁻	mg/L (ppm)	Not detected
Ammonium ion	NH ₄ ⁺	mg/L (ppm)	1.0 or less
Residual chloride	Cl	mg/L (ppm)	0.3 or less
Free carbon	CO ₂	mg/L (ppm)	4.0 or less
Stability index	-	-	6.0 to 7.0

*1 Electrical conductivity must be 0.2 [mS/m] and over. Consult with CKD for the range of 0.05 to 0.2 [mS/m]. Levels below 0.05 [mS/m] qualify as ultra pure water and must not be used.

Wiring methods

- Observe precautions for use when wiring.
- 4-conductor cable conductor 0.2 mm² is used for cable.

Option

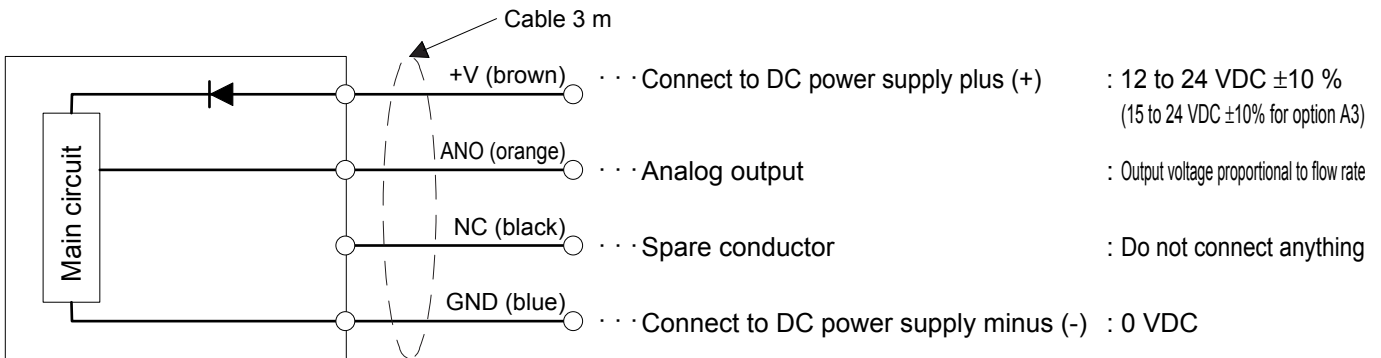
Sensor type (analog output)

- A0; (0-5 (V))
- A1; (4-20 (mA))
- A2; (1-5 (V))
- A3; (0-10 (V))

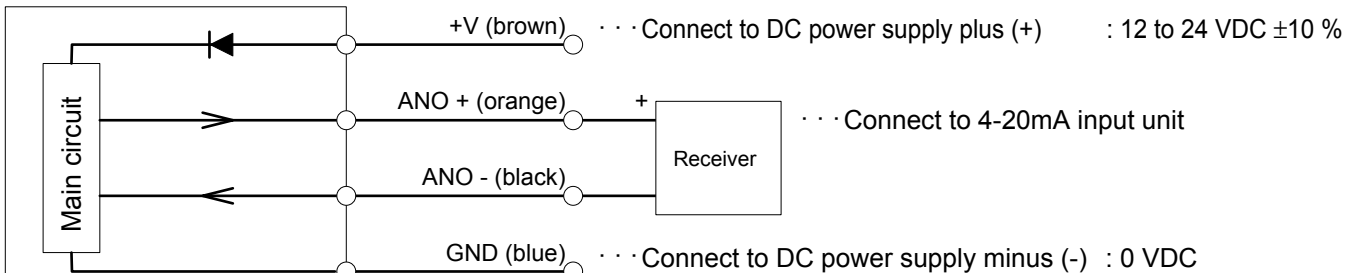
Switch type (switch output type)

- N0; (NPN a contact, 2 point)
- N1; (NPN b contact, 2 point)
- P0; (PNP a contact, 2 point)
- P1; (PNP b contact, 2 point)

● WFK3012S (sensor type voltage output: -A0, -A2, -A3)



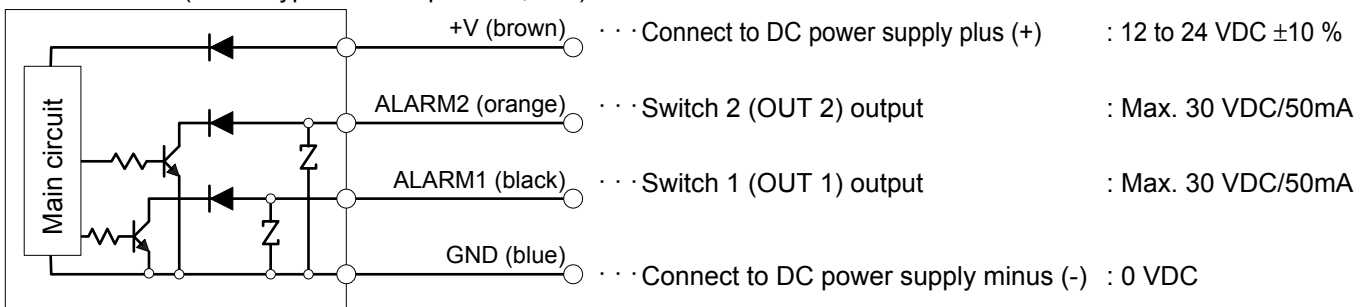
● WFK3012S (sensor type current output: -A1)



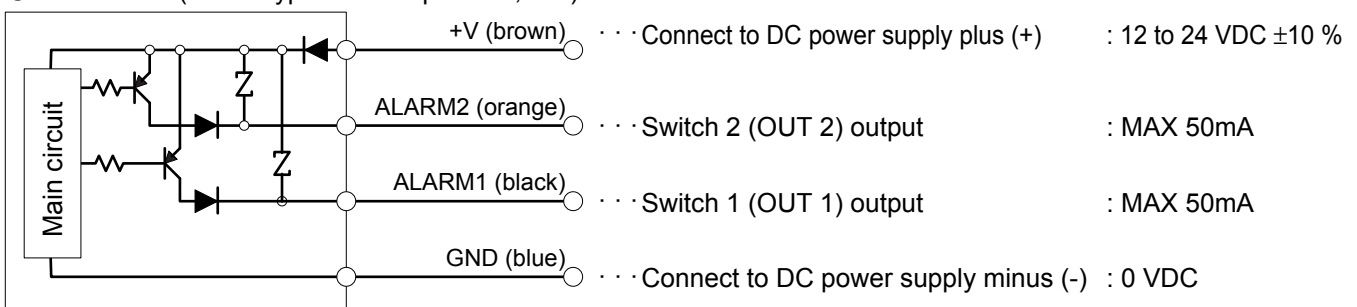
* Note

When connecting more than one flow sensor to the host input circuit (receiver), check that signals do not interfere. (Refer to "3. Connecting analog output AI (4-20 mA)", on page 1455 for details.)

● WFK3012M (switch type NPN output: -N0, -N1)



● WFK3012S (switch type PNP output: -P0, -P1)



Functional explanation

● Switch type (WFK3000M)

- Output light: green (OUT 1)

Indicates the state of switch output.

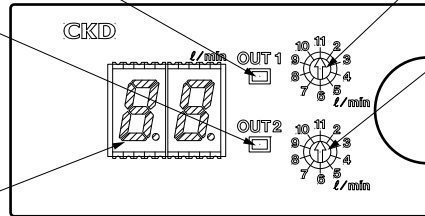
- Output light: orange (OUT 2)

Indicates the state of switch output.

- 2 digit digital display

The instantaneous flow rate is displayed.

* Less than 10L/min.: Decimal display
10L/min. or more: Integer display



- Switch output setting rotary switch (OUT 1)

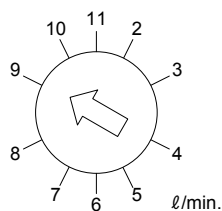
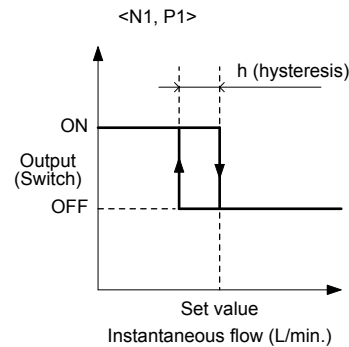
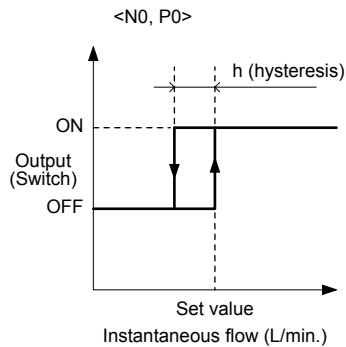
Switch output is set in 10 steps.

- Switch output setting rotary switch (OUT 2)

Switch output is set in 10 steps.

* Corresponds to OUT 1: Lead wire (black)
OUT 2: Lead wire (orange).

• Switch output type switch operation



* The switch output is set with the rotary switch on the sensor top.

* Set the rotary switch with a precision driver, etc. Do not apply excessive force to the rotating section or the contact could fail.

* Flow settings are fixed as shown at right. Check with CKD when the value must be changed.

Model	WFK3004M-** (NO, N1, P0, P1)	WFK3012M-** (NO, N1, P0, P1)	WFK3032M-** (NO, N1, P0, P1)
Switch output Set value [L/min.]	0.6	2.0	5.0
	0.7	3.0	9.0
	0.8	4.0	12
	0.9	5.0	14
	1.0	6.0	16
	1.5	7.0	18
	2.0	8.0	21
	2.5	9.0	24
	3.0	10	27
	3.5	11	30
Hysteresis [L/min.]	0.1	0.5	1.0

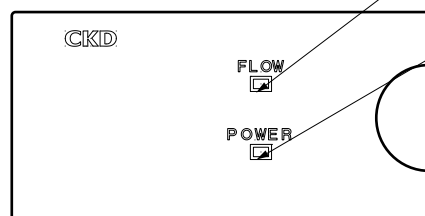
● Sensor type (WFK3000S)

- Water passage display: Green

Lights when water is flowing within the specified range.

- Power display: Orange

Lights when power is turned on.



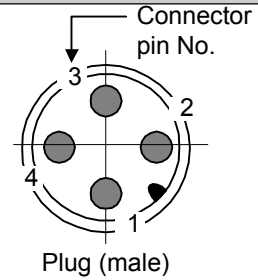
Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

Karman's vortex type for water
Flow sensor

Wiring methods

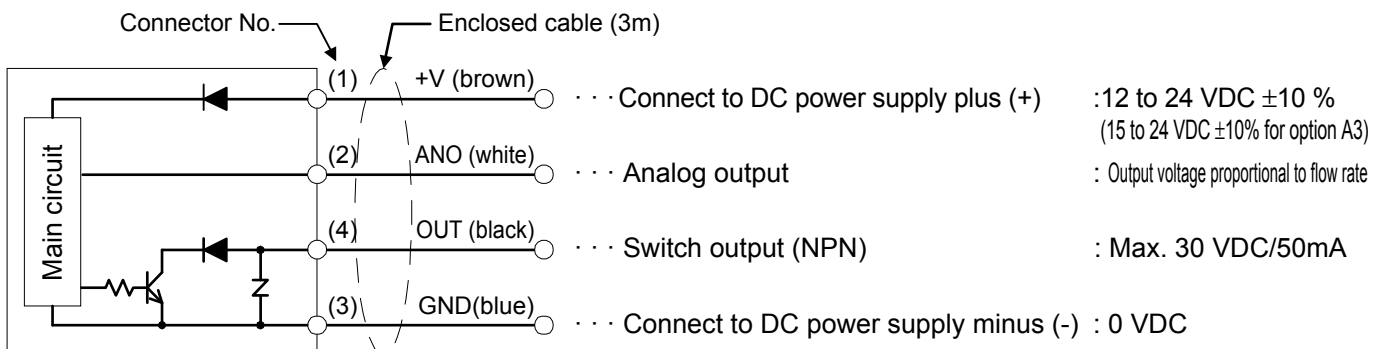
- Observe precautions for use when wiring.
Use a Correns VA connector. Model: TM-4DSX3HG4
Specifications: For DC, 4 conductor 0.5mm²



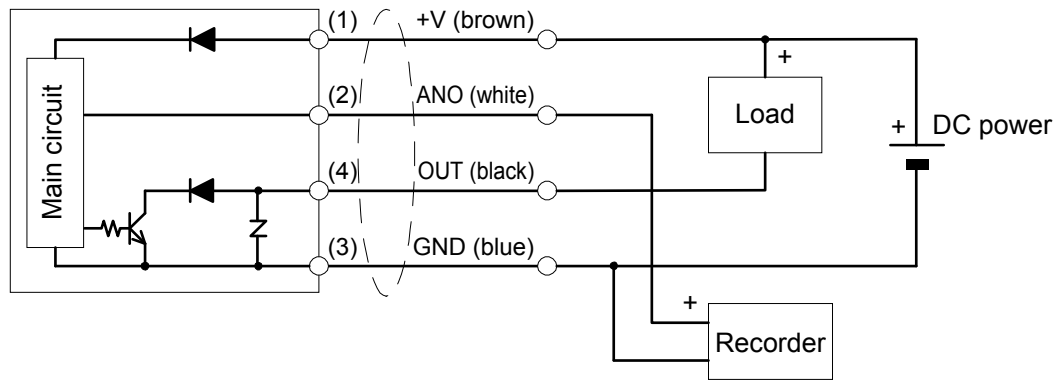
- Option (analog output, switch output type)

Blank; (0-5 (V), NPN)	-P; (0-5 (V), PNP)
-A1; (4-20 (mA))	
-A2; (1-5 (V), NPN)	-PA2; (1-5 (V), PNP)
-A3; (0-10 (V), NPN)	-PA3; (0-10 (V), PNP)
-A4; (without analog output, NPN)	-PA4; (without analog output, PNP)
-A5; (2 point alarm output, NPN)	-PA5; (2 point alarm output, PNP)

1) Blank -A2, -A3, -A4 (Switch output type: NPN)

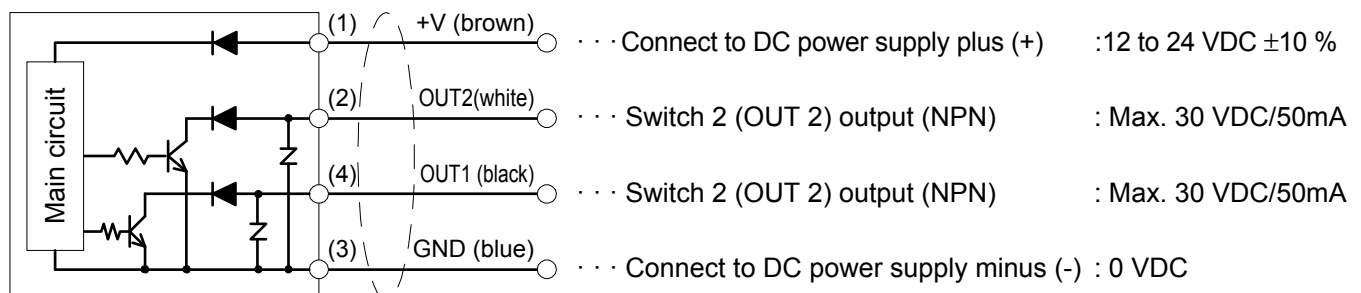


Example of connection with relay, resistance load and recorder

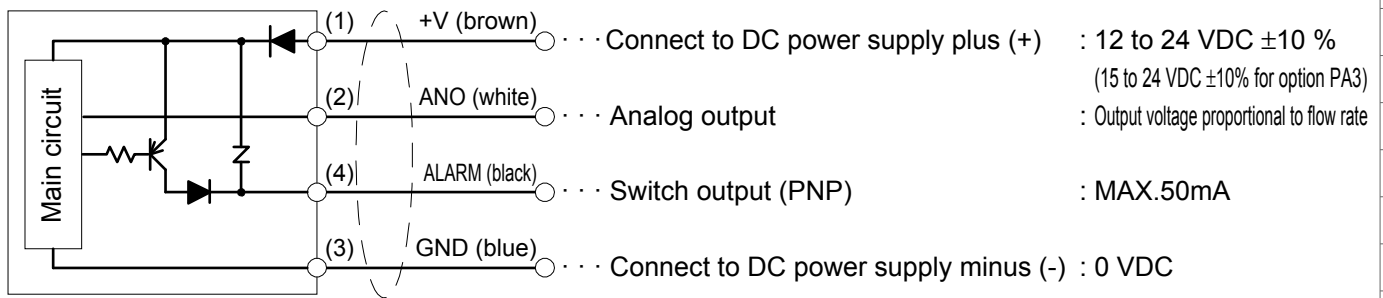


2) -A5 (2 point switch output: NPN)

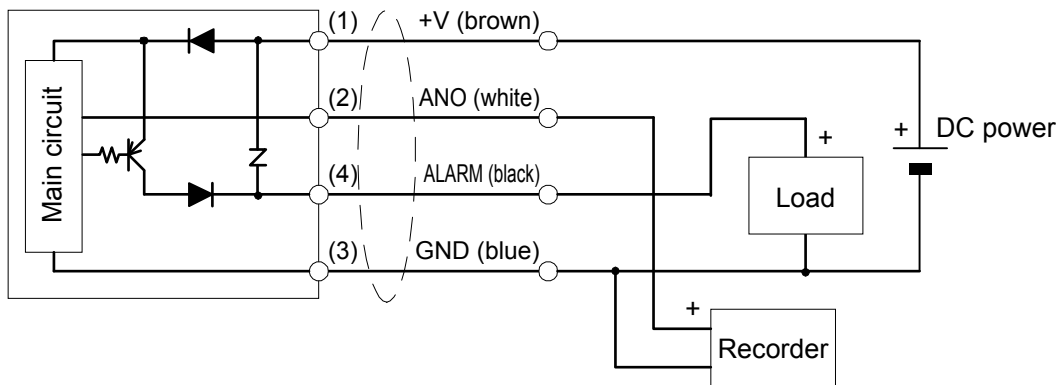
- Analog output cannot be used when 2 point switch output is selected.



3) -P, -PA2, -PA3, -PA4 (switch output type: PNP)

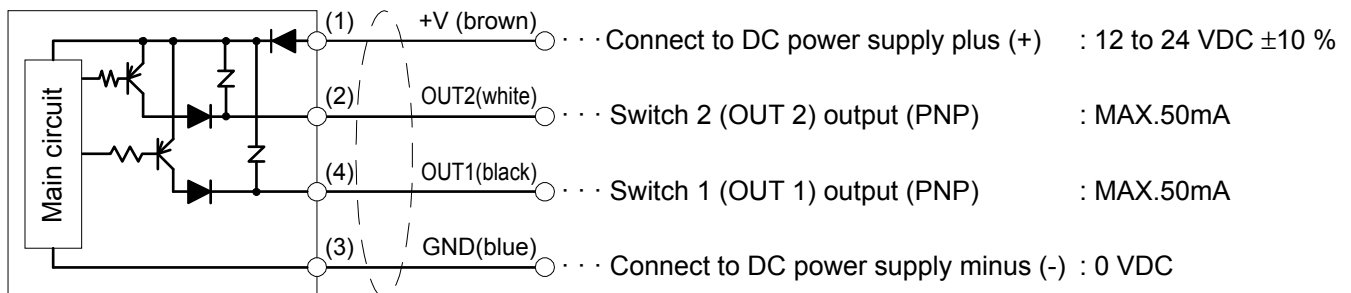


Example of connection with relay, resistance load and recorder



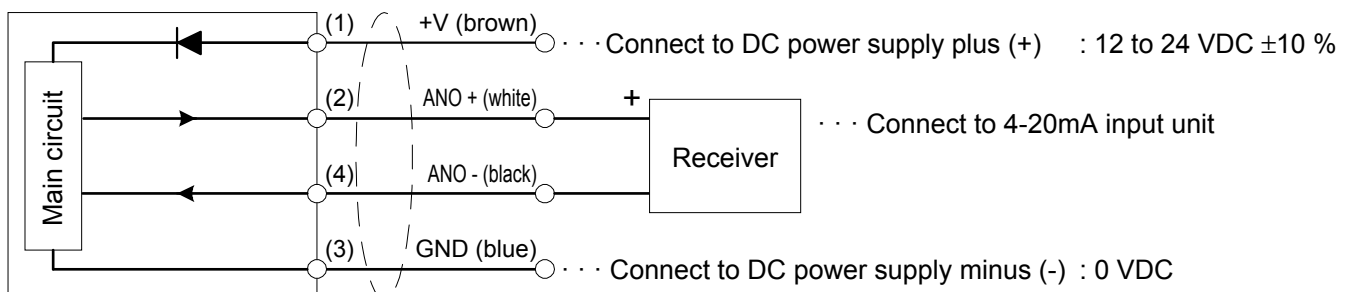
4) -PA5 (2 point switch output: PNP)

- Analog output cannot be used when 2 point switch output is selected.



5) -A1 (4-20mA)

- 4-20mA switch output cannot be used when 4-20mA output is selected.



*** Note**

When connecting more than one flow sensor to the host input circuit (receiver), check that signals do not interfere. (Refer to "3. Connecting analog output AI (4-20 mA)", on page 1455 for details.)

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)
Ending

Functional explanation

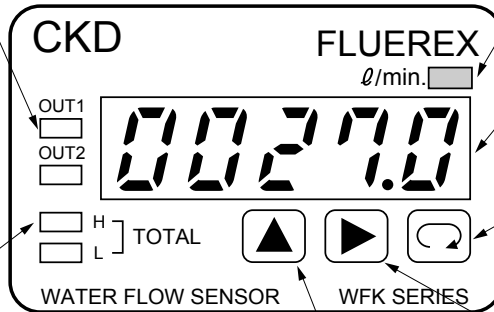
● Output light

Indicates the state of switch output.
*Note that OUT2 is used only when option A5 is selected.

● Unit light integrated flow

<L>
• Indicates the low-order digit of the integrated flow. (Unit: L)
<H>
• Indicates the high-order digit of the integrated flow. (Unit: L)

Integrated flow is expressed in up to 9 digits
(H) High-order digit : 09999
(L) Low-order digit : 99999



● UP key

<MEASURING MODE>
• Toggles between H and L when the integrated flow is displayed.
<WRITE MODE>
• Increments the blinking digit.

● Unit light instantaneous flow

• When ON, indicates that the 5-digit digital display is showing the instantaneous flow.

● 5 digit digital display

• Displays the instantaneous flow and integrated flow.
<WRITE MODE>
• Displays output setting value, etc.

● Change key

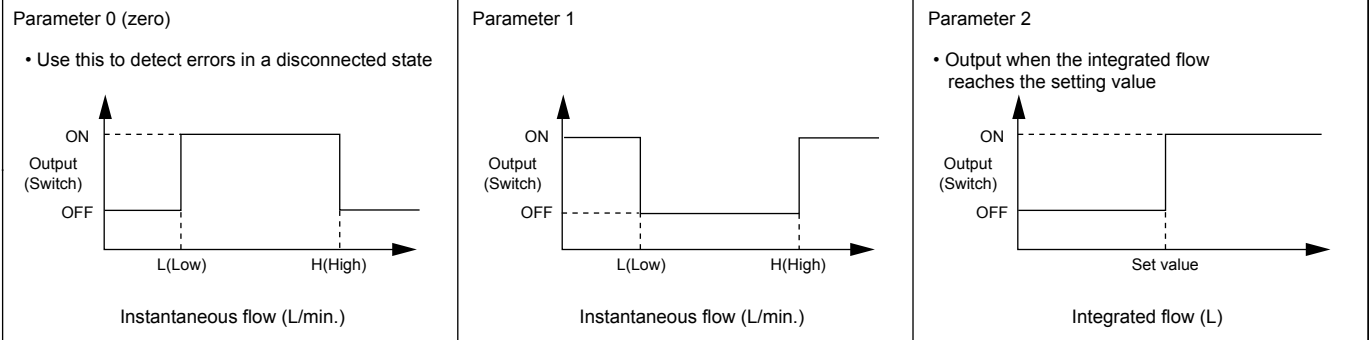
<MEASURING MODE>
• Changes between instantaneous and integrated flows.
<WRITE MODE>
• Use to enter the setting.

● Shift key

<MEASURING MODE>
• Changes to the WRITE MODE when held down for 2 seconds.
<WRITE MODE>
• Shifts the blinking digit to the right.

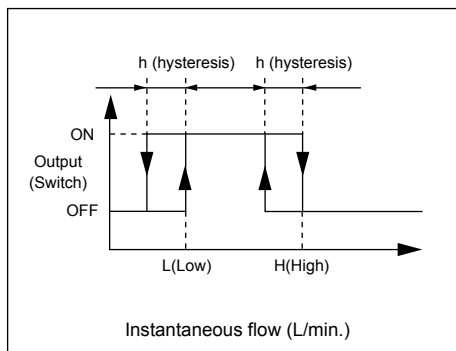
● Switch parameter

• Three types of parameters are selected based on the applications.



● Hysteresis

• Set this when the flow pulses and the alarm chatters.



● Clear with integrated flow

- 1) Clear the value by pressing keys in WRITE MODE.
- 2) Clear the value by turning power OFF.

Note)

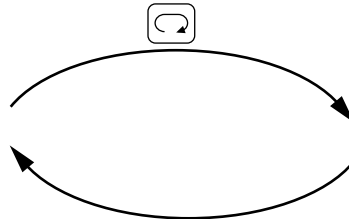
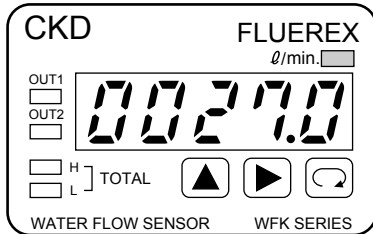
- 1) The OUT (alarm) ON state indicates that transistor power is ON.
 - 2) For safety, set output while the upper stream device is stopped.
 - 3) Satisfy the following conditions when setting parameters 0 and 1.
 - Operation is not guaranteed when these conditions are not met.
 - $0 < L < H$
 - $0 < (L-h) \leq L < (H-h)$
- Note that output is always OFF when $L = H = h = 0$ (at shipment).

MEASURING MODE

- Instantaneous and integrated flows are measured. (When power is ON)

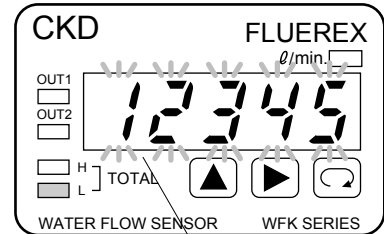
The constant display of integration appears when held down for 2 seconds. Settings are saved even when power is turned OFF, so there is no need to reset these. Hold down the key for 2 seconds again to redisplay the instantaneous flow.

Instantaneous flow display



After 10 seconds, blinking changes to continuously lit, and the instantaneous flow returns automatically.

Temporary integrated flow display



Note) Decimal fractions are not displayed when the integrated flow is displayed.

Hold down for 2 secs.

WRITE MODE

- Set switch output.



Parameter setting

Note) In the following example, P (parameter) is set to 0, L (Low) is set to 10, H (High) to 20, and h (hysteresis) to 1L/min.

- Set parameter using the UP key. Note) L, H and h are not displayed when parameter 2 is selected. Refer to the instruction manual for details.



L (Low) setting

- Set the L (Low) value using SHIFT/UP keys.



H (High) setting

- Set the H (High) value using SHIFT/UP keys. Note) The OUT2 setting is added when option A5 is selected. Refer to the instruction manual for details.



Hysteresis setting

- Set the h (hysteresis) using SHIFT/UP keys.



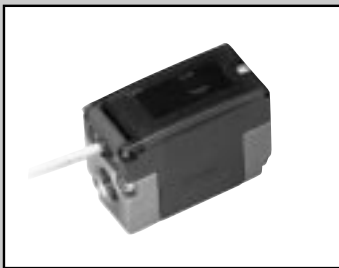
Integration cleared

To clear the count, push shift key and up key at the same time for ten seconds.

To measuring mode

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)
Ending

Karman's vortex type for water Flow sensor



Flow sensor

WFK3000S series

(Compact, device integrated sensor type)



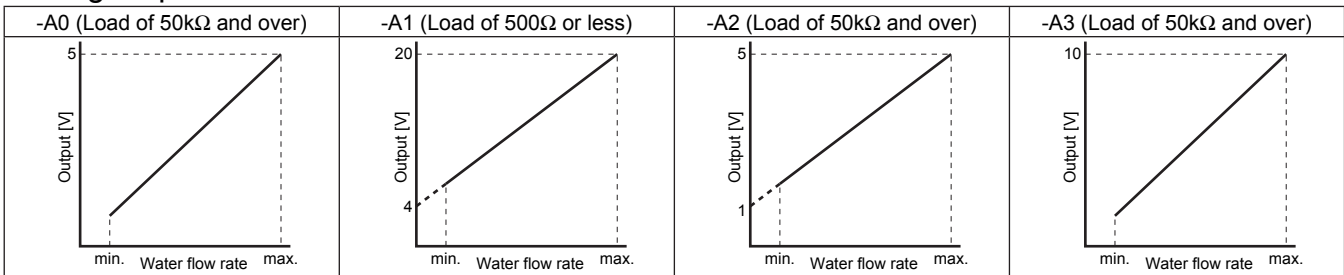
Specification

Model no.	WFK3004S-10	WFK3004S-15	WFK3012S-10	WFK3012S-15	WFK3032S-10	WFK3032S-15
Descriptions						
Flow rate range L/min.	0.5 to 4.0		1.5 to 12		4.0 to 32	
Port size Rc	3/8	1/2	3/8	1/2	3/8	1/2
Connection section material	Stainless steel: SCS13					
Working condition	Working fluid	Clean water, industrial water				
	Max. working pressure MPa	1.0				
	Withstanding pressure MPa	1.5				
	Ambient temperature °C	0 to 50 (85% RH or less)				
	Fluid temperature °C	1 to 70				
Precision	±2.5%F.S.					
Temperature characteristics	±5%F.S. (10 to 50°C, 20°C reference)					
Pressure loss MPa	0.06 or less (4.0 L/min.)		0.05 or less (12L/min.)		0.06 or less (32 L/min.)	
Responsiveness	1 sec. (Note 1)					
Output	Indicator	None				
	Analog output	Standard: 0 to 5 VDC/option: 4 to 20 mA, 1 to 5 V, 0 to 10 VDC				
Power supply	12 to 24 VDC ±10% (Max. 80mA) 15 to 24 VDC for option A3					
Cable	3m, 4-core, finished outer diameter of 4.8mm, core wire 0.2mm ² , insulator outer diameter 1.3mm					
Installation	Installation attitude	Both vertical and horizontal				
	Straight piping section	None (Note2)				
	Protective structure	Equivalent to IP65 (Excluding units equipped with the optional water temperature measurement function)				
Weight g	380	410	380	410	380	410

Note 1: Time to reach 70% of the original output when flow rate is instantly set to zero from the normal (usage) flow rate.

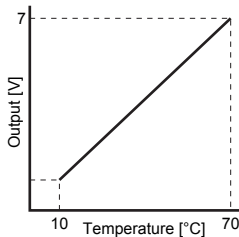
Note 2: The Installation of a straight pipe portion (IN-side: 10D, Out-side: 5D) is recommended to eliminate problems caused by piping conditions. (D: port size)

Analog output

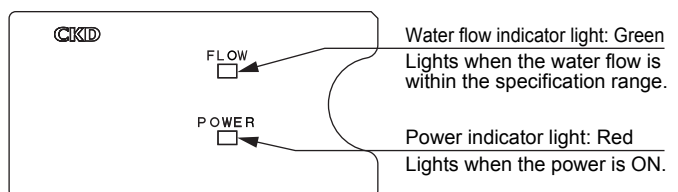


* "min." denotes the flow rate range's minimum value, and "max." denotes maximum value.

Water temperature measurement function (option)



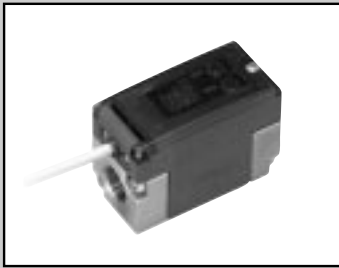
Function explanation



Descriptions	Descriptions	
Specification	Measured temperature range	10 to 70°C
	Port size	Rc3/8 (Note 1)
Output	Temperature output (analog)	1 to 7 VDC (Linear output)
	Precision	±2°C (50°C or less) ±3°C (50°C and over) (Note 2)

(Note 1) Port size is Rc3/8 only.

(Note 2) The difference between the fluid temperature and the ambient temperature must be within ±10°C (or within -20°C when the fluid temperature is 50°C or higher).



Flow sensor

WFK3000M series

(Compact, device integrated sensor type)



Specification

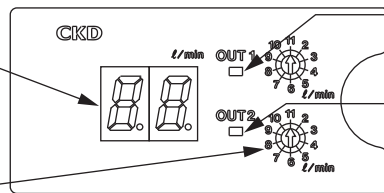
Model no.		WFK3004M-10	WFK3004M-15	WFK3012M-10	WFK3012M-15	WFK3032M-10	WFK3032M-15
Descriptions							
Flow rate range	L/min.	0.5 to 4.0		1.5 to 12		4.0 to 32	
Port size	Rc	3/8	1/2	3/8	1/2	3/8	1/2
Connection section material		Stainless steel: SCS13					
Working condition	Working fluid	Clean water, industrial water					
	Max. working pressure	1.0					
	Withstanding pressure	1.5					
	Ambient temperature	0 to 50 (85% RH or less)					
	Fluid temperature	1 to 70					
Precision		±2.5%F.S.±1digit (1digit = 0.1L/min. (Less than 10 L/min.), 1L/min. (10L/min. and over))					
Temperature characteristics		±5%F.S. (10 to 50°C, 20°C reference)					
Pressure loss	MPa	0.06 or less (4.0 L/min.)		0.05 or less (12L/min.)		0.06 or less (32 L/min.)	
Responsiveness		1 sec. (Note 1)					
Output	Indicator		Instantaneous flow 2 digit LED display				
	Switch output	Point	2 points transistor output (NPN/PNP selection)				
		Rated	Max 50mA DC				
		Internal voltage drop	2.0V or less				
Power supply		12 to 24 VDC ±10% (Max. 80mA)					
Cable		3m, 4-core, finished outer diameter of 4.8mm, core wire 0.2mm ² , insulator outer diameter 1.3mm					
Installation	Installation attitude		Both vertical and horizontal				
	Straight piping section		None (Note2)				
	Protective structure		Equivalent to IP65				
Weight	g	380	410	380	410	380	410

Note 1: Time to reach 70% of the original output when flow rate is instantly set to zero from the normal (usage) flow rate.

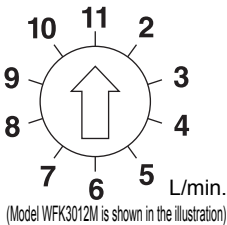
Note 2: The Installation of a straight pipe portion (In-side: 10D, Out-side: 5D) is recommended to eliminate problems caused by piping conditions. (D: port size)

Function explanation

- 2-digit digital display
Displays the instantaneous flow
*Decimal value displays when the flow rate is less than 10 L/min.
Integer value displays when the flow rate is 10 L/min. and over.
- Output setting rotary switch



- Output light: Green (OUT 1)
Lights when the switch output is ON.
- Output light: Red (OUT 2)
Lights when the switch output is ON.
- *OUT1: Lead wire (black)
OUT2: Lead wire (orange) compatible.

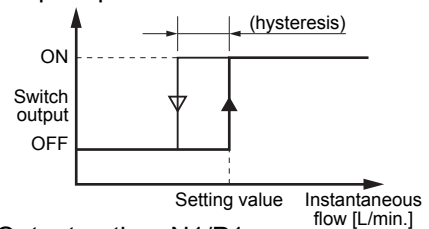


- The switch output has 10 setting levels.
- * Use a precision screwdriver, etc., to set the rotary switch to the desired level. Use care to avoid applying excessive turning force, as this could cause a contact failure condition at the contact.
 - * Be sure that the arrow mark is pointing directly at the setting level value. An unstable output could occur if the arrow is pointing to an area between the setting level values.
 - * The power must be OFF when setting the switch output.

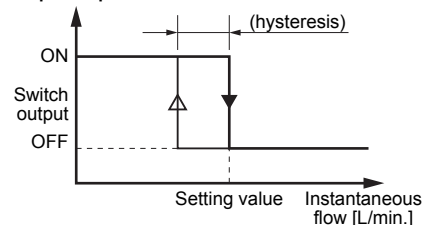
Model	WFK3004M	WFK3012M	WFK3032M
Switch output setting value [L/min.]	0.6	2.0	5.0
	0.7	3.0	9.0
	0.8	4.0	12
	0.9	5.0	14
	1.0	6.0	16
	1.5	7.0	18
	2.0	8.0	21
	2.5	9.0	24
	3.0	10	27
	3.5	11	30
Hysteresis	0.1	0.5	1.0

Switch output operation

<Output option: N0/P0>



<Output option: N1/P1>



Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

Karman's vortex type for water Flow sensor

WFK3000 Series

How to order

● Sensor type

WFK 3 012 S- 10 - A0 T B

<Example of model number>

WFK3004S-10-A0

- A** Shape : Compact installed type
- B** Flow rate range : 0.5 to 4 L/min.
- C** Port size : Rc3/8
- D** Analog output : 0 to 5 VDC
- E** Water temp. measurement function : None
- F** Bracket : None

● Switch type

WFK 3 012 M- 10 - N0 B

<Example of model number>

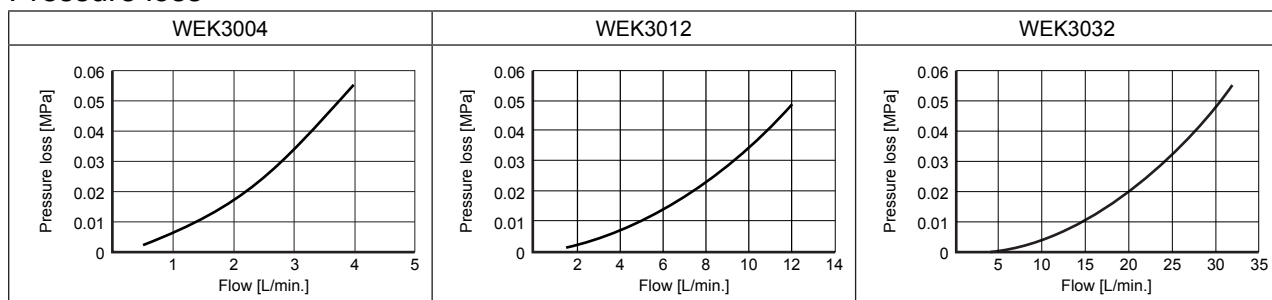
WFK3012M-15-N1B

- A** Shape : Compact installed type
- B** Flow rate range : 1.5 to 12 L/min.
- C** Port size : Rc1/2
- D** Switch output type : NPN 2 points (b contact)
- E** Bracket : With bracket

Symbol	Descriptions
A Shape	
3	Compact installed type
B Flow rate range	
004	0.5 to 4.0 L/min.
012	1.5 to 12 L/min.
032	4.0 to 32 L/min.
C Port size	
10	Rc3/8
15	Rc1/2 (The "T" (with water temp. measurement function) option cannot be selected)
D Analog output	
A0	0 to 5 VDC
A1	DC 4 to 20mA (The "T" (with water temp. measurement function) option cannot be selected)
A2	1 to 5 VDC
A3	0 to 10 VDC
E Water temp. measurement function	
Blank	None
B	With water temp. measurement function
F Bracket	
Blank	None
B	With bracket

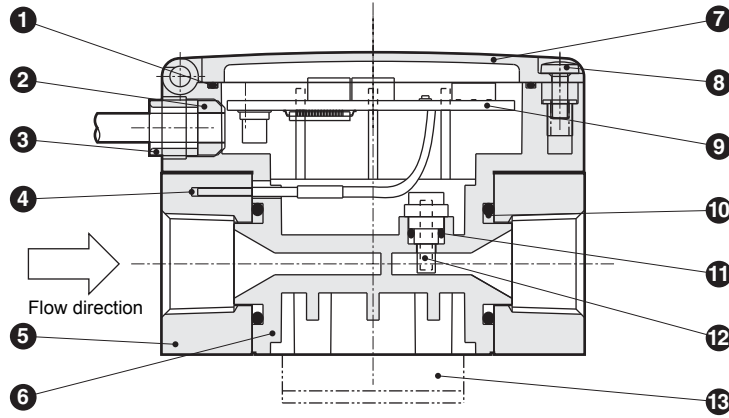
Symbol	Descriptions
A Shape	
3	Compact installed type
B Flow rate range	
004	0.5 to 4.0 L/min.
012	1.5 to 12 L/min.
032	4.0 to 32 L/min.
C Port size	
10	Rc3/8
15	Rc1/2
D Switch output type	
N0	NPN transistor output 2 points (a contact)
N1	NPN transistor output 2 points (b contact)
P0	PNP transistor output 2 points (a contact)
P1	PNP transistor output 2 points (b contact)
E Bracket	
Blank	None
B	With bracket

Pressure loss



WFK3000 Series

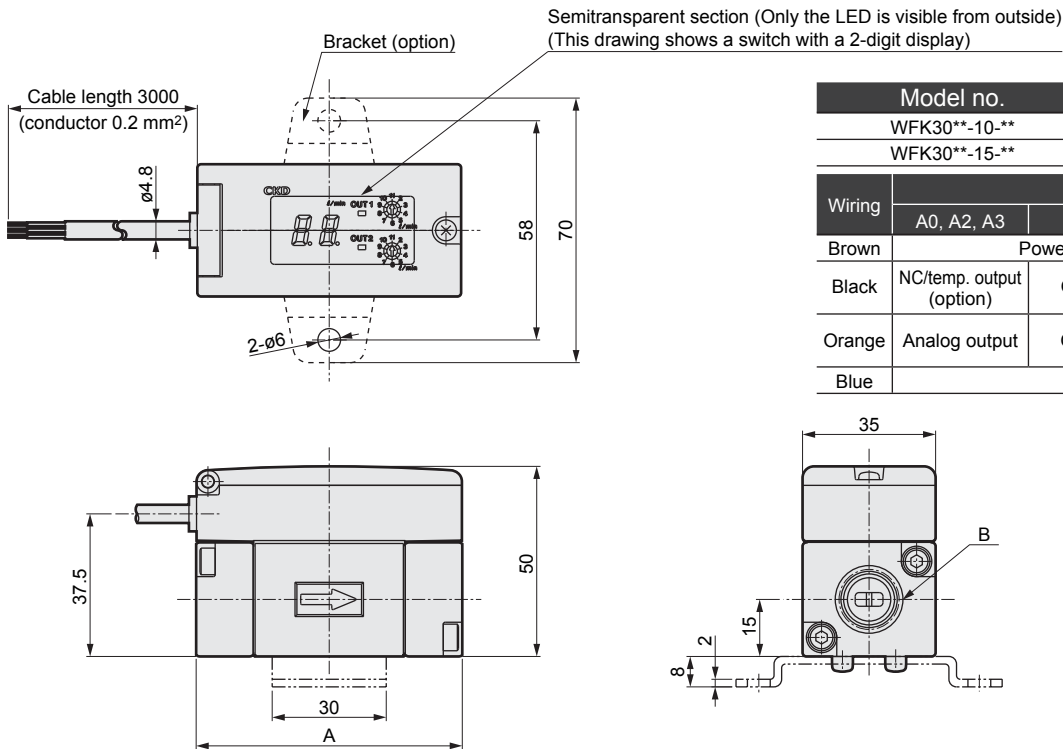
Internal structure / Dimensions



No.	Parts name	Material	Quantity	No.	Parts name	Material	Quantity
1	Guard packing	NBR Nitrile rubber	1	8	Screw for guard		1
2	Cable packing	NBR Nitrile rubber	1	9	Electric component section		1
3	Cable gland	PPS resin GF40%	1	10	O-ring	NBR Nitrile rubber	2
4	Temp. measurement sensor (option)	Thermistor	(1)	11	O-ring	NBR Nitrile rubber	1
5	Attachment	SCS13 Stainless steel casting	2	12	Karman's vortex detection sensor	PPS resin (internal: piezo-electric ceramics)	1
6	Body	PPS resin GF40%	1	13	Bracket (option)	SPCC	(1)
7	Guard	PC resin	1				

* Connected parts are (5), (6), (11), (12).

Dimensions



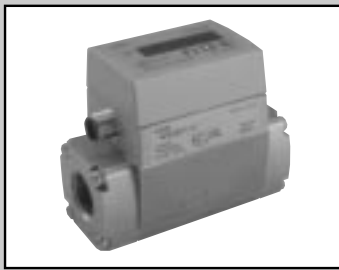
Model no.	A	B
WFK30**-10-**	70	Rc3/8
WFK30**-15-**	80	Rc1/2

Wiring	Option		
	A0, A2, A3	A1	N0, N1, P0, P1
Brown	Power supply DC+		
Black	NC/temp. output (option)	Output -	Switch output (OUT1)
Orange	Analog output	Output +	Switch output (OUT2)
Blue	GND		

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

Karman's vortex type for water
Flow sensor



Flow sensor

WFK5000 series

(Standard type)

Flow rate range: 1.0 to 8.0, 3.0 to 27.0L/min.



Refer to Intro 32 for details.



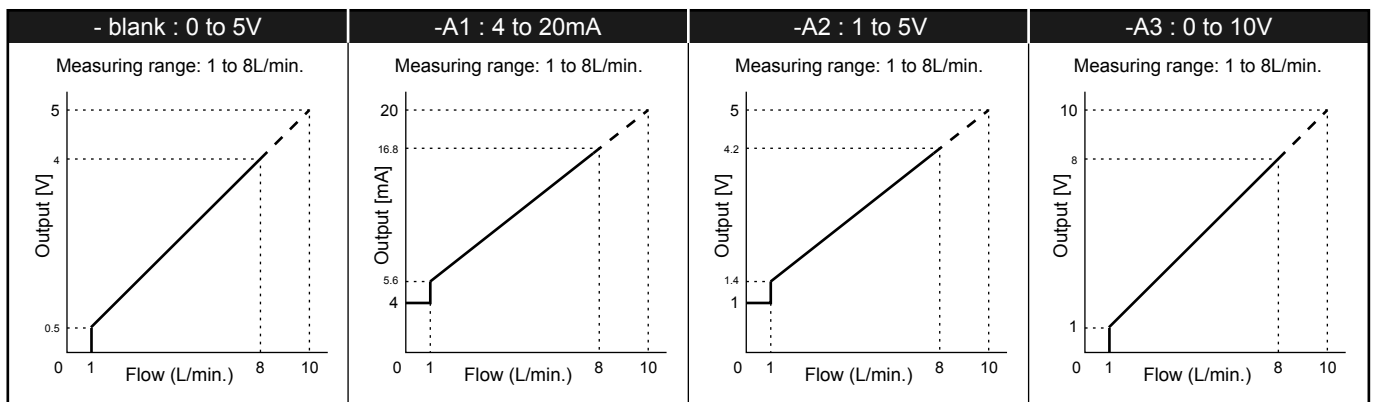
Specifications

Descriptions	WFK5008-10	WFK5008-15	WFK5008-20	WFK5027-10	WFK5027-15	WFK5027-20	
Specifications	Flow measuring range L/min.	1.0 to 8.0			3.0 to 27.0		
	Port size Rc	3/8	1/2	3/4	3/8	1/2	3/4
	Connection section material	Stainless steel: SCS13					
Working conditions	Pressure loss MPa	0.050 or less (8.0L/min.)			0.045 or less (27.0L/min.)		
	Working fluid	Clean water, industrial water					
	Max. working pressure MPa	1.0					
	Withstanding pressure MPa	1.5					
	Fluid temperature °C	1 to 70					
Indicator	Ambient temperature °C	0 to 50 (85%RH or less)					
	Indicator	5 digit LED display					
Integrated flow		Max.9 digit					
		H and L separately displayed					
Output	Switch output	When power supply turns off, counter is reset					
	Point	1 point (NPN/PNP transistor open collector)					
	Rated	MAX 50mA					
	Internal voltage drop	2.0V or less					
	Switch output	0 to 5 VDC (linear output) standard					
Precision	±2.5%F.S. ±1 digit						
Switch output response time sec	Approx. 1.0 (Note)						
Power supply	12 to 24 VDC ±10% (Max. 100mA) 15 to 24 VDC for option A3						
Cable	Enclosed (3 m, 4-conductor, finished outer diameter of ø6, conductor wire 0.5 mm ² , insulator outer diameter of ø1.9, with connector)						
Installation attitude	Horizontal or vertical						
Protective structure	IP64 or equivalent						
Weight g	630	600	650	630	600	650	

Note: Time to reach 70% of the original output when flow rate is instantly set to zero from the normal (usage) flow rate.

Analog output

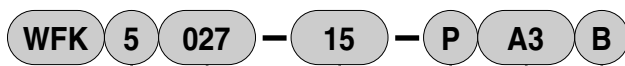
● WFK5008-**



Connecting load conditions

Descriptions	Blank [0 to 5V]	-A1 [4 to 20mA]	-A2 [1 to 5V]	-A3 [0 to 10V]
Allowable load	50kΩ and over	500Ω or less	50kΩ and over	50kΩ and over

How to order



A Port shape, material

B Flow rate range

C Port size
Note 1

D Switch output type

E Analog output

F Bracket
Note 4

Symbol	Descriptions
A Port shape, material	
5	Shape: female thread Material: stainless steel (SCS13)
B Flow rate range	
008	1 to 8L/min.
027	3 to 27L/min.l
C Port size	
10	Rc3/8
15	Rc1/2
20	Rc3/4
10N	3/8NPT
15N	1/2NPT
20N	3/4NPT
D Switch output type	
Blank	NPN transistor open collector
P	PNP transistor open collector
E Analog output	
Blank	0 to 5 VDC
A1	4 to 20mA DC Note 2
A2	1 to 5 VDC
A3	0 to 10 VDC
A4	Without analog output
A5	2 points switch output Note 3
F Bracket	
Blank	None
B	With bracket

⚠ Note on model no. selection

Note 1: When using American taper pipe thread, add "N" to the port size.

Note 2: When selecting analog output A1: 4 to 20mA, switch function can not be used.

Note 3: When selecting analog output A5: 2 points alarm output, analog output can not be used.

Note 4: For option B, a bracket and set screw are attached.

When ordering a bracket only, indicate part name: bracket assembly and model no. WF-FL-249969.

<Example of model number>

WFK5027-15-PA3B

Model : Flow rate sensor standard type

A Port shape, material : Shape : female thread,
Material : stainless steel

B Flow rate range : 3 to 27L/min.

C Port size : Rc1/2

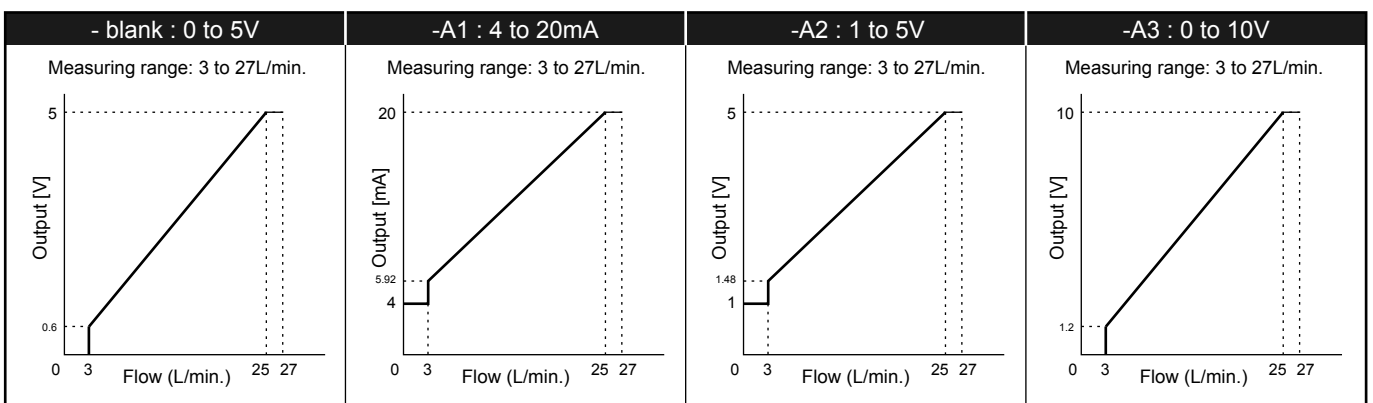
D Switch output type : PNP transistor open collector

E Analog output : 0 to 10 VDC

F Bracket : With bracket

Analog output

● WFK5027-**



Connecting load conditions

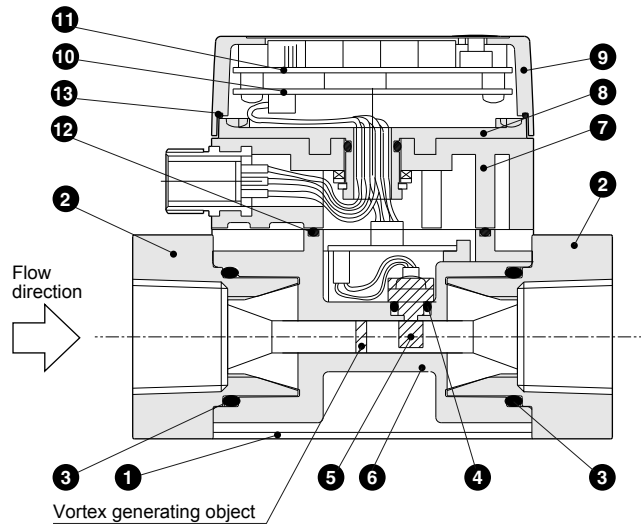
Descriptions	Blank [0 to 5V]	-A1 [4 to 20mA]	-A2 [1 to 5V]	-A3 [0 to 10V]
Allowable load	50kΩ and over	500Ω or less	50kΩ and over	50kΩ and over

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

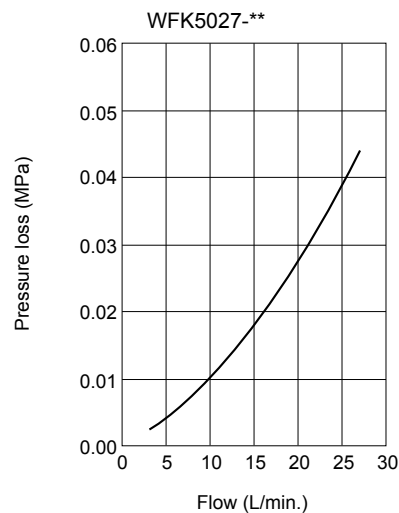
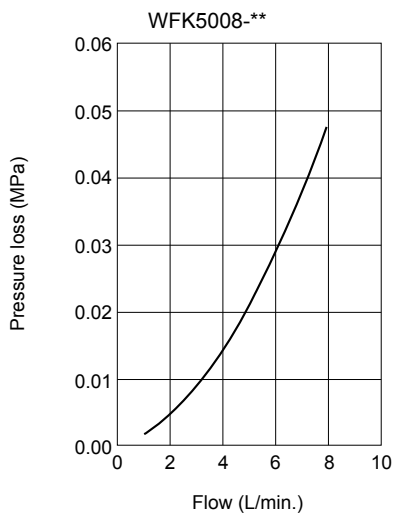
Karman's vortex type for water
Flow sensor

Internal structure and parts list

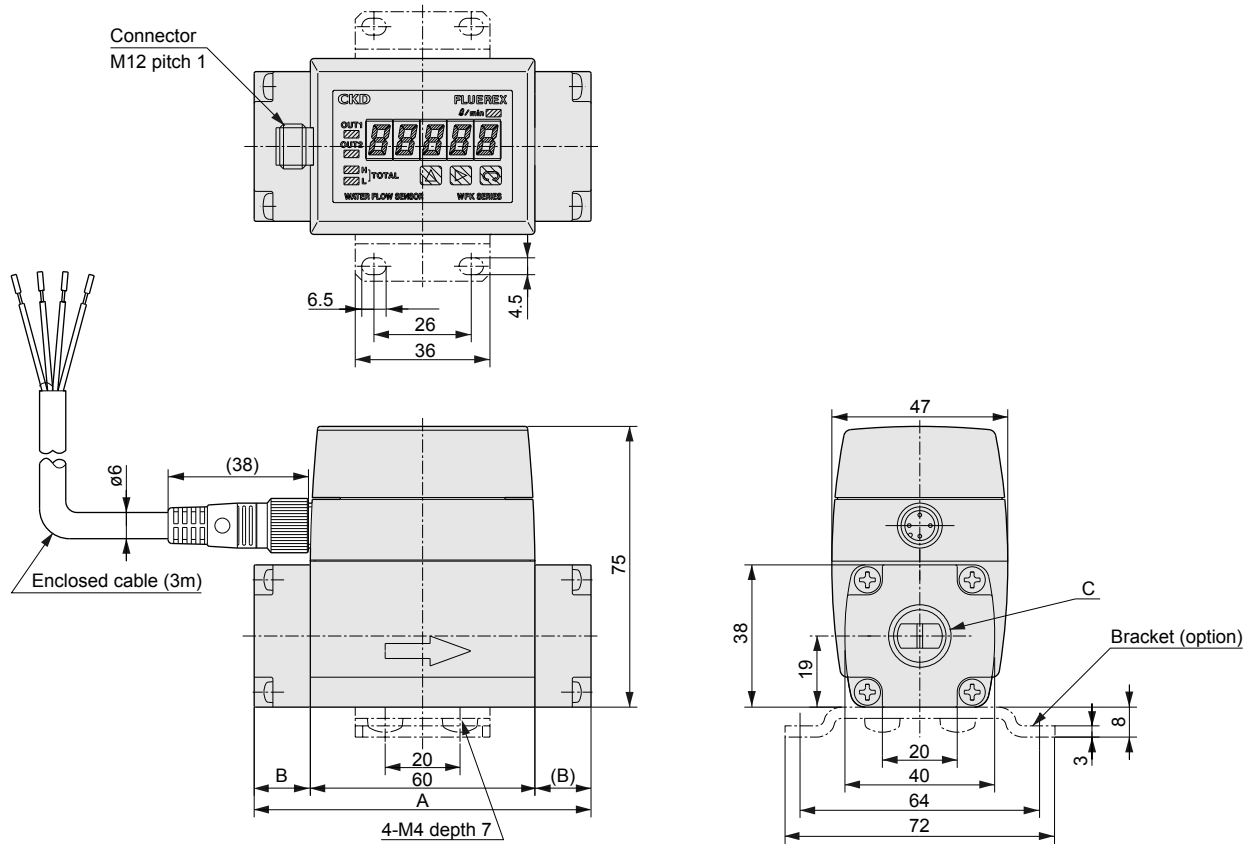


No.	Parts name	Material	Quantity
1	Body	SCS13 Stainless steel casting	1
2	Attachment	SCS13 Stainless steel casting	2
3	O ring	NBR Nitrile rubber	2
4	O ring	NBR Nitrile rubber	1
5	Vortex detecting element	PPS resin (internal piezo-electric ceramics)	1
6	Sleeve	PPS resin	1
7	Connector case	ABS resin	1
8	Case B	PC/ABS alloy resin	1
9	Case A	ABS resin	1
10	CPU circuit board	-	1
11	Display circuit board	-	1
12	Sleeve packing seal	NBR Nitrile rubber	1
13	Case packing seal	NBR Nitrile rubber	1

Pressure loss



Dimensions



Model no.	A	B	C
WFK50**-10	90	15	Rc3/8
WFK50**-15	90	15	Rc1/2
WFK50**-20	105	22.5	Rc3/4
WFK50**-10N	90	15	3/8NPT
WFK50**-15N	90	15	1/2NPT
WFK50**-20N	105	22.5	3/4NPT

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

Karman's vortex type for water
Flow sensor



Flow sensor

WFK6000 series

(Modular design type)

Flow rate range: 1.0 to 8.0, 3.0 to 27.0L/min.



Refer to Intro 32 for details.



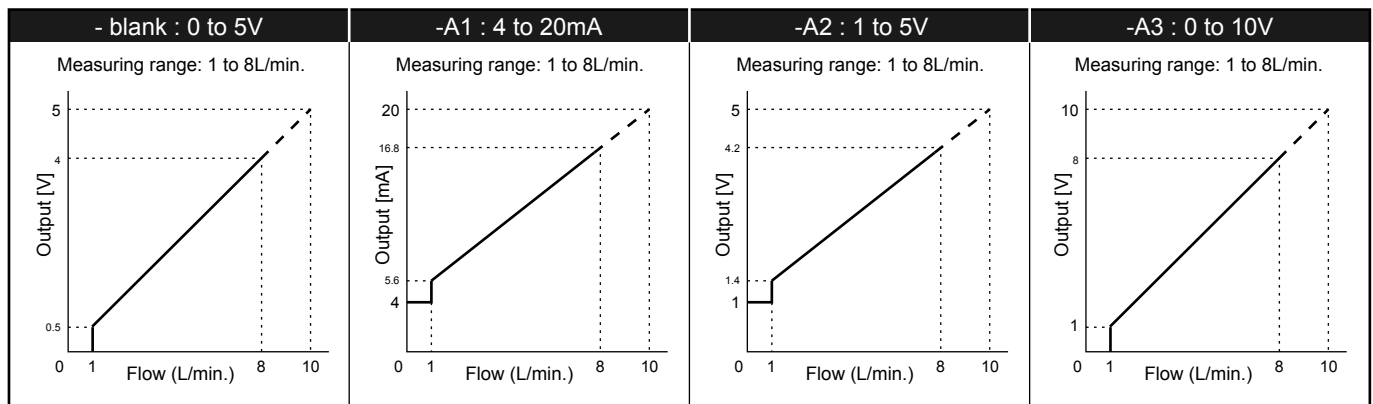
Specifications

Descriptions	WFK6008-10	WFK6008-15	WFK6008-20	WFK6027-10	WFK6027-15	WFK6027-20
Flow measuring range L/min.	1.0 to 8.0			3.0 to 27.0		
Port size Rc	3/8	1/2	3/4	3/8	1/2	3/4
Connection section material	Stainless steel: SCS13					
Pressure loss MPa	0.050 or less (8.0L/min)			0.045 or less (27.0L/min.)		
Working fluid	Clean water, industrial water					
Max. working pressure MPa	1.0					
Withstanding pressure MPa	1.5					
Fluid temperature °C	1 to 70					
Ambient temperature °C	0 to 50 (85%RH or less)					
Indicator	5 digit LED display					
Integrated flow	Max.9 digit					
	H and L separately displayed					
	When power supply turns off, counter is reset					
	1 point (NPN/PNP transistor open collector)					
Output	Switch output	Point	MAX 50mA			
		Rated	2.0V or less			
	Internal voltage drop	0 to 5 VDC (linear output) standard				
Analogue output	Precision ±2.5%F.S. ±1 digit					
Switch output response time sec	Approx. 1.0 (Note)					
Power supply	12 to 24 VDC ±10% (Max. 100mA) 15 to 24 VDC for option A3					
Cable	Enclosed (3 m, 4-conductor, finished outer diameter of ø6, conductor wire 0.5 mm ² , insulator outer diameter of ø1.9, with connector)					
Installation attitude	Horizontal or vertical					
Protective structure	IP64 or equivalent					
Weight g	830	810	850	830	810	850

Note: Time to reach 70% of the original output when flow rate is instantly set to zero from the normal (usage) flow rate.

Analog output

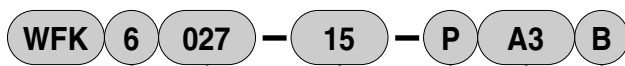
● WFK6008-**



Connecting load conditions

Descriptions	Blank [0 to 5V]	-A1 [4 to 20mA]	-A2 [1 to 5V]	-A3 [0 to 10V]
Allowable load	50kΩ and over	500Ω or less	50kΩ and over	50kΩ and over

How to order



A Port shape, material

B Flow rate range

C Port size
Note 1

D Switch output type

E Analog output

F Bracket
Note 4

Symbol	Descriptions
A Port shape, material	
6	Shape: female thread Material: stainless steel (SCS13)
B Flow rate range	
008	1 to 8L/min.
027	3 to 27L/min.
C Port size	
10	Rc3/8
15	Rc1/2
20	Rc3/4
10N	3/8NPT
15N	1/2NPT
20N	3/4NPT
D Switch output type	
Blank	NPN transistor open collector
P	PNP transistor open collector
E Analog output	
Blank	0 to 5 VDC
A1	4 to 20mA DC Note 2
A2	1 to 5 VDC
A3	0 to 10 VDC
A4	Without analog output
A5	2 points switch output Note 3
F Bracket	
Blank	None
B	With bracket

⚠ Note on model no. selection

Note 1: When using American taper pipe thread, add "N" to the port size.

Note 2: When selecting analog output A1: 4 to 20mA DC, switch function can not be used.

Note 3: When selecting analog output A5: 2 points alarm output, analog output can not be used.

Note 4: For option B, a bracket and set screw are attached.

When ordering a bracket only, indicate part name: bracket assembly and model no. WF-FL-249969.

<Example of model number>

WFK6027-15-PA3B

Model: Flow sensor modular design

A Port shape, material : Shape : female thread, Material : stainless steel

B Flow rate range : 3 to 27L/min.

C Port size : Rc1/2

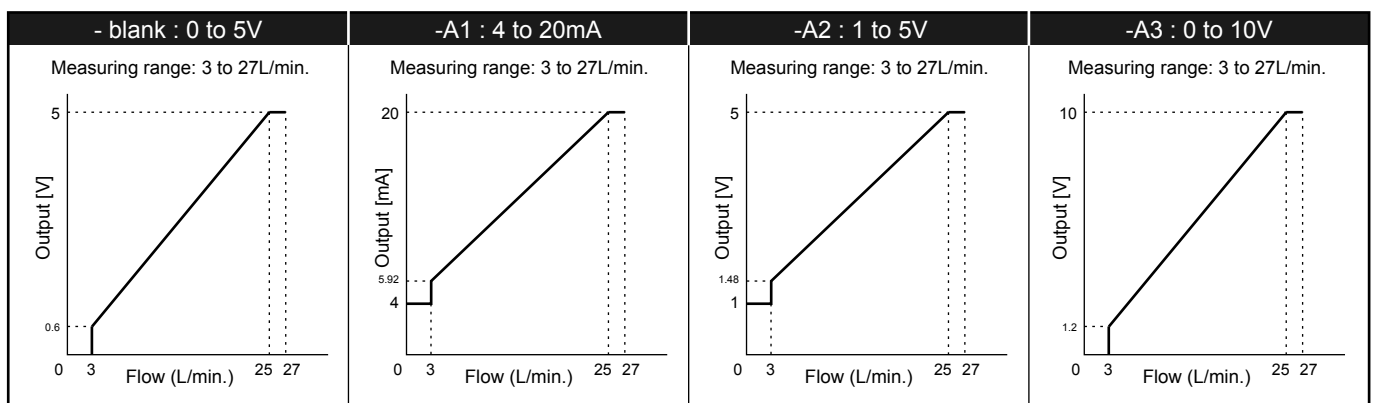
D Switch output type : PNP transistor open collector

E Analog output : 0 to 10 VDC

F Bracket : with bracket

Analog output

● WFK6027-**



Connecting load conditions

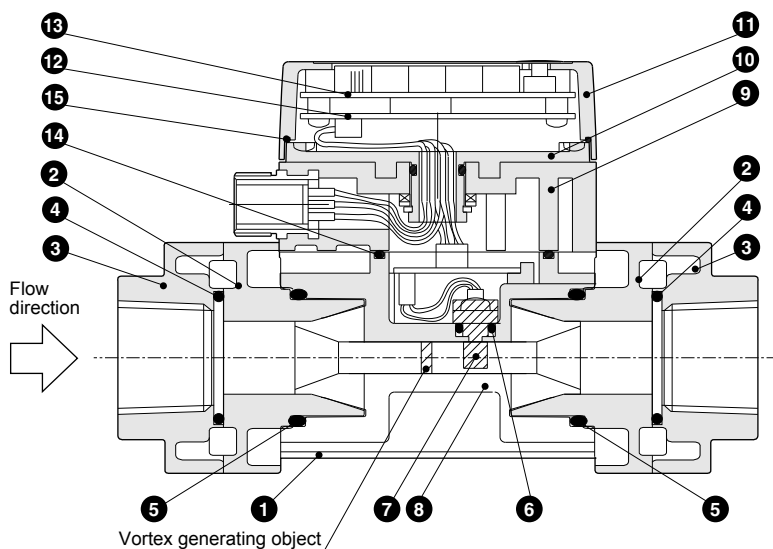
Descriptions	Blank [0 to 5V]	-A1 [4 to 20mA]	-A2 [1 to 5V]	-A3 [0 to 10V]
Allowable load	50kΩ and over	500Ω or less	50kΩ and over	50kΩ and over

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

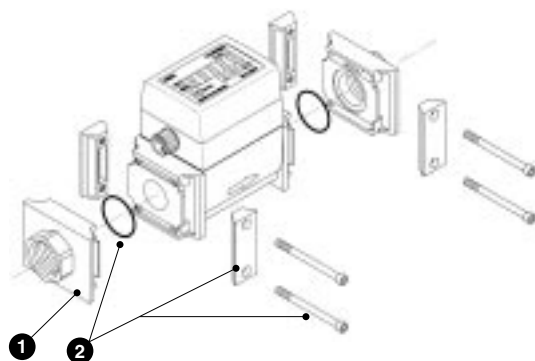
Karman's vortex type for water
Flow sensor

Internal structure and parts list



No.	Parts name	Material	Quantity	No.	Parts name	Material	Quantity
1	Body	SCS13 Stainless steel casting	1	9	Connector case	ABS resin	1
2	Attachment K	SCS13 Stainless steel casting	2	10	Case B	PC/ABS alloy resin	1
3	Attachment	SCS13 Stainless steel casting	2	11	Case A	ABS resin	1
4	O ring	NBR Nitrile rubber	2	12	CPU circuit board	-	1
5	O ring	NBR Nitrile rubber	2	13	Display circuit board	-	1
6	O ring	NBR Nitrile rubber	1	14	Sleeve packing seal	NBR Nitrile rubber	1
7	Vortex detecting element	PPS resin (internal: piezo-electric ceramics)	1	15	Case packing seal	NBR Nitrile rubber	1
8	Sleeve	PPS resin	1				

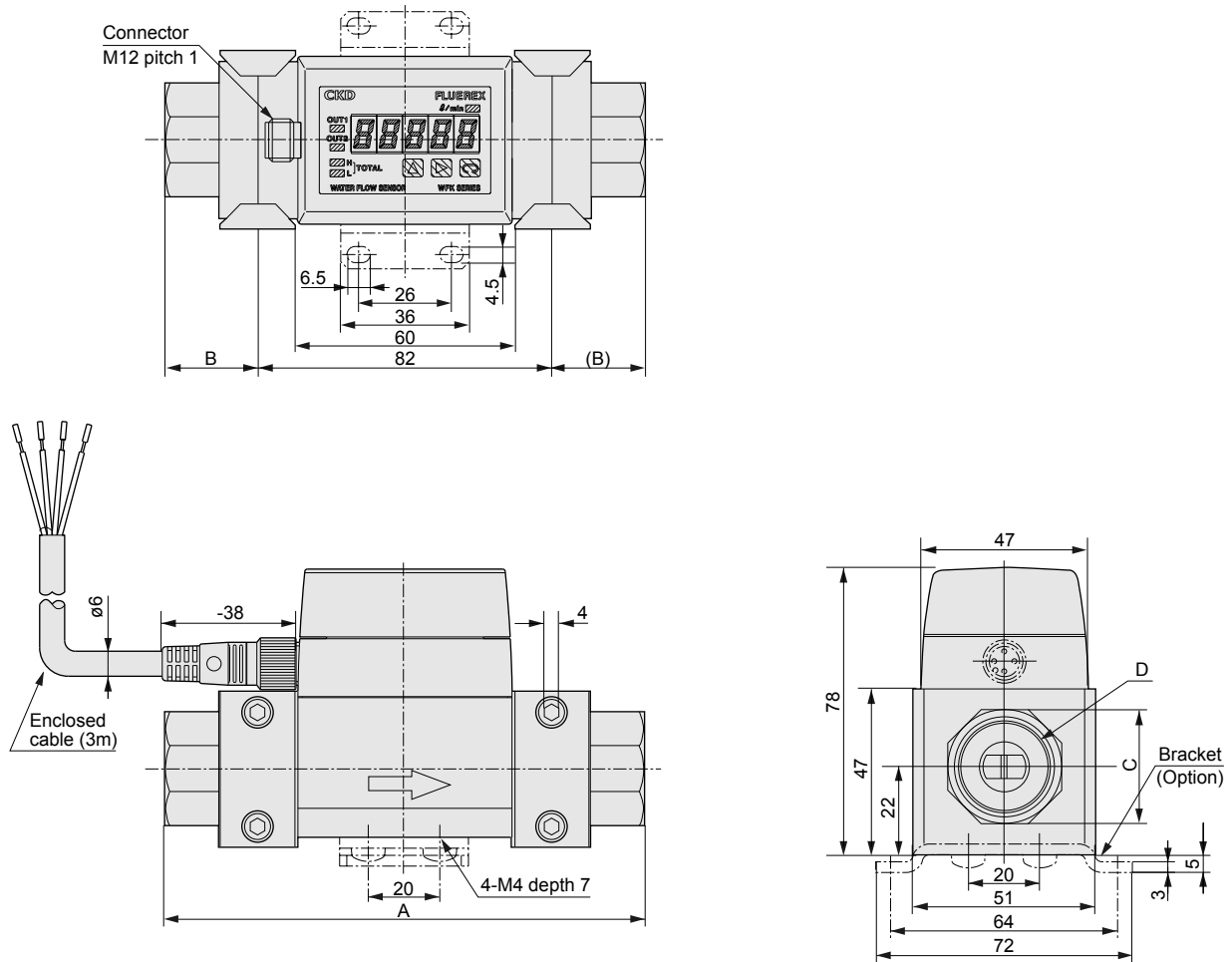
Module assembly



Model no.	Port size	(1) Attachment	(2) Joiner set
WFK60**-10	Rc3/8	WF-FL-290810	WF-FL-298234 (common)
WFK60**-15	Rc1/2	WF-FL-290811	
WFK60**-20	Rc3/4	WF-FL-290812	
WFK60**-10N	3/8NPT	WF-FL-290813	
WFK60**-15N	1/2NPT	WF-FL-290814	
WFK60**-20N	3/4NPT	WF-FL-290815	

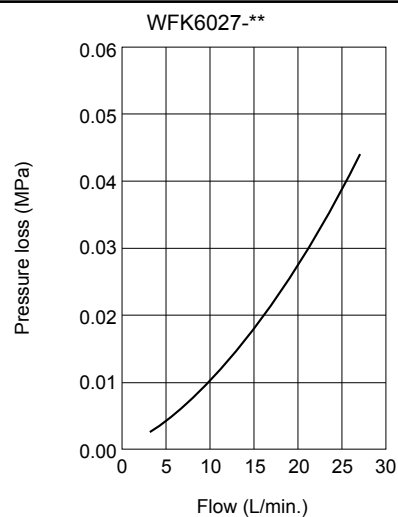
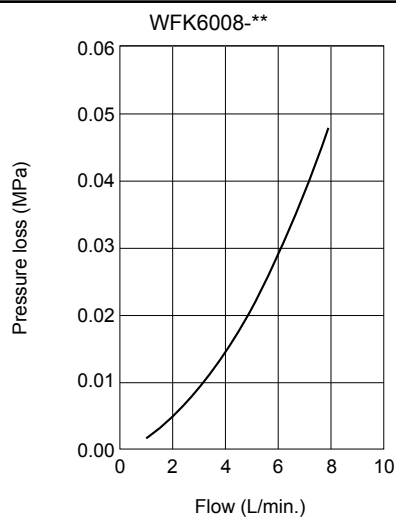
* For attachment and joiner set, model no. for single side is provided.
2 pieces apply for both sides replacement.

Dimensions



Model no.	A	B	C	D
WFK60**-10	122	20	24 (hexagon)	Rc3/8
WFK60**-15	122	20	27 (hexagon)	Rc1/2
WFK60**-20	134	26	32 (octagonal)	Rc3/4
WFK60**-10N	122	20	24 (hexagon)	3/8NPT
WFK60**-15N	122	20	27 (hexagon)	1/2NPT
WFK60**-20N	134	26	32 (octagonal)	3/4NPT

Pressure loss



- Refrigerating type dryer
- Desiccant type dryer
- High polymer membrane type dryer
- Air filter
- Auto. drain / others
- F.R.L. (Module unit)
- F.R.L. (Separate)
- Compact F.R.
- Precise regulator
- F.R.L. (Related products)
- Clean F.R.
- Electro pneumatic regulator
- Air booster
- Speed control valve
- Silencer
- Check valve / others
- Joint / tube
- Vacuum filter
- Vacuum regulator
- Suction plate
- Magnetic spring buffer
- Mechanical pressure SW
- Electronic pressure SW
- Contact / close contact cont. SW
- Air sensor
- Pressure SW for coolant
- Small flow sensor
- Small flow controller
- Flow sensor for air
- Flow sensor for water
- Total air system
- Total air system (Gamma)

Ending

Karman's vortex type for water
Flow sensor



Flow sensor

WFK7000 series

(Large flow rate type)

Flow rate range: 10 to 50, 20 to 100, 40 to 200L /min.



Refer to Intro 32 for details.

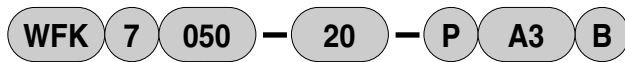


Specifications

Descriptions		WFK7050-20	WFK7050-25	WFK7100-25	WFK7100-32	WFK7200-32	WFK7200-40
Working conditions	Flow measuring range L/min.	10 to 50		20 to 100		40 to 200	
	Port size Rc	3/4	1	1	1 1/4	1 1/4	1 1/2
	Connection section material	Stainless steel: SCS13					
	Pressure loss MPa	0.050 or less (50L/min)		0.050 or less (100L/min)		0.050 or less (200L/min)	
	Working fluid	Clean water, industrial water					
	Max. working pressure MPa	1.0					
	Withstanding pressure MPa	1.5					
	Fluid temperature °C	1 to 70					
	Ambient temperature °C	0 to 50 (85%RH or less)					
	Indicator	5 digit LED display					
Integrated flow		Max. 9 digits, H and L separately displayed When power supply turns off, counter is reset					
Output	Switch output	Point	1 point (NPN/PNP transistor open collector)				
		Rated	MAX 50mA				
	Switch output	Internal voltage drop	2.0V or less				
		Standard	0 to 5 VDC (linear output) standard				
		Precision	±2.5%F.S. ±1digit				
Alarm output response time sec	Approx. 1.0 (Note)						
Power supply	12 to 24 VDC ±10% (Max. 100mA) 15 to 24 VDC for option A3						
Cable	Enclosed (3 m, 4-conductor, finished outer diameter of ø6, conductor wire 0.5 mm ² , insulator outer diameter of ø1.9, with connector)						
Installation attitude	Horizontal or vertical						
Protective structure	IP64 or equivalent						
Weight g	4400	4200		4000		3800	

Note: Time to reach 70% of the original output when flow rate is instantly set to zero from the normal (usage) flow rate.

How to order



A Port shape, material

B Flow rate range

C Port size
Note 1

D Switch output type

E Analog output

F Bracket
Note 4

Note on model no. selection

Note 1: When using American taper pipe thread, add "N" to the port size.

Note 2: When selecting analog output A1: 4 to 20mA DC, switch function can not be used.

Note 3: When selecting analog output A5: 2 points alarm output, analog output can not be used.

Note 4: For option B, a bracket and set screw are attached.

When ordering a bracket only, indicate part name: bracket assembly 2, model no.: WF-FL-251256.

<Example of model number>

WFK7050-20-PA3B

Model: Flow sensor large flow rate type

A Port shape, material : Shape : female thread, Material : stainless steel

B Flow rate range : 10 to 50L/min.

C Port size : Rc3/4

D Alarm output type : PNP transistor open collector

E Analog output : 0 to 10 VDC

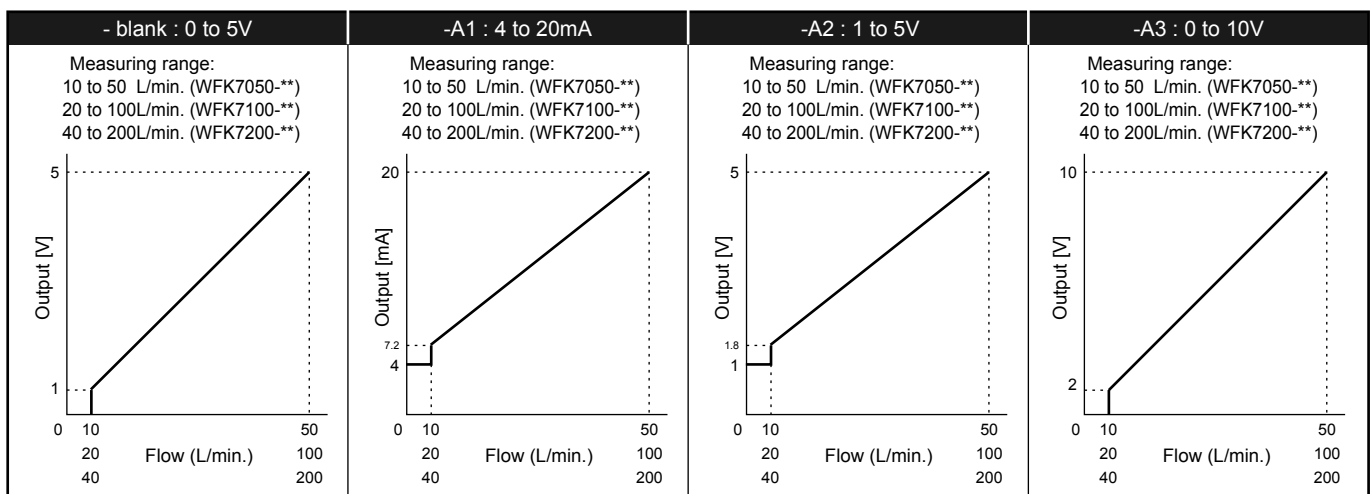
F Bracket : with bracket

Symbol	Descriptions			
A Port shape, material				
7	Shape: female thread Material: stainless steel (SCS13)			
B Flow rate range				
050	10 to 50L/min.			
100	20 to 100L/min.			
200	40 to 200L/min.			
C Port size				
	Flow rate range	050	100	200
20	Rc3/4	●	-	-
25	Rc1	●	●	-
32	Rc1 1/4	-	●	●
40	Rc1 1/2	-	-	●
20N	3/4NPT	●	-	-
25N	1NPT	●	●	-
32N	1 1/4NPT	-	●	●
40N	1 1/2NPT	-	-	●
D Switch output type				
Blank	NPN transistor open collector			
P	PNP transistor open collector			
E Analog output				
Blank	0 to 5 VDC			
A1	4 to 20mA DC Note 2			
A2	1 to 5 VDC			
A3	0 to 10 VDC			
A4	Without analog output			
A5	2 points switch output Note 3			
F Bracket				
Blank	None			
B	With bracket			

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Analog output

● WFK7050-**/WFK7100-**/WFK7200-**

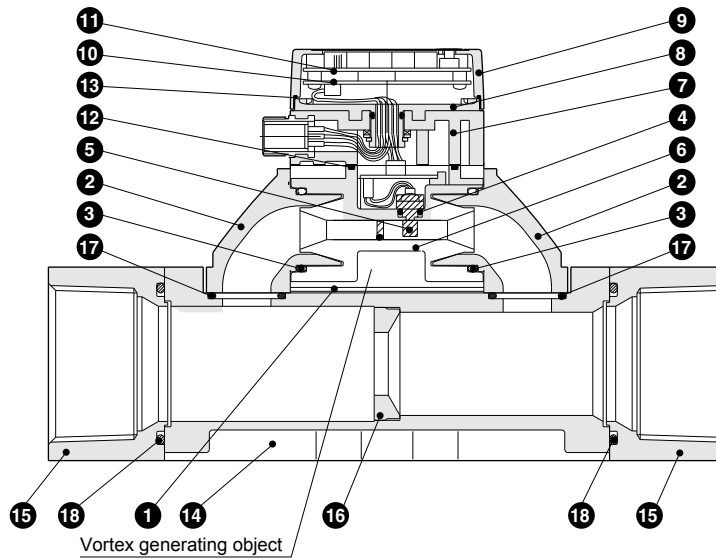


Connecting load conditions

Descriptions	Blank [0 to 5V]	-A1 [4 to 20mA]	-A2 [1 to 5V]	-A3 [0 to 10V]
Allowable load	50kΩ and over	500Ω or less	50kΩ and over	50kΩ and over

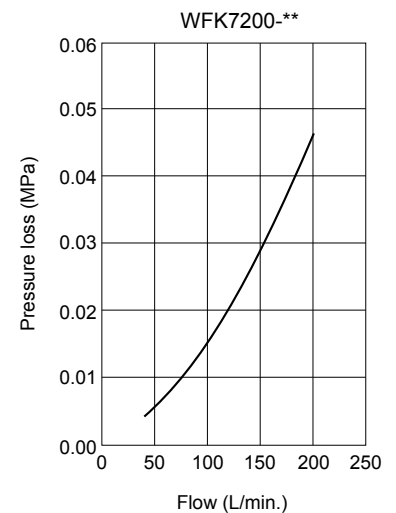
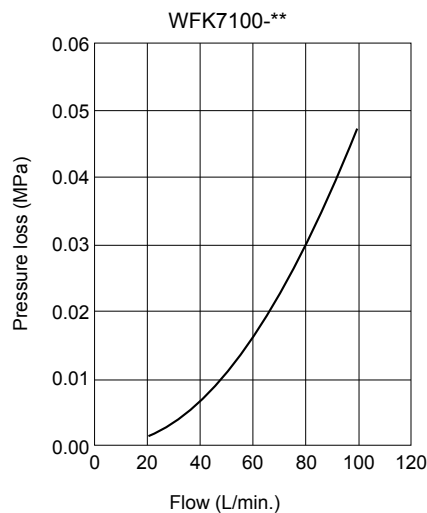
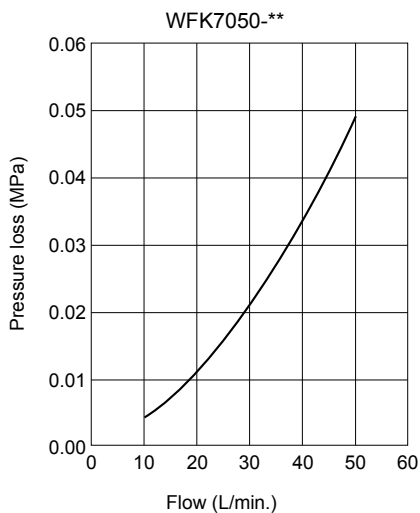
Karman's vortex type for water Flow sensor

Internal structure and parts list

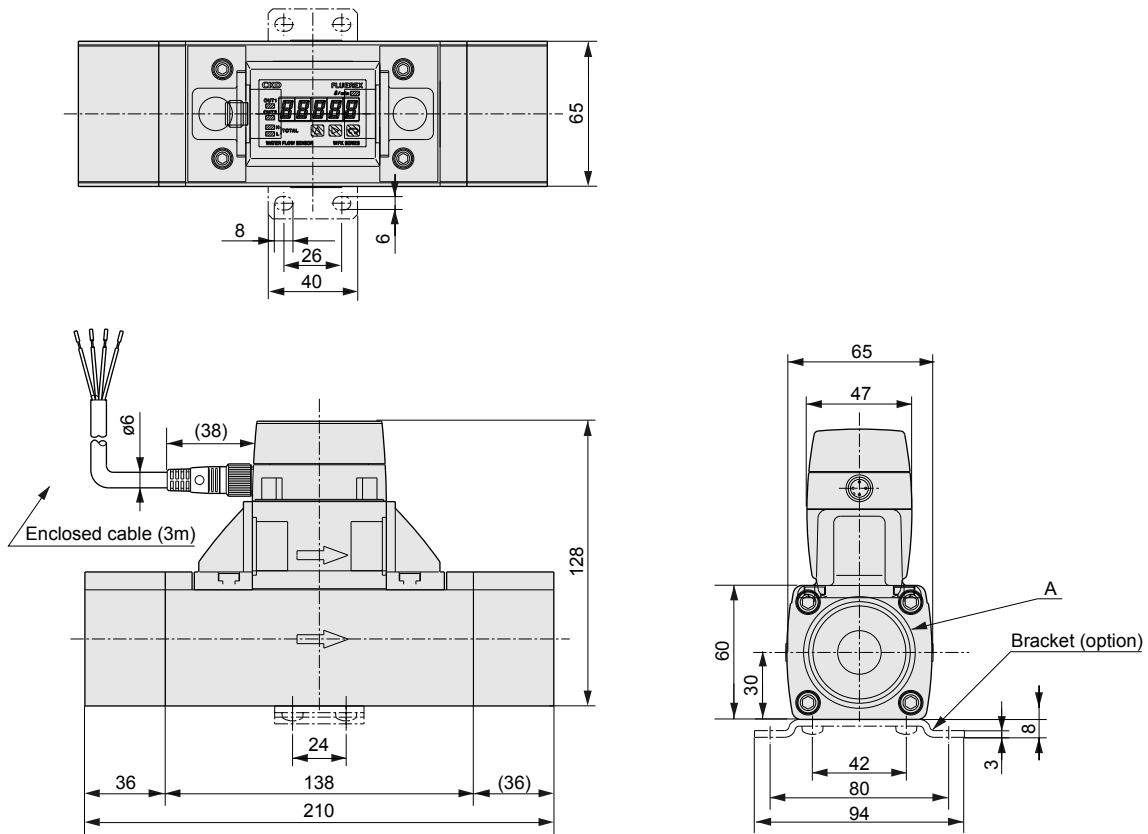


No.	Parts name	Material	Quantity	No.	Parts name	Material	Quantity
1	Body	SCS13 : Stainless steel casting	1	10	CPU circuit board	-	1
2	Sub-attachment	SCS13 : Stainless steel casting	2	11	Display circuit board	-	1
3	O ring	NBR : Nitrile rubber	2	12	Sleeve packing seal	NBR : Nitrile rubber	1
4	O ring	NBR : Nitrile rubber	1	13	Case packing seal	NBR : Nitrile rubber	1
5	Vortex detecting element	PPS resin (internal piezo-electric ceramics)	1	14	Main body	SCS13 : Stainless steel casting	1
6	Sleeve	PPS resin	1	15	Main attachment	SCS13 : Stainless steel casting	2
7	Connector case	ABS resin	1	16	Orifice	SUS304 : Stainless steel	1
8	Case B	PC/ABS alloy resin	1	17	O ring	NBR : Nitrile rubber	2
9	Case A	ABS resin	1	18	O ring	NBR : Nitrile rubber	2

Pressure loss



Dimensions



Model no.	A
WFK7050-20	Rc3/4
WFK7050-25	Rc1
WFK7100-25	Rc1
WFK7100-32	Rc1 1/4
WFK7200-32	Rc1 1/4
WFK7200-40	Rc1 1/2
WFK7050-20N	3/4NPT
WFK7050-25N	1NPT
WFK7100-25N	1NPT
WFK7100-32N	1 1/4NPT
WFK7200-32N	1 1/4NPT
WFK7200-40N	1 1/2NPT

Refrigerating type dryer
Desiccant type dryer
High polymer membrane type dryer
Air filter
Auto. drain / others
F.R.L. (Module unit)
F.R.L. (Separate)
Compact F.R.
Precise regulator
F.R.L. (Related products)
Clean F.R.
Electro pneumatic regulator
Air booster
Speed control valve
Silencer
Check valve / others
Joint / tube
Vacuum filter
Vacuum regulator
Suction plate
Magnetic spring buffer
Mechanical pressure SW
Electronic pressure SW
Contact / close contact cont. SW
Air sensor
Pressure SW for coolant
Small flow sensor
Small flow controller
Flow sensor for air
Flow sensor for water
Total air system
Total air system (Gamma)

Ending

Karman's vortex type for water Flow sensor