

CKD

New product

Karman Vortex Flow Sensor for Water FLUEREX WFK3000 Series



FLOW SENSOR FOR WATER WFK3000 SERIES

Large flow rate with compact body

60L/min
Large flow
rate type
New release!!

Output
variation
types
added

New

CKD Corporation

CC-1292A

Size and range that are easy to design with

New release of small water sensors with large flow rates!



FLUEREX - Karman Vortex Flow sensor for Water

WFK3000 SERIES

Rich model variations C type variations added

Model variations	Port size	Flow rate range (L/min)	Option
WFK3000 S Series Analog 1-point output	Rc3/8 Rc1/2	0.5 - 4.0	Water temperature measuring function (Rc3/8 only) Analog output temperature range: 10 to 70°C
		1.5 - 12	
	Rc3/4 Rc1	4.0 - 32	
		8.0 - 60	
WFK3000 M Series Switch 2-point output	Rc3/8 Rc1/2	0.5 - 4.0	
		1.5 - 12	
	Rc3/4 Rc1	4.0 - 32	
		8.0 - 60	
WFK3000 C Series Analog 1-point output Switch 1-point output	Rc3/8 Rc1/2	0.5 - 4.0	
		1.5 - 12	
	Rc3/4 Rc1	4.0 - 32	
		8.0 - 60	

User friendly with no manual needed

Sensor type will be ready for use as soon as wiring is completed.
 Setting of switch type is done simply by turning the rotary switch.
 Troublesome switch settings are not required.

Supports both analog & switch outputs

WFK3000S

Sensor type: 1 analog output



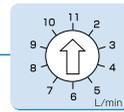
Power supply lamp Water flow lamp

WFK3000M

Switch type: 2 switch output



Output lamp
 Instant flow rate display
 (Integer will be displayed for 10 L/min and over.)



Rotary switch
 (Set the output in 10 steps.)

WFK3000C

Sensor/switch type:
 1 analog output, 1 switch output



Output lamp
 Instant flow rate display
 (Integer will be displayed for 10 L/min and over.)

New

Built-in water temperature measuring function

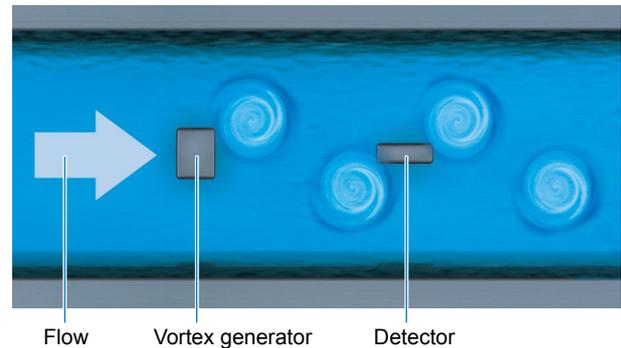
The sensor type can incorporate the water temperature measuring function.
 Enables water temperature measurements without additional work or space for installation. (WFK3000S Option)

Equivalent to IP65 degree of protection

Safe to use in food equipment or such other equipment that requires drip-proofness.

Highly reliable measurements

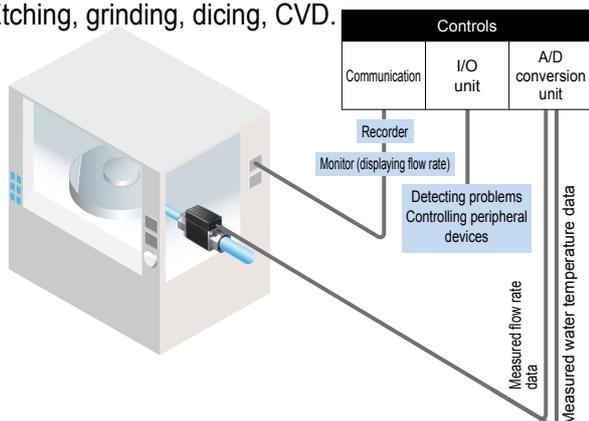
The reliable Karman's vortex method is utilized. Unlike the impeller type, you are freed from trouble caused by debris and rust in the piping as there are no moving parts.



Example of applications

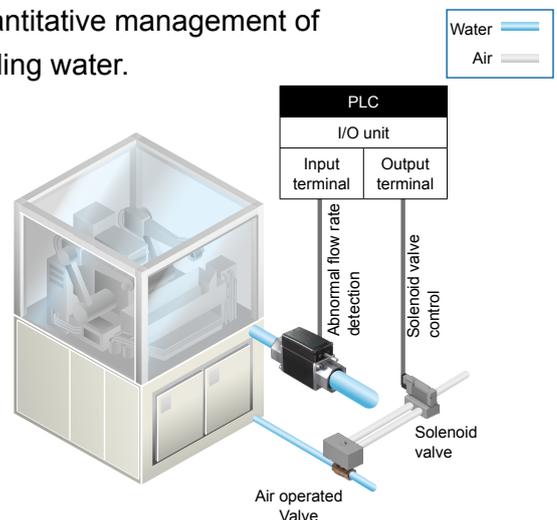
Semiconductor Semiconductor manufacturing equipment

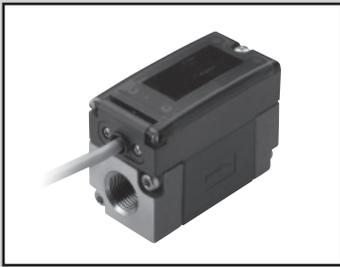
Cooling and temperature control of semiconductor manufacturing equipment.
 Etching, grinding, dicing, CVD.



Hardening Induction hardening device

Quantitative management of cooling water.





FLUEREX

WFK3000S Series

(Compact/Device Built-in Sensor Type)



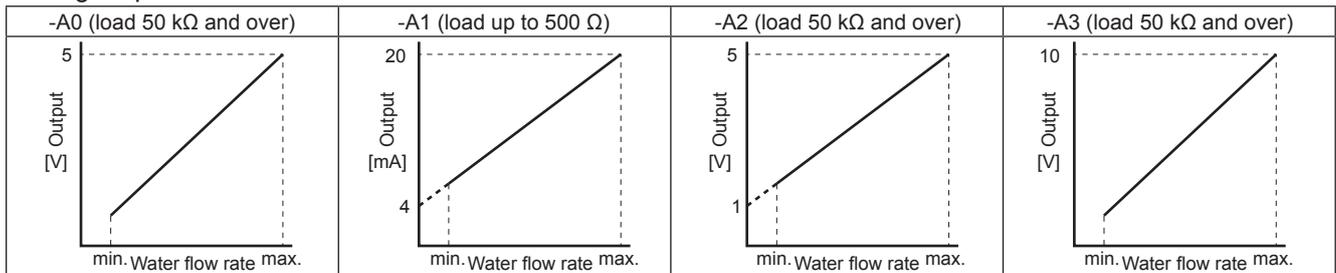
Specifications

Model No.	WFK3004S-10	WFK3004S-15	WFK3012S-10	WFK3012S-15	WFK3032S-10	WFK3032S-15	WFK3060S-20	WFK3060S-25
Descriptions								
Flow rate measurement range L/min	0.5 to 4.0		1.5 to 12		4.0 to 32		8.0 to 60	
Port size Rc	3/8	1/2	3/8	1/2	3/8	1/2	3/4	1
Port material	Stainless steel: SCS13							
Working conditions	Applicable fluid	Clear water, industrial water						
	Max. working pressure MPa	1.0						
	Proof 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 (at 4.0 L/min)		0.05 or less (at 12 L/min)		0.06 or less (at 32 L/min)		0.05 or less (at 60 L/min)	
Response time	1 sec (Note 1)							
Output	Display	None						
	Analog output	Standard: 0 to 5 VDC/Option: 4 to 20 mA, 1 to 5 V, 0 to 10 VDC						
Power supply voltage	12 to 24 VDC±10% (MAX 80 mA) 15 to 24 VDC for option A3							
Cable	3 m, 4-core, final diameter 4.8 mm, core wire 0.2 mm ² , insulator outer diameter 1.3 mm							
Installation	Mounting orientation	Unrestricted in vertical/horizontal orientation						
	Straight piping section	None (Note 2)						IN side 10D, OUT side 5D
	Degree of Protection	Equivalent to IP65 (excluding the unit with optional water temperature measuring function)						
Weight g	380	410	380	410	380	410	470	510
Bracket weight g	28 (including screws)							

Note 1: This is the time required to return to 70% of the original output after the normal flow rate (in use) is instantly dropped to 0.

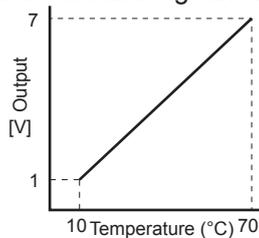
Note 2: A straight pipe (IN side 10D, OUT side 5D) should be installed to eliminate the effect of piping conditions. (D indicates the connection port diameter.)

Analog output

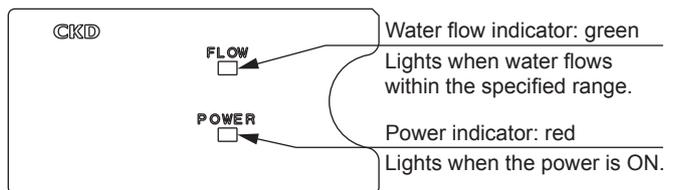


* min. is the minimum value and max. is the maximum value in the flow rate range.

Water temperature measuring function (option)



Functional explanation



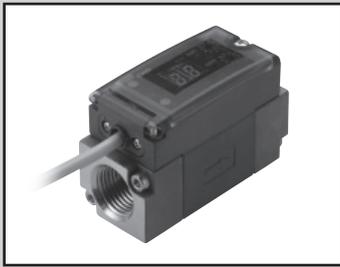
Descriptions	Values	
Specifications	Measurement temperature	10 to 70°C
	Port size	Rc3/8 (Note1)
	Temperature output (analog)	1 to 7 VDC (linear Output)
Output	Precision	±2°C (under 50°C) (Note 2) ±3°C (50°C to 70°C) (Note 3)

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

(Note 2) When the difference between the fluid temperature and ambient temperature is within ±10°C.

(Note 3) However, the working fluid temperature and ambient temperature difference must be within 20°C.

Also, the conditions must be within product specifications.



FLUEREX

WFK3000M Series

(Compact/Device Built-in Switch Type)



Specifications

Model No.		WFK3004M-10	WFK3004M-15	WFK3012M-10	WFK3012M-15	WFK3032M-10	WFK3032M-15	WFK3060M-20	WFK3060M-25	
Descriptions										
Flow rate measurement range	L/min	0.5 to 4.0		1.5 to 12		4.0 to 32		8.0 to 60		
Port size	Rc	3/8	1/2	3/8	1/2	3/8	1/2	3/4	1	
Port material		Stainless steel: SCS13								
Working conditions	Applicable fluid	Clear water, industrial water								
	Max. working pressure	1.0								
	Proof pressure	1.5								
	Ambient temperature	0 to 50 (85%RH or less)								
	Fluid temperature	1 to 70								
Precision		±2.5% F.S. ± 1 digit (1 digit = 0.1 L/min (less than 10 L/min), 1 L/min (10 L/min and over))								
Temperature characteristics		± 5% F.S. (10 to 50°C, 20°C reference)								
Pressure loss	MPa	0.06 or less (at 4.0 L/min)	0.05 or less (at 12 L/min)	0.06 or less (at 32 L/min)	0.05 or less (at 60 L/min)					
Response time		1 sec (Note 1)								
Output	Display	Instant flow rate 2 digit LED display								
	Switch output	Number of points	2 point transistor output (select NPN/PNP)							
		Rating	MAX. DC50mA							
		Internal voltage drop	(NPN) 2.0 V or less (PNP) 2.5 V or less							
Power supply voltage		12 to 24 VDC±10% (MAX80mA)								
Cable		3 m, 4-core, final diameter 4.8 mm, core wire 0.2 mm ² , insulator outer diameter 1.3 mm								
Installation	Mounting orientation	Unrestricted in vertical/horizontal orientation								
	Straight piping section	None (Note 2)						IN side 10D, OUT side 5D		
	Degree of protection	Equivalent to IP65								
Weight	g	380	410	380	410	380	410	470	510	
Bracket weight	g	28 (including screws)								

Note 1: When the switch output is set to 70% of the normal flow rate (used), the time until the switch output occurs after the flow rate drops instantly to 0.
 Note 2: A straight pipe (IN side 10D, OUT side 5D) should be installed to eliminate the effect of piping conditions. (D indicates the connection port diameter.)

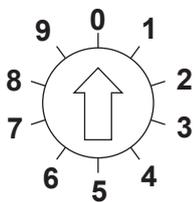
Functional explanation

• 2 digit digital display

Displays the instant flow rate.

* Less than 10L/min: Decimal number displayed
 10L/min or more: Integer number displayed

• Rotary switch for output setting



Allows you to set the switch output level in 10 steps.

* Use a precision driver or similar tool to set the rotary switch. Be extremely careful since applying excessive force to the rotating part may result in contact failure.

* Be sure to align the arrow with the scale mark.

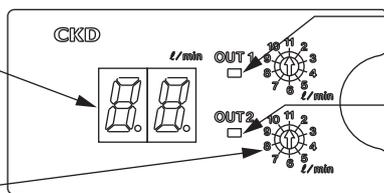
If it is set in a halfway point, output may become unstable.

* Turn off the power before setting the switch output.

* The set flow rate will be displayed when you close the cover after the switch output setting.

Switch output set value (L/min)

Rotary switch contact number	Model			
	WFK3004M	WFK3012M	WFK3032M	WFK3060M
1	0.6	2.0	5.0	10
2	0.7	3.0	9.0	15
3	0.8	4.0	12	20
4	0.9	5.0	14	25
5	1.0	6.0	16	30
6	1.5	7.0	18	35
7	2.0	8.0	21	40
8	2.5	9.0	24	45
9	3.0	10	27	50
0	3.5	11	30	55
Hysteresis	0.1	0.5	1.0	3.0



• Output light: green (OUT1)*

Lights when switch output is ON.

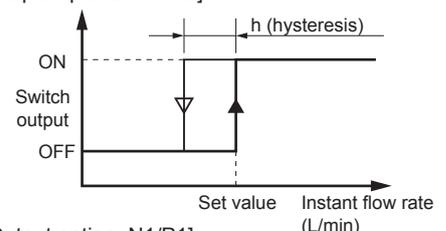
• Output light: red (OUT2)

Lights when switch output is ON.

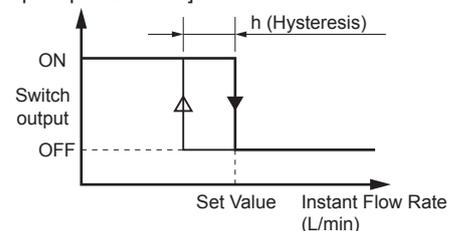
* OUT1: lead wire (black)
 OUT2: lead wire (orange)

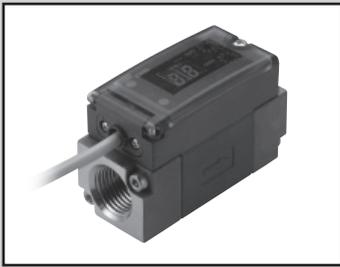
Switch output operation

[Output option: NO/PO]



[Output option: N1/P1]





FLUEREX

WFK3000C Series

(Compact/Device Built-in Sensor & Switch Type)



Specifications

Model No.	WFK3004C-10	WFK3004C-15	WFK3012C-10	WFK3012C-15	WFK3032C-10	WFK3032C-15	WFK3060C-20	WFK3060C-25	
Descriptions									
Flow rate measurement range L/min	0.5 to 4.0		1.5 to 12		4.0 to 32		8.0 to 60		
Port size Rc	3/8	1/2	3/8	1/2	3/8	1/2	3/4	1	
Port material	Stainless steel: SCS13								
Working conditions	Applicable Fluid	Clear water, industrial water							
	Max. working pressure MPa	1.0							
	Proof 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. ± 1 digit (1 digit = 0.1 L/min (less than 10 L/min), 1 L/min (10 L/min and over))								
Temperature characteristics	± 5% F.S. (10 to 50°C, 20°C reference)								
Pressure loss MPa	0.06 or less (at 4.0 L/min)		0.05 or less (at 12 L/min)		0.06 or less (at 32 L/min)		0.05 or less (at 60 L/min)		
Response time	1 sec (Note 1)								
Output	Display	Instant flow rate 2 digit LED display							
	Analog output	Standard: 0 to 5 VDC /option: 4 to 20mA, 1 to 5 V, 0 to 10 VDC							
	Switch	Number of points 1 point transistor output (select NPN/PNP)							
	Output	Rating	MAX. DC 50 mA						
		Internal voltage drop	(NPN) 2.0V ore less (PNP) 2.5V or less						
Power supply voltage	12 to 24VDC±10% (MAX 80mA) 15 to 24 VDC for option A3								
Cable	3 m, 4-core, final diameter 4.8 mm, core wire 0.2 mm ² , insulator outer diameter 1.3 mm								
Installation	Mounting orientation	Unrestricted in vertical/horizontal orientation							
	Straight piping section	None (Note 2)						IN side 10D, OUT side 5D	
	Degree of protection	Equivalent to IP65							
Weight g	380	410	380	410	380	410	470	510	
Bracket weight g	28 (including screws)								

Note 1: When the switch output is set to 70% of the normal flow rate (used), the time until the switch output occurs after the flow rate drops instantly to 0.

Note 2: A straight pipe (IN side 10D, OUT side 5D) should be installed to eliminate the effect of piping conditions. (D indicates the connection port diameter.)

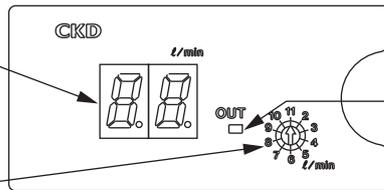
Functional explanation

• 2 digit digital display

Displays the instant flow rate.

- * Less than 10L/min: Decimal number displayed
- 10 L/min or more: Integer number displayed

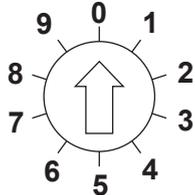
• Rotary switch for output setting



• Output light: orange (OUT2)

Lights when switch output is ON.

* OUT2: Compatible with lead wire (black).



Allows you to set the switch output level in 10 steps.

* Use a precision driver or similar tool to set the rotary switch. Be extremely careful since applying excessive force to the rotating part may result in contact failure.

* Be sure to align the arrow with the scale mark.

If it is set in a halfway point, output may become unstable.

* Turn off the power before setting the switch output.

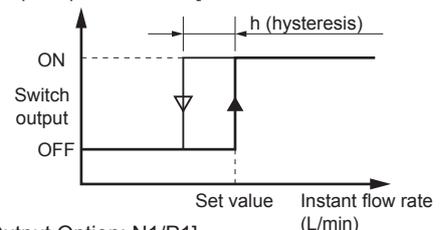
* The set flow rate will be displayed when you close the cover after the switch output setting.

Switch output setting value

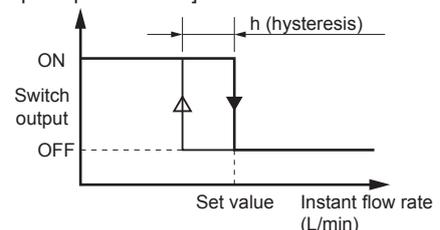
Rotary switch contact number	Model			
	WFK3004C	WFK3012C	WFK3032C	WFK3060C
1	0.6	2.0	5.0	10
2	0.7	3.0	9.0	15
3	0.8	4.0	12	20
4	0.9	5.0	14	25
5	1.0	6.0	16	30
6	1.5	7.0	18	35
7	2.0	8.0	21	40
8	2.5	9.0	24	45
9	3.0	10	27	50
0	3.5	11	30	55
Hysteresis	0.1	0.5	1.0	3.0

Switch output operation

[Output option: NO/PO]

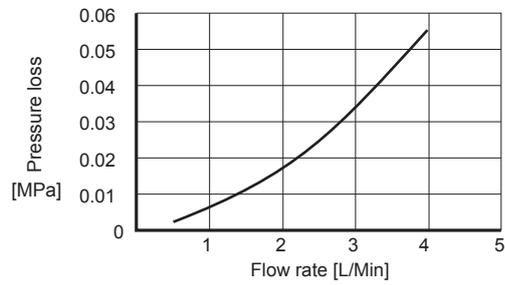


[Output Option: N1/P1]

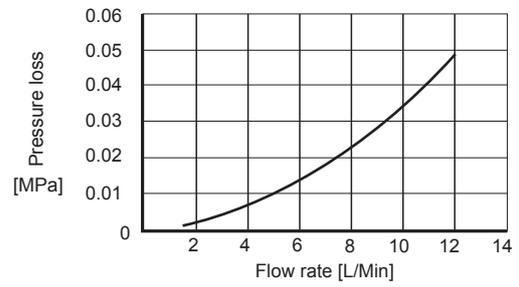


Pressure loss

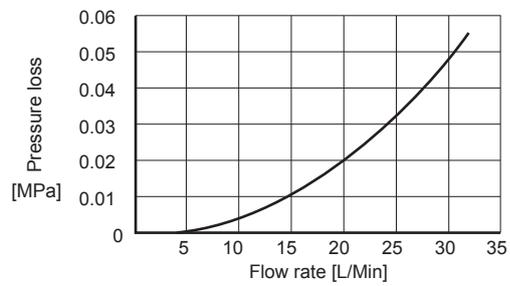
● WFK3004



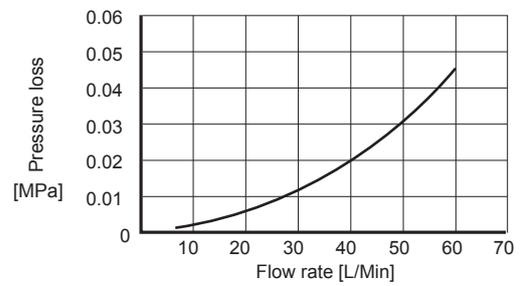
● WFK3012



● WFK3020



● WFK3060



WFK3000 Series

Model designation (set model No.)

● Sensor type

WFK **3** **012** S- **10** - **A0** **T** **B**

A Shape

B Flow rate range

C Port size

D Analog output

E Water temperature measuring function

F Bracket

[Example of model designation]

WFK3004S-10-A0

- A** Shape: Compact, device built-in
- B** Flow rate range: 0.5 to 4 L/min
- C** Port size: Rc3/8
- D** Analog output: 0 to 5 VDC
- E** Water temperature measuring function: None
- F** Bracket: None

Code	Descriptions				
A Shape					
3	Compact, device built-in				
B Flow rate range					
004	0.5 to 4.0L/min				
012	1.5 to 12L/min				
032	4.0 to 32L/min				
060	8.0 to 60L/min				
C Port size					
	Flow rate range	004	012	032	060
10	Rc3/8	●	●	●	—
15	Rc1/2	●	●	●	—
20	Rc3/4	—	—	—	●
25	Rc1	—	—	—	●
D Analog output					
A0	0 to 5 VDC (Note 1)				
A1	4 to 20 mA DC (not available when "T" with water temperature measuring function is selected.)				
A2	1 to 5 VDC (Note 1)				
A3	0 to 10 VDC (Note 1)				
E Water temperature measuring function					
Blank	None				
T	With water temperature measuring function				
F Bracket					
Blank	None				
B	With bracket (including fixing screws)				

Note 1: If you select "T" with a water measurement function, only the port size "10" and analog output "A0, A2, A3" can be selected.
 Note 2: Contact CKD for G thread/NPT thread.

● Switch type

WFK **3** **012** M- **10** - **N0** **B**

A Shape

B Flow rate range

C Port size

D Alarm output

E Bracket

[Example of model designation]

WFK3012M-15-N1B

- A** Shape: Compact, device built-in
- B** Flow rate range: 1.5 to 12 L/min
- C** Port size: Rc1/2
- D** Alarm output: NPN2 point (b contact)
- E** Bracket: Attached

Code	Descriptions				
A Shape					
3	Compact, device built-in				
B Flow rate range					
004	0.5 to 4.0L/min				
012	1.5 to 12L/min				
032	4.0 to 32L/min				
060	8.0 to 60L/min				
C Port size					
	Flow rate range	004	012	032	060
10	Rc3/8	●	●	●	—
15	Rc1/2	●	●	●	—
20	Rc3/4	—	—	—	●
25	Rc1	—	—	—	●
D Alarm output					
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 (including set screws)				

Note 1: Contact CKD for G thread/NPT thread.

Model designation

- Sensor/switch type

WFK **3** **004** **C-** **10** - **A0** **N0** **B**

A Shape

B Flow rate range

C Port size

D Analog output

E Alarm Output

F Bracket

[Example of model designation]

WFK3004C-10-A0N0B

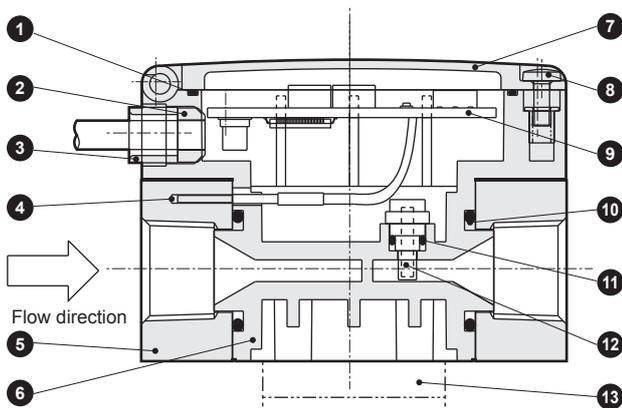
- A** Shape: Compact, device built-in
- B** Flow rate range: 0.5 to 4 L/min
- C** Port size: Rc3/8
- D** Analog output: 0 to 5 VDC
- E** Alarm output: NPN1 point (a contact)
- F** Bracket: Attached

Code	Descriptions				
A Shape					
3	Compact, device built-in				
B Flow rate range					
004	0.5 to 4.0L/min				
012	1.5 to 12L/min				
032	4.0 to 32L/min				
060	8.0 to 60L/min				
C Port size					
	Flow rate range	004	012	032	060
10	Rc3/8	●	●	●	—
15	Rc1/2	●	●	●	—
20	Rc3/4	—	—	—	●
25	Rc1	—	—	—	●
D Analog output					
A0	0 to 5 VDC				
A1	4 to 20 mA DC				
A2	1 to 5 VDC				
A3	0 to 10 VDC				
E Alarm output					
N0	NPN transistor output, 1 point (a contact)				
N1	NPN transistor output, 1 point (b contact)				
P0	PNP transistor output, 1 point (a contact)				
P1	PNP transistor output, 1 point (b contact)				
F Bracket					
Blank	None				
B	With bracket (including fixing screws)				

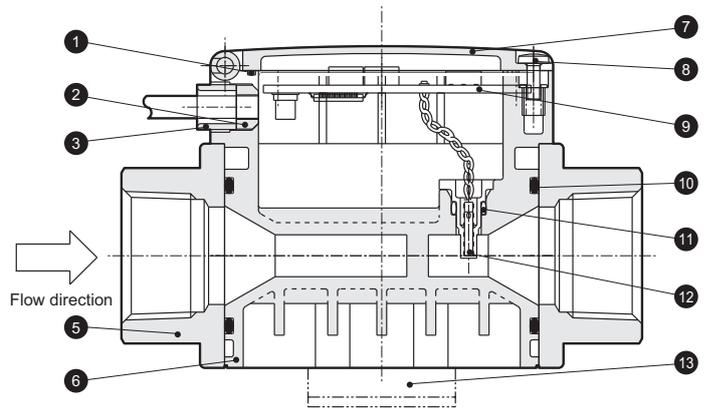
Note 1: Contact CKD for G thread/NPT thread.

Internal Structure and Parts List

- WFK3004□, WFK3012□, WFK3032□



- WFK3060□



This cannot be disassembled

No.	Parts name	Material	Quantity	No.	Parts name	Material	Quantity
1	Cover packing	NBR	1	8	Screw for cover		1
2	Cable packing	NBR	1	9	Electric component section		1
3	Cable gland	PPS resin	1	10	O-ring	NBR	2
4	Temperature sensor (option)	Thermistor	(1)	11	O-ring	NBR	1
5	Attachment	SCS13	2	12	Karman's Vortex Detection Sensor	PPS resin (interior: piezoceramic)	1
6	Body	PPS resin	1	13	Bracket (option)	Steel	(1)
7	Cover	PC resin	1			Zinc plating	

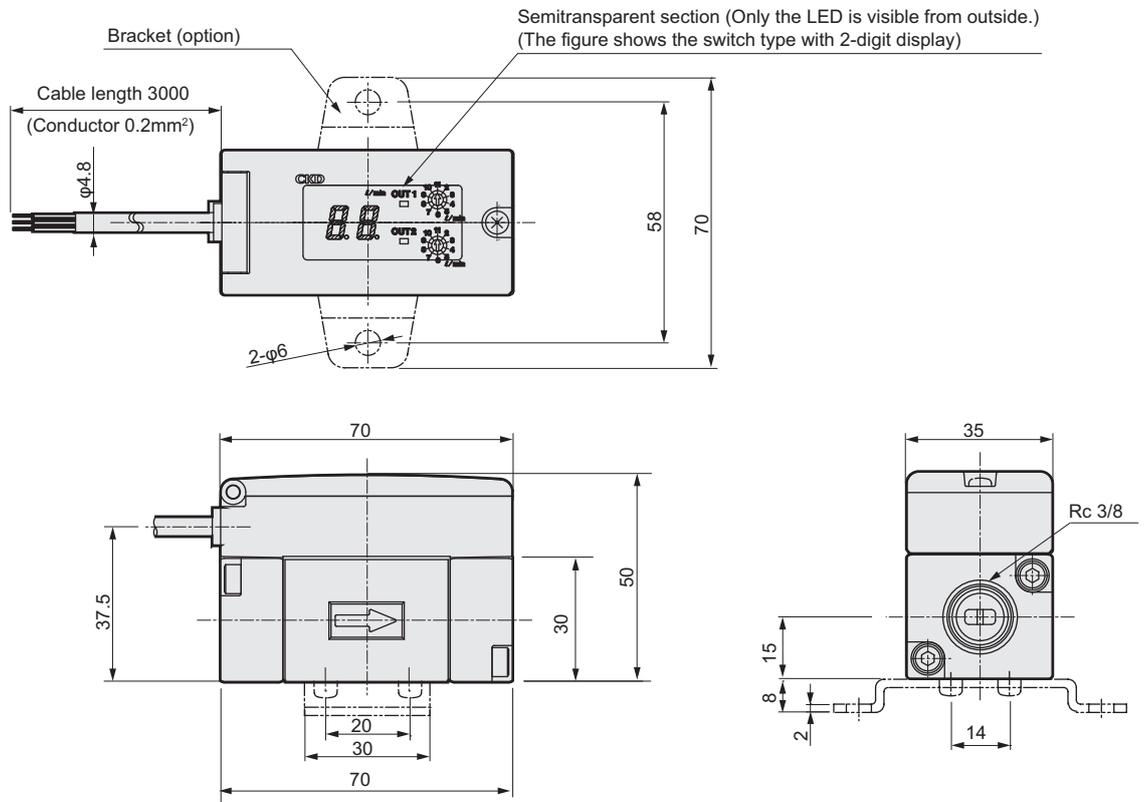
* Liquid contacting parts are (5), (6), (10), (11) and (12).

WFK3000 Series

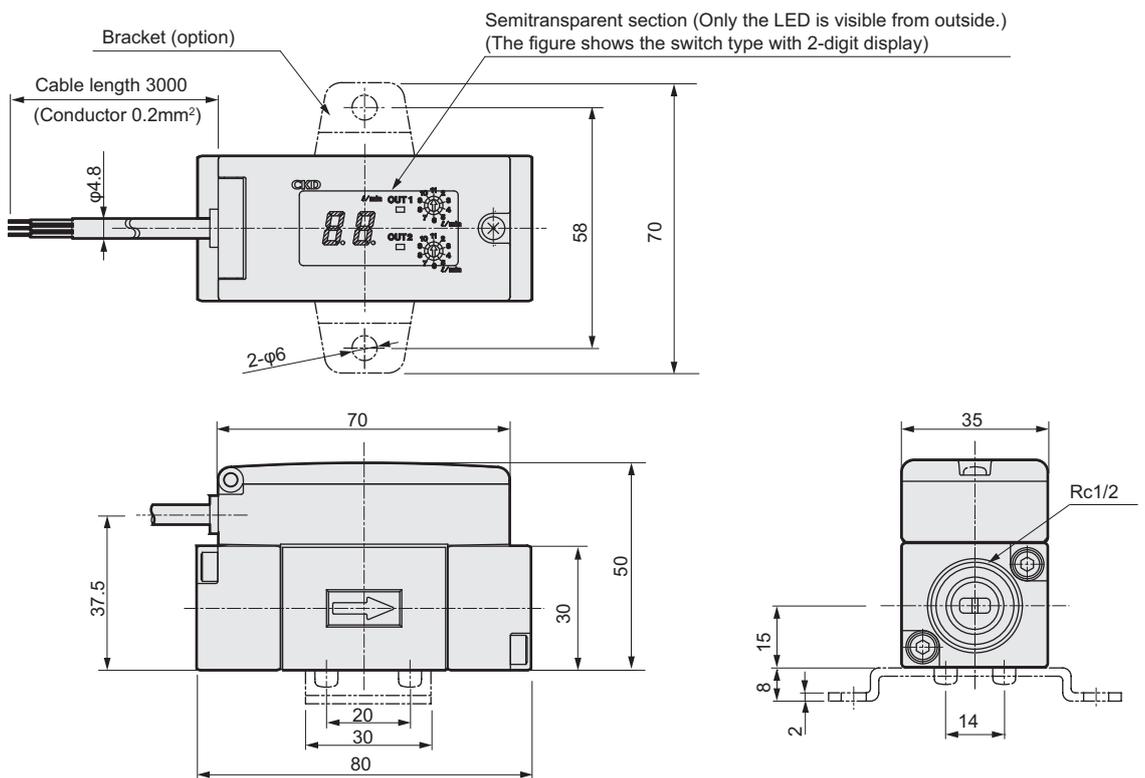
Dimensions

- WFK3004□, WFK3012□, WFK3032□

• Port size: 10 (Rc3/8)



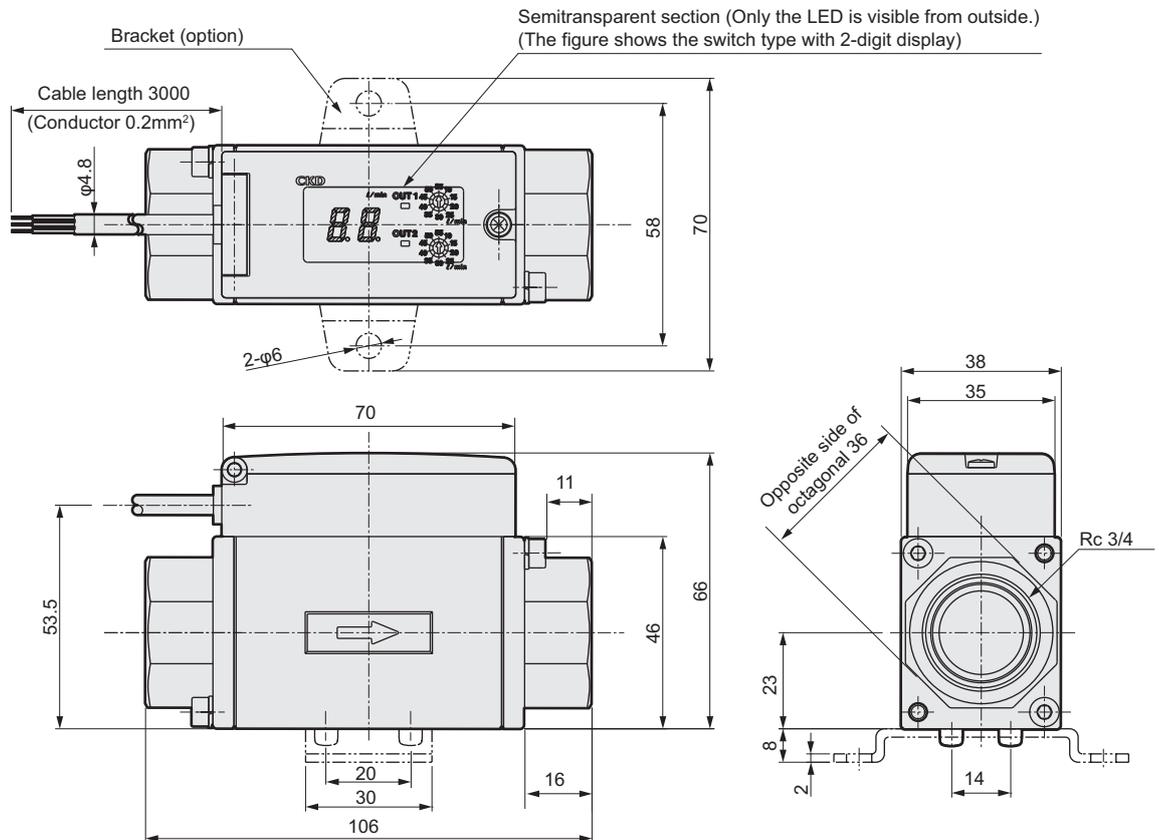
• Port size: 15 (Rc1/2)



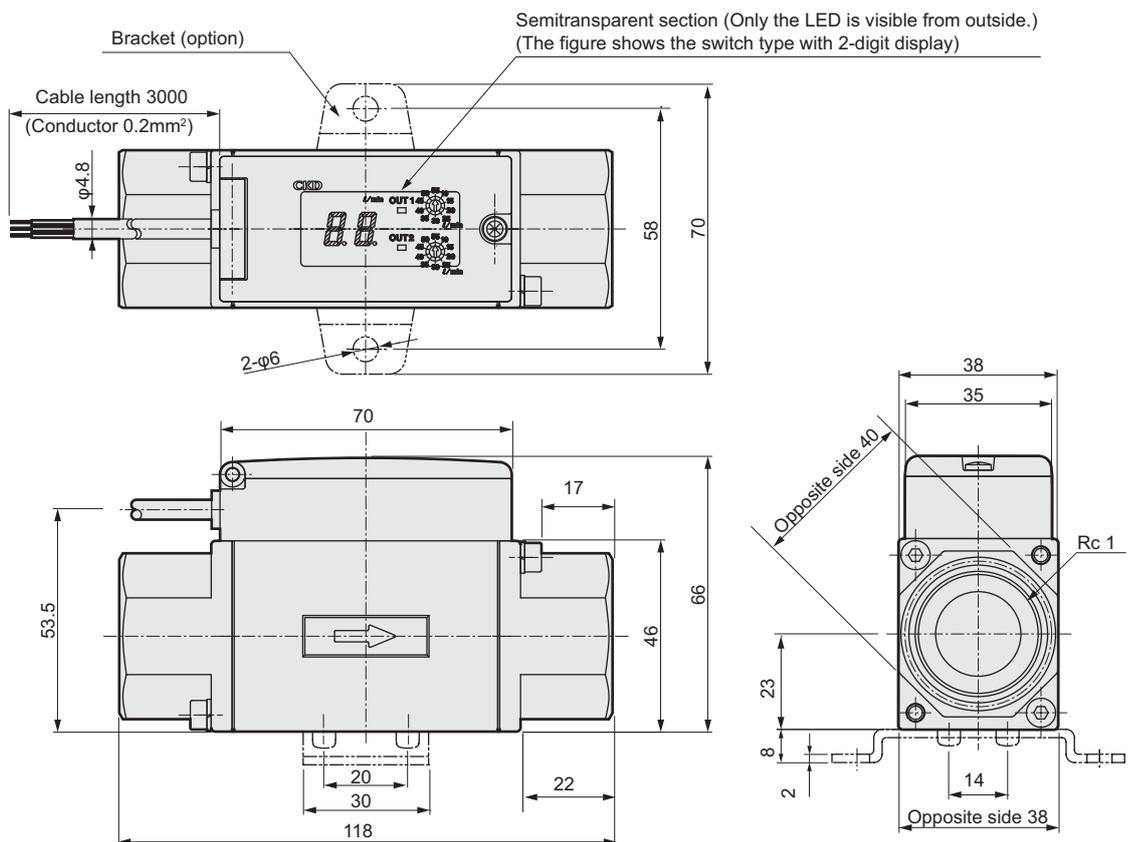
Dimensions

● WFK3060□

- Port size: 20 (Rc3/4)



- Port size: 25 (Rc1)



Wiring methods

- Always read the safety precautions before wiring.
- 4-core cable cables 0.2 mm² are used.
- Option

Sensor Type (analog output)

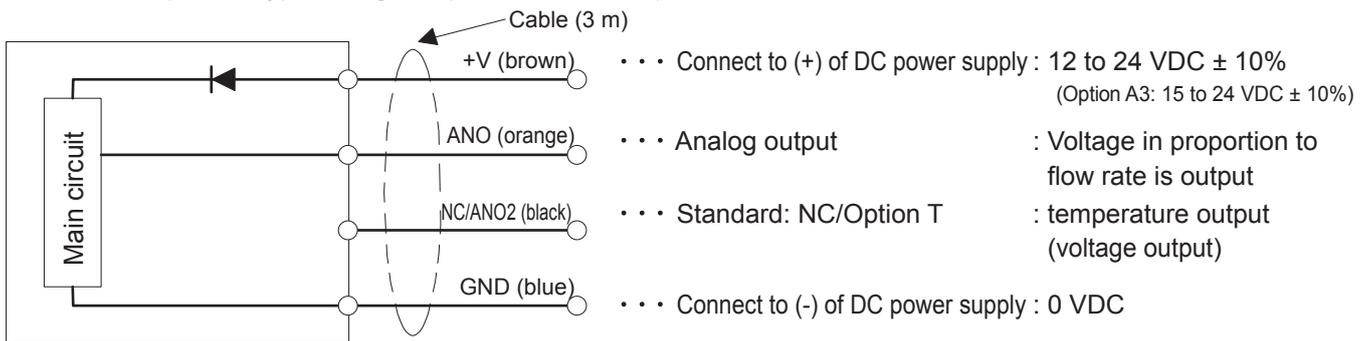
- A0; (0-5 [V])
- A1; (4-20 [mA])
- A2; (1-5 [V])
- A3; (0-10 [V])

* The sensor/switch type alarm output will be 1 point.

Switch type (switch output)

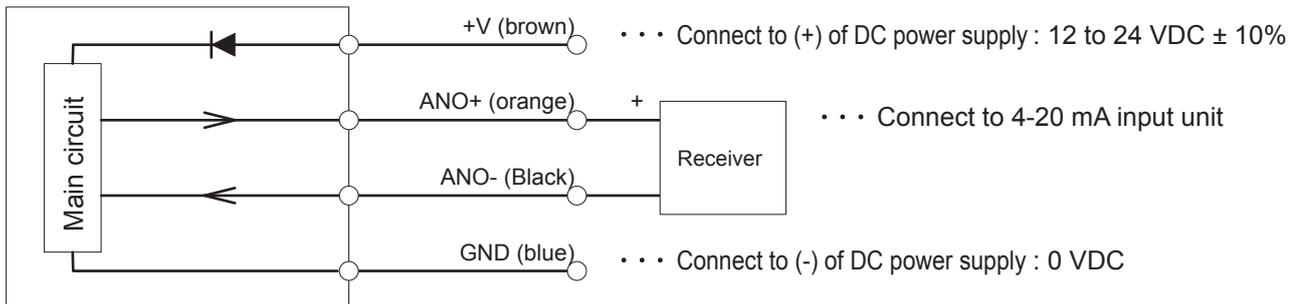
- N0; (NPN a-contact, 2 points)
- N1; (NPN b-contact, 2 points)
- P0; (PNP a-contact, 2 points)
- P1; (PNP b-contact, 2 points)

● WFK3***S (sensor type voltage output: -A0, -A2, -A3)

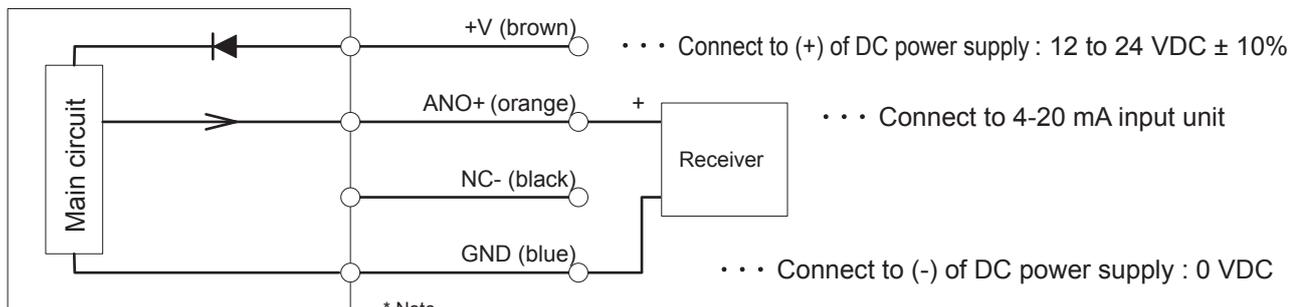


● WFK3***S (sensor type current output: -A1)

The current output (A1) has 2 types of wiring methods. Please use a wiring method that is tailored to the contents printed on the product side.

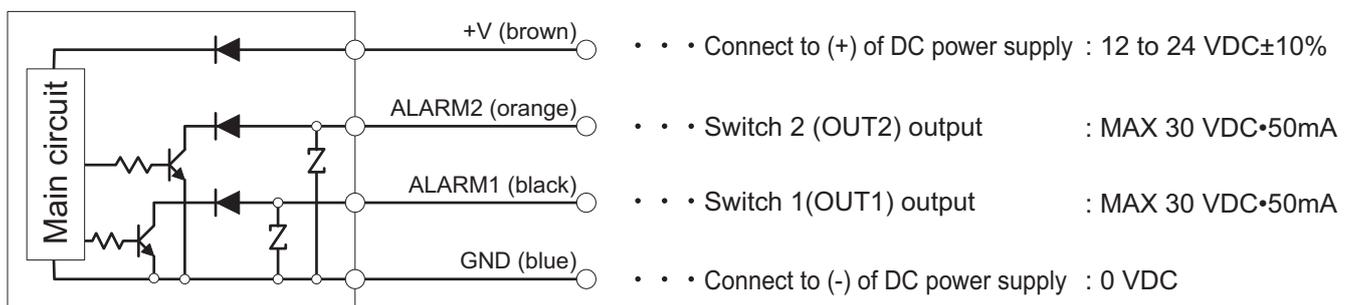


or

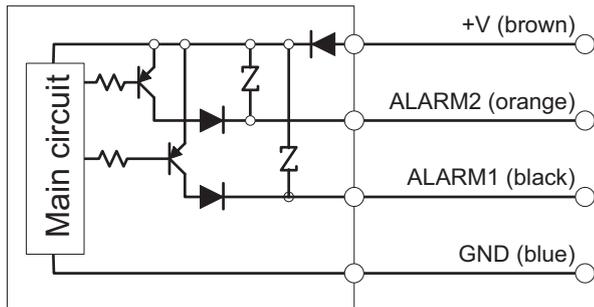


* Note
When connecting two or more flow rate sensors to the upper-level input circuit (receiver), carefully prevent signal interference.

● WFK30***M (switch type NPN output: -N0, -N1)

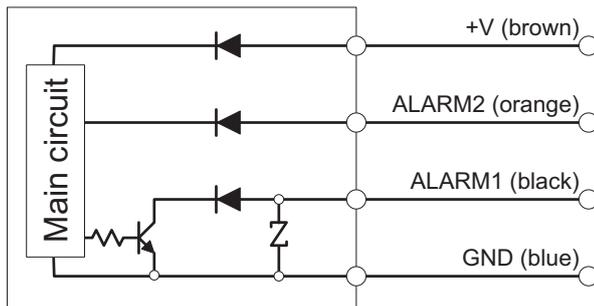


● WFK3***M (switch type PNP output: -P0, -P1)



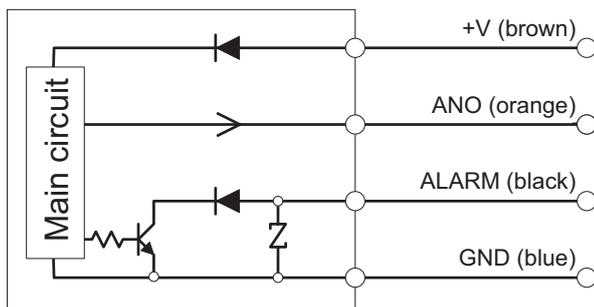
- • • Connect to (+) of DC power supply : 12 to 24 VDC±10%
- • • Switch 2 (OUT2) output : MAX 50mA
- • • Switch 1 (OUT1) output : MAX 50mA
- • • Connect to (-) of DC power supply : 0 VDC

● WFK3***C (sensor type voltage output specifications: -A0, -A2, -A3, switch type NPN output specifications: N0, N1)



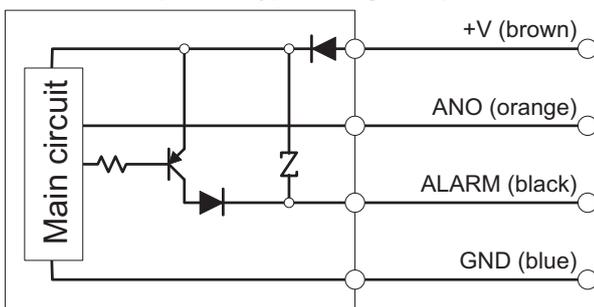
- • • Connect to (+) of DC power supply : 12 to 24 VDC±10%
(OptionA3: 15 to 24 VDC ± 10%)
- • • Analog output : Voltage in proportion to flow rate is output
- • • Switch (OUT) output : MAX 30VDC•50mA
- • • Connect to (-) of DC power supply : 0 VDC

● WFK3***C (sensor type voltage output: -A1, switch type NPM output: N0, N1)



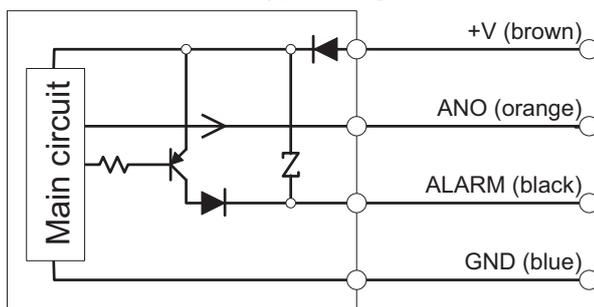
- • • Connect to (+) of DC power supply : 12 to 24 VDC±10%
- • • Connect to 4-20 mA input unit
- • • Switch (OUT) output : MAX 30 VDC•50mA
- • • Connect to (-) of DC power supply : 0 VDC

● WFK3***C (sensor type voltage output : -A0, -A2, -A3, switch type PNP output: P0, P1)



- • • Connect to (+) of DC power supply : 12 to 24 VDC±10%
(OptionA3: 15 to 24 VDC ± 10%)
- • • Analog output : Voltage in proportion to flow rate is output
- • • Switch (OUT) output : MAX 30 VDC•50mA
- • • Connect to (-) of DC power supply : 0 VDC

● WFK3***C (sensor type voltage output: -A1, switch type PNP output: P0, P1)



- • • Connect to (+) of DC power supply : 12 to 24 VDC±10%
- • • Connect to 4-20 mA input unit
- • • Switch (OUT) output : MAX 30 VDC•50mA
- • • Connect to (-) of DC power supply : 0 VDC



Safety precautions

Be sure to read the instructions before use

When designing and manufacturing a device using CKD products, the manufacturer is obligated to check that device safety mechanism, pneumatic control circuit, or water control circuit and the system operated by electrical control that controls the devices is secured.

Product selection, its usage and handling, as well as adequate maintenance management are important in order to safely use CKD products.

Observe warnings and precautions to ensure device safety.

Check that the safeness of the device is ensured, and work to manufacture safe devices.



Warning

- 1** This product is designed and manufactured as a general industrial machine part.
It must be handled by an operator having sufficient knowledge and experience in handling such parts.
 - 2** Use this product in accordance with specifications.
This product must not be used outside its stated specifications. Do not attempt to modify or additionally machine the product. In addition, since this product is intended for general use as an industrial machine part, use in outdoors (outdoor type excluded) or use in the following environments and conditions are not applicable.
(If you consult CKD concerning adoption and consent to CKD product specification it may become applicable, however, safeguards should be adopted that will circumvent dangers in the event of failure.)
 - 1** Use for special applications requiring safety including nuclear energy, railroad, aviation, ship, vehicle, medical equipment, equipment or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.
 - 2** Use for applications where people or assets could be adversely affected, and special safety measures are required.
 - 3** Observe corporate standards and regulations, etc., related to the safety of device design and control, etc.
ISO4414, JIS B 8370 (Pneumatic System Rules)
JFPS 2008 (Principles for pneumatic cylinder selection and use)
High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, body standards and regulations, etc.
 - 4** Do not handle this product or remove devices before confirming safety.
 - 1** Inspect and service the machine and devices after confirming safety of the entire system related to this product.
 - 2** Note that there may be hot or charged sections even after operation is stopped.
 - 3** 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.
 - 4** 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 through mishandling, 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 through mishandling, leading to fatal or serious injuries.



CAUTION: If handled incorrectly, a dangerous situation may occur, resulting in minor injury or property damage only.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. In any case, important information that must be observed is explained.

Disclaimer

- 1** Warranty period
Warranty period of this product is one (1) year from the first delivery to the specified delivery destination.
- 2** Scope of warranty
In the event that 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, according to its own judgment.
Note that the following faults are excluded from the warranty:
 - (1) Product abuse/misuse, contrary to conditions/environment recommended in its catalogs/specifications
 - (2) Failure caused by factors other than the delivered product
 - (3) Use beyond original design purposes.
 - (4) Third-party repair/modification
 - (5) Faults caused by factors that could not be predicted through technological methods in practical use at the time of delivery.
 - (6) Faults resulting from natural disasters or accidents for which CKD is not liable.The warranty mentioned here covers the delivered product in working condition. The scope of warranty will not cover losses induced by defects in the delivered product.
- 3** Compatibility confirmation
The customer is responsible for confirming the compatibility of CKD products with their systems, machines and equipment.



Water-related equipment

Safety precautions

Be sure to read the instructions before use

Design & Selection

1. Working fluid

DANGER

- Do not use this product with drinking water. As it does not conform to the requirements of the Food Sanitation Act, do not use this product for applications that measure water to enter the human body. Use this as an industrial sensor.
- Never use this product with a flammable fluid.

WARNING

- This product cannot be used as a business meter. Do not use this product for commercial transaction as it is not compliant with the Measurement Act. We cannot meet your requests for calibration, etc., so use this as an industrial sensor.
- The only applicable fluid is water (industrial water, clear water); do not use with any other fluid.

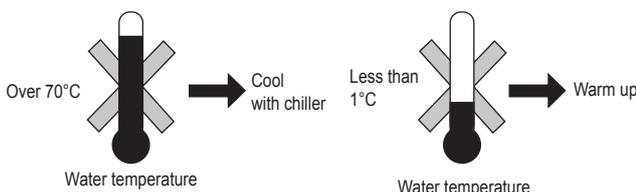
2. Working environment

DANGER

- Explosion-proof environment**
Do not use this product in an explosive gas atmosphere. This product does not have an explosion-proof structure; therefore, using it in such an environment may result in explosion and fire.

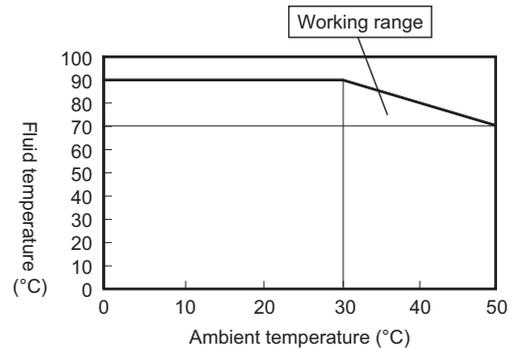
WARNING

- Corrosive environment**
Do not use this product in a corrosive gas atmosphere, such as sulfur dioxide.
- Fluid temperature and ambient temperature**
Fluid temperature should be in the range of 1 to 70°C. If the fluid temperature rises to 70°C or above, cool it down using a cooling system such as a chiller. On the other hand, if there is a risk of freezing, drain the product or warm it up to prevent freezing. Even if the ambient temperature is within the specified range, do not use this product in a location where rapid changes in temperature can occur.



Ambient temperature should be in the range of 0 to 50°C.

The use of WFK3060 is possible only following the conditions below.



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. To prevent the pressure reaching the maximum pressure due to the water hammer, take the following measures:

- Use a water hammer reduction valve or other similar mechanism, and regulate the valve closing speed.
- Use elastic piping material such as rubber hose, as well as an accumulator, and absorb the impact pressure.
- Make the pipe length as short as possible.

Drip-proof environment

This product employs a dust-proof, drip-proof structure that provides reliability during maintenance and cleaning, during which it may be exposed to water splashing. However, avoid using this product in a location where it can be constantly exposed to water or heavy water/oil spattering.

Conditions of use for CE compliance

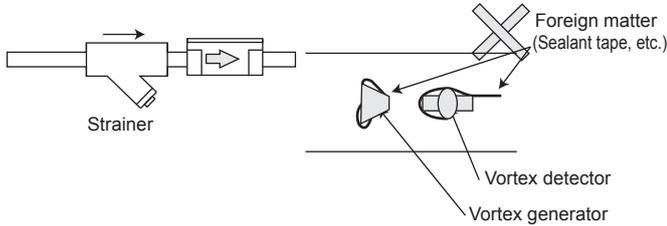
This product is CE-marked, indicating conformity with the EMC Directives. The standard for the immunity for industrial environments applied to this product is EN61000-6-2; the following requirements must be satisfied in order to conform to this standard:

Conditions

- The assessment of this product is performed by using a cable pairing a power supply line and a signal line, treating this cable as a signal line.
- This product is not equipped with surge immunity. Implement surge protection measures on the system side.

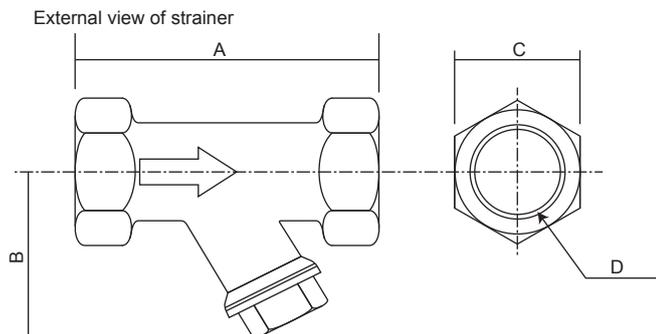
CAUTION

- If there is a risk of foreign matter entering the fluid, install a filter (strainer) on the primary side. If foreign matter adheres to the vortex generator or vortex detector, measurement accuracy can be compromised.



Strainer specifications

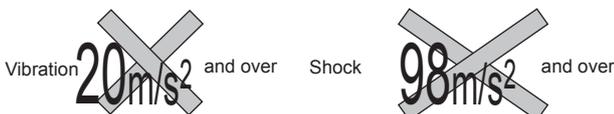
Descriptions	Specifications
Specified fluid	Water
Withstanding pressure MPa	2
Working pressure range MPa	0 to 1
Ambient temperature °C	1 to 90
Main material	Specifications
Body	Bronze casting
Strainer	Stainless steel



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	Rc 1
WF-FL-280734	135	82	52	Rc1 1/4
WF-FL-280735	160	98	59	Rc1 1/2

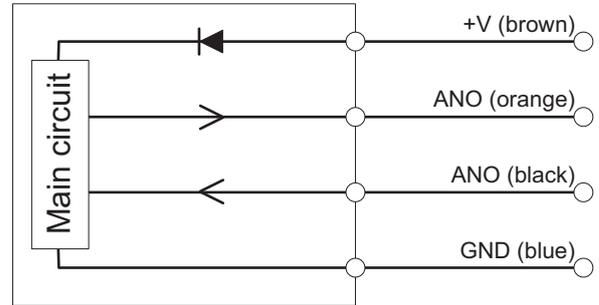
Vibration/shock

Do not use this product in an environment exposed to vibration of 20 m/s² and over and shock of 98 m/s² and over. Such vibration or shock may cause malfunction and/or damage as this product uses Karman's vortex type detection principle.

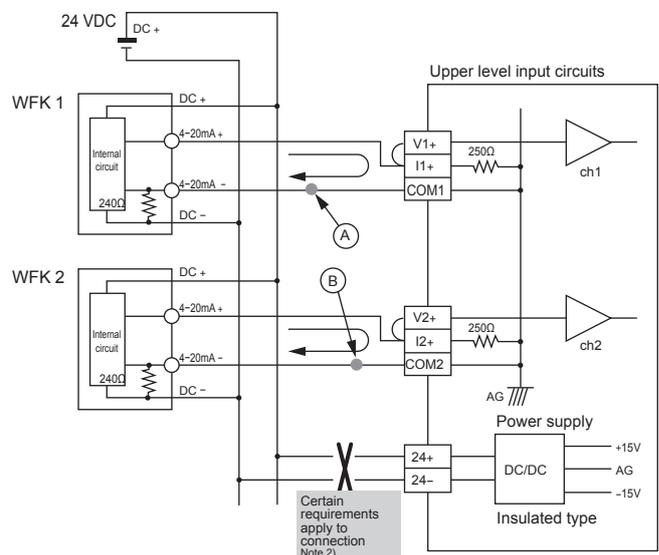


3. Analog output A1 (4 to 20mA) Connection

The analog output of the wiring diagram below is A1 (4-20mA) only



CAUTION



Note 1) Connecting more than one analog output 4-20 mA sensor to the same common input circuit (upper level computer, sequencer, etc.) as shown above makes the respective signals interfere with each other, preventing correct operation. In this case please use the voltage output type (standard, A2, A3).

* The voltage at point A and that at point B are connected inside the input circuit, which gives them the same electrical potential, creating an error in the respective analog outputs.

Note 2) If the power supply (24 VDC) of the upper level input circuit is not insulated, install separate power supplies for the input circuit and the sensor.

Mounting, Installation & Adjustment

1. Wiring

⚠ DANGER

- Use the product with a power supply voltage and output within the specified range.
Applying a voltage that is outside of the specified range may cause malfunction, damage to the sensor, electrical shock, and/or fire.
Do not use any load that exceeds the rated output.
Using such a load may result in damage to the output part or fire.

⚠ WARNING

- Check the line color and terminal no. when connecting wires.
While an overcurrent protection circuit for the output transistor and a protection circuit for erroneous wiring, using diodes for preventing reverse connection, are implemented, these do not protect against all incorrect wiring. Incorrect wiring can result in malfunction, failure, or damage to the sensor. Check the instruction manual for line colors and terminal nos. in order to ensure correct wiring.

- Check wiring insulation.
Make sure that the wires do not come into contact with other circuits, and that there is no ground fault or insulation failure between terminals. Otherwise, overcurrent may flow into the sensor, causing damage.

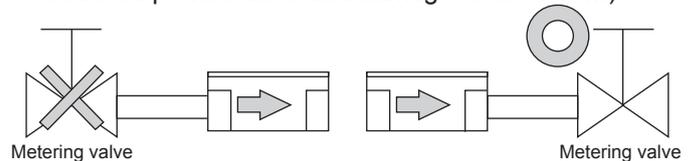
⚠ CAUTION

- Keep the cable away from all sources of noise, including power distribution wires. Noise can cause malfunctions.
- Keep unused wires from coming into contact with other wires.
- Do not short-circuit the output contact.
When a load is short-circuited, the overcurrent protection circuit is triggered to prevent damage to the output transistor; however, if this state persists, the output transistor could be damaged.
Overcurrent protection...About 50mA
- Do not use this product for loads generating surge voltage.
While an element that protects against surge is inserted, repeated exposure to surges can lead to damage. Use relays and solenoid valves that are equipped with surge absorption elements. If there is a surge source on the same power supply line, similarly implement surge protection.
- Make sure that the lead wire is free of repeated bends and tension. Failure to observe this could result in a wire break.

2. Piping

⚠ CAUTION

- Pipes can be installed in any orientation, including vertical and horizontal. Note that pipes should be installed so that the fluid constantly fills the piping as it flows through the pipes.
When installing a pipe vertically, making the fluid flow upward can reduce the impact of air bubbles inside.
- If a pipe is narrowed right before the flow rate sensor, or if there is a valve or other throttling component on the primary side, cavitation occurs inside the pipe, preventing accurate measurements. For this reason, such piping should be installed on the secondary side of the sensor.
Cavitation: (Vapor bubbles form when static pressure at the back is smaller than water vapor pressure, such as with a boat screw. Cavitation can cause reduced performance and damage to the screw.)



However, operating the pump with the secondary-side valve closed may cause the flow rate sensor to detect pressure waves from the pump, resulting in incorrect indication. If this occurs, install the valve on the primary side. When doing so, ensure that a straight pipe with a diameter of 10 times and over the bore size is installed between the valve and the flow rate sensor.

- When using an elbow or bush in the piping
When using an elbow or bush in the piping, provide straight piping sections with at least 10D on the IN side and 5D on the OUT side when using a WFK3060 series model. However, port size change by bush should be within one rank. Note that, without a straight pipe, measurement accuracy can be compromised due to disturbances in the flow rate and/or pressure distribution.
(Straight pipes are not necessary for the WFK3004, 3012, and 3032 series. However, it is recommended that a straight pipe is installed to ensure stable measurements.)
* "D" here indicates the inner diameter of the piping material.

Refer to the table below for specific values.

Port size	Rc3/8	Rc1/2	Rc3/4	Rc1
	(10A)	(15A)	(20A)	(25A)
5D	50mm	75mm	100mm	125mm
10D	100mm	150mm	200mm	250mm

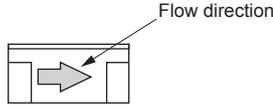
- Use the proper torque to tighten the pipes when connecting them.
 - Using the appropriate torque can ensure the prevention of water leakage and screw damage.
 - First tighten the screw by hand to ensure that threads are not damaged, then use a tool.

<Recommended values>

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



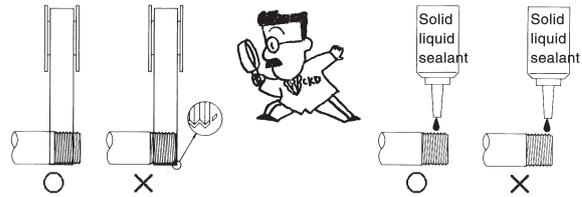
- When installing piping, make sure that the direction of the flow matches the direction of the arrow marked on the body. Connecting the pipe in the wrong direction causes the flow rate to be indicated as less than the actual flow rate or zero.



- Before installing piping, clean the pipes to remove all foreign matter, cutting chips and remains of testing water from the pipes. ■ Check that force is not applied to resin parts when piping.
- Make sure that no seal tape or adhesive enters the pipes when connecting the piping.

- If there is significant difference between the ambient temperature and the fluid temperature condensation occurs, which can enter electrical parts, causing operation failure. If condensation may occur, ensure that the mounting orientation of the flow rate sensor is horizontal and the display is facing 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 sealant, make sure to keep it away from resin parts. Resin parts can be damaged if a sealant adheres.



During use & maintenance

1. Common

⚠ CAUTION

- If a problem occurs during operation, turn off the power immediately and stop the use of the product. Contact the dealership. Slight heating (40°C) of the display section is not abnormal.
- Hardware check and other internal settings are performed during the first two seconds after turning on the power. Display and output do not function properly during this period. Particularly, if a transistor output is used in the control of an interlock circuit, an abnormal stop may occur. Mask the output during this period.
- If the output setting value is changed, control system devices could operate unintentionally. Stop devices before changing settings.
- Ensure proper operation through periodic inspections.
- When removing the equipment, shut off power, make sure that no water pressure is applied, and take other safety precautions before the removal.
- Do not disassemble or modify this product. Doing so could result in faults.
- For cleaning, use mild detergent or any other non-polluting cleaning agent.

2. Applicable fluid

⚠ CAUTION

- Follow the precautions below for the applicable fluids to be measured. If the following water quality standards are not met, performance may be compromised.
- The water quality of the applicable fluid should be as per the "Guideline of Water Quality for Refrigeration and Air Conditioning Equipment" (Water quality standard: Cooling system - Circulating type - Circulating water) provided by the Japan Refrigeration and Air Conditioning Industry Association.

Descriptions	Chemical formula	Unit	Water quality standard
pH	-	pH (25°C)	6.5 to 8.2
Electrical 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 (pH 4.8)	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
Ionized 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
Residue chlorine	Cl	mg/L (ppm)	0.3 or less
Free carbonic acid	CO ₂	mg/L (ppm)	4.0 or less
Stability index	-	-	6.0 to 7.0

*1 Electrical conductivity should be 0.2 (mS/m) and over. For use in a range of 0.05 to 0.2 (mS/m), contact CKD. Do not use for ultra pure water, i.e. water with an electrical conductivity of below 0.05 (mS/m).

Related products

Multi Monitor MD Series

- Compatible with flow rate/pressure without sensor selection.
- Analog output proportional to indicated value is possible
- Clear, three-colour display
- Lock mechanism for misoperation prevention
- Low energy mode function for power saving
- Scaling function allows the conversion of sensor input into an arbitrary numerical value

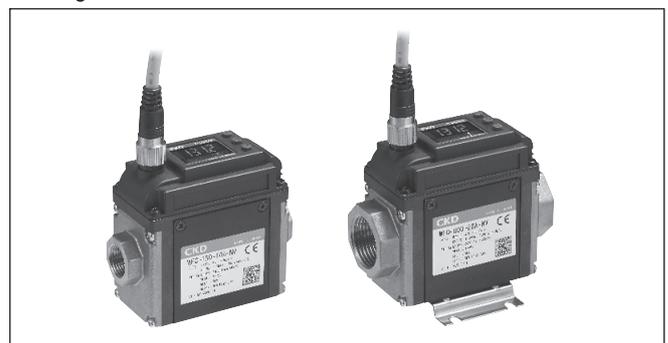
Catalog No. CC-1290A



Capacitance Magnetic Flow Sensor WFC Series

- Penetration structure employment allows use without issue even where water quality is poor
- Capacitance employment prevents accumulation of foreign matter, leading to detection failure
- Repeated precision when using elbow pipes guaranteed
- Does not require a stabilized power supply or a noise-countering ferrite core
- Zero point modulation enabled by external input
- Display 180° inversion function built in
- Backflow detecting mechanism built in

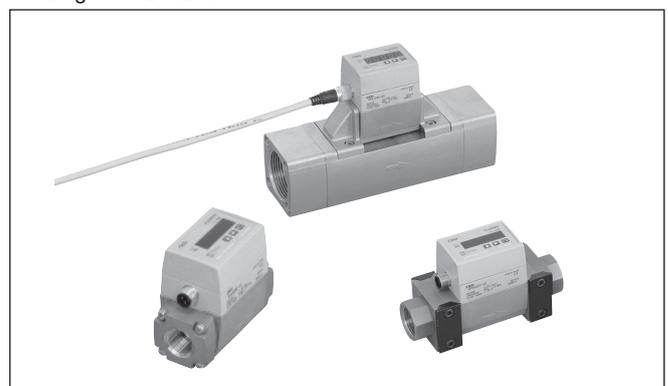
Catalog No. CC-1230A



Karman Vortex Type Flow Sensor for Water WFK 5000, 6000, 7000 Series

- Karman's vortex detection method enables use in environments with bad water quality
- A large effective cross-sectional area can minimize pressure loss
- The energy needed to operate the water pump can be effectively reduced.
- 1.0 sec. high speed response has been enabled by our unique vortex street frequency processing technology.
- Display of instantaneous flow and integrating flow rates can be alternated with one touch
- 5-digit digital display (WFK5027/6027) is equipped to enable one-day integrating flow rate to be viewed at a glance
- Besides alarm output, analog output for record keeping is included as standard.

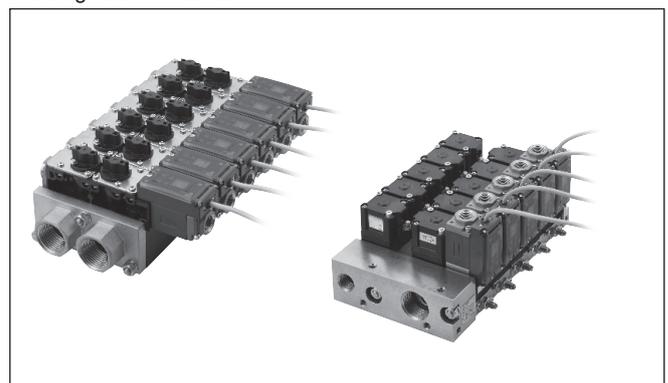
Catalog No. CB-024SA



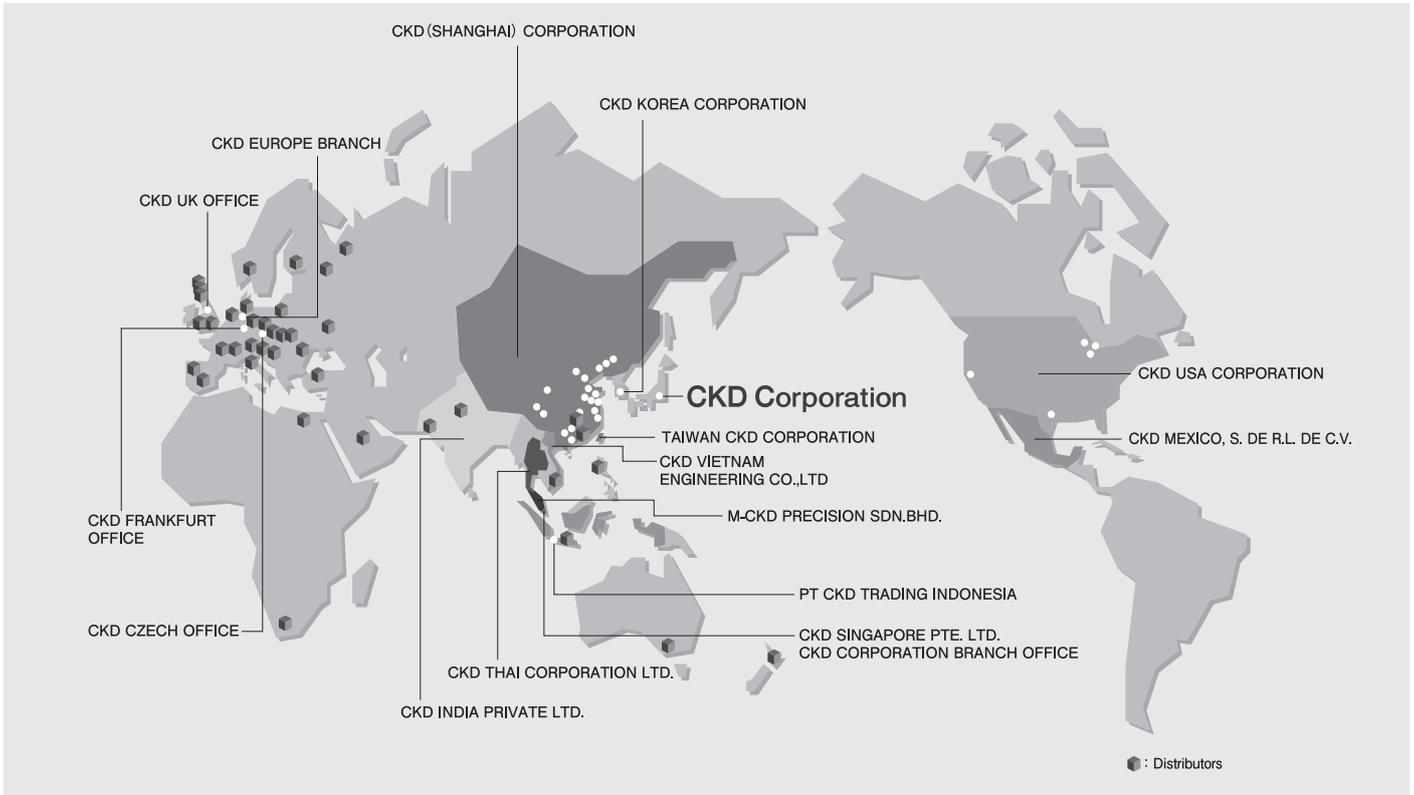
Water Integrated Unit WXU Series

- Space saving without piping
Installation space significantly reduced by unitization, with discrete piping connection eliminated.
Footprint 80% reduced compared to CKD previous models (2-fluid control type)
- Improved quality
Due to no screwed piping between components, the risk of external leak is eliminated.
The execution of work does not let in foreign matter.
- Man-hours reduced
Man-hours for troublesome piping design, piping work, material arrangement etc. are reduced significantly.

Catalog No. CC-1116A



WORLD-NETWORK



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