CKD

New Products

Karman Vortex Flow Sensor
FLUEREX WFK2 Series

Diversified
Easier to use

New

Added manual needle valve

Compatible with fluorine liquids

CKD Corporation

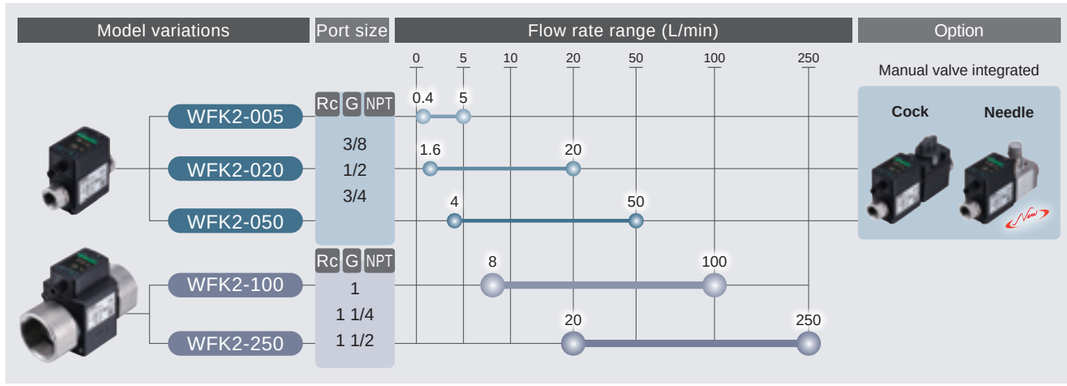
CC-1342A 4

Diversified

Karman Vortex Flow Sensor FLUEREX

WFK2 SERIES

Received the 2018 Good Design Award



Supports fluorine liquids New

Supports fluorine liquids with excellent electrical insulation.
Ideal for controlling coolant in semiconductor manufacturing equipment.
Fluids with low global warming potential are also supported.

Fluorinert™	Galden®	Novec™	Opteon™
FC-3283	HT135	Novec7300	SF10
FC-40	HT200		

* Compatible models: WFK2-005, WFK2-020, WFK2-050

Compatible with flow rates of 0.4 to 250 L/min

Compatible with a wide range of flow rates.

All models equipped as standard with fluid temperature measuring function

Saves space and wiring time with no need for a separately installed temperature sensor. As the temperature sensor is inside the product, it is not easily affected by ambient temperatures.

Easy flow rate adjustment (Option)

Needle: Fine adjustment is possible with the manual valve.
Cock: Valve can be easily opened and closed.

Needle type

Cock type

Various output functions available

OUT1		OUT2	
Analog Output	Switch Output NPN/PNP can be switched	Analog Output	Switch Output NPN/PNP can be switched
› Instantaneous flow rate › Temperature	› Instant flow rate1/2 › Temp1/2 › Accumulated flow	› Instantaneous flow rate › Temperature	› Instant flow 1/2 › Temp1/2 › Accumulated flow
Pulse Output	External Input	Pulse Output	IO-Link
› Accumulated flow	› Accumulated flow reset › Peak hold reset	› Accumulated flow	

* Fluorinerts ™ and Novec™ are trademarks of 3M Corporation.
* Galden®is a registered trademark of Solvay Special Polymers Japan.
* Opteon ™ is a trademark of Chemours-Mitsui Fluoroproducts Co., Ltd.

USER-FRIENDLY

Easier to use

Easy to read 2-screen color LCD

The temperature, accumulated flow, set value, etc., can be displayed simultaneously. The display color can be selected from white, green, and red.

Upper: Instantaneous flow rate
Lower: fluid temperature

Upper: Instantaneous flow rate (green)
Lower: Fluid temperature (red)

Upper: Accumulated flow
Lower: Instantaneous flow rate

Upper: Instantaneous flow rate
Lower: OUT1 output set value

Display screen rotation

The liquid crystal display can be rotated 90° at a time without moving the body.
There is no interference even when installing in parallel.

Easy setting function

Frequently used settings can be set from the normal screen using shortcut operations.
Example: The output threshold can be changed while viewing the current flow rate value.

* Refer to page 12 for details.

Supports fluid temperatures up to 95°C

Ideal for detection of return flow of cooling liquid which tends to become hot.

Cooling liquid for casting machines

High temperature liquid for mold temperature controllers

Cooling liquid for laser oscillators

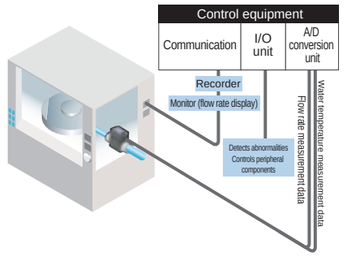
ATEX compliant

Compliant with ATEX Directive.
Refer to "Option (ATEX compatible)" on page 18 for details on the specifications.

Examples of applications

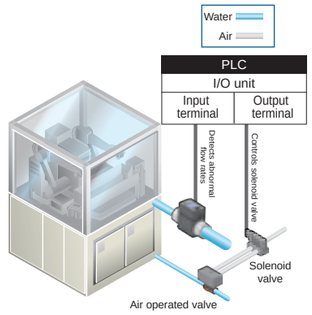
Semiconductor Semicon manufacturing equipment

Cooling and temperature control of semiconductor manufacturing equipment.
Etching, grinder, dicer, CVD.



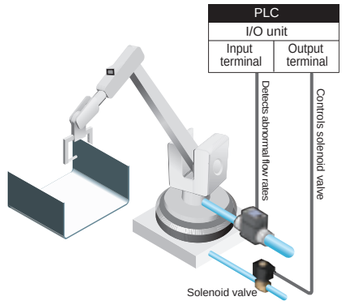
Hardening Induction hardening device

Quantitative management of coolant.



Welding Spot welding machine

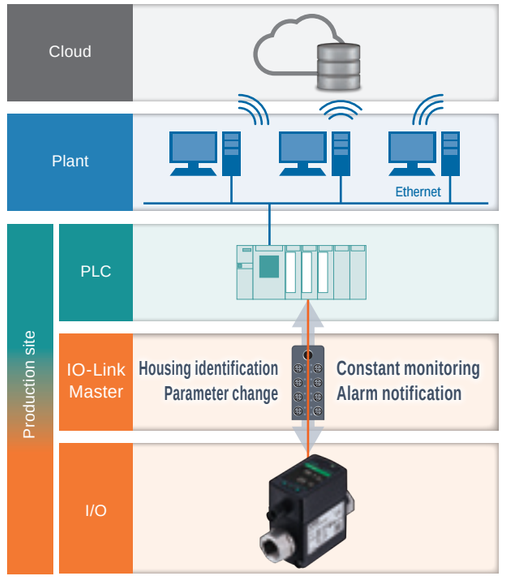
Spot welding machine coolant control and flow rate abnormality detection for chip fallout.



Supports IO-Link

IO-Link

IO-Link is a digital communication standard for sensors/actuators at factory sites. (IEC 61131-9)
Unlike analog communication, it enables the transmission of parameters and event data.



Features of IO-Link

Constant monitoring with digital data is possible.

Parameters can be set and changed via the network, enabling remote equipment operation.

Models, serial numbers, etc., can be confirmed on the network.

The settings can be copied from the master (scanner), making parameter reconfiguration after maintenance obsolete.

Device failure and disconnection can be confirmed.

It can also be converted to Ethernet networks and connected, enabling devices to be IoT-ready.

FP Food Process™

Contact CKD for support of food manufacturing processes FP series.

FLUEREX (Karman Vortex Flow Sensor)

WFK2 Series

Small body

● Flow rate range: 0.4 to 5, 1.6 to 20, 4 to 50 L/min

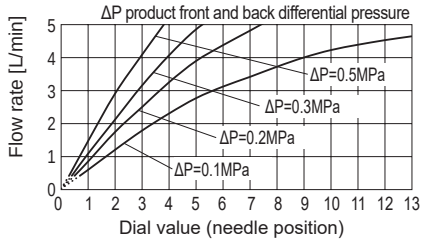
Specifications

Item			WFK2-005	WFK2-020	WFK2-050
Connection	Port size	Rc, G, NPT	3/8, 1/2, 3/4		
	Port material		Stainless steel		
Working conditions	Applicable fluid		Pure water, industrial water		
			Fluorine liquid proof option: Fluorinert™ (FC-3283, FC-40), Galden® (HT135, HT200) Novec™7300, Opteon™SF10 (*8)		
	Max. working press	MPa	1.0		
	Proof pressure	MPa	1.5		
	Manual valve (cock) internal leakage	mL/min	0		
	Manual valve (cock) allowable back press	MPa	0.3		
	Ambient temperature	°C	0 to 50 (85%RH or less, no condensation)		
	Fluid temp (*1)	°C	Standard: 1 to 95 Fluorine-based liquid compatible option: -10 to 95		
Flow	Flow rate range	L/min	0.4 to 5	1.6 to 20	4 to 50
	Repeatability (*2)		Analog output accuracy: ±2.5%F.S. Display accuracy: ±2.5%F.S.±1digit (min. display unit)		
	Temp characteristics (*2) (*3)		±5% F.S.(25°C standard, 10 to 50°C)		
	Low flow cut		5% of F.S.		
	Accumulated flow range (*4)		99,999L or 99999m³ (unit selectable) Resets when the power is turned OFF		
	Integrated pulse rate (*4)	L/pulse	0.1, 0.5, 1	0.1, 0.5, 1, 10	0.5, 1, 10, 50
	Pressure loss (when the fluid is water)	MPa	0.07 (F.S.)	0.05 (F.S.)	0.05 (F.S.)
	Response time (*5)	sec	0.25, 0.5, 1, 5, 10 (Initial value 1)		
Temp	Measurement temp	°C	−10 to 100		
	Accuracy	°C	0 to less than 50: analog output accuracy ±2, display accuracy ±2±1digit (min. display unit 1)		
			50 to 100: analog output accuracy ±3, display accuracy ±3±1digit (min. display unit 1)		
Output	Display		2-screen LCD display, instantaneous flow rate: 3 digits, liquid temp: 2 digits, integrated flow: 5 digits, with screen rotation		
	Analog output (*6)		Standard: DC0 to 5V/1 to 5V Option: 4 to 20mA DC, 0 to 10VDC/1 to 10V		
	Switch output		NPN or PNP open collector output (can be switched from settings)		
		Max. load current	50mA		
		Max. applied voltage	30 VDC		
		Internal voltage drop	2.0 V or less		
Power supply voltage			Analog output standard: 12 to 24 VDC ±10%, analog output option: 24 VDC ±10%		
Current consumption (*7)			50 mA or less		
Mount	Mounting orientation		Unrestricted in vertical/horizontal direction		
	Straight piping section		None		
	Degree of protection		IP 65 or equiv.		
	Weight	g	3/8 (Rc, G, NPT): approx. 320, with manual valve (cock) approx. 510, with manual valve (needle) approx. 820 1/2 (Rc, G, NPT): approx. 320, with manual valve (cock) approx. 510, with manual valve (needle) approx. 820 3/4 (Rc, G, NPT): Approx. 400, with manual valve (cock) Approx. 590, with manual valve (needle) Approx. 880		

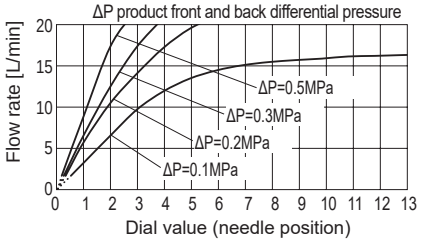
*1: For fluorine liquids, the fluid temperature range which can be measured differs depending on the fluid type.Refer to the measurable fluid temperature range graph.
*2: Accuracy is the average value over 10 sec (for conditions not containing air bubbles). F.S. stands for full scale flow rate.
*3: This temperature characteristics are when the fluid is water. For fluorine liquids, check the range of the corresponding kinematic viscosity.
*4: The integrating flow is a calculated (ref) value. It is reset when the power is turned OFF. Errors may occur between the integrating flow display and integrated pulse output.
*5: The time to attain 70% of the original output after the normal flow rate (used) drops instantly to 0.
*6: Check the allowable load on the wiring method page.
*7: Current for when 24 VDC is connected, and no load is applied. Please note that the current consumption changes depending on the load connection status.
*8: Fluorinerts™ and Novec™ are trademarks of 3M Corporation. Galden® is a registered trademark of Solvay Specialty Polymers Japan. Opteon™ is a trademark of Chemours-Mitsui Fluoroproducts Co., Ltd.

Manual valve (needle) flow characteristics (When the fluid is water)

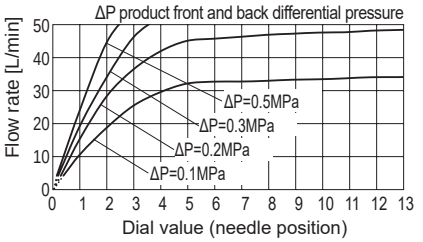
● WFK2-005



● WFK2-020



● WFK2-050



* Internal leakage occurs even when the number of rotations of the needle valve is 0 (fully closed).
* For fluorine liquid, refer to "Conversion of needle flow characteristics" on page 17.

How to order

WFK2 - 005 AA A A N - A C -

- A Flow rate range
- B Port size
- C IO-Link/ Analog output
- D Display unit
- E Manual valve
- F Option (cable included)
- G Option (bracket included)
- H Option (other)

Precautions for model No. selection

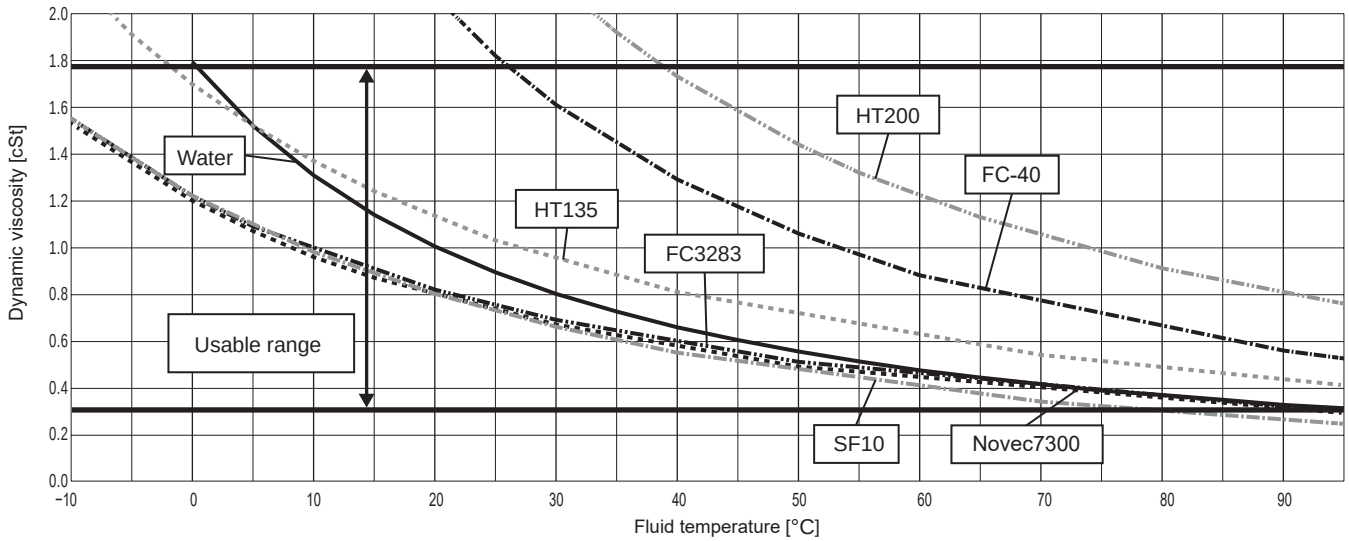
*1: Display unit code B is for overseas use and cannot be used in Japan.
*2: When selecting manual valve codes A and B (with manual valve) and the included bracket is selected, 2 sets of brackets are included.
*3: Type with manual valve (cock) cannot be selected for the option code SF (fluorine-based liquid compatible).
*4: Cable attachment cannot be selected for option (ATEX compatible).
*5: Refer to "Option (ATEX compatible)" on page 18 for details on specifications.

[Example of model No.]
WFK2-005AAAAN-AC

- A Flow rate range: 0.4 to 5L/min
- B Port size: Rc3/8
- C IO-Link analog output: Switch/analog output DC0 to 5V/DC1 to 5V
- D Display unit: L/min L m^3 °C
- E Manual valve: sensor only
- F Option: standard cable included
- G Option: bracket included

Code	Description	
A Flow rate range		
005	0.4 to 5L/min	
020	1.6 to 20L/min	
050	4 to 50L/min	
B Port size		
AA	Rc 3/8	**AB** G 3/8 **AC** NPT 3/8
BA	Rc 1/2	**BB** G 1/2 **BC** NPT 1/2
CA	Rc 3/4	**CB** G 3/4 **CC** NPT 3/4
C IO-Link/ Analog output	* "D""E""F" is the analog output specs for when not using IO-Link	
A	Switch/analog output DC0 to 5V/DC1 to 5V	
B	Switch/analog output DC4 to 20mA	
C	Switch/analog output DC0 to 10V/DC1 to 10V	
D	DC0 to 5V/DC1 to 5V for IO-Link	
E	DC4 to 20mA for IO-Link	
F	DC0 to 10V/DC1 to 10V for IO-Link	
D Display unit		
A	L/min L m^3 °C	
B	L/min, US gal/min L, m^3, US gal °C, °F	*1
E Manual valve		
N	Sensor only	
A	With manual valve (cock)	*2, *3
B	With manual valve (needle)	*2
F Option (cable included)		*4
Blank	None	
A	Standard cable (M12/4-conductor 3 m) included	
B	Both ends connector cable (M12/4-conductor 3 m) included	
G Option (bracket included)		
Blank	None	
C	Bracket included	*2
H Option (other)		
Blank	None	
EX	ATEX compliant	*4, *5
SF	Compatible with fluorine liquids	*3

Measurable fluid temperature range



FLUEREX (Karman Vortex Flow Sensor)

WFK2 Series

Large body

● Flow rate range: 8 to 100/20 to 250L/min

Specifications

Item			WFK2-100	WFK2-250
Connection	Port size	Rc, G, NPT	1, 1 1/4, 1 1/2	
	Port material		Stainless steel	
Working conditions	Applicable fluid		Pure water, industrial water	
	Max. working press	MPa	1.0	
	Proof pressure	MPa	1.5	
	Ambient temperature	°C	0 to 50 (85% RH or less, no condensation)	
	Fluid temperature	°C	1 to 95	
Flow	Flow rate range	L/min	8 to 100	20 to 250
	Repeatability (*1)		Analog accuracy: ±2.5%F.S. Display accuracy: ±2.5%F.S. ±1 digit (min. display unit)	
	Temp characteristics (*1)		±5%F.S. (base temperature 25°C, 10 to 50°C)	
	Low flow cut		5% of F.S.	
	Accumulated flow range (*2)		99,999 L or 99,999 m³ (unit selectable), reset when the power is turned OFF.	
	Integrated pulse rate (*2)	L/pulse	1, 10, 50, 100	10, 50, 100
	Pressure loss	MPa	0.05 (at F.S.)	0.03 (at F.S.)
	Response time (*3)	sec	0.25, 0.5, 1, 5, 10 (Initial value 1)	
Temp	Measurement temp	°C	0 to 100	
	Accuracy	°C	0 to 50: analog accuracy ±2, display accuracy ±2 ±1 digit (min. display unit 1)	
			50 to 100: analog accuracy ±3, display accuracy ±3 ±1 digit (min. display unit 1)	
Output	Display		2-screen LCD display, instantaneous flow rate: 3 digits, water temperature: 2 digits, integrating flow: 5 digits, with screen rotation	
	Analog output (*4)		Standard: 0 to 5 VDC/1 to 5 VDC, option: 4 to 20 mA DC, 0 to 10 VDC/1 to 10 VDC	
	Switch output		NPN or PNP transistor open collector output (can be switched from settings)	
		Max. load current	50mA	
		Max. applied voltage	30 VDC	
		Internal voltage drop	2.0 V or less	
Power supply voltage			Analog output standard: 12 to 24 VDC ±10%, analog output option: 24 VDC ±10%	
Current consumption (*5)			50 mA or less	
Mount	Mounting orientation		Unrestricted in vertical/horizontal direction	
	Straight piping section		IN side: 10 D, OUT side: 5 D	
	Degree of protection		IP65 or equiv.	
	Weight	g	1 (Rc, G, NPT): approx. 870 1 1/4 (Rc, G, NPT): approx. 1,010 1 1/2 (Rc, G, NPT): approx. 1,100	

*1: Accuracy is the average value over 10 sec (for conditions not containing air bubbles). F.S. stands for full scale flow rate.

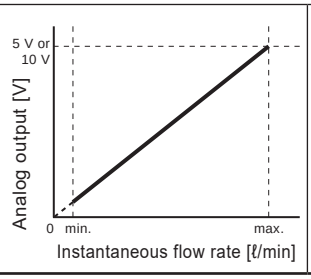
*2: The integrating flow is a calculated (reference) value. It is reset when the power is turned OFF. Errors may occur between the integrating flow display and integrated pulse output.

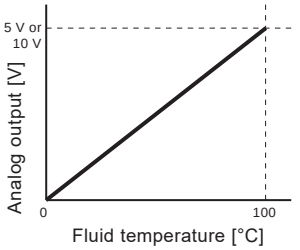
*3: The time to attain 70% of the original output after the normal flow rate (used) drops instantly to 0.

*4: Check the allowable load on the wiring method page.

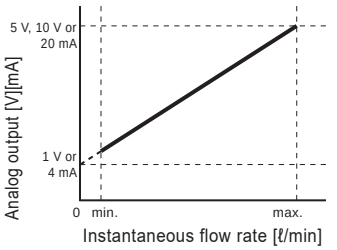
*5: Current for when 24 VDC is connected, and no load is applied. The current consumption will vary depending on how the load is connected.

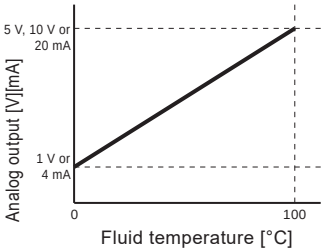
Switch/analog output 0 to 5 VDC
Switch/analog output 0 to 10 VDC





Switch/analog output 1 to 5 VDC
Switch/analog output 1 to 10 VDC
Switch/analog output 4 to 20 mADC





Note: Output value without adjustment of original range analog output or span.

How to order

WFK2 - 100 DA A A N - A C -

Ⓐ Flow rate range
Ⓑ Port size
Ⓒ IO-Link analog output
Ⓓ Display unit
Ⓔ Manual valve
Ⓕ Option (cable included)
Ⓖ Bracket (bracket included)
Ⓗ Option (other)

Code	Description
Ⓐ Flow rate range	
100	8 to 100L/min
250	20 to 250L/min
Ⓑ Port size	
DA Rc 1	**DB** G 1	**DC** NPT 1
EA Rc 1 1/4	**EB** G 1 1/4	**EC** NPT 1 1/4
FA Rc 1 1/2	**FB** G 1 1/2	**FC** NPT 1 1/2
Ⓒ IO-Link analog output	
* "D""E""F" is the analog output specifications for when not using IO-Link	
A	Switch/analog output 0 to 5VDC/1 to 5VDC
B	Switch/analog output 4 to 20mA DC
C	Switch/analog output 0 to 10VDC/1 to 10VDC
D	0 to 5VDC/1 to 5VDC for IO-Link
E	4 to 20mA DC for IO-Link
F	0 to 10VDC/1 to 10VDC for IO-Link
Ⓓ Display unit	
A	L/min L m³ °C
B	L/min us gal/min L m³ us gal °C °F *1
Ⓔ Manual valve	
N	Sensor only
Ⓕ Option (cable included)	*2
Blank	None
A	Standard cable (M12/4-conductor 3 m) included
B	Both ends connector cable (M12/4-conductor 3 m) included
Ⓖ Option (bracket included)	
Blank	None
C	Bracket included
Ⓗ Option (other)	
Blank	None
EX	ATEX supported *3

Precautions for model No. selection

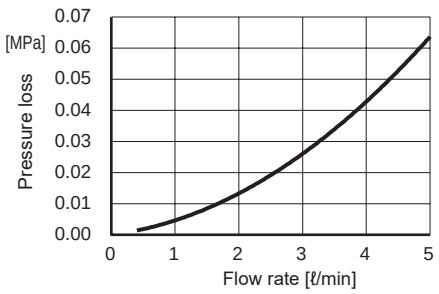
*1: Display unit code B is for overseas use and cannot be used in Japan.
*2: Cable attachment cannot be selected for option (ATEX compatible).
*3: Refer to "Option (ATEX compatible)" on page 18 for details on specifications.

[Example of model No.]
WFK2-100DAAAN-AC

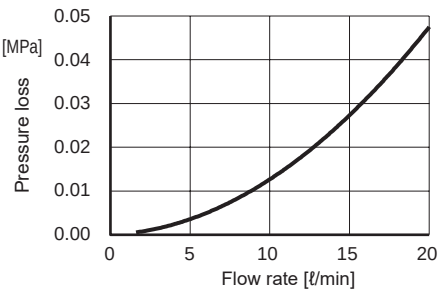
Ⓐ Flow rate range: 8 to 100L/min
Ⓑ Port size: Rc1
Ⓒ IO-Link/Analog output:
Switch/analog output
0 to 5VDC/1 to 5VDC
Ⓓ Display unit: L/min L m³ °C
Ⓔ Manual valve: Sensor only
Ⓕ Option: Standard cable included
Ⓖ Option: Bracket included

Pressure loss (when the fluid is water)

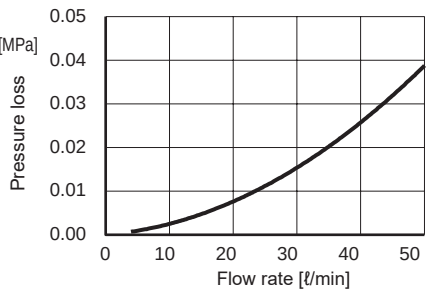
● WFK2-005



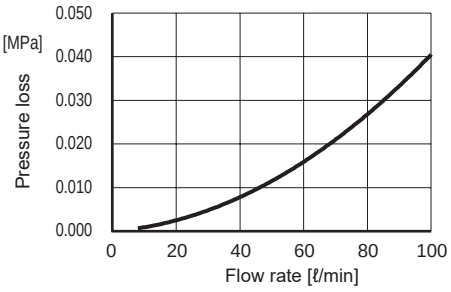
● WFK2-020



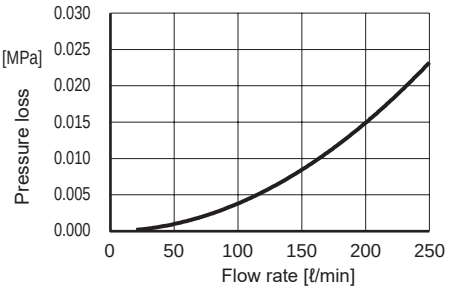
● WFK2-050



● WFK2-100



● WFK2-250



■ Conversion to fluorine liquid

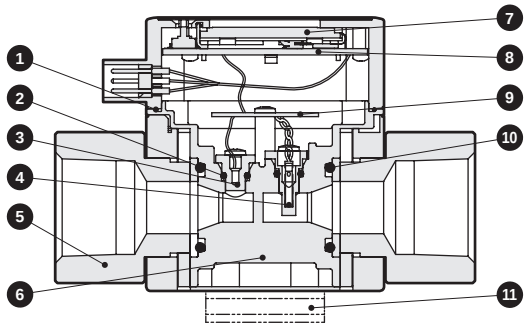
When the flow path volume and flow rate are the same, pressure loss is proportional to specific gravity, as the formula below is attained.

$$\frac{\Delta p_1}{G_1} = \frac{\Delta p_2}{G_2}$$

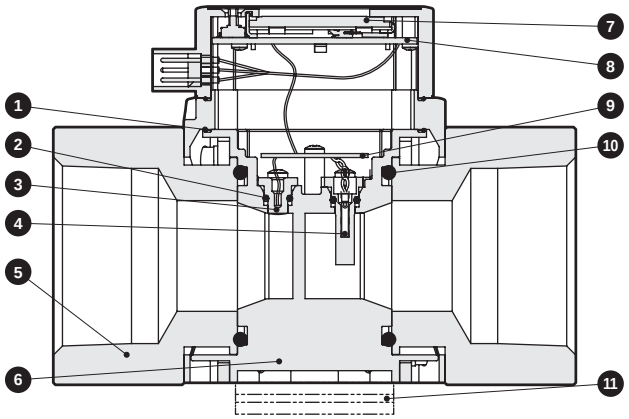
Δp: Pressure loss (MPa)
G: Specific gravity (ratio of density to water)

Internal structure and parts list

● WFK2-005, 020, 050



● WFK2-100, 250

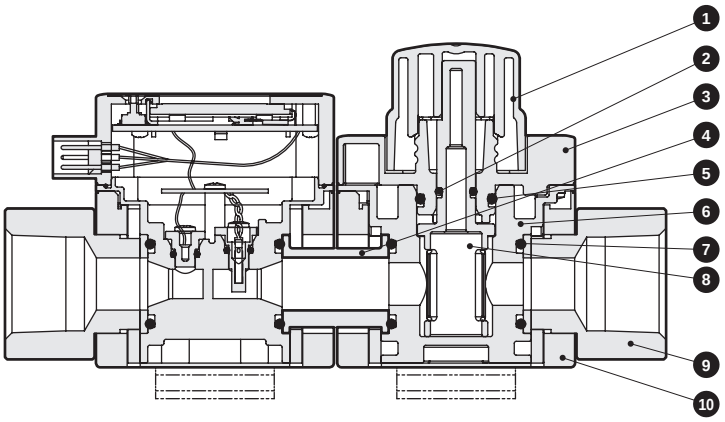


Cannot be disassembled

Part No.	Part name	Material		Qty.	Part No.	Part name	Material		Qty.
1	Packing	FKM	Fluoro rubber	1 or 2	7	Liquid crystal			1
2	O-ring *1	FKM	Fluoro rubber	2	8	CPU board			1
3	Temperature sensor	SUS316L	Thermistor	1	9	Sensor board			1
4	Karman's vortex street detection sensor	PPS resin	Piezoelectric element	1	10	O-ring *1	FKM	Fluoro rubber	2
5	Attachment	SUS304 or SCS13		2	11	Bracket (option)	SUS304 or SPCC		(1)
6	Sensor body	PPS resin		1					

* The wetted parts are ②, ③, ④, ⑤, ⑥ and ⑩.
*1: EPDM (ethylene propylene diene rubber) when fluorine-based liquid is supported.

● WFK2-005, 020, 050****A (cock)

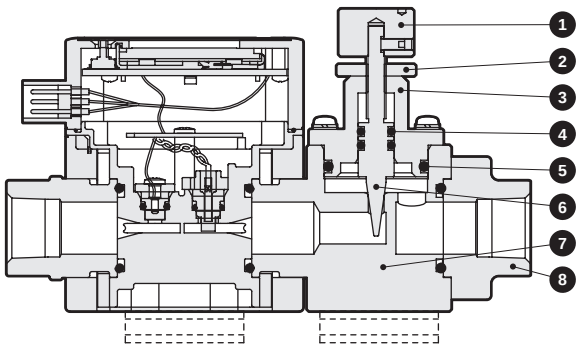


Cannot be disassembled

Part No.	Part name	Material		Qty.
1	Handle	POM resin		1
2	O-ring	FKM	Fluoro rubber	1
3	Stuffing	PPS resin		1
4	Spacer	SUS304 or SCS13		1
5	O-ring	FKM	Fluoro rubber	1
6	Cock body	PPS resin		1
7	O-ring	FKM	Fluoro rubber	2
8	Cock	PPS resin		1
		FKM	Fluoro rubber	
9	Attachment	SUS304 or SCS13		2
10	External case	PBT resin		1

* The wetted parts are ②, ③, ④, ⑤, ⑥, ⑦, ⑧ and ⑨.

● WFK2-005, 020, 050****B (needle)



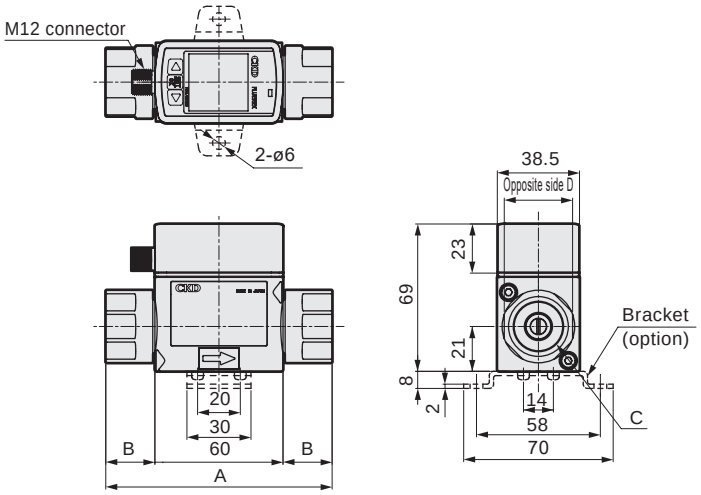
Cannot be disassembled

Part No.	Part name	Material		Qty.
1	Knob	Aluminum		1
2	Lock nut	SUS303		1
3	Needle guide	SUS304		1
4	O-ring *1	FKM	Fluoro rubber	1
5	O-ring *1	FKM	Fluoro rubber	2
6	Needle	SUS304		1
7	Needle body	SUS304		1
8	Attachment	SUS304 or SCS13		1

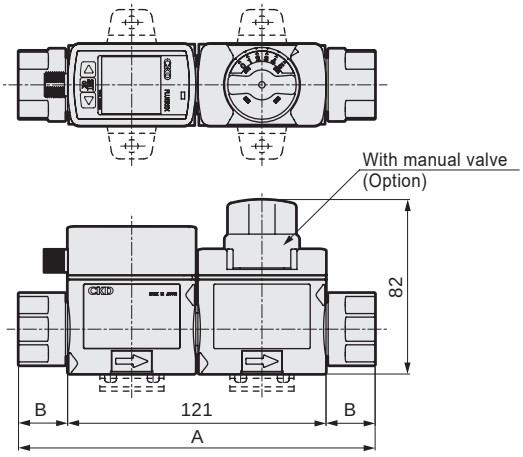
* The wetted parts are ③, ④, ⑤, ⑥, ⑦ and ⑧.
*1: EPDM (ethylene propylene diene rubber) when fluorine-based liquid is supported.

Dimensions

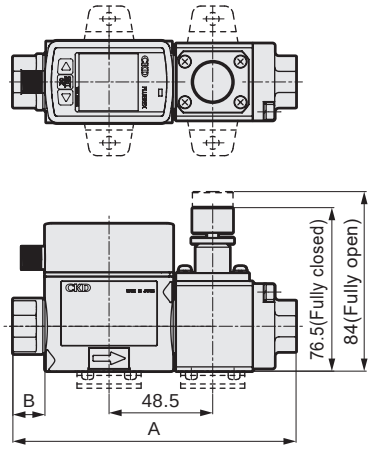
● WFK2-005, 020, 050



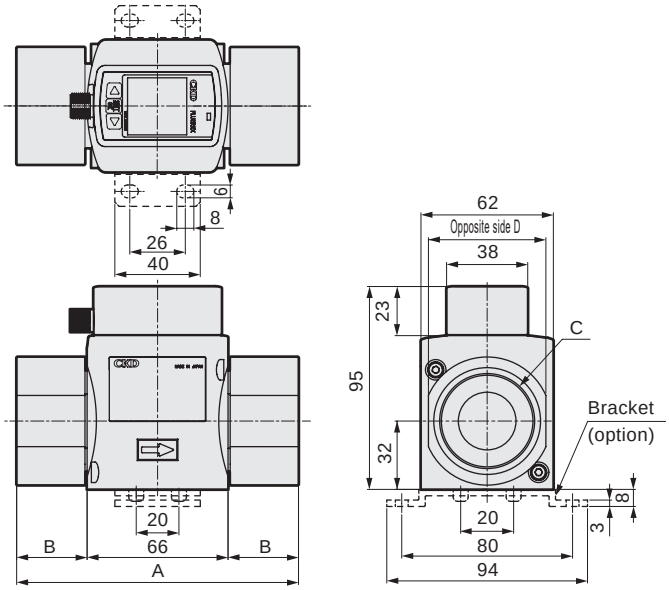
● With manual valve (cock)



● With manual valve (needle)



● WFK2-100, 250



Model No.	A	B	C	Opposite side D	Model No.	A	B	C	Opposite side D
WFK2-[*1]A[*3]**N	90	15	Rc3/8	24	WFK2-[*1]A[*3]**A	151	15	Rc3/8	24
WFK2-[*1]B[*3]**N	90	15	Rc1/2	27	WFK2-[*1]B[*3]**A	151	15	Rc1/2	27
WFK2-[*1]C[*3]**N	106	23	Rc3/4	32	WFK2-[*1]C[*3]**A	167	23	Rc3/4	32
WFK2-[*2]D[*3]**N	106	20	Rc1	46	WFK2-[*1]A[*3]**B	132.5	15	Rc3/8	24
WFK2-[*2]E[*3]**N	125	29.5	Rc1 1/4	50	WFK2-[*1]B[*3]**B	132.5	15	Rc1/2	27
WFK2-[*2]F[*3]**N	132	33	Rc1 1/2	55	WFK2-[*1]C[*3]**B	148.5	23	Rc3/4	32

[*1]: Select from 005, 020, and 050
[*2]: Select from 100, 250
[*3]: Select from A, B, and C (the Dimensions of the G screw and NPT screw are the same)

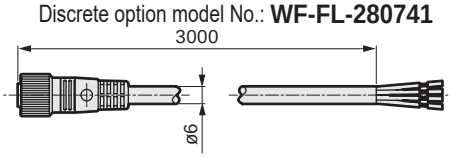
Optional dimensions

● Cable option

Common for WFK2

• Standard cable

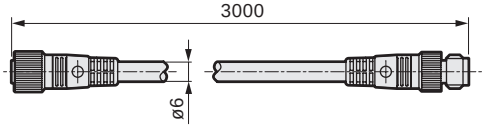
Discrete option model No.: **WF-FL-280741**



Finished outer diameter 6mm, core 0.5mm², insulated outer diameter 1.9mm

• Double ended connector cable

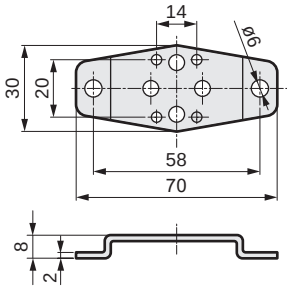
Discrete option model No.: **WF-FL-662453**



● Bracket option

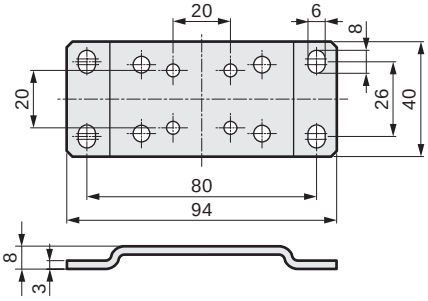
WFK2-005, 020, 050

Discrete option model No.: **WF-FL-315544**



WFK2-100, 250

Discrete option model No.: **WF-FL-636342**



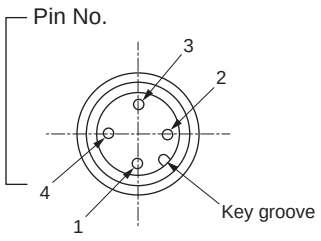
Wiring method

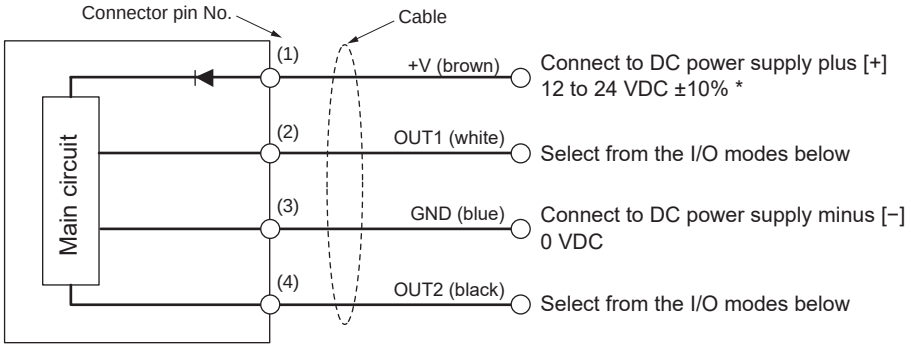
· Always read the safety precautions before wiring.

· The cable used is a 4-conductor cabtyre cable with a core of 0.5 mm^2.

*** Keep the cable far away from power cords or other things that may cause noise. Noise can cause malfunctions.**

[Connector (male)]





* With a standard analog output (0 to 5 V/1 to 5 V). With option (4 to 20 mA/0 to 10 V/1 to 10 V), it is 24 VDC ±10%.

I/O mode

OUT 1: analog flow output, analog temperature output, flow switch 1 output, flow switch 2 output, temperature switch 1 output, temperature switch 2 output, integrated pulse output, integrated switch output, external input, OFF

OUT 2: analog flow output, analog temperature output, flow switch 1 output, flow switch 2 output, temperature switch 1 output, temperature switch 2 output, integrated pulse output, integrated switch output, IO-Link, OFF

Item	[A, D] 0 to 5V/ 1 to 5V	[B, E] 4 to 20mA	[C, F] 0 to 10V/ 1 to 10V
Allowable load weight	50 kΩ or more	500 Ω or less	50 kΩ or more

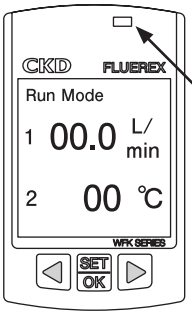
The default settings are the following:

IO-Link/Analog output	OUT1	OUT2
Switch/analog output	Analog flow output	Analog temp output
IO-Link compatible	OFF	IO-Link

IO-Link parameter specifications

1. General

Item	Details
Communication protocol	IO-Link
Communication protocol version	V1.1
Transmission bit rate	COM2 (38.4 kbps)
Port	M12 Class A
Process data (input)	4 byte
Process data (output)	0 byte
Min. cycle time	5 ms
Data storage	1 kbyte
SIO mode support	None



Power light (green)

· Lights when the power is ON. Blinks during IO-Link communication.

2. Process data

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Data	MSB															LSB
	Instantaneous flow rate [Flow Rate]															
Data range	Refer to Table 1															
Format	UInteger 16															

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Data	Error	WARNING	-	-	Switch output				MSB							LSB
					4	3	2	1	Fluid temperature [Temperature]							
Data range	True/False								−10 to 110°C							
Format	Boolean								Integer 8							

Data range (Table 1)

Flow rate range	005	020	050	100	250
Data range	0.00 to 5.50 L/min	0.0 to 22.0 L/min	0.0 to 55.0 L/min	0 to 110 L/min	0 to 275 L/min

* IODD files can be downloaded from the CKD website. (https://www.ckd.co.jp/en/)

Names and functions of display/operation section

Main screen
The state of instantaneous flow rate, integrating flow, temperature, and various settings are displayed.

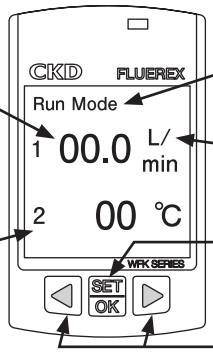
Mode display
Display the screen mode.

Unit display
Display the value units.

Output display
Indicates the switch output status.

Set key

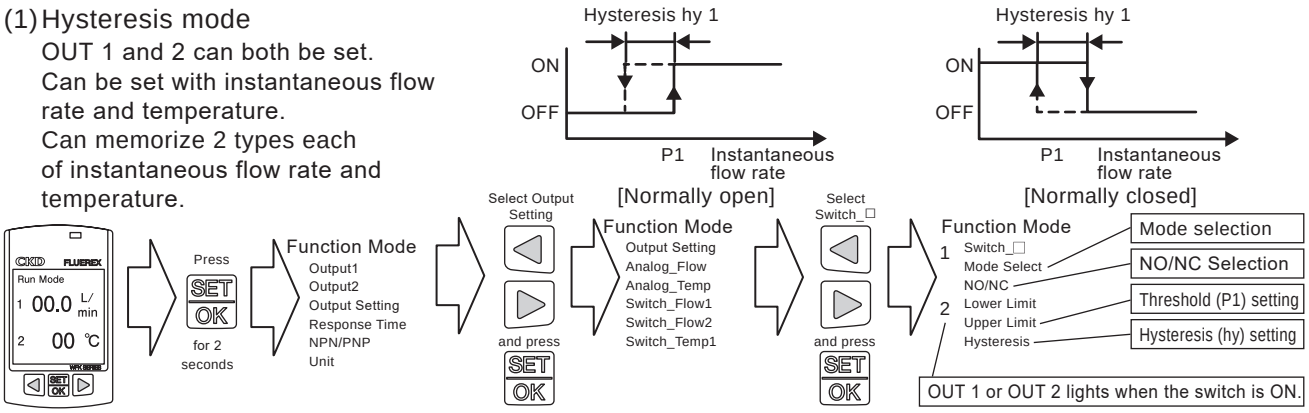
Selection key
Up/down changes depending on the orientation of the screen display.
Also, you can return to the previous selection screen by pressing ◁ and ▷ at the same time, and then releasing them.



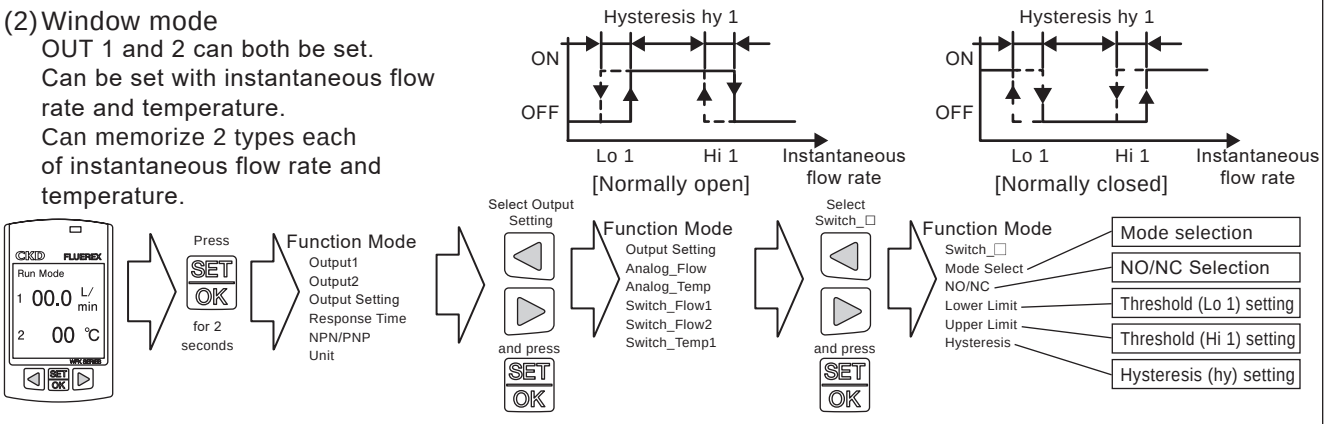
Output mode and output operation

1. Switch output

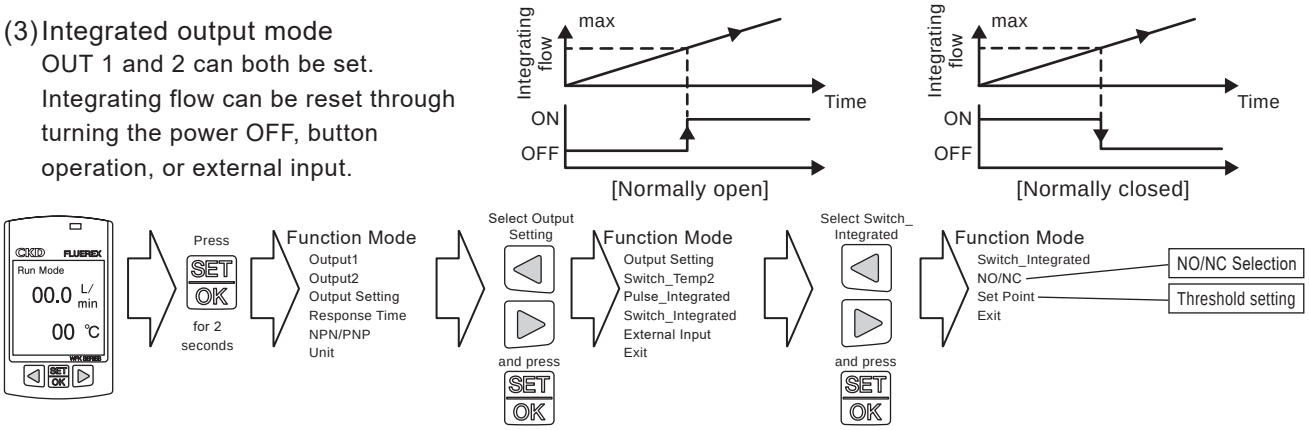
(1) Hysteresis mode
OUT 1 and 2 can both be set.
Can be set with instantaneous flow rate and temperature.
Can memorize 2 types each of instantaneous flow rate and temperature.



(2) Window mode
OUT 1 and 2 can both be set.
Can be set with instantaneous flow rate and temperature.
Can memorize 2 types each of instantaneous flow rate and temperature.



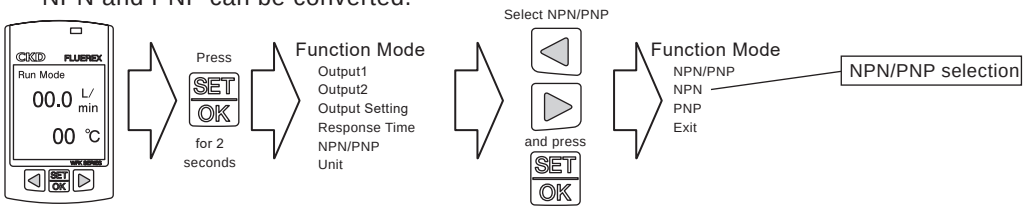
(3) Integrated output mode
OUT 1 and 2 can both be set.
Integrating flow can be reset through turning the power OFF, button operation, or external input.



(4) NPN/PNP conversion

NPN and PNP can be converted.

* Perform NPN and PNP conversion when the switch output is OFF.
Conversion settings are applied when the power is turned back ON.

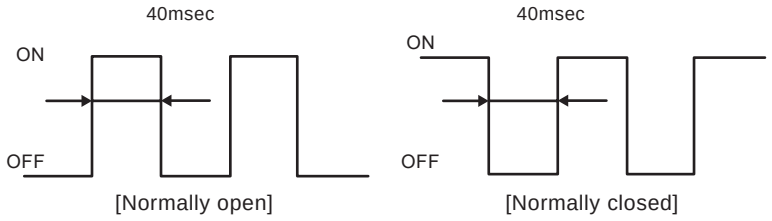


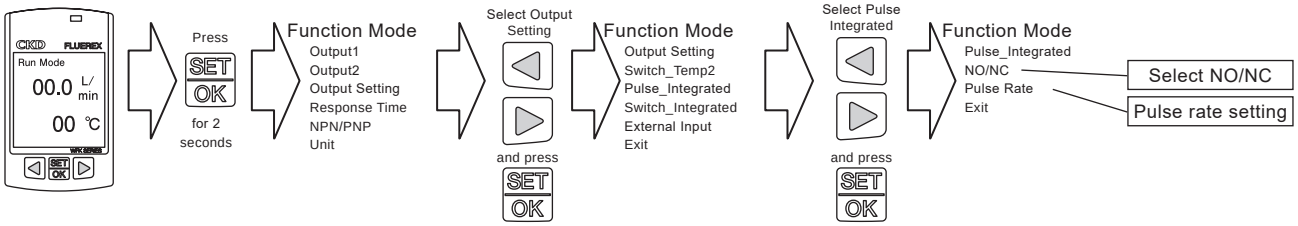
2. Integrated pulse output

Pulse output matches the integrating flow count.

Selectable pulse rates

Model	5 L	20 L	50 L	100 L	250 L
0.1 L	○	○			
0.5 L	○	○	○		
1 L	○	○	○	○	
10 L		○	○	○	○
50 L			○	○	○
100 L				○	○

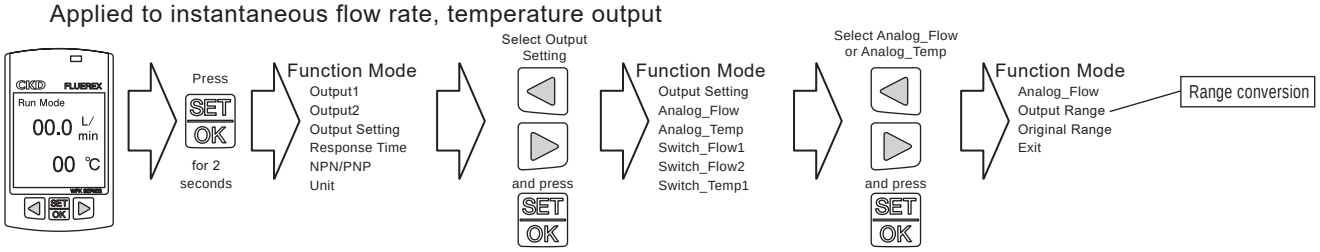




3. Analog output

(1) Output conversion

0 to 5 V/1 to 5 V ..... select between 0 to 5 V output and 1 to 5 V output
4 to 20 mA..... no output conversion
0 to 10 V/1 to 10 V..... select between 0 to 10 V output and 1 to 10 V output
Applied to instantaneous flow rate, temperature output



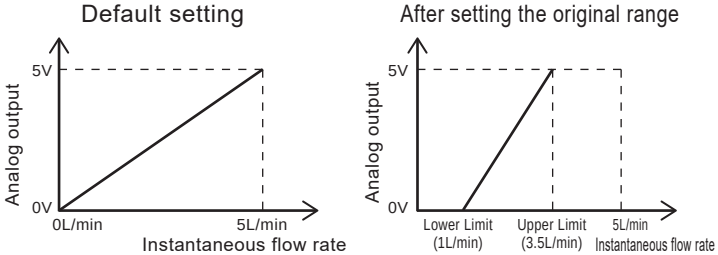
(2) Original analog output

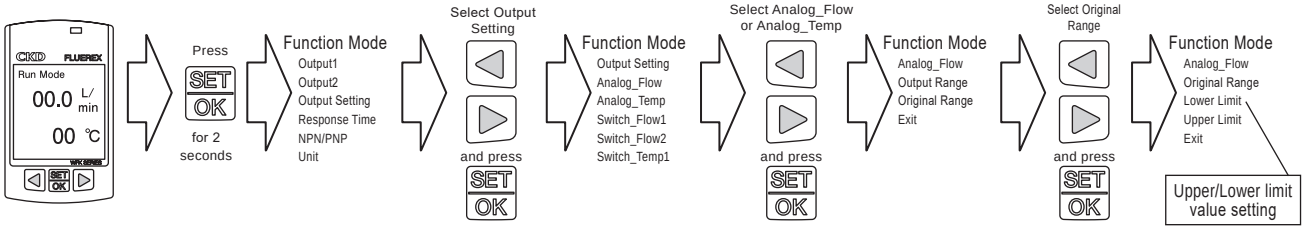
An analog output function that freely sets the upper and lower limits of normal analog output.

・Settable range

Instantaneous flow rate : 0 to F.S. L/min
Fluid temperature : -10 to 100°C

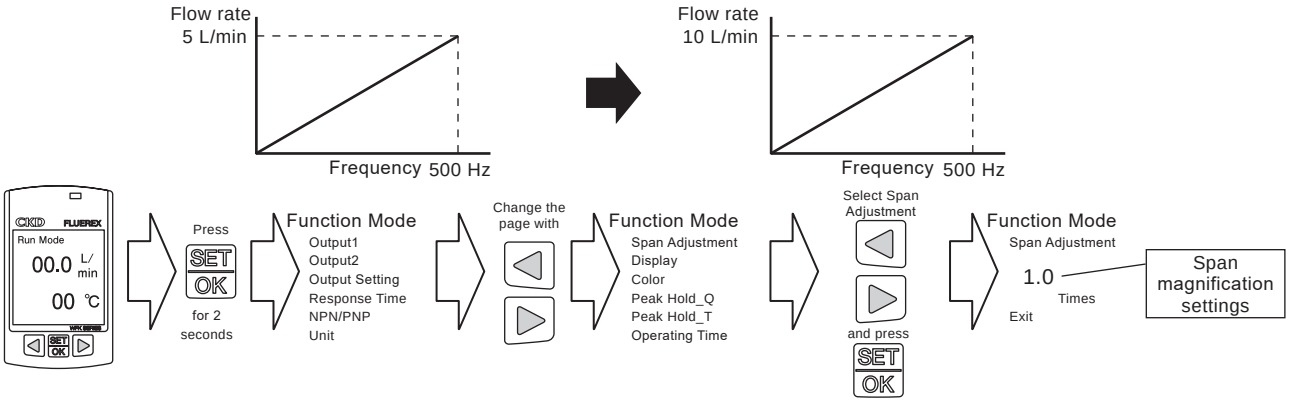
・Example (WFK2-005, instantaneous flow rate,
Lower Limit = 1L/min,
Upper Limit = 3.5L/min
if set to .)





4. Span adjustment

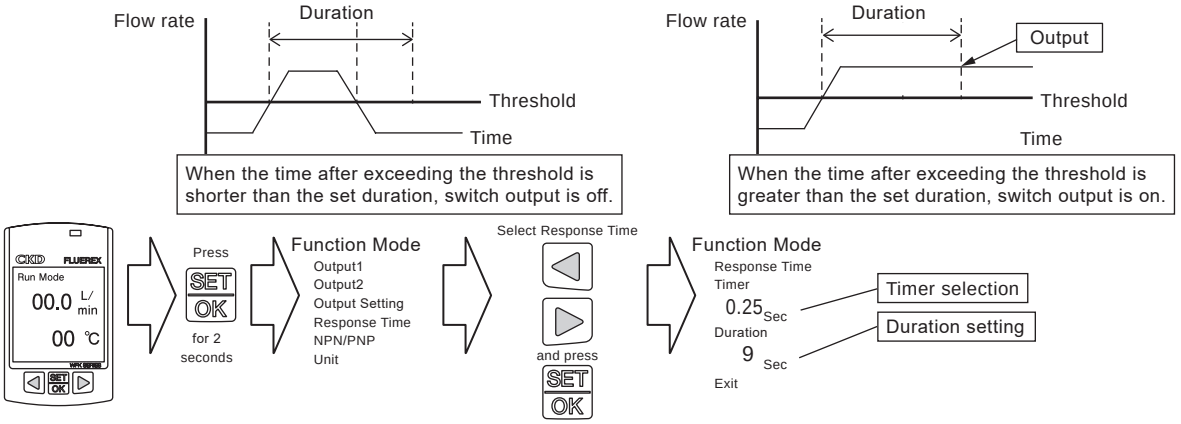
Span adjustment can be set from 0.1 to 2.5 times with the initial flow rate value.
[Ex.] When set to 2.0 times



5. Setting response time

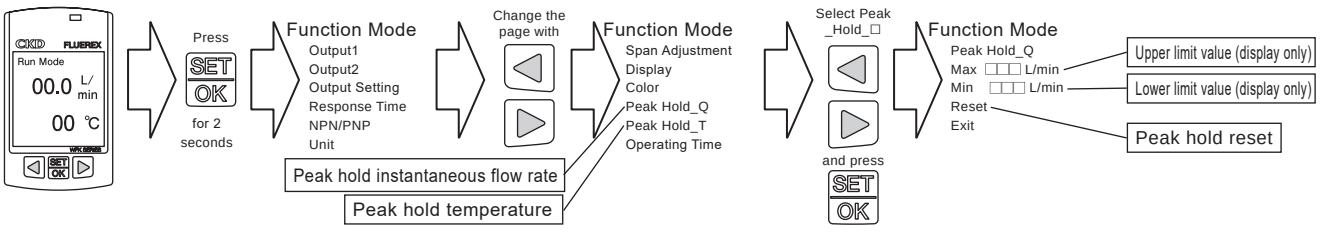
(1) Timer selection
Instantaneous flow rate response time (average movement time) can be changed.
Select from 0.25 sec, 0.5 sec, 1 sec, 5 sec, and 10 sec (1 sec at factory settings)

(2) Duration....can be set from 0 to 9 sec
During switch output, the time it takes for the output to occur after exceeding the threshold can be set.



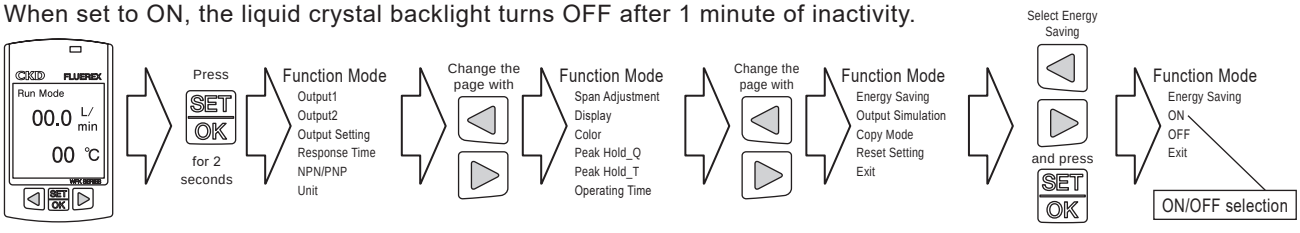
6. Peak hold

The max. and min. flow rates of instantaneous flow rate and temperature can be confirmed.
The max. and min. flow rates can be reset through turning the power OFF, button operation, or external input.



7. Energy Saving setting

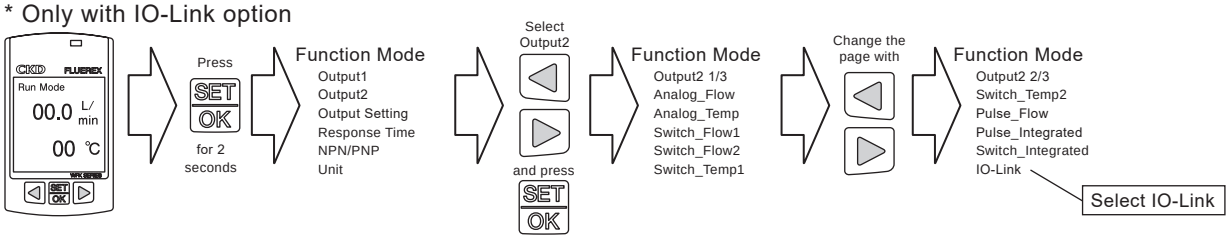
Energy saving can be set to "ON" or "OFF".
When set to ON, the liquid crystal backlight turns OFF after 1 minute of inactivity.



8. IO-Link

Acquiring measurement data, changing the threshold, and other bi-direction communication are possible with an IO-Link connection (OUT 2 only).

* Only with IO-Link option



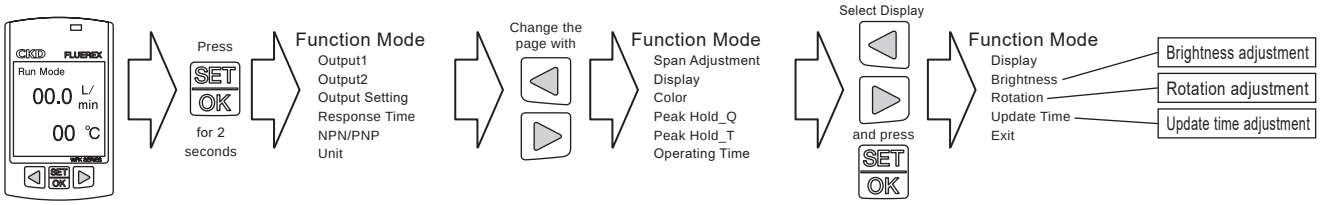
9. Screen display

(1) Display

Brightness ..... select from 25%, 50%, 75%, and 100%.

Rotation ..... select from 0°, 90°, 180°, and 270°.

Update time..... select from 0.25 sec, 0.5 sec, 1 sec, 5 sec, and 10 sec.



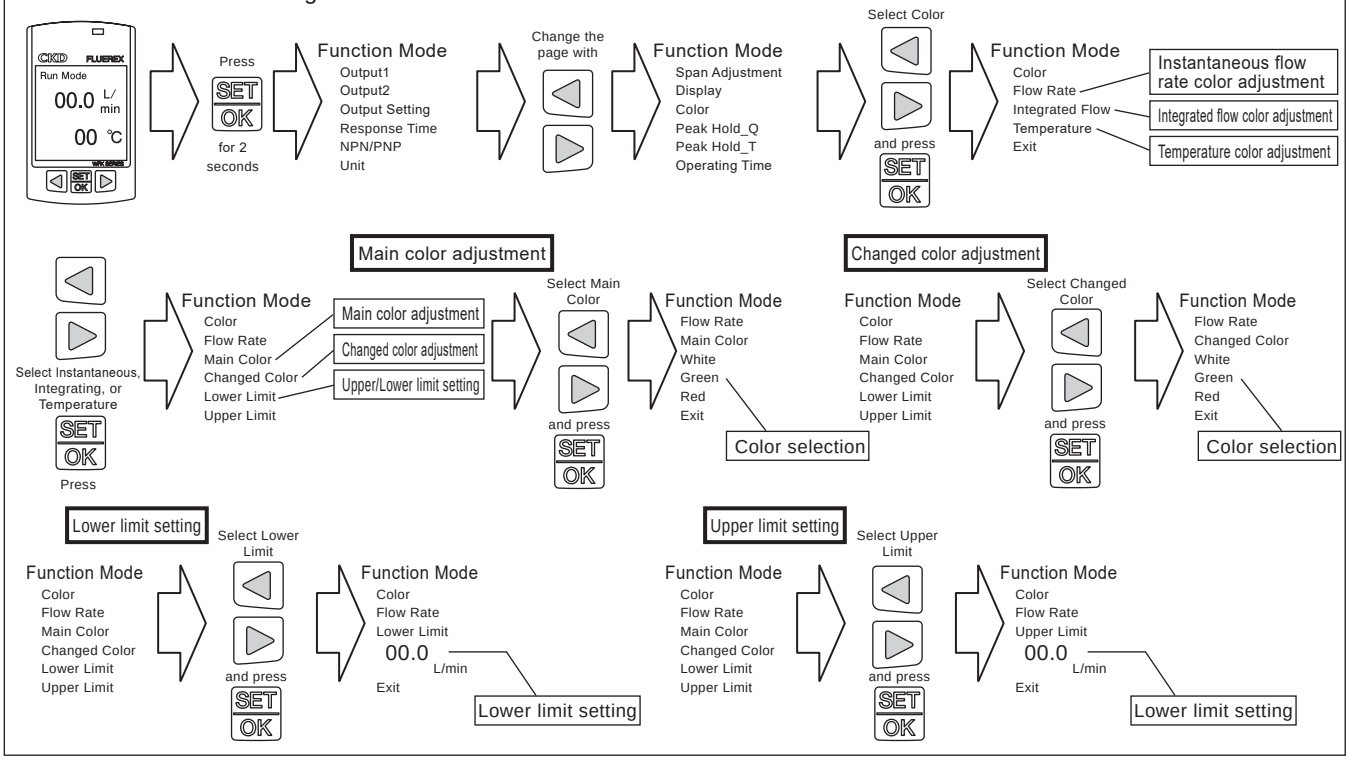
(2) Color

Main Color: change the color of characters on the main display. (Select from white, green, and red)

Changed Color: change the color when the instantaneous flow rate, integrating flow rate, and temperature go above or below their set upper and lower limits.

Change character color……select from white, green, and red

- Upper limit setting: the upper limits of instantaneous flow rate, integrating flow rate, and temperature at which character color changes.
- Lower limit setting: the lower limits of instantaneous flow rate, integrating flow rate, and temperature at which character color changes.

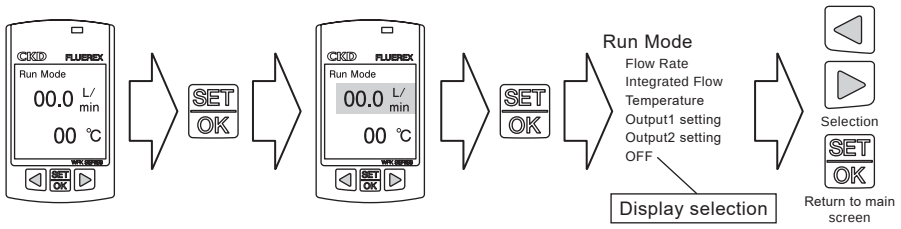


Refer to the instruction manual regarding operation of other functions (setting copy, external input, unit change, simulation output, power ON time display, all reset, etc.).

Easy setting function

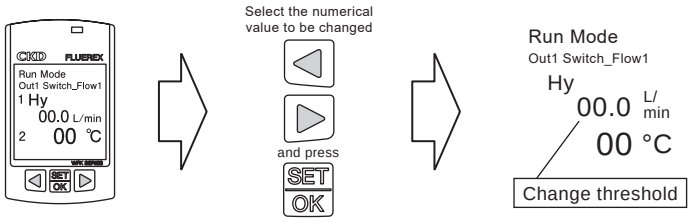
Frequently used settings can be set from the normal screen using shortcut operations.

Change main screen display

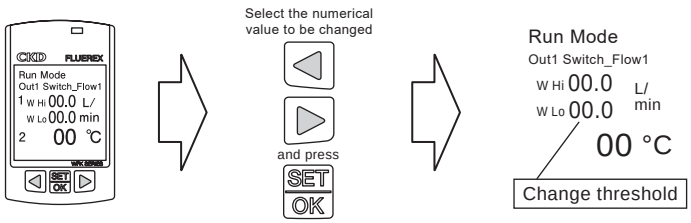


Switch setting

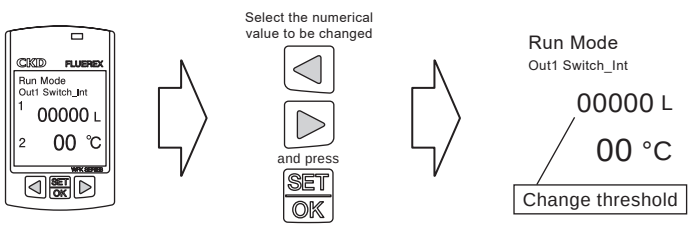
Hysteresis mode



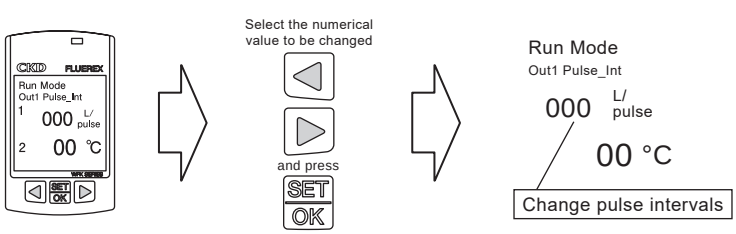
Window mode



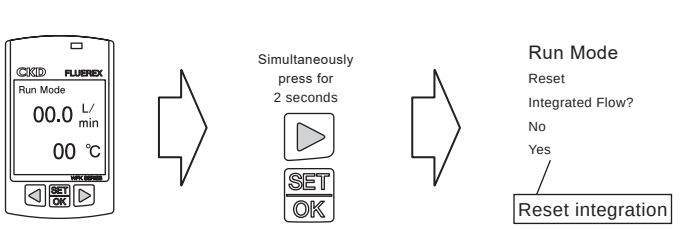
Integrated Switch setting



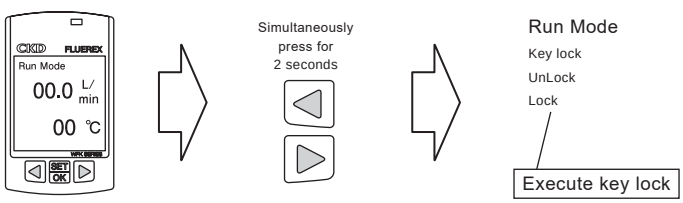
Integrated Pulse setting



Integration reset



Key lock



Safety Precautions

Be sure to read this section 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.
It is important to select, use, handle and maintain the product appropriately to ensure that the CKD product is used safely.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured, and manufacture a safe device.

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.

2 Use this product in accordance with specifications.

This product must be used within its stated specifications. In addition, never modify or additionally machine this product.
This product is intended for use in general industrial machinery equipment or parts. It is not intended for use outdoors (except for products with outdoor specifications) or for use under the following conditions or environments.
(Note that this product can be used when CKD is consulted prior to its usage and the customer consents to CKD product specifications. The customer should provide safety measures to avoid danger in the event of problems.)

❶ Use for applications requiring safety, including nuclear energy, railways, aircraft, marine vessels, vehicles, medical devices, devices or applications in contact with beverages or foodstuffs, amusement devices, emergency cutoff circuits, press machines, brake circuits, or safety devices or applications.
❷ Use for applications where life or assets could be significantly affected, and special safety measures are required.

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

ISO4414, JIS B 8370 (Pneumatics fluid power - General rules and safety requirements for systems and their components)
JFPS2008 (Principles for pneumatic cylinder selection and use)
Including the High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, organization standards and regulations, etc.

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

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

5 Observe warnings and cautions in the following pages to prevent accidents.

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

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

WARNING: If handled incorrectly, a dangerous situation may occur, resulting in death or serious injury.

CAUTION: When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation.
Every item provides important information and must be observed.

Warranty

1 Warranty period

The product specified herein is warranted for one (1) year from the date of delivery to the location specified by the customer.

2 Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified above, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

1) Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or the Instruction Manual.
2) Failure caused by use of the product exceeding its durability (cycles, distance, time, etc.) or caused by consumable parts.
3) Failure not caused by the product.
4) Failure caused by use not intended for the product.
5) Failure caused by modifications/alterations or repairs not carried out by CKD.
6) Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
7) Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.
Note: For details on the durability and consumable parts, contact your nearest CKD sales office.

3 Compatibility check

The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.

Safety Precautions

Always read this section before use.

Design/selection

1. Working fluids

⚠ DANGER

- Do not use in 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 entering the human body. Intended applications include industrial sensors.
- 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. It cannot be calibrated, so use it as an industrial sensor.
- Applicable fluid is water (industrial water, pure water); do not use with any other fluid. When supporting fluorine-based fluids, the product can be used only with the fluids described in the applicable fluid.

2. Working environment

⚠ DANGER

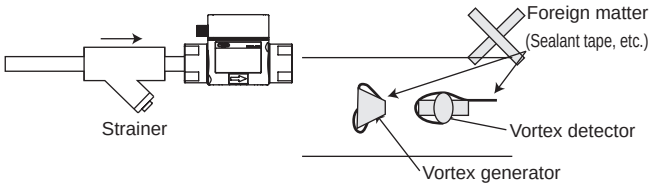
- Explosion-proof environment
  Never use this product in an explosive gas atmosphere. The structure is not explosion-proof, and explosions or fires could occur. However, if the option (ATEX supported) is selected, the product can be used in an environment with II 3 G Ex ec II C T4 Gc 0°C≤Ta≤50°C. Also, refer to “Option (ATEX supported)” on Page 18 for operating conditions.

⚠ WARNING

- Corrosive environment
  Do not use this product in an atmosphere containing corrosive gases such as sulfur dioxide.
- Fluid temperature and ambient temperature
  Use in a fluid temperature range of 1 to 95°C (-10 to 95°C when compatible with fluorine liquid), and an ambient temperature range of 0 to 50°C. If the fluid temperature rises to 95°C or higher, cool it down using a cooling system such as a chiller. As well, if there is a risk of freezing, drain the product or keep it warm to prevent freezing. When the fluid and ambient temperatures are high, the product may also get hot. There is a risk of burns if it is touched directly. 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.
- Max. working pressure
  Do not use at a pressure exceeding the max. working pressure, as excessive pressure can cause product failure. To prevent the pressure from reaching the max. working pressure, particularly due to water hammer, take the following measures:
  (1) Using a water hammer reduction valve or other similar mechanism, reduce the valve closing speed.
  (2) Using elastic piping material, e.g. rubber hose, and an accumulator, absorb the impact pressure.
  (3) 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 may be constantly exposed to water or intense splattering of water and/or oil.
- CE-compliant working conditions
  This product is CE-marked, indicating conformity with the EMC Directives. The standard for the immunity for industrial environments applied to this product is EN61000-6-2; the following requirements must be satisfied in order to conform to this standard:
  Conditions
  - The 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 protection. 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.

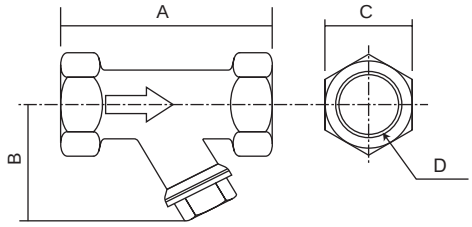


Strainer specifications

Item		Usage
Specification fluid		Water
Pressure resistance	MPa	2
Working pressure range	MPa	0 to 1
Operating ambient temperature range	°C	1 to 90
Main material		**Usage**
Body		Copper alloy casting
Strainer		Stainless steel

When using after adjusting to a small flow rate with the manual valve, the valve's opening (clearance) becomes very small. If there are large foreign bodies in the fluid, they may clog the clearance and reduce the flow rate.

External view of strainer



Model No.	A	B	C	D
WF-FL-280730	70	44	23	Rc3/8
WF-FL-280731	80	49	28	Rc1/2
WF-FL-280732	100	57	35	Rc3/4
WF-FL-280733	115	72	43	Rc1
WF-FL-280734	135	82	52	Rc1 1/4
WF-FL-280735	160	98	59	Rc1 1/2

Design/selection

■ Vibration/impact
Do not use this product in an environment exposed to vibrations of 20 m/s^2 and over and shocks of 98 m/s^2 and over. This may cause malfunction and/or damage, as this product uses the Karman's vortex type detection principle.

3. Regarding with manual valve

⚠CAUTION

■ Since the manual valve (needle) does not have a closing function, internal leakage will occur even when the valve is fully closed. If a closing function is required, select the manual valve (cock).

Mounting, installation and adjustment

1. Wiring

⚠DANGER

■ Use with power supply voltage and output in 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 wire color and terminal No. when connecting wires.
An overcurrent protection circuit for the output transistor and a protection circuit for erroneous wiring, which uses diodes to prevent reverse connection, are implemented, but 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 wiring colors and terminal numbers in order to ensure correct wiring.
■ Check wiring insulation.
Check that wires do not come into contact with other circuits, that no ground faults occur, and that the insulator between terminals is not defective. Otherwise, overcurrent may flow into the sensor, causing damage.

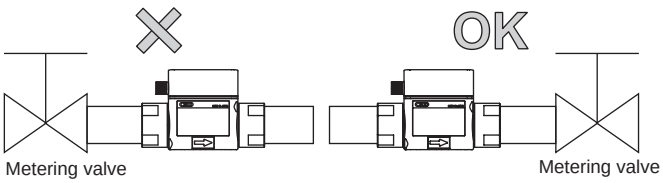
⚠CAUTION

■ Keep the cable far away from power cords or other things that may cause noise. Noise can cause malfunctions.
■ Keep unused wires from coming into contact with other wires.
■ Do not short-circuit the output transistor.
When a load is short-circuited, 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 .....approx. 50 mA
■ Do not use a load that can produce 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. This may lead to disconnection.
■ Insert and fit the M12 connector securely to the back.
Failure to do so may prevent the connector from demonstrating its excellent waterproof performance, resulting in water infiltrating the wiring section, causing malfunction or lower display resolution.

2. Piping

⚠CAUTION

■ Pipes can be installed vertically, horizontally, or in any other orientation. Note that pipes should be installed so that the fluid constantly fills the piping while it flows through the pipes.
When installing a pipe vertically, making the fluid flow upward can reduce the influence of air bubbles inside.
■ If a pipe is narrowed just before the flow rate sensor, or if there is a valve or other restricting component on the primary side, cavitation occurs inside the pipe, preventing accurate measurement. For this reason, such piping should be installed on the secondary side of the sensor. If there is no choice but to position the valve on the primary side, ensure that a straight pipe with a diameter of 10 times or more bore size is installed between the valve and the flow rate sensor.
Cavitation...(Vapor cavities that form due to the static pressure at end points, such as a ship propeller, dropping below the vapor pressure of the water. Reduced efficiency or screw damage may result.)



■ 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 or more bore size is installed between the valve and the flow rate sensor.

■ Using an elbow or bush in the piping
When using an elbow or bush in the piping, provide straight piping sections of at least 10 D on the IN side and 5 D on the OUT side when using a WFK2-100 or WFK2-250 Series model. Note that bore size change by bush should be limited to one size. 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 WFK2-005, WFK2-020, and WFK2-050 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.

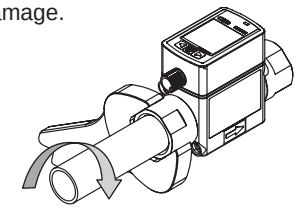
Bore size	Rc3/8 (10A)	Rc1/2 (15A)	Rc3/4 (20A)	Rc1 (25A)	Rc1 1/4 (32A)	Rc1 1/2 (40A)
5D	50 mm	75 mm	100 mm	125 mm	160 mm	200 mm
10D	100 mm	150 mm	200 mm	250 mm	320 mm	400 mm

■ Use proper torque to tighten the pipes when connecting them.
- The purpose is to prevent water leakage and screw damage.
- First tighten the screw by hand to ensure that threads are not damaged, then use a tool.

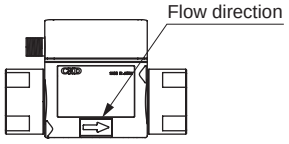
(Recommended values)

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
Rc1 1/4	94 to 100
Rc1 1/2	104 to 108

- When mounting piping or fittings to this product, always hold the attachment on the mounting side with a tool. Holding the body of the product or the attachment on the opposite side may lead to damage.



■ When installing piping, align the fluid flow direction to the direction marked on the body. Connecting the pipe in the wrong direction prevents correct measurement of the flow rate.



■ Before installing piping, clean the pipes to remove foreign matter, cutting chips, residual testing water, etc.

■ Make sure that no force is applied to the resin parts when piping.

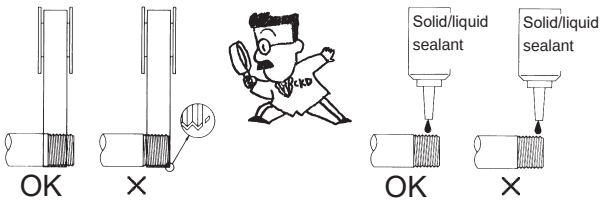
■ Make sure that the self-weight of the piping is not applied to flow rate sensor.
It may lead to damage or external leakage. We recommend that piping be fixed during operation.

■ Make sure that no sealing tape or adhesive enters the pipes when connecting the piping.

■ When freezing may occur, take antifreezing measures with the devices used, such as draining the pipes of water.

■ If there is significant difference between the ambient temperature and the fluid temperature, condensation occurs, which can enter wiring parts and cause operation failure. If condensation should 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 the pipe threads, it could be cut when screwing the bolts in. This could cause the tape to enter the valve, causing failures.
- When using a liquid sealant, make sure it does not adhere to resin parts. Otherwise resin parts could be damaged, which is dangerous.



3. Regarding manual valves

⚠WARNING

■ If the fluid temperature is high, the temperature of the manual valve handle and knob will be high. There is a risk of burns if it is touched directly.

⚠CAUTION

■ Do not turn the handle and knob forcibly when fully closing, fully opening, or fixing the manual valve (0.5N•m or less). The manual valve could become damaged to the point where it cannot be adjusted or fixed.

■ Do not turn the lock nut of the manual valve (needle) forcibly (0.5N•m or less). It may become locked or unlocked.

■ Operate the manual valve when it is filled with liquid.

During Use & maintenance

1. Common

⚠CAUTION

- If a problem occurs during operation, immediately turn the power OFF, stop use, and contact your dealer. The display may become warm (approx. 40°C), but this is not an abnormality.
- Hardware check and other internal settings are performed during approximately the first two seconds after turning the power ON. Display and output do not function normally 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 the power, make sure that no water pressure is applied, and take other safety precautions beforehand.
- Do not disassemble or modify this product. Doing so could result in faults.
- When cleaning the product, use a low-polluting cleaning agent such as a neutral detergent.
- Be sure to perform air blow from the downstream direction. Set pressure to 0.3 MPa or less.
- Do not press the display as it is LCD.
  This may lead to failure.
- Needle flow characteristics conversion
  The following formula is valid when the dial value of the needle is the same as the pressure loss. Therefore, the flow rate Q_2 for a fluorinated liquid can be calculated as the square root of the value obtained by dividing the flow rate Q_1 of water by the specific gravity G_2 of the liquid.

$$Q_1^2 G_1 = Q_2^2 G_2$$

  Q: Flow rate (L/min)
  G: Specific gravity (ratio of density to water)
  G_1: Specific gravity of water = 1

2. Applicable fluid

⚠CAUTION

- Follow the precautions below for the applicable fluids to be measured (excluding fluorine-based liquids). 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.

Item	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 (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
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 the range of 0.05 to 0.2 mS/m, consult with CKD.
Do not use for ultrapure water, i.e. water with electrical conductivity below 0.05 mS/m.

3. Regarding with manual valve

⚠CAUTION

- After adjusting the flow rate with the manual valve, be sure to fix with the push lock for the cock type and the lock nut for the needle type. If not fixed, the flow rate will fluctuate.
- Use the manual valve (needle) only for flow rate adjustment.Internal leakage occurs even when the valve is fully closed.
- Do not use the manual valve continuously.
- Do not turn the manual valve forcibly.
- The position of the dial mark on the needle type varies depending on the individual model. It does not indicate an absolute opening.

Option (ATEX supported)

■ The following should be observed.
II 3 G Ex ec II C T4 Gc 0°C≤Ta≤50°C

■ Working conditions
1) Keep the product stored in the protective box while it is in use to protect the flow rate sensor from all directions.
The strength of the protective box: Greater than that of DC01, DC03, DC04, DC05, DC06 and DC07.
Plate thickness: 1 mm or more
Clearance between the flow rate sensor and plate: 70 mm or more.
2) There is a possibility that the electrostatic charge could be drained. Attach the product to grounded metal.
Wipe it with a damp cloth.
3) Use the product in a clean environment with Pollution Degree 2 or higher.

■ Temperature rating of fluid being measured
From a point of view of explosion protection, the temperature of fluid being measured should be 95°C.

■ ATEX Directive
EN standards for explosive atomosheres
EN IEC 60079-0:2018
EN 60079-7:2015

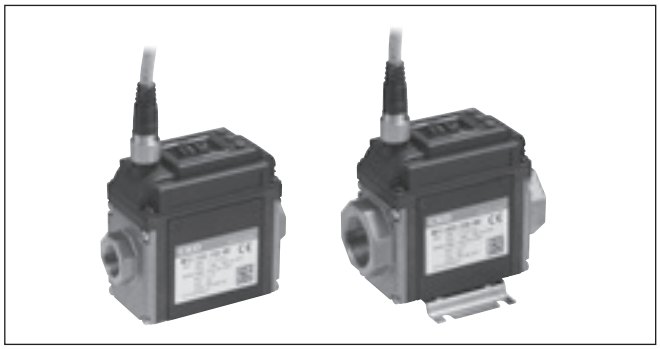
⚠WARNING
■ Never unplug and plug back in this product in an explosive atmosphere while it is being energized.

⚠CAUTION
■ Use an M12 cable compliant with the ATEX Directive.

Related products

Capacitance electromagnetic flow sensor WFC Series

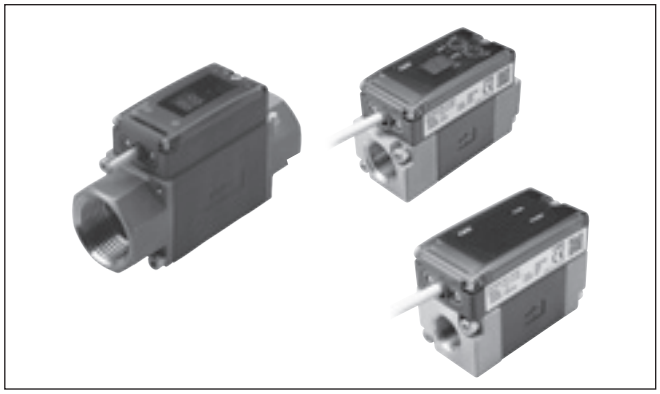
Catalog No. CB-024SA



■ The Flo-Thru structure allows use even with water of poor quality
■ The capacitance structure prevents detection failures caused by foreign matter deposited onto the electrode
■ Repeatability in elbow piping ensured
■ Stabilized power supply and anti-noise ferrite core not required
■ Allows zero point adjustment by external input
■ With 180° invertible display
■ Reverse flow detection function equipped

Karman vortex flow rate sensor for water WFK 3000 Series

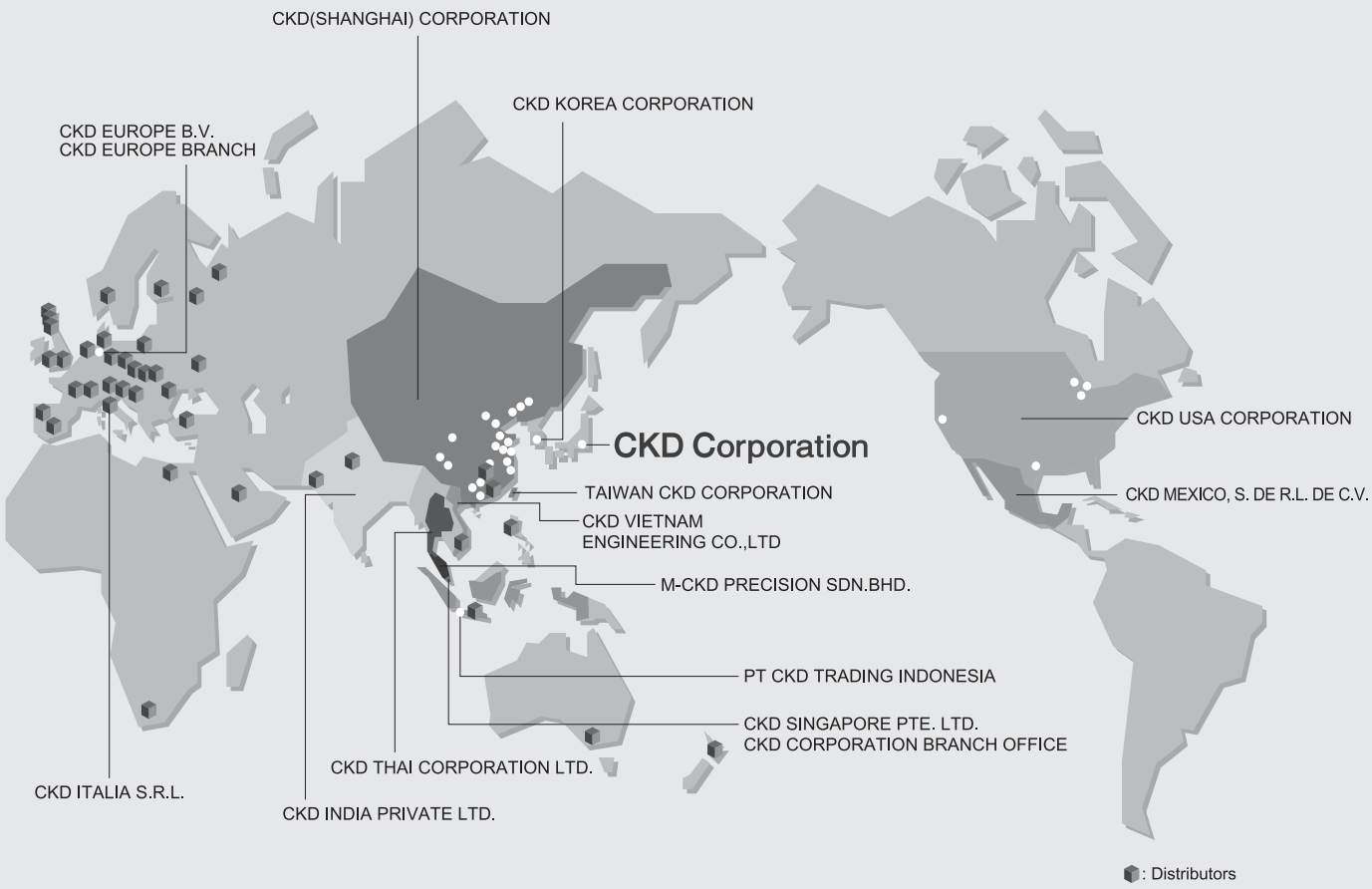
Catalog No. CB-024SA



■ A wide variety of models
- Sensor type S Series
- Switch type M Series
- Sensor/Switch type C Series

■ Easy operation that does not require a manual
■ Highly reliable Karman's vortex used
■ IP65 equiv. protection structure

WORLD-NETWORK



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- 無錫事務所(WUXI OFFICE)
- 昆山事務所(KUNSHAN OFFICE)
- 蘇州事務所(SUZHOU OFFICE)
- 南京事務所(NANJING OFFICE)
- 合肥事務所(HEFEI OFFICE)
- 成都事務所(CHENGDU OFFICE)
- 武漢事務所(WUHAN OFFICE)
- 鄭州事務所(ZHENGZHOU OFFICE)
- 長沙事務所(CHANGSHA OFFICE)
- 重慶事務所(CHONGQING OFFICE)
- 西安事務所(XIAN OFFICE)
- 広州事務所(GUANGZHOU OFFICE)
- 中山事務所(ZHONGSHAN OFFICE)
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- 深圳東事務所(EAST SHENZHEN OFFICE)
- 東莞事務所(DONGGUAN OFFICE)
- 厦門事務所(XIAMEN OFFICE)
- 福州事務所(FUZHOU OFFICE)
- 瀋陽事務所(SHENYANG OFFICE)
- 大連事務所(DALIAN OFFICE)
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- 青島事務所(QINGDAO OFFICE)
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