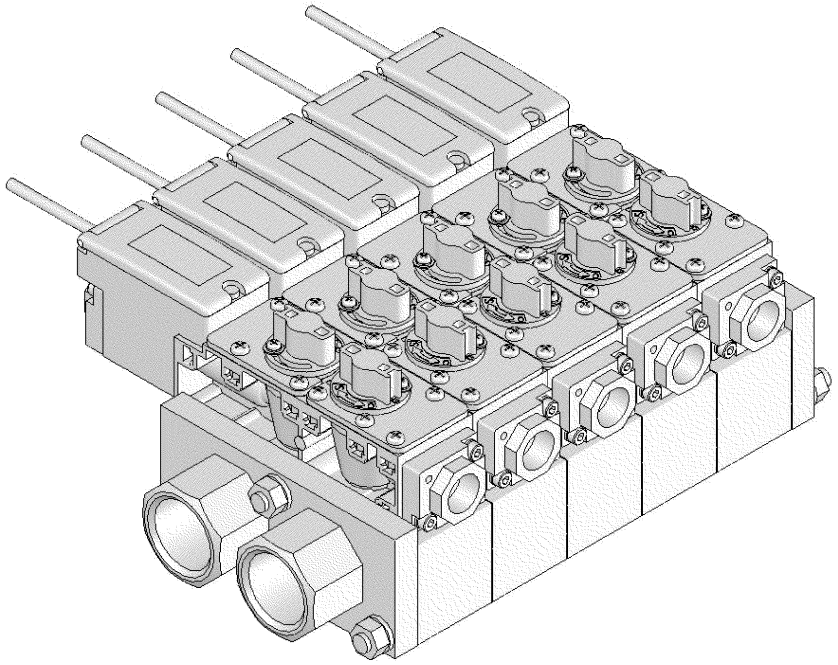
CKD

SM－50778－A

Instruction Manual
Integrated Water Unit
（Single fluid control type）
WXU-H Series



- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

CKD Corporation

Safety precautions

When designing and manufacturing a device using CKD products, the manufacturer is obligated to manufacture a safe product by confirming safety of the system comprising the following items:

- Device mechanism
- Pneumatic or water control circuit
- Electric control that controls the above

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 someone having sufficient knowledge and experience.

2. Use this product within its specifications.

This product cannot be used beyond its specifications. Additionally, the product must not be modified or machined.
This product is intended for use in general industrial devices and parts. Use beyond such conditions is not considered. Consult with CKD for details when using the product beyond the unique specification range, outdoors, or in the following conditions or environments. In any case, measures for safety shall be provided when the vavle malfunctions.

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 life 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)
JFPS2008 (principles for pneumatic cylinder selection and use)
Including High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, standards and regulations, etc.

4. Do not handle, pipe, 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. Release any compressed air from the system, and pay enough 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 system safety, such as pop-out prevention measures, is secured.

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

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

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

⚠ WARNING :When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

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

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.

Precautions with regard to guarantee

● Guarantee period

The guarantee period of our product shall be one (1) year after it is delivered to the place specified by the customer.

● Guarantee coverage

If any failure for which CKD CORPORATION is recognized to be responsible occurs within the above warranty period, a substitute or necessary replacement parts shall be provided free of charge, or the product shall be repaired free of charge at the plant of CKD CORPORATION.

However, the guarantee excludes following cases:

① Defects resulting from operation under conditions beyond those stated in the catalogue or specifications.
② Failure resulting from malfunction of the equipment and/or machine manufactured by other companies.
③ Failure resulting from wrong use of the product.
④ Failure resulting from modification or repairing that CKD CORPORATION is not involved in.
⑤ Failure resulting from causes that could not be foreseen by the technology available at the time of delivery.
⑥ Failure resulting from disaster that CKD is not responsible of.

Guarantee stated here covers only the delivered products. Any other damage resulting from failure of the delivered products is not covered by this guarantee.

● Confirmation of product compatibility

Our customer shall be responsible of confirming compatibility of our product used in our customer's system, machinery or device.

【 Contents 】

1. Unpacking

⚠ CAUTION	Do not take off the vinyl sheet and cap until just before piping. Otherwise, foreign matter enters from the piping port and cause malfunction or bad operation.

(1) Check that the model No. shown on the face plate of the product is the same with what you ordered.
(2) Check that the product has no external damages.
(3) When storing the product, keep the product inside the packing box to prevent the intrusion of foreign matter to the valve. Take out the product when piping.

2. Installation

⚠ WARNING	Contact CKD if the product is to be used beyond specifications, or in special applications.

2. 1 Conditions for installation

⚠ WARNING	a) Do not use this product under corrosive or product-material degrading atmosphere. b) Vibration and shock ・ Do not subject the product under vibration and shock. c) Heat cycle ・Do not subject the product under cycling large temperature change. d) Avoid humid environments, since condensation may occur with change in temperature.

(1) Provide appropriate measures to prevent the product from freezing at cold places.

2. 2 Installation method

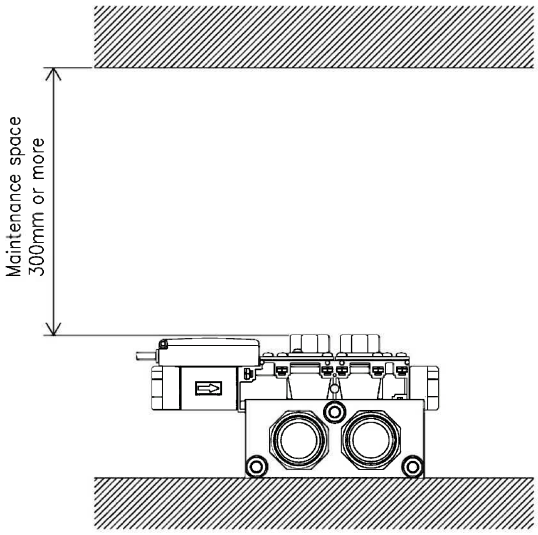
2.2.1 Mounting

⚠ CAUTION	a) Read this instruction manual thoroughly and understand the contents before mounting the product. b) Fix the product on a plain surface using all M8 screw holes located on the bottom side of the product (on the Port Block, End Block and Intermediate Block) c) Confirm leakage from the piping after installation. d) Product weight may exceed 10 kilograms, depending on its specification. e) Always take hold of the metal portion on both ends when handling the product.

(1) Install the product so water is always filled inside the Flow Sensor for Water.
(2) The product cannot be used outdoors. Protect the product by covering it or installing it inside a panel.

2.2.2 Maintenance space

Provide enough space for safe maintenance and troubleshooting work.



(Figure 2-1)

2. 3 Piping

⚠ CAUTION	a) When piping or re-piping, firmly fix the product and its metal connection port b) Tighten the piping with recommended tightening torque as shown in Table 2-1.

(1) Cleaning the piping

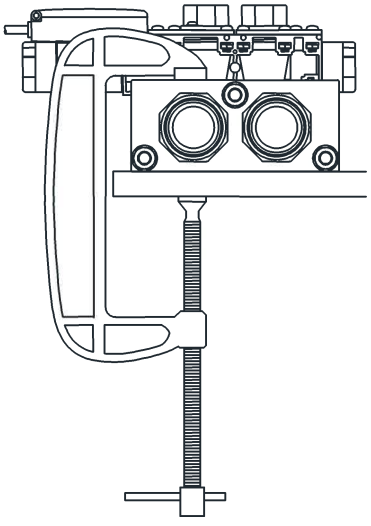
・ Before piping, flush the piping with compressed air 0.3MPa or more to remove foreign material such as dust, metal powder, rust, and sealing material.

(2) Removal of foreign matter

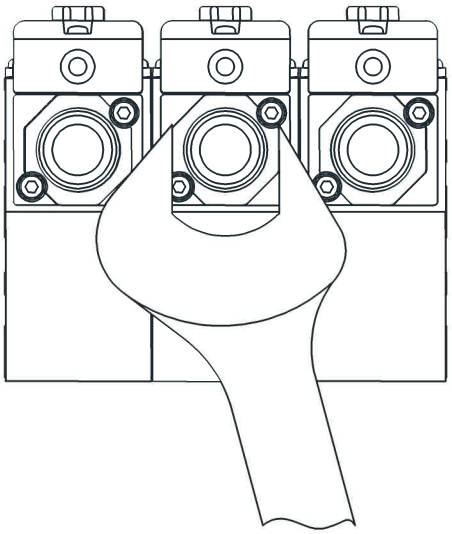
・ Foreign matter such as dust in the fluid causes malfunction and leakage.
Attach a strainer 80 mesh or finer at the near primary side of the product.

(3) Piping

・ Pipe the product after firmly fixing the product (figure 2-2). When piping to the flow sensor for water and attachments, tighten while fixing the two flat sides of the connection ports with a tool such as a wrench (figure 2-3).



(Figure 2-2)

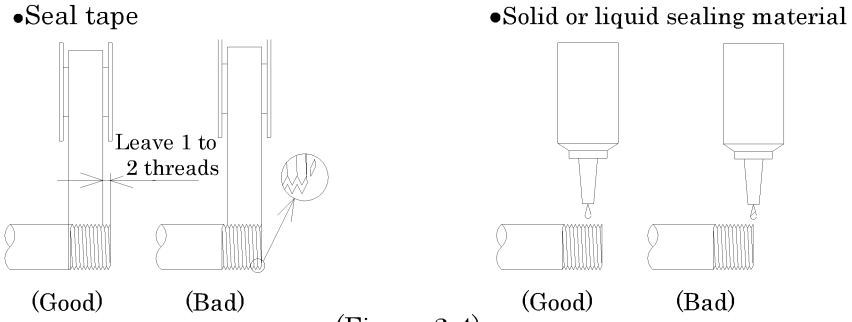


(Figure 2-3)

(4) Sealing material

・When sealing material is used, make sure it does not enter the piping. Also, make sure there is no external leakage. When taping seal tape to the pipe thread, leave 1 to 2 threads at the tip without taping (figure 2-4).

Also, when liquid sealing material is used, leave 1 to 2 threads at the tip without sealing material. Do not apply too much sealing material on the thread. Do not apply sealing material to the internal thread.



(Figure 2-4)

(5) Tightening

・Refer to table 2-1 for recommended port tightening torque.

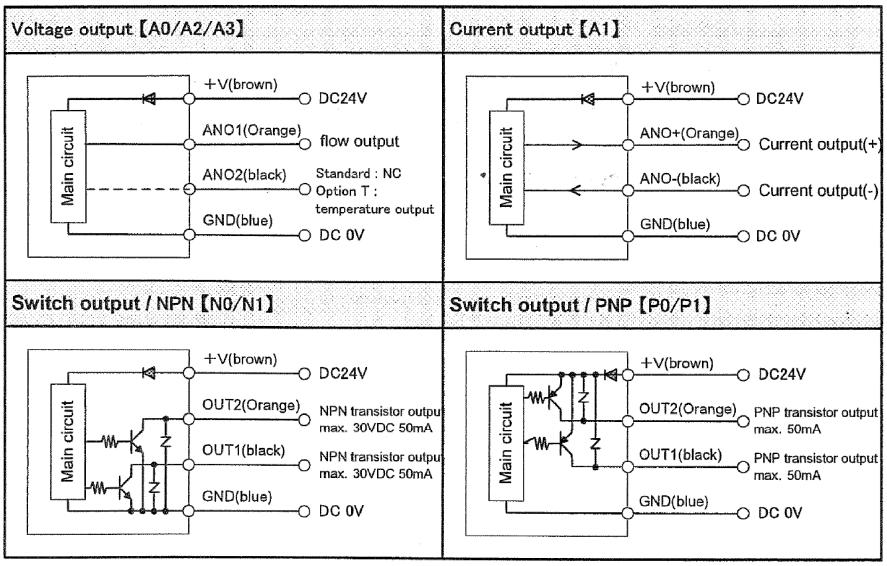
Table 2-1 Recommended port tightening torque

Port size	Recommended tightening torque
Rc3/8	22 to 24 N・m
Rc1/2	28 to 30 N・m
Rc1	36 to 38 N・m

2. 4 Wiring (flow sensor for water)

(1) Power supply voltage and output must be within specified values.

(2) Confirm wire color when wiring (figure 2-5).



※The rating of the output transistor must be observed.

※Use an analog-digital converter that is insulated between channels to convert current output.

(Figure 2-5)

(3) Check the insulation of wires.

(4) Perform wiring away from strong noise sources, such as power lines. Otherwise, noise may cause malfunction.

(5) Separate unused wires from other lines.

(6) Do not apply repeated bending force and tension to the wire. Otherwise, the wire may break.

3. Pre-operation (post-installation) check

3. 1 Appearance check

⚠WARNING	Stop the flow of fluid (shut the supply). Discharge the fluid inside the product. Cut off the electricity.

(1) Push the product by hand and confirm that the product is firmly fixed on the piping.
(2) Confirm that threaded parts such as hexagon socket head cap screws are not loose.

3. 2 Leakage check

(1) Confirm leakage at the connection part by applying pressure to the fluid.
We recommend leakage check by the following method:

- Supply compressed air (0.3-0.5MPa).
- Apply soap water to the portion to check for leakage.
- Bubbles will appear if there is any leakage.

3. 3 Electrical check (flow sensor for water)

⚠WARNING	Cut off the electricity.

(1) Confirm that there is enough insulation resistance.
(2) Check the power source. Use the product within allowed rated voltage range.

4. Instructions for proper use

4. 1 Handling precautions

⚠WARNING	a) Take measures to prevent harm to operators or objects if this product fails. b) Liquid-filled state ・ When conveying a liquid in a circuit, operation may fail if liquid-filled state occurs. This is because pressure rises in the liquid-filled state when temperature rises. Provide an escape valve in the system so that a liquid-filled state circuit is not created. c) Working fluids ・ Do not use this product for fluids other than the working fluids listed in the specification section. d) Do not loosen or retighten the hexagon nut at the port block and end block portion. Otherwise, resin parts may break and cause external leakage.

⚠ CAUTION	a) Always use within the maximum working pressure range. b) In general, the product can be used for fluids having viscosity up to 500 mm²/s. However, please consult us beforehand if fluid viscosity is high; some fluids have unique characteristics.

(1) Do not use the product as footings, or place heavy loads on the product.

(2) Observe the specified working pressure, fluid temperature, and ambient temperature range.

(3) If the product is not used for a long time, carry out trial run before work.

(4) Refer to “6. Troubleshooting” if any trouble occurs.

4. 2 Manual valve

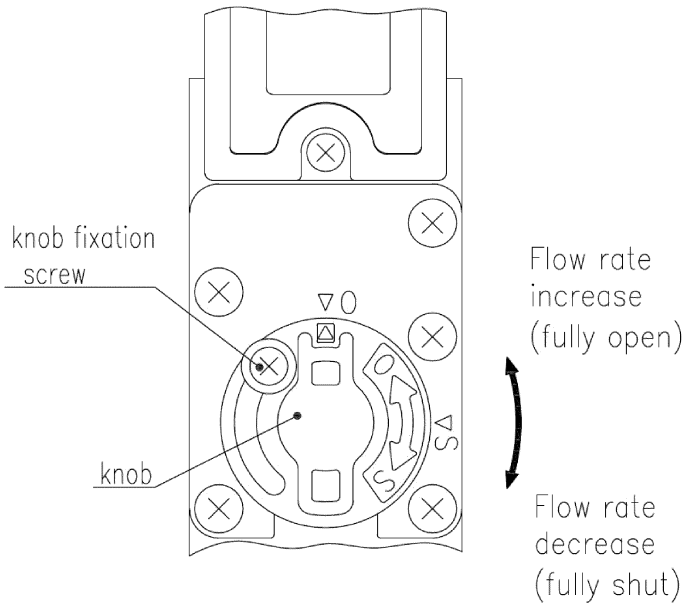
(1) Operating method (figure 4-1)

・ Before valve opening, valve closing and adjusting flow rate (before turning the knob), loosen the knob fixation screw.

・ Turn the knob clockwise to decrease flow rate. Turn it counterclockwise to increase flow rate.

・ After valve opening, valve closing and adjusting flow rate, fix the knob by tightening the knob fixation screw (to prevent wrong operation).

＜Right figure shows fully open position＞



(2) Precautions

- The manual valve is fully open (maximum flow rate) at delivery.
- Recommended tightening torque of the knob fixation screw is 0.4～0.6 N･m. **Do not tighten with excessive force, or the manual valve will break.**
- Do not turn the knob too strong when it is fully open or fully shut.
- Quick operation of manual valve gives bigger load to the sealing rubber. It will lead durability drop. Turn the knob at constant speed by 3～4 seconds.
- Knob fixation screw has a structure to prevent it from falling off. Do not loosen the screw too much. Otherwise, the screw will be broken.
- If the manual valve has not been used for a long time, the first operation torque may become higher.
- Use manual valve of the return side to adjust flow rate.

4. 3 Flow sensor for water

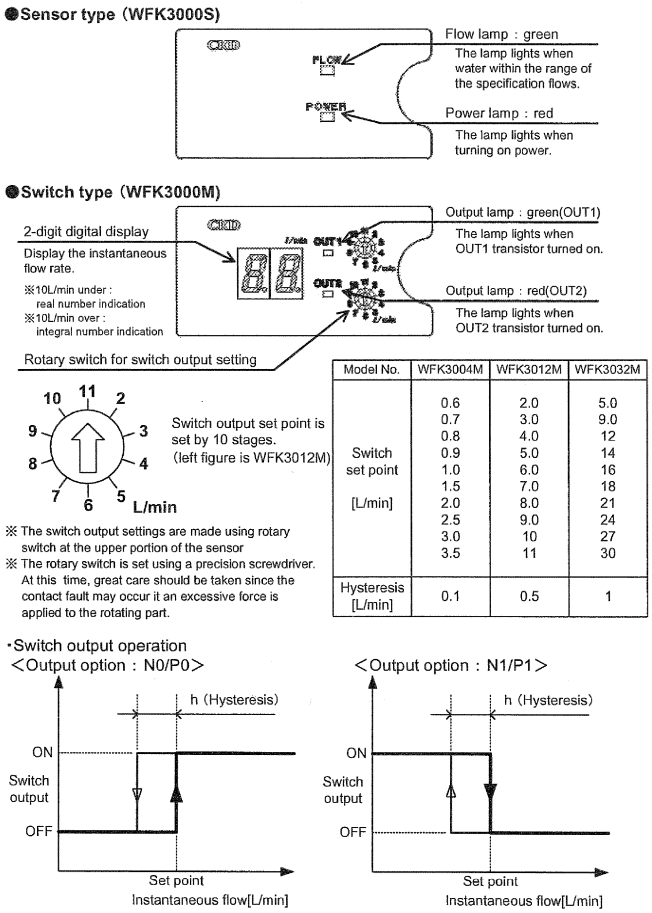
(1) If abnormalities occur during work, cut off power immediately, abort use, and contact your vendor. The display portion becomes hot, but it is not abnormal.

(2) After turning the sensor ON, the sensor checks its internal settings for approximately two seconds. Display and output within this duration will not be normal. In particular, the sensor's control device may stop abnormally if the switch type sensor's alarm output is connected to the control device interlock circuit; mask the sensor output until the sensor's internal setting check is complete.

(3) When the sensor output setting is changed while the control device is turned ON, the control device may perform unintended operation; change the setting after turning OFF the control device.

(4) The sensor is unable to measure air flow rate (flow sensor output is not accurate when fluid is air).

＜Function＞



5. Maintenance

(1) Regularly inspect the product to ensure optimum performance. Although inspection frequency differs based on the working state, the product should be inspected every half year.

(2) If the product has not been used for more than a month, carry out trial run before work.

(3) Refer to "3. Pre-operation check" for contents of inspection.

6. Troubleshooting

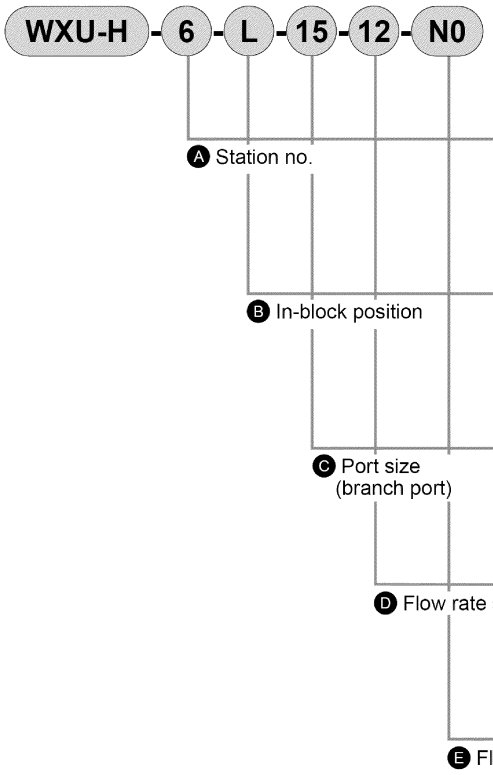
(1) If the integrated water unit does not operate as intended, check according to the table below.

State of failure	Cause	Countermeasure
Fluid leaks externally	Abrasion or flaw of O-ring.	Replace the O-ring.
	Loose screws or bolts.	Tighten screws and bolts.
Fluid leaks internally	Flaw of base sealing face.	Contact us or our authorized dealers.
	Abrasion or flaw of cock sealing rubber.	
	Foreign matter caught in the sealing rubber of cock.	
No analog output. Analog output is too small.	Bad wiring.	Check the wiring.
	Load impedance is not correct.	Check the load impedance.
Analog output is unstable.	Noise is mixed in the signal.	Reduce the noise. Measure the AC voltage of the analog output. If the voltage is 0.1 V or more, the analog output may be oscillated. Ground the stainless steel portion of the sensor, the negative voltage line of the DC power source, or place cables and sensors away from power-driven devices (compressors, pumps) and power lines.

(2) Please contact CKD or your nearest agent for any unclear points.

7. Product specification

7. 1 Model number display



Symbol	Descriptions
Ⓐ Station no.	
2	2 stations
to	to
10	10 stations
Ⓑ In-block position	
L	Left
R	Right
W	Both sides
Ⓒ Port size (branch port)	
10	Rc3/8
15	Rc1/2 (Not available with "T" water temperature measuring function.)
Ⓓ Flow rate sensor range	
04	0.5 to 4.0L/min
12	1.5 to 12L/min
32	4.0 to 32L/min
Ⓔ Flow rate sensor output	
A0	DC0 to 5V
A0T	DC0 to 5V+With water temperature measuring function
A1	DC4 to 20mA
A2	DC1 to 5V
A2T	DC1 to 5V+With water temperature measuring function
A3	DC0 to 10V
A3T	DC0 to 10V+With water temperature measuring function
N0	NPN transistor 2 outputs (a contact point)
N1	NPN transistor 2 outputs (b contact point)
P0	PNP transistor 2 outputs (a contact point)
P1	PNP transistor 2 outputs (b contact point)

7. 2 Product specification

(1) Integrated water unit specifications

Applicable fluid		Water・hot water
Main fluid pressure	MPa	0 to 0.7
Withstanding pressure (water)	MPa	1.4
Main fluid temperature	℃	1 to 70
Ambient temperature	℃	5 to 50
Flow rate control range	%	0 to 100

(2) Flow sensor for water (sensor type) specifications

Model	WFK3004S-Port-Output-FL451298	WFK3012S-Port-Output-FL451298	WFK3032S-Port-Output-FL451298
Flow rate range L/min	0.5 to 4.0	1.5 to 12	4.0 to 32
Port	Rc3/8, Rc1/2		
Output	A0：DC0 to 5 V, A1：DC4 to 20 mA A2：DC1 to 5 V, A3：DC0 to 10 V ※Output value for flow rate below display minimum will be the same as that for zero flow rate. Output accuracy below flow rate range is not guaranteed.		
Accuracy	±2.5% F.S.		
Load impedance	A0, A2, A3：50 kΩ or more A1：500 Ω or less		
Power supply	DC12 to 24 V±10% (Max 80 mA) A3: DC15 to 24 V		
Cable	Cabtire cord 3 m (conductor 0.2 mm^2)		

(3) Flow sensor for water (switch type) specifications

Model		WFK3004M-Port-Output-FL451298	WFK3012M-Port-Output-FL451298	WFK3032M-Port-Output-FL451298
Flow rate range L/min		0.5 to 4.0	1.5 to 12	4.0 to 32
Port		Rc3/8, Rc1/2		
Output	Display	instantaneous flow rate 2 digit LED display		
	Switch output	2 point transistor output (select either NPN or PNP) Max. 50 mA Internal voltage drop：2.0 V or less		
Accuracy		±2.5% F.S. ±1 digit		
Power supply		DC12 to 24 V±10% (Max 80 mA)		
Cable		Cabtire cord 3 m (conductor 0.2 mm^2)		

※ See also the instruction manual for individual devices.