

必ずお読みください
READ ALL INSTRUCTIONS THOROUGHLY

取扱説明書 INSTRUCTIONS

渦流量計
KARMAN VORTEX FLOW METER

QLK - 30

SAGHOMIYA

1 . P R E F A C E

Failure to read and follow all instructions carefully before installing or operating this KARMAN VORTEX FLOW METER (TYPE QLK-**30) could cause personal injury and/or property damage.

Save these instructions for future use.

2 . N O T E F O R S A F E T Y

⚠ WARNING

- Failure to read and follow instructions or improper handling will make it out of warranty and it may cause diminish of reliability.
- Do not touch any internal part except changeover Unit Switch and Reset Switch since the Flowmeter is strictly calibrated in factory and then delivered.
- Display case is not drip proof construction. Do not splash water directly to the case, or it may cause short circuit of electronic parts.
- Do not use a different kind of dry cell, or it may cause chemical liquid leakage or bursting.

⚠ CAUTION

- Do not expose it under direct sunlight, or it may cause LCD damage.
- Display case can not be turned more than one rotation. Do not turn more than one rotation.
- Tighten the union nut with the special tool and specified torque, or it may cause damage of the main body and external leakage. Note 1)
- Do not install this product to metal piping units because thermal expansion of metal pipes could cause breakings of body, and fluid leakages.

3 . F E A T U R E S

- High reliability and durability with simple mechanism and no moving parts. The material at fluid contact surface is New PFA.
 - Small pressure loss construction which exists only vortex generator and vortex detector in the fluid path. Note 2)
 - It is easy to read flow rate as the display box can rotate.
 - This flowmeter can indicate both of instantaneous flow rate and integrated flow amount.
 - The measurement unit can be changed with a build-in switch.
- At the instantaneous measurement [L/min or m³/h], at the integrated measurement [L or m³].
- Dry cell battery operating makes free from troublesome wiring work. The battery is exchangeable.

4 . S P E C I F I C A T I O N S

Catalog Number	Q L K -					
	1 0 3 0 A X	1 0 3 0 T X	1 5 3 0 A X	1 5 3 0 T X	2 0 3 0 A X	2 0 3 0 T X
Connection Style	FINALLOCK type connection	tube type connection	FINALLOCK type connection	tube type connection	FINALLOCK type connection	tube type connection
Dia. of PFA made connection tube(OD, ID)	(12.70 , 9.53)		(19.05 , 15.88)		(25.4 , 22.2)	
Port size	9		13		20	
Max. working pressure(at 25) Note 3)	1.0MPa		0.6MPa		0.5MPa	
Material at fluid contact surface	N E W P F A					
Fluid	Pure water, chemicals and various kind of fluid					
Allowable kinematic viscosity	1.5mm ² /s or less		2.5mm ² /s or less		4mm ² /s or less	
Measurable flow range	1 mm ² /s(water)	2~20L/min		3~40L/min		8~90L/min
	Max. kinematic viscosity	2.5~20L/min(at 1.5mm ² /s)		4~40L/min(at 2.5mm ² /s)		10~90L/min(at 4mm ² /s)
Allowable instantaneous max. flow rate	25L/min		50L/min		100L/min	
Allowable fluid temperature	0~90 (No frozen and no boiling)					
Ambient temperature at body	0~50 (No frozen and no dew condensation)					
Ambient humidity at body	95 %RH or less					
Storage temperature	-10~60 (No frozen and no dew condensation)					
Power supply voltage range	DC 3V (AA type dry cell ×2 pcs.)					
Display part	Instantaneous flow digit LCD, 3 digits					
	Integrating flow digit LCD, 8 digits					
Function key	3 pcs.					
Sampling time	Approx. 1 sec.					
Accuracy Note 4)	±2 %FS					
Installation	Free installing direction(Except direction which circuit case located below the axis of piping.)					
Accessory	AA type lithium dry cell ×2 pcs.					
Battery life	Approximately 2 years when it is used normal condition on room temperature.					
Wt (kg)	0.22	0.23	0.23	0.26	0.31	0.34

• FINALLOCK connection models (QLK-**30AX) are supplied with 2 sets of flare nut and ferrule as standard.

• Material (New PFA) of finallock connection part is made by 'KURABO INDUSTRIES LTD.'

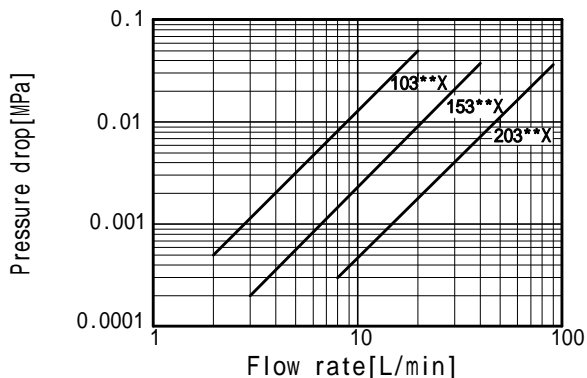
Note 1) SPECIFIED NUT TIGHTENING TORQUE(FINALLOCK CONNECTION)

Q L K -	1030AX	1530AX	2030AX
[N · m]	5.5	9	13

Above tightening torque rate is recommended rate by connection manufacturer, KURABO industries LTD.

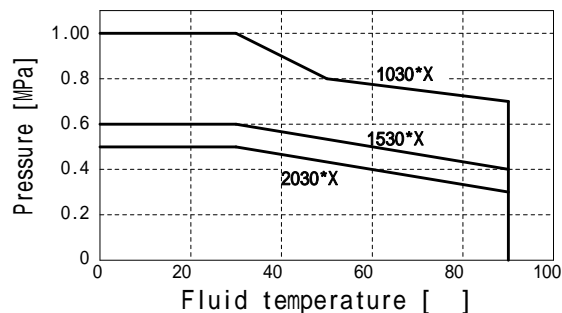
Note 2) PRESSURE DROP

Refer to the following chart. (Kinematic viscosity 1mm²/s liquid)



Note 3) MAX. WORKING PRESSURE

Max. working pressure may change depending on the fluid temp. since the main body and connectors are made of PFA resin. Use the meter within the range shown in the following chart.



Note 4) ACCURACY

The accuracy may change depending on the fluid temp. since the main body is made of PFA resin. In order to keep the accuracy, compensate the flow rate with the following equations in accordance with fluid temp.

(Note; The equations are for water as fluid.)

Q L K - 1 0 3 0 X (60~90)

Q L K - 1 5 3 0 X (60~90)

$$\text{Compensating flow rate[L/min]} = \text{Indicating value[L/min]} \times \{1 + 0.0003 \times (\text{fluid temp. [} \text{]} - 20)\}$$

Q L K - 2 0 3 0 X (60~90)

$$\text{Compensating flow rate[L/min]} = \text{Indicating value[L/min]} \times \{1 + 0.0005 \times (\text{fluid temp. [} \text{]} - 20)\}$$

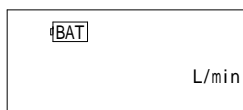
5. INSTALLATION AND EXCHANGE OF BATTERY

(Battery is not installed at shipment. Please install attached battery according to instructions below.)

- Loosen screw at four corners of the case, then open the case upward and remove battery holding band and set attached battery. (Make sure + and - side) After setting the battery, be sure to lock the battery holding band.

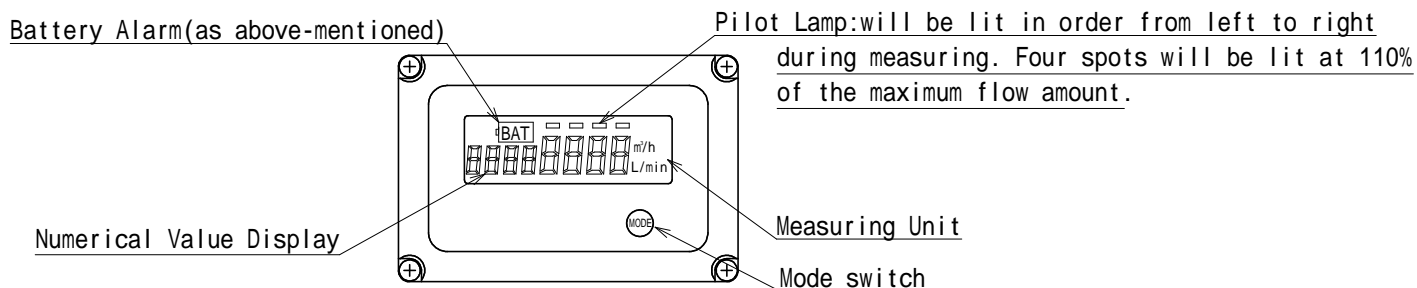
⚠ CAUTION

- When battery alarm «BAT» begin blinking, please exchange battery as soon as possible.
- AA type lithium dry cell are recommended, but other type AA dry cell (alkaline, manganese) can also be used, but the battery life is little shorter than the recommended one.
- **Do not use different types of dry cells, or it may cause liquid leakage or bursting.**
- When it is used as a integrated flow meter, exchange a dry cell within 60 sec. Memorized integrated flow rate data will be kept if it can be done within 60 sec. It is recommended to make a note of the accumulated flow amount just for an accidental case.
- When the voltage drops, the flowmeter becomes stand-by condition and does not measure. In this case memorized integrated data may not be kept, so, reset to initial condition by pushing Reset switch before usage.



(During stand-by Condition: Only battery alarm mark and unit indication are lit up.)

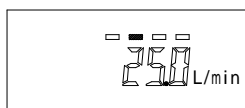
6. EXPLANATION OF THE DISPLAY



7. EXPLANATION OF MODE

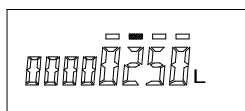
- There are three mode indications, and it will be changed by pushing the Mode switch.

MODE1 : Indicates instantaneous flow rate.



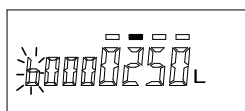
Instantaneous flow rate is blinking for 3 seconds after changing mode.

MODE2 : Indicates integrated flow amount display.



Integrated flow rate is blinking for 3 seconds after changing mode. Push reset SW to clear integrated flow amount.

MODE3 : Integrating indication for batch process.

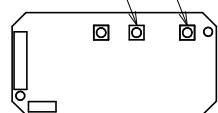


Letter "b" is blinking at the end of upper digits of numerical value. Integrating value will be cleared by pushing Mode SW for 6 sec.or more continuously and starts measuring integrated flow amount at the time of releasing the switch.

8. CHANGE OF MEASURING UNIT

- Select beforehand setting of SW2 for desired Measuring Unit from below table.
- Loosen the screws at the four corners, and open the case upward, then set SW2 on the circuit board located at the back of the case with a minus screw driver.
- After setting, the unit will be changed within 2 minutes. Integrated amount will be calculated according to the set unit.
- **Do not touch other SW and Trimmer on the Circuit Board.**
- After setting, tighten surely the screws at the four corners.

Unit SW(SW2) Reset SW(Dry cell operating only.) Initial setting



SW2 Setting	0	1	2	3	4	5	6	7	8	9
Instantaneous indication	L/min	L/min	L/min	L/min	m ³ /h	m ³ /h	m ³ /h	m ³ /h	L/min	L/min
Integrating indication	1L	0.1L	0.01m ³	0.1m ³	1L	0.1L	0.01m ³	0.1m ³	1L	0.1L

A decimal point for instantaneous indication shifts depending on a port size of the body.
 QLK-1030*X,1530*X... One place of decimal at [L/min],two places of decimal at [m³/h]
 QLK-2030*X... Integer at [L/min],two places of decimal at [m³/h]

9. INSTALLATION

⚠ CAUTION

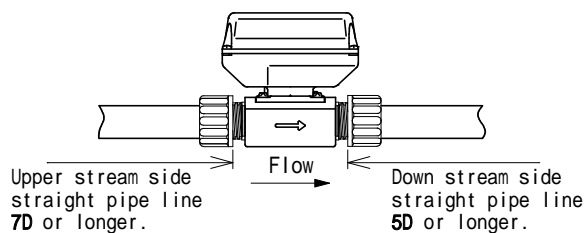
- The flow direction must accord with the direction of the arrow mark on the flow meter.
- When piping work, read and follow the fitteng/piping instruction manual.
- When the flow meter installation, tighten the nuts as holding the main body. Do not hold it is display box.
- When the initial test running, open the valves slowly and let fluids flow gradually.
- The display box can be turned to a readable position, but do not turn it more than 360°.
- Please execute air flashing significantly. Bubbles in piping may disturb measurement of the flow amount.

10. PIPING INSTRUCTION

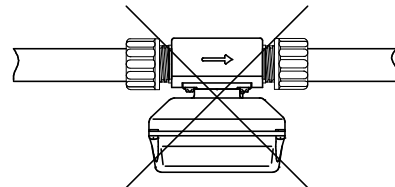
⚠ CAUTION

- Installing place : **Do not install at following places.**
 - 1) Outdoor, Place where exposed to direct sunlight.
 - 2) Place where large mechanical vibration/impact exist.
 - 3) Place where large electric noises exist.
- Do not install where vibration exists. In case any vibration is transferred from the piping line, fix the main body.
- Take care of piping arrangement or valve operation in order not to apply excessive pressure such as water hammer to the flow meter, or it may cause damage of the vortex detector.
- Flash the pipe inside before installation to prevent foreign particles from entering.
- Install a strainer (60 mesh or finer) at upper stream of the meter in case foreign particles are expected.
- If it is installed with a throttle valve, distribute valve or temp. sensor etc., it should be placed on down stream of the meter, or it may affect its accuracy.
- For large pulsating flow, install a damper in order to avoid measuring error.
- Install where no noise affects. Noise may cause its malfunction.
- To avoid affection to measuring accuracy by drift stream, swirling stream etc., be sure to have straight piping at inlet and outlet side as below.

HORIZONTAL PIPING (D : Port size)

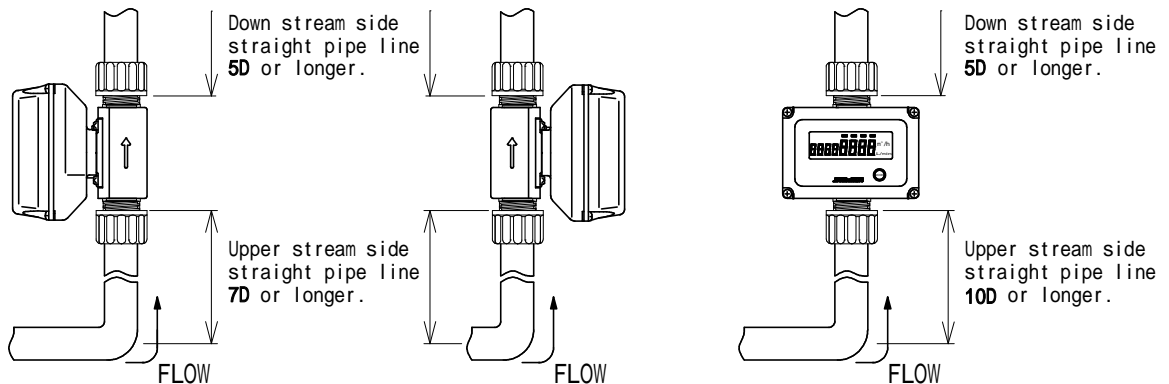


Circuit case downward is not permitted.
 (Condensed water accumulates inside of the case, which may affect electronic parts.)



VERTICAL PIPING

In case of vertical piping, it is recommendable to install in direction of the flow coming up from lower side for avoiding two phase flow.



11. EFFECT OF CAVITATION

⚠ CAUTION

- Accuracy of the flow measurement would be degraded if cavitation occurs. Prior to use the product, confirm that pressure at downstream of the flow meter is higher than pressure calculated from below formula.

$$P = 2.7 P + 1.3 P_0$$

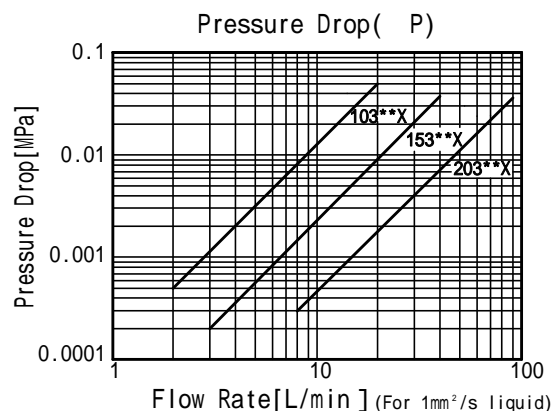
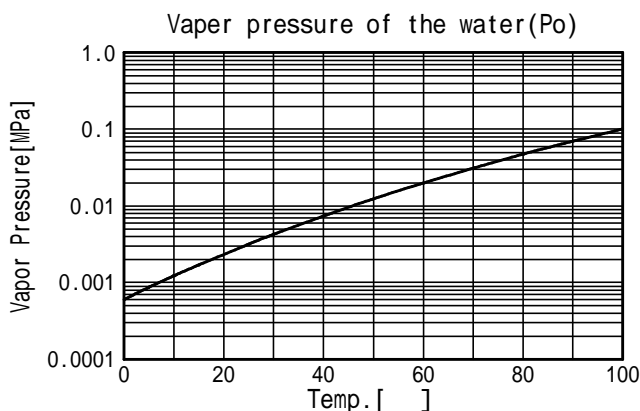
P : Pressure(abs) of 3.5 ~ 7.5D at downstream.

P₀ : Vapor Pressure(abs) of the fluid.

For vapor pressure of the water, refer the below chart.

P : Pressure Drop.

D : Port size



12. TROUBLESHOOTING MEASURES

TROUBLE PHENOMENA	CHECK POINT
Display is not lit.	•Check power source to be turned on.
Even with having a flow, instantaneous value indicates 0 [L/min] or no change on integrating indication.	•Check the flow direction in accordance with the arrow mark shown on the body. •Check whether any foreign matter is attached on Vortex Generator. •Check whether using within its measuring flow range.
Even with a constant flow, large variation on instantaneous value.	•Check whether any foreign matter is attached on Vortex Generator. •Check whether using within its measuring flow range.
Even at same flow instantaneous value decreased, or indicating 0 [L/min].	•Check whether any foreign matter is attached on Vortex Generator.
Even no fluid applied, instantaneous value indicates other than 0 [L/min] or integrating value changes.	•Check any of noise affection received. •Check any of vibrating affection received.

13. HANDLING PRECAUTIONS

CAUTION

- If it is used for a liquid which including a gas intensively penetrates into PFA, it may cause damage of the sensor.
- Do not drop or hit the product, it may cause of malfunction.
- This product is not water proofed. Do not immerse into the water.
- Do not run excess flow larger than allowable instantaneous flow rate, it may cause of breakage of vortex detector.

14. CLEANING

- Be sure to check that the power supply has been turned off before cleaning the product.
- Since the display is easy to get damaged, use a soft cloth or paper for cleaning. Do not wipe with a hard material.
- Use a tightly squeezed wet cloth to wipe out stains on the case cover. Then wipe with a dried cloth for finishing.

15. REFERENCE

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