

必ずお読みください

READ ALL INSTRUCTIONS THOROUGHLY

取扱説明書 INSTRUCTIONS

**渦流量計
パルス出力形**
KARMAN VORTEX FLOW METER
Pulse output type

SLK - 34

SAGINO MIYA

1. PREFACE

Failure to read and follow all instructions carefully before installing or operating this KARMAN VORTEX FLOW METER (TYPE SLK-**34) could cause personal injury and/or property damage.

Save these instructions for future use.

2. NOTE FOR SAFETY

- ⚠ WARNING** • Failure to read and follow instructions or improper handling will make it out of warranty and it may cause diminish of reliability.
- Never disassemble. The KARMAN VORTEX FLOW METER (Type SLK) is strictly calibrated in factory and then delivered.
 - Be sure to connect the wiring with confirming its color, or it may cause damage, over heat or ignition.
 - Do not apply the different voltage (except 12 to 24 V DC), or it may cause damage, over heat or ignition.
 - Do not apply any voltage on the reset input wire, or it may cause a breakdown, over heat or ignition.
- ⚠ CAUTION** • 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 in metallic piping unit, or it may cause damage of the main body and external leakage by its thermal expansion.

3. FEATURES

- 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)
- Legible LED display and the display box is rotatable. Pulse output, switching outputs and reset input function are provided. The switching outputs are selectable from Instantaneous flow alarm or Accumulating flow alarm.

4. SPECIFICATIONS

Catalog Number		S L K -									
		0534AX	0534TX	0834AX	0834TX	1034AX	1034TX	1534AX	1534TX	2034AX	2034TX
Connection Style		FINALLOCK type connection	tube type connection	FINALLOCK type connection	tube type connection	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)		(9.53, 6.35)		(12.70, 9.53)				(19.05, 15.88)		(25.4, 22.2)	
Port size		4.2 equivalent		5.5 equivalent		9		13		20	
Max. working pressure(at 25) Note 3)		1 MPa						0.6 MPa		0.5 MPa	
Material at fluid contact surface		NEW PFA									
Fluid		Pure water, chemicals and various kind of fluid									
Allowable kinematic viscosity		1 mm ² /s		1.2 mm ² /s or less		1.5 mm ² /s or less		2.5 mm ² /s or less		4 mm ² /s or less	
Measurable flow range	1 mm ² /s	0.5~3.5 L/min		1~10 L/min		2~20 L/min		3~40 L/min		8~90 L/min	
	Max. kinematic viscosity	-		1~10 L/min		2.5~20 L/min		4~40 L/min		10~90 L/min	
Allowable instantaneous max. flow rate		4 L/min		12.5 L/min		25 L/min		50 L/min		100 L/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		-10~70 (No frozen and no dew condensation)									
Power supply voltage range		12~24 V DC ±10 %									
Consumption current		100 mA or less									
Accuracy Note 4)		±2%FS(in case of water at 20)		±3%RD (in case of water at 20), ±2%FS (in case of other liquid)							
Response speed		Pulse output: less than 0.2 sec. Switching output: Approx 1 sec.									
Pulse output	Common specification	NPN open collector output Pulse width: 0.1 ms Max. withstand current: 100 mA, Max. apply voltage: 30 V DC, Residual voltage: 1 V or less									
	Pulse rate	0.1 mL/pulse		1 mL/pulse						10 mL/pulse	
Switching output		NPN open collector output: 1 output (Selectable from accumulating flow alarm or Instantaneous flow alarm) Max. withstand current: 100 mA, Max. apply voltage: 30 V DC, Residual voltage: 1 V or less									
Reset input		No-voltage input Reset operation for Accumulating flow mode by 0V input for 0.1sec. or longer (open at measuring)									
Display part		Accumulating or Instantaneous flow measurement: 7 segment LED, 3 digits Switching output : Red LED (Lighting Output state) Mode indication: Green LED (Lighting Accumulating, Off Instantaneous)									
Decimal point indicating		0.01 L/min		0.1 L/min						1 L/min	
Function key		3 pcs.									
Lead cable		5 lead cable, length: 3 m Brown : Vcc, Blue : GND, Black : Alarm output, white : Reset input, Gray : Pulse output									
Protective construction		IP65									
Installation		Free installing direction(Except derrection which circuit case located below the axis of piping.)									
Wt (kg)		0.22	0.23	0.26	0.27	0.26	0.27	0.28	0.30	0.36	0.38

• FINALLOCK connection models (SLK-****AX) 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.'

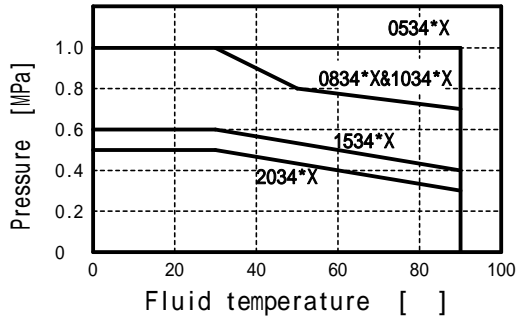
Note 1) SPECIFIED NUT TIGHTENING TORQUE(FINALLOCK CONNECTION) Note 2)PRESSURE DROP

S L K -	0534AX	0834AX	1034AX	1534AX	2034AX
[N·m]	3.0	3.5	3.5	6.0	9.0

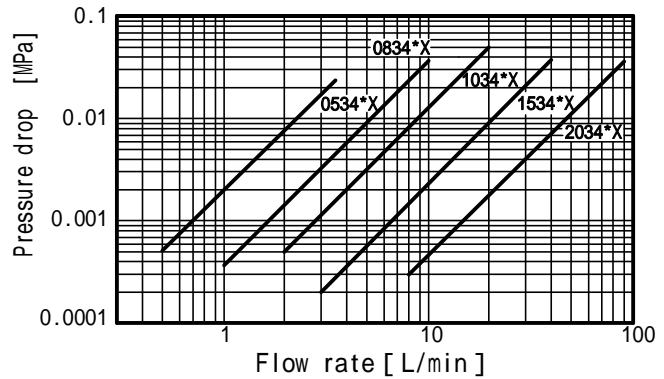
Above tightening torque rate is recommended rate by connetion manufacturer,KURABO industries LTD.

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.

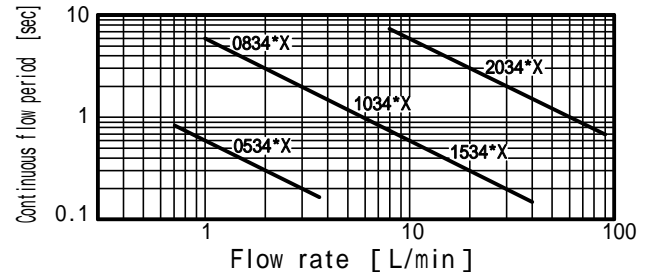


Refer to the following chart. (Kinematic viscosity 1 mm²/s liquid)



Note 4) Accuracy

- Accuracy may be changed by fluid temperature because the flowmeter body is made by PFA.
- In case fluid other than water(20) is used and high accuracy is required, a compensating formula is needed. Please feel free to contact us in such case.
- In case fluid is run in short time, the resolving power may be short and not be satisfied enough. In order to keep high accuracy, fluid must be continuously run more than certain period which calculated by the below chart.



5. DISPLAY AND KEY FUNCTION

Instantaneous flow rate display

Flow rate setting display

Mode indicating (Green)

Lighting: Accumulated flow mode
Off: Instantaneous flow mode

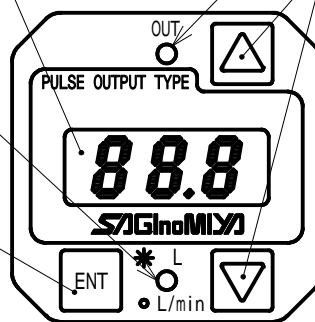
Setting key

Setting mode(Push the key when checking of the setting mode)

Output indicating lamp (Red)

Up and Down key

- Up and Down key (main function)
- key: to change setting at alarm setting mode
- key: to change indication [instantaneous flow measurement] [accumulating flow measurement]
- key: manual reset for accumulating flow
Please keep pressing KEY for more than 1 sec when the Manual Reset is needed

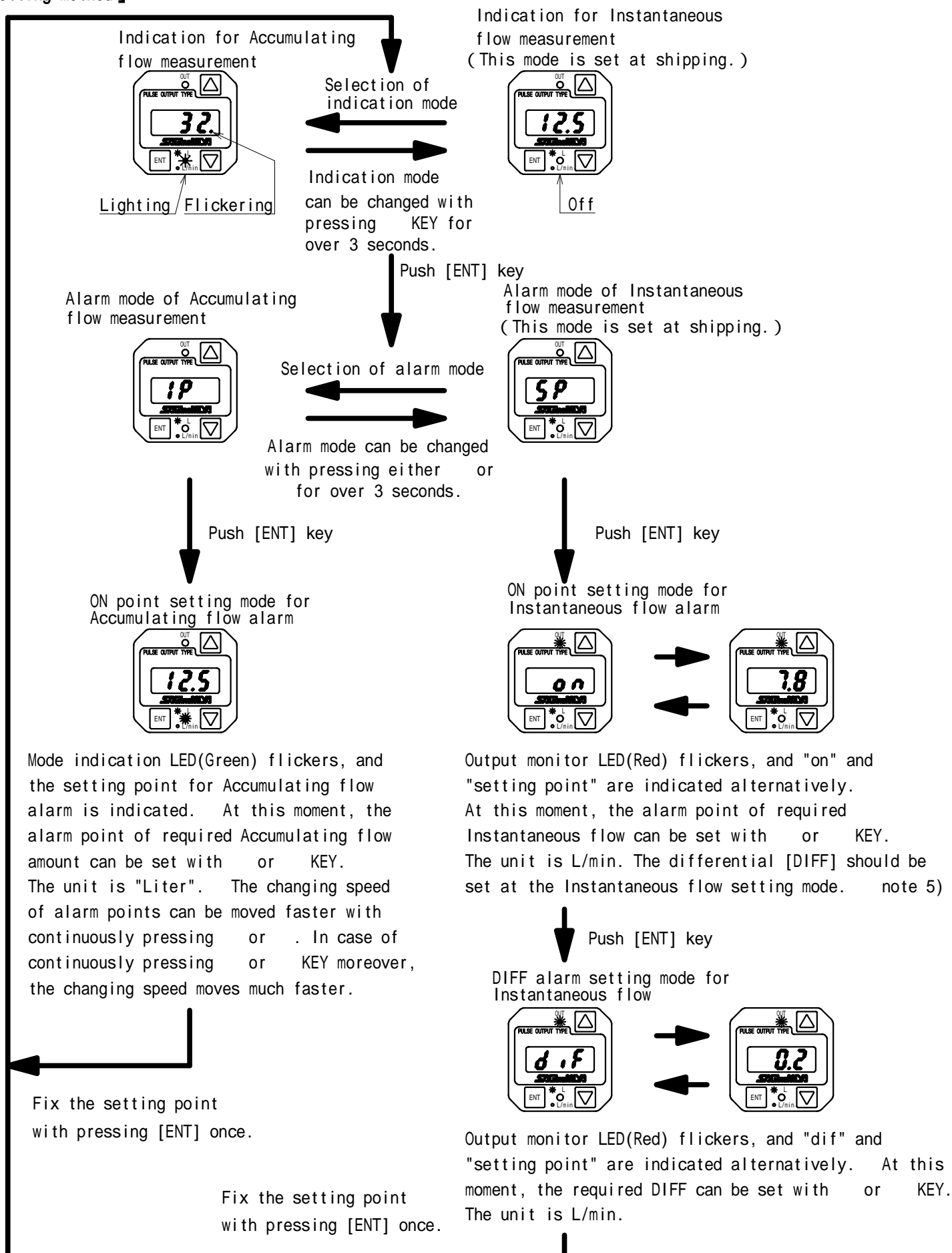


6. Methods for changing indication and switch output setting

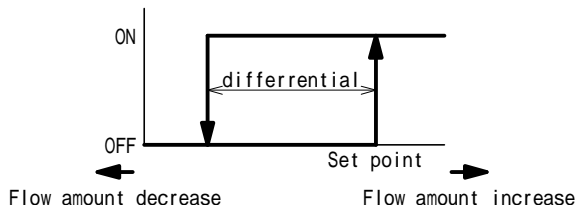
- ⚠ WARNING** • After output setting, the indication mode must be back to the accumulating flow mode(or instantaneous flow mode) with pressing [ENT] key. In case of not back to the accumulating flow mode indication (or instantaneous flow mode), the previous setting point will be effective.
- Even in case the indication mode is changed, the alarm mode will not be changed. Similarly, in case the alarm mode is changed, the indication mode will not be changed.
 - The reset for accumulating flow should be conducted with manual reset or reset input. Please pay attention that the accumulating flow alarm will be reset in case the power supply turns OFF.
 - In case of resetting the accumulating flow alarm output, the accumulating flow indication will turn back to "0".
 - In case the accumulating flow indication counts over "999", the indication turn back to "0" and keep counting accumulating flow amount. Even the indication turn back to "0", the accumulating flow alarm output will not be reset.

- This component is not provided a memory function of accumulating flow amount.
Please take note that the accumulating flow alarm will be reset when the power supply turns OFF.

[Setting method]



Note 5) Output operation for Instantaneous flow (Open collector, Transistor ON-OFF operation.)



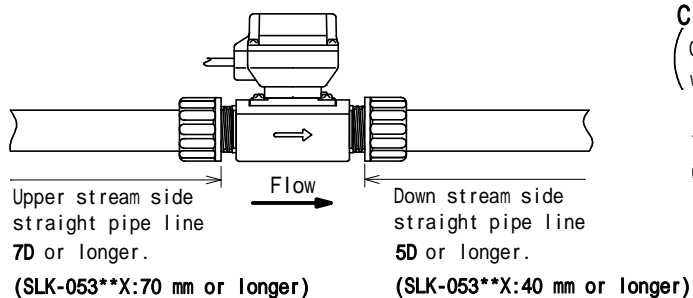
7. INSTALLATION

- CAUTION** The flow direction must accord with the direction of the arrow mark on the flow meter.
- When piping work, read and follow the fitting/piping instruction manual.
 - When the flow meter installation, tighten the nuts as holding the main body. Do not hold it in the 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.

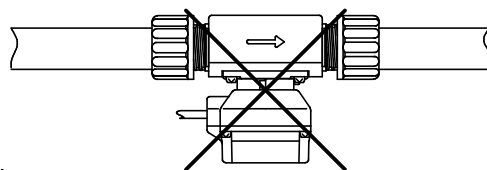
8. PIPING INSTRUCTION

- CAUTION** Installing place : **Do not install at following places.**
- 1) Outdoor, Place where exposed to direct sunlight.
 - 2) Place above 2,000m above sea level.
 - 3) Place with a degree of pollution of 3 or higher.
 - 4) Place where large mechanical vibration/impact exist.
 - 5) Place where large electric noises exist.
- Do not pull the cable nor carry by the cable, or it may cause breaking of the cable.
 - 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)

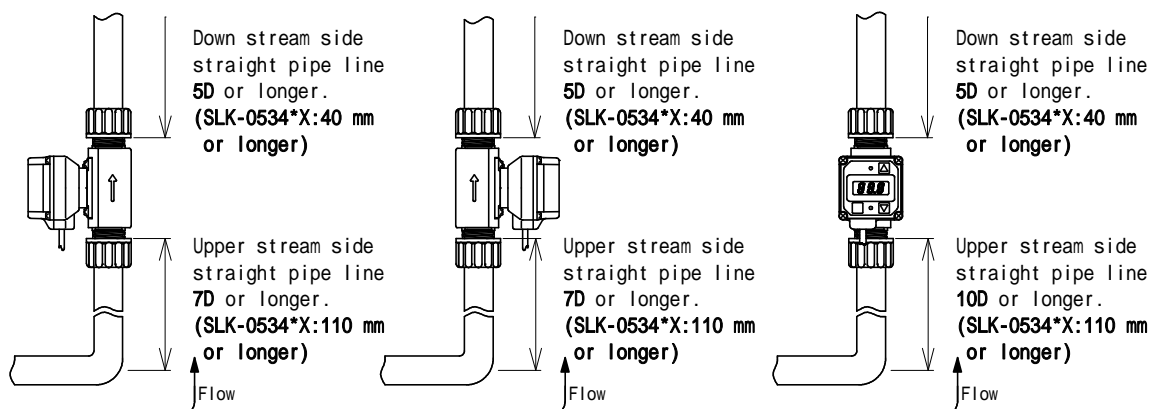


Circuit case downward is not permitted.
(Condensed water accumulates inside of the case, which may affect electronic parts.)



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.



9. WIRING DIAGRAMS

⚠ WARNING • Be sure to connect a shield wire to power source's GND together with SLK's 0V.

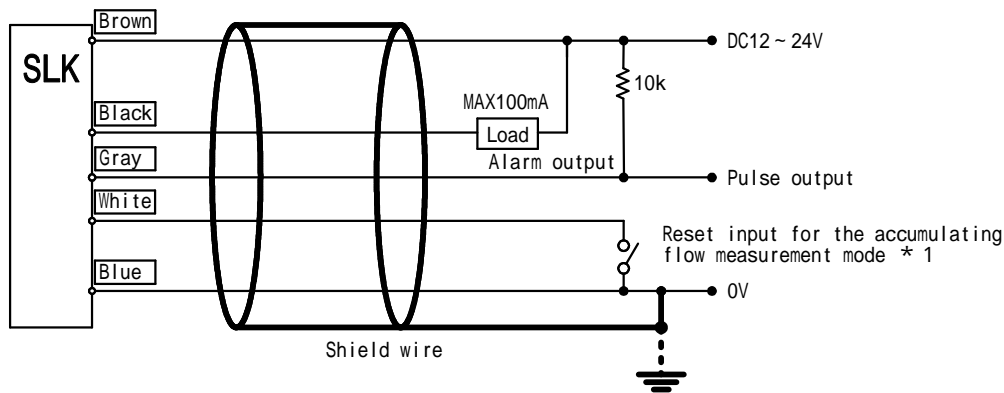
Otherwise malfunction may occur by effect of noise.

- Be sure for connection only to NEC class 2 power source.
- In case of connecting other instrument to this product, be sure to use a instrument of low voltage, low current and conforming to EN61010-1. EN61010-1 is a safety requirement standard for electric equipment which is intended to use in measurement, control and test.
- Do not apply any voltage on the reset input wire, or it may cause a breakdown, over heat or ignition.

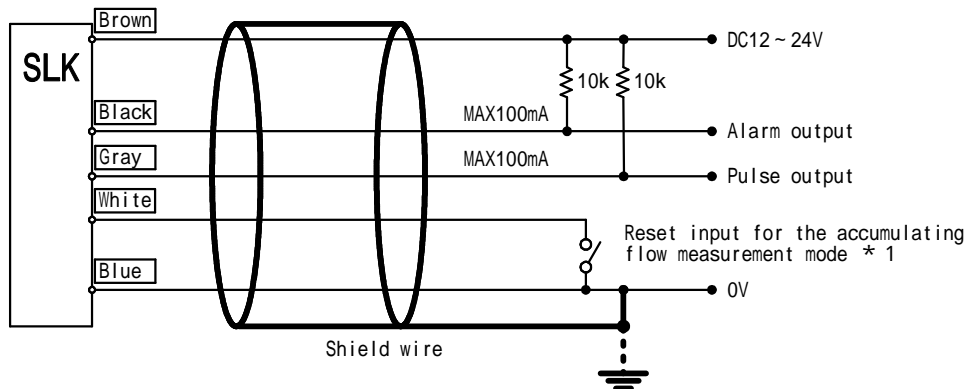
⚠ CAUTION • Do not tie up nor place in parallel with power line.

- Be sure to provide an appropriate surge control circuit respectively for the following:
 - If input/output or signal lines within the building are longer than 30 meters.
 - If input/output or signal lines leave the building, regardless the length.
- Do not install near to the source of noise.
- Make sure to insulate any unused output line as contact with the electric power supply can cause burnout of the internal electronic components.

Direct Drive of Load



Control by Voltage Output



* 1 In case the alarm output of accumulating flow is not used, do not connect the reset input wire(white) with any other wire.

10.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.

$$P=2.7 P+1.3P_o$$

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

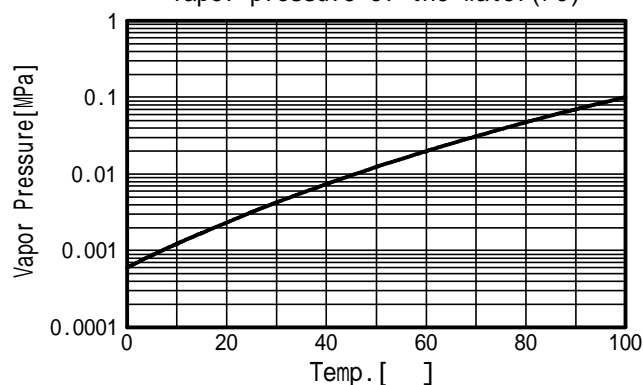
P_o :Vapor Pressure(abs) of the fluid.

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

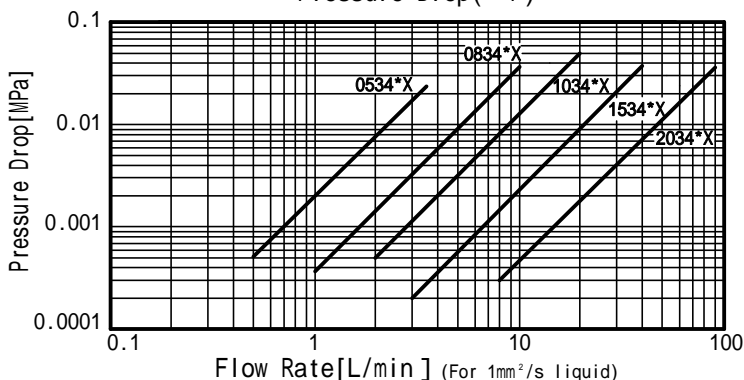
P:Pressure Drop.

D :Port size

Vaper pressure of the water(P_o)



Pressure Drop(P)



11.TROUBLE SHOOTING

TROUBLE PHENOMENA	CHECK POINT
No output(pulse). Display is not lit.	<ul style="list-style-type: none"> Check the wiring to be connected properly. Check power source to be turned on.
Even with having a flow, it indicates 0 and no output(pulse).	<ul style="list-style-type: none"> 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 it is used within the measuring flow range.
Even with a constant flow, the output provides large variation.	<ul style="list-style-type: none"> 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 it is used within the measuring flow range.
Even at same flow, the output decreased, or indicating 0 and no output(pulse).	<ul style="list-style-type: none"> Check whether any foreign matter is attached on Vortex Generator.
Even no fluid applied, it indecates other than 0 and output(pulse).	<ul style="list-style-type: none"> Check any of noise affection received. Check any of vibration affection received.
Display indicates "Hi".	<ul style="list-style-type: none"> Flow rate is exceeding 110% of the maximum allowable instantaneous flow. Check to see if it is being used outside of the valid measurement range.
Display indicates "ErC".	<ul style="list-style-type: none"> Max. withstand voltage for Switching Output is exceeding over 100 mA. Check the wiring to be connected properly.

12. HANDLING PRECAUTIONS



- CAUTION**
- Type SLK has drip proof construction, it is available to use chemical/medical condition. if it is used with a special condition, please consult with us.
 - If it is used for a liquid which including a gas intensively penetrates into PFA, it may cause damage of the sensor.
 - Do not pull the cable nor carrying by the cable, or it may cause breaking of the cable.
 - 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 as shown on below, it may cause of breakage of vortex detector.

Catalog Number	0534*X	0834*X	1034*X	1534*X	2034*X
Allowable instantaneous max. flow rate	4 L/min	12.5 L/min	25 L/min	50 L/min	100 L/min

13. APPLICABLE STANDARDS

- If the following print is found on the product label, that the standard is applied.
CE . . . EN 6 1 3 2 6 - 1

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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