

GENERAL SPECIFICATIONS

ULTRASONIC VORTEX FLOWMETER (SUS series)



GS-F3010E-03

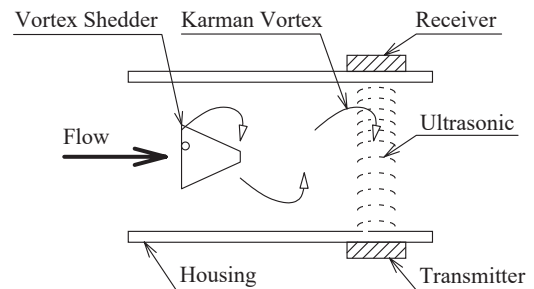


Overview

The ultrasonic vortex flowmeter is designed for the liquid. The Karman vortex regularly generated in the downstream of the vortex shedding bluff body put in the flow is detected with the non-contact ultrasonic sensor.

The signals by vortex are detected with the ultrasonic in high accuracy. Totalized flow and instantaneous flow are displayed on the site, and 4~20mA analog signal and pulse signal are output.

Principle of Operation



Features

●High Accuracy

Since the Karman vortex frequency is detected by ultrasonic, the flow can be measured to a high accuracy of $\pm 1\%$ RD ($\pm 0.5\%$ RD) with a wide flow rate range.

●High Reliability and Durability

The flowmeter excels in reliability and durability because there is no moving part. Moreover, the maintenance of the flowmeter is easy because the structure is simple due to only a vortex shedder in the housing.

●Vibration and Noise Resisting Structure

Since the high frequency ultrasonic sensor is used, the flowmeter is not affected by such of a mechanical noise as piping vibration.

●Easy Display Switching

The content of the display can be easily changed to the integrated flow or the instantaneous flow from the outside by a magnet.

●Analog Output of Two Lines Type

To decrease the power consumption, the analog output is made by two wire system.

●Flow Alarm

Flow alarm of the instantaneous flow rate for both the upper limit and the lower limit can be set to output the flow alarm.

●Fail Safe

The flow is detected with two ultrasonic sensors through the measurement is possible with one sensor by the self-diagnosis function even if another sensor breaks down.

●Replaceable on Line

The ultrasonic sensor assembly for more than 3"(or 80mm²) can be detached from the flowmeter housing while the flowmeter is installed at piping.

Standard Specification (Measuring Unit)

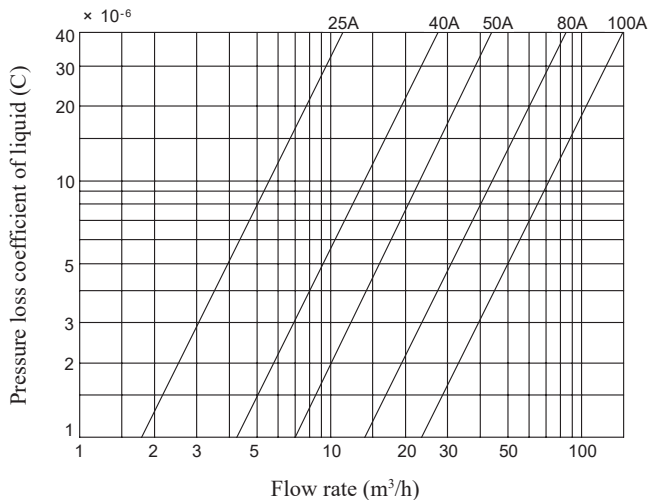
Applicable Fluid	Liquid (However, the liquid which corrodes SUS316 is not available)	
Accuracy	$\pm 1.0\%$ RD ($\pm 0.5\%$ RD)	
Flow Rate Range	0.6~200m ³ /h (However, the flow rate range according to the connection size is shown in the attached table)	
Fluid Temperature	-20~160℃ (Drip-proof type) -20~120℃ (Flame-proof type)	
Working Pressure	Max.5 MPa	
Connection Size	25mm (1B)~100mm (4B)	
Process Connection	Wafer / Flange	
Flange Rating	JIS 10K, 20K ANSI 150, 300	
Wetted Material	Housing	SCS 16 (Wafer) SCS 16 (Flange)
	Sensor Unit	SUS 316L
Installation Piping	Horizontal, Vertical, Diagonal	

Standard Specification (Indicator)

Display		8 digits LCD Instantaneous Flow (Total Value/Reset Value) Instantaneous Flow/ Alarm Number
Pulse Output	Type	Pulse after coefficient is corrected
	Output Signal	Open Collector
	Capacity	30V DC 50mA
	Duty	About 50%
Analog Output	Type	Instantaneous Flow (Accuracy± 0.1% FS)
	Output Signal	4 ~ 20mA (2 line type)
	Time Constant	1 second ~ 199 second
	Load Resistance	0 ~ 500Ω
Alarm Output	Type	Upper and Lower Limit Flow or Alarm
	Output Signal	Open Collector (Time of Alarm:ON,Normal Time:OFF)
	Capacity	30V DC 50mA
Power Supply Voltage		24V DC ± 10%
Structure		Flame-proof (Exd II BT4) Drip-proof (JICC 0920, IECIP66 equivalent)
Ambient Temperature		-20 ~ 60°C
Surrounding Humidity		10 ~ 95% (Non-condensate)

Pressure Loss Characteristics

The pressure loss is calculated from the next expression. $\Delta P = c \times \gamma$
 ΔP : Pressure loss (MPa), c: Pressure loss coefficient (under table),
 γ : Density of fluid (kg/m³)



Flow Rate Range Accuracy : ± 1.0%

Conn. Size (mm)	Accuracy Guaranteed Minimum Flow of ±1% (m³/h)											Max. Flow (m³/h)
	Dynamic Viscosity (×10 ⁻⁶ m ² /s)											
	0.3	0.5	0.7	1	2	3	4	5	7	10	20	
25	0.6	0.9	1.2	1.7	3.4	5.1	6.8	8.5	12	—	—	14
40	0.7	1.1	1.6	2.2	4.4	6.6	8.8	11	16	22	—	36
50	0.8	1.3	1.8	2.5	5.0	7.5	10	13	18	25	50	60
80	1.4	2.3	3.2	4.6	9.2	14	19	23	32	46	92	115
100	2.3	3.7	5.2	7.4	15	23	30	37	52	74	148	200

Standard Calculation and Unit of Output Pulse

Conn. Size (mm)	Totalized Flow	Instantaneous Flow	Min. Unit of Output Pulse
25	8 digits Unit of min.digit : 1×10 ⁻⁴ m ³ /h	3 digits	0.1 L/P
40		Unit of min.digit : 1×10 ⁻⁴ m ³ /h	
50		8 digits Unit of min.digit : 0.1m ³	3 digits
80	Unit of min.digit : 1×10 ⁻³ m ³ /h		
100			

Note) The totalized flow, the instantaneous flow, and the unit of the output pulse can be individually set.

Parameter List

Parameter	Value which can be set
Unit of Instantaneous Flow	L, m ³ , /s, min, h, day
Unit of Totalized Flow	L, m ³
The Maximum Instantaneous Flow	From 10% of max. flow to max. flow
Unit of Output Pulse	0.1, 1, 10, 100L/P, 1m ³ /p
Time Constant	1 ~ 199 seconds
Upper Bound Flow of Flow Alarm	1 ~ 110%
Low Bound Flow of Flow Alarm	0 ~ 99%
Connection Point Output	Alarm, Flow Alarm, Pulse

Flow Rate Range which can be measured

Conn. Size (mm)	Minimum Flow which can be measured (m³/h)											Max. Flow (m³/h)
	Dynamic Viscosity (×10 ⁻⁶ m ² /s)											
	0.3	0.5	0.7	1	2	3	4	5	7	10	20	
25	0.1	0.15	0.2	0.28	0.6	0.9	1.2	1.4	2.0	2.8	5.7	14
40	0.2	0.3	0.4	0.53	1.0	1.5	2.0	2.5	3.5	5.0	10	36
50	0.3	0.4	0.52	0.74	1.4	2.0	2.7	3.4	4.7	6.7	14	60
80	0.5	0.8	1.0	1.4	2.4	3.6	4.8	6.0	8.4	12	24	115
100	1.0	1.5	1.8	2.4	3.9	5.8	7.7	9.6	14	20	39	200

Flow Rate Range Accuracy : ± 0.5% (Option)

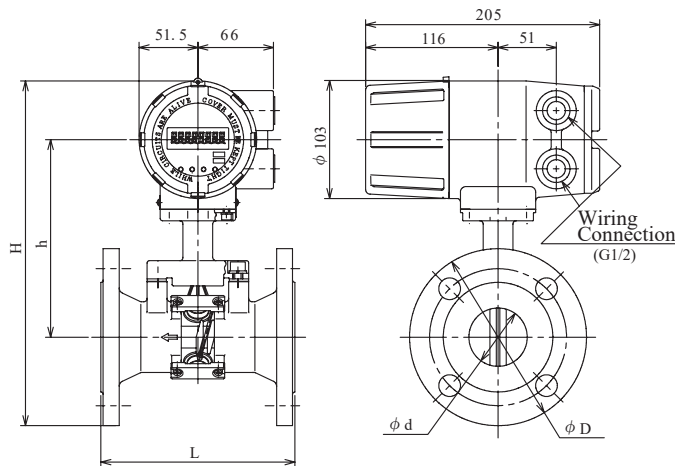
For Water (at 20°C)

Conn. Size (mm)	Flow Rate Range (m³/h)
25	—
40	4.5 ~ 16
50	6.9 ~ 29
80	15 ~ 70
100	24 ~ 119

Basic Models

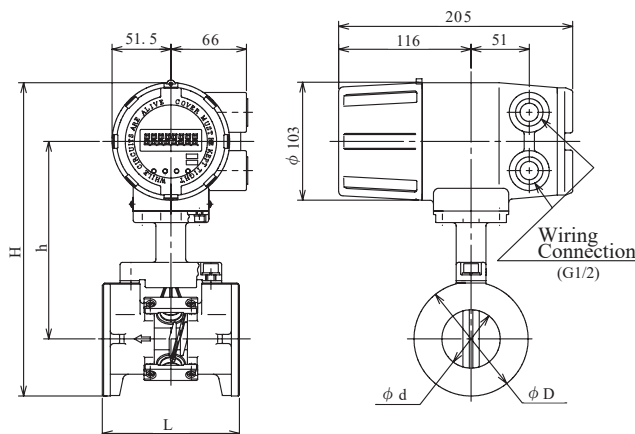
1	2	3	4	5	6	7	8	9	10	11	12	Contents				
F	U	T										ULTRASONIC VORTEX FLOWMETER (SUS series)				
Conn. Size (mm)	B	8										1 B (25 mm)				
	0	4										1½ B (40 mm)				
	0	5										2 B (50 mm)				
	0	8										3 B (80 mm)				
	1	0										4 B (100 mm)				
Design Pressure			H									Max. 5 MPa				
												Always – (hyphen)				
Indicator												Flame-proof Structure (Exd II BT4)				
												Drip-proof Structure (JICC 0920, IECIP 66 equivalent)				
Output Signal												Analog Output	Pulse Unit	Alarm Output	Flow Alarm Output	
		A										4 ~ 20 mA	–	Open Collector	–	
		F										4 ~ 20 mA	–	–	Open Collector	
		P										4 ~ 20 mA	Open Collector	–	–	
												Always – (hyphen)				
Flange Rating		B										ANSI CLASS 150	(Wafer, Flange)			
		D										ANSI CLASS 300	(Wafer, Flange)			
		K										JIS 10K	(Wafer, Flange)			
		L										JIS 20K	(Wafer, Flange)			
		M										JIS 30K	(Wafer)			
		N										JIS 40K	(Wafer)			
		R										JPI CLASS 150	(Wafer, Flange)			
		S										JPI CLASS 300	(Wafer, Flange)			
		1										DIN PN10	(Wafer)			
		2										DIN PN16	(Wafer)			
		3										DIN PN25	(Wafer)			
		4										DIN PN40	(Wafer)			
Y										JISG3451F12	(Wafer)					
Connection Type												W	Wafer			
													R	Flange (RF)		

Dimension Drawing



Flange Type (For JIS 10K)

Conn. Size (mm)	Dimensions (mm)					Approx Weight (kg)
	L	φ d	φ D	h	H	
25	150	25.7	125	155	269	6.1
40	150	39.7	140	163.5	285	7.3
50	170	51.1	155	173	302	8.7
80	200	71.1	185	177.5	321.5	12.5
100	220	93.8	210	189	345.5	16.0

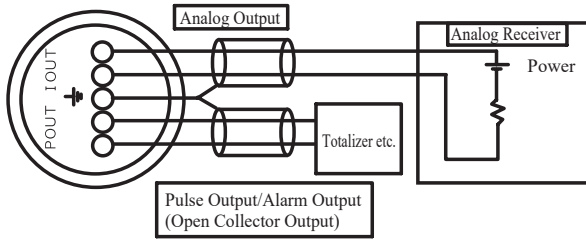


Wafer Type

Conn. Size (mm)	Dimensions (mm)					Approx Weight (kg)
	L	φ d	φ D	h	H	
25	93	25.7	63	155	238	4
40	106	39.7	81	163.5	256	4.5
50	120	51.1	100	173	275	5
80	160	71.1	127	177.5	293	7
100	180	93.8	157	189	319	8.5

Wiring Procedure (Recommended cable is CEV-S sectional area of wick wire is 1.25sq or more)

Vortex flowmeter



1. Wire with shielded cable from the flowmeter to power supply and to totalizer etc. according the drawing as shown left. When grounding the cable shield, use a single point of grounding on the flowmeter side or the host device side.
2. Analog signal loop is composed by connection with a load resistance between "I OUT (+)" and "I OUT (-)". The loop supplies with power to the flowmeter.
3. The pulse output/the alarm output is used by connecting a power supply with a power supply limitation resistance between "P OUT (+)" and "P OUT (-)".
4. For other wiring methods, please refer to the instruction manual.

⚠ Attention	Installation Area Selection
<ul style="list-style-type: none"> ● In case that the flowmeter mounting pipe is vibrating or unstable, support the pipe firmly. ● For vertical piping, it is recommended to install the meter so that the liquid is filled in the pipe and flows up from the bottom. 	<ul style="list-style-type: none"> ● The acceleration should be restrained less than 9.8 m/s² to protect the connections. ● Provide sufficient room around the flowmeter for periodic maintenance and for ease of wiring and piping.

⚠ Attention	Piping Connection									
<ul style="list-style-type: none"> ● Make sure to set flow direction shown on the flowmeter the actual fluid flow direction. ● Straight pipe (Inlet:10D or more,Outlet:2D or more) is required to prevent drift or rotational flow from affecting the accuracy. (D:Connection Size) ● Inside diameter of the piping connected inlet and outlet side of the flowmeter should be equal or larger than the inside diameter of the flowmeter to ensure the flow measurement accuracy. 	<ul style="list-style-type: none"> ● A location of the valve installation is preferable the downstream side of the flowmeter. ● Please hold the line pressure higher than the next valve at the exit side of the flowmeter to prevent the cavitation. $P_d = 2.7 \times \Delta P + 1.3 \times P_o$ P_d : The downstream side pressure (MPa abs, absolute pressure) ΔP : Pressure loss (MPa) P_o : Steam pressure of fluid at temperature when measuring (MPa abs, absolute pressure) ● The gasket must not protrude in the passage between the flowmeter and the connected piping to secure the flow measurement accuracy. ● When pressure tap is required, locate 2 to 7 inner pipe diameters downstream of the flowmeter outlet. ● Align the flowmeter with piping using appendant collors. Misalignment will cause accuracy instability. 									
<table border="1"> <thead> <tr> <th>Conn. Size</th> <th>Inside Diameter of Flowmeter</th> <th>Connected Piping</th> </tr> </thead> <tbody> <tr> <td>25A~50A</td> <td>Schedule 40 equivalent</td> <td>Schedule 40 equivalent or larger inside diameters than this</td> </tr> <tr> <td>80A~100A</td> <td>Schedule 80 equivalent</td> <td>Schedule 80 equivalent or larger inside diameters than this</td> </tr> </tbody> </table>	Conn. Size	Inside Diameter of Flowmeter	Connected Piping	25A~50A	Schedule 40 equivalent	Schedule 40 equivalent or larger inside diameters than this	80A~100A	Schedule 80 equivalent	Schedule 80 equivalent or larger inside diameters than this	
Conn. Size	Inside Diameter of Flowmeter	Connected Piping								
25A~50A	Schedule 40 equivalent	Schedule 40 equivalent or larger inside diameters than this								
80A~100A	Schedule 80 equivalent	Schedule 80 equivalent or larger inside diameters than this								
<ul style="list-style-type: none"> ● If a feeding pump like plunger or bellows type is used, pulsation flow will causes measuring error. Minimize the pulsation flow by means of an orifice and an accumulator. 										

Ordering Instruction

	Item	Contents
1	Application	For Production Control etc
2	Applicable Fluid	Name, Composition, Existence of Admixture, Existence of Corrosive
3	Flow Rate	Maximum, Normal, Minimum, Full scale, (Use time per day) (m ³ /h)
4	Temperature of Fluid	Maximum, Normal, Minimum (°C)
5	Fluid Pressure.	Maximum, Normal, Minimum (MPa)
6	Viscosity and Density of Fluid	Viscosity (at°C), Density (at°C)
7	Connection Standard	Connection Structure, Connection Size, Flange standard, etc
8	Applied Regulations	Name of Regulations and Standards
9	Flow Alarms	Alarms Set Values of High and Low Limit Flow (%)
10	Connected Meter	Totalizer and Recorder, Indicator, etc (m)
11	Power Supply	

*Be sure to read the instruction manual carefully before you use this meter to ensure you use it correctly.

*Note that the contents may be subject to change without notice.

● Contact

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