GENERAL SPECIFICATIONS

TOKICO GS-F3021E-06

ULTRASONIC VORTEX FLOWMETER (PFA series)

Overview

The ultrasonic vortex fowmeter is a flowmeter only for the liquid where the Karman vortex regularly generated in the downstream of the vortex shedding bluff body put in the flow is detected with the ultrasonic sensor of non-contact. In the PFA series, there is neither a seal nor a pocket, except in the piping connection part, because liquid contact parts are molded as one body with an excellent corrosion-resistant PFA resin. Therefore, the PFA series is suitable for the measurements such as chemicals, corrosive fluids and ultra-pure waters.

Features

●High Accuracy
Because the Karman vortex frequency is detected ultrasonically, the flow can be measured to a high accuracy by a wide flow rate range.

●Excellent Corrosion-resistant Feature
Because an excllent corrosion-resistant PFA resin is used for the parts in contact with liquid,it is suitable for the measurements of ultra-pure water and chemicals which are sensitive to dirt.

●Complete Pocketless Structure
Because the pocketless structure where fluid is always moving is adopted, it is suitable for the measuring of the liquid which causes chemical reactions or liquid that change quality easily.

●Noise Resisting Structure
Because a high frequency ultrasonic sensor is used, the sensor is not influenced by mechanical noise such as piping vibrations.

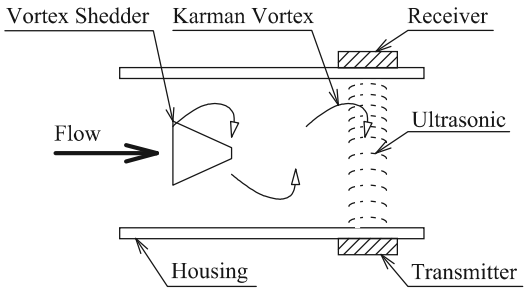
●Maintenance-Free Structure
Maintenance is easy because the measurement system has no moving parts.

●Light-weight
PFA series flowmeter is lightened by the resin and can be directly installed at the resin piping of the ultra-pure water line etc.

●Chemical Fluid Resisting Structure
Because the amplifier case storing the electric circuit is made of resin, the PFA series is excellent in corrosion-resistance when chemicals are measured.

●Display Part, Output Signal
LED display is adopted for very clear visual check. Upper and lower warning output signal is also available in addition to pulse / analogue output.

Principle of Operation



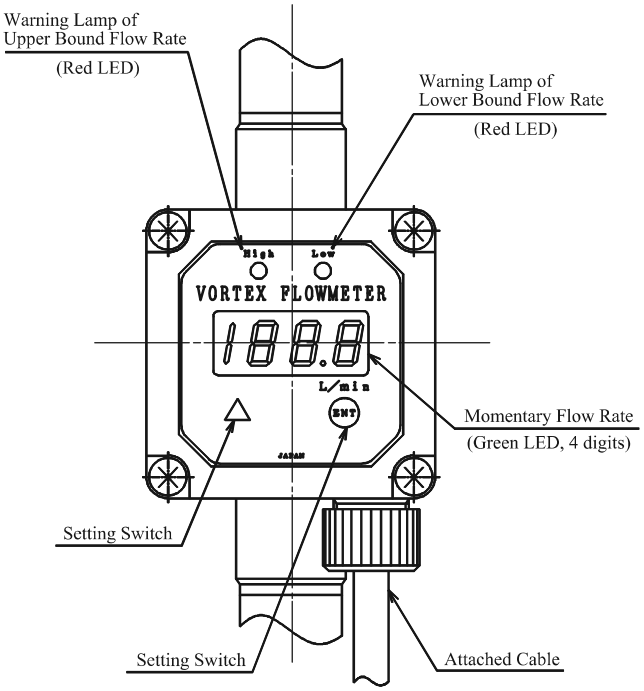
Standard Specification (Measuring Unit)

Connection Size		3/8 B	1/2 B	3/4 B	1 B
Applicable Fluid		Liquid (Chemical fluid,corrosive fluid, and ultra-pure water are also acceptable.)			
Accuracy		±3% FS	±3% RD		
Flow Rate Range		0.3～150 L /min (Refer to flow rate range on the next page.)			
Fluid Temperature		0～100℃			
Max. Working Press (at 20℃)		1.0MPa	1.0MPa	0.7MPa	0.5MPa
Material	Housing	New PFA Resin			
	Indicator Case	PPS (Polyferron sulfide) Resin			
	Screw	PEEK (Poly-ether-ether-ketone) Resin			
	Connector	PFA Resin			
Piping Installation		Horizontal, Vertical, Diagonal			

Standard Specification (Indicator)

Display		Momentary Flow Rate : 4 digits Green LED Warning Lamp : Red LED
Pulse Output	Type	Pulse after scale compensation
	Output Signal	Open Collector
	Capacity	30V DC 150 mA
	Duty	Approx. 50 %
Analogue Output	Type	Momentary Flow Rate (Accuracy± 1% FS)
	Output Signal	4 ～ 20 mA
	Load Resistance	0 ～ 500 Ω
	Response Time	1,2,3,5,10s (Settable)
Span Setting		30%,50%,70%,100% of Max. Flow Rate for Each Conn.Size
Warning Output	Setting	Upper and Lower Bound Flow Rate
	Output Signal	Open Collector (Time of Alarm:ON,Normal Time:OFF)
	Capacity	30V DC 150 mA
External Power Supply		12 ～ 24V DC
Consumption Current		Max. 150 mA
Protection Structure		IP65 Equivalent
Attached Cable		2 m six shield lines with Heatproof Vinyl Insulation (4.8 mm in outside diameter)
Ambient Temperature		0 ～ 60℃ (however, no freeze)
Ambient Humidity		5 ～ 80% RH (however, no dew condensation)

Name of Each Display Part



Flow Rate Range

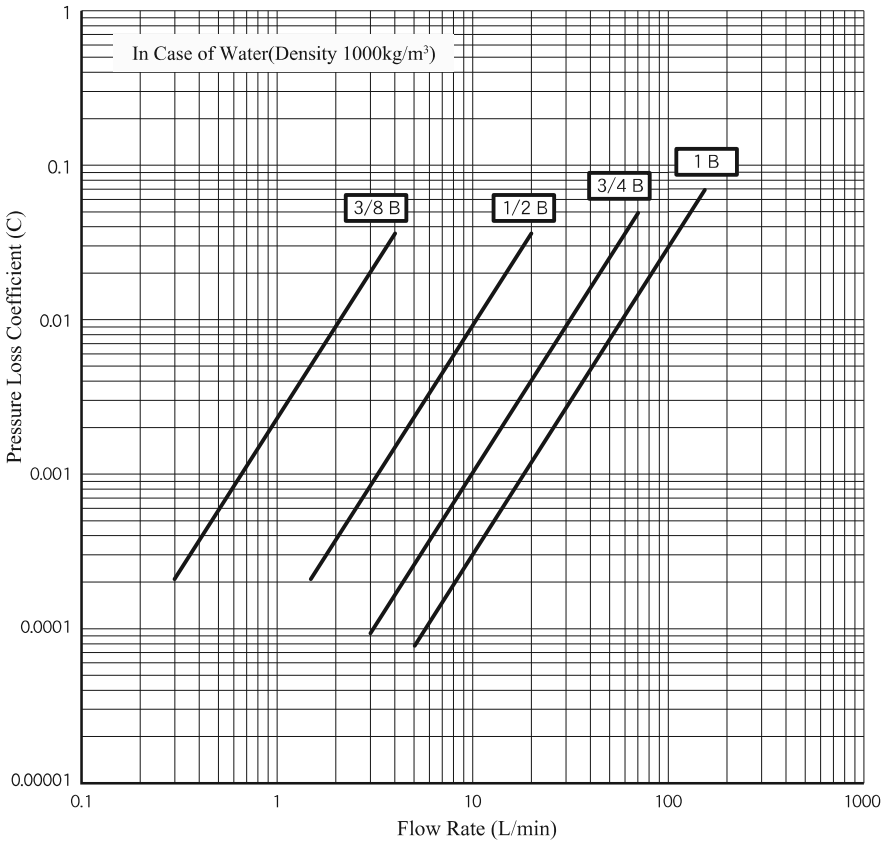
Conn.Size	Min. Flow Rate (L/min) Viscosity of Measurment Fluid ($\times 10^{-6}m^2/s$)									Max.Flow Rate (L/min)
	0.3	0.5	0.7	1	2	3	4	5	7	
3/8B	0.3	0.3	0.3	0.4	0.8	1.2	1.6	2	2.8	3.5
1/2B	0.6	1	1.4	2	4	6	8	10	14	20
3/4B	3	5	7	10	20	30	40	50	70	70
1B	4.5	7.5	10.5	15	30	45	60	75	105	150

Measurable Flow Rate Range

For Water (at 20°C)

Conn. Size	Flow Rate Range (L/min)
3/8B	0.3 ～ 3.5
1/2B	1.5 ～ 20
3/4B	3 ～ 70
lB	5 ～ 150

Pressure Loss Characteristics



Unit of Calculation and Output Pulse

Conn.Size	Momentary Flow Rate	Output Pulse
3/8B	4 digits Unit of min. digit [0.1 L/min]	0.1 mL/p
1/2B		1 mL/p
3/4B		10 mL/p
lB		10 mL/p

Note)1. The pressure loss is calculated from next expression.

$\triangle P = C \times \gamma$ $\triangle P$: Pressure loss (MPa)
c : Pressure loss coefficient (left table)
γ : Density of fluid (kg/m^3)

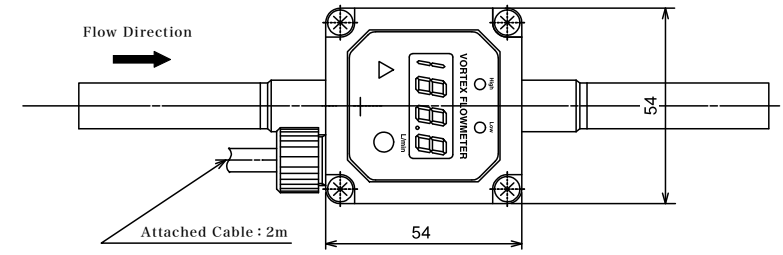
2. Please hold the fluid pressure more than the next value at the exit side of the flowmeter to prevent the cavitation.
Pd =2.7×△P +1.3×P
Pd : The downstream side pressure (MPa abs, absolute pressure)
△P : Pressure loss (MPa)
P_v : Vapor pressure of fluid at measuring temperature (MPa abs, absolute pressure)

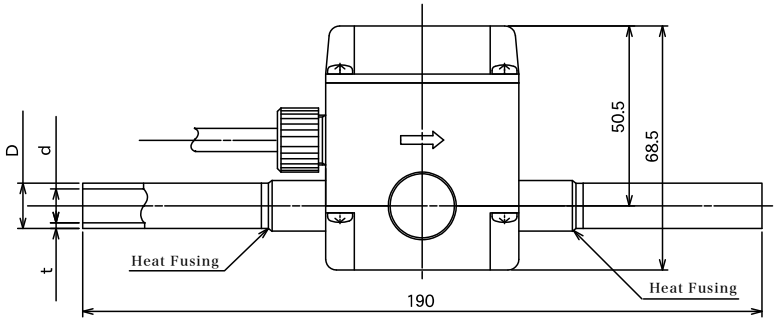
Basic Models

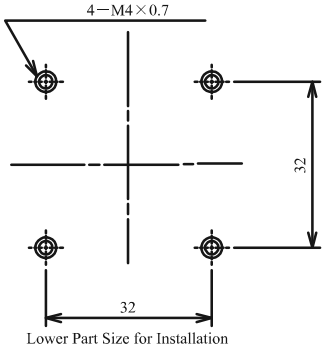
1	2	3	4	5	6	7	8	9	Contents		
F	U	B							ULTRASONIC VORTEX FLOWMETER (PFA series)		
Conn. Size			B	3					3/8 B (10 mm)		
			B	4					1/2 B (15 mm)		
			B	6					3/4 B (20 mm)		
			B	8					1 B (25 mm)		
Design Press.					A				Max. Working Pressure : 0.5 ～ 1.0 MPa (Differ by the temperature and the conn.size)		
						—			Always "—" (hyphen)		
Indicator							KW		Structure	Pulse Output	Analogue Output
									IP65	Open collector	4 ～ 20 mA

Dimension Drawing

• The position of the display can be changed by 90 degree step.







Conn.Size	Dimension (mm)		
	D	d	t
3/8B	ϕ 9.52 $^{+0.30}_{-0.10}$	ϕ 6.35	1.59 ±0.15
1/2B	ϕ 12.70 $^{+0.30}_{-0.10}$	ϕ 9.52	1.59 ±0.15
3/4B	ϕ 19.05 $^{+0.30}_{-0.10}$	ϕ 15.88	1.59 ±0.15
1B	ϕ 25.40 $^{+0.30}_{-0.10}$	ϕ 22.22	1.59 ±0.15

Cable Wiring Points

Red	Power Supply (+12 ～ 24 V)
White	Common
Purple	Pulse (Open collector)
Green	Analogue (4 ～ 20 mA)
Blue	Upper Bound Flow Rate Warning
Yellow	Lower Bound Flow Rate Warning

1. Please set up the signal lines away from high voltage and high electric current source to prevent the noise mixed.
2. Please separate wiring from the power line as much as possible.
3. Length of the attached cable is 2m. Please relay the wiring with joint box etc. when transmitting to the long distance. The cable between these points must use shield cable of six cores which meets the undermentioned specification.

(1) Cross-section Area of Cores : 0.3 mm² or more
(2) Recommended Cable : CVVS
(3) Transmission Distance : Maximum 100 m

⚠ Caution for Use

- Please install a straight pipe, which is longer than l0D on the inlet side and 2D on the outlet side of the flowmeter, to prevent an influence on the accuracy due to whirl flow or turbulence flow.
- The direction of the flow specified in the flowmeter must be matched to the flow of fluid.
- Please do not damage the tube at both ends of the flowmeter.
- Please use the tube of a specified size for the connection of piping.
- As for the installation position, any horizontal, vertical or diagonal position is possible. However, always fill the piping with the fluid in any position, The measurement will become impossible in the 2-phase flow (gas and liquid) or in the bubble mixed flow.
- This flowmeter is with excellent vibration-proof structure. However install a support if there is extreme vibration, which may cause the damage of piping.
- The measurement of the fluid might become impossible when liquid temperature changes drastically because the heat exchanger etc. exist point in the near upstream of the flowmeter. Please reduce the temperature change of the fluid by setting up the flowmeter on the upstream side or separating the flowmeter from the heat exchager.
- There is a possibility of an error when the pulsation, such as bellows pump, is large. Reduce the pulsation with a damper etc. as much as possible.
- Please avoid the installation of the flowmeter in areas of extreme high temperature, low temperature, large heat radiation and corrosive atmosphere is strong.
- Please use this flowmeter indoors.
- Please do not use this flowmeter in a hazardous area because it is not an explosion-proof structure.

Ordering Instructions

No.	Item	Contents	
1	Applications	Production Control etc.	
2	Applicable Fluid	Name, Composition, Existence of Admixture and Corrosion	
3	Accuracy	± ☐ %	
4	Flow Rate	Maximum, Normal, Minimum	(L/min)
5	Operating Temperature	Maximum, Normal, Minimum	(℃)
6	Operating Pressure	Maximum, Normal, Minimum	(MPa)
7	Viscosity and Specific Gravity	Viscosity (at ℃), Specific Gravity (at ℃)	
8	Flow Rate Warning	Upper bound set flow rate Lower bound set flow rate	(L/min) (L/min)
9	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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