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.

Features
- **High Accuracy**
  Since the Karman vortex frequency is detected by ultrasonic, the flow can be measured to a high accuracy of ±1% RD (±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)

<table>
<thead>
<tr>
<th>Applicable Fluid</th>
<th>Liquid (However, the liquid which corrodes SUS316 is not available)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>±1.0% RD (± 0.5% RD)</td>
</tr>
<tr>
<td>Flow Rate Range</td>
<td>0.6~200m³/h (However, the flow rate range according to the connection size is shown in the attached table)</td>
</tr>
<tr>
<td>Fluid Temperature</td>
<td>-20~160°C (Drip-proof type)</td>
</tr>
<tr>
<td></td>
<td>-20~120°C (Flame-proof type)</td>
</tr>
<tr>
<td>Working Pressure</td>
<td>Max.5 Mpa</td>
</tr>
<tr>
<td>Connection Size</td>
<td>25mm (1B)~100mm (4B)</td>
</tr>
<tr>
<td>Process Connection</td>
<td>Wafer / Flange</td>
</tr>
<tr>
<td>Flange Rating</td>
<td>JIS 10K, 20K</td>
</tr>
<tr>
<td></td>
<td>ANSI 150, 300</td>
</tr>
<tr>
<td>Wetted Material</td>
<td>Housing SCS 16 (Wafer)</td>
</tr>
<tr>
<td></td>
<td>SCS 16 (Flange)</td>
</tr>
<tr>
<td></td>
<td>Sensor Unit SUS 316L</td>
</tr>
<tr>
<td>Installation Piping</td>
<td>Horizontal, Vertical, Diagonal</td>
</tr>
</tbody>
</table>
### 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 匏 BT4)  
|                               | Drip-proof (JICC 0920, IEC/IP66 equivalent)  
| Ambient Temperature           | -20 ~ 60°C  
| Surrounding Humidity          | 10 ~ 95% (Non-condensate)  

### Pressure Loss Characteristics

The pressure loss is calculated from the next expression. \( \Delta P = c \times \gamma \)

\( \Delta P \): Pressure loss (MPa), \( c \): Pressure loss coefficient (under table), \( \gamma \): Density of fluid (kg/m³)

![Pressure loss graph](image)

### Flow Rate Range

**Accuracy : ± 1.0%**

<table>
<thead>
<tr>
<th>Conn. Size (mm)</th>
<th>Accuracy Guaranteed Minimum Flow of ±1% (m³/h)</th>
<th>Max. Flow (m³/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dynamic Viscosity ((\times 10^{-4} \text{ m}^2/\text{s}))</td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>25</td>
<td>6.9</td>
<td>1.2</td>
</tr>
<tr>
<td>40</td>
<td>7.1</td>
<td>1.6</td>
</tr>
<tr>
<td>50</td>
<td>8.1</td>
<td>1.8</td>
</tr>
<tr>
<td>80</td>
<td>10.4</td>
<td>2.3</td>
</tr>
<tr>
<td>100</td>
<td>12.3</td>
<td>5.2</td>
</tr>
</tbody>
</table>

**Flow Rate Range**

**Accuracy : ± 0.5% (Option)**

For Water (at 20°C)

<table>
<thead>
<tr>
<th>Conn. Size (mm)</th>
<th>Flow Rate Range (m³/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>—</td>
</tr>
<tr>
<td>40</td>
<td>4.5 ~ 16</td>
</tr>
<tr>
<td>50</td>
<td>6.9 ~ 29</td>
</tr>
<tr>
<td>80</td>
<td>15 ~ 70</td>
</tr>
<tr>
<td>100</td>
<td>24 ~ 119</td>
</tr>
</tbody>
</table>
Basic Models

<table>
<thead>
<tr>
<th>Conn. Size (mm)</th>
<th>B 8</th>
<th>1 B (25 mm)</th>
<th>1/2 B (40 mm)</th>
<th>0 4</th>
<th>2 B (50 mm)</th>
<th>0 5</th>
<th>3 B (80 mm)</th>
<th>0 8</th>
<th>4 B (100 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Pressure</td>
<td>H</td>
<td>Max. 5 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Output Signal

<table>
<thead>
<tr>
<th>Indicator</th>
<th>I Flame-proof Structure (Exd II BT4)</th>
<th>K Drip-proof Structure (JISCO 0920, IECIP 66 equivalent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Analog Output 4 ~ 20 mA Pulse Unit</td>
<td>Flow Alarm Output –</td>
</tr>
<tr>
<td>F</td>
<td>4 ~ 20 mA – Open Collector –</td>
<td>– Open Collector –</td>
</tr>
<tr>
<td>P</td>
<td>4 ~ 20 mA Open Collector –</td>
<td>– –</td>
</tr>
</tbody>
</table>

Always – (hyphen)

Flange Rating

<table>
<thead>
<tr>
<th>Flange Rating</th>
<th>B ANSI CLASS 150 (Wafer, Flange)</th>
<th>D ANSI CLASS 300 (Wafer, Flange)</th>
<th>K JIS 10K (Wafer, Flange)</th>
<th>L JIS 20K (Wafer, Flange)</th>
<th>M JIS 30K (Wafer)</th>
<th>N JIS 40K (Wafer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection Type</td>
<td>W Wafer</td>
<td></td>
<td>R JPI CLASS 150 (Wafer, Flange)</td>
<td>S JPI CLASS 300 (Wafer, Flange)</td>
<td>1 DIN PN10 (Wafer)</td>
<td>2 DIN PN16 (Wafer)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 DIN PN25 (Wafer)</td>
<td>4 DIN PN40 (Wafer)</td>
<td>80 200</td>
<td>100 220</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y JISG3451F12 (Wafer)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dimension Drawing

Flange Type (For JIS 10K)

<table>
<thead>
<tr>
<th>Conn. Size (mm)</th>
<th>Dimensions (mm)</th>
<th>Approx. Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>( \phi )</td>
<td>D</td>
</tr>
<tr>
<td>25</td>
<td>150</td>
<td>25.7</td>
</tr>
<tr>
<td>40</td>
<td>150</td>
<td>39.7</td>
</tr>
<tr>
<td>50</td>
<td>170</td>
<td>51.1</td>
</tr>
<tr>
<td>80</td>
<td>200</td>
<td>71.1</td>
</tr>
<tr>
<td>100</td>
<td>220</td>
<td>93.8</td>
</tr>
</tbody>
</table>

Wafer Type

<table>
<thead>
<tr>
<th>Conn. Size (mm)</th>
<th>Dimensions (mm)</th>
<th>Approx. Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>( \phi )</td>
<td>D</td>
</tr>
<tr>
<td>25</td>
<td>93</td>
<td>25.7</td>
</tr>
<tr>
<td>40</td>
<td>106</td>
<td>39.7</td>
</tr>
<tr>
<td>50</td>
<td>120</td>
<td>51.1</td>
</tr>
<tr>
<td>80</td>
<td>160</td>
<td>71.1</td>
</tr>
<tr>
<td>100</td>
<td>180</td>
<td>93.8</td>
</tr>
</tbody>
</table>
### 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 (-)”. For other wiring methods, please refer to the instruction manual.

### Attention

**Installation Area Selection**

- 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.
- 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.

**Piping Connection**

- 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.
- A location of the valve installation is preferable the downstream side of the flowmeter.
- Please hold the line pressure higher than the next value at the exit side of the flowmeter to prevent the cavitation. 
  \[ P_d = 2.7 \times \triangle P + 1.3 \times P_o \]
  \( P_d \): The downstream side pressure (MPa abs, absolute pressure)
  \( \triangle P \): 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.
- 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.

### Application

- For Production Control etc
- Name, Composition, Existence of Admixture, Existence of Corrosive
- Maximum, Normal, Minimum, Full scale, (Use time per day) (m³/h)
- Maximum, Normal, Minimum (˚C)
- Maximum, Normal, Minimum (MPa)
- Viscosity (at ˚C), Density (at ˚C)
- Connection Structure, Connection Size, Flange standard, etc
- Name of Regulations and Standards
- Alarms Set Values of High and Low Limit Flow (%)
- Totalizer and Recorder, Indicator, etc (m)
- 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.

**Tokico System Solutions, Ltd.**

Global Business Div.
Sales Management Headquarters
Parale Mitsui Blding, 8, Higashida-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa 210-0005 Japan

TEL: 81-50-3852-5336
FAX: 81-44-222-7155
URL: https://www.tokicosys.com/en/

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