Digital Vortex Flowmeter
digitalYEWFLO Series

www.yokogawa.com/
Unrivaled Performance, Functionality and Ease of Use

digital YEWFLO Series

Measurement principle
When a shedder bar is placed in a flow, Karman vortices are generated on the downstream side of the bar. The Karman vortices are detected by two piezoelectric elements installed in the upper part of the shedder bar. The vortex frequency is proportional to the flow velocity in a specific range of Reynolds numbers. Therefore, flow velocity or flow rate can be determined by measuring vortex frequency.

Features of the Vortex Flowmeter
- Easy installation, with flange or wafer process connections.
- No zero adjustment is needed.
- No moving parts make Vortex Flowmeters highly durable and reliable.
- The sensing element and bluff body are combined in a single shedder bar, minimizing the pressure loss. The flowmeter is leak-free with a high degree of safety.
- Robust construction of the shedder bar makes measurement at high temperatures (max. 450°C) and high pressure possible.
Yokogawa’s proprietary filter (SSP) for digital signal processing analyzes vortex signals and automatically selects the optimum settings for the best possible measurement.

**Noise Reduction**

Noise caused by strong piping vibration may affect the accuracy of vortex frequency detection. The two piezoelectric elements installed in digitalYEWFLO are of a polarized structure, so they do not detect vibration in the flow or vertical directions. The noise of vortex (lift)-direction vibration is reduced by adjusting the outputs of the piezoelectric elements. Combining these features with the Spectral Signal Processing (SSP) provides optimum and stable measurement.

digitalYEWFLO’s SSP function provides enhanced vibration immunity and advanced diagnostics.

In the past some situations required manual adjustment to compensate for piping vibration noise.

digitalYEWFLO is a maintenance-free flowmeter. It has a circuit for analyzing the detected frequency and allows only vortex frequency to pass through the segmented band-pass-filter, thereby accurately identifying and eliminating noise. The Spectral Signal Processing (SSP) function of digitalYEWFLO only outputs the appropriate vortex frequencies, even under fluctuating flow rate conditions.

**Lower Cost of Ownership**

- Enhanced vibration immunity! No adjustment costs!
- Maintenance free! The self-diagnostic function reduces regular maintenance costs.
- User-friendly! Parameters are easily set by categorizing frequently used parameters into one group, reducing total maintenance costs!
**High Process Temperature Version / Cryogenic Version**

For high temperature or cryogenic flow measurement.

**Measurable temperature range:**
Maximum 450°C, Minimum -196°C

- Easy installation and high level of safety with minimum fugitive emission points.
- Same face-to-face dimension as the Standard Type
- Simple construction for easy insulation
- Available with Reduced Bore Type

* Remote Type is used for high process temperature / cryogenic applications. Must be combined with Model DYA remote converter.

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### Specification

<table>
<thead>
<tr>
<th>Model &amp; Suffix Code</th>
<th>Standard</th>
<th>Reduced Bore</th>
<th>Multi-Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid to be measured</td>
<td>Model DY Vortex Flowmeter (Integral type, Remote type)</td>
<td>Model DYA Vortex Flowmeter Converter Suffix Code: /R1, /R2 Suffix Code: /MV</td>
<td></td>
</tr>
<tr>
<td><strong>Nominal size</strong></td>
<td>15 mm - 300 mm (400 mm: special)</td>
<td>R1: 25 mm - 200 mm, R2: 40 mm - 200 mm</td>
<td>25 mm - 200 mm</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>Liquid: ±1.0% of reading (2000000 Re &lt; Re &lt; 109)</td>
<td>Liquid: ±0.75% of reading (Dx10&lt;sup&gt;9&lt;/sup&gt; &lt; Re)</td>
<td>Liquid: ±1.0% of reading (2000000 Re &lt; Re &lt; 109)</td>
</tr>
<tr>
<td><strong>Output signal</strong></td>
<td>Dual Output (both analog and transistor contact output can be obtained simultaneously)</td>
<td>Analog Output: 4-20 mA DC, 2-wire system</td>
<td>Transistor Contact Output: Open collector, 3-wire system</td>
</tr>
<tr>
<td><strong>Process temperature range</strong></td>
<td>-29°C - 100°C (option: Cryogenic version)</td>
<td>-29°C - 450°C (option: High Process Temperature version)</td>
<td>- Available - Not available - Available</td>
</tr>
<tr>
<td><strong>Process pressure limit</strong></td>
<td>-0.1MPa (-1kg/cm²) to flange rating.</td>
<td>- Available - Not available - Not available</td>
<td></td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>-29°C - 80°C (integral type with indicator)</td>
<td>-9°C - 85°C (Remote type detector)</td>
<td>-9°C - 80°C (Remote type converter with Indicator)</td>
</tr>
<tr>
<td><strong>Mounting</strong></td>
<td>Integral type and Remote type detector: Flange mounting or wafer mounting Remote type converter: 2 inch pipe mounting JIS10/20/30/50/80/100, ANSI150/300/600/900, JPI150/300/600, DIN PN10/16/25/40</td>
<td>Flange mounting only JIS10/20K, ANSI150/300, JPI150/300</td>
<td>Integral type and Remote type detector: Flange mounting or wafer mounting Remote type converter: 2 inch pipe mounting JIS10/20/40, ANSI150/300/600/900, JPI150/300/600, DIN PN10/16/25/40</td>
</tr>
<tr>
<td><strong>Electrical connection</strong></td>
<td>JIS G1/2 Female, ANSI 1/2NPT Female, ISO M20×1.5 Female</td>
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<tr>
<td><strong>Material</strong></td>
<td>Body: SCS14A casting stainless steel (equivalent to SUS316, CF8M) Shedder bar: Duplex stainless steel (option: anti-corrosive version) Gasket: SUS316 stainless steel with polytetrafluoroethylene (Teflon) coating Converter housing and case cover: Aluminum alloy</td>
<td></td>
<td></td>
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</tbody>
</table>
Reduced Bore Type

Minimum measurable flow up to five times lower than conventional vortex flowmeter. Integrated construction with reducers built into the flowmeter body.

Integrated construction allows for size reduction up to 2 sizes smaller

- Enhanced safety realized by integrated construction
  No leak points!
- Same face-to-face dimension as the Standard Type makes replacement easier.

* The face-to-face dimension is the same as that of YEWFLO’E (Style E).

Measurable Flow Rate Range (saturated steam: normal pressure 500 kPa)

- Measurement of low flow rates
- Measurement of low flow rates and wide range measurement
- Very wide range measurement

Lower Cost of Ownership

- No need for reducers/expanders or short pipes to achieve the required straight pipe length! Improves safety and reduces installation costs!
- Increases the space for installation of additional instrumentation.
- Improved stability in measuring low flow ranges! A single unit can perform such measurements, thereby reducing instrumentation costs.

<table>
<thead>
<tr>
<th>Reducer bore type (pipe/detector)</th>
<th>Pressure loss higher than that of the standard type by 28%</th>
<th>Flow rate (kg/h)</th>
</tr>
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<tbody>
<tr>
<td>DY/R2 (50/25mm)</td>
<td>44kg/h</td>
<td>74kg/h</td>
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<tr>
<td>DY/R1 (50/40mm)</td>
<td>1132kg/h</td>
<td>1876kg/h</td>
</tr>
<tr>
<td>DY standard type (50mm)</td>
<td>22kg/h</td>
<td>475kg/h</td>
</tr>
</tbody>
</table>

New instrumentation using Reduced Bore Type

Traditional instrumentation
**Multi-variable Type**

The world’s first two-wire Multi-variable Type (with built-in temperature sensor) can directly output the mass flow rate of saturated steam.

Shedder bar with built-in temperature sensor has a temperature monitoring function and a mass flow rate calculation function.

- Shedder bar with built-in temperature sensor: The shedder bar, which is strong enough to be used as a thermo-well, incorporates a RTD sensor (equivalent to Pt1000, Class A) for temperature measurement.
- SSP function facilitates highly accurate measurement of flow rate over a wide range, even under radically fluctuating temperatures.
- A combination of the reduced bore and multi-variable types is ideal for saturated steam instrumentation when the flow rate fluctuates largely.

**Temperature monitoring function**
Readings of flow rate and temperature measurements are displayed simultaneously.

**Mass flow rate calculation function**
The saturated steam curve based on temperature measurement is used to directly output mass flow.

- Volumetric flow rate or mass flow rate (Pulse output) → Totalized value
- Temperature value (analog) → Process temperature value control
- A single digital YEWFLO unit can perform highly accurate measurement of saturated steam.
  The ultimate solution for energy-efficient steam control
- Robust body and shedder bar construction for safer measurement and control
- The SSP function facilitates highly accurate measurement even when the boiler is vibrating.

![Diagram of temperature monitoring and mass flow rate calculation](image)

**Lower Cost of Ownership**

- A high level of safety is assured without the expense or installation of a temperature sensor, and an insertion hole is not required.
- Neither an external output temperature display unit nor a square root extractor is needed.

New saturated steam instrumentation of Multi-variable Type

Traditional saturated steam instrumentation of T/P COMP.