

Digital Vortex Flowmeter
digitalYEWFLO



Digital Vortex Flowmeter

digitalYEWFLO Series

Bulletin 01F06A02-00E

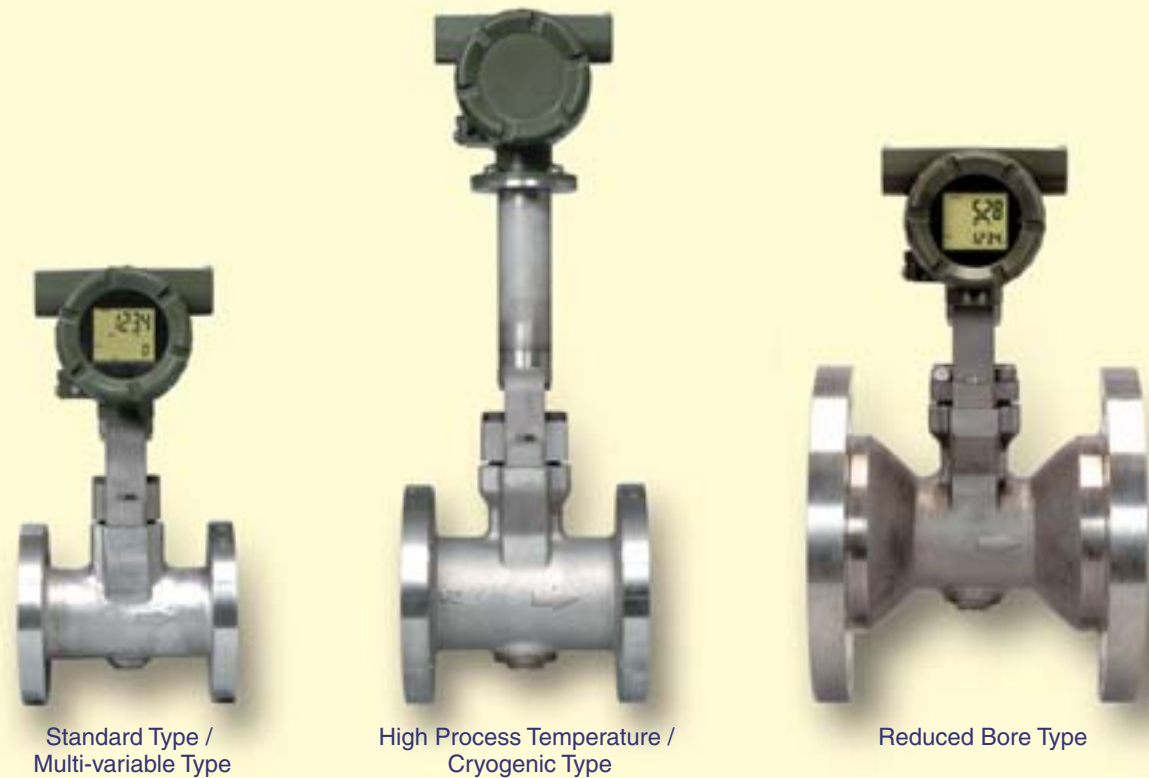
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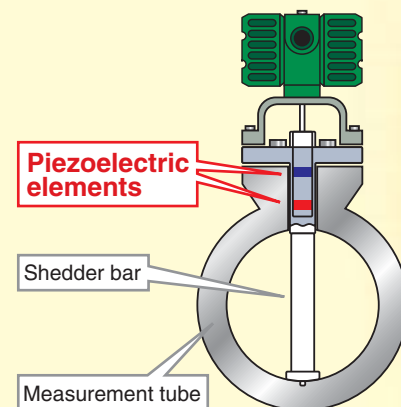
digital YEWFLQ Series



Simple body construction for easy installation and high level of safety

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

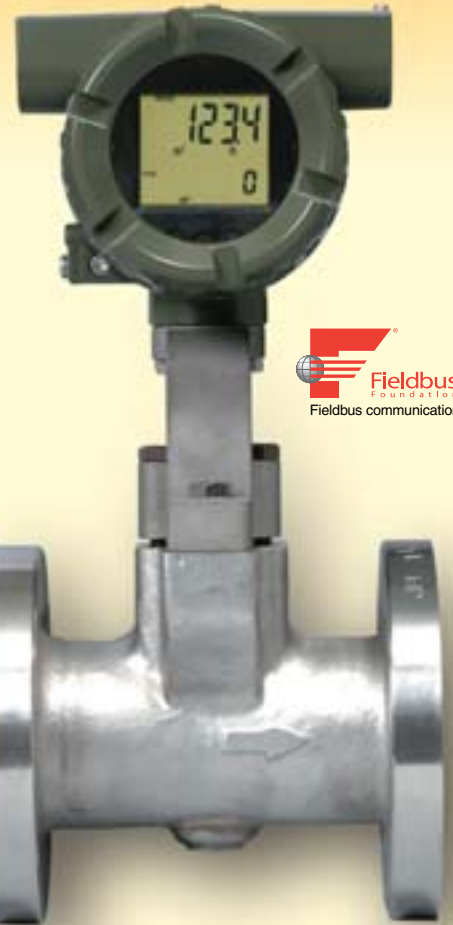
- Easy installation, with flange or wafer process connections.
- No zero adjustment is needed.
- No moving parts make Vortex Flowmeters highly durable and reliable.
- The sensing element and bluff body are combined in a single shedder bar, minimizing the pressure loss. The flowmeter is leak-free with a high degree of safety.
- Robust construction of the shedder bar makes measurement at high temperatures (max. 450°C) and high pressure possible.



digital YEWFLQ Series

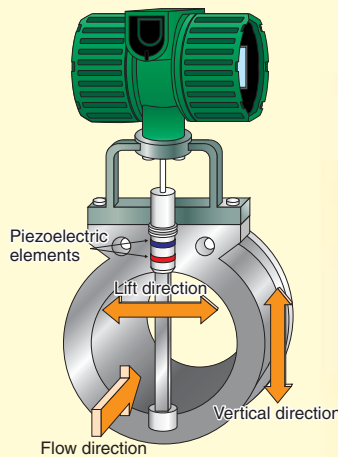
Standard Type

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

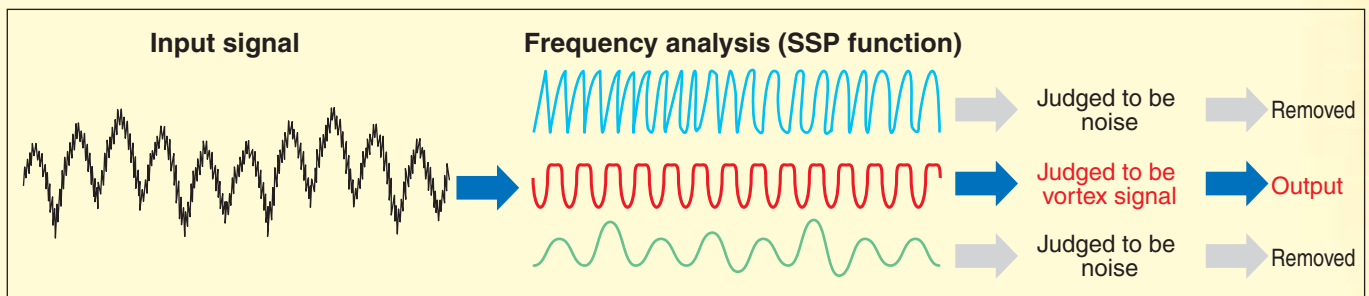
Noise caused by strong piping vibration may affect the accuracy of vortex frequency detection. The two piezoelectric elements installed in digitalYEWFO are of a polarized structure, so they do not detect vibration in the flow or vertical directions. The noise of vortex (lift)-direction vibration is reduced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



digitalYEWFO's SSP function provides enhanced vibration immunity and advanced diagnostics.

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

digitalYEWFO 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 digitalYEWFO 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.



Specification

	Standard	Reduced Bore	Multi-Variable
Model & Suffix Code	Model DY Vortex Flowmeter (Integral type, Remote type) Model DYA Vortex Flow Converter	Suffix Code: /R1, /R2	Suffix Code: /MV
Fluid to be measured	Liquid, Gas, Steam (Avoid multiphase flow and sticky fluids.)		
Nominal size	15 mm - 300 mm (400 mm: special)	R1: 25 mm - 200 mm, R2: 40 mm - 200 mm	25 mm - 200 mm
Accuracy	Liquid: $\pm 1.0\%$ of reading ($20000 \leq Re \leq Dx10^3$) Liquid: $\pm 0.75\%$ of reading ($Dx10^3 \leq Re$) Gas, Steam: $\pm 1.0\%$ of reading (Flow velocity less than 35 m/s) Gas, Steam: $\pm 1.5\%$ of reading (Flow velocity 35 m/s - 80 m/s)	Liquid: $\pm 1.0\%$ of reading ($20000 \leq Re$)	Liquid: $\pm 1.0\%$ of reading ($20000 \leq Re \leq Dx10^3$) Liquid: $\pm 0.75\%$ of reading ($Dx10^3 \leq Re$)
Output signal	Dual Output (both analog and transistor contact output can be obtained simultaneously) Analog Output: 4-20 mA DC, 2-wire system Transistor Contact Output: Open collector, 3-wire system Pulse, Alarm, Status output are selectable. Contact rating: 30 V DC, 120 mA DC Low level: 0 to 2V DC		Indication: Upper: FLOWRATE(%), FLOWRATE, *TEMPERATURE(%) Lower: BLANK, TOTAL, *TEMPERATURE *Options available for Multi-variable Type only
Process temperature range	-29°C - 260°C (general) -196°C - 100°C (option: Cryogenic version) -29°C - 450°C (option: High Process Temperature version)	← Available ← Not available ← Available	← Available ← Not available ← Not available
Process pressure limit	-0.1MPa(-1kg/cm ²) to flange rating. -29°C - 80°C (Integral type with Indicator)		
Ambient temperature	-29°C - 85°C (Remote type detector) -30°C - 80°C (Remote type converter with Indicator)		
Ambient humidity	5 to 100%RH (Non condensing)		
Mounting	Integral type and Remote type detector: Flange mounting or wafer mounting Remote type converter: 2 inch pipe mounting JIS10/20/40, ANSH150/300/600/900, JPI150/300/600, DIN PN10/16/25/40	Flange mounting only JIS10/20K, ANSI 150/300, JPI150/300	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
Electrical connection	JIS G1/2 Female, ANSI 1/2NPT Female, ISO M20×1.5 Female		
Explosion protected type	TIIS F.P., FM E.P./I.S., CENELEC ATEX (KEMA) E.P./I.S./type n, CSA E.P./I.S., SAA E.P./I.S., SAA E.P./I.S.		
Material	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		

Reduced Bore Type

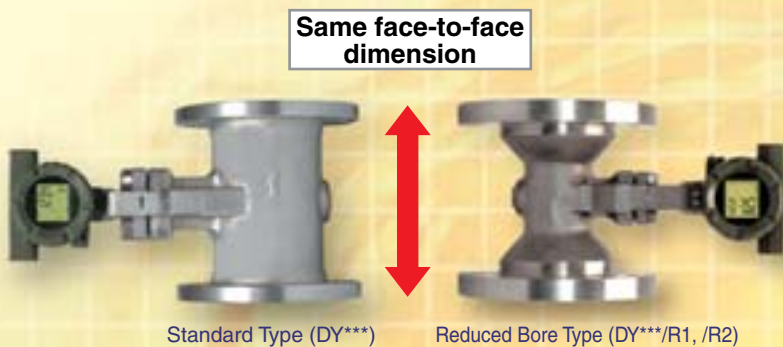
Minimum measurable flow up to five times lower than conventional vortex flowmeter.
Integrated construction with reducers built into the flowmeter body.



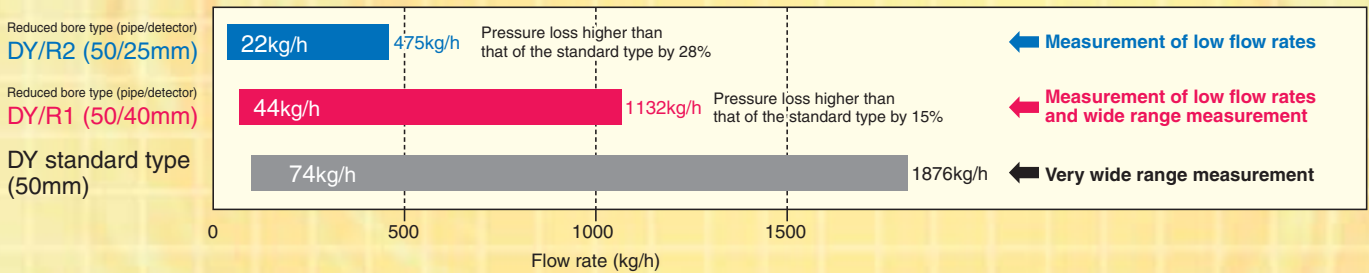
Integrated construction allows for size reduction up to 2 sizes smaller

- 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 YEWFLOW*E (Style E).



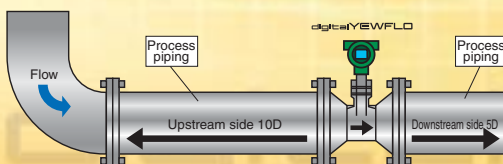
Measurable Flow Rate Range (saturated steam: normal pressure 500 kPa)



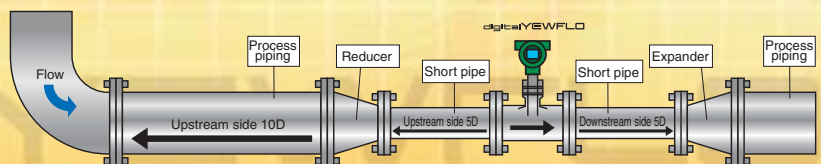
Lower Cost of Ownership

- ◆ 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.

New instrumentation using Reduced Bore Type



Traditional instrumentation

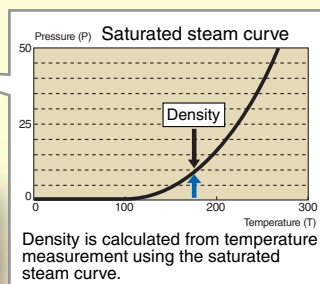


Multi-variable Type

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.

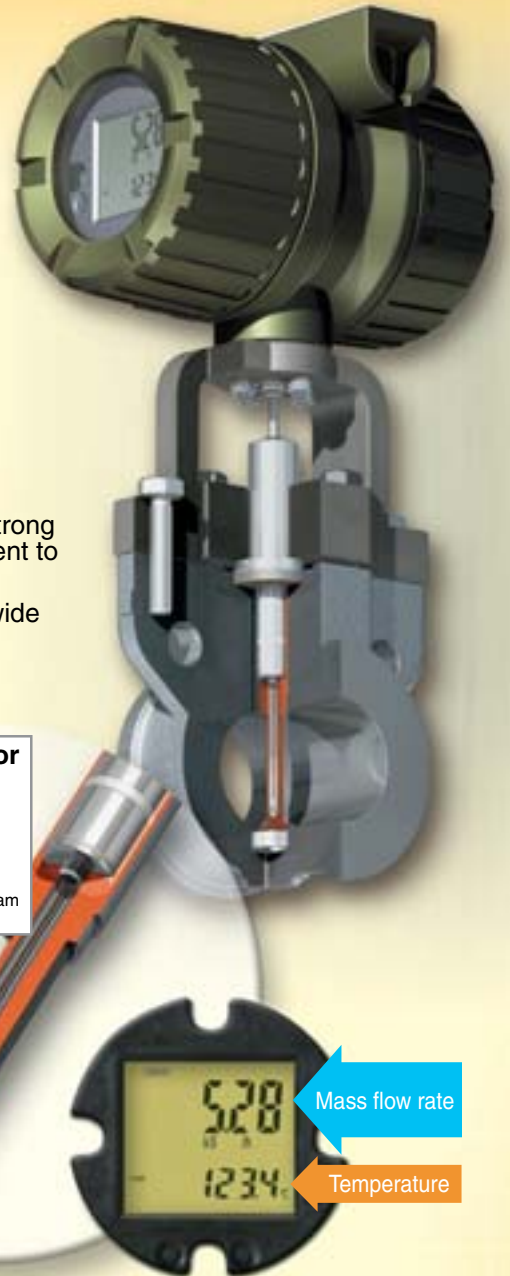
- Shedder bar with built-in temperature sensor: The shedder bar, which is strong enough to be used as a thermo-well, incorporates a RTD sensor (equivalent to Pt1000, Class A) for temperature measurement.
- SSP function facilitates highly accurate measurement of flow rate over a wide range, even under 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 Sensor

Built-in temperature sensor housed inside the shedder bar.

Based on signals from the temperature sensor, which is protected by the shedder bar serving as a protector tube, the mass flow rate of saturated steam is calculated.



Temperature monitoring function

Readings of flow rate and temperature measurements are displayed simultaneously.

- Volumetric flow rate or mass flow rate (Pulse output) ⇒ Totalized value
- Temperature value (analog) ⇒ Process temperature value control

Mass flow rate calculation function

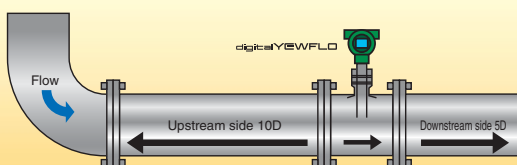
The saturated steam curve based on temperature measurement is used to directly output mass flow!

- A single digital YEWFLOW 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.

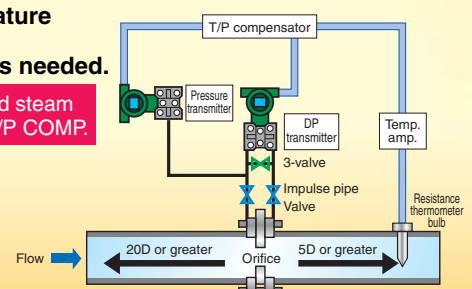
Lower Cost of Ownership

- ◆ 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.



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Represented by:

Printed in Japan, 702(KP) [Ed : 01/b]