CAT.No.CBT003E-4



EX TURBINE

INDUSTRIAL TURBINE METER



Based on the theoretical analysis in fluid dynamics and experimental approaches in the field of liquid flow measurement,

"EX TURBINE" series was developed for high accuracy and durability for a wide range of viscosities. For example, petroleum products in general, liquefied gas, chemical products and water applicable to process control, and loading/ unloading systems for general fluid flow management.



EX TURBINE is compatible with a wide choice of receiving instruments available for other types of OVAL flowmeters. We also supply converters equipped with a local totalizer or indicator for monitoring at the point of measurement.



Integrally-mounted LCD total counter Model PA14S

A converter with cumulative digital total counter and resettable counter. The total count is retained to an internal non-volatile memory (EEPROM) as backup.



Integral type

Separate type

GENERAL SPECIFICATIONS

Item		Description				
Nominal size		15 to 50mm			80 to 400mm	
Model		Low temp.	Standard	High temp.	Standard (High)	High viscosity
Flow range		1 to 54m ³ /h	0.63 to 54m ³ /h	1 to 54m ³ /h	10 to 4500m ³ /h	45.2 to 4500m ³ /h
Kinematic viscosity		Than 1mm ² /s				Than 10mm ² /s
Operating temp. range		–200 to –30°C	–30 to +120°C	120 to 300°C	–30 to +300°C	
Max. operating pressure		Depends on flange rating.				
Linearity		±0.15% or ±0.35%				
Converter	Display	Without display or total count				
	Output	Pulse or analog				
		(Pulse only for model w/totalizer; analog only for model w/analog instant. output)				
	Power supply	12 to 45V DC				
	Construction	Non-explosionproof or explosionproof				

Aiming at an ideal turbine meter design

With low pressure loss, long service life and a wide range of acceptable fluids, two types available to choose from.

Standard EX TURBINE

Features

- ①A high degree of accuracy
- Linearity to ±0.15% in the most demanding application.
- ②Low pressure drop saves energy.
- ③High resolution and consistent accuracy over many years' service.
- (4) The turbine rotor made up with the latest precision-machining techniques features interchangeability.
- ⑤Fine ceramics and tungsten-carbide alloy are used for rotor bearings to increase durability.

OVAL

Front Support -----

This front member is used for up-

stream flow pattern conditioning,

maintaining effective rotation of the

rotor elements. For medium and large

EX TURBINE, a defuser is provided

to achieve ideal velocity distribution.

⑥A broad operating range from −200°C to +300°C.

EX TURBINE for high viscosity service

Operating Principle and Construction

Features

- Introduction of a shroud ring permits precise liquid flow measurement in low Reynolds number regions.
- ②A high frequency of pulses generated per rotor revolution benefits meter testing with the master, such as a pipe prover.
- ③Linearity to±0.15% or better..... desirable in the accounting field.
- ④Rotor blades paper-thin yet sturdy enough thanks to a double-ended shroud ring, and shaped to give a helical surface area reduce pressure loss more than the traditional cantilever, or single-ended, blades.

EX TURBINE measures the process fluid flowing across it with a rotor turning freely on its shaft which is fixed parallel to the flow path. As the rotor turns proportional to the flowrate, this rotational frequency is electrically picked up to obtain the flowrate information. Due to the marked difference in nominal diameter/ flowrate, the small and medium size EX Turbine meters have bearings and support members designed to minimize their cross sectional area, whereas the medium and large size EX Turbine meters are so designed to increase rotor blade rigidity relative to their diameter to achieve precise flow measurement in low Reynolds number regions.

--••Converter

Voltage signals generated from an electromagnetic pickup are amplified and modulated and then transmitted to a receiving instrument. A direct-reading local display is also available upon request.

-Pickup

Senses the rotation of the rotor in the form of voltage pulses proportional to actual flowrate.

- • Rotor

Rotor blades, ideally shaped into a helical surface area, are characterized by exceptionally stable performance characteristics.

For medium and large sized EX Turbine, rotor blades are secured to a shroud ring at their free ends to improve rigidity, making possible the metering of high-viscosity fluids. The design also serves to increase the rate of generated pulses.

-----•Rear Support

This member serves to straighten turbulent flows with swirl created immediately past the rotating rotor.

Rotor shaft and Bearings

Taking into consideration the corrosion and abrasion resistance, the small size EX TURBINE uses tungstencarbide alloy, while the medium and large size EX TURBINE use stainless steel combined with tungsten-carbide alloy.

In addition, our hydraulic balance system eliminates the thrust drag acting on the bearings.

HYDRAULIC BALANCE

The rotor hub diameter is smaller than that of the rear support in our design, resulting in a greater sectional area of the flow path around the rotor hub and a reduction in flow velocity. As a result, a pressure (ΔP) acting on the reverse face of the rotor, opposite to the flow direction, appears to cancel out the thrust force (Ps) acting on the shaft.



Meter Body-----

Made of stainless steel for outstanding corrosion resistance. Has adequate strength as a pressure vessel.

APPLICATIONS

EX TURBINE exhibits desirable meter error characteristics comparable to the OVAL PD flowmeter. Small in physical size, yet flexible enough to handle large quantities of the process fluid. These benefits are all the more remarkable when you note how it works in high Reynolds number regions.



LPG loading control for tank trucks

EX Turbine is ideally suited for metering low viscosity liquids, such as LPG. Tank truck loading service, in particular, is one of its applications where linearity to $\pm 0.15\%$ and long-term maintenance-free operation are required as essential conditions.

The EX Turbine is the right answer to meet both of these needs.



Calibration to establish and maintain EX Turbine accuracy

OVAL employs world's top flowmeter calibration facilities, including pipe provers, which are traceable to the established international standards, for proving EX Turbine meters, and for simulating actual user conditions with water, oil, or any other fluids. Inferentialtype meters, including the EX Turbine, are generally effected of the given operating conditions. We therefore conduct stringent meter error testing before every EX Turbine leaves our factory to insure its stated performance under customer's particular operating conditions.

The specification as of October, 2015 is stated in this catalog. Specifications and design are subject to change without notice



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