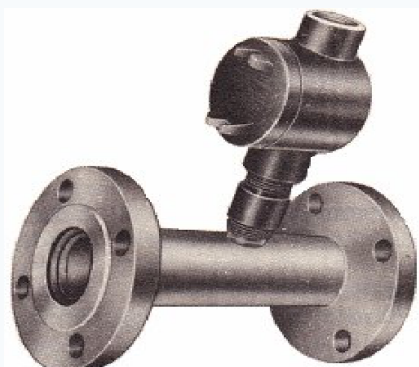


IE Turbine Flow Meters

TURBINE FLOWMETERS

Description

Parity Turbine Flowmeters The IE Parity Turbine Flowmeter line exemplifies all the proven and known advanced techniques in the Art of Measurement by the Turbine Principle. The meter's clean lines and simple configuration of components assure higher flow rates, extended flow range and sustained performance capability. The Parity Turbine Flowmeter is designed for use within the guidelines of API Standard 2534. (The Measurement of Liquid Hydrocarbons by Turbine Meter Systems), and the test procedures of API Standard 2531, (Mechanical Displacement Meter Provers). **ML Turbine Flowmeters** The IE ML Turbine Flowmeter is a self contained volumetric flow measuring device with the exclusive capacity of primary electrical output for registration, instrumentation and control. Combined in one compact package, the ML Turbine Flowmeter offers the advantages of both the positive displacement meter and turbine meter. It has excellent performance capacity and reliability and its compact size, high flow rates and broad flow ranges are typical of turbine flowmeter.



IE TURBINE FLOW METERS

Design Features

- Output linear with flow rate
- Rangeability 5 to 1 (4" ML) & 7 to 1 (1/2" Parity). 10 to 1 (3/4" through 6" Parity, 6" ML Turbine)
- Explosion proof amplifier housing
- Superior accuracy and repeatability
- Compact design
- Low maintenance cost – few moving components, no lubrication required, readily accessible for service
- Carbon-graphite bearing (Industrial/Instrument grade turbines) – no lubrication required
- Tungsten Carbide bearings (High accuracy grade turbines) – no lubrication required
- Variety of readout instruments available
- Dual output capacity – electrical (ML Turbine)
- Magnetic coupling drive sealed line fluid (ML Turbine)
- No stuffing boxes, packing glands or dynamic O-ring seals (ML Turbine). Series 2900 Parity Turbine Flowmeter with NPT Threaded Connections. Series 2900 Parity Turbine Flowmeter with ANSI R.F. Flanged Connections ML Turbine Flowmeter (With Optional Condulet)



PRINCIPLE OF OPERATION

PARITY TURBINE FLOWMETERS

IE Parity Turbine Flowmeters are volumetric flow measuring and transmitting devices that produce output signals directly proportional to the flow rate of the liquid product being measured.

The primary output of the 1/2" size is a high resolution signal that is amplified and shaped by an integral amplifier built into the reluctance type, motion sensing pick-off. The resulting output is a 0-10 Vdc square wave pulse.

The primary output of the 3/4" through 6" sizes is a 15mv. R.M.S. minimum pulse emanating from a reluctance type, magnetic pick-off. With the addition of an optional, direct mounted, explosion-proof preamplifier, this wave pulse can be shaped and fed directly to totalizing counters, digital readout devices or process control equipment. All sizes of the Parity Turbine Flowmeters can accommodate up to two pick-offs.

ML TURBINE FLOWMETERS

ELECTRICAL

The flow of liquid product through the meter turns the meter's rotor assembly. The passage of the rotor shroud through a magnetic field generates an electrical signal which is immediately amplified and shared by an amplifier mounted directly on the meter. This wave pulse can then be fed directly to the desired instrumentation for readout or control. The ML Turbine Flowmeter accommodates up to two primary electrical signals.

APPLICATIONS

1/2" THROUGH 2"

A small, economical meter, the Parity Turbine Flowmeter is engineered for a wide range of applications and can be used on fuel metering systems, chemical and petroleum products, and other industrial applications requiring low cost and accurate flow measurement. It is also available for use on corrosive liquids.

3" THROUGH 6"

PIPELINE CONTROL:

Custody Transfer – tanker and barge loading – unloading – product loss control – security (safety) – accounting – sales – tax.

BLENDING:

Medium and light crude oils and finished (hydrocarbon) products.

SPECIFICATIONS

CAPACITIES:

Parity Turbine Industrial/Instrument grade (1/2" through 2")
 - Refer to Table 1

Parity Turbine High Accuracy grade (3/4" through 6")
 - Refer to Table 2

ML Turbine (4" and 6") – Refer to Table 3

PERFORMANCE

Meter

Accuracy/Linearity

Industrial Grade: = +/- 1.0% of flow rate on viscosity between 0.3 and 3 centistokes. (1/2" through 2" meters)

Instrument Grade: = +/- 0.5% of flow rate on viscosity between 0.3 and 3 centistokes. (3/4" through 2" meters).

High Accuracy Grade: = +/-0.25% of flow rate on viscosity between 0.3 and 3 centistokes. (3/4" through 2" meters)

High Accuracy Grade: = +/-0.15% of flow rate (3" through 6" meters).

Flow Range

5 to 1 (4" ML Turbine)

7 to 1 (1/2" Parity turbine)

10 to 1 (3/4" through 6" Parity, 6" ML Turbine)

Repeatability

Industrial/Instrument Grade: +/- 0.05% (1/2" through 2" meters)

High Accuracy Grade: +/- 0.02% (3/4" through 6" meters)

Pressure Ratings

MS and NPT Meters

Industrial/Instrument Grade: 5,000 PSI (34,500 kPa) maximum (1/2", 3/4" and 1" sizes)

Industrial/Instrument Grade: 3,500 PSI (24,150 kPa) maximum (1-1/2" and 2" sizes)

High Accuracy Grade: 3,000 PSI (20,700 kPa) maximum (3/4" through 2" sizes).

ANSI Flanged Meters:

Flowmeters from 1/2" through 6" sizes are available with ANSI B16.5 R.F. flanges.

Standard: 150 lb. through 600 lb.

Optional : 900 lb. through 2500 lb.

ANSI Pressure/Temperature corresponding to flanges used.

Temperature:

Industrial/Instrument Grade (1/2" through 2") Motion sensing pick-off with built-in amplifier:
 -40° F to +230 °F (-40 °C to +110 °C)

Magnetic pick-off:
 -100° F to +225 °F (-73 °C to +107 °C)

High temperature Magnetic pick-off
 -100° F to +450 °F (-73 °C to +232 °C)

High Accuracy Grade (3/4" through 2")
 Standard magnetic pick-off:

-100° F to +500 °F (-73 °C to +260 °C)

Low temperature magnetic pick-off:
 -350° F to +100 °F (-212 °C to +38 °C)

High Temperature magnetic pick-off:
 -0° F to +660 °F (-18 °C to +316 °C)

High Accuracy Grade (3" through 6")

Standard magnetic pick-off:
 -20° F to +180 °F (-29 °C to +82 °C)

Low temperature magnetic pick-off:
 -30° F to +400 °F (-34 °C to +204 °C)

Extreme low temperature pick-off: (SS meters only):
 -350° F to +400 °F (-212 °C to +204 °C)

ML Turbine

Standard: -20° F to +180 °F (-29 °C to +82 °C)

Optional : -30° F to +400 °F (-34 °C to +204 °C)

Pick-off

Motion sensing pick-off with built-in amplifier:

Standard: 1/2" meter

Optional: 3/4" through 2" Industrial/Instrument grade meters

Power required: 10-18 Vdc at 20mA (quiescent)

Frequency Range: 1-2000 Hz

Output Signal: 0-10 volt, square wave dc pulse, 20mA dc into a 500 ohm load (12 Vdc)

Output Impedance: 200 ohm effective

Magnetic pick-off, Low and High temperature magnetic pick-offs:

Standard: Magnetic pick-off 3/4" through 2" meters

Optional: High temperature pick-off 3/4" through 2" meters. Low temperature pick-off 3" through 6" meters.

Output Signal: 15 mV R.M.S. minimum at minimum flow rate. Maximum AC voltage varies with meter size, up to a maximum of 8 Vac for a 2" meter.

Preamplifier

Preamplifier is optional for 3/4" through 6" meters (not available for 1/2" size meter)

Power required: 6-26 Vdc at 20 mA minimum

Input Sensitivity: 5 mV peak-to-peak at 5Hz

Frequency Range : 4 to 10000 Hz

Output Signal: 0 to 5 volts pulsating dc TTL Logic Signal
 Transmitting range up to 3000 feet (914 meters) with Belden 8770, 3 Conductor Shielded, 18 Gauge Stranded cable terminated into 4.7K ohm load. Signal transmission less preamp not to exceed 300 feet (91.4 m)

Temperature : -30° F to +180 °F (-34 °C to +85 °C)

Materials of Construction:

Housing (1/2" through 2"): 316 Stainless Steel

(3" through 6"): Standard: Steel,

Optional: 316 Stainless Steel.

Flanges: (1/2" through 2"): 316 Stainless Steel (3" through 6"):

Standard: Steel, Optional: 316 Stainless Steel

Internals: (1/2" through 4" Parity): Stainless Steel (4", 6" ML and 6" Parity): Standard: Stainless Steel and Aluminium, Optional: All Stainless Steel

Bearings: (Industrial/Instrument Grade 1/2" through 2"): Carbon-Graphite (High Accuracy Grade 1/2" through 6"): Tungsten Carbide

Ball Bearing: (ML Turbine, Sealed from metered liquid and prelubricated for life at factory): Stainless Steel.

Connections:
Mechanical

Flowmeters from 1/2" through 2" sizes are available with MS tubing. NPT threaded connections

Flowmeters from 1/2" through 6" sizes are available with ANSI B16.5 RF flanges.

Electrical

Standard meter will be equipped with one reluctance type pick-off.

Standard:

1/2" meter, Motion sensing pick-off with built-in amplifier. Non-explosion proof with pigtail leads. 3/4" through 6" meters, Magnetic pick-off. Non explosion proof with two-pin type AN connector.

Optional:

3/4" through 2" Industrial/Instrument grade meters, Motion sensing pick-off with built-in amplifier. Non-explosion proof with pigtail leads. 3/4" through 2" meters, High temperature magnetic pick-off. Non-explosion proof with two-pin type AN connector.

3" through 6" meters, Low temperature magnetic pick-off. Non-explosion proof with two-pin type AN connector.

3/4" through 6" meters, Preamplifier with Class 1, Group D, Division 1, Explosion proof housing with terminal strip. 1/2" through 2" Industrial/Instrument grade meters, Class 1, Groups C & D, Division 1, Explosion proof Additional pick-off.

Note:

On meters with MS and NPT connections additional pick-off will be 180° mechanical. On flanged meters, additional pick-off will be mounted 90° electrical.

Rotor shroud – Standard 6" – Optional 3" and 4"

Recommended on 3" and 4" when metering products with viscosities above 4.3 centistokes.

TABLE 1 – CAPACITIES (1/2" THROUGH 2" INDUSTRIAL/INSTRUMENT GRADE PARITY TURBINES)

METER SIZE	LINEAR FLOW RANGE				EXTENDED FLOW RANGE		K FACTOR		PRESSURE DROP	
	MINIMUM		MAXIMUM							
	GPM	LPM	GPM	LPM	GPM	LPM	C/GAL	C/LIT	PSI	KPa
1/2"	1	3.8	7	26.5	--	--	13000	3435	12	83
3/4"	3	11.4	30	113.6	45	170.3	4250	1125	10	69
1"	6	22.7	60	227.1	88	333.1	975	258	8	55
1-1/2"	15	56.8	150	567.8	188	711.6	435	115	7	48
2"	25	94.6	250	946.3	325	1230.1	200	53	5	34

TABLE 2 – CAPACITIES (3/4" THROUGH 6" HIGH ACCURACY GRADE PARITY TURBINES)

METER SIZE	LINEAR FLOW RANGE				EXTENDED FLOW RANGE		K FACTOR		PRESSURE DROP	
	MINIMUM		MAXIMUM							
	GPM	LPM	GPM	LPM	GPM	LPM	C/GAL	C/LIT	PSI	kPa
3/4"	2	7.6	20	75.7	25	94.6	4200	1109	9	62
1"	7	26.5	70	265.0	88	333.1	900	238	14	97
1-1/2"	15	56.8	150	567.8	188	711.6	400	106	13	90
2"	30	113.6	300	1135.5	375	1419.4	180	48	14	97
3"	70	264.9	700	2649.5	910	3444.4	48	13	3	21
4"	129	488.3	1295	4901.6	1610	6093.9	24	6	3	21
6"	294	1112.8	2940	11127.9	3780	14307.3	24	6	3	21

TABLE 3 – CAPACITIES (4" and 6" ML TURBINES)

METER SIZE	LINEAR FLOW RANGE				EXTENDED FLOW RANGE		K FACTOR		PRESSURE DROP	
	MINIMUM		MAXIMUM							
	GPM	LPM	GPM	LPM	GPM	LPM	C/GAL	C/LIT	PSI	kPa
4"	259	980.3	1295	4901.6	1610	6093.9	24	6	3	21
6"	294	1112.8	2940	11127.9	4130	15632.0	24	6	3	21

Note: For larger sizes consult Factory

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