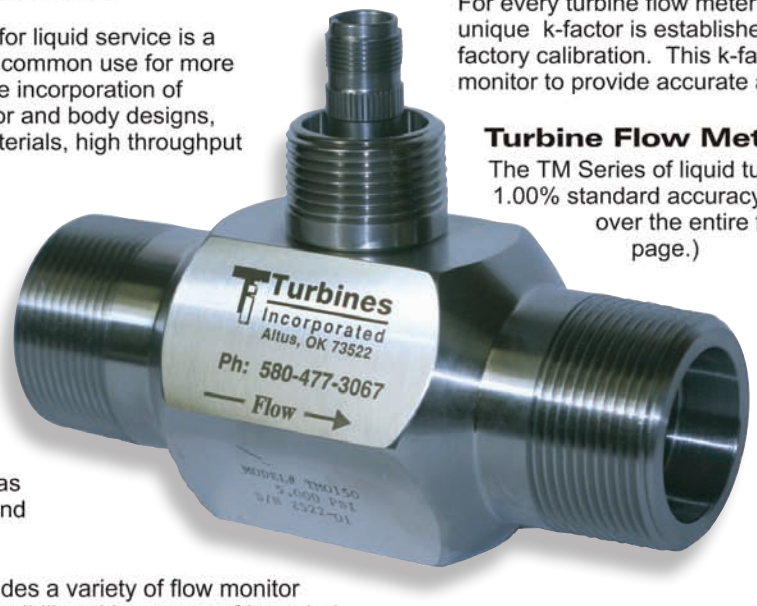
The Series TM Liquid Turbine Flow Meter

General Description

Turbines Incorporated is an original equipment manufacturer located in the United States of America, specializing in the design, marketing, sales, service and manufacture of a full line of high accuracy turbine type flow meters and associated flow monitor products and accessories.

The turbine type flow meter for liquid service is a technology that has been in common use for more than forty years, however the incorporation of improved bearing, shaft, rotor and body designs, higher quality alloys and materials, high throughput CNC machining capabilities, and vastly advanced electronics make the Turbines, Inc. turbine flow meter one of the most ideal, cost effective, accurate and repeatable flow metering devices available today. The turbine flow meter is widely used in numerous oilfield applications, as well as a broad range of industrial and commercial applications.



Turbines, Incorporated provides a variety of flow monitor options that offer ideal compatibility with a range of intended applications.

Operating Principle

The operating principle of the turbine flow meter is simple and straightforward. The meter consists of a precisely machined cylindrical body that serves as a conduit for the line fluid to be metered. Into this flow stream a specially designed and machined rotor is suspended axially by means of rotor supports and specially designed bearings (dependent on line fluid composition). The flowing line fluid causes the rotor to revolve at a rate that is directly proportional to the velocity of the line fluid. A pick-up coil (typically magnetic) is positioned externally in direct opposition to the location of the rotor, and perpendicular to the axis of rotation. The rotation of the rotor through the magnetic field causes electrical pulses that are "picked up" by the magnetic pick up and conducted to the secondary device (flow monitor, totaliser/indicator, SCADA system, etc.)

In this fashion, the number of pulses caused by the turbine flow meter defines a specific and unique flow rate. A properly designed and manufactured turbine flow meter will always produce the same number of pulses as a function of time for a given unique flow rate within the flow range of the meter, subject to the stated accuracy and repeatability.

Each individual turbine flow meter has a distinctive *k-factor* that defines the actual number of pulses per actual unit volume of line fluid. This factor may be different for each physical embodiment of the turbine meter, and must be experimentally determined in order to yield the stated accuracy and repeatability of the meter.

For every turbine flow meter manufactured by Turbines, Inc. A unique k-factor is established by means of NIST traceable factory calibration. This k-factor is then used to set the flow monitor to provide accurate and reliable readings.

Turbine Flow Meter Installation

The TM Series of liquid turbine flow meters provides +/- 1.00% standard accuracy, and is repeatable to +/-0.10% over the entire flow range (see table on next page.)

In order to assure this performance, it is necessary to install the turbine flow meter with adequate upstream and downstream straight piping, and the device must not be exposed to sudden acceleration (deceleration) nor may a liquid turbine flow meter be exposed to air (or gas flow) since so doing may cause bearings to wear prematurely.

The Turbines, Inc. standard product line consists of meters from 3/8" through 10" line sizes with end arrangements including NPT threaded, flanged, grooved, or wafer style (*see Series WM Turbines, Inc. wafer style turbine flow meters*.)

Turbines, Inc. maintains substantial inventories of In-Line and Wafer style turbine flow meters, however, flanged and grooved end are readily available, in most cases, on a day's notice. Any other non-standard configurations are gladly quoted on special request.

Materials of Construction

The design and manufacturing of the TM Series In-Line turbine flow meter for liquid service is the product of extensive engineering and design work, skilled and experienced machinist and assembly operations, and top quality, certified materials. The product is manufactured in our climate controlled modern ISO 9001 certified facility in Altus, Oklahoma, and the continued satisfaction of our customers contributes to the steady growth of the company as well as the reputation for quality, service, and price that has become the trademark of Turbines, Inc.

Please see reverse side

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Series TM
In-Line Liquid Turbine Flow Meter and Retro-Fit Kits

TECHNICAL DATA
TURBINES INCORPORATED ALTUS OKLAHOMA USA

TURBINESDOC: 4000-Rev-00

Materials of construction are as follows:

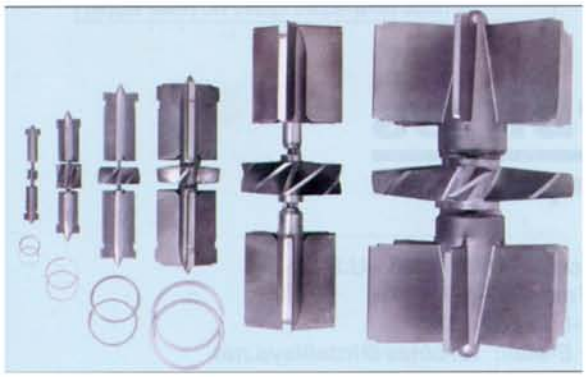
Meter Body: 316 Stainless Steel
Rotor Supports: 316 Stainless Steel
Meter Rotor: 416 Stainless Steel
Rotor Shaft: Tungsten Carbide
Sleeve Bearing: Tungsten Carbide

Retro-Fit Kits

The nature of the turbine flow meter dictates that after a period of service, the inevitable wear on the rotor blade demands that the rotors be replaced. For this purpose, Turbines, Inc. provides a complete line of Retro-Fit Kits that are easily field installed, and include the rotor, rotor supports, bearings and shaft, as well as the retaining rings.

Our kits are extremely cost effective, and they also fit into the bodies of most competitors' turbine flow meters, making Turbines, Inc. the retro-fit kit supplier of choice for major users.

Turbines, Inc. Also offers factory refurbishment with a 1 day turnaround time guaranteed that includes the freight, the retro-fit kit, shop labor and new calibrated k-factor!



SERIES TM - LIQUID TURBINE FLOW METER AND RETRO-FIT KITS

Turbine TM Model No:	Retro-Fit Kit Model No:	Flow Meter I.D. (inches)	Standard End Connection Spec.	Flow Range (gpm)	Flow Range (bpd)	Flow Range (lpm)	Flow Range (m3d)	Accuracy/ Repeatability	Max. Pressure (psi)
TM 0038	TK 0038	3/8"	1 x 1 male NPT	0.3 - 3	10 - 100	1.14 - 11.36	1.6 - 16	+/- 2.0 % +/- 0.10%	5000
TM 0050	TK 0050	½"	1 x 1 male NPT	0.75 - 7.5	25 - 250	2.84 - 28.39	4 - 40	+/- 1.0 % +/- 0.10%	5000
TM 0075	TK 0075	3/4"	1 x 1 male NPT	2 - 15	68 - 514	7.57 - 56.78	11 - 80	+/- 1.0 % +/- 0.10%	5000
TM 0078	TK 0078	7/8"	1 x 1 male NPT	3 - 30	100 -1,000	11.36 - 113.56	16 - 160	+/- 1.0 % +/- 0.10%	5000
TM 0100	TK 0100	1.0"	1 x 1 male NPT	5 - 50	170 - 1,700	18.93 - 189.27	27 - 270	+/- 1.0 % +/- 0.10%	5000
TM 0150	TK 0150	1-1/2"	1-1/2 x 1-1/2 male NPT	15 - 180	515 - 6,000	56.78 - 681.35	80 - 1,100	+/- 1.0 % +/- 0.10%	5000
TM0200L	TK0 150	1-1/2"	2 x 2 male NPT	15 - 180	515 - 6,000	56.78 - 681.35	80 - 1,100	+/- 1.0 % +/- 0.10%	5000
TM 0200	TK 0200	2"	2 x 2 female NPT	40 - 400	1,300 - 13,000	151.41 - 1514.12	210 - 2,100	+/- 1.0 % +/- 0.10%	5000
TM 0300	TK 0300	3"	3" Grooved End	60 - 600	2,100 - 21,000	227.12 - 2271.18	320 - 3,200	+/- 1.0 % +/- 0.10%	800
TM 0400	TK 0400	4"	4" Grooved End	120 - 1,200	4,100 - 41,000	454.24 - 4542.36	654.12 - 6.541.18	+/- 1.0 % +/- 0.10%	800
TM0 600	TK 0600	6"	6" Grooved End	250 - 2,500	6,800 - 85,700	757.06 - 9,463.25	1,362 - 13,627.50	+/- 1.0 % +/- 0.10%	800
TM 0800	TK 0800	8"	8" Grooved End	350 - 3,500	12,000 - 120,000	1,324.85 - 13,248.57	1,907.84 - 19,078.47	+/- 1.0 % +/- 0.10%	800
TM 1000	TK 1000	10"	10" Grooved End	500 - 5,000	17,143 - 171,423	1,892.65 - 18,926.53	2,725.43 - 27,254.96	+/- 1.0 % +/- 0.10%	800

PLEASE NOTE:

1.) **Magnetic Pick-up(standard service) is included with each turbine flow meter at No Extra Charge!**
2.) **Flanged or Grooved End Connection available on all meter sizes. Please call.**
3.) **Standard Service Temperature Range: -100° to +300° F.**

QMI REGISTERED ISO 9001:2000

Our Quality Managment System is registered to ISO 9001:2000 And AS: 9100 Compliant

Turbines Inc.™
FLOW METERS FOR INDUSTRY, OIL & GAS, and BUSINESS

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