

The Series WM Wafer Style 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 over forty years, however 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 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, totalizer/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 WM 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.)

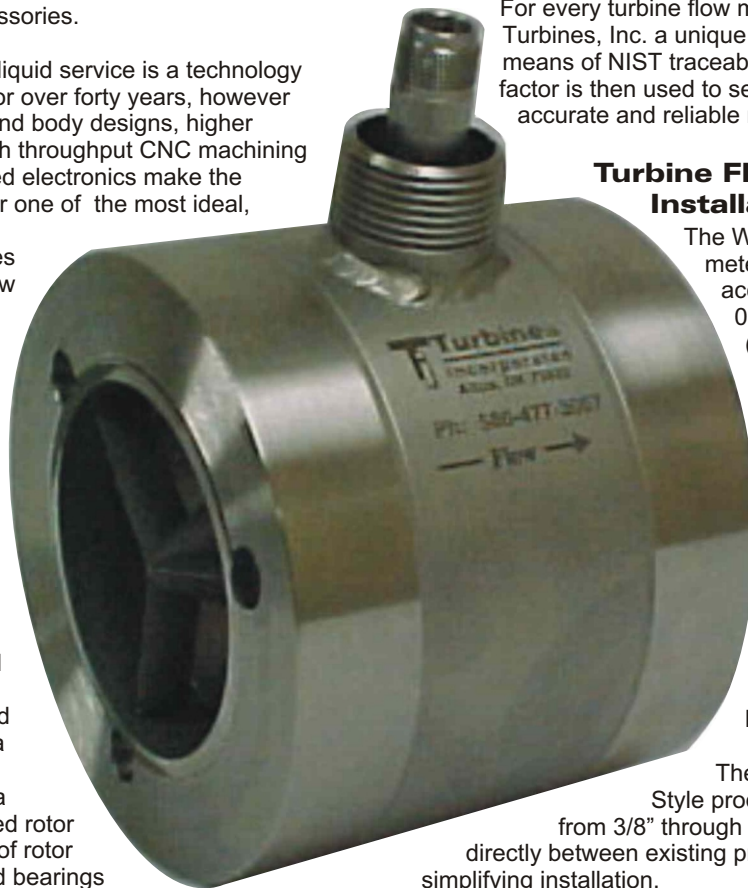
In order to assure this performance, it is necessary to install the turbine flow meter with adequate upstream and downstream straight piping, and the device must not be exposed to sudden acceleration (deceleration) nor may a liquid turbine flow meter be exposed to air (or gas flow) since so doing may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

The Turbines, Inc. standard Wafer Style product line consists of meters from 3/8" through 10" line sizes that mount directly between existing process piping flanges, thereby simplifying installation.

The service pressure capabilities for any standard Turbines, Inc. Wafer style meters is 3700 psi, although the specific limitations are defined by the mating flange pressure ratings of the process piping.

Materials of Construction

The design and manufacture of the WM Series Wafer 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.



Series WM

Wafer Liquid Turbine Flow Meter and Retro-Fit Kits

TECHNICAL DATA

TURBINES INCORPORATED ALTUS OKLAHOMA USA

TURBINESDOC: 4001-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

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!

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.



SERIES WM - WAFER STYLE LIQUID TURBINE FLOW METER AND RETRO-FIT KITS

Turbine WM Model No:	Retro-Fit Kit Model No:	End Connection Size (inches)	Flow Range (gpm)	Flow Range (bpd)	Flow Range (lpm)	Flow Range (m3d)	Accuracy/ Repeatability	Max. Pressure (psi)
WM0038 X 1 WM0038 X 2	WK0038 X 1 WK0038 X 2	3/8" x 1" 3/8" x 2"	0.3 - 3	10 - 100	1.14 - 11.36	1.6 - 16	+/- 2.0 % +/- 0.10%	3,700
WM0050 X 1 WM0050 X 2	WK0050 X 1 WK0050 X 2	1/2" x 1" 1/2" x 2"	0.75 - 7.5	25 - 250	2.84 - 28.39	4 - 40	+/- 1.0 % +/- 0.10%	3,700
WM0075 X 1 WM0075 X 2	WK0075 X 1 WK0075 X 2	3/4" x 1" 3/4" x 2"	2 - 15	68 - 514	7.57 - 56.78	11 - 80	+/- 1.0 % +/- 0.10%	3,700
WM0078 X 1 WM0078 X 2	WK0078 X 1 WK0078 X 2	7/8" x 1" 7/8" x 2"	3 - 30	100 - 1,000	11.36 - 113.56	16 - 160	+/- 1.0 % +/- 0.10%	3,700
WM0100 X 1 WM0100 X 2	WK0100 X 1 WK0100 X 2	1" x 1" 1" x 2"	5 - 50	170 - 1,700	18.93 - 189.27	27 - 270	+/- 1.0 % +/- 0.10%	3,700
WM0150 X 2	WK0150 X 2	1-1/2" x 2"	15 - 180	515 - 6,000	56.78 - 681.35	80 - 1,000	+/- 1.0 % +/- 0.10%	3,700
WM0200 X 2	WK0200 X 2	2" x 2"	40 - 400	1,300 x 13,000	151.41 - 1,514.12	210 - 2,100	+/- 1.0 % +/- 0.10%	3,700
WM0300 X 3	WK0300 X 3	3" x 3"	60 - 600	2,100 - 21,000	227.12 - 2271.18	320 - 3,200	+/- 1.0 % +/- 0.10%	3,700
WM0400 X 4	WK0400 X 4	4" x 4"	120 - 1,200	4,100 - 41,000	454.24 - 4542.36	654.12 - 6,541.18	+/- 1.0 % +/- 0.10%	3,700
WM0600 X 6	WK0600 X 6	6" x 6"	200 - 2,500	6,800 - 85,700	757.06 - 9,463.25	1,090.20 - 13,627.50	+/- 1.0 % +/- 0.10%	3,700
WM0800 X 8	WK0800 X 8	8" x 8"	350 - 3,500	12,000 - 120,000	1,324.85 - 13,248.57	1,907.84 - 19,078.47	+/- 1.0 % +/- 0.10%	3,700

PLEASE NOTE:

- 1.) Magnetic Pick-up (standard service) is included with each turbine flow meter at No Extra Charge!
- 2.) ACTUAL WORKING PRESSURE DETERMINED BY FLANGE RATING!
- 3.) Standard Service Temperature Range: -100° to +300° F.

ANSI flange size	Working Pressure in PSI	
	Carbon Steel	Stainless Steel
CL-150	285	230
CL-300	740	600
CL-600	1,480	1,200
CL-900	2,200	1,800
CL-1500	3,705	3,000

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PLEASE NOTE: Use this data as general application guidance for the equipment and/or services referenced herein. Users may reasonably expect this disclosure to constitute an accurate factual representation at the time of publication, however all data and specifications contained herein are subject to change without prior notice. CONTACT MANUFACTURER AT TIME OF ORDER FOR CURRENT SPECIFICATIONS.



Turbines Inc.TM
 Highway 283 North Altus, OK USA 73522
 Ph: 5 80-477-3067 Fax: 5 80-477-3071
 1-800-809-1387
 www.turbinesinc.com