

Turbo Pro™ Multivariable Flowmeter

Model Pro-TI™ Inline Turbine Mass Flow Meter

BESTOBELL
AQUATRONIX

www.bestobell.com

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VorTek Instruments' Model Pro-TI™ flowmeters utilize a turbine sensor to measure the mass flow rate of gases, liquids and steam. They are easily installed with flanged, wafer, male NPT, grooved, flare, and tri-clamp process connections in any pipe size from 3/8 inch to 12 inches. Integrating multivariable input capability with a single line penetration also simplifies system complexity and helps reduce initial equipment cost, installation cost and maintenance costs.

TurboPro™ Model Pro-TI™ provides excellent rangeability and can measure very low flow rates with negligible permanent pressure drop. To simplify installation and commissioning, all measured variables and programming menus are available on the instrument's easy to use display and control pad.

The product line is available with a wide range of options and meter configurations to meet your specific application requirements.

Pro-TI™ Advantage:

- Volumetric or mass flow monitoring of most liquids, gases, and steam
- Mass flow equations for liquids, gases, and steam
- Energy monitoring capabilities to compute use and output
- Easy to install and commission
- High accuracy with rangeability up to 17:1
- Temperature -450 to 850°F
- Pressure up to 20,000 psig
- Inline configuration for pipe sizes 3/8" to 12" (DN10 to DN300)
- Field configurable ranges, outputs and displays
- Remote electronics option available for use in harsh environments or locations with limited access
- 4-20mA loop-powered Mass Meter design saves on energy costs
- HART protocol communications - Standard
- Modbus, BACnet, and IP communications available



VorTek
INSTRUMENTS
VorTek Instruments, LLC

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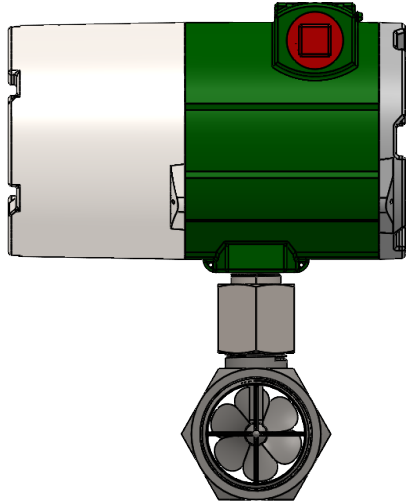
Longmont, CO 80504 USA

Tel: 303/682-9999 Fax: 303/682-4368

info@vortekinst.com

TurboPro™ Principle of Operation

Inline turbine flow meters measure flows of liquid, gas, and steam by detecting the frequency of rotation of the turbine blades. According to the proven laws of physics, the frequency at which the turbine rotates is directly proportional to the flow velocity. It uses the local velocity, along with other parameters such as fluid type, pipe size, and Reynolds Number to calculate the average pipe velocity, and consequently, the volumetric flow rate



TurboPro™ Model PRO-TI™-V

The Model Pro-TI™-V delivers a direct reading of volumetric flow rate –generally the most cost-effective solution for gases, liquids, and steam flow monitoring– in applications ranging from general water flows to hydrocarbon fuel flow measurement.

TurboPro™ Model PRO-TI™-EM

The Model Pro-TI™-EM Energy Monitoring option permits real-time calculation of energy consumption for a facility or process. The meter can be programmed to measure steam, hot water or chilled water. The Model Pro-TI™-EM flowmeter monitors one side of the process, either sent or returned, and uses the external input from a second separate temperature sensor on the opposite leg of the process to calculate the change in energy. Selectable energy units include BTU, joules, calories, Watt-hours, Megawatt-hours and Horsepower-hours. The local or remote electronics indicate two temperatures, delta T, mass total and energy total.

TurboPro™ Model PRO-TI™-VET-EM

Similar to PRO-TI™-EM but with the option for an additional external input (T) via RTD.

Performance Specifications

Accuracy

Mass flow rate for gas and steam based on 50-100% of pressure range.

Model PRO-TI™ Multiparameter Inline Turbine Meter		
Process Variables	Liquids	Gas & Steam
Volumetric Flow Rate	± 1.0% of Rate	± 1.0% of Rate
Mass Flow Rate	± 1.5% of Rate	± 2.0% of Rate
Density	± .3% of Reading	± .5% of Reading

Repeatability

Mass Flow Rate.....± .2% of rate
 Volumetric Flow Rate.....± .1% of rate
 Density.....± .1% of reading

Stability Over 12 Months

Mass Flow Rate.....± .2% of rate
 Volumetric Flow Rate.....± negligible
 Density.....± .1% of reading

Response Time

Adjustable from 1 to 100 seconds.

Operating Specifications

Any gas, liquid, or steam compatible with 316L stainless steel and other listed materials. Not recommended for multi-phase fluids.

Process and Ambient Temperature

Process Standard Temperature (code ST): -100 to 450°F (-73 to 232°C)
 Process High Temperature (code HT): -450 to 850°F (-267 to 454°C)
 Ambient Operating: -40 to 140°F (-40 to 60°C)
 Ambient Storage: -40 to 185°F (-40 to 85°C)

Power Requirements

DCL option: 12-36 VDC, 25mA, 1W max, loop powered (single output)
 DCH option: 12-36 VDC, 300mA, 9W max, (multiple outputs)
 DCHPOE option: 12-28 VDC or Power over Ethernet, 5W maximum (multiple outputs)
 AC option: 100-240 VAC, 50/60Hz line power, 5W (multiple outputs)

Display

Alphanumeric 2 line x 16 character LCD digital display six pushbuttons for full field configuration. Pushbuttons can be operated with magnetic wand without removal of enclosure covers. Display can be mounted in 90° intervals for better viewing.

Output Signals

Analog: 4-20 mA
 Alarm: Solid state relay, 40 VDC
 Totalizer Pulse: 50 millisecond pulse, 40 VDC
 Volumetric or Loop Powered Mass: One analog, one totalizer pulse, HART
 Multivariable option: Up to three analog signals, three alarms, one totalizer pulse, HART
 Multivariable option: Modbus or BACnet process monitoring

Physical Specifications

Wetted Materials

- | | |
|--------------------------------------|-------------------------|
| Liquid Models: | Gas Models: |
| • Meter Body (316L) | • Meter Body (316L) |
| • Rotor Supports (316L) | • Rotor Supports (316L) |
| • Meter Rotor (CD4MCu/416L) | • Meter Rotor (17-4PH*) |
| • Rotor Shaft (tungsten carbide) | • Rotor Shaft (316L) |
| • Sleeve Bearings (tungsten carbide) | • Bearings (440C SS) |

*Consult factory for additional options



Sizing Considerations

Piping Conditions

Condition	Pipe Diameters, D	
	Upstream	Downstream
One 90° elbow before meter	10D	5D
Two 90° elbows before meter	15D	5D
Two 90° elbows before meter, out of plane	30D	10D
Reduction before meter	10D	5D
Expansion before meter	20D	5D
Partially open valve	30D	10D

Flow Range

Consult the VorTek Instruments Sizing Program at <https://vortek.sizingapp.com> for easy calculation of flow range.

Water Minimum and Maximum Flow Rates*						
Rate	Nominal Pipe Size (in)					
	3/8	1/2	3/4	1	1.5	2
GPM min	0.3	0.3	0.007	0.3	0.01	0.013
GPM max	3	15	30	75	180	400
Rate	Nominal Pipe Size (in)					
	3	4	6	8	10	12
GPM min	0.03	0.03	0.055	330	550	900
GPM max	650	1250	2900	5200	8000	12000

*Flow ranges vary for certain models

Water Minimum and Maximum Flow Rates*						
Rate	Nominal Pipe Size (mm)					
	10	15	20	25	40	50
m ³ /hr min	0.07	0.07	0.002	0.07	0.002	0.003
m ³ /hr max	0.7	3.4	6.9	17	41	91
Rate	Nominal Pipe Size (mm)					
	80	100	150	200	250	300
m ³ /hr min	0.007	0.007	0.01	75	125	204
m ³ /hr max	148	284	659	1181	1817	2725

*Flow ranges vary for certain models

Product Disposal Information

To ensure environmental safety and compliance, please follow these disposal instructions for the product and its components:

Electronic Components:

This product contains electronics that must be recycled through approved e-waste recycling programs. Electronics can contain harmful materials and should be prevented from entering landfills. Do not place electronics in regular trash.

Metal Parts:

Any metal components can be separated and recycled through your local metal recycling facility.

Packaging Materials:

Recycle or reuse packaging materials such as cardboard or plastics, following local recycling guidelines.

For local disposal sites, refer to:

- Call2Recycle (USA, Canada)
- Earth911 (USA, Canada)
- SERI (International)

In the USA, for more information, visit:

- EPA's battery disposal guide
- EPA's electronics recycling page

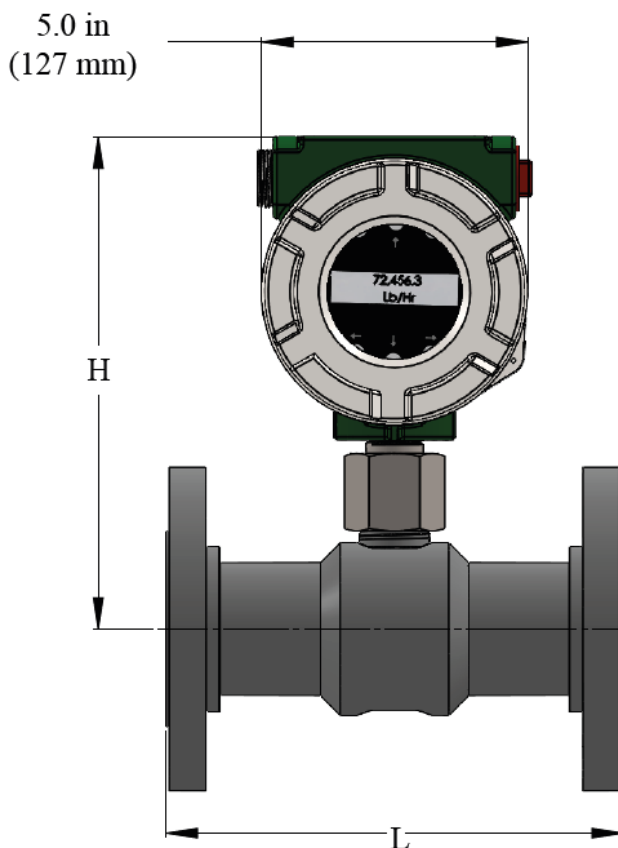
By following these guidelines, you help reduce waste and support environmental sustainability.

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Flow Meter Nominal Size	L	H*
3/8 inch (10mm)	6.0 in (152 mm)	8.5 in (216 mm)
1/2 inch (15mm)	6.0 in (152 mm)	8.5 in (216 mm)
3/4 inch (20mm)	6.0 in (152 mm)	8.6 in (218 mm)
1 inch (25mm)	6.0 in (152 mm)	8.8 in (224 mm)
1.5 inch (40mm)	7.0 in (178 mm)	8.9 in (226 mm)
2 inch (50mm)	8.5 in (216 mm)	9.2 in (234 mm)
3 inch (80mm)	10.0 in (254 mm)	10.2 in (260 mm)
4 inch (100mm)	12.0 in (305 mm)	10.8 in (274 mm)

Please contact the factory for dimensions of models not listed

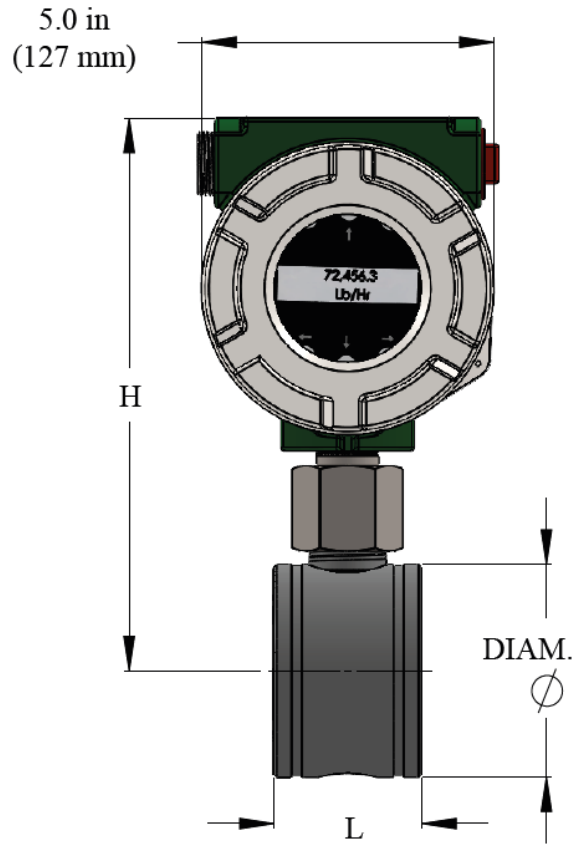
*H dimensions are approximate values

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Flow Meter Nominal Size	L	H*
3/8 inch (10mm)	2.5, 4.0 in (64, 102 mm)	8.6, 9.4 in (218, 239 mm)
1/2 inch (15mm)	2.5, 4.0 in (64, 102 mm)	8.6, 9.4 in (218, 239 mm)
3/4 inch (20mm)	2.5, 4.0 in (64, 102 mm)	8.6, 9.4 in (218, 239 mm)
1 inch (25mm)	2.5, 4.0 in (64, 102 mm)	8.6, 9.4 in (218, 239 mm)
1.5 inch (40mm)	2.5, 4.25 in (64, 108 mm)	9.4, 10.1 in (239, 257 mm)
2 inch (50mm)	2.5, 4.25 in (64, 108 mm)	9.4, 10.1 in (239, 257 mm)
3 inch (80mm)	5.0 in (127 mm)	10.1 in (257 mm)
4 inch (100mm)	5.0 in (127 mm)	10.7 in (272 mm)

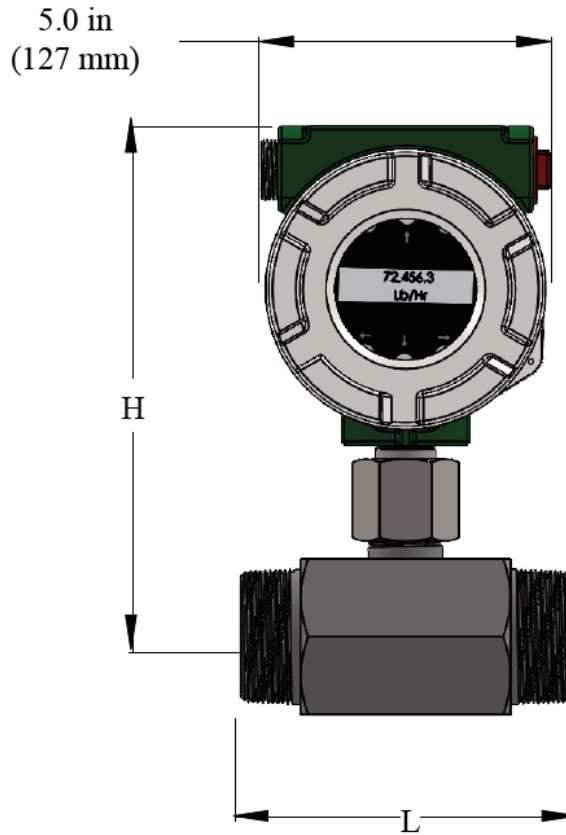
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1/2 inch (15mm)	4.0 in (102 mm)	8.5 in (216 mm)
3/4 inch (20mm)	4.0 in (102 mm)	8.6 in (218 mm)
1 inch (25mm)	4.0 in (102 mm)	8.8 in (224 mm)
1.5 inch (40mm)	6.0 in (152 mm)	8.9 in (226 mm)
2 inch (50mm)	10.0 in (216 mm)	9.2 in (234 mm)
3 inch (80mm)	10.0 in (254 mm)	10.2 in (260 mm)
4 inch (100mm)	11.5 in (292 mm)	10.8 in (274 mm)

Please contact the factory for dimensions of models not listed

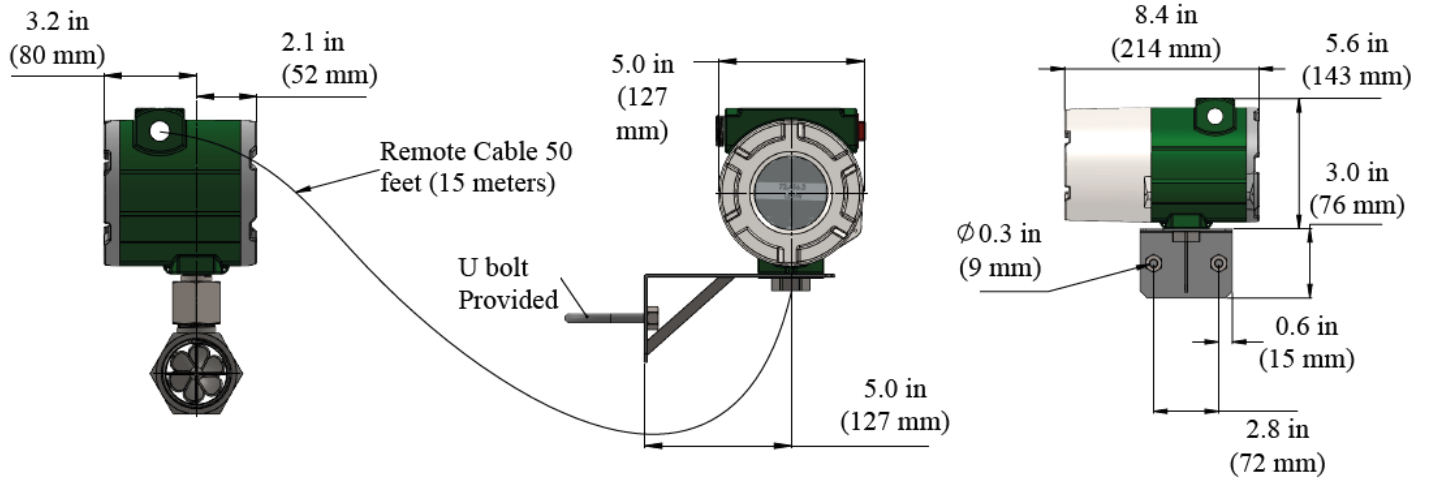
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Dimensional Outline: Remote Electronics Option



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Model Number Information - TurboPro™ Inline Turbine Flowmeter

Parent Number Code

PRO-TI™ Inline Turbine Flowmeter

Feature 1: Multivariable Options

V Volumetric Flowmeter for liquid, gas, and steam
VET Velocity, External RTD Temperature Input
VET-EM Velocity, External RTD Temperature Input x2

Feature 2: Flow Body

03	3/8-inch Nominal Bore (10mm)	24	3-inch Nominal Bore (80mm)
04	1/2-inch Nominal Bore (15mm)	32	4-inch Nominal Bore (100mm)
06	3/4-inch Nominal Bore (20mm)	48	6-inch Nominal Bore (150mm)
08	1-inch Nominal Bore (25mm)	64	8-inch Nominal Bore (200mm)
12	1.5-inch Nominal Bore (40mm)	80	10-inch Nominal Bore (250mm)
16	2-inch Nominal Bore (50mm)	96	12-inch Nominal Bore (300mm)

Feature 3: Meter Body Material

S 316 Stainless Steel

Feature 4: Process Connection

150	ANSI 150# Flange	NPT	ANSI 150-600# NPT
300	ANSI 300# Flange	GRVD	Victaulic® Grooved
600	ANSI 600# Flange	AN	37° AN Flare
W	Wafer ANSI 600#	TC	Tri-Clamp

Feature 5: Electronics Enclosure

L NEMA 4x IP66 Enclosure
R() Remote Electronics NEMA 4X IP66 Enclosure, Specify cable length in parentheses, Standard 50ft

Feature 6: Display Options

DD Digital Display and Programming Buttons

Feature 7: Input Power

DCL 12-36 VDC, 25mA, 1W max. – required on loop powered meters, 1AHL only
DCH 12-36 VDC, 300mA, 9W max. – use with 1AH, 1AM, 1AB, 3AH, 3AM, 3AB
DCHPOE 12-28 VDC or Power Over Ethernet, 5W max. – required on 1AMIP, 1ABIP, 3AMIP, 3ABIP
AC 100-240 VAC, 50/60 Hz line power, 5W max. – use with 1AH, 1AM, 1AB, 3AH, 3AM, 3AB

Feature 8: Output

1AHL Loop powered option – one analog output (4-20mA), one scaled frequency, one pulse, HART, DCL input power only
1AH One analog output (4-20mA), one alarm, one pulse, HART Communication Protocol, DCH or AC option only *
1AM One analog output (4-20mA), one alarm, one pulse, MODBUS RTU Communication Protocol, DCH or AC option only *
1AMIP One analog output (4-20mA), one alarm, one pulse, MODBUS TCP/IP Communication Protocol, DCHPOE option only *
1AB One analog output (4-20mA), one alarm, one pulse, BACnet MS/TP Communication Protocol, DCH or AC option only *
1ABIP One analog output (4-20mA), one alarm, one pulse, BACnet/IP Communication Protocol, DCHPOE option only *
3AH Three analog outputs (4-20mA), three alarms, one pulse, HART, VT or VTP option only, DCH or AC option only *
3AM Three analog outputs (4-20mA), three alarms, one pulse, MODBUS RTU, VT or VTP option only, DCH or AC option only *
3AMIP Three analog outputs (4-20mA), three alarms, one pulse, MODBUS TCP/IP, VT or VTP option only, DCHPOE option only *
3AB Three analog outputs (4-20mA), three alarms, one pulse, BACnet MS/TP, VT or VTP option only, DCH or AC option only *
3ABIP Three analog outputs (4-20mA), three alarms, one pulse, BACnet/IP, VT or VTP option only, DCHPOE option only * *Includes scaled frequency output

Feature 9: Temperature Options

ST Standard Temperature – Process temperature -330° to 500° F (-200° to 260° C) **HT** High Temperature – Process temperature up to 750° F (400° C)

Feature 10: Accuracy

1	Liquid Standard Accuracy: ±1.0% of Rate	2	Liquid High Accuracy: ±0.5% of Rate
3	Gas Standard Accuracy: ±1.0% of Rate	4	Gas High Accuracy: ±0.5% of Rate

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