

Pro-M™ Electromagnetic Flowmeter



VorTek Instruments Pro-M™ Electromagnetic Flowmeter offers accurate and reliable flow metering of liquids. Using Faraday's law of electromagnetic induction, these meters measure a variety of conductive liquids. Unaffected by the temperature, pressure, density, or viscosity of the liquid, these meters provide a level of measurement stability unmatched

among flow metering technologies. The full-bore design does not create a pressure loss and has no moving parts for a maintenance-free design.

The Pro-M design incorporates an assortment of electrode and liner material options to provide application flexibility across industries. Meter sizes are offered for pipe sizes 1/2" through 80". For demanding applications, a high accuracy option of up to $\pm 0.2\%$ of rate meets the most stringent application requirements.

Pro-M meters offer an array of communication and power options. In addition to providing traditional communication methods such as analog output signals, Pro-M meters also offer advanced digital communication options such as Modbus® RTU and HART®.

With the addition of external temperature inputs, these meters can provide a reliable thermal energy (BTU) measurement.

Pro-M™ Advantage:

- Volumetric flow metering of most liquids
- Reliable & maintenance free—no moving parts
- High accuracy - up to $\pm 0.2\%$ of rate
- Meter sizes from 1/2" through 80"
- Pulsed DC magnetic field for zero point stability
- Wide choice of liner and electrode materials
- Bidirectional flow metering capabilities
- Robust, fully welded and potted construction
- Thermal energy metering (BTU) option
- Empty pipe detection feature
- Full-bore design, no pressure loss
- Unaffected by the temperature, pressure, density, or viscosity of the liquid
- Unaffected by particulate solids
- Rangeability up to 45:1
- Temperatures up to 356°F (180°C)
- Remote electronics option available for use in harsh environments or locations with limited access
- Suitable for submersible applications; remote sensor rated to IP68
- Modbus® RTU and HART® communications



VorTek Instruments, LLC

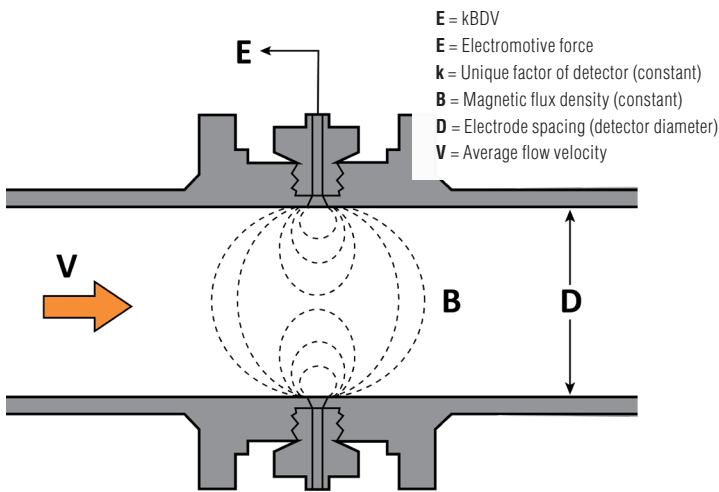
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Pro-M™ Principle of Operation

Electromagnetic flowmeters use a phenomenon known as Faraday's Law of Electromagnetic Induction to measure flow. Faraday's Law states that an electrically conductive fluid flowing through a magnetic field will generate an electromotive force (electric signal). The strength of that force is proportional to the velocity of the fluid moving through the pipe. The faster the fluid is moving, the larger the resulting electric signal.



Pro-M™ Volumetric Model

The Pro-M flowmeter provides a volumetric flow rate of electrically conductive liquids over a wide range of flow rates.

Pro-M™ Energy Model

With the addition of external temperature inputs, the Pro-M flow meter can provide a reliable thermal energy (BTU) measurement. VorTek Instruments can provide clamp-on or insertion RTD temperature sensors.

Operating Specifications

Any liquid meeting the minimum electrical conductivity of 20 $\mu\text{s}/\text{cm}$ or greater.

Ambient Temperatures

Ambient Operating: -4 to 140°F (-20 to 60°C)

Power Requirements

AC option: 110-240 VAC (50/60Hz) | **DC option:** 20-36 VDC

Display

- Alphanumeric 3 line LCD digital display
- Four push buttons for full field configuration

Communications

- Analog (4-20 mA)
- Two Alarms
- Frequency/Pulse
- Modbus® RTU
- HART®

Physical Specifications

Wetted Materials

- Liner, Electrodes, & Grounding Rings (optional)

Liner Selection Table

Material	Line Sizes	Temperature Range
PTFE	1/2" thru 24"	-4 to 248°F (-20 to 120°C)
Hard Rubber	2" thru 24"	-4 to 140°F (-20 to 60°C)
Polyurethane	1/2" thru 24"	-4 to 176°F (-20 to 80°C)
PFA	1/2" thru 24"	-4 to 356°F (-20 to 180°C)

Electrode & Grounding Ring Material Options

- 316L Stainless Steel, Titanium, Tantalum, Hastelloy C, Platinum-Iridium

Performance Specifications

Accuracy

Standard Accuracy Model:

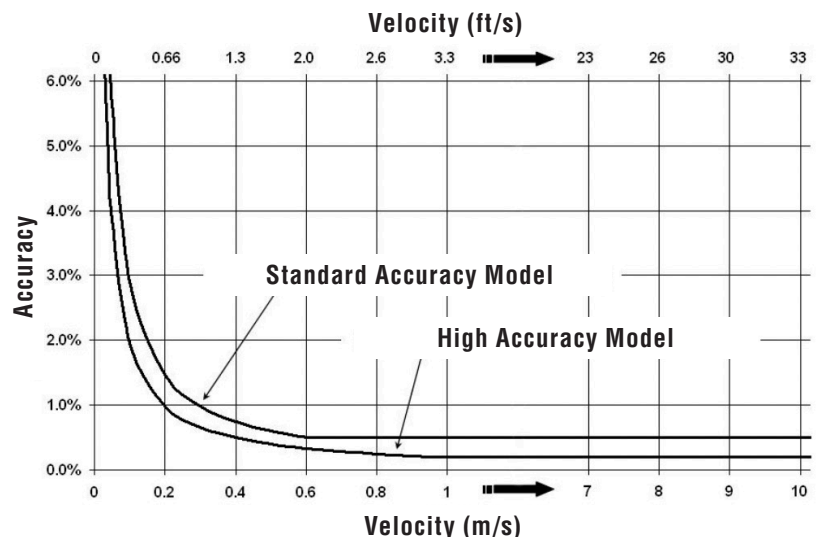
$\pm 0.5\%$ of reading (velocity > 1.97 ft/s)
or ± 0.01 ft/s of reading (velocity ≤ 1.97 ft/s)

High Accuracy Model:

$\pm 0.2\%$ of reading (velocity > 3.28 ft/s)
or ± 0.006 ft/s of reading (velocity ≤ 3.28 ft/s)

Repeatability

Volumetric Flow Rate $\pm 0.1\%$ of rate



Sizing Considerations

Minimum Straight Pipe Requirements

CONDITION	PIPE DIAMETERS, D	
	Upstream	Downstream
Fully open full bore valve before meter	5D	2D
Reduction before meter	0D	0D
Expansion before meter	10D	2D
Piping tee before meter	5D	0D
90° elbow before meter	5D	0D
Partially open or non-full bore valve before meter	10D	2D

Velocity Range

Maximum velocity, liquid: 30 meters/second (32.8 feet/second)

Minimum velocity, liquid: 0.3 meters/second (0.98 feet/second)

Flow Range

Rate	Nominal Pipe Size (in)											
	0.5	0.75	1	1.5	2	3	4	6	8	10	12	
GPM min	0.88	1.3	2.2	4.4	8.8	22	36	88	150	234	335	
GPM max	26	48	79	198	312	796	1,246	2,800	4,979	7,779	11,205	

Rate	Nominal Pipe Size (in)									
	14	16	18	20	24	28	32	36	40	
GPM min	458	599	753	934	1,343	1,828	2,387	2,91	3,734	
GPM max	15,255	19,918	25,210	31,123	44,816	60,979	79,691	100,825	124,469	

Rate	Nominal Pipe Size (mm)											
	15	20	25	40	50	80	100	150	200	250	300	
M3/hr min	0.2	0.3	0.5	1	2	5	8	20	34	53	76	
M3/hr Max	6	11	18	45	71	181	283	636	1,131	1,767	2,545	

Rate	Nominal Pipe Size (mm)									
	350	400	450	500	600	700	800	900	1000	
M3/hr min	104	136	171	212	305	415	542	662	848	
M3/hr Max	3,465	4,524	5,726	7,069	10,179	13,850	18,100	22,900	28,270	



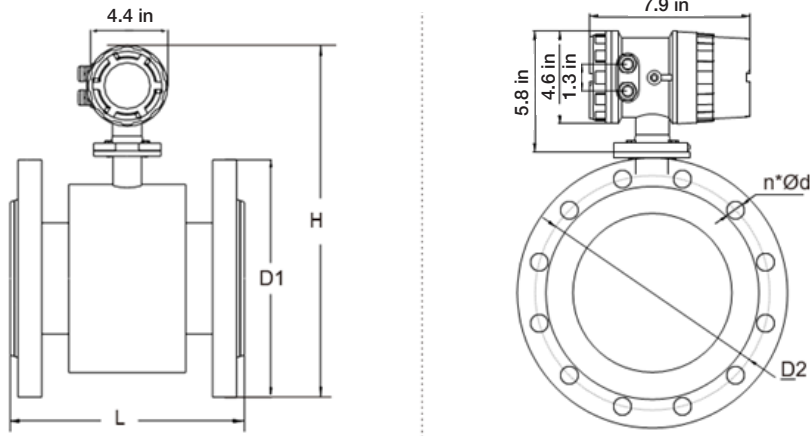
Turndown

Consult the VorTek Sizing Program at <https://vortek.sizingapp.com> for exact values.

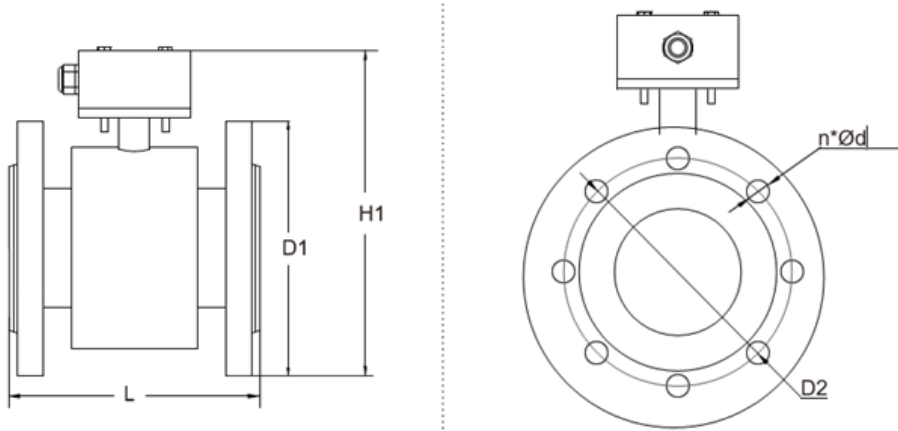
Turndown is application dependent.

Dimensional Outline: Pro-M™ Electromagnetic Flow Meter

Local Electronics



Remote Electronics



							WEIGHT
Flow Meter Nominal Size	L	H	H1	D1	D2	n*Ød	ANSI 150
1/2 inch (15 mm)	7.9 inch (200 mm)	11.8 inch (300 mm)	8.9 inch (227 mm)	3.5 inch (89 mm)	2.4 inch (61 mm)	4 X 0.62 in	22 lb (10 kg)
3/4 inch (20 mm)	7.9 inch (200 mm)	12.2 inch (310 mm)	9.5 inch (240 mm)	3.9 inch (99 mm)	2.8 inch (70 mm)	4 X 0.62 in	23 lB (11 kg)
1 inch (25 mm)	7.9 inch (200 mm)	12.6 inch (320 mm)	9.6 inch (243mm)	4.3 inch (108 mm)	3.2 inch (80 mm)	4 X 0.62 in	27 lb (12 kg)
1.5 inch (40 mm)	7.9 inch (200 mm)	14.0 inch (355 mm)	10.2 inch (260 mm)	5 inch (127 mm)	4 inch (99 mm)	4 X 0.62 in	29 lb (13 kg)
2 inch (50 mm)	7.9 inch (200 mm)	14.6 inch (370 mm)	10.8 inch (275 mm)	5.9 inch (152 mm)	4.8 inch (121 mm)	4 X 0.75 in	33 lb (15 kg)
3 inch (80 mm)	9.8 inch (250 mm)	15.9 inch (405 mm)	12.2 inch (310 mm)	7.5 inch (191 mm)	6 inch (152 mm)	4 X 0.75 in	44 lb (20 kg)
4 inch (100 mm)	9.8 inch (250 mm)	16.7 inch (425 mm)	13 inch (330 mm)	9 inch (229 mm)	7.5 inch (191 mm)	8 X 0.75 in	51 lb (23 kg)
6 inch (150 mm)	11.8 inch (300 mm)	19.3 inch (490 mm)	15.6 inch (395 mm)	11 inch (279 mm)	9.5 inch (241 mm)	8 X 0.88 in	102 lb (46 kg)
8 inch (200 mm)	13.8 inch (350 mm)	22.2 inch (565 mm)	19.1 inch (485 mm)	13.5 inch (343 mm)	11.8 inch (299 mm)	8 X 0.88 in	144 lb (65 kg)
10 inch (250 mm)	17.7 inch (450 mm)	23.6 inch (600 mm)	19.7 inch (500 mm)	16 inch (406 mm)	14.3 inch (362 mm)	12 X 1 in	177 lb (80 kg)
12 inch (300 mm)	19.7 inch (500 mm)	25.6 inch (650 mm)	21.7 inch (550 mm)	19 inch (483 mm)	17 inch (432 mm)	12 X 1 in	221 lb (100 kg)

Note:
Add 5 lb (2.3 KG)
for remote electronics

