



**Badger Meter**

## E-Series® Ultrasonic Meter

Cold Water Stainless Steel Meter, 1-1/2" and 2"  
NSF/ANSI Standard 61 Certified, Annex G

### DESCRIPTION

The E-Series® Ultrasonic meter uses solid-state technology in a compact, totally encapsulated, weatherproof, and UV-resistant housing, suitable for residential and commercial applications. Electronic metering provides information—such as rate of flow and reverse flow indication—and data not typically available through traditional, mechanical meters and registers. Electronic metering eliminates measurement errors due to sand, suspended particles and pressure fluctuations.

#### The Ultrasonic 1-1/2" and 2" meters feature:

- Minimum extended low-flow rate lower than typical positive displacement meters.
- Simplified one-piece electronic meter and register that are integral to the meter body and virtually maintenance free.
- Sealed, non-removable, tamper-protected meter and register.
- Easy-to-read, 9-digit LCD display presents consumption, rate of flow, reverse-flow indication, and alarms.
- High resolution industry standard ASCII encoder protocol.

The Ultrasonic meter is available with a wired lead, in-line connector or fully prewired to AMR/AMI devices.

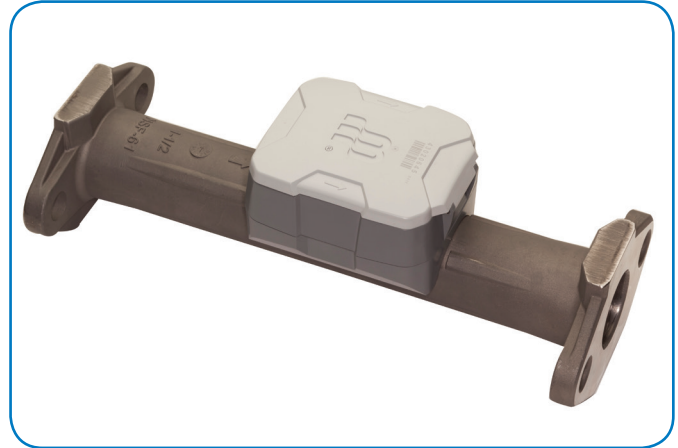
### APPLICATIONS

Use the Ultrasonic meter for measuring potable cold water in residential, commercial and industrial services. The meter is also ideal for non-potable, reclaimed irrigation water applications or less than optimum water conditions where small particles exist.

The Ultrasonic meter complies with applicable portions of ANSI/AWWA Standard C700 and NSF/ANSI Standard 61, Annex G. There is currently no AWWA standard that specifically addresses ultrasonic meters for residential applications.

### OPERATION & PERFORMANCE

As water flows into the measuring tube, ultrasonic signals are sent consecutively in forward and reverse directions of flow. Velocity is then determined by measuring the time difference between the measurement in the forward and reverse directions. Total volume is calculated from the measured flow velocity using water temperature and pipe diameter. The LCD display shows total volume and alarm conditions and can toggle to display rate of flow.



In the normal temperature range of 45...85° F (7...29° C), the Ultrasonic “new meter” consumption measurement is accurate to:

- $\pm 1.5\%$  over the normal flow range
- $\pm 3.0\%$  from the extended low flow range to the minimum flow value

### CONSTRUCTION

E-Series Ultrasonic meters feature a stainless steel, lead-free meter housing, an engineered polymer and stainless steel metering insert, a meter-control circuit board with associated wiring, LCD, and battery. Wetted elements are limited to the pressure vessel, the polymer/stainless steel metering insert and the transducers. The electronic components are housed and fully potted within a molded, engineered polymer enclosure, which is permanently attached to the meter housing. The transducers extend through the stainless steel housing and are sealed by O-rings.

The metering insert holds the stainless steel ultrasonic reflectors in the center of the flow area, enabling turbulence-free water flow through the tube and around the ultrasonic signal reflectors. The metering insert's patented design virtually eliminates chemical buildup on the reflectors, ensuring long-term metering accuracy.

### METER INSTALLATION

The meter is completely submersible and can be installed using horizontal or vertical piping, with flow in the up direction. The meter will not measure flow when an “empty pipe” condition is experienced. An empty pipe is defined as a condition when the flow sensors are not fully submerged.

## SPECIFICATIONS

E-Series Ultrasonic Meter Size	1-1/2" (40 mm)	2" (50 mm)
<b>Operating Range</b>	1.25...100 gpm	1.5...160 gpm
<b>Extended Low-Flow Rate</b>	0.40 gpm	0.50 gpm
<b>Maximum Continuous Operation</b>	100 gpm	160 gpm
<b>Pressure Loss at Maximum Flow</b>	3.8 psi	5.2 psi
<b>Reverse Flow – Maximum Rate</b>	12 gpm	18 gpm
<b>Operating Performance</b>	In the normal temperature range of 45...85° F (7...29° C), new meter consumption measurement is accurate to: <ul style="list-style-type: none"> <li>• ±1.5% over the normal flow range</li> <li>• ±3.0% from the extended low flow range to the minimum flow value</li> </ul>	
<b>Storage Temperature</b>	– 40...140° F (– 40...60° C)	
<b>Maximum Ambient Storage (Storage for One Hour)</b>	150° F (72° C)	
<b>Measured-Fluid Temperature Range</b>	34...140° F (1...60° C)	
<b>Humidity</b>	0...100% condensing; meter is capable of operating in fully submerged environments	
<b>Maximum Operating Pressure of Meter Housing</b>	175 psi (12 bar)	
<b>Register Type</b>	Straight reading, permanently sealed electronic LCD; digits are 0.28" (7 mm) high	
<b>Register Display</b>	<ul style="list-style-type: none"> <li>• Consumption (up to nine digits)</li> <li>• Rate of flow</li> <li>• Alarms</li> <li>• Unit of measure factory programmed for gallons, cubic feet and cubic meters</li> </ul>	
<b>Register Capacity</b>	<ul style="list-style-type: none"> <li>• 100,000,000 gallons</li> <li>• 10,000,000 cubic feet</li> <li>• 1,000,000 cubic meters</li> </ul>	
<b>Totalization Display Resolution</b>	<ul style="list-style-type: none"> <li>• Gallons: 0.X</li> <li>• Cubic feet: 0.XX</li> <li>• Cubic meters: 0.XXX</li> </ul>	
<b>Battery</b>	3.6-volt lithium thionyl chloride; battery is fully encapsulated within the register housing and is not replaceable; 20-year battery life	

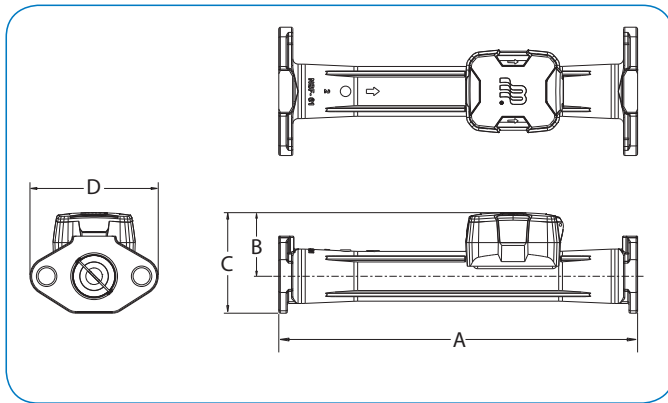
## MATERIALS

<b>Meter Housing</b>	316 stainless steel
<b>Measuring Element</b>	Pair of ultrasonic sensors located in the flow tube
<b>Register Housing &amp; Lid</b>	Engineered polymer
<b>Metering Insert</b>	Engineered polymer & stainless steel
<b>Transducers</b>	Piezo-ceramic device with wetted surface of stainless CrNiMo

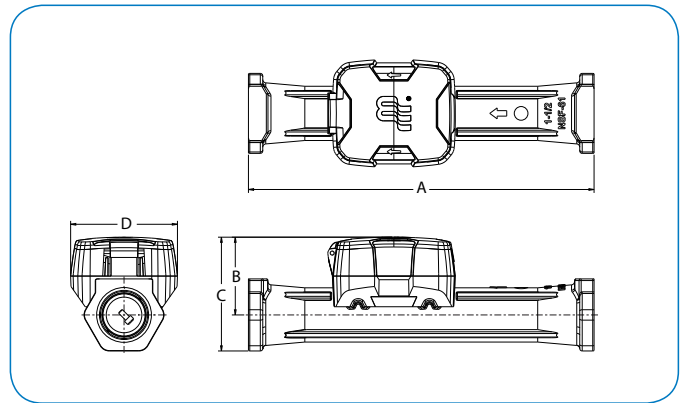
## PHYSICAL DIMENSIONS

E-Series Ultrasonic Meter Size	1-1/2" (40 mm)	1-1/2" (40 mm)	2" (50 mm)	2" (50 mm)
Housing	Elliptical	HEX	Elliptical	HEX
Size Designation X Lay Length	1-1/2" x 13"	1-1/2" x 12.62"	2" x 17"	2" x 15.25"
Weight (without AMR)	8.2 lb	6.5 lb	11.9 lb	8.9 lb
See illustration below for Measurement Designations.				
Length (A)	13"	12.62"	17"	15.25"
Height (B)	2.80"	2.84"	3.01"	3.06"
Height (C)	4.55"	4.15"	4.76"	4.68"
Width (D)	5.50"	3.90"	6.08"	3.90"
Bore Size	1-1/2"	1-1/2"	2"	2"
Two-Bolt Elliptical Flange (AWWA)	1-1/2"	—	2"	—
Companion Flange	1-1/2"	—	2"	—
Internal Thread Size	—	1-1/2" NPT	—	2" NPT

### Elliptical Measurement Designations

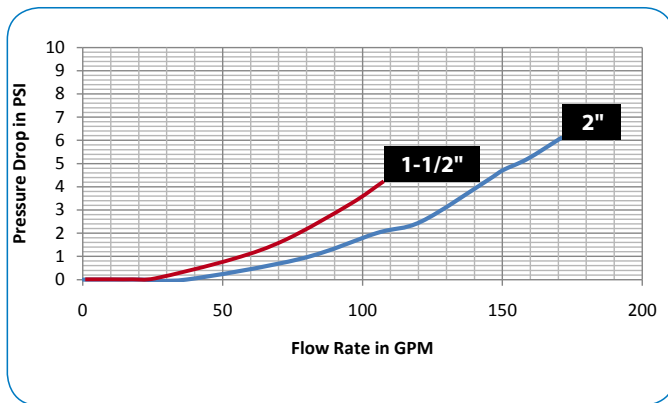


### HEX Measurement Designations



## PRESSURE LOSS CHART

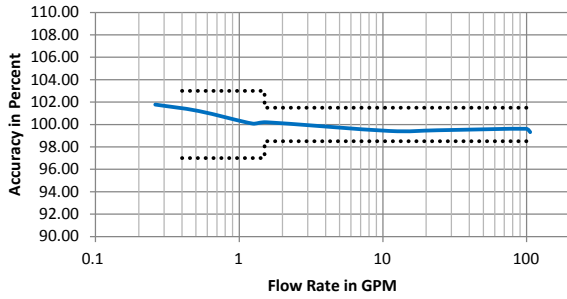
Rate of Flow in Gallons per Minute (gpm)



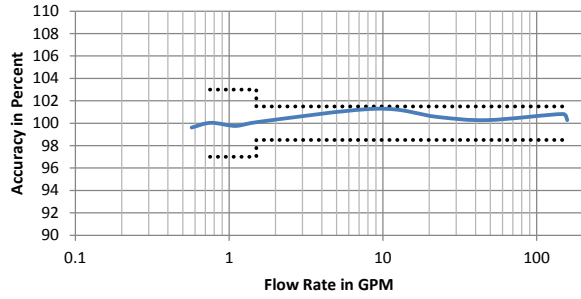
## ACCURACY CHARTS

Rate of Flow in Gallons per Minute (gpm)

1-1/2" Meter



2" Meter



## Making Water Visible®

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Legacy Document Number: ESM-T-10-EN