

## Description

The Badger® E-Series™ meter is a static meter using ultrasonic technology and solid-state electronics contained in a compact, totally encapsulated, weatherproof and UV-resistant housing for residential and commercial applications. The ultrasonic measurement system has no moving parts, provides long-term accuracy and eliminates measurement errors due to sand, suspended particles, air pockets and pressure fluctuations.

Electronic metering provides information and data not typically available from traditional, mechanical meters and registers such as rate-of-flow and reverse-flow indication. The flow tube is composed of a low-lead alloy brass. The E-Series meter is compatible with AMR transmitters requiring either an encoded input or a scaled pulse input.

The E-Series meter is designed to comply with applicable portions of ANSI/AWWA Standard C700 and NSF/ANSI Standard 61. There is currently no AWWA standard that specifically addresses ultrasonic meters for residential applications.

**Applications:** The E-Series meter can be used for measuring potable, cold water in residential, commercial and industrial services. It is ideal for non-potable, reclaimed, irrigation water applications or less than optimum water conditions where small particulates exist. The E-Series meter is useful in any application requiring long-term measurement accuracy.

## Features

- Static meter design with no moving parts provides a high level of accuracy over the life of the meter.
- Minimum extended low-flow rate is lower than typical positive displacement meters.
- Simplified one piece electronic meter and register are integral to the meter body and require virtually no maintenance.
- Meter and register are sealed and protected from tampering.
- Meter is completely submersible.
- Display presents consumption, rate of flow, reverse-flow indication and alarms.



**Model E-25**

**Operation:** The E-Series meter is an inferential meter that uses ultrasonic technology to measure velocity. The velocity is then multiplied by the cross-sectional area of the flow tube to calculate the volume. Water flows into the measuring tube, where ultrasonic signals are sent consecutively in both directions of flow. The sum of the phase angles of the receive signals compared to the transmit signals provides the velocity, which is used to calculate the volume at short intervals. The volume totalization units are displayed on an integral liquid crystal display (LCD). In addition, alarms and a rate of flow can be displayed.

**Operating Performance:** The E-Series meters provide "new meter" consumption measurement accurate to:

- $\pm 1$  percent over the normal flow range at a normal temperature range of 45° F to 85° F (7° C to 29° C).
- +1/-2 percent from the extended low-flow range to the minimum flow value in the normal temperature range.
- $\pm 2.0$  percent from extended low-flow range to maximum flow value throughout the expanded range of 35° F to 140° F (2° C to 60° C).

**Construction:** E-Series meters consist of a cast brass, low-lead alloy pressure vessel (meter housing), an engineered plastic and stainless steel metering insert, a meter-control circuit board with associated wiring, LCD and battery. The wetted elements are limited to the pressure vessel, plastic/stainless steel metering insert and the transducers. The electronic components are housed and fully potted within a molded, engineered plastic enclosure, which is attached to the meter housing. The transducers are wetted components that extend through the brass housing and are sealed by O-rings.

The metering insert provides a method of holding 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, helping to ensure long-term metering accuracy.

No part of the meter is removable or serviceable.

**Meter Display:** E-Series meters use an LCD to display consumption, flow and alarm information.

- The LCD contains a nine-digit display with the digits 0.25 inch (6.5 mm) high. Units of measure and resolution are factory programmed. Totalized flow displays up to 10,000,000 gallons, at a resolution of 0.01 gallons, or 1,000,000 cubic feet, at a resolution of 0.001 cubic feet.
- The LCD includes a factory-programmed visual black line above and below the digits used for billing purposes. This is the visual equivalent of the white and black number wheels on mechanical registers.
- Units of measure options include gallons, cubic feet, cubic meters, imperial gallons and liters; the meter is factory programmed to a specific unit of measure.
- The consumption display provides a measurement representing the sum of the forward flow, minus the reverse flow.
- The display alternates between total flow and rate of flow. The rate-of-flow display also serves as the flow-finder indicator. You activate the display and switch between total flow and rate displays with a finger-controlled optical switch or by opening and closing the meter lid.
- Alarms are displayed as icons that are either active or inactive. Icons include: meter functioning correctly, reverse flow alarm, suspected leak alarm, 30-day no usage alarm, battery end-of-life indicator and other alarm conditions (including empty pipe, poor-quality sensor measurement and low temperature). Alarm displays will clear when the conditions are eliminated.

**Tamper-Proof Features:** No part of the meter is removable or serviceable; it is therefore tamper resistant.

**Battery:** A 3.6-volt lithium thionyl chloride battery is fully encapsulated within the register housing and is not replaceable. The life expectancy of the battery is 20 years.

**Meter Installation:** The meter can be installed using horizontal or vertical piping, with water 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.

**AMR Output:** An optional output wire (three conductor) that is fully potted and submersible is available for factory connection to the Badger Meter ORION® or GALAXY® remote transmitters. If an AMR transmitter is not ordered with the meter, a four-inch output cable with an in-line connector is included to allow upgrading to AMR. The output from the meter can be specified for factory setting as either a "scaled output" (replica of the Recordall® Transmitter Register [RTR®] output) or "encoder output" (replica of the Absolute Digital Encoder [ADE®] output). The output protocol is indicated on the AMR output wire.

**Fluid Impurities:** The E-Series meter can tolerate solids of up to 0.08 inch (2 mm) in diameter.

**Maintenance:** E-Series meters are designed and manufactured to provide long-term service with no maintenance. The enclosure, which includes the electronics, ultrasonic sensors, battery and display, is completely potted, and therefore permanently sealed and unserviceable.

**Connections:** Tailpieces/unions for installation on various pipe types and sizes, including misaligned pipes, are available as an option.

**Serial Numbering:** Serial number and barcodes are engraved on the outside surface of the lid and the face of the meter. An optional "piggy-back" label can also be affixed to the inside lid, containing either the Badger Meter serial number or a customer-supplied serial number of up to 10 digits.

**Ordering Guide:** When ordering a Model E-25 E-Series meter, the following choices are available:

- Application: Potable (gray lid), reclaimed (lavender lid)
- Output Protocol: RTR or ADE
- Visual Indication of Billing Units: Four, five or six digits
- Units of Measure: Gallons, cubic feet, cubic meters, liters, imperial gallons
- AMR Output: In-line connector, ORION system, GALAXY system
- Lead length of AMR module

## Specifications

<b>Typical Operating Range</b>	.25 GPM - 25 GPM
<b>Meter Start Flow Rate</b>	0.05 GPM
<b>Extended Low-Flow Rate</b>	0.125 GPM
<b>Maximum Continuous Operation</b>	25 GPM
<b>Pressure Loss at Maximum Flow</b>	12.4 PSI at 25 GPM
<b>Reverse Flow - Maximum Rate</b>	9.8 GPM
<b>Accuracy – New Meter</b>	±1% over the normal flow range at a normal temperature range of 45° F to 85° F (7° C to 29° C)
<b>Accuracy – Extended Low Flow (New Meter)</b>	+1/-2% from the extended low-flow range to the minimum flow value in the normal temperature range. Accuracy of ±2.0% from extended low flow range to maximum flow value throughout the expanded temperature range of 35° F to 140° F (2° C to 60° C).
<b>Operating Temperature</b>	14° F to 140° F (-10° C to 60° C)
<b>Storage Temperature</b>	-40°F to 140° F (-40° C to 60° C)
<b>Maximum Ambient Storage (Storage for One Hour)</b>	150° F (72° C)
<b>Measured-Fluid Temperature Range</b>	35° F to 140° F (2° C to 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>Maximum Static Pressure of Meter Housing</b>	350 PSI (24 bar)
<b>Minimum Burst Pressure of Meter Housing</b>	600 PSI (40 bar)
<b>Register Type</b>	Straight reading, permanently sealed electronic LCD; digits are 0.25 inch (6.5 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, imperial gallons, cubic meters and liters</li> </ul>
<b>Register Capacity</b>	10,000,000 gallons 1,000,000 cubic feet 100,000 cubic meters 100,000,000 liters (US) 10,000,000 liters (non-US) 10,000,000 imperial gallons
<b>Totalization Display Resolution</b>	Gallons: 0.01 Cubic feet: 0.001 Cubic meters: 0.0001 Liters (US): 0.1 Liters (non-US): 0.01 Imperial gallons: 0.01
<b>Battery</b>	3.6-volt lithium thionyl chloride; battery is fully encapsulated within the register housing and is not replaceable
<b>Meter Weight (without AMR)</b>	2.2 pounds

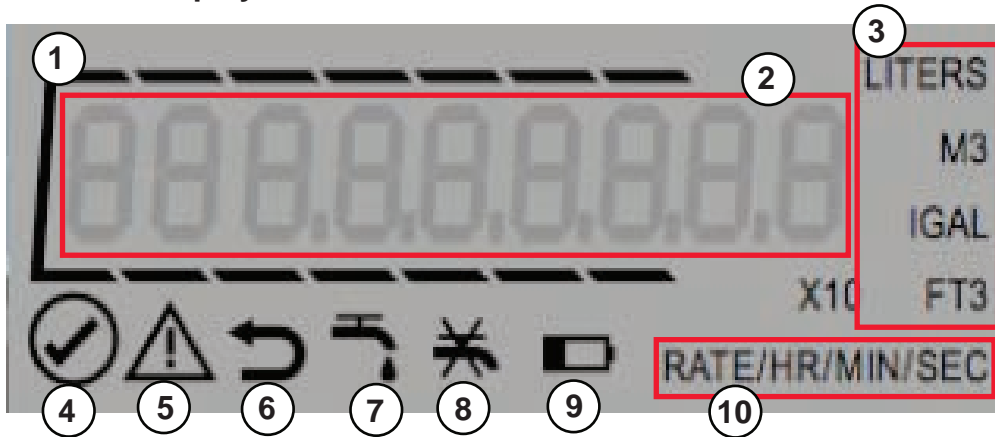
## Materials

<b>Meter Housing</b>	Cast bronze, low-lead alloy
<b>Measuring Element</b>	Pair of ultrasonic sensors located in the flow tube
<b>Register Housing</b>	Engineered thermoplastic
<b>Register Lid</b>	Engineered thermoplastic
<b>Metering Insert</b>	Engineered thermoplastic and stainless steel
<b>Transducers</b>	Piezo-ceramic device, with wetted surface of stainless CrNiMo

## Meter Spud and Connection Sizes

<b>Model</b>	E-25
<b>Size Designation x Lay Length</b>	5/8-inch x 7-1/2 inch
<b>Bore Size</b>	5/8-inch
<b>Coupling Nut and Spud Thread</b>	3/4-inch x 14 NPSM
<b>Tailpiece Pipe Thread (NPT)</b>	1/2-inch
<b>Service Pipe Thread (NPT)</b>	3/4-inch

## E-Series Display

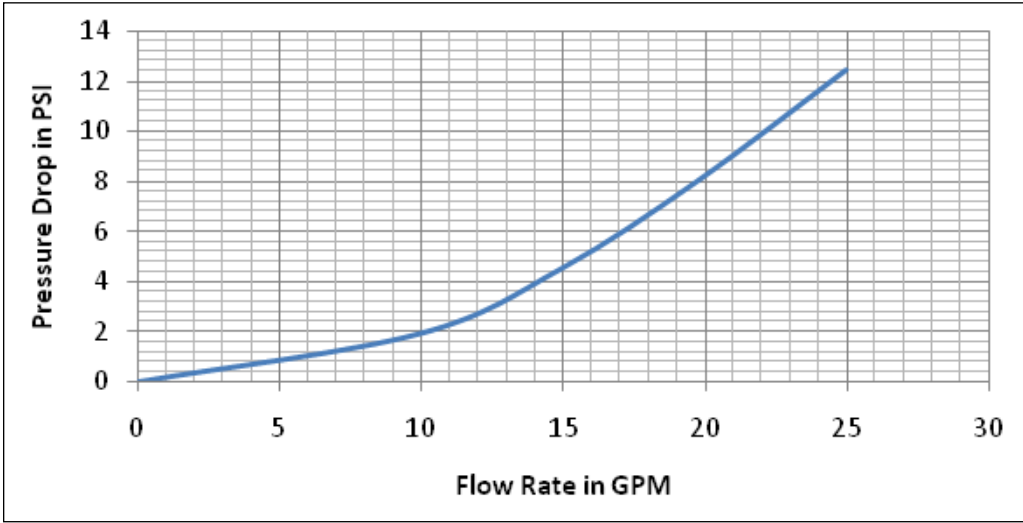


- |                                    |                                   |
|------------------------------------|-----------------------------------|
| 1. Billing Units Indicator         | 6. Reverse Flow                   |
| 2. Nine-Digit Display with Decimal | 7. Suspected Leak                 |
| 3. Consumption Units of Measure    | 8. No Flow Over 30 Days           |
| 4. Meter Operating Normally        | 9. Low-Battery Alert              |
| 5. Meter Alarm or Error            | 10. Rate of Flow Units of Measure |

### Pressure Loss Chart

Rate of flow in gallons per minute (GPM)

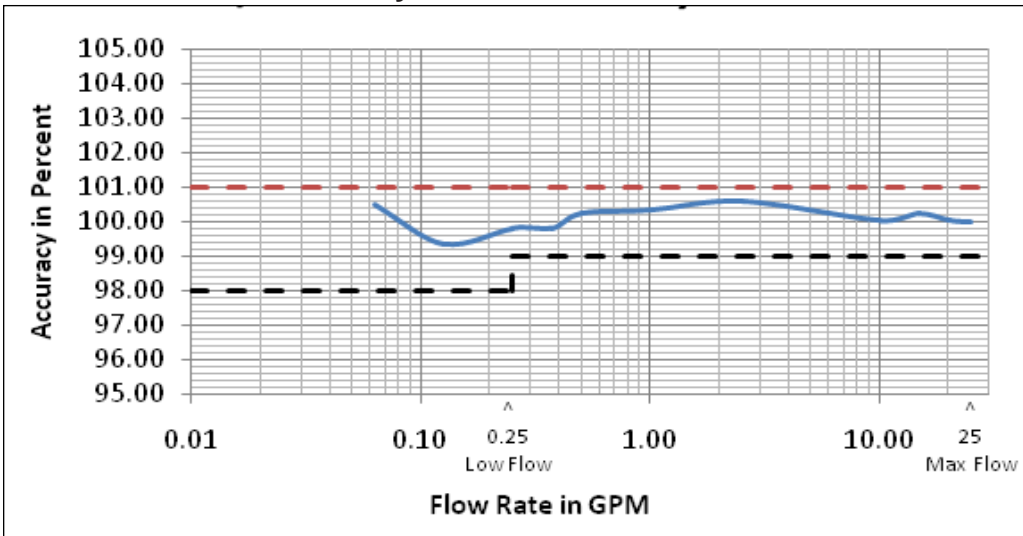
#### 5/8-Inch E-Series Pressure Drop



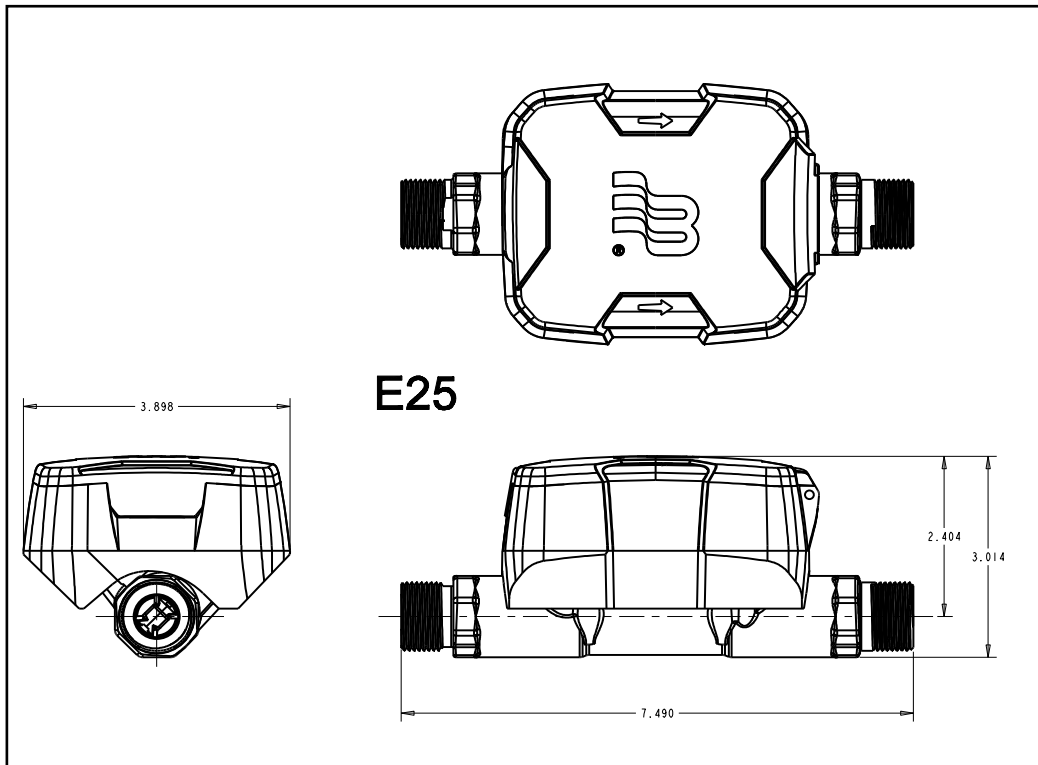
### Accuracy Chart

Rate of flow in gallons per minute (GPM)

#### 5/8-Inch E-Series Accuracy Chart



## Physical Dimensions of the Model E-25







Please see our Web site at  
[www.badgermeter.com](http://www.badgermeter.com)  
for specific contacts.



**BadgerMeter, Inc.**

P.O. Box 245036

Milwaukee, WI 53224-9536

800-876-3837 / Fax: 888-371-5982

[infocentral@badgermeter.com](mailto:infocentral@badgermeter.com) • [www.badgermeter.com](http://www.badgermeter.com)