INDUSTRIAL

E-Series®

Ultrasonic Flow Meters

E-Series G2® Ultrasonic Industrial Meters

Pulse & 4-20 mA Output

DESCRIPTION

The E-Series G2® Ultrasonic meter uses solid-state technology in a compact, tamper protected, weatherproof and UV-resistant housing, suitable for building and property management water flow measurement and totalizing applications. Electronic metering provides information—such as rate of flow and status and alarm indication—and data not typically available through traditional, mechanical meters and registers. Electronic metering minimizes measurement errors due to sand, suspended particles and pressure fluctuations.

Ultrasonic Meter Features

- No moving parts for increased performance
- Easy-to-read, 9-digit LCD display for consumption, rate of flow
- Sealed, tamper-protected meter
- Battery powered
- Field programmable registration and maintains an hourly internal logging capacity of 160 days of data
- Pulse and passive 4-20 mA output options

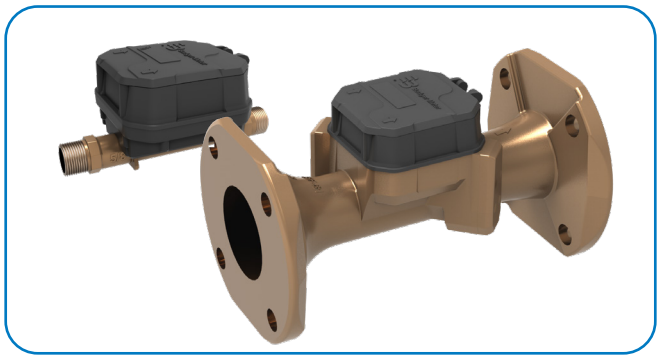
APPLICATIONS

Use the E-Series Ultrasonic meter for measuring potable cold water in building/property management applications. The meter is also ideal for non-potable, reclaimed irrigation water applications, or less than optimum water conditions where small particles exist.

E-Series Ultrasonic meters meet and exceed ANSI/AWWA C715 Standards. The lead-free bronze alloy meters comply with the lead-free provisions of the Safe Drinking Water Act and NSF/ANSI/CAN Standards 61 and 372.

OPERATION AND 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.



CONSTRUCTION

The E-Series Ultrasonic meter features lead-free bronze alloy meter housing, ultrasonic transducers, a meter-control circuit board with associated wiring, LCD, and battery. Wetted elements are limited to the pressure vessel and transducers. The electronic components are housed and fully potted within a molded, engineered polymer enclosure, which is attached to the meter housing. The transducers extend through the housing and are sealed by O-rings, enabling turbulence-free water flow through the tube. The flow tube is designed to reduce pressure loss and provide long-term accuracy.

METER INSTALLATION

For long-term performance the meter is weatherproof, UV-resistant, fully submersible and can be installed using horizontal or vertical piping. The registration electronics and battery are encapsulated to withstand harsh environments and protect the electronics in flooded or submerged applications. The meter will not measure flow when an "empty pipe" condition is experienced.

NOTE: An empty pipe is defined as a condition that occurs when the flow sensors are not fully submerged.

The meter comes with a flying lead for field splice connection.

SPECIFICATIONS

E-Series G2 Ultrasonic Meter Sizes	5/8 in.	5/8 x 3/4 in.	3/4 in. (7-1/2 in.)*	1 in.
Normal Test Flow Limits	0.08–30 gpm (0.02–6.81 m3/hr)	0.08–30 gpm (0.02–6.81 m3/hr)	0.1–35 gpm (0.02–7.95 m3/hr)	0.16–62 gpm (0.04–14.08 m3/hr)
Minimum Test Flow Limits	0.04 gpm (0.009 m3/hr)	0.04 gpm (0.009 m3/hr)	0.04 gpm (0.009 m3/hr)	0.075 gpm (0.017 m3/hr)
Safe Maximum Operating Condition (SMOC)	30 gpm (6.81 m3/hr)	30 gpm (6.81 m3/hr)	35 gpm (7.95 m3/hr)	62 gpm (14.08 m3/hr)
Typical Pressure Loss	3 psi @ 15 gpm (0.21 bar @ 3.4 m3/hr)	2.6 psi @ 15 gpm (0.18 bar @ 3.4 m3/hr)	1.15 psi @ 15 gpm (0.079 bar @ 3.4 m3/hr)	4.1 psi @ 40 gpm (0.28 bar @ 9.1 m3/hr)

E-Series G2 Ultrasonic Meter Sizes	2 in. (10 in.)	3 in. (12 in.)*	4 in. (14 in.)*	6 in. (18 in.)*	8 in. (20 in.)*
Normal Test Flow Limits	0.70–260 gpm (0.16 – 59.05 m3/hr)	0.75–560 gpm (0.17– 127.19 m3/hr)	1.5–1100 gpm (0.34– 249.84 m3/hr)	2.2–2000 gpm (0.50– 454.25 m3/hr)	4–3500 gpm (0.50– 794.94 m3/hr)
Minimum Test Flow Limits	0.35 gpm (0.080 m3/hr)	0.37 gpm (0.084 m3/hr)	0.75 gpm (0.170 m3/hr)	1.1 gpm (0.249 m3/hr)	2.0 gpm (0.454 m3/hr)
Safe Maximum Operating Condition (SMOC)	260 gpm (59.05 m3/hr)	560 gpm (127.19 m3/hr)	1100 gpm (127.19 m3/hr)	2000 gpm (127.19 m3/hr)	3500 gpm (127.19 m3/hr)
Typical Pressure Loss	4 psi @ 220 gpm	2.6 psi @ 350 gpm	2.1 psi @ 630 gpm	1.5 psi @ 1400 gpm	2.4 psi @ 2800 gpm

E-Series G2 Ultrasonic Meter	All Meter Sizes		
Liquid Type	Water with small amounts of particles or gas bubbles		
Operating Performance	In the normal temperature range of 45 to 122 °F (7 to 50 °C), new meter consumption measurement is accurate to: • 100% ±1.5% over the normal test flow limits • 100% ±3.0% for the minimum test flow limits		
Storage Temperature	–40 to 140 °F (–40 to 60 °C)		
Maximum Ambient Storage (Storage for One Hour)	150 °F (66 °C)		
Measured Fluid Temperature Range	34 to 140 °F (1 to 60 °C)		
Humidity	0–100% condensing; meter is capable of operating in fully submerged environments		
Maximum Working Pressure of Meter Housing	175 psi (12 bar)		
Register Type	Straight reading, permanently sealed electronic LCD; digits are 0.28 in. (7 mm) high		
Register Display	• Total consumption (nine digits) • Temperature • Alarm and operating mode • Alarm indicators	• Firmware version • Rate of flow • Unit of measure (factory programmed for gallons, cubic feet and cubic meters)	
Totalization Display Resolution up to 1 in.	• Gallons: 0.01	• Cubic feet: 0.001	• Cubic meters: 0.0001
Totalization Display Resolution 2 in., 3 in., 4 in.	• Gallons: 0.1	• Cubic feet: 0.01	• Cubic meters: 0.001
Totalization Display Resolution 6 in., 8 in.	• Gallons: 1.0	• Cubic feet: 0.1	• Cubic meters: 0.01
Scaled/Unscaled Pulse Output**	Solid-state relay		
Max. Voltage	30V DC		
Current	100 mA		
Pulse Width	50 ms (programmable 30–100 ms) See *"Pulse Weight" on page 3* for a table of default and maximum settings.		
Analog 4-20 mA Output**	Two-wire/passive flow rate measurement		
Input Voltage Range	9–50V DC supply		
Current	4–20 mA – default scaling set to the safe maximum operating condition (SMOC)		
Max. Load Resistance (Ohms)	50 Ohms + 50 Ohms (supply voltage - 9V)		
Battery	3.6-volt lithium thionyl chloride; battery is fully encapsulated within the register housing and is not replaceable; 15-year battery life; 20-year battery life w/encoder option		

* Longer lay lengths available

** BEACON®/AquaCUE® connectivity can be substituted for either output option. When BEACON/AquaCUE connectivity is ordered with the scaled/unscaled pulse output, the pulse output is an open drain MOSFET.

PULSE WEIGHT

Meter Size (in.)	Scaled Volume per Pulse Default			Unscaled/Minimum Volume per Pulse		
	gal	ft3	m3	gal	ft3	m3
5/8	1	0.1	0.01	0.02	0.002	0.00005
5/8 x 3/4	1	0.1	0.01	0.02	0.002	0.00005
3/4	1	0.1	0.01	0.02	0.0025	0.0001
2	10	1	0.1	0.250	0.05	0.001
3	10	1	0.1	0.250	0.05	0.001
4	10	1	0.1	0.500	0.1	0.002
6	100	10	1	1.000	0.1	0.005
8	100	10	1	2.000	0.2	0.005

Meter Programming

The outputs and other settings of the flow meter may be programmed through the meter infrared (IR) optical communication port using the Badger Meter Product Configuration Utility (PCU) with the ACTiSYS® IR programming cable or IR Communication Device with micro USB cable (user-supplied).

Part Number	IR Communication Device
64436-041	ACTiSYS IR programming cable
68891-001	IR Communication Device

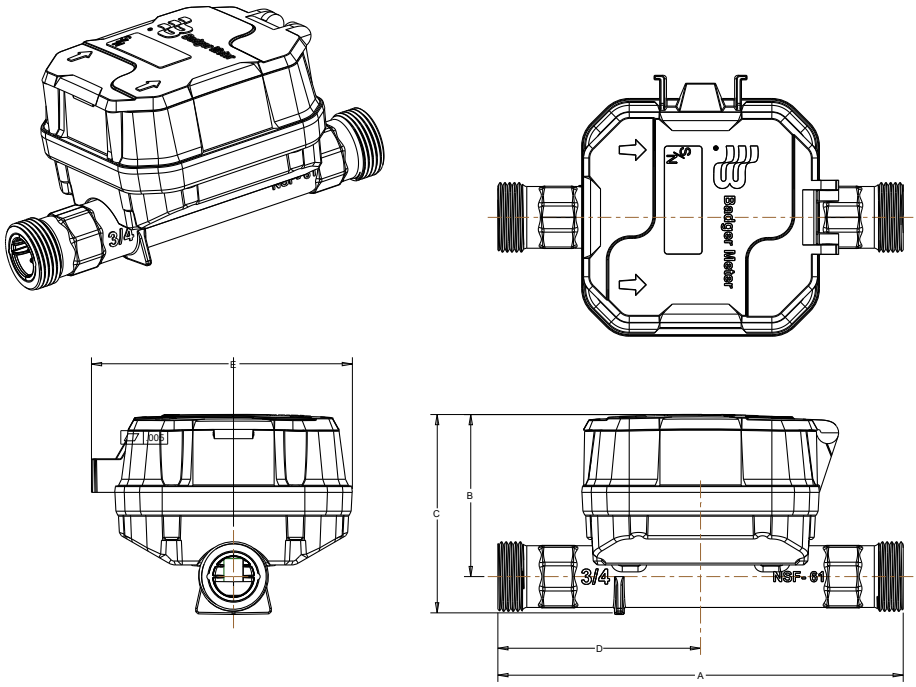
MATERIALS – METERS UP TO 1 INCH

Meter Housing	Lead-free bronze alloy
Measuring Section	Ultrasonic sensors located in the flow tube
Register Housing and Lid	Engineered polymer
Strainer	Engineered composite

PHYSICAL DIMENSIONS – METERS UP TO 1 INCH

E-Series G2 Ultrasonic Meter Size	5/8 in.	5/8 x 3/4 in.	3/4 in. (7-1/2 in.)	1 in.
Size Designation X Lay Length	5/8 × 7-1/2 in. (16 × 191 mm)	5/8 × 3/4 × 7-1/2 in. (16 × 19 × 191 mm)	3/4 × 7-1/2 in. (19 × 191 mm)	1 × 10-3/4 in. (25 × 273 mm)
Bore Size	5/8 in. (16 mm)	3/4 in. (19 mm)	3/4 in. (19 mm)	1 in. (25 mm)
Coupling Nut & Spud Thread (NPSM)	3/4 in. (19 mm) × 14 NPSM	1 in. (25 mm) × 11-1/2 NPSM	1 in. (25 mm) × 11-1/2 NPSM	1-1/4 in. (32 mm) × 11-1/2 NPSM
Service Pipe Thread (NPSM)	1/2 in. (13 mm)	3/4 in. (19 mm)	3/4 in. (19 mm)	1 in. (25 mm)
Weight (without AMR)	2.5 lb (1.13 kg)	2.7 lb (1.23 kg)	2.62 lb (1.19 kg)	4.02 lb (1.82 kg)
See illustrations below for Measurement Designations				
Length (A)	7.49 in. (190 mm)	7.46 in. (189 mm)	7.46 in. (189 mm)	10.75 in. (273 mm)
Height (B)	2.95 in. (75 mm)	2.99 in. (76 mm)	2.99 in. (76 mm)	3.19 in. (81 mm)
Height (C)	3.55 in. (90 mm)	3.66 in. (93 mm)	3.66 in. (93 mm)	4.06 (103 mm)
Length (D)	3.74 in. (95 mm)	3.74 in. (95 mm)	3.74 in. (95 mm)	3.94 (100 mm)
Width (E)	4.82 in. (122 mm)			

Measurement Designations



MATERIALS – METERS 2–8 INCH

Meter Housing	Lead-free bronze alloy
Measuring Section	Ultrasonic sensors located in the flow tube
Register Housing & Lid	Engineered polymer
Transducer Port Covers 3 in., 4 in.	Engineered polymer
Transducer Port Covers 6 in., 8 in.	Engineered polymer

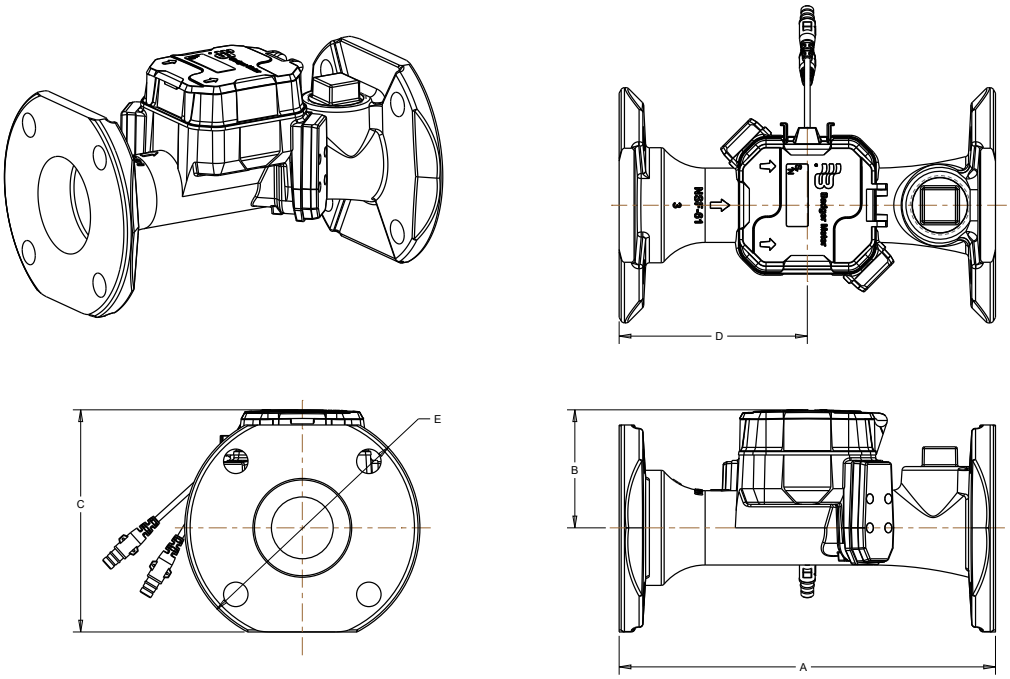
NOTE: There is no transducer port cover for 2 inch meters.

PHYSICAL DIMENSIONS – METERS 2–8 INCH

E-Series G2 Ultrasonic Meter Size	2 in.	3 in.	4 in.	6 in.	8 in.
Size Designation X Lay Length	2 × 10 in. (51 × 254 mm)	3 × 12 in. (76 × 305 mm)	4 × 14 in. (102 × 356 mm)	6 × 18 in. (152 × 457 mm)	8 × 20 in. (203 × 508 mm)
Weight (without AMR)	10.2 lb (4.6 kg)	26 lb (11.8 kg)	38 lb (17.2 kg)	59 lb (26.8 kg)	96 lb (43.5 kg)
See illustrations below for Measurement Designations					
Length (A)	10 in. (254 mm)	12 in. (305 mm)	14 in. (356 mm)	18 in. (457 mm)	20 in. (508 mm)
Height (B)	3.73 in. (95 mm)	3.76 in. (95 mm)	3.99 in. (101 mm)	5.15 in. (131 mm)	6.49 in. (165 mm)
Height (C)	5.54 in. (141 mm)	7.08 in. (180 mm)	8.5 in. (216 mm)	10.36 in. (263 mm)	13.05 in. (331 mm)
Length (D)	4.2 in. (107 mm)	6 in. (152 mm)	7 in. (178 mm)	8 in. (203 mm)	9 in. (229 mm)
Width (E)	6.1 in. (155 mm)	7.5 in. (191 mm)	9 in. (229 mm)	11 in. (279 mm)	13.50 in. (343 mm)
Height with Lifting Ring	NA	NA	NA	12.96 in. (329 mm)	15.65 in. (398 mm)
Number of Bolts	2	4	8	8	8
Bolt Hole Diameter	0.781 in. (19.84 mm)				
Companion Flange	2 in. (51 mm)	3 in. (76 mm)	4 in. (102 mm)	6 in. (152 mm)	8 in. (203 mm)
NPT Test Port	1 in. (25 mm)	1.5 in. (38 mm)	2 in. (51 mm)	2 in. (51 mm)	2 in. (51 mm)

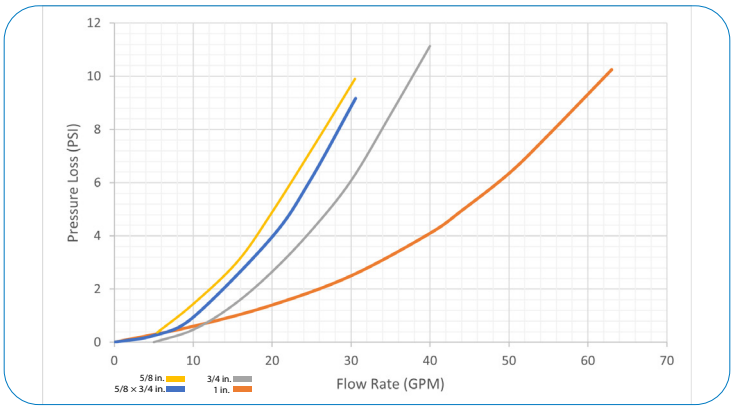
Drawings illustrate the 3 inch meter

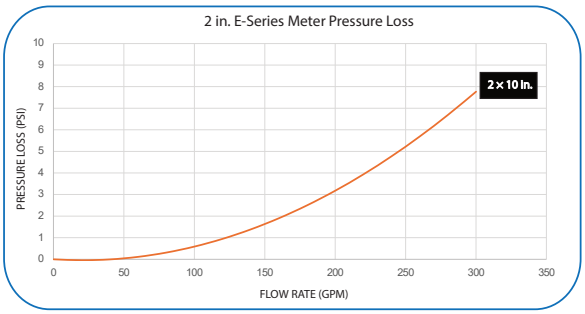
Measurement Designations

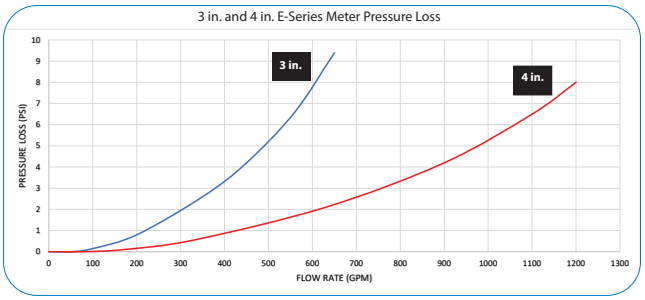


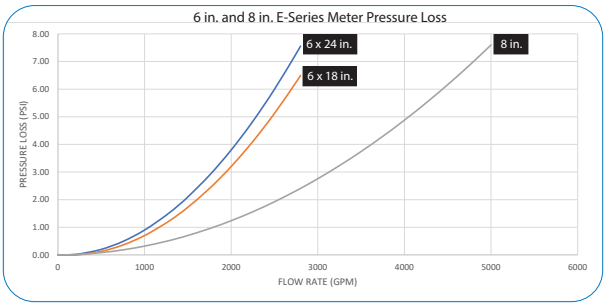
PRESSURE LOSS CHARTS

Chart represents typical meter performance. Rate of flow in gallons per minute (gpm).









ACCURACY CHARTS

Chart represents typical meter performance. Rate of flow in gallons per minute (gpm).