



**Badger Meter**

## HR-E<sup>®</sup> LCD 4-20 Encoder

### DESCRIPTION

The High Resolution 4-20 encoder (HR-E LCD 4-20) is a fully electronic, solid-state encoder with no moving parts. It is designed for use with all current Badger Meter<sup>®</sup> Recordall<sup>®</sup> Disc Series, Turbo Series, Compound Series, Combo Series and Fire Service meters and assemblies. These solid-state units produce a standard encoded output as well as a 4-20 mA DC output signal through a dual output wire design. The HR-E LCD 4-20 encoder provides connectivity with Badger Meter ORION<sup>®</sup> AMR/AMI endpoints and other AMR/AMI technology solutions approved by Badger Meter.

**NOTE:** For more detailed information, see the user manual, *High Resolution LCD Encoders*, available at [www.badgermeter.com](http://www.badgermeter.com).

**Field Programmable:** The HR-E LCD 4-20 encoder comes standard as factory programmed, with the option for field programming the unit of measure, meter type, meter model, digit resolution from the encoder, billing units, rate-of-flow time and units, and the analog output. Programming is performed through the IR port via a computer using the Programmer software, version 2.0.0 or greater.

**Output Resolution:** Standard encoded output is 9 digits. The 4-20 signal from the encoder is proportional to the flow of fluid passing through the meter. Power for the 4-20 output signal device can be obtained from a 9...50V DC control loop. The default 20 mA setting of the signal is defined in the resolution chart.

**Status Indicators:** Icons on the encoder face indicate encoder status and alarm conditions. Status indicators are sent as part of the encoder extended message to AMR/AMI systems such as ORION Cellular, Fixed Network and Migratable endpoints that are capable of receiving an extended message. The details can also be read through an IR interface.

**Mounting:** The fully potted encoder assembly has a bayonet mount compatible with all Recordall Disc, Turbo Series, Compound Series, Combo Series and Fire Series meters and assemblies. The bayonet mount positions the encoder in any of four orientations for visual reading convenience. The encoder can be removed from the meter without disrupting water service.

**Magnetic Drive Communication:** The encoder detects movement of the wet side meter magnet with magnetic sensors to provide reliable and dependable meter monitoring.

**Tamper-resistant Features:** Unauthorized removal of the encoder is inhibited by a tamper-resistant Torx seal screw. Torx seal screws are provided as standard accessories. Optional proprietary tamper-proof screws are also available.

In addition, the encoder is resistant to magnetic tampering. The encoder detects an attempted tamper—as well as encoder removal—and displays a tamper alarm in either situation. Approved endpoints capable of receiving the alarms, such as ORION Cellular, Fixed Network and Migratable endpoints, can then report the tamper condition to the meter reading software.



**Construction:** The housing of the HR-E LCD 4-20 encoder is constructed of an engineered polymer enclosure and a polycarbonate lens. For long-term performance, the enclosure is fully encapsulated, weatherproof, and UV-resistant to withstand harsh environments and to protect the electronics in flooded or submerged pit applications. A patented epoxy potting comprises the encoder bottom. Due to this unique sealing, the HR-E LCD 4-20 exceeds all applicable requirements of AWWA Standard C707.

**Wire Connections:** The encoder is available with dual output wire connections. The encoder side wire is available with an in-line connector for easy connection to AMR/AMI endpoints, or a flying lead for field splice connection. The 4-20 side is available with a flying lead for easy connection in the field.

**Operating Characteristics:** The encoder is shipped in storage mode so a meter status alarm is not triggered. In storage mode, the meter model screen is displayed. Upon sensing two revolutions of the meter magnet, the encoder goes into normal operation mode. The display then automatically toggles between these four modes:

- 9-digit consumption displays for 45 seconds.
- 6-digit consumption (segmented leak detector in this mode) displays for 5 seconds.
- Rate of flow displays for 5 seconds.
- Meter model displays for 5 seconds.

## SPECIFICATIONS

<b>Encoder Type</b>	Permanently sealed, electronic LCD absolute encoder with analog output and field-programmable option
<b>Encoder Display</b>	Status indicators, unit of measure, billing units, automatic toggle between 9-digit and 6-digit consumption (segmented leak detector in this mode), rate of flow, meter model
<b>Unit of Measure</b>	U.S. gallons, Imperial gallons, cubic feet, cubic meters and liters
<b>Flow Rate</b>	Seconds, minutes, and hours
<b>Numerals</b>	7 mm (0.28 in.) high
<b>Weight</b>	11 ounces
<b>Humidity</b>	0...100% condensing
<b>Temperature</b>	Storage: -40...140° F (-40...60° C) Max. ambient for 1 hr: 150° F (66° C) Electronics & Display: 14...140° F (-10...60° C)
<b>Status Indicators</b>	Electronic and visual icons for: meter functioning correctly, meter alarm (indicates temperature limits exceeded, magnetic tamper or encoder removal), reverse flow, suspected leak, 30-day no usage, end of battery life
<b>Encoder Output</b>	Industry standard ASCII format Three-wire synchronous for AMR/AMI solutions Red = clock/power; Black = ground; Green = data
<b>Analog Output</b>	Two-wire/passive
Input Voltage Range	9...50V DC supply
Current	4...20 mA
Max. Load Resistance (Ohms)	50 Ohms + 50 Ohms (supply voltage - 9V)
<b>Battery</b>	Lithium thionyl chloride AA cell, fully encapsulated within encoder housing
<b>Battery Life</b>	20 years (calculated)

## DIMENSIONAL DRAWINGS

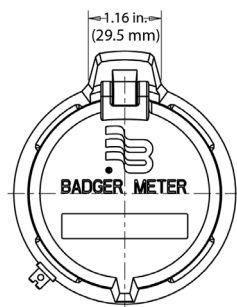


Figure 1: Top view

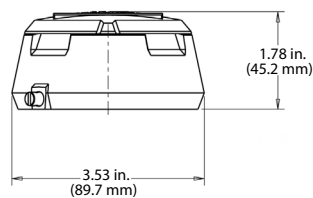


Figure 2: Front view

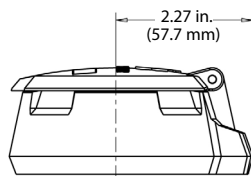


Figure 3: Left side view

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## MEASUREMENT RESOLUTION

The HR-E LCD 4-20 default output resolutions are as noted below.

Recordall Disc Series	Size (in.)	Encoder Output			Analog Output
		9-dial (gal)	9-dial (ft³)	9-dial (m³)	20 mA Set point (gpm)
LP	5/8, 5/8 x 3/4	0.01	0.001	0.0001	20
M25	5/8, 5/8 x 3/4	0.01	0.001	0.0001	25
M35	3/4	0.01	0.001	0.0001	35
M40	1	0.01	0.001	0.0001	40
M55	1	0.01	0.001	0.0001	55
M70	1	0.01	0.001	0.0001	70
M120	1-1/2	0.1	0.01	0.001	120
M170	2	0.1	0.01	0.001	170

Recordall Turbo Series	Size (in.)	Encoder Output			Analog Output
		9-dial (gal)	9-dial (ft³)	9-dial (m³)	20 mA Set point (gpm)
T160	1-1/2	0.1	0.01	0.001	200
T200	2	0.1	0.01	0.001	310
T450	3	0.1	0.01	0.001	550
T1000	4	0.1	0.01	0.001	1250
T2000	6	1	0.1	0.01	2500
T3500	8	1	0.1	0.01	4500
T5500	10	1	0.1	0.01	7000
T6200	12	10	1	0.01	8800
T6600	16	10	1	0.01	13200
T10000	20	10	1	0.01	19800

Recordall Compound Series	Size (in.)	Encoder Output			Analog Output
		9-dial (gal)	9-dial (ft³)	9-dial (m³)	20 mA Set point (gpm)
High Side T200	2.	0.1	0.01	0.001	200
Low Side M25	2.	0.01	0.001	0.0001	25
High Side T450	3	0.1	0.01	0.001	450
Low Side M25	3	0.01	0.001	0.0001	25
High Side T1000	4	0.1	0.01	0.001	1000
Low side M35	4	0.01	0.001	0.0001	35
High Side T2000	6	1	0.1	0.01	2000
Low Side M35	6	0.01	0.001	0.0001	35
High Side T3500	8	1	0.1	0.01	—
Low side M120	8	0.1	0.01	0.001	—

**NOTE:** For Fire Service Meters and Assemblies, please refer to appropriate Disc and TSM information provided above.