Badger Meter

HR-LCD 4-20

Scaled/Unscaled Register

DESCRIPTION

The High Resolution 4-20 scaled/unscaled register (HR-LCD 4-20 scaled/unscaled) is a fully electronic, solid-state register with no moving parts. It is designed for use with all current Badger Meter® Recordall® Disc Series, Turbo Series, Compound Series, Combo Series and Fire Service meters and assemblies. These solid-state units produce a scaled/unscaled output as well as a 4-20 mA DC output signal through a dual output wire design.

NOTE: For more detailed information, see the user manual, *High Resolution LCD Encoders*, available at *www.badgermeter.com*.

Field Programmable: The HR-LCD 4-20 scaled/unscaled register comes standard as factory programmed, with the option for field programming the unit of measure, meter type, meter model, 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: The output resolution table in this document lists the minimum output resolution for all Recordall meters.

Scaled Output:

- The scaled output is a switch closure output defined as: red wire = positive, black wire = negative.
- The scaled digital output from the register has a default resolution of 1/10th of the register test circle (resolution may vary in some cases).
- The movement of the meter magnet is converted to a square wave signal that is available as a scaled output through a solid-state relay.
- The scaled output is a solid-state relay to provide isolation from the 4-20 mA output.
- The nominal pulse output width is programmable from 30…100 msec.
- Resolution of the output is defined in the registration section.
- This digital pulse output is compatible with most totalizers and batch controllers.

Unscaled Output:

- The unscaled output is a switch closure output defined as: green wire = positive, black wire = negative.
- The movement of the meter magnet is converted to a square wave signal that is available as an unscaled output through a solid-state relay.
- The unscaled output is a solid state relay to provide isolation from the 4-20 mA output.
- Resolution of the output is defined in the registration section.
- The unscaled output will only be active when the device is powered by the 4-20 mA output.
- This digital pulse output is compatible with most totalizers and batch controllers.

Analog Output:

- The input pulses generated within the transmitter assembly are converted to a standard 4-20 mA control signal.
- This signal is proportional to the flow of fluid passing through the flow meter.



- Power for the device can be obtained from a 9…50V DC control loop.
- The default 20mA setting of the signal is defined in the registration section.

Mounting: The fully potted register assembly has a bayonet mount compatible with all Recordall meters. The bayonet mount positions the register in any of four orientations for visual reading convenience. The register can be removed from the meter without disrupting water service.

Magnetic Drive Communication: The register 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 register is inhibited by a tamper-resistant Torx® seal screw. Torx seal screws are provided. Optional proprietary tamper-proof screws are also available.

In addition, the register is resistant to magnetic tampering. The register detects any attempted tamper or register removal and displays the status indicator/alarm condition icon.

Construction: The housing of the register 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 register bottom. Due to this unique sealing, the register exceeds all applicable requirements of AWWA Standard C707.

Wire Connections: The register is available with dual output wire connections. Both the scaled/unscaled wire and the 4-20 wire are available with flying leads for easy connection in the field.

Operating Characteristics: The register 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 register goes into normal operation mode. The display then automatically toggles between these modes:

- 9-digit consumption displays for 50 seconds
- Rate of flow displays for 5 seconds
- Meter model displays for 5 seconds

SPECIFICATIONS

Register Type	Permanently sealed, electronic LCD register with scaled/unscaled and analog output, as well as a field-programmable option
Register Display	Status indicators, unit of measure, billing units, automatic toggle between 9-digit consumption, rate of flow, meter model
Unit of Measure	U.S. gallons, Imperial gallons, cubic feet, cubic meters, and liters
Flow Rate	Seconds, minutes, and hours
Numerals	7 mm (0.28 in.) high
Weight	11 ounces
Humidity	0…100% condensing
Temperature	Storage: – 40…140° F (– 40…60° C) Max. ambient for 1 hr: 150° F (66° C) Electronics & Display: 14…140° F (–10…60° C)
Status Indicators	Visual icons for: meter functioning correctly, meter alarm (indicates temperature limits exceeded, magnetic tamper or register removal), reverse flow, suspected leak, 30-day no usage, end of battery life
Scaled/Unscaled Output	Solid-state relay (not a dry contact)
Max. Voltage	30V DC
Current	100 mA
Pulse Width	50 ms (programmable 30…100 ms)
Analog Output	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)
Battery	Lithium thionyl chloride AA cell, fully encapsulated within register housing
Battery Life	10 years based on default settings and typical operating range

DIMENSIONAL DRAWINGS

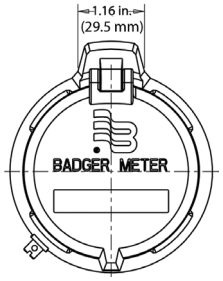


Figure 1: Top view

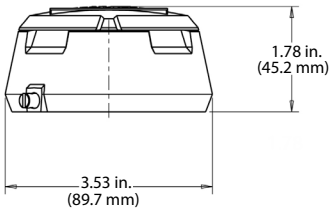


Figure 2: Front view

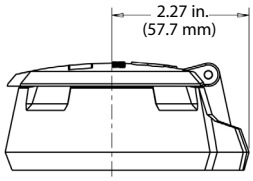


Figure 3: Left side view

MEASUREMENT RESOLUTION

The HR-LCD 4-20 scaled/unscaled default output resolutions are as noted below.

Recordall Disc Series

Model	Size (in.)	Scaled (pulse/unit)			Unscaled (pulse/unit)			Analog Output
		gal	ft³	m³	gal	ft³	m³	20 mA Set point (gpm)
LP	5/8	1	10	100	228.415	1708.661	60337.105	20
M25	5/8	1	10	100	198.334	1483.641	52391.084	25
M35	3/4	1	10	100	126.678	947.621	33462.863	35
M40	1	1	10	100	89.783	671.621	23716.632	40
M55	1	1	10	100	58.065	434.358	15338.279	55
M70	1	1	10	100	46.773	349.884	12355.278	70
M120	1-1/2	0.10	1	10	23.866	178.533	6304.435	120
M170	2	0.10	1	10	14.565	108.950	3847.303	170

Recordall Turbo Series

Model	Size (in.)	Scaled (pulse/unit)			Unscaled (pulse/unit)			Analog Output
		gal	ft³	m³	gal	ft³	m³	20 mA Set point (gpm)
T160	1-1/2	0.10	1	10	1.537	11.494	405.894	200
T200	2	0.10	1	10	1.537	11.494	405.894	310
T450	3	0.10	1	10	1.598	11.954	422.109	550
T1000	4	0.10	1	10	1.665	12.455	439.820	1250
T2000	6	0.01	0.10	1	0.150	1.123	39.639	2500
T3500	8	0.01	0.10	1	0.151	1.131	39.939	4500
T5500	10	0.01	0.10	1	0.198	1.481	52.308	7000
T6200	12	0.001	0.01	0.10	0.129	0.963	34.006	8800
T6600	16	0.001	0.01	0.10	0.016	0.116	4.107	13200
T1000	20	0.001	0.01	0.10	0.009	0.067	2.382	19800

Recordall Compound Series

Model	Size (in.)	Scaled (pulse/unit)			Unscaled (pulse/unit)			Analog Output
		gal	ft³	m³	gal	ft³	m³	20 mA Set point (gpm)
High Side T200	2	0.10	1	10	1.537	11.494	405.894	200
Low Side M25	2	1	10	100	198.334	1483.641	52391.084	25
High Side T450	3	0.10	1	10	1.598	11.954	422.109	450
Low Side M25	3	1	10	100	198.334	1483.641	52391.084	25
High Side T1000	4	0.10	1	10	1.665	12.455	439.820	1000
Low side M35	4	1	10	100	126.678	947.621	33462.863	35
High Side T2000	6	0.01	0.10	1	0.150	1.123	39.639	2000
Low Side M35	6	1	10	100	126.678	947.621	33462.863	35
High Side T3500	8	0.01	0.10	1	0.151	1.131	39.939	—
Low side M120	8	0.10	1	10	23.866	178.533	6304.435	—

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

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