

**DESCRIPTION**

**APPLICATIONS:** The Badger® RTR® Extended Range Pit ORION® RF system is designed for water meter pit or vault installations that are subject to flooding or submergence. The assembled system consists of the Recordall® Transmitter Register (RTR®) and the Extended Range Pit ORION Module. The RTR is factory wired to the end cap assembly for maximum reliability; the Extended Range Pit ORION is bottom mounted thru a drilled hole in the meter pit lid.

The assembled RTR Extended Range Pit ORION is designed to communicate with Badger interrogation devices, including handheld or mobile.

**OPERATION:** The RTR provides a digital signal from Badger Meter's patented piezoelectric solid-state switch. This signal has the characteristics of an open drain Field Effect Transistor (FET) and has no electrical contacts to stick, wear or corrode. It is fully compatible with the input circuitry of the Extended Range Pit ORION Module. The Extended Range Pit ORION Module uses the RF bubble-up (broadcast) mode.

**RESOLUTION:** Digital output from the RTR has resolution of 1/10th of the register test circle. Output resolution of the Extended Range Pit ORION Module may vary with meter size. The resolution table on the back of this technical brief lists output resolution for all ORION meter applications.

**LEAK DETECTION:** The Orion system provides optional leak detection notification when the meter is read. The system reports leak detection when a two hour window of no usage is found within a 24 hour time period. The system automatically resets when the next two hour window of no usage is found.

**MOUNTING:** The RTR uses a bayonet connection compatible with all Recordall® Disc, Turbo, Compound and Fire Series meters. A TORX® seal screw is provided to allow positioning and to secure the RTR to the meter body in a tamper resistant mode. The RTR can be removed from the meter without disrupting service or disconnecting the Extended Range Pit ORION. The RTR is factory wired to the Extended Range Pit ORION Module.

For best performance, the Extended Range Pit ORION is mounted through the drilled hole in the lid, attached to the lid, and programmed by the utility in the field. **If the Extended Range Pit ORION system is mounted below the lid (not through the drilled hole) reduced performance will result.**

**MAGNETIC DRIVE:** Direct drive, high-strength, magnetic coupling through the meter body to the wetted magnet provides reliable and dependable register coupling.

**SEALED REGISTER:** The RTR local register consists of a six-digit straight-reading mechanical odometer totalizer, a 360° test circle with sweep hand, and a flow finder to detect leaks. The register gearing is self-lubricating, thermoplastic to minimize friction and provide long, reliable life. Permanent sealing eliminates moisture, dirt, and other contaminants.

**TAMPER-PROOF FEATURES:** Removal of the RTR from the meter can be minimized by using a tamper resistant TORX seal screw. TORX seal screws are provided as standard accessories with the RTR. Optional tamper detection seal wire screws are also available.

**CUT WIRE TAMPER INDICATION:** The Extended Range Pit ORION has the capability to detect a tamper should it exist. Proper setup in ORION Reading System software needed.

**CONSTRUCTION:** The housing of the RTR is constructed of a tempered glass lens top and a copper alloy metal bottom. Internal construction materials are thermoplastic for long-life and high reliability. The integrity of the adhesive seal joining the glass top to the metal base provide unmatched protection in water meter applications. A corrosion and tamper resistant TORX seal screw is provided to secure the RTR to the meter. The shroud assembly is polycarbonate.

The housing of the Extended Range Pit ORION is constructed of a polycarbonate material.

**TEMPERATURE:** The operating range of the RTR is -40°C to 49°C (-40°F to 120°F). The operating range of the Extended Range Pit ORION is -40°C to 60°C (-40°F to 140°F). The water meter should not be subjected to temperatures below freezing.



**SPECIFICATIONS**

<b>Transmitter/Register</b>	Straight reading, permanently sealed, magnetic drive
<b>Unit of Measure</b>	U.S. Gallons, Cubic Feet, Cubic Meters, clearly identified on register face
<b>Number Wheels</b>	Six with 3/16" high numerals Namel font type
<b>Test Circle</b>	360° circle with ten major increments with ten divisions each
<b>Weight</b>	9 Ounces
<b>Humidity</b>	0% to 100% Condensing
<b>Signal Characteristics</b>	Open Drain (FET)
<b>Visual Resolution</b>	1/100th of Test Circle
<b>Electronic Resolution</b>	1/10th of Test Circle
<b>Typical Signal Duration</b>	15 ms to 75 ms @ 25°C (77°F) 8 ms to 75 ms over operating temperature range at 67 µA
<b>On State Resistance</b>	7.5 Ohms @ 25°C (77°F)
<b>Power Source</b>	External
<b>Maximum Switching</b>	30 VDC @ 1 mA @ 25°C (77°F)
<b>Battery on Pit ORION</b>	(2) 3.6V 2.4 Ahr Lithium Batteries

See Badger Technical Brief RTR-T-05 for RTR® specifications.



**MOISTURE:** The RTR is permanently sealed and designed for submerged meter pit applications. The RTR Extended Range Pit ORION system is also designed for flooded or submerged meter pit locations.

**WIRE CONNECTIONS:** The RTR can be factory prewired with pre-sized wire harness of either 5 or 20 feet to the Extended Range Pit ORION Module.

**ELECTRONICS:** The piezoelectric switch circuit board is completely sealed against moisture inside the unit and sealed to ensure protection from humidity. The Extended Range Pit ORION Module is designed to protect against the effects of humidity.

**ELECTRICAL:** The electronic circuitry of the RTR and Extended Range Pit ORION Module is designed to provide immunity to electrical surges and transients per IEC801-2, IEC801-4 Severity Level 4.

**OPERATING CHARACTERISTICS:** The RTR has an output equal to 1/10th of the meter test circle with the characteristics of an open drain FET. The on-state condition is a solid-state switch closure. Off-state condition is an open circuit. Powered by an external source, the RTR has a maximum rating of 30 VDC at 1 mA (25°C).

**PATENT:** The Badger RTR Extended Range Pit ORION application is covered by US patent number 5,298,894.

**TRANSPORTATION WARNING:** The Federal Aviation Administration prohibits operating transmitters and receivers on all commercial aircraft. When powered, the Extended Range Pit ORION Module is considered an operating transmitter and receiver and cannot be shipped by air.

M E A S U R E M E N T



**RESOLUTION:**

The

minimum electronic resolution of the RTR is noted to the right. To verify the correct resolution for your application, contact Badger Meter Customer Solutions.

**METER COMPATIBILITY:** Badger Meter's Recordall® Disc, Turbo, Compound, and Fire Series meters.

RECORDALL Model	Size	Gallons	Resolution Cubic Feet (Ft³)	Resolution Cubic Meters (m³)
M25	5/8"	1	0.1	0.01
M25	3/4"	1	0.1	0.01
M35	3/4"	1	0.1	0.01
M70	1"	1	0.1	0.01
M120	1 1/2"	10	1	0.1
M170	2"	10	1	0.1

  

RECORDALL Turbo Series (Size)	Gallons	Resolution Cubic Feet (Ft³)	Resolution Cubic Meters (m³)
2"	100	10	0.1
3"	100	10	0.1
4"	100	10	0.1
6"	100	10	1
8"	100	10	1
10"	100	10	
12"	1000	100	
16"	1000	100	
20"	1000	100	

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**LICENSE REQUIREMENTS**

This device complies with Part 15 of the FCC Rules. Operation of this device is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Any changes made by the user not approved by Badger Meter can void the user's authority to operate the equipment. No license is required by the utility to operate a ORION meter reading system.



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

Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding bid obligation exists.



**BadgerMeter, Inc.**

P.O. Box 245036, Milwaukee, WI 53224-9536  
 (800) 876-3837 / Fax: (888) 371-5982  
[www.badgermeter.com](http://www.badgermeter.com)