

# Badger® ORION® Automated Meter Reading System

## Badger® ORION® Remote Transmitter for Gas Meters

# Technical Brief

**APPLICATIONS:** The Badger ORION Remote Transmitter for Gas Meters is a totally integrated unit compatible with a variety of residential and commercial gas meters equipped with either a pulsed output or using the Badger Gas-RT in conjunction with the meter's index. The Badger ORION Remote Transmitter is mounted near the meter on a wall, pipe, or other suitable location.

The Badger ORION Remote Transmitter combines the latest in radio frequency (RF) transmission and antenna technology, and is designed for maximum flexibility to meet the various system and application needs of utilities of all sizes. Users will get faster meter reading, greater accuracy, increased operator safety, fewer re-reads, elimination of "hard-to-read" meters, and improved customer service.

The Badger ORION Remote Transmitter's signal can be received using a variety of data collection devices and systems, including the Badger ORION handheld for programming and data collection, the Badger ORION Mobile Reading System at speeds up to 50 miles per hour, the Badger ORION Network Gateway Receiver, and selected networks provided by alliance partners of Badger Meter that can readily integrate electric, gas, and water meters.

**OPERATION:** Badger ORION Remote Transmitters operate using bubble-up (broadcast) Radio Frequency technology, which does not require the utility to obtain an FCC license. Typically Badger ORION Remote Transmitters are shipped to the utility for field retrofit to currently installed gas meters. The Badger ORION would be installed, programmed, and turned on using the Badger ORION handheld programmer. Once programmed and turned on, the Badger ORION Remote Transmitter transmits at the factory-set time interval.

**RESOLUTION:** The Badger ORION Remote Transmitter broadcasts an electronic reading resolution equal to what is provided by the gas meter index drive dial (eg. 2 cu ft per revolution for most residential meters) or the value of the pulse from a pulsed output device. The Badger ORION Remote Transmitter provides an electronic reading of up to seven digits.

**CONSTRUCTION:** The Badger ORION Remote Transmitter is constructed with an ORION RF circuit board and battery completely encapsulated in a waterproof epoxy within a UV-stabilized plastic housing. Stainless steel mounting hardware is provided as part of the installation kit with each module and allows mounting to a flat wall surface or to a pipe.

The Badger ORION Remote Transmitter may be installed indoors or outdoors but is not intended for locations that are subject to flooding or submergence.

The Badger ORION Remote Transmitter will not affect the gas meter accuracy beyond the meter's specified tolerances, nor will it interfere with the operation of the gas meter.

**OPERATING ENVIRONMENT:** Designed for indoor and outdoor non-submersible applications. The operating temperature of the Badger ORION Remote Transmitter is -40 C to +60 C (-40 F to +140 F). Humidity range is 0% to 100% condensing.

**BATTERY:** The Badger ORION Remote Transmitter utilizes two lithium-thionyl chloride AA-cell, 3.6 volts. It is a non-replaceable battery and is completely encapsulated in a waterproof epoxy within the Badger ORION module. Projected battery life is 10 years.

**TRANSMITTER:** Badger ORION Remote Transmitters operate in the 902-928 MHz range, using bubble-up (broadcast) technology, eliminating the need for FCC licensing. The Badger ORION Remote Transmitter is factory programmed to a choice of transmit modes:

- Transmitted signal is broadcast every 4-5 seconds for use in drive-by applications.



## SPECIFICATIONS

Frequency	902-928 MHz
Broadcast Technology	Nonlicensed, bubble-up (broadcast)
Temperature	-40°F to +140°F (-40°C to +60°C)
Humidity	0% to 100% Condensing
Battery	3.6 V Lithium-Thionyl Chloride (2) AA-Cells 10 year life
Input Switch Closure	Mechanical or electronic switch closure terminals Pulse width greater than 6 msec Pulse frequency maximum 8 Hz
Transmission Interval	4-5 seconds for Drive-by applications 8-9 seconds for Fixed Network applications
Tamper Sensors	Cut wire tamper No-usage for 30 day period
Data Profiling	Option to store 21,000 consumption readings taken at user-defined intervals from 1 minute to 24 hours (default is hourly)

- Transmitted signal every 8-9 seconds when used in a fixed network application. When used in fixed network applications, the transmitter will also transmit a periodic high power signal along with the standard signal.

An internal antenna is mounted to the circuit board.

The Badger ORION Remote Transmitter encodes and transmits the module serial number, the gas consumption reading, any tamper and non-usage indicators, and data verification checks. The factory-programmed serial number will be 80,000,000 or higher.

**GAS METER COMPATIBILITY:** Badger ORION Remote Transmitters are compatible with:

- Meters and correctors with pulsed outputs (Type-A pulse)
- Badger Gas RT mounted on the face of an index cover and driven by the index drive dial



Refer to Badger® ORION® for Gas Meters Selection Guide for specific meter models.

The Badger ORION can interface to any switch closure ranging from mechanical switches such as reed switches to electronic switch closures such as the Gas RT. The pulse width must be greater than 6 msec and the maximum pulse frequency is 8 Hz.

**TAMPER PROTECTION:** The transmitter, circuit board, and battery are completely encapsulated to protect from tampering as well as the environment.

In addition the Badger ORION Remote module incorporates a cut-wire sensor. The alarm is part of the transmitted signal and is manually reset to insure physical inspection of the meter and module.

**NO-USAGE NOTIFICATION:** Badger ORION Remote transmitters provide notification of meters with no consumption over a 30-day time period. This alert could also indicate a stuck meter or tampering of the module itself. The no-usage notification automatically resets after gas flow resumes through the meter. The notification is part of the transmitted signal.

**DATA PROFILING:** Badger ORION Remote Transmitters include a Data Profiling feature. The Badger ORION Data Profile Transmitter includes all the same features and functionality of other Badger ORION Transmitters plus a user-programmable data storage option. The Data Profile information provides utilities with an additional customer service tool that helps resolve high consumption disputes and suspected tampering.

The Data Profiling feature allows the utility to program the time interval between consumption readings from the following settings: 1 minute, 5 minutes, 15 minutes, 30 minutes, 1 hour (default setting), 12 hours, and 24 hours. A total of 21,000 readings can be stored within the Badger ORION Data Profile Remote Transmitter. The stored data can be retrieved at any time with the Badger ORION handheld programmer/data collector or a laptop computer using the transmitter's optical port for communications. With the capability to store over 21,000 consumption readings, based on one-hour intervals, the Badger ORION Data Profile Transmitter can accumulate over two years worth of customer usage for analysis.

The user can download selectable time periods: last 2 days, last 7 days, last 30 days, last 60 days, last 90 days, last 180 days, and All Data. The downloaded data file, including tamper and no usage indicators, can be saved in the Badger ORION and viewed immediately. The data file can also be exported from the handheld to a computer running the Badger ORION Data Profile Viewer software. The Data Profile Viewer software allows graphing and statistical analysis of the data, printing of graphs, etc.

**INSTALLATION:** The Badger ORION Remote Transmitter is easily mounted in the vicinity of the meter on a flat surface or a pipe. The installation can be accomplished within minutes by an installer without interruption of service to the customer. The two-conductor cable from the Remote Badger ORION Transmitter is connected to the output terminals of the pulser or to the Gas RT.

The Badger ORION handheld programmer/data collector is used to program the current meter reading (so account history is maintained), the index resolution, the number of dials, and the value of the drive dial or pulse, into the transmitter, and then activate the transmitter. The communications between the programmer and the Badger ORION Remote Transmitter are through the transmitter optical port. The module serial number is factory programmed into the module. Verification of the transmitted RF signal is also accomplished with the handheld using its internal receiver.

**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 user's authority to operate the equipment. No license is required by the utility to operate a Badger ORION meter reading system.

**TRANSMISSION RANGE:** Transmission range is dependent on the environment between each gas meter transmitter and the data collection device. Vegetation, buildings, vehicles, snow/rain and other obstacles affect range by either absorbing some of the RF signal or by reflecting the signal. These obstacles can be either permanent or temporary. The range is also affected if the transmitter is covered with vegetation, snow or other obstacles. For severe issues, a Badger ORION Repeater is available to extend the range.

#### REGULATORY AND STANDARDS

Among the various standards and regulatory requirements, the Badger ORION Remote Transmitter complies with the following:

- FCC compliance with Part 15
- ANSI B109.1, .2, and .3 Gas Meters

#### ⚠ WARNING

**TRANSPORTATION:** The Federal Aviation Administration prohibits operating transmitters and receivers on all commercial aircraft. When powered, the Badger ORION Remote Transmitter is considered an operating transmitter and cannot be shipped by air.

#### ⚠ CAUTION

The Badger ORION Remote Transmitter should only be connected to a Badger meter or an approved product. Connection to an unapproved product will void the transmitter warranty.

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