

Badger® ORION® Automated Meter Reading System

Badger® ORION® Integral Transmitter for Gas Meters

Technical Brief

APPLICATIONS: The Badger ORION Integral Transmitter for Gas Meters is a totally integrated unit compatible with popular American®, Sensus® and Actaris® residential and commercial gas meters, as well as on selected devices such as the Dresser/Roots meter with the appropriate AMR adapter. The Badger ORION Integral Transmitter is mounted between the gas meter and the meter's index without any modification to the meter itself.

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

RESOLUTION: The ORION Integral 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). The ORION provides an electronic reading of up to seven digits.

CONSTRUCTION: The Badger ORION Integral Transmitter is constructed with a Badger ORION RF circuit board and battery completely encapsulated in a waterproof epoxy within a UV-stabilized plastic housing. A molded thermoplastic elastomer gasket is utilized between the Badger ORION Integral Transmitter housing and the meter body. Stainless steel mounting hardware is provided as part of the installation kit with each module. A clear polycarbonate lens cover is UV stabilized and replaces the existing index cover. Weep holes are provided in the Badger ORION Integral Transmitter cover to dissipate moisture.

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

The Badger ORION Integral 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 Integral Transmitter is -40 C to +60 C (-40 F to +140 F). Humidity range 0% to 100% condensing.

BATTERY: The Badger ORION Integral Transmitter utilizes a choice of batteries depending on the application: C-Cell for drive-by or an A-Cell for fixed network applications. The battery is a single lithium-thionyl chloride cell, 3.6 volts. It is a non-replaceable cell and is completely encapsulated in a waterproof epoxy within the Badger ORION Integral Transmitter module. Projected battery life is 20 years, regardless of cell size and application.



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, choice of: A-Cell for Fixed Network applications C-Cell for Drive-By applications 20 year life
Transmission Interval	4-5 seconds for Drive-by applications 8-9 seconds for Fixed Network applications
Tamper Sensors	Magnetic 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)

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

- Transmitted signal is broadcast every 4-5 seconds for use in drive-by applications.
- 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® Integral 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 Integral Transmitters are available for most common residential and commercial gas meters from American® Meter, Sensus® (including Rockwell®, Equimeter® and Invensys® brands), Actaris® (including Sprague® and Schlumberger® brands) and Dresser/Roots rotary meter (using the Dresser/Roots AMR adapter).

For certain meters and correctors with pulsed outputs, the Badger ORION Remote Transmitter for Pulsed Outputs can be utilized. Also, other aluminum body meters with plastic index covers can utilize the Gas RT and the Badger ORION Remote Transmitter module.

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

TAMPER PROTECTION: Two red seal plugs are used over the mounting screws after the installation is complete to indicate a mechanical tamper with the transmitter or meter.

In addition the Badger ORION Integral Transmitter incorporates a magnetic tamper sensor that senses the presence of an external magnet. 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 Integral 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 (Option): Badger ORION Integral Transmitters can be purchased with an optional Data Profiling feature. The Badger ORION Data Profile Transmitter includes all the same features and functionality of the Badger ORION Integral Transmitter 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 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 Integral Transmitter is easily mounted between the gas meter and the existing index. Typically the Transmitter is retrofitted to an existing meter; the installation can be accomplished within minutes by an installer without interruption of service to the customer. The existing index cover and index are removed, the index is mounted to the Badger ORION Integral Transmitter module, and the Badger ORION and index assembly are mounted to the meter. The new Badger ORION clear cover protects the transmitter and index. Standard hand tools are utilized.

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 into the transmitter, and the value of the drive dial, and then activate the transmitter. The communications between the programmer and the Badger ORION Integral 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, an ORION Repeater is available to extend the range.

REGULATORY AND STANDARDS

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

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

⚠ WARNING

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

⚠ CAUTION

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

Badger® and ORION® are registered trademarks of Badger Meter, Inc. American® is a registered trademark of American Metering Company, Inc. Sensus® is a registered trademark of Sensus Metering Systems – North America, Inc. and its subsidiaries and affiliates. Actaris® is a registered trademark of Actaris U.S. Gas, Inc. Rockwell® is a registered trademark of Rockwell Automation, Inc. Equimeter® is a registered trademark of Equimeter Incorporated, a BRT Metering Systems Company. Invensys® is a registered trademark of Invensys. Sprague® is a registered trademark of Sprague Meter Division of Textron, Inc. Schlumberger® is a registered trademark of Schlumberger Limited Corporation.

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 contractual obligation exists.



Please see our website at
www.badgermeter.com
for specific contacts.



BadgerMeter, Inc.

P.O. Box 245036, Milwaukee, WI 53224-9536
(800) 876-3837 / Fax: (888) 371-5982

www.badgermeter.com