Gen™5

500W ERT® Module Remote Installation Guide

Gen5 500W ERT Module Remote Installation Guide
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New in This Document

Revision	Date	Description
002	December 5, 2022	Revised ERW-1601-010in Description on page 6 to specify that the flying telemetry lead is 10 inches.
001	December 2, 2022	Added ERW-1601-010 to Description on page 6.
000	November 9, 2022	First publication. This document was previously part of the *500W ERT Module Remote Installation Guide*, which has been split into two documents: ■ *Gen™5 500W ERT Module Remote Installation Guide* (this document) ■ *OpenWay® Riva™ 500W ERT® Module Remote Installation Guide* (815-0005-00)

1 Introduction

Itron Gen™5 500W ERT® Modules are radio-frequency (RF) water modules that connect to the Gen™5 Network as a leaf on a continuously powered device (CPD). The modules choose one CPD as a gateway to the Gen5 Network. The CPD communication with the modules is based on a limited listening schedule (LLS). The CPD handles the modules' messages, forwarding and transmitting the module's messages. The modules can communicate in mobile mode (also known as 100S system mode) to support a ready-to-secure installation when a third-party work order system is used. The utility configures the module to switch to the Gen5 network mode.

The CPD device accepts up to 20 modules at a time. The modules choose the CPD association. Associated parent CPDs can change over time. The 500W ERT Modules are not IP-addressable. The Gen5 network head end addresses the 500W ERT Module through the CPD and maintains a list of CPDs and associated 500W ERT Modules. The CPD forwards messages addressed to the 500W ERT Module. The modules continue Itron's tradition of reliability, accuracy, and long battery life while supporting the industry's standards for security.

Description

The following table describes the 500W ERT Module's location compliance and part number.

Description	Location compliance	Itron part number
500W ERT Module, 4 battery, register and telemetry 10-inch flying lead	USA/Canada, Australia, Tonga	ERW-1601-002
500W ERT Module, 2 battery, register and telemetry 10-inch flying lead	USA/Canada, Australia	ERW-1601-007
500W ERT Module, 2 battery, register, and 10-inch flying telemetry lead	USA/Canada, Australia	ERW-1601-010

> **Note:** The 500W ERT Module works accurately with cable lengths up to 300 feet. Use an Itron-approved extension cable.

Related Documents

The following documents may also be of use to you. These documents, as well as others, can be accessed and viewed at https://products.itron.com.

- *500 Modules Ordering Guide*
- *Gen™5 500W ERT® Module Specification Sheet*
- *Gen™5 500W ERT® Module Technical Reference Guide*
- *UtilityIQ® Installation Guide*
- *Water Meter and Telemetry Module Compatibility List*

Security

When configured to operate in network mode, 500W ERT Modules attempt to join a Gen5 network. The next hop from the module is to a CPD. When the 500W ERT Module has found a suitable CPD, confirmed a secure link, and received a drivers' license from the head end, UtilityIQ can present the module data in the user interface and export it to customer applications.

Refer to the *Gen™X 500W ERT® Module Specification Sheet* for information on compatible hardware, firmware, and UtilityIQ versions.

Transmission Modes

The 500W ERT Module is an IPv6 Wi-SUN compliant device that operates in network mode or mobile mode.

Network Mode

In network mode, the module supports 5-, 15-, 30-, or 60-minute intervals. It provides storage and reporting for up to 62 days of 15-minute interval data and associated event data, or 8 months of hourly interval data.

Note: Interval data configuration is dependent on the module's firmware version. See Firmware Functionality on page 11 for more information.

The 500W ERT Module also sends a local access beacon message every 60 seconds that allows users to gather contingency readings locally when needed.

Caution: If you perform a switch to network mode or switch to mobile mode operation, it results in a loss of interval data.

The 500W ERT Module operates using the 902 to 928 MHz in the ISM band frequency band and does not require an FCC license.

Mobile Mode

In mobile mode, the module transmits every nine seconds over multiple RF channels to report on:

- meter register value
- cut cable or communication error event
- reverse flow (encoder version selected)
- system leak status
- low battery indicator

Operating Modes

The 500W ERT Module has the following operating modes.

- **Factory mode**
  - 500W ERT Modules are shipped from the factory in factory mode.
  - The 500W ERT Module's transmitter is turned off.
  - The 500W ERT Module's receiver is bubbling up to listen for a programming command.
  - 500W ERT Module attempt to read the register every hour.
  - Register Error Detected and Register Error alarm or event flags may be set when a register is not connected.
  - If the 500W ERT Module reads a connected register, the module automatically moves to run mode.
- **Audit mode**
  - Audit mode reduces the normal read latency time associated with standard modes of operation and is often used after initial installation.

  - This mode is useful in network installations where the normal bubble rate is very slow.
  - Audit mode remains active for 30 days and then reverts to the initial programmed mode.
  - Audit mode is intended to be used once.
- **Run mode**
  - The 500W ERT Module's normal operation mode.
  - The 500W ERT Module's transmitted message is dependent on its factory settings for standard consumption + messages (SCM+).
  - SCM+ 500W ERT Module default bubble-up rate is 10 seconds.
- **Quiet mode**
  - Meter manufacturers can configure the 500W ERT Module for quiet mode after programming and direct mounting the 500W ERT Module in a factory.
  - The 500W ERT Module is awakened from quiet mode and enters run mode in one of two ways:
    - The 500W ERT Module detects consumption at the top of the hour (last hourly interval is greater than 1 or less than -1).
    - Receiving a two-way command, such as a **Read ERT** using FDM.

If a 500W ERT Module installed in quiet mode is not bubbling up SCM+ messages, it may be due to zero consumption on the 500W ERT Module , such as a vacant or vacation home. Initiate a two-way command (for example, perform a **Read ERT** with FDM) before removing the unit.

Battery Life

The 500W ERT Modulehas an expected battery life of 20 years, dependent on use case.

Low Battery

The 500W ERT Module includes a low battery indicator that helps utilities proactively plan and manage field module replacements.

Events and Alarms

The following section describes common events and alarms in the 500W ERT Module. For an in-depth list of events, alarms, and their description, see Events and Alarms on page 38.

Mobile Mode

Extended Alarm Flag

This is retrievable with two-way communication.

Register Error Flag

- The Register Error flag sets if the Register Error Detected flag is active for 24 hours.
- The Register Error Flag remains active for 40 days in mobile mode.

Register Error Detected

- Register Error Detected indicates that the 500W ERT Module is not communicating with the register/meter. The event or alarm flag automatically clears after the 500W ERT Module receives a successful read from the register.

> **Note:** The Register Error Detected flag may be an indicator of a damaged register.

Low Battery Warning

- The remote modules include a battery life estimator. The estimator is based on the number of data packets sent at the various power levels and the age (self-discharge) of the 500W ERT Module . The low battery warning allows the utility to easily identify which 500W ERT Modules are nearing end-of-life in a mixed population and gives the utility the opportunity to schedule replacement.

> **Note:** The low battery warning is a single flag that is set when the battery has less than 10% remaining capacity, which typically corresponds to two years of battery life remaining. Battery life is evaluated daily at midnight.

Network Mode

> **Note:** 500W ERT Module events and alarms are dependent on the module's firmware version. For more information, see Firmware Functionality on page 11.

The 500W ERT Module reports the tampers available in mobile mode as well as extended meter alarms available from new solid-state and electronic meters connected to the 500W ERT Module. The extended alarms include:

- Empty pipe
- Temperature
- High flow
- Meter low battery
- Meter tampering
- Reverse flow
- Zero consumption

Extended meter alarms are only available when a 500W ERT Module is in network mode.

For more information about the extended alarms, see the *OpenWay® Collection Manager Device Interface Guide*.

Firmware Functionality

This section lists the 500W ERT Module firmware information and lists functionality by version. Each new version contains the features associated with the previous GSR.

Part number	Global software release (GSR) version	FDM Check Endpoint firmware version	Over-the-Air firmware part number	Firmware functionality
FMW-1606-001	2.0	6.6.0.0	DFW-1606-001	■ Firmware download ■ 100S mobile modes ■ 5-, 15-, 30-, 60-minute interval data ■ Extended meter alarms
FMW-1606-002	2.0	6.6.2.0	DFW-1606-002	■ Supports all functionality described for firmware FMW-1606-001 for the 2-battery 500W ERT Module

2 Initializing and Connecting

This chapter provides the instructions to initialize and connect the 500W ERT Module to the meter or register.500W ERT Modules must be connected to the register or meter before they can be installed.

Requirements are based on the network system mode. The 500W ERT Module 's auto-sensing technology eliminates the need to initialize the module at the time of installation. The module automatically detects the connected register type.

Caution: To obtain an immediate reading, initialize the 500W ERT Module with an approved handheld computer. Failure to initialize the module may delay the initial reading up to one hour.

To initialize the 500W ERT Module immediately, use one of the following handheld computers running Field Deployment Manager (FDM) version 4.0 or later.

- FC300SR handheld computer
- Itron Mobile Radio (IMR) connected to a user-supplied computer or Bluetooth® device

For normal activation, connect the 500W ERT Module to the water meter register. The module polls for a register every hour and automatically activates after it detects a register.

Programming

Consider the following when the 500W ERT Module is programmed:

- The consumption values are not programmable. (Programmable parameters include values like ID and register type.)
- Programming the 500W ERT Module moves it into the specified operating mode.
- If the 500W ERT Moduleis not programmed, the module attempts to read the register every hour and wakes up in default mobile mode when a register is found.

To program the module, use either:

- An FC300SR handheld or Itron Mobile Radio connected to a user-supplied computer

  or

- A Bluetooth device running FDM Tools 4.0 or later and your utility's programming configuration file

Important! Do not program the module until it is connected to the water meter register.

Refer to the *Field Deployment Manager Tools Mobile Application Guide* for programming information.

After programming, the 500W ERT Module enters the selected operating mode and begins to bubble up specified messages at the chosen rate.

Caution!

- The FC300SR or Itron Mobile Radio are the only devices that support programming for the 500W ERT Module.
- Keep a minimum of 12 inches between the 500W ERT Module and programming device while programming configuration changes are completed.
- Do not place the programming device antenna directly on the 500W ERT Module.

Encoder-type Register Connections

Connect the wires from the 500W ERT Module to the register screw terminals according to the following table.

Note: Itron recommends 19-26 gauge, pre-bonded or solid conductor wire with a maximum diameter of .082 inches (individual wire insulation). The use of un-bonded wire may produce an unreliable connection when using gel caps for joining wires.

	Remote 500W ERT Module wire color		
	Brown (data)	**Gray (power/clock)**	**Yellow (ground)**
Register manufacturer	**Register screw color designator**		
■ ADE ■ Badger ■ E Series ■ HR E LCD ■ HR E Mechanical	Green	Red	Black
Badger M5000 Mag Meter	Green terminal: Out 4+	Red terminal: Input +	Black Input - and Out 4 -
■ AquaMaster ■ AquaMaster III ■ Elster AMCO ■ Invision ■ Scancoder	Red	Green	Black
Diehl Hydrus	Green	White	Brown
■ Elster AMCO ■ evoQ4 (Sensus Protocol) ■ Q200 (Sensus protocol) ■ SM 700 (Severn Trent)	Green	Red	Black
Elster AMCO evoQ4 Mag	Red	White	Black

	Remote 500W ERT Module wire color		
	Brown (data)	**Gray (power/clock)**	**Yellow (ground)**
Register manufacturer	**Register screw color designator**		
Itron (Actaris) Cyble Coder	Green	Red	Black
Kamstrup flowIQ2100	Green	Red	Black
■ Acculinx ■ MasterMeter ■ Octave	Green	Red	Black
McCrometer	Green/data port	Red/clock port	Black/GND port
Metron Farnier OER	Green	Red	Black
■ Mueller (Hersey) ■ SSR ■ Translator	Green	Red	Black
■ ARB-V ■ E-Coder ■ Neptune ■ ProRead ■ ProRead Auto-Detect	Red	Black	Green
Performance ETR	Green	Red	Black
RG3 Tomahawk	Green	Red	Black
■ ECR ■ ICE ■ iPERL ■ OMNI ■ Sensus ■ SRII	Green	Red	Black
■ Mag8000-7ME6810 ■ Mag8000CT-7ME6820 ■ Siemens Mag Meter	92	91	93
Zenner (Hendey) ETR	Green	Red	Black

Pulser-type Register Connections

Connect the 500W ERT Module cable to the register according to the following table.

	Remote module wire color		
	Brown	**Gray**	**Yellow**
Register manufacturer	**Register screw color designator**		
Badger RTR (3-wire)	Red	Black	Green
Badger RTR (2-wire)	Red	Black	No connection*
Badger M5000 Mag Meter	Red terminal: Out 1+	Black terminal: Out 1-	White terminal: Out 1+
■ Cadillac Meter CMAG/EMAG ■ Magnetic Flow	DO1/DO2	COM	COM
Elster Digital	Black	Green	Red
Elster V100T	Red & Black	Blue	Yellow
■ Itron (Actaris) ■ Flostar (2-wire) ■ Cyble Sensor	Either wire	Remaining wire must be connected to both ERT Module wires	
Krohne IFC	Term B	Term H	Term B
RG3 Tomahawk	Green	Black	Green
Sensus PMM	Red	Black	Bare

Note: *Itron recommends terminating unconnected wires with a gel-cap connector to protect the bare wire end. See for more information.

Extending the Cable

Order the 25-foot inline connector extension cable assembly (CFG-0151-404) to extend the 500W ERT Module's cable.

Verifying Operation

Use one of the following programming devices to verify that the 500W ERT Module is correctly recording consumption data.

- FC300SR handheld computer
- Itron Mobile Radio connected to a user-supplied computer or Bluetooth device

Caution: Verifying the 500W ERT Module operation requires an FC300SR handheld computer or Itron Mobile Radio running FDM 4.0 or later. Legacy Itron handheld programming devices cannot read the 500W ERT Module .

Each handheld radio requires special setup and configuration parameters to successfully read and program remote modules. Refer to the respective meter reading application for specific instructions.

When comparing the actual register value to that reported by the 500W ERT Module , please keep in mind the 500W ERT Module 's consumption value is updated once an hour when it is in run mode.

3 Setting up and Installing

This section describes the installation process for the 500W ERT Module and its necessary and optional accessories. Read this chapter in the order it is provided, as certain procedures must be completed ahead of 500W ERT Module installation.

Installing the Module Cable Strain Relief

After you complete the 500W ERT Module to register connections, install a cable tie to the meter cable just below the exposed colored lead wires on the cable insulation. The cable tie provides a cable strain relief to reduce the risk of destructive tension on the lead wires.

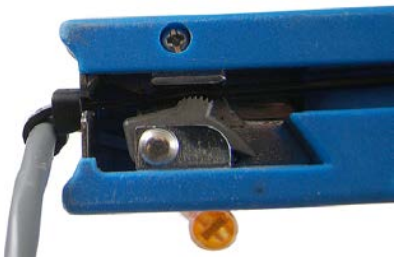
These materials are required to install the cable strain relief:

- Remote mount kit
- CFG-1300-003, dual cable ports for register connection and telemetry device connection
- Side cutter pliers
- Gel connector crimping tool
- Cable tie gun
- Torx T-15 screwdriver

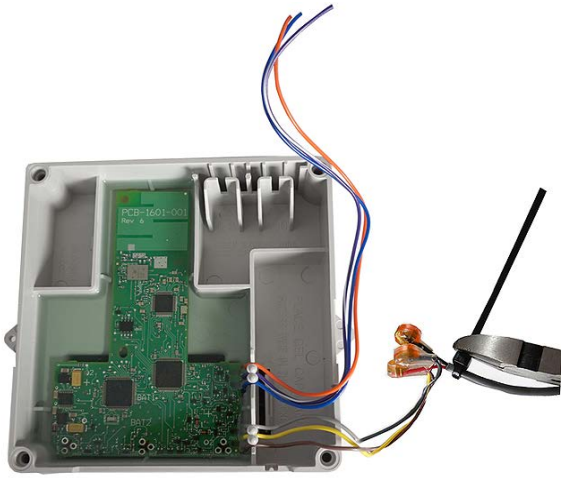
Installing the Cable Strain Relief

1. Wrap the cable tie around the meter register or secondary connection cable.

2. Insert the pointed end of the cable tie into the receptacle end of the cable tie with the ribbed edge facing in.
3. Pull the pointed end of the cable tie until the cable tie is hand-tightened.
4. Insert the excess cable tie into the cable tie gun. Pull the cable gun trigger to tighten and clip the excess cable tie. The cable tie gun shown in the illustration is equipped with a red dial that allows the user to set the cable tightening pressure of the cable gun.



5. If your cable tie gun is equipped with a dial to set the tightening pressure, set the pressure to ensure that the cable tie is secure on the lead wire. After installation, the cable tie must not move on the register or secondary lead wire.
6. If your cable tie gun does not have a clipping feature, remove the cable tie from the cable tie gun. Using a side cutter pliers, clip the excess cable tie.



7. Place the cable connection into the 500W ERT Module housing with the cable ties to the inside.

Installing the Backplate

After the connections are made to the register and optional telemetry device, attach the 500W ERT Module's backplate.

Mount the remote module after the backplate is attached.

1. Route the register cable and telemetry device cable through the dual-port backplate. Ensure that the cable strain reliefs are inside the module housing and backplate assembly.

2. Route the register cable through the bottom backplate cable cutout and telemetry device cable through the top backplate cable cutout.

3. Align the remote module backplate with the mounting screw holes. Verify that the Itron logo is not upside down.
4. Insert a backplate mounting screw in one corner and tighten the screw two or three turns. Insert the remaining three screws and tighten each a few turns.

5. Completely tighten all screws evenly in an alternating fashion.

Remote Mounting the 500W ERT Module

1. Connect the 500W ERT Module to the register as described in Initializing and Connecting on page 12.
2. Using a backplate, create a template by drilling through a backplate lug slot to mark the position of the screw. Use the drilled backplate as your mounting template.

   The arrow on the 500W ERT Module must point up when installation is complete.

Mounting Accessories

Accessory	Part number
Remote mount kit (500W ERT Module with telemetry device)	CFG-1300-003
Pipe mount kits	
Pipe mount kit for pipe diameters up to 4”	CFG-0217-501
Pipe mount kit for pipe diameters between 3/4” to 1-3/4”	CFG-0217-503
Pipe mount kit for pipe diameters between 1-5/16” to 2 ¼”	CFG-0217-504
Cable armor (for field retrofit installation instructions,)	
5-foot cable thin-insulation (with protective cover and cable armor)	CFG-0151-006SS
5-foot cable thick-insulation (with protective cover and cable armor)	CFG-0151-010SS
5-foot cable armor for field retrofit	FAB-1302-001
Direct mount screw pack	SCR-0010-005
Direct mount screw pack, bulk: 80 per bag	SCR-0010-004
Direct mount screw pack, bulk: 122 per bag	SCR-0010-001

Direct-mounting to the Meter Register

Direct-mounting 500W ERT Modules to a meter register requires a register designed for that purpose. This section describes 500W ERT Module installation for the following direct mount registers:

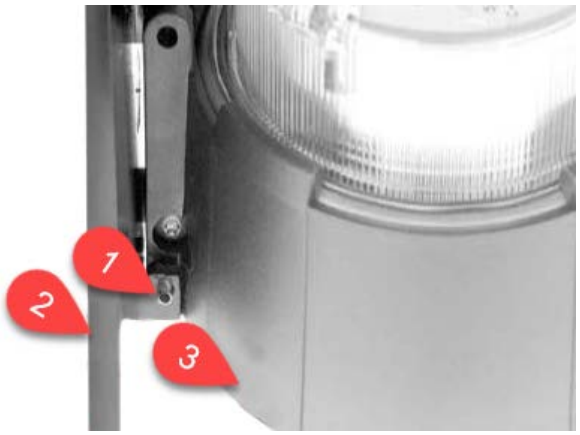
- Badger ADE and RTR
- Elster/AMCO (ABB) Scancoder, InVISION, and Digital

Warning! Do not use the direct mounting method in a pit environment. Use a 500W ERT Module for pit environments.

Direct mounting on the ABB Scancoder, InVision, or Digital Direct Mount

Note: Verify that you have an Elster/AMCO meter with a register designed for direct-mount 500W ERT Module. Always install the 500W ERT Module right side up with the arrow on the housing pointed upward. The register may or may not be mounted on the meter when performing the following steps.

1. Push the hollow pin (1) completely out of its location and separate the 500W ERT Module mounting bracket (2) from the meter register collar (3).



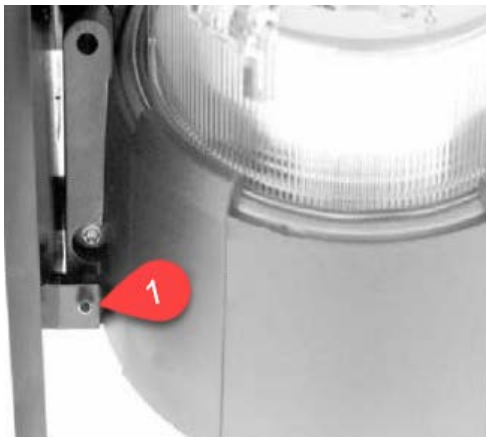
2. Strip 1/2 inches of insulation from the end of the brown, gray, and yellow wires.
3. Place the 500W ERT Module on the mounting bracket and route the yellow, gray, and brown wires through the opening.

> **Note:** A gasket is not required.

4. Install four Torx-head mounting screws (Itron part number SCR-0010-005).
5. Hand-tighten each screw.
6. Connect the 500W ERT Module wires to the register screw terminals following the 500W ERT Module to the Elster/AMCO meter register wire connections.

> **Caution:** Install the wires around the screws in a clockwise direction (as shown) or the wires may come out from under the screw heads as you tighten them. Also, verify that insulation is *NOT* compressed under the screw head, or the wire may not make good contact.

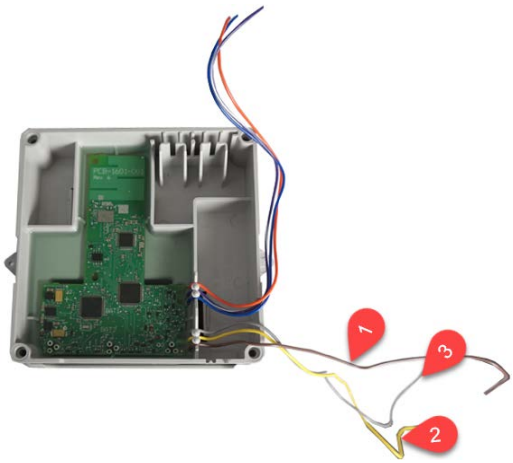
7. After the wires are connected, carefully tuck the connectors into the 500W ERT Module housing.
8. Tighten all screws securely.
9. Install the module and mounting bracket on the meter register adapter collar.
10. Replace the hollow pin (1) you removed in step 1.



Direct Mounting to a Badger Direct Mount Register

> **Note:** Verify you have a Badger meter with a register designed for direct mount remote modules. Check the part number on the label to verify the module matches the meter. Always install the module with the arrow on the housing pointing upward. The register may or may not be mounted on the meter when performing the following steps.

1. Connect the 500W ERT Module wires to the register using gel-cap connectors following the 500W ERT Module to the Badger ADE register wire connections (see Encoder-type Register Connections on page 13). The 500W ERT Module has three wires that connect to the register.



2. To wire the 500W ERT Module to the RTR 2-wire register, connect the 500W ERT Module wires to the 2-wire register using gel-cap connectors.
3. After the wires are connected, carefully tuck the connectors into the 500W ERT Module housing.

4. Place the 500W ERT Module on the register, ensuring that the edge of the 500W ERT Module housing is seated properly around the perimeter of the register as shown.

Note: A gasket is not required.

5. Install four Torx-head mounting screws (SCR-0010-005) and hand-tighten the screws.
6. If you have not already done so, connect the register to the water meter and fully tighten the mounting screw (1) as directed by Badger Meter.

Note: Mount the register on the meter in one of four different positions with respect to the direction of water flow (refer to the manufacturer's installation directions).

7. If the standard Torx screw is used (1), a wire seal is not necessary. If the optional slotted and drilled RTR screw is used, install a wire seal through the drilled screw from (1) to (2), or as specified by utility policy.

Mounting to a Pipe

The 500W ERT Module can mount on a pipe vertically, diagonally, or horizontally using a pipe mount kit and remote mount kit (see Mounting Accessories on page 21).

Caution: A vertical mounting position is important to maximize RF performance. Mount the 500W ERT Module with the module's label arrow pointing up. *The module's arrow must never point to either side or upside down.* The module's tilt tamper functionality is designed to operate with the module installed vertically.

1. Remove the pipe bracket and band clamp from the pipe mount kit (Itron part number CFG-0005-003). Pipe brackets may be black or gray. These instructions show a black pipe bracket.


2. Loosen the band clamp screw until the end of the band releases.

3. Push the end of the clamp's band through the holes in the pipe bracket.

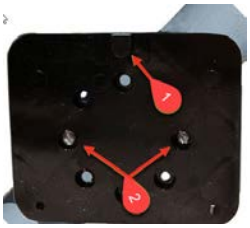
4. Place the band clamp around the pipe. The band loosely wraps around the pipe.
5. Push the end of the band through the band clamp screw assembly. Turn the band clamp's screw assembly to fit into the pipe bracket opening. Tighten the clamp screw until the band clamp is secure on the pipe.

Adapter Plate Mounting Positions

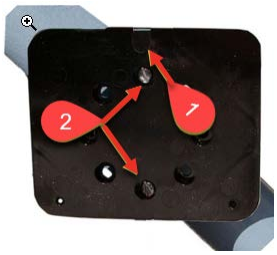
The installation procedure in the previous section shows how to mount the adapter plate on a vertical pipe.

The following pictures show the adapter plate on 45-degree angle and horizontal pipes. Regardless of the angle of the pipe, the adapter plate mounting lug (1) must always be at

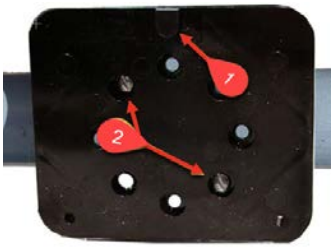
the top. If the pipe is at a 45-degree angle up to the right, install the adapter plate with the mounting screws (2) as shown.

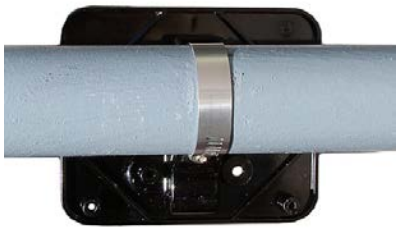


If the pipe is at a 45-degrees angle up to the left, install the adapter plate as shown.



If the pipe is horizontal, install the adapter plate as shown.





Mounting on the Adapter Plate

1. Locate the two 1-inch 500W ERT Module mounting screws in the pipe mount kit.
2. Slide the 500W ERT Module back cover onto the adapter, pushing up to secure the lug adapter in the lug slot.

3. Install the two 1-inch 500W ERT Module mounting screws.

4. Tighten the screws to 9 to 12 inch-pounds of torque.

Remote Mounting the 500W ERT Module

1. Connect the 500W ERT Module to the register as described in Initializing and Connecting on page 12.
2. Using a backplate, create a template by drilling through a backplate lug slot to mark the position of the screw. Use the drilled backplate as your mounting template.

   The arrow on the 500W ERT Module must point up when installation is complete.

Installing on a Flat Surface

1. Select an installation location.
2. Using a back plate template, drill three pilot holes into the wall or other surface. Make sure the two bottom holes are level.
3. Screw a mounting screw for the lug slot into the surface, leaving approximately 1/8 inch of the screw protruding. The lug slot should slide over the screw with a tight fit.

4. Slide the 500W ERT Module lug slot onto the mounting screw, pushing the 500W ERT Module upward until the screw head is all the way into the slot.

5. Screw the 500W ERT Module to the wall using the remaining two mounting screws.

6. Insert a tamper seal over each mounting screw and drive into place with a nut driver or a similar tool.

Note: A tamper seal is fully seated when the top of the tamper seal is approximately 1/16 inch below the top of the screw recess.

7. Secure any excess cable using the provided cable ties.

Installing the Remote Disconnect Valve

This section describes installation of a Smart Earth Technologies (SET) Remote Disconnect Valve in a water system. The 500W ERT Module automatically detects the presence of connected water disconnect devices within 22.5 minutes and begins reading disconnect valve data. To immediately detect the water disconnect valve and begin reading data, perform a **Check ERT** with a handheld computer running FDM software.

The 500W ERT Module supports the following states:

- **Connected**. The water flow is open and flowing at 100% configured capacity.
- **Disconnected**. The water flow is shut off with no water flowing. The remote water disconnect valve provides the ability to remotely open (reconnect) the valve.
- **Restricted**. The water is restricted and flowing at the configured installation flow.

Wire Connections

Connect the 500W ERT Module wires to the Remote Disconnect Valve wires following the connections shown in the table below. The Remote Disconnect Valve connects to the Cellular 500W orange, white/purple, and blue wires.

Connect the 500W ERT Module wires to the SET valve wires following the connections shown in the SET Valve/500W ERT Module wire connections table.

500W ERT Module wire color	Remote Disconnect Valve wire color
Orange	Red
White/purple	Black
Blue	Green

Installing the Leak Sensor

Installation of the Leak Sensor with a 500W ERT Module requires the Leak Sensor with an inline connector (Itron part number LDS-1601-001). The Leak Sensor connects to the telemetry connector on the 500W ERT Module. For the installation instructions, see *OpenWay® Riva™ Leak Sensor Installation Guide*.

If the Leak Sensor five foot cable is not long enough to reach the 500W ERT Module, an extension cable is available from Itron (CFG-0151-404). The maximum cable length between the Leak Sensor and the 500W ERT Module should not surpass 30 feet.

Caution: If the 500W ERT Module is installed to enable communications for the Leak Sensor but a register is not connected, replace the register connector's cap with the environmental cap removed from the blue telemetry connector to protect the register connector.

Installing the Itron Cable Armor

The Itron cable armor provides a layer or protection for the module's cable jacket. Itron cable armor is available in five-foot sections.

This section describes the procedure for installing Itron cable armor in a field installation.

Warning! Use caution when you are installing the cable armor.

- Itron cable armor is stainless steel and may have sharp edges.
- If you remove the inline connector from the remote module to install the cable armor, you must use an Itron handheld to reprogram the module using FDM Endpoint Tools.
- Perform a **Check ERT** function (with FDM Endpoint Tools) after you reprogram the 500W ERT Module to verify communication with the meter register.

1. Remove the installed 500W ERT Module.

   > **Note:** Itron strongly recommends that you keep the 500W ERT Module connected to the register during cable armor installation.

2. Cut a two- to three-inch strip of electrical tape.

3. Wrap the entire piece of electrical tape around the 500W ERT Module cable near the 500W ERT Module .

4. Beginning over the installed electrical tape, twist the Itron cable armor onto the 500W ERT Module cable using a right-handed twist.

   > **Warning!** You must twist—not wrap—the cable armor onto the 500W ERT Module cable. Wrapping the cable armor can cause the stainless steel jacket to warp.
   >
   > You must begin twisting the cable armor over portion of the cable protected by the electrical tape. If you do twist the cable armor onto the 500W ERT Module cable on the unprotected portion of the 500W ERT Module cable, you could damage the module's cable. A cut cable could cause an 500W ERT Module or register communication failure.

5. Continue to twist the cable armor onto the 500W ERT Module cable until the cable armor covers the entire cable.

6. Remove any leftover materials from the customer premises. Discard or recycle leftover materials.

4 Using Gel-cap Connections to Complete Wiring Connections

Important! All unused wires on 500W ERT Module must be terminated. Wire terminations must be properly sealed with a non-conductive gel material to prevent water intrusion and possible environmental or electrical issues.

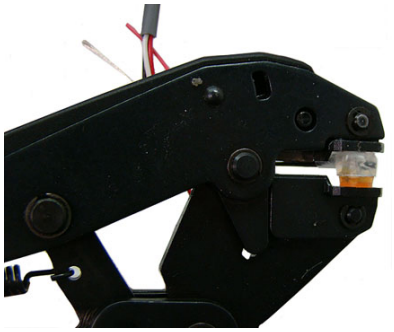
This section provides the instructions to complete remote module to meter wiring connections. Gel-cap connections require:

- E-9R 3M® gel connector crimping tool (or other 3M approved crimping tool)
- Itron splice kit (part number OEM-0034-002)

1. Push two wires as far as possible into the connector.

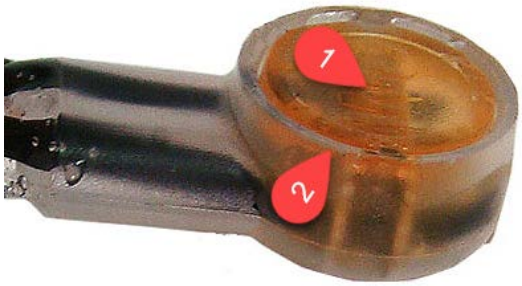
   Caution: Do not strip insulation from the ends of the wires before inserting them into the connector.

2. Place the connector and wires into the jaws of the crimping tool. Ensure the wires remain fully inserted in the connector.



3. Squeeze the handles to crimp the connector. Apply pressure until the cap is fully seated (at least three seconds).

4. The connector is properly crimped when the top of the moveable yellow center (1) is flush with the top of the connector body (2).



> **Warning!** Crimping the connector forces some sealant out of connector. The sealant protects the inside of the connector against insects, moisture, and other contaminants. The sealant may cause minor eye and skin irritation. Avoid eye contact. Avoid prolonged or repeated skin contact. Contact Itron Support for Safety Data Sheets (SDS).

5. After the 500W ERT Module to register or meter wire connections are completed, arrange the connectors in a single file.

6. Insert the connectors and wires into the splice tube until the connectors and wires are completely immersed in the non-conductive gel material.

7. Separate the cable wires to the sides and close the splice tube cover.

8. Remove any leftover materials from the customer premises.

A Troubleshooting

This information is provided to help you troubleshoot issues related to 500W ERT Modules.

The following table describes possible issues and provides suggested actions to resolve the issue.

Issue	Action
Cannot program the 500W ERT Module.	Check the programming device and software version. Program 500W ERT Module using the FC300 handheld computer running Field Deployment Manager (FDM) software v4.0 or higher.
Cannot read the 500W ERT Module.	A 500W ERT Module that is not programmed will not transmit an SCM+ message. Reprogram the 500W ERT Module and perform a reread. If a 500W ERT Module is not initially programmed, it will not bubble-up and listen for an SCM+ message.
The 500W ERT Module is reporting an invalid read.	A 500W ERT Module that has set the Register Error flag will cause an Invalid Read to display in the FDM Consumption field.
Marginal readability due to 500W ERT Module location (for example, a 500W ERT Module deep inside a pit).	Consider reprogramming the 500W ERT Module for Hard-to-read (H2R) mode. Programming the 500W ERT Module for hard-to-read mode increases the output to high power. **Note:** Hard-to-read mode will reduce battery life.
The handheld programmer is locked up and button presses produce no response.	*Soft boot* the handheld. Reference the documentation for your programming device. For more information, see Related Documents on page 7.

B Events and Alarms

The following table describes events and alarms for the 500W ERT Modules. These events and alarms are supported only when the device is in network mode.

Event ID	Event name	Event description
1	Inter Digit	Corrupt digit in the encoded register reading.
2	Register Error	No Communication with Register.
3	Invalid Read	Register is not sending a valid read.
6	Endpoint - Low Battery	500W ERT Module has a low battery warning. 10% battery life remaining. Is an alarm by default.
7	Consumer Leak detected	500W ERT Module has detected continuous flow over a set period of time. Is an alarm by default. Qualifies as an active event.
8	Consumer Leak end	500W ERT Module has detected the end of continuous flow after having reported a leak.
9	Reverse Flow detected	500W ERT Module has detected reverse flow. Qualifies as an active event.
10	Reverse Flow end	500W ERT Module has detected the end of reverse flow after having reported reverse flow.
11	Leak Sensor Ok	500W ERT Module detects a leak sensor attached and it is working properly (triggered when state was previously unknown or previously not working properly).
12	Leak Sensor No Comms	500W ERT Module detects a leak sensor is attached but it not working properly.
13	Leak Sensor Detached	500W ERT Module does not detect a Leak Sensor attached after having previously having one attached.
14	Valve OK	500W ERT Module detects a disconnect valve attached and it is working properly (triggered when state was previously unknown or previously not working properly).
15	Valve No Comms	500W ERT Module detects a disconnect valve is attached but it not working properly.
17	Pulse Mismatch	The 500W ERT Module has detected an internal pulse mismatch.
18	Cut Cable detected	Physical Cut Cable detected by the 500W ERT Module. Qualifies as an active event.

Event ID	Event name	Event description
19	Cut Cable end	Physical Cut Cable no longer detected by the 500W ERT Module.
28	Encoder Micro Reset	Device has detected that the Encoder Micro has reset unexpectedly.
500	Critical error (internal)	Catch-all for critical internal error not covered in other events.
501	Right Sizing started	Client has requested Right Sizing operation in 500W ERT Module. **Note:** Right sizing operations are not supported when the device is operating in Network mode. However, if the device is operating in Mobile (100S) mode and right sizing is started this event will be logged in the COSEM event log.
502	Right Sizing completed	Right Sizing operation is complete. **Note:** Right sizing operations are not supported when the device is operating in Network mode. However, if the device is operating in Mobile (100S) mode and right sizing is started this event will be logged in the COSEM event log.
503	Right Sizing cancelled	Right Sizing operation was cancelled by client. **Note:** Right sizing operations are not supported when the device is operating in Network mode. However, if the device is operating in Mobile (100S) mode and right sizing is started this event will be logged in the COSEM event log.
504	Flash Error	A flash error has been detected.
505	Meter Quiet Mode Exit	Occurs when the 500W ERT Module first gets pulses, or detects consumption and wakes from Meter Quiet Mode (not Factory Ship Mode).
506	Entering network mode	The device has been changed to Network mode.
507	Set Battery Params	Any change to the BatteryUseParameters structure will result in this event.
508	Set Meter Right Sizing Params	Meter right sizing parameters have been changed. **Note:** Right sizing operations are not supported when the device is operating in Network mode. However, if the device is operating in Mobile (100S) mode and right sizing is started this event will be logged in the COSEM event log.
509	Key Update	Key has been updated in the device.
510	Device Not Communicating	Application has not received any incoming data which indicates the device may not be communicating on the network.

Event ID	Event name	Event description
511	Load Profile Cleared	Load Profile object has been cleared. The specific causes of this event are: ■ Transitioning from 100S (Run, Factory, Quiet)to IoT mode, or from IoT to 100S mode. ■ Setting Interval size to a new value (IoT mode only) ■ Setting count rate, initial index, PCOMP, Rollover, EncoderDriv500W ERT Moduleype (100S or COSEM) to a new value.
512	Manual Time Sync	Time has been changed manually.
515	Time Sync – over threshold detected	Time change is greater than warning level threshold. Qualifies as an active event.
516	Time Sync – over threshold end	Time change is greater than warning level threshold back below threshold.
517	Entering 100S Mode	The device has been changed from Network mode to 100S Mode.
1000	Meter - Register Removal	Badger Extended Alarm: Bit 0 = register removal.
1001	Meter - Temperature Alarm	Badger Extended Alarm: Bit 1 = temperature alarm.
1002	Meter - End of meter life	Badger Extended Alarm: Bit 2 = end of life alarm.
1003	Meter - Zero Consumption Detected	Badger Extended Alarm: Bit 3 = no usage alarm.
1004	Meter - Reverse Flow Meter	Badger Extended Alarm: Bit 4 = reverse flow alarm.
1005	Meter - Leak Meter Alarm	Badger Extended Alarm: Bit 5 = leak alarm. Is an alarm by default.
1006	Meter - Encoder Programming	Badger Extended Alarm: Bit 6 = program alarm.
1007	Meter - Tamper	Badger Extended Alarm: Bit 7 = tamper.
1500	Meter - Active Reverse Flow	Kamstrup Extended Alarm Byte1: Bit 0 = Active reverse flow.

Event ID	Event name	Event description
1501	Meter - Historic Reverse Flow	Kamstrup Extended Alarm Byte1: Bit 1 = Historic Reverse (Active info-code within the last 30 days, no matter how long the info-code was active).
1502	Meter - Active Empty Pipe	Kamstrup Extended Alarm Byte1: Bit 2 = Active Dry (meter is in a current empty pipe state). Is an alarm by default.
1503	Meter - Historic Empty Pipe	Kamstrup Extended Alarm Byte1: Bit 3 = Historic Dry (Active info-code within the last 30 days, no matter how long the infocode was active).
1504	Meter - Active Burst	Kamstrup Extended Alarm Byte1: Bit 4 = Active burst (meter is currently in a high flow state outside of the meter parameters). Is an alarm by default.
1505	Meter - Historic Burst	Kamstrup Extended Alarm Byte1: Bit 5 = Historic Burst (Active info-code within the last 30 days, no matter how long the infocode was active).
1506	Meter - Encoder Programming	Kamstrup Extended Alarm Byte1: Bit 6 = Encoder setup has been changed one or more times since production.
1507	Meter - Active Leak Alarm	Kamstrup Extended Alarm Byte2: Bit 0 = The meter is in an active leak state. Is an alarm by default.
1508	Meter - Historic Leak Alarm	Kamstrup Extended Alarm Byte2: Bit 1 = Historic Leak (Active info-code within the last 30 days, no matter how long the infocode was active).
1509	Meter - Low Temperature Alarm	Kamstrup Extended Alarm: Minimum meter temperature detected. Trigger on <36F indication from Kamstrup meter.
1510	Meter - High Temperature Alarm	Kamstrup Extended Alarm: Maximum meter temperature detected. Trigger on >125F indication from Kamstrup meter.
1511	End of meter life	Kamstrup Extended Alarm: The meter is near the end of its expected life.
1512	Register Removal	Kamstrup Extended Alarm: The meter register has been tampered with or removed.
1513	Meter - Zero Consumption Detected	Kamstrup Extended Alarm: The meter has detected no usage.
1514	Low Pressure Alarm	Kamstrup Extended Alarm: The meter has detected minimum pressure.
1515	High Pressure Alarm	Kamstrup Extended Alarm: The meter has detected maximum pressure.

Event ID	Event name	Event description
1600	Meter - Backflow	Intelis Water Meter Extended Alarm bit 9: The meter has detected backflow consumption. For the International meter this is cleared at midnight each day if the condition is no longer present. For the NAM meter this is cleared after an “alarm duration” time which is 1 day minimum.
1601	Meter - Empty Pipe	Intelis Water Meter Extended Alarm bit 6: The meter has detected that the pipe is empty. For the International meter this is cleared at midnight each day if the condition is no longer present. For the NAM meter this is cleared after an “alarm duration” time which is 1 day minimum. Is an alarm by default.
1602	Meter - Meter Reversed	Intelis Water Meter Extended Alarm bit 2: The meter has detected that it has been installed in a reverse orientation. For the International meter this is cleared at midnight each day if the condition is no longer present. For the NAM meter this is cleared after an “alarm duration” time which is 1 day minimum.
1603	Meter – Low Battery	Intelis Water Meter Extended Alarm bit 5: The meter has detected that its battery is low (NAM Meter remaining life time < 6 months, International Meter remaining life time < 12 months).
1604	Meter - Leakage	Intelis Water Meter Extended Alarm bit 8: The meter has detected a leak. For the International meter this is set if the average flow rate during each of the previous 24 hours (midnight to midnight) was above the leakage flow rate threshold; it is cleared if the average flow rate during any of the previous 24 hours (midnight to midnight) was below the leakage flow rate threshold. For the NAM meter this is set if the average flow rate during each of the hours over a configurable number of days was above the leakage flow rate threshold; it is cleared as soon as the average flow rate for an hour goes below the leakage flow rate. Is an alarm by default.
1605	Meter - Burst Flow / Broken Pipe	Intelis Water Meter Extended Alarm bit 4: The meter has detected a burst flow which indicates the pipe is likely broken. For both the International and the NAM meter this is cleared immediately as soon as the condition is no longer present. Is an alarm by default.
1606	Cover Open / Real Time Removal	Intelis Water Meter Extended Alarm: The meter has detected that the cover is currently open. Is an alarm by default.
1607	Meter - Tamper Alarm	Intelis Water Meter Extended Alarm bit 11: The meter has detected that the cover was opened so the meter may have been tampered with. For the International meter this is never cleared. For the NAM meter this is cleared after an “alarm duration” time which is 1 day minimum.

Event ID	Event name	Event description
1608	Meter - Temperature Alarm	Intelis Water Meter Extended Alarm bit 0 OR bit 1: The meter has detected that the temperature has gone outside the meter's temperature range (either high or low). For the International meter this is cleared at midnight each day if the condition is no longer present. For the NAM meter this is cleared after an "alarm duration" time which is 1 day minimum.
3000	Device Reconfigured	The HES configuration has changed in the device.
3001	Event Log Cleared	The Itron Event Log has been reset.
3003	Configuration Downloaded	A new HES configuration has been downloaded.
3004	System Reboot	Watchdog error - reboot.
3005	System Restart	Planned restart of 500W ERT Module.
3006	Improper Installation Detected	500W ERT Module could not adopt configuration information.
3007	Disconnect Completed	Disconnect was received and has completed.
3008	Disconnect Failed	Disconnect was received but failed to execute. Event detail will contain the verbose_ result attribute of the DisconnectControl object.
3011	Connect Completed	Reconnect was received and has completed. Event detail will contain the verbose_ result attribute of the DisconnectControl object.
3012	Connect Failed	Reconnect was received but failed to execute. Event detail will contain the verbose_ result attribute of the DisconnectControl object.
3013	Flow Restriction Setting Changed	Restrict / service limit was received and has completed. Event detail will contain the verbose_result attribute of the DisconnectControl object.
3014	Flow Restriction Setting Failed	Restrict / service limit was received but failed to execute. Event detail will contain the verbose_result attribute of the DisconnectControl object.
3015	Authentication Failed	Application level security failure - authentication.
3016	Access Control Failed	Application level security failure - access control.
3017	Key Rollover	Key rollover command received.
3018	Key Signing	Application level security failure - c500W ERT Moduleificate.

Event ID	Event name	Event description
3019	Takeover Package Accepted	A Takeover Package was presented and accepted by the 500W ERT Module.
3020	Takeover Package Rejected	A Takeover Package was presented, but rejected by the 500W ERT Module.
3021	Replay Attack Detected	Application level security failure - Replay.
3022	RMA Signed Authorization Received	A Signed Authorization with issued-to “Itron-RMA” has been received.
10000	PCOMP Changed	Metrology parameter (PCOMP) changed.
10001	Count Rate Changed	Metrology parameter (Count Rate) changed.
10002	Rollover Count Changed	Metrology parameter (Rollover Count) changed.
10003	Count Sample Debounce Changed	Metrology parameter (Count Sample Configuration – debounce parameters) changed.
10004	Encoder Driver Type Changed	Metrology parameter (Encoder Driver Type) changed.
10005	Prescaler changed	Metrology parameter (Prescaler) changed.
10006	Initial Index	Metrology parameter (Initial Index) changed.
10007	Image transfer initiated (enabled)	Self-descriptive.
10008	Image transfer canceled (disabled)	Self-descriptive.
10009	Image transfer cancel failed	Self-descriptive.
10010	Image verification initiated	Self-descriptive.
10011	Image verification successful	Self-descriptive.

Event ID	Event name	Event description
10012	Image verification failed	Self-descriptive.
10013	Image activation initiated	Self-descriptive.
10014	Image activation successful	Self-descriptive.
10015	Image activation failed	Self-descriptive.
10019	Load Profile Interval Changed	A change has been made to the CompressedLoadProfile object (OBIS A.128.100.0.1.255) capture_period (attribute 7).
10020	Count Sample Width Changed	Metrology parameter (Count Sample Configuration – sample width parameters) changed.
10021	Count Sample Rate Changed	Metrology parameter (Count Sample Configuration – sample width parameters) changed.

C Important Safety and Compliance Information

This section provides important information for your safety and product compliance.

USA, FCC Part 15 Spectrum Compliance

This device complies with Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference that may cause undesirable operation.

This device must be installed to provide a separation distance of at least 20 centimeters (7.9 inches) from all persons to be compliant with regulatory RF exposure.

USA, FCC Class B-Part 15

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or TV technician for help.

Modifications and Repairs

To ensure system performance, this device and antenna shall not be changed or modified without the express approval of Itron. Per FCC and ISED rules, unapproved modifications

or operation beyond or in conflict with these instructions for use could void the user's authority to operate the equipment.

Canada, ISED Spectrum Compliance

Compliance Statement Canada	Déclaration de Conformité
This device complies with Innovation, Science and Economic Development Canada (ISED) license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, (2) this device must accept any interference, including interference that may cause undesired operation of the device. Under Innovation, Science and Economic Development Canada (ISED) regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.	Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

RF Exposure (FCC/ISED)

This equipment complies with radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.	Cet équipement est conforme aux limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement do it être installé et utilisé à distance minimum de 20 cm entre le radiateur et votre corps. Cet émetteur ne doit pas être co-localisées ou opérant en conjonction avec tout autre antenne ou transmetteur.

Australia, ACMA Spectrum Compliance

When this device is sold and shipped to Australia, it is configured and labeled accordingly to be compliant with ACMA Standards for the Radio, EMC and RF Exposure. This includes standard AS/NZS 4268 RF spectrum standard for frequency and power out.

New Zealand, RCM Spectrum Compliance

Note: The Remote 500W ERT Module is not approved for use in New Zealand.

Lithium Battery Safety

Warning! Follow these procedures to avoid injury to yourself or others.

- The lithium battery may cause a fire or chemical burn if it is not disposed of properly.
- Do not recharge, disassemble, heat above 212°Fahrenheit (100°C Celsius), crush, expose to water, or incinerate the lithium battery. Fire, explosion, and severe burn hazard.
- The battery used in this device may present a risk of fire or chemical burn if mistreated.
- Keep the lithium battery away from children.

Disconnecting Power

Warning! Qualified technicians: during service, disconnect power to prevent ignition of flammable or combustible atmospheres.

Electromagnetic Compatibility

Warning! Use only approved accessories with this equipment. Unapproved modifications or operation beyond or in conflict with these instructions for use may void authorization by the authorities to operate the equipment.

Electrostatic Discharge

Warning! Internal circuit components can be sensitive to electrostatic discharge. Before installation, discharge electrostatic buildup by touching a metal pipe or other earth-grounded metal object prior to touching the meter body, register housing, or Itron device.

Do Not Drop

Warning! While Itron modules are designed to withstand a drop, dropping the module may damage the device and void the warranty.