Cellular 500W Remote Module Installation Guide

DRAFT

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New in This Document

Revision	Date	Description
000	September 2021	First publication.

1 Introduction

The Cellular 500W Remote Module (ECW-1700-002) is a cellular radio frequency transmitting modules that attaches to water registers or meters to collect consumption usage, event, and alarm data. It is an IPV6-compliant endpoint designated to communicate over the Itron's OpenWay multi-purpose IoT solution: Network or the legacy ChoiceConnect™ Mobile platform.

The Cellular 500Ws ship from the factory in Factory Mode, which prevents unwanted radio transmissions during transit. After installation and programming, the remote modules acquire and transmit meter or register data in accordance with the selected remote module parameter settings. The Cellular 500Ws support protection for a variety of meter manufacturer's registers. Refer to the *Water Meter and Telemetry Module Compatibility Matrix* for the list of supported meters and registers.

Cellular 500Ws feature the following capabilities:

- **Datalogging**. In Network Mode, the Cellular 500W provides 3,840 buckets of interval data configurable from 1 minute to 1 hour (for example, 160 days of hourly data or 40 days of 15 minute data).

  > **Note:** Interval data functionality is dependent on the module's firmware version. For more information, see Firmware Functionality on page 11.

- In Mobile Mode, the module provides 960 buckets of hourly interval data and can be set to transmit in Mobile and Handheld Mode, Mobile High Power Mode, or Hard-to-Read Mode.
  - **Mobile High Power Mode.** The module transmits a high-powered RF message every 60 seconds. In Mobile High Power Mode, the expected battery life is 20 years.

  - **Mobile and Handheld Mode.** The module transmits a medium-powered RF message every 15 seconds. In Mobile and Handheld Mode, the expected battery life is 20 years.
  - **(Optional) Hard-to-Read Mode.** The module transmits a high-powered RF message every 30 seconds. In Hard-to-Read Mode, the expected battery life decreases to 15 years in this mode. The Hard-to-Read Mobile Mode should only be used for exceptionally hard to read applications (such as meters installed in sub-basements).
- **Leak Detection and Reverse Flow Detection**. Cellular 500Ws feature robust algorithms that provide leak and reverse flow detection.
- *(Optional)* **Leak Sensor**
  - The optional Leak Sensor analyzes water flow sound patterns to detect water leaks. Leak sensor analysis data is uploaded to the mlogonline Network Leak Monitoring online portal. Systems with optional Leak Sensor devices access leak information through their utility-specific, secure mlogonline portal. For more information, see the *mlogonline Network Leak Monitoring System User Guide*.
- *(Optional)* **Telemetry devices**
  - An optional remote water disconnect valve provides water utilities with a non-intrusive means of managing customer disconnects and reconnects that traditionally required on-site visits. The remotely-controlled disconnect valve helps lower the utility's costs by eliminating routine move-in/move-out service calls. For more information, see Remote Disconnect Valve Installation on page 33.

    > **Note:** Remote water disconnect operation requires a module with enhanced security enabled. To learn more about enabling enhanced security, see the *Field Deployment Manager (FDM) Tools Mobile Application Guide*.

Related Documents

The following documents may also be useful to readers. These documents and others can be accessed and viewed on Itron Access (https://access.itron.com).

- *Cellular 500W Pit Module Installation Guide*
- *Cellular 500W Spec Sheet*
- *Cellular 500W Technical Reference Guide*
- *Field Deployment Manager (FDM) Configuration Guide*
- *Field Deployment Manager (FDM) Tools Mobile Application Guide*
- *OpenWay Collection Manager Operational Guidelines*
- *OpenWay Riva Collection Manager Device Interface Guide*

- *OpenWay Riva Water Products Ordering Guide*
- *Water Modules Ordering Guide*

Security

Users have the option of enabling enhanced security in Cellular 500Ws. Itron Security Manager (ISM) is a feature of the OpenWay Network that ensures that certain Cellular 500W commands are controlled through secure radio communications between the handheld computer or Mobile Collector and the Cellular 500W .

There are two fundamental security processes used in the OpenWay system to ensure confidentiality and validity of secured commands.

- **Authentication**. Authentication is the process of confirming that an artifact is genuine or valid. Authentication in the Cellular 500W is the process of verifying a request is from a valid source and in its original form.
- **Encryption**. Encryption is the process of transforming information to make it unreadable to anyone who does not have a valid security key. There are two types of encryption: symmetric and asymmetric. Symmetric encryption uses a shared key to decrypt or encrypt information. Asymmetric encryption uses a private key to encrypt and a public key to decrypt. Data transmissions over the network are protected using AES-256 encryption.

Transmission Modes

The Cellular 500W is an IPv6 Wisun compliant device that operates in Mobile Mode or Network Mode.

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

Network Mode

In Network Mode, the module reports four interrogation cycles daily. Each interrogation collects six hours of 3,840 buckets of interval and event data. Interval data is configurable from 1 minute to 1 hour (for example, 160 days of hourly data or 40 days of 15 minute data). Interval options are 5, 15, or 30 minutes.

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

The Cellular 500W 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 Cellular 500W operates using FCC or ISED licensed spectrum defined by 3GPP ranging from Band 4 (744-787 MHz) and Band 13 (1710-2155) operation 612054.

Operating Modes

The Cellular 500W has the following operating modes.

- **Factory Mode**
  - Remote modules are shipped from the factory in Factory Mode.
  - The module's transmitter is turned off.
  - The module's receiver is bubbling-up to listen for a programming command.
  - Remote modules will 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 Cellular 500W 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**
  - Remote module normal operation mode.
  - The remote module's transmitted message is dependent on its factory settings for standard consumption + messages (SCM+).
  - SCM+ remote module default bubble-up rate is 10 seconds.

- **Quiet Mode**
  - Meter manufacturers can configure the Cellular 500W for Quiet Mode after programming and direct mounting the Cellular 500W in a factory.
  - The Cellular 500W is awakened from Quiet Mode and enters Run Mode in one of the following ways:
    - Counting two pulses. The pulses are counted internal to the Cellular 500W while it is in Quiet Mode.
    - Receiving a two-way command, such as a **Read** using FDM.

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

Battery Life

The Cellular 500W is powered by a single non-replaceable, long-life lithium batteries and has an expected battery life of 20 years, dependent on use case.

Low Battery

Cellular 500Ws include a low battery indicator that helps utilities proactively plan and manage field module replacements.

Events and Alarms

The events and alarms available to a Cellular 500W vary based on the mode it is operating in.

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 Cellular 500W is not communicating with the register/meter. The event or alarm flag automatically clears after the Cellular 500W 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 low battery warning allows the utility to easily identify which Cellular 500Ws are nearing end-of-life in a mixed population and gives the utility the opportunity to schedule replacement.

  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 Cellular 500W .

  > **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 2 years of battery life remaining. Battery life is evaluated daily at midnight.

Network Mode

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

The Cellular 500W reports the tampers available in Mobile Mode as well as extended meter alarms available from new solid-state and electronic meters connected to the Cellular 500W . The extended alarms include:

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

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

Firmware Functionality

This section lists the Cellular 500W firmware information and lists functionality by version.

Firmware part number	Global software release version (GSR)	FDM Check Endpoint firmware version	Over-the-air firmware part number	Firmware functionality
FMW-xxxx-xxx- [4.4.2]	5.4	4.4.0	DFW-xxx-xxx	■ Initial firmware release ■ Network Mode ■ Mobile Mode ■ 60 minute interval data ■ Firmware download

2 Initialization, Connection, and Programming

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

Requirements are based on the network system mode. The Cellular 500W '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 Cellular 500W with an approved handheld computer. Failure to initialize the module may delay the initial reading up to one hour.

To initialize the Cellular 500W immediately, use one of the following handheld computers running Field Deployment Manager (FDM) version 4.4 or later.

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

For normal activation, connect the Cellular 500W 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 Cellular 500W is programmed:

- The consumption values are not programmable. (Programmable parameters include values like ID and register type.)
- Programming the module will move the remote module into the specified operating mode.
- If the module is not programmed, the module will attempt to read the register every hour and will wake up in default Mobile Handheld Mode when a register is found.

Use an FC300SR handheld or Itron Mobile Radio connected to a user-supplied computer or Bluetooth device running FDM Tools 4.4 or later and your utility's programming configuration file to program the module .

> **Note:** Do not program the module until it is connected to the water meter register.

Refer to the *Field Deployment Manager (FDM) Mobile Application Guide* for programming information.

After programming, the module enters the selected operating mode and begins bubbling-up specified messages at the selected rate.

Caution: The FC300SR or Itron Mobile Radio are the only devices that support programming for the remote module endpoint.

The remote module and programmer should be a minimum of 12 inches apart while programming.

Do not place the programmer antenna directly on the remote module.

Encoder-type Register Connections

Connect the wires from the Cellular 500W Cellular 500W 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.

	Cellular 500W wire color		
	Brown (data)	**Gray (power/clock)**	**Yellow (ground)**
Register manufacturer	**Register screw color designator**		
■ Badger ■ ADE ■ 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 -
■ Elster AMCO ■ Invision ■ Scancoder ■ AquaMaster ■ AquaMaster III	Red	Green	Black
■ Diehl Hydrus	Green	White	Brown
■ Elster AMCO ■ SM 700 (Severn Trent) ■ Q200 (Sensus protocol) ■ evoQ4 (Sensus Protocol)	Green	Red	Black

	Cellular 500W wire color		
	Brown (data)	**Gray (power/clock)**	**Yellow (ground)**
Register manufacturer	**Register screw color designator**		
■ Elster AMCO evoQ4 Mag	Red	White	Black
■ Itron (Actaris) Cyble Coder	Green	Red	Black
■ Kamstrup flowIQ2100	Green	Red	Black
■ MasterMeter ■ Acculinx ■ Octave	Green	Red	Black
■ McCrometer	Green/data port	Red/clock port	Black/GND port
■ Metron Farnier OER	Green	Red	Black
■ Mueller (Hersey) ■ Translator ■ SSR	Green	Red	Black
■ Neptune ■ ProRead ■ ProRead Auto-Detect ■ E-Coder ■ ARB-V	Red	Black	Green
■ Performance ETR	Green	Red	Black
■ RG3 Tomahawk	Green	Red	Black
■ Sensus ■ ECR ■ ICE ■ iPERL ■ SRII ■ OMNI	Green	Red	Black
■ Siemens Mag Meter ■ Mag8000CT-7ME6820 ■ Mag8000-7ME6810	92	91	93
■ Zenner (Hendey) ETR	Green	Red	Black

Pulser-type Register Connections

Connect the Cellular 500W 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 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 Completing Gel-cap Connections Using the Itron Splice Tube Kit on page 38 for more information.

Cable Extension

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

Operation Verification

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

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

> **Caution:** Verifying the Cellular 500W operation requires an FC300SR handheld computer or Itron Mobile Radio running FDM v4.0 or higher. Legacy Itron handheld programming devices cannot read the Cellular 500W .

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 Cellular 500W, please keep in mind the Cellular 500W 's consumption value is updated once an hour when it is in Run Mode.

3 Setup and Installation

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

Module Cable Strain Relief Installation

After you complete the Cellular 500W 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.

The following materials are required to install the cable strain relief:

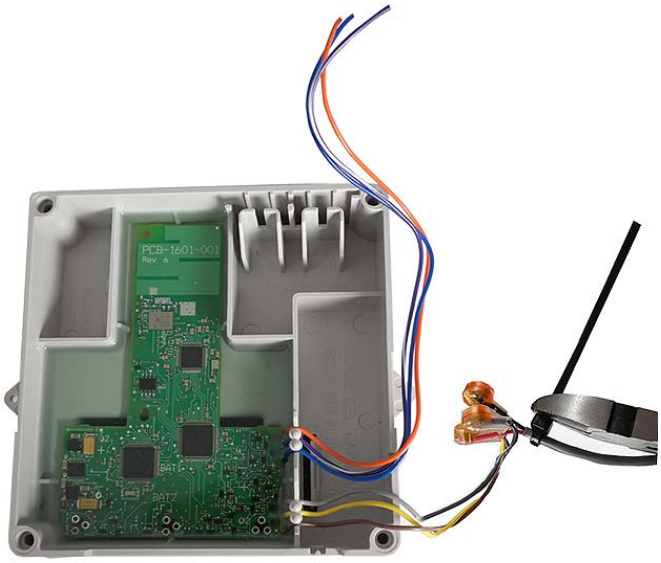
- Remote mount kit
- CFG-1300-003, dual cable ports for register connection and telemetry device connection
- Side cutter pliers
- Gel connector crimping tool
- Cable tie gun
- Torx T-15 screwdriver

To Install 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 Cellular 500W housing with the cable ties to the inside.

Backplate Installation

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

Attaching the Backplate

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.

Mount the remote module after the backplate is attached. See Cellular 500W Installation on page 22.

Cellular 500W Installation

Warning! Internal circuit card components may be sensitive to electrostatic discharge. Be careful not to touch any part of the meter body, register housing, or remote module prior to discharging any static buildup on your person. To discharge electrostatic buildup, touch a grounded metal object such as the metal water pipe or an earth-grounded metal structure.

Install the Cellular 500Ws using one of the following mounting options:

Direct mount to the Meter Register

The Cellular 500W mounts directly to a meter register designed for Cellular 500W direct mounting. This installation does not require a mounting kit (see Direct-mount to the Meter Register on page 23).

Pipe Mount

The Cellular 500W mounts to a pipe near the meter (see Pipe Mount Installation on page 29). This option requires the remote mount kit and the appropriate pipe mount kit.

Remote Mount

The Cellular 500W mounts to a flat surface and connects to the meter register with a cable up to 300 feet (see Remote Mount Installation on page 31). This option requires the remote

mount kit.

> **Important!** While Itron modules are designed to withstand a drop, dropping the module can damage sensitive electronic components and void the product warranty.

Mounting Accessories

Accessory	Part number
Remote mount kit (Cellular 500W 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, Itron Cable Armor Installation on page 34)	
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-mount to the Meter Register

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

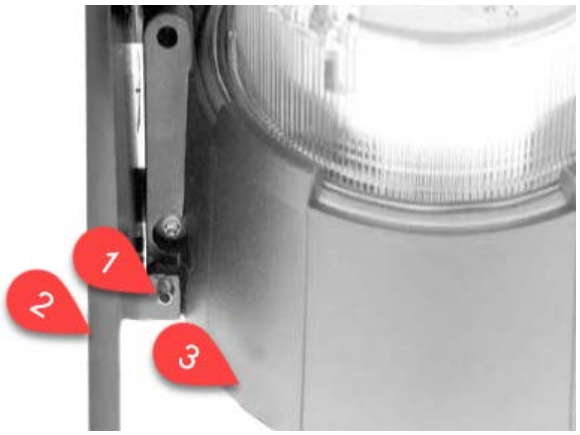
- Badger ADE and RTR
- Elster/AMCO (ABB) Scancoder, InVISION, and Digital

> **Warning!** Do not use the direct mounting method in a pit environment. Use a Cellular 500W for pit environments. Remote modules direct mounted in a pit environment are not covered by the Itron warranty.

To direct mount 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 Cellular 500W . Always install the Cellular 500W 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 Cellular 500W mounting bracket (2) from the meter register collar (3).



2. Strip 0.5 inches of insulation from the end of the brown, gray, and yellow wires.
3. Place the Cellular 500W on the mounting bracket and route the yellow, gray, and brown wires through the opening.

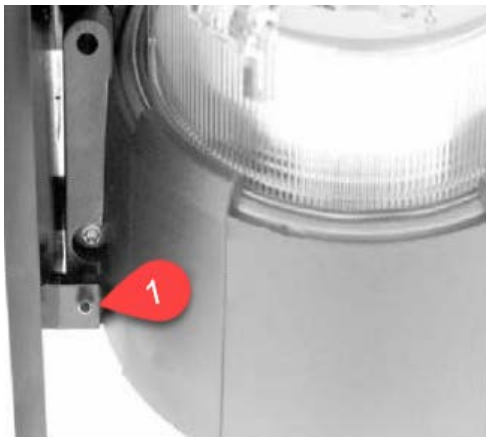
   > **Note:** A gasket is not required.

4. Install four Torx-head mounting screws (SCR-0010-005).
5. Hand-tighten each screw.

6. Connect the Cellular 500W wires to the register screw terminals following the Cellular 500W to the Elster/AMCO meter register wire connections. After the wires are connected, carefully tuck the connectors into the Cellular 500W housing. Tighten all screws securely.

> **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 the wire insulation is *NOT* compressed under the screw head, or the wire may not make good contact.

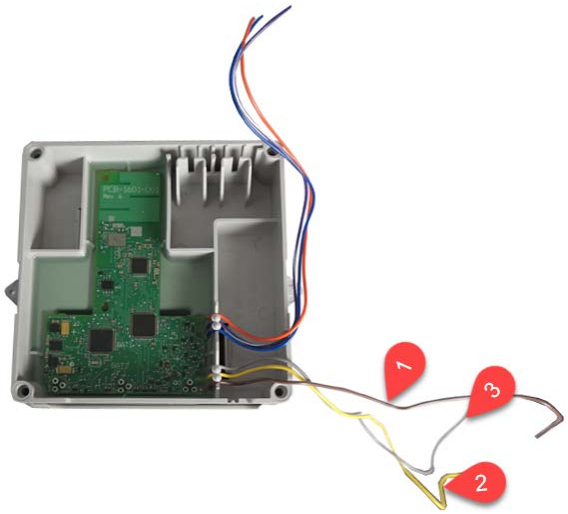
7. Install the module and mounting bracket on the meter register adapter collar.
8. Replace the hollow pin (1) you removed in step 1.



To direct mount 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. The Cellular 500W has three wires that connect to the register:



2. Connect the Cellular 500W wires to the register using gel-cap connectors following the Cellular 500W to the Badger ADE register wire connections (see Encoder-type Register Connections on page 14).
3. After the wires are connected, carefully tuck the connectors into the Cellular 500W housing.

4. To wire the Cellular 500W to the RTR two wire register, connect the Cellular 500W wires to the two wire register using gel-cap connectors. After the wires are connected, carefully tuck the connectors into the Cellular 500W housing.
5. Place the Cellular 500W on the register, ensuring that the edge of the Cellular 500W housing is seated properly around the perimeter of the register as shown.

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

6. Install four Torx-head mounting screws (SCR-0010-005) and hand-tighten the screws.

Warning! Use Itron mounting screws (SCR-0010-005). Using the wrong mounting screws could crack the plastic module housing.

7. 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 instructions.

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).

8. 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.

Pipe Mount Installation

The Cellular 500W can mount on a pipe vertically, diagonally, or horizontally using a pipe mount kit and remote mount kit (see Mounting Accessories on page 23).

To mount the pipe bracket on a vertical pipe

Caution: A vertical mounting position is important to maximize RF performance. Mount the 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.

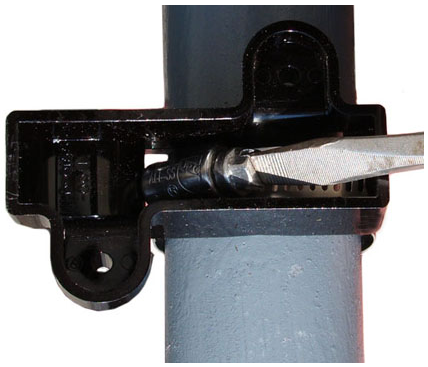
1. Remove the pipe bracket and band clamp from the pipe mount kit (Itron part number CFG-0005-003). Pipe brackets may be black or gray. These instructions show a black pipe bracket.

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.

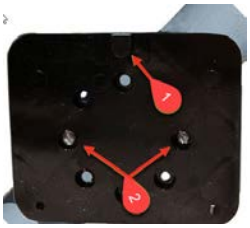


Adapter Plate Mounting Positions

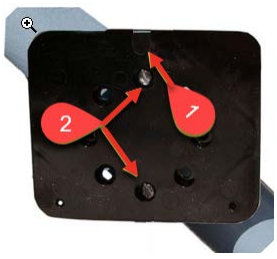
The installation procedure in the previous section shows how to mount the adapter plate on a vertical pipe.

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.

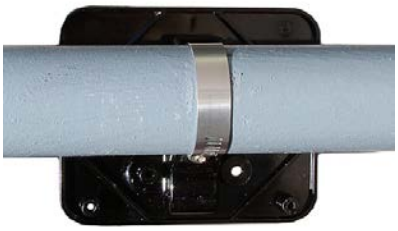
If the pipe is at a 45° angle up to the right, install the adapter plate with the mounting screws (2) as shown.



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



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



To mount on the adapter plate

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

3. Install the two 1 inch Cellular 500W mounting screws.

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

Remote Mount Installation

1. Connect the Cellular 500W to the register as described in Initialization, Connection, and Programming on page 13.

2. Using a back plate, create a template by drilling through a back plate lug slot to mark the position of the screw. Use the drilled back plate as your mounting template.

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

To install 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. The two bottom holes should be 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 Cellular 500W lug slot onto the mounting screw, pushing the Cellular 500W upward until the screw head is all the way into the slot.

5. Screw the Cellular 500W 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 inches below the top of the screw recess.

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

Remote Disconnect Valve Installation

This section describes installation of a Smart Earth Technologies (SET) Remote Disconnect Valve in an OpenWay water system. The Cellular 500W 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.

The remote 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** with a handheld computer running FDM software.

The Remote Disconnect Valve connects to the Cellular 500W orange, blue, and purple/white wires.

Wire Connections

Connect the Cellular 500W wires to the Remote Disconnect Valve wires following the connections shown in the table below.

Remote Disconnect Valve to Cellular 500W wiring			
Remote module wire color	Blue	Orange	Purple/white
SET shutoff valve wire color	Green	Red	Black

Leak Sensor Installation

Installation of the Leak Sensor with a Cellular 500W requires an Leak Sensor with flying lead ends (LDS-1601-002). For the remote module installation instructions, see *OpenWay® Riva Leak Sensor Installation Guide*.

Itron Cable Armor Installation

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 pit module using FDM Endpoint Tools.
- Perform a Check Endpoint function (with FDM Endpoint Tools) after you reprogram the Cellular 500W to verify communication with the meter register.

To install the cable armor

1. Remove the installed Cellular 500W.

   Note: Itron strongly recommends that you keep the Cellular 500W 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 Cellular 500W cable near the Cellular 500W .

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

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

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

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

To install the cable armor

1. Remove the installed Cellular 500W.

> **Note:** Itron strongly recommends that you keep the Cellular 500W 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 Cellular 500W cable near the Cellular 500W .

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

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

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

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

4 Completing Gel-cap Connections Using the Itron Splice Tube Kit

> **Important!** All unused wires on modules 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.

Required Materials

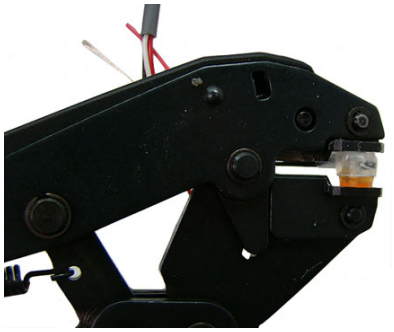
- E-9R 3M® gel connector crimping tool (or other 3M approved crimping tool)
- Itron splice kit (part number OEM-0034-002)

To complete gel-cap connections

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

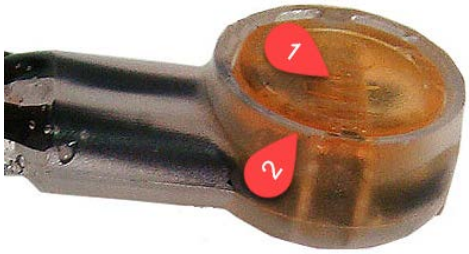
> **Caution:** Do not strip insulation from the ends of the wires before inserting them into the connector.

2. Carefully place the connector and wires into the jaws of the crimping tool. Make sure the wires remain fully inserted in the gel-cap connector.



3. Crimp the connector by squeezing the handles until the connector cap is fully seated. Continue to apply pressure for three seconds.

4. A connector is crimped properly when the top of the movable 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 Cellular 500W 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.

5 Troubleshooting

This information will help you troubleshoot issues related to the Cellular 500W.

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

Issue	Action
Cannot program the Cellular 500W.	Check the programming device and software version. Program Cellular 500W using an approved handheld computer running Field Deployment Manager (FDM) 4.4 or higher.
Cannot read the Cellular 500W.	A Cellular 500W that is not programmed does not transmit a SCM+. Reprogram the Cellular 500W and perform a reread. If a Cellular 500W is not initially programmed, it does not bubble up and listen for an SCM+.
The Cellular 500W is reporting an invalid read.	A Cellular 500W that has set the Register Error flag causes an Invalid Read to display in the FDM Consumption field.
Marginal readability due to the Cellular 500W location (for example, a Cellular 500W deep inside a pit).	Consider reprogramming the Cellular 500W for Hard-to-Read Mode. This increases the output to high power levels **Note:** This mode reduces battery life.
The handheld programmer is locked up and button presses produce no response.	*Soft boot* the handheld. Reference the documentation for your programmer.

6 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. Operation 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.

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.

Modifications and Repairs

Warning! This unit cannot be modified and is not repairable. Attempts to modify or repair this module voids the warranty, per FCC and ISED rules.

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.

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.