Itron

OpenWay Riva®

500W ERT® Pit Module Installation Guide

Template

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Contact

Email: **support@itron.com**

Itron Access: **https://access.itron.com**

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New in this Document

Table 1 New in this document

Revision	Date	Description
	July 2019	First publication.
1	January 2020	Added **Australia, ACMA Spectrum Compliance**.

1 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 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.

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.

Modifications and Repairs

Warning! This unit cannot be modified and is not repairable. Attempts to modify or repair this module will void the warranty.

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.

2 About the OpenWay Riva 500W ERT Module

OpenWay Riva 500W ERT remote modules are high-power radio frequency transmitting modules that attach to water registers or meters to collect consumption usage, event, and alarm data. The OpenWay Riva 500W ERT module is an IPv6-compliant endpoint designated to communicate over the ItronOpenWay Riva multi-purpose IoT solution: OpenWay Riva Network or the legacy ChoiceConnect Mobile platform. The OpenWay Riva 500W ERT module transmits in Mobile Mode offering Mobile Handheld, Hard-to-Read Mobile, High-Power Mobile, or OpenWay Riva Network Mode.

The OpenWay Riva 500W ERT modules ship from the factory in Factory Mode, which prevents unwanted radio transmissions during transit. After installation and programming, the pit modules acquire and transmit meter or register data in accordance with the selected pit module parameter settings. The OpenWay Riva 500W ERT modules support protocols for a variety of meter manufacturer's registers. Refer to the *Water Meter and Telemetry Module Compatibility List* (PUB-0063-002) for the list of supported meters and registers.

> **Note:** The OpenWay Riva 500W ERT Module was formally known as the OpenWayRiva Water Module. The UI associated with this device may reflect the former name.

OpenWay Riva 500W ERT modules feature the following capabilities:

- **Datalogging**. In OpenWay Riva Network Mode, the OpenWay Riva 500W ERT module 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**.

- 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. Output power in this mode is 250 milliwatts or +24dbm. 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. Output power in this mode is 10 milliwatts or +10dBm. 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. Output power in this mode is 250 milliwatts or +24dBm. 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**. OpenWay Riva 500W ERT modules feature robust algorithms that provide leak and reverse flow detection.
- *(Optional)* **OpenWay Riva Leak Sensor (OLS)**
  - The optional OLS 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 OLS devices access leak information through their utility-specific, secure mlogonline portal. For more information, see the *mlogonline Network Leak Monitoring System User Guide* (TDC-0792-XXX).
- *(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.

> **Note:** Remote water disconnect operation requires a module with enhanced security enabled. To learn more about enabling enhanced security, see the *Field Deployment Manager Tools Application Guide* (TDC-1713-XXX).

Description

Description	Itron part number
OpenWay Riva 500W ERT pit module	ERW-1601-001

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

Related Documents

Document description	Itron part number
OpenWay Riva 500W ERT Remote Module Installation Guide	TDC-1687-XXX
OpenWay Riva 500W ERT Pit Module Installation Guide	TDC-1743-XXX
OpenWay Riva Leak Sensor Installation Guide	TDC-1691-XXX
Customer setup to order secured OpenWay Riva modules	TDC-1748-XXX
First article review form	TDC-1749-XXX

Document description	Itron part number
OpenWay Collection Manager Operational Guidelines	
OpenWay Riva Collection Manager Device Interface Guide	TDC-1786-XXX
OpenWay Riva Water Module Specification Sheet	101474SP-0X
Field Deployment Manager Tools Configuration Guide	TDC-1711-XXX
Field Deployment Manager Tools Application Guide	TDC-1713-XXX
Field Deployment Manager Field Representative's Guide	TDC-1714-XXX
FC300 Getting Started Guide	TDC-0898-XXX
Itron Mobile Radio User Guide	TDC-1719-XXX
Itron Mobile Radio Quick Reference Guide	TDC-1720-XXX
OpenWay Riva Water Products Ordering Guide	PUB-0063-004
Water Meter and Telemetry Module Compatibility List	PUB-0063-002
mlogonline™ Network Leak Monitoring System User Guide	TDC-0792-XXX

Note: XXX designates the document revision and is subject to change without notice.

Itron Security Manager (ISM)

Users have the option of enabling enhanced security in OpenWay Riva 500W ERT pit modules. Itron Security Manager (ISM) is a feature of the OpenWay Riva system that ensures certain pit module commands are issued through secure radio communications between the handheld computer, Mobile Collector, or OpenWay Riva Network.

There are two fundamental security processes used in the OpenWay Riva system to ensure secured commands are confidential and valid.

- **Authentication**. Authentication is the process of confirming that an artifact is genuine or valid. Authentication in the OpenWay Riva 500W ERT pit module is the process of verifying the 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.

Battery Life

Powered by four non-replaceable, long-life lithium batteries, the OpenWay Riva pit module has an expected battery life of 20 years, dependent on use case.

Low Battery

OpenWay Riva 500W ERT modules include a low battery indicator that helps utilities proactively plan and manage field module replacements.

> **Note:** Low battery functionality is based on the module's firmware version. For more information, see **Firmware Functionality**.

Transmission Modes

The OpenWay Riva 500W ERT pit module is an IPv6 Wisun compliant device that operates in Mobile Mode or OpenWay Riva Network Mode.

In Mobile Mode, the module transmits every ten seconds over multiple RF channels to report on:

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

In OpenWay Riva Network Mode, the module reports four interrogation cycles daily. Each interrogation collects six hours of interval and event data.

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

The OpenWay Riva 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 OpenWay Riva Network Mode or Switch to Mobile Mode operation, it results in a loss of interval data.

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

Operating Modes

The OpenWay Riva pit module has the following operating modes.

1. **Factory Mode**
   - Pit modules ship from the factory in Factory Mode.
   - The pit module's transmitter is off.
   - The pit module's receiver listens for a programming command.
   - The pit modules attempt to read the register every hour.
   - Last Good Read and Extended event or alarm flags may be set when a register is not connected.
   - If the pit module reads a connected register, the pit module automatically switches to Run Mode.
2. **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 Riva 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.
3. **Run Mode**
   - Pit module normal operation mode.
   - The OpenWay Riva 500W ERT Pit Module transmitted message is dependent on its factory settings or setting programmed with FDM for standard consumption messages (SCM+). For SCM+ (Mobile), the pit module default bubble-up rate is 10 seconds.
4. **Meter manufacturer Quiet Mode**
   - Meter manufacturers can configure the pit module for Quiet Mode after initializing and direct mounting the pit module in the factory.
   - The pit module awakens from Quiet Mode and enters run mode in one of two ways:
     1. The pit module detects consumption at the top of the hour (last hourly interval >1 or <-1).
     2. The pit module receives a two-way command (for example, a **Read ERT** using FDM software).

Firmware Functionality

This section lists the OpenWay Riva 500W ERT module 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-1601-004	4.1	1.3.7		■ Network topology ■ IPv6 addressable ■ 60 minute interval data ■ Mobile Mode ■ Firmware download
FMW-1602-006	4.5	2.1.10.0	DFW-1602-006	■ GSR 4.1 functionality ■ 5, 10, 15, 30 minute interval data ■ Extended meter alarms ■ Low battery alarm ■ Restricted water flow state
FMW-1602-012	4.5	2.2.6.0	DFW-1602-012	■ 4.1 GSR compatibility ■ 4.5 2.1.10.0 compatibility ■ Bug fix to OpenWay Riva Leak Sensor compatibility
FMW-1604-006	5.0	4.3.15.0	DFW-1604-006	■ Intelis Water meter encoder support ■ 1 Minute sub hourly support (Network Mode only) ■ Ability to separate FWDL from Comm FW vs. Metrology FW ■ Remote Auditing of 500W in Network mode ■ Extended Fan Connectivity Mode (GeoMode)

Events and Alarms

For OpenWay Riva modules reporting in 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 OpenWay Riva remote 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 OpenWay Riva 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 water 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 2 years of battery life remaining. Battery life is evaluated daily at midnight.

For OpenWay Riva modules reporting in OpenWay Riva Network Mode.

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

The OpenWay Riva 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

For more information about the extended alarms, see the *OpenWay Riva Events and Alarms Reference Guide*, TDC-1746-XXX.

For more information about the extended alarms, see the *OpenWay Riva Collection Manager Device Interface Guide*, TDC-1786-XXX.

3 Initializing, Connecting, and Programming the Pit Module

This chapter provides the instructions to program and connect the pit module.

Requirements are based on the network system mode. The OpenWay Riva pit module's auto-sensing technology eliminates the need to program the module at the time of installation for most popular registers by automatically detecting the connected register type.

Start-up

The pit module automatically:

- Detects the connected register type at the top of the hour, exits Factory Mode, and enters Run Mode.
- Detects an Itron OpenWay Riva Leak Sensor (OLS).

OpenWay Riva 500W ERT pit module programming is required to:

- Change the operation mode
- Enter a utility ID or lock type.
- To enter an E-Coder 8-digit driver.
- Commission security

Itron strongly recommends performing a **Check ERT** with a handheld computer running FDM to verify that the pit module is operating correctly after installation. Performing a **Check ERT** will:

- Initiate an immediate register read.
- Verify communication with the OLS or remote shut-off valve.
- Check for event or alarm flags.

Programming

Programming the pit module requires one of the following handheld computers running Field Deployment Manager (FDM) or FDM Tools 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 pit module to the water meter register. The 500W ERT module polls for a register every hour. The OpenWay Riva pit module automatically activates after it detects the register.

> **Caution:** Do not program configuration changes to the OpenWay Riva 500W ERT module until it is connected to the water meter register.

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

Extending the Cable

Order the 25-foot inline connector extension cable assembly (CFG-0151-404) to extend the cable of the pit module.

Encoder-type Meter Register Connections

Pit module connections are made by the meter manufacturer for encoder-type registers. This information describes those connections.

> **Caution:** Itron recommends OpenWay Riva pit module connections be completed using the inline connector. In rare instances, if a spliced connection is made, the Itron splice kit must be used (Itron part number OEM-0034-002). For more information, see **Completing Gel-cap Connections Using the Itron Splice Kit**.

	Pit module wire color		
	Red (data)	**Black (power/clock)**	**White (ground)**
Register manufacturer	**Register screw terminal**		
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 Terminal: Input - and Out 4-

	Pit module wire color		
	Red (data)	**Black (power/clock)**	**White (ground)**
Register manufacturer	**Register screw terminal**		
Diehl Hydrus	Green	Red	Black
Elster AMCO InVision Scancoder AquaMaster AquaMaster III	Red	Green	Black
Elster AMCO SM 700 (Severn Trent) Q200 (Sensus Protocol) evoQ4 (Sensus Protocol)	Green	Red	Black
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	Data port/green	Clock/red	Gnd port/black
Metron Farnier OER	Green	Red	Black
Mueller (Hersey) Translator SSR	Green	Red	Black
Sensus ECR ICE iPERL SRII OMNI	Green	Red	Black
Neptune ProRead ProRead AutoDetect E-Coder ARB-V	Red	Black	Green

	Pit module wire color		
	Red (data)	**Black (power/clock)**	**White (ground)**
Register manufacturer	**Register screw terminal**		
Performance ETR	Green	Red	Black
RG3 Tomahawk	Green	Red	Black
Siemens Mag Meter Mag8000CT-7ME6820 Mag8000-7ME6810	92	91	93
Zenner (Hendey) ETR	Green	Red	Black

Pulser-type Register Connections

Pit module connections are made by the meter manufacturer for pulser-type registers. This information describes those connections.

Caution: Itron recommends OpenWay Riva pit module connections be completed using the inline connector. In rare instances, if a spliced connection is made, the Itron splice kit must be used (Itron part number OEM-0034-002). For more information, see **Completing Gel-cap Connections Using the Itron Splice Kit**

	Module wire color		
	Red	**Black**	**White**
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	DO1/DO2
Elster Digital	Black	Green	Red
Elster V100T	Black	Red	Blue
■ Itron (Actaris) ■ Flostar (2-wire)	Either wire	Remaining wire must be connected to both ERT module wires	

	Module wire color		
	Red	**Black**	**White**
Register manufacturer	**Register screw color designator**		
■ Cyble Sensor			
Krohne IFC	Term B	Term H	Term B
RG3 Tomahawk	Green	Black	Green
Sensus PMM	Red	Black	Bare

Verifying Operation

Use one of the following handheld computers to verify consumption:

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

> **Caution:** Verifying the OpenWay Riva 500W ERT Pit Module operation requires an FC300SR handheld computer or Itron Mobile Radio running FDM v4.0 or higher. Legacy Itron handheld programming devices cannot read the pit modules.

- Each handheld radio requires special setup and configuration parameters to successfully read and program the pit module. Refer to the respective meter reading application for specific instructions.
- When comparing the actual register value to that reported by the pit module, please keep in mind the 500W ERT module's consumption value is updated once an hour when it is in Run Mode.

4 Installing the OpenWay Riva 500W ERT Pit Module

Install the pit module using one of the following methods. (For mounting option accessories, see **Pit module mounting accessories**.)

Pit module mounting options	
Through-lid	The pit module mounts in lids with hole sizes from 1-3/4 inches to 2-inches. Installation requires the Pit mount kit.
Rod mount*	The pit module mounts on a 1/2-inch outside diameter rod. Installation requires the rod mount adapter.
Wall mount*	The pit module mounts to a wall or other vertical surface. Installation requires the rod mount adapter.

* Rod and wall mount installations require the Itron through-the-lid remote antenna.

Important! The OpenWay Riva 500W ERT pit module is shipped with a protective cover over the connectors. The protective cover must be fully engaged over the connectors until the module is installed to protect the module's connectors from damage.

For 500W ERT pit boxes, the type of installation method is based on the location of the meter in the pit box and the lid material. Itron recommends mounting the pit module in pit boxes with in plastic lids (or other composite materials) for optimum network performance. Metal lids require a through-lid remote antenna and rod or wall mount accessory for optimal pit module radio performance. The pit modules are temperature rated from -20° C to +60° C. Do not install the pit module in locations that may exceed the temperature rating.

Warning

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

Pit module positioning other than upright will negatively affect radio performance.

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

Pit module mounting accessories

Accessory	Part number
Remote antenna kit (required for rod and wall mount installations)	CFG-0900-003
Riva 500W ERT module rod mount adapter	CFG-1601-002
Fiberglass mounting rod. (Minimum order quantity is 100.)	
12"	OEM-1006-001
18"	OEM-1006-002
36"	OEM-1006-003
Riva 500W ERT module pit lid mounting kit	CFG-1601-001
Cable armor (see**Using the Itron Cable Armor**for field retrofit installation instructions)	
5 foot cable thin-insulation (with protective cap and cable armor)	CFG-0151-006SS
5 foot cable thick-insulation (with protective cap and cable armor)	CFG-0151-010SS
5 foot cable armor for field retrofit	FAB-1302-001
Pit module universal environmental cap	MSC-0019-011
Itron security seal	MSC-0018-001

Caution: Shield unconnected pit module connectors on field installed modules with protective environmental caps. Do not leave an exposed connector in the field. Environmental caps employ multiple seals to increase connector life.

Pit modules with Integral Connectors

Prior to connecting inline connectors to the pit module connectors, remove the environmental cap. If pit modules with integral connectors (ERW-1601-001) and the registers are not installed at the same time, secure the protective environmental connector cap on the pit module connector using an Itron security seal (Itron part number MSC-0018-001). Cable ties are not shipped with the pit module, but can be ordered from Itron. Use the protective cap (on the pit module side) in the field for up to one year.

Warning! If a three-port pit module is installed but the telemetry device is not attached, the environmental cap (MSC-0019-0011) must remain in place on the blue connector (telemetry) to protect the connector from damage.

After installation is complete, recycle or discard installation waste. Do not leave materials on the customer's premises.

Through-lid Installation

This section provides instructions to mount the pit module in a plastic or composite pit lid of ½" to 2-1/2" thickness with a drilled, round 1-3/4-inch, 1-7/8-inch, or 2-inch hole.

Required Tools and Hardware

This mounting method requires the pit lid mounting hardware (CFG-1601-001).

Note: Pit lid mounting is not intended for applications involving vehicular traffic. Use the remote antenna kit in incidental traffic areas (such as residential environments).

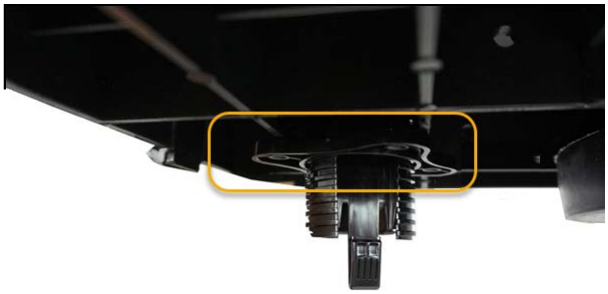
This section provides the instructions to install the pit module in a pit lid with a hole using the pit lid mounting bracket. Verify that you have the following items to complete the installation.

1	Pit lid with a pre-drilled hole	User-supplied
2	Through-the-lid retainer clip	CFG-1601-001
3	Retainer clip collar	
4	OpenWay Riva 500W ERT pit module	ERW-1601-001

Installing the Module in the Pit Lid

1. Insert the retainer clip into the pit lid hole with the convex surface on the top of the pit lid.

2. From the bottom side of the lid, screw on the threaded retainer clip collar until the beveled top rests against the pit lid.



> **Note:** Ensure that the beveled edge of the clip collar is toward the top of the pit lid.

3. Align and insert the retainer clip tab (1) into the retainer clip receptacle (2) on the pit module housing.

Verify that the clip locks into place and the retainer clip collar is hand-tightened against the pit lid.

> ⚠ **Caution:** Carefully align the pit module through lid assembly. If the assembly is improperly aligned, the pit lid may not close.

Pit lid mounting installation is complete.

Rod Mount Installation

> **Important!** Rod mount installation requires the remote antenna and rod mount adapter. For more information, see **Pit module mounting accessories**.

OpenWay Riva 500W ERT Pit Modules can mount below the pit lid on a customer-supplied 1/2-inch diameter rod. A mounting rod is available from Itron. For more information, see **Pit module mounting accessories** or visit www.itron.com and reference the *Water Products Ordering Guide* (PUB-0063-001).

Warning

- The rod installation area must be free from other pipes, wires, or facilities that may be damaged by driving a rod into the ground.
- You must follow local codes when using the rod mount installation method.
- Failure to use a 1/2-inch rod and follow instructions may result in an unreliable installation.
- Pit module positioning other than upright will negatively affect radio performance.

Required Tools and Hardware

- Hammer
- 1/2-inch outside diameter rod (you may use either a square or round rod)*
- Tape measure
- Rod-driving tool (optional)
- Rod cutting tool

*For mounting rods available from Itron, see **Pit module mounting accessories** or reference the *Water Products Ordering Guide* (PUB-0063-001).

Installing

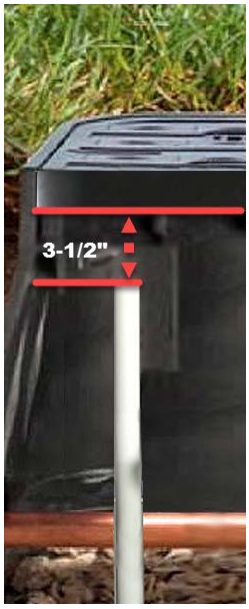
1. Remove the pit lid. Inspect the area to make sure there are no buried cables, pipes, or other obstructions.
2. Measure the pit box depth from the top of the lip (where the lid will rest) to the bottom of the pit. Be sure to measure the depth at the point where you will drive the rod into the ground.
3. Add 12 inches to the pit box depth measurement taken in step 2. The resulting total represents the minimum length of rod needed. Soil types and moisture conditions may

require longer rod lengths to ensure that the pit module is well supported and remains vertical.

4. Without touching the meter body or adjacent pipes, position the rod as close to the center of the pit as possible. Drive the rod into the ground. Ensure that the rod remains vertical.

> **Note:** The rod shown has an end cap to protect the rod while driving it into the ground.

5. Drive the rod into the ground so the top of the rod is approximately 3-1/2 inches below the bottom of the pit lid.



   - If you cannot drive the rod in enough to equal the necessary spacing, cut the remaining rod length to the proper height using an abrasive cut-off tool.

> ⚠ **Caution:** Cutting fiberglass creates dust particles. Practice proper safety precautions when using cut-off tools to prevent exposure to fiberglass dust particles.

   - If the rod is the correct depth but remains loose in the soil, replace the rod with a longer version.

6. The top of the rod must be 3-1/2 inches below the bottom of the lid. Place the Riva module on the rod. Completely insert the rod into the pit module's rod mount hole. Do not force the pit module onto the rod. If the pit module does not slide freely on the rod, remove the pit module and examine the pit module rod hole and rod for burrs or obstructions.
7. You may secure the pit module to the rod with a self-drilling screw through the hole in the top of the pit module's rod mount cavity.

8. Connect the register (black connector, 1), optional remote antenna (red connector, 2) and optional telemetry device (blue connector, 3) into the appropriate connection.

9. Turn the connector locking ring to secure the connection.

> **Caution:** Turn only the locking ring. Turning the entire connector could damage the connector pins.

10. Installation is complete when the pit module is perpendicular to the underside of the lid. The pit module must not contact the pit structure or lid.

> **Caution:** Verify that the pit lid does not touch the pit module when the lid is replaced. There must be a 1 to 2-inch space between the top of the pit module and the bottom of the pit lid. If the pit module is installed too high or too low, or is touching any of the surrounding surfaces, adjust the installation as necessary.

Wall Mount Installation

> **Important!** Wall mount installation in a pit requires the mounting adapter from the remote antenna kit. For more information, see **Pit module mounting accessories**.

Select a flat vertical mounting surface. Install the pit module in an upright position. Locate the pit module as high as possible in a 500W ERT pit box. Maintain a distance of one to two inches from the bottom of the pit box lid.

Caution

Observe the following guidelines for mounting the pit module using the wall mount procedure:

- ERT module positioning other than upright will negatively affect radio performance.
- Use inline connectors to connect the OpenWay Riva 500W ERT module to the register or meter. If a splice is required to connect the register or meter, you must use the Itron splice kit (OEM-0034-002).

The pit module works accurately with Itron-approved cable type and lengths up to 300 feet.

Installing the Module to the Pit Wall

1. Select a vertical, flat surface in the pit box.
2. Insert the rod/wall mounting bracket tab (1) into the module tab receptacle (2).

3. Position the pit module vertically so the top of the pit module is between 1 and 2 inches below the bottom of the lid.
4. Mark the location of the top mounting hole.

5. Drill a pilot hole in the pit box wall. Follow the screw manufacturer's recommendation for the pilot hole size.
6. For concrete-type pit boxes, it may be necessary to use a screw anchor. Choose an anchor appropriate for a #10 pan head screw.

> **Caution:** Do not over-tighten the mounting screws. Over-tightening the mounting screws may break the pit module mounting tabs.

7. Start a screw into the pilot hole. Using the top hole of the pit module, set the pit module over the screw head and slide it down so the screw is now at the top of the notch. Carefully tighten the screw until snug. Over-tightening the mounting screw could damage the pit module housing.

   > **Note:** If the mounting location requires a screw anchor, mark the location of the bottom anchor and remove the pit module. Drill the required mounting hole, insert the anchor, and re-attach the pit module.

8. Holding the pit module in the upright position, drill the second pilot hole. Use the bottom mounting hole as a template.

> **Caution:** Any pit module position other than upright will negatively affect radio performance.

9. Screw the bottom screw into the pilot hole until snug. Do not over-tighten the mounting screw.

   Wall mounting the OpenWay Riva pit module is complete.

Leak Sensor (OLS) Installation

Installation of the OLS with a pit 500W ERT module requires the OLS with an inline connector (Itron part number LDS-1601-001). The OLS connects to the telemetry connector on the pit module. For pit module installation instructions, see the installation guide for your 500W ERT module.

If the OLS 5 foot cable is not long enough to reach the OpenWay Riva Pit 500W ERT Module, an extension cable is available from Itron (CFG-0151-404). The maximum cable length between the OpenWay Riva Leak Sensor and the OpenWay Riva Pit 500W ERT Module is 30 feet.

Caution: If the pit module is installed to enable communications for the OLS but a register is not connected, replace the register connector's cap (2) with the environmental cap removed from the blue telemetry connector (1) to protect the register connector.

Optional Remote 500W ERT Disconnect Valve Installation

This section describes installation of a remote 500W ERT disconnect valve in an OpenWay Riva 500W ERT system. The OpenWay Riva 500W ERT module supports three valve 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 pit 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 disconnect valve is used in conjunction with both indoor (basement) and outdoor (mounting on the exterior of the house) pit module installations. Water disconnect devices are mounted on a water service pipe or meter insetter (meter horn) and connect to the center telemetry connector (blue) on the pit module. For more information, see **Pit module mounting accessories**.

Note: Remote water disconnect operation requires a pit module with enhanced security enabled.

Installing the Remote 500W ERT Disconnect Valve

The remote 500W ERT disconnect valve ships from the supplier with the Itron cable installed. See the manufacturer's installation instructions for the procedure to mount the disconnect valve in the pipe close to the pit module.

Caution: Remote disconnect valves must connect to the telemetry (blue port) of the module.

1. Remove the protective plastic cover from the module's connector ports.

2. Remove the environmental cap from the pit module's telemetry connector (blue).

3. Verify that the connectors are clean and dry.

1. **Black register connection**
2. **Red optional antenna connection**
3. **Blue telemetry device connection**

4. Align the disconnect valve connector with the pit module's blue telemetry connector.

5. Push the valve connector into the pit module's connector.

6. Rotate the connector locking ring until the security holes align.

Caution: Do not force the connector ends together. While you hold the disconnect valve's connector, engage the pit module's connector by rotating the locking ring until both connectors are securely connected. Twist only the connector locking ring, not the body of the connector. Twisting the connector body could damage the pit module and disconnect valve's connector pins.

Install an Itron security seal through the aligned security holes.

Optional Through-the-lid Remote Antenna Installation

Important! The remote antenna and rod mount adapter are required for all rod and wall mount installations. For more information, see **Pit module mounting accessories**.

This section provides antenna mounting and connection instructions for modules installed through a pit lid. This device has been designed and approved per FCC and ISED rules, to operate with the antennas listed below. Antennas not included in this list are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. To reduce potential radio interference to other users, the antenna type and its gain should be chosen so that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication. The optional 900 MHz remote mount antenna provides increased RF range coverage for the listed mobile applications where the meters are located deep in pit boxes.

Specifications	
Part number	CFG-0900-003
Gain	2 dBi
Horizontal beamwidth	Omni-directional
Impedance	50 ohms
Termination	Proprietary

Innovation, Science and Economic Development Canada (ISED) Conformity

The radio transmitter (IC:864D-RIVAWA) has been approved by Innovation, Science and Economic Development Canada (ISED) to operate with the antenna types listed above with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (IC: 864D-RIVAWA) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

OpenWay Riva Through-the-lid Remote Antenna

Metal lids on 500W ERT pit boxes require a through-lid solution for optimal pit module radio performance. The remote antenna is designed to fit in a pit lid hole with a diameter of 3/4-inch and lid thicknesses from 1/4-inch to 1-3/4-inch.

Caution: Remove cable or twist ties from the antenna cable to prevent damage to the pit module or antenna.

Installing

1. Thread the remote antenna connector and cable through the pit lid hole. Verify that the antenna's convex surface is on the top of the pit lid. (These instructions show a simulated pit lid material.)

2. Insert the antenna connector through the rectangular opening in the threaded collar.

3. Turn the threaded collar until it is tight against bottom of the pit lid.

Connecting

1. Align the connector pins with the middle red connector on the pit module.
2. Push in the antenna connector to complete the connection.

3. To mount the pit module, see **Installing the OpenWay Riva 500W ERT Pit Module on page 1**.

   Remote antenna installation is complete.

5 Using the Itron Cable Armor

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

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 pit 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 pit module to verify communication with the meter register.

Installing

1. Remove the pit module from the pit.

   > **Note:** If it is possible in your field installation, keep the pit module connected to the register.

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

3. Wrap the entire piece of electrical tape around the pit module cable near the inline connector.

4. Beginning over the installed electrical tape, twist the Itron cable armor onto the pit module cable using a right-handed twist.

Important! You must twist—not wrap—the cable armor onto the pit 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 not begin to twist the cable armor over the protected portion of the pit module cable, a cut cable could cause an pit module/register communication failure.

5. Continue to twist the cable armor onto the pit module cable until the cable armor covers the entire cable.

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

6 Connecting the Inline Connector

> **Note:** If an inline connector is not used or the pit module is already connected to the water meter or register, skip this step.

1. Remove the protective environmental cap from the module connector.

   > ⚠ **Caution:** Verify that the connector ends are clean and dry before assembly.

   If any of the following conditions occur, do not install the modules.

   - Any of the three pins are damaged or missing.
   - The O-ring is missing.
   - The cable is cut or nicked.

2. Remove the protective cap from the register or accessory connector.
3. Connect the register cable to the pit module connector.
   - Align the connectors.
   - Push until snug.
   - Twist the register cable's black coupling nut to align the two tabs.

4. Install the security seal as shown. Push it until it snaps into place.

For future meter or pit module servicing, break the security seal by pulling the seal apart. The original protective connector caps can be reused if kept clean and dry. Install a new security seal after servicing either device. To order replacement security seals, see the *Water Products Ordering Guide* (PUB-0063-001). Environmental caps employ multiple seals to protect the connector from the environment. Environmental cap design allows utilities to install the pit module and, at a future date, install a OLS or optional remote antenna

> **Caution:** Shield connectors with protective environmental caps (for more information, see **Pit module mounting accessories**). Do not leave an exposed connector in the field.

7 Completing Gel-cap Connections Using the Itron Splice Kit

> **Caution:** OpenWay Riva module wire terminations must be properly sealed with a non-conductive gel material to prevent water intrusion.

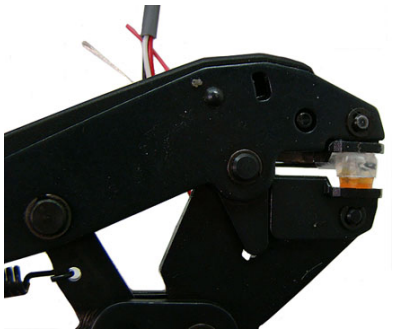
Required materials

- 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.

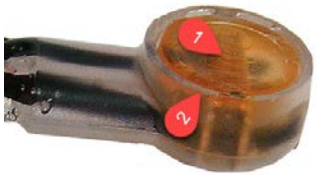
> **Caution:** Do not strip insulation from the ends of the wires before inserting them into the connector.

2. 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 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 the OpenWay Riva 500W ERT pit modules.

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

Issue	Action
Cannot program the pit module.	Check the programming device and software version. Program pit module using the FC300 handheld computer running Field Deployment Manager (FDM) software v4.0 or higher.
Cannot read the pit module.	A pit module that is not programmed will not transmit an SCM+ message. Reprogram the pit module and perform a reread. If a pit module is not initially programmed, it will not bubble-up and listen for an SCM+ message.
The pit module is reporting an invalid read.	A pit 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 pit module location (for example, a pit module deep inside a pit).	Consider reprogramming the pit module for Hard-to-read (H2R) mode or using the remote antenna. Programming the pit 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**.