OpenWay® Riva™ Pit Water Module
Installation Guide

Technical Communications

knowledge to shape your future

Identification

OpenWay® Riva™ Pit Water Module Installation Guide

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Chapter 1 Important Safety and Compliance Information

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

FCC Part 15 Rules

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 permanently mounted such that it retains a distance of 20 centimeters (7.9 inches) from all persons in order to comply with FCC RF exposure levels.

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.

Compliance Statement Canada
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.

Déclaration de Conformité
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.

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.

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.

Modifications and Repairs

To ensure system performance, this device and antenna shall not be changed or modified without the expressed 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.

Lithium battery safety

⚠ **Warning**: Follow these procedures to avoid injury 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 100° Celsius (212° Fahrenheit), crush, expose to water, or incinerate the lithium battery.
- Keep the lithium battery away from children.
- Fire, explsion, and severe burn hazard.

Modifications and repairs

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

Disconnecting power

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

Electromagnetic compatibility

Warning: ELECTROMAGNETIC COMPATIBILITY
Use only approved accessories with this equipmemt. 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 card components can be sensitive to electrostatic discharge. Before installation, discharge electrostatic buildup by touching a metal water pipe or other earth-grounded metal object prior to touching the meter body, register housing, or water module.

Drop height limitation

Warning: ERT modules contain sensitive electronic components which can be damaged if the module is dropped from heights greater than 36 inches. Product warranty coverage is contingent on not exceeding this drop height limitation.

Chapter 2 About the OpenWay Riva Water Module

OpenWay Riva remote modules are high-power radio frequency transmitting modules that attach to water registers/meters to collect consumption usage and tamper data. The OpenWay Riva remote module is an IPv6-compliant endpoint designated to communicate over the ItronOpenWay Riva multi-purpose IoT solution; Itron Riva Network or the legacy ChoiceConnect network. The Riva Water module transmits in ChoiceConnect Mobile, ChoiceConnect Hard-to-Read Mobile, ChoiceConnect High Power Mobile, or OpenWay Riva Network mode.

The OpenWay Riva water 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 register data in accordance with the selected pit module parameter settings.

The OpenWay Riva water 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.

OpenWay Riva water modules feature the following capabilities:

- Leak Detection and Reverse Flow Detection. OpenWay Riva water modules feature robust algorithms that provide Leak and Reverse Flow Detection.
- (Optional) Riva Leak Sensor
  - The optional Riva 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 a 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 an pit module with enhanced security enabled. To learn more about enabling enhanced security, see the Field Deployment Manager Endpoint Tools Mobile Application Guide (TDC-0934-XXX).

OpenWay Riva water pit module description

Description	Itron part number
OpenWay Riva water pit module	ERW-1600-001

Note: The OpenWay Riva water module works accurately with cable lengths up to 300 feet.

Related documents

Document description	Itron part number
OpenWay Riva Water Remote Module Installation Guide	TDC-1687-XXX
OpenWay Riva Water Pit Module Installation Guide	TDC-1666-XXX
OpenWay Collection Manager Operational Guidelines	
OpenWay Riva Events and Exceptions Reference Guide	
Field Deployment Manager Endpoint Tools Mobile Application Guide	TDC-0934-XXX
Field Deployment Manager Field Representative's Guide	TDC-0936-XXX
900 MHz Belt-Clip Radio User's Guide	TDC-0889-XXX
FC300 Getting Started Guide	TDC-0898-XXX
FC200 Series Getting Started Guide	TDC-0598-XXX
Itron Mobile Radio Quick Reference Guide	
Water Module Products Ordering Guide	PUB-0063-001
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 Water 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 system.

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 Water 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.

Enabling OpenWay Riva water pit module security

Each pit module ships from the Itron factory with a utility factory security key. The presence of this utility factory key does not enable security. To utilize the module's security feature, the installer must use an Itron programming device that is configured with the corresponding security key for that particular pit module. Initial key exchange commands are secured using the utility factory key. For more information about programming the pit module, see the FDM Endpoint Tools Mobile Application Guide (TDC-0934).

Battery life

Powered by four non-replaceable, long-life lithium batteries, the OpenWay Riva pit module has an expected battery life of 20 years. OpenWay Riva water modules include a battery replacement alarm that helps utilities plan and manage field module replacements.

OpenWay Riva water pit module transmission modes

The OpenWay Riva water pit module is an IPv6 Wisun compliant device that operates in ChoiceConnect mobile or OpenWay Riva Network mode.

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

- meter register value
- cut cable or communication error tamper(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. The OpenWay Riva water module also sends a local access beacon message every 60 seconds that allows users to gather contingency readings locally when needed.

The OpenWay Riva water module uses the 908-924 MHz ISM frequency band and does not require an FCC license to ready the OpenWay Riva pit modules.

OpenWay Riva water pit module 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 bubbles-up to listen for a programming command.
    - pit modules attempt to read the register every hour.

- Last Good Read and Extended Tamper Flags may be set when a register is not connected.
- If the pit module reads a connected register, the pit module automatically moves to Run Mode.

2. Run mode
   - Pit Module normal operation mode.
   - The OpenWay Riva Water 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.
3. 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).

Error/warning flags

For OpenWay Riva modules reporting in ChoiceConnect 100S mode.

Register error detected. Register error detected indicates that the pit module is not communicating with the register/meter. The tamper flag automatically clears after the pit module receives a successful read from the register.

Note: The register error detected flag may be an indicator of a damaged register.

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.

Extended tamper flag (retrievable with two-way communication).

Low battery warning. The pit 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 pit 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 operating in OpenWay Riva Network mode.

The Riva water module reports the tampers available in ChoiceConnect systems as well as extended meter alarms provided by new solid-state and electronic meters. The exteded alarms include:

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

Chapter 3 Initializing, Connecting, and Programming the OpenWay Riva Water 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. The module automatically detects the connected register type.

OpenWay Riva water pit module 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 Riva Leak Sensor.

OpenWay Riva water 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 the pit module is operating correctly after installation. Performing a **Check ERT** will:

- Generate an immediate register read.
- Verify communication with the Riva Leak Sensor or remote shut-off valve.
- Check for tamper flags.

Programming the pit module

Programming the pit module requires one of the following handheld computers running Field Deployment Manager (FDM) or FDM Tools version 4.0 or later.

- FC200SR handheld computer (Itron part number FC2-0005-004 or FC2-0006-004)
- FC300SR handheld computer
- 900 MHz Belt Clip Radio
- Itron Mobile Radio (IMR)

For normal activation, connect the pit module to the water meter register. The water module polls for a register every hour. The OpenWay Riva pit module automatically activates after it detects the register.

Note: Do not program configuration changes to the Riva water module until it is connected to the water meter register.

⚠ **Caution**:

- The FC200SR, FC300SR, 900 MHz Belt Clip Radio, or Itron Mobile Radio are the only devices that support progamming for the OpenWay Riva pit module.
- Keep a minimum of 12 inches between the Riva pit water module and programming device while programming configuration changes are completed.
- Do not place the programming device antenna directly on the pit module.

Extending the water pit module cable

Order the 25-foot inline connector extension cable assembly (CFG-0151-401) to extend the cable of the pit module.

Connecting the pit module to an encoder-type meter register

Connect the pit module cable to the encoder-type register using the wire connections in the following table.

	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-
Elster AMCO InVision, Scancoder, AquaMaster, AquaMaster III	Red	Green	Black
Elster AMCO SM 700 (Severn Trent), Q200 (Sensus Protocol)	Green	Red	Black
Elster AMCO evoQ4 Mag, evoQ4 (Sensus Protocol)	Red	White	Black
Itron (Actaris) Cyble Coder	Green	Red	Black

	Pit module wire color		
	Red (data)	**Black** (power/clock)	**White** (ground)
Register manufacturer	**Register screw terminal**		
Kamstrup flowIQ2100	Green	Red	Black
MasterMeter AccuLinx, Octave	Green	Red	Black
McCrometer	Green	Red	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
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

Connecting the pit module to a pulser-type meter register

Connect pit module cable to the pulser-type register using the wire connection in the following table.

	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), Cyble Sensor	Either wire	Remaining wire must be connected to both ERT module wires	
Krohne IFC	Term B	Term H	Term B

	Module wire color		
	Red	**Black**	**White**
Register manufacturer	**Register screw color designator**		
RG3 Tomahawk	Green	Black	Green
Sensus PMM	Red	Black	Bare

Note: *For the Badger RTR connection, Itron recommends terminating the unconnected wire with a gel-cap connector to protect the bare wire end. (For more information about installing gel-cap connectors, see Using Gel Cap Connectors.

Verifying pit module operation

Use one of the following handheld computers to verify consumption:

- FC200SR handheld computer (Itron part number FC2-0005-004 or FC2-0006-004)
- FC300 SR handheld computer
- 900 MHz Belt Clip Radio
- Itron Mobile Radio

Note:

- 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 water module's consumption value is updated once an hour when it is in run mode.

⚠ **Caution**: Verifying the OpenWay Riva Water Pit Module operation requires an FC200SR handheld computer, FC300SR handheld computer, 900 MHz Belt Clip Radio, or Itron Mobile Radio running FDM v4.0 or higher. Legacy Itron handheld programming devices cannot read the pit modules.

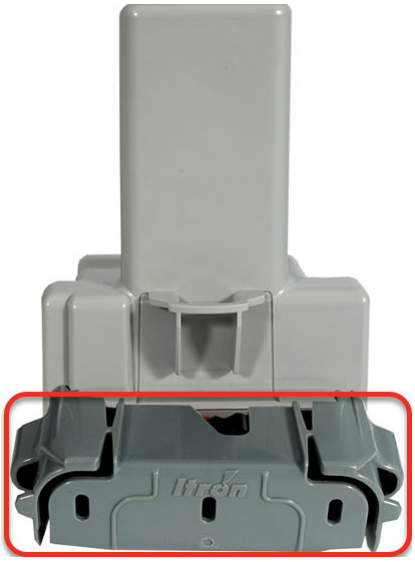
Chapter 4 Installing the OpenWay Riva Water Pit Module

Install the pit module using one of the following methods:

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 Lid Mounting Kit.
Rod mount*	The pit module mounts on a 1/2-inch outside diameter rod.
Wall mount*	The pit module mounts to a wall or other vertical surface.

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

Important The OpenWay Riva water 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 water pit boxes, the type of installation method is based on three factors: the location of the meter in the pit box, the lid material, and the current lid configuration. 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.

⚠ **Caution**: Pit module positioning other than upright could negatively affect radio performance and battery life.

Warning: Pit modules contain sensitive electronic components which can be damaged if the module is dropped from heights greater than 36 inches. Product warranty coverage is contingent on not exceeding this drop height limitation.

Warning: 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 rod mount adapter (available only with the remote antenna kit)	MLD-1601-007
Riva pit lid mounting kit	CFG-1601-001
Cable armor (see Appendix C for field retrofit installation instructions)	
5 foot cable thin-insulation (with protective cover and cable armor)	CFG-0151-006SS
5 foot cable thick-insulation (with protective cover and cable armor)	CFG-0151-010SS
5 foot cable armor for field retrofit	FAB-1302-001
Pit module universal environmental cap	MSC-0019-008
Itron security seal	MSC-0018-001

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

Pit modules with integral connectors

If pit modules with integral connectors (ERW-1601-001) and the registers are not installed at the same time, secure the protective environmental connector cover on the pit module 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 cover (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-0019-008) must remain in place on the blue connector (telemetry) to protect the connector from damage.

Through-lid installation

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

Through-lid mount 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).

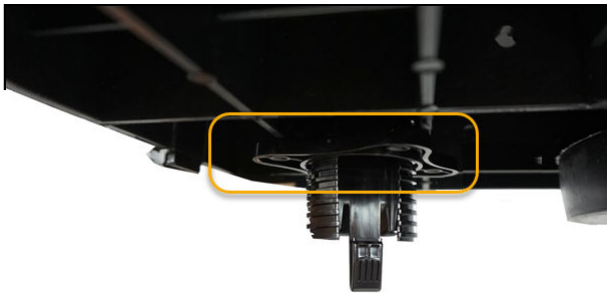
This section provides the instructions to install the pit module in a pit lid with a hole using the pit lid mounting bracket. Verify you have the following items to complete the installation.

1	Pit lid with a pre-drilled hole	CFG-1601-001
2	Retainer clip	
3	Retainer clip collar	User-supplied
4	OpenWay Riva water 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.

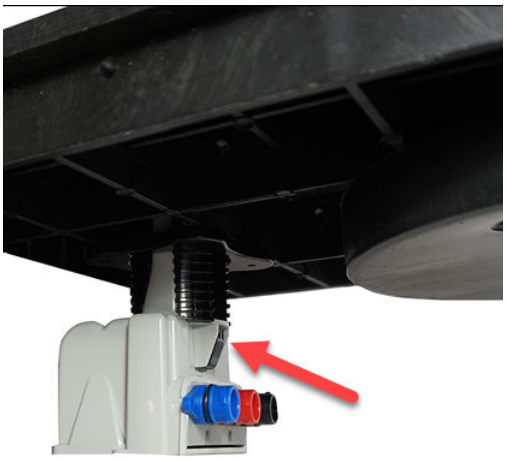


Note: Ensure the beveled edge of the clip collar is toward the top of the pit lid.

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

4. Verify the clip locks into place in the housing.

⚠ **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 Water 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, visit www.itron.com and reference the *Water Meter and Telemetry Device Compatibility List* (PUB-0063-002).

⚠ **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.

⚠ **Caution**: 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 could negatively affect radio performance and battery life.

Rod mounting 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

*Itron offers 12" (OEM-1006-001), 18" (OEM-1006-002), or 36" (OEM-1006-005) fiberglass mounting rods. Minimum order quantity is 100. For more information, see the *Itron Water Products Ordering Guide* (PUB-0063-001).

Installing the pit module on a rod

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 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 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.

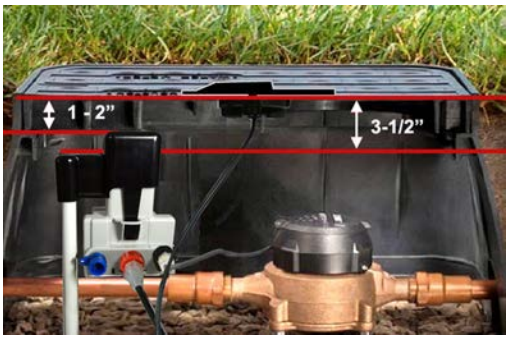
6. The top of the rod must be 3-1/2 inches below the bottom of the lid (see the illustration in Step 10). Place the Riva module on the rod. Completely insert the rod into the pit module's rod mount hole. Do not force the pit module onto the rod. If the pit module does not slide freely on the rod, remove 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 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, 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 remote antenna.

Select a flat vertical mounting surface. Install the pit module in an upright position. Locate the pit module as high as possible in a water 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 could negatively affect radio performance and battery life.
- Do not use gel connectors in pit environments; use only inline connectors.

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 may negatively affect radio performance and battery life.

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.

Optional Riva Leak Sensor installation

This section describes installation of the OpenWay Riva Leak Sensor in a OpenWay Riva Water system.

The water module stores 20 days of Riva Leak Sensor data. On the 21st day, the module begins to write over stored data in a first in, first out manner.

The module automatically detects the presence of connected Riva Leak Sensor. The pit module automatically detects the sensor within 22.5 minutes and begins reading the sensor data. To immediately detect the Riva Leak Sensor and begin reading data, perform a **Check ERT** with a handheld computer running FDM software.

Riva Leak Sensors mount on a water service pipe or meter insetter (meter horn) and connect to the telemetry connector on the pit module. For more information, see Connecting the Riva Leak Sensor to the module. The mounting bracket shipped with the Riva Leak Sensor accommodates an (up to) 1-1/2-inch OD pipe. An optional mounting bracket is available for pipe sizes (up to 2 1/2-inch OD).

⚠ **Caution**: If the OpenWay Riva pit module is installed to enable communcations for the Riva Leak Sensor but a register is not connected, replace the register connector's cover (2) with the environmental cover removed from the blue telemetry connector (1) to protect the register connector.

Riva Leak Sensor installation equipment

For a list of Riva Leak Sensor installation equipment, refer to the *Water ERT Products Ordering Guide* PUB-0063-001.

Pipe preparation

Clean any dust or dirt from the pipe to facilitate direct contact with the Riva Leak Sensor surface.

Installing the Leak Sensor

1. Select a mounting location within 5-feet of the water module.
2. Verify the pipe's mounting surface is free from dirt and debris.
3. Mount the sensor mounting clamp on the pipe on the water input side of the meter.

⚠ **Caution**: Mount the Riva Leak Sensor on the water input side of the meter. Failure to follow this mounting requirement could result in errors in the leak detection data. Installation requires Itron mounting hardware. Repair costs and service charges relating to the use on non-compliant mounting hardware will be charged to the customer. Contact Itron Support for more information.

Note: Do not mount the leak sensor on a pipe coupler, joint, or nut.

4. Align the Riva Leak Sensor mounting lock pin with the pin receptacle on the Riva Leak Sensor mounting base and insert the sensor.

5. Turn the Riva Leak Sensor to lock the sensor into place.

Note: For Riva Leak Sensor installations on pipes up to 2-1/2 inches, use the optional larger mounting bracket. For more information, see the *Water Products Ordering Guide* PUB-0063-001.

Connecting the leak sensor to the module

After the pit module is installed in the desired location, connect the pit module to the Riva Leak Sensor.

⚠ **Caution**: The Riva Leak Sensor must connect to the blue telemetry connector of the pit module. Connecting the sensor to the red antenna port or the black register port will cause electrical damage to the Riva Leak Sensor and pit module.

1. Remove the environmental cap from the blue telemetry connector of the pit module.
2. Remove the environmental cap from the leak sensor connector. Verify the connectors (the pit module telemetry connector and the leak sensor connector) are clean and dry.
3. Align the Riva Leak Sensor connector with the pit module's blue connector and insert.
4. Rotate the connector locking ring until the security holes align.

⚠ **Caution**: Do not force the connector ends together. While you hold the Riva Leak Sensor connector, engage the pit module connector by rotating the locking ring until both connectors securely connect. Twist only the connector locking ring, not the body of the connector. Twisting the connector body could damage the connector's pins.

Attaching a security seal to the completed connection

1. Insert the pointed end of the security seal through the inline connector and the pit module connector security holes.

2. Insert the pointed end of the security seal into the capped end and push until the seal locks.

Optional remote water disconnect valve installation

This section describes installation of a remote water disconnect valve in an OpenWay Riva water system.

The pit module automatically detects the presence of connected water disconnect devices. The pit module automatically detects the device 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 as described in Installing the Remote Water Disconnect Valve.

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

Installing the remote water disconnect valve

The remote water 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. Connecting the disconnect valve to the optional remote antenna (red) or register (black) port will cause electrical damage to the disconnect valve and pit 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 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. For more information, see Attaching a security seal to the completed connection in the Optional Riva Leak Sensor installation information.

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 a pit boxes.

Specification	
Part number	CFG-0900-003-002
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 water 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 the through-the-lid remote antenna

1. Thread the remote antenna connector and cable through the pit lid hole. Verify 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 the through-the-lid remote antenna module

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, follow the installation instructions (Installing the OpenWay Riva Water Pit Module).

Remote antenna installation is complete.

Chapter 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**: Itron cable armor is stainless steel and may have sharp edges. Use caution when you are installing the cable armor.

Important: 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 the Itron cable armor

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.

⚠ **Warning**: 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.

⚠ **Warning**: You must continue to twist the cable armor onto the cable protected by the electrical tape. If you do not twist the cable armor over the protected portion of the cable, you could initiate a cut cable and cause and pit module/register communication failure.

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

Chapter 6 Connecting the Inline Connector

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

1. Remove the protective plastic cover from the module.

   ⚠ **Caution**: Verify the connector halves are clean and dry before assembly.

   Note: 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. 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.

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

Note: For future meter or pit module servicing, break the security seal by pulling the seal apart. The original protective connector covers 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).

⚠ **Caution**: Shield connectors with protective environmental covers (for more information, see Pit Module Mounting Accessories). Do not leave an exposed connector in the field.

Note: Environmental caps employ multiple seals to increase cap life. Environmental cap design allows utilities to install the pit module and install a Riva Leak Sensor or optional remote antenna at a future date.

Chapter 7 Troubleshooting

This information is provided to help you troubleshoot issues related to the OpenWay Riva Water 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.	An pit module that is not programmed will not transmit an SCM or SCM+ message. Reprogram the pit module and perform a reread. If an pit module is not initially programmed, it will not bubble-up and listen for an SCM/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 water pit module location (for example, an 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 by pressing and holding buttons A and B until the screen fades. Release the buttons and allow the handheld to reboot.