Bullhorn® Monitoring

RM3000 Series

User Guide

American Innovations

Proven compliance solutions.
Relentless service.

American Innovations | www.aiworldwide.com | 12211 Technology Blvd | Austin, TX 78727

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Getting Started

This guide explains how to install and configure Bullhorn RM3000 Series units, including the RM3011, RM3012, and RM3250, for service. This guide includes instructions for installing and configuring units, optional equipment that is available to be installed with select units, technical specifications for different unit types, and other related information.

This chapter includes the following topics:

RM3011 Unit Overview

The RM3011 is capable of collecting and reporting register readings for equipment located in remote areas, including compressors and electronic flow meters (EFMs). Additional functionality includes items in the following list:

- Reads shutdown codes, hour meter, and rpms on compressor annunciators. Also reads suction and discharge pressures if measured through the annunciator.
- Reads alarm conditions or shutdown codes without using a digital dry contact by polling the annunciator and looking for changes in the shutdown codes.

- The RM3011 transmits data using the SkyWave-Inmarsat satellite network. To view a SkyWave-Immarsat satellite coverage map, visit the SkyWave-Immarsat website at http://www.inmarsat.com.
- The RM3011 collects and transmits register readings for equipment located in remote areas (such as compressors) to your account on Bullhorn Web.
- Registers: supports up to sixteen 6-digit registers, eight 12-digit registers, or a combination of both.
- DTR output: supports an optional DTR output (data terminal ready) for devices that require a handshake signal from the RM3011.
- Alarm input: supports an optional alarm input for devices that support an alarm output.

NOTE: The RM3011 transmits data using the SkyWave-Inmarsat satellite network. To view a SkyWave-Immarsat satellite coverage map, visit the SkyWave-Immarsat website at http://www.inmarsat.com.

IMPORTANT: To ensure consistent communication with the satellite, the enclosure *must* be pointing in the direction of the satellite with no obstructions between the two, such as buildings, trees, or hills.

RM3012 Unit Overview

The BullhornRM3012 remote monitoring units accurately, regularly, and reliably calculate gas or liquid volume by measuring the digital pulse output or querying MODBUS or Mercury registers via RS232 from a positive displacement (PD), gas, or lease automatic custody transfer meter (LACT). Meter readings are automatically uploaded via cellular communications to Bullhorn Web, where they can be used to calculate the volume of gas delivered to customers, optimize the system, and/or populate a gas measurement database. The RM3012 is a fully-integrated unit that is easily installed. All components, including the antenna, are internal. This design makes it easier to transport, install, and maintain. The RM3012 can be installed either as a stand alone device, installed with an attached index, or installed on an existing index using an adapter.

The RM3012 is housed in a NEMA-rated weatherproof enclosure that measures 7" x 5" x 5". The unit transmits data to Bullhorn Web using the SkyWave-Inmarsat satellite network and includes the following product specifications:

- Data collection: collects and transmits register readings for equipment located in remote areas (such as compressors).

- Registers: supports up to sixteen 6-digit registers, eight 12-digit registers, or a combination of both.
- DTR output: supports an optional DTR output (data terminal ready) for devices that require a handshake signal from the RM3012.
- Alarm input: supports an optional alarm input for devices that support an alarm output.
- Reads shutdown codes, hour meter, and rpms on compressor annunciators. Also reads suction and discharge pressures if measured through the annunciator.
- Includes a backup battery in case of power loss from the compressor. The backup battery allows the unit to continue to monitor the compressor as well as to send alarms until the battery is drained. These alarms include when power is lost and when it is restored. For more information on the backup battery, including how to replace it, refer to *Battery Replacement*.
- An LED light, located below the power switch, indicates when messages are being sent or if the unit is low on power. During normal operation, the LED light remains on. However, the LED flashes on and off if the unit is idle, sending messages, or if the battery power is low.

NOTE: The RM3012 transmits data using the SkyWave-Inmarsat satellite network. To view a SkyWave-Immarsat satellite coverage map, visit the SkyWave-Immarsat website at http://www.inmarsat.com.

IMPORTANT: To ensure consistent communication with the satellite, the enclosure *must* be pointing in the direction of the satellite with no obstructions between the two, such as buildings, trees, or hills.

RM3250 Unit Overview

The RM3250 is housed in a weatherproof enclosure that can be easily installed and configured. The RM3250 is designed primarily for metering applications and supports two-way communication with Bullhorn Web through a GSM cellular network.

Figure 1-1. RM3250 Enclosure

The RM3250 unit automatically read meters to accumulate and report pulse counts. The unit utilize cellular networks for two-way communication with Bullhorn Web, a cloud-based asset manager where readings can be monitored. Reports and extracts are also available through the Bullhorn Web account to view the data from the units.

The RM3250 is a fully-integrated unit that can be mounted alone or on top of a meter. The RM3250 supports Modbus RTU protocols. All components, including the antenna, are internal to make it easier to transport, install, and maintain.

The RM3250 supports 10 registers and 1 digital contact closure/accumulator input. The RM3250 inputs can be measured and configured locally using the Bullhorn Tools software on a laptop, using a Bluetooth connection. Bullhorn Tools software is available for download from the Bullhorn Tools launch page. Refer to *RM3250 Technical Specifications on page 94* for more details on the inputs.

The input connections and battery placement for the RM3250:

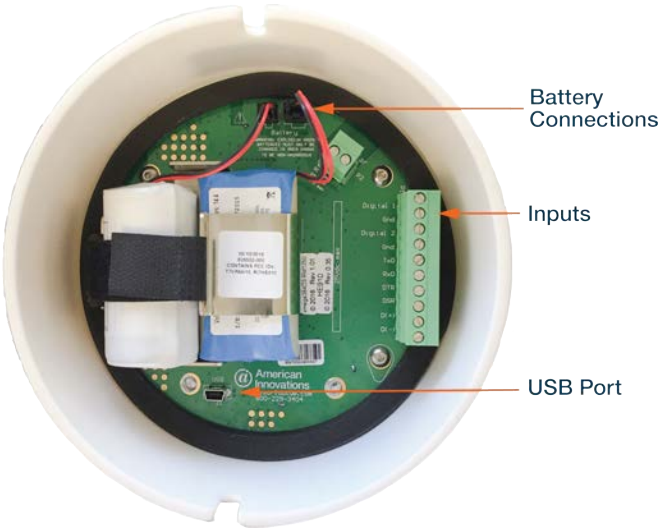

Figure 1-2. RM3250 Inputs and Batteries

NOTE: The battery is the only field-serviceable item in the RM3250.

After installation, the RM3250 can be configured with the Bullhorn Tools configuration software on a laptop, using a Bluetooth connection. Bullhorn Tools can display reading, set up transmission schedules, set alarms, send a test message, or send an email to Technical Services. Refer to *Configuring the RM3250 with Bullhorn Tools Software on page 74* for more information on using Bullhorn Tools.

NOTE: Because of the variations in customer's installation and grounding methods, AI cannot warranty any damage to equipment caused by lightning strikes.

Bullhorn System Overview

Bullhorn is a wireless telemetry system that provides scheduled and by-exception inbound reporting for field equipment typically located in remote areas. Data and alarm packets transmit from remote field locations to your account on the secure Bullhorn Web using digital cellular or satellite communication networks. You can quickly determine the status of field equipment anytime using information that posts to your website account.

The Bullhorn system provides remote monitoring with full coverage using GSM cellular network, GEOS satellite (SkyWave-Inmarsat), or LEOS satellite (ORBCOMM) communication networks.

Installing Conduit

If a remote monitoring unit is installed outside the rectifier, or if wires are to be buried or covered,

ensure that conduit is used to protect the wiring from physical damage, electrical interference, or weather.

The conduit should not be greater than 1/2" in diameter. Conduit is provided by the customer.

Required Tools and Equipment

The following tools and equipment are required for installing and configuring the unit for service:

- anti-static wrist strap
- magnet
- small slotted screwdriver
- small Phillips head screwdriver
- wire stripper
- wire cutter
- voltmeter
- adjustable wrench
- socket or open end wrench set
- compass
- waterproof sealing tape
- 1/2” wide Teflon tape
- configuration cable (provided in installation kit; standard mini USB cable typically used with most digital cameras)
- Optional: mounting hardware (appropriate type for mounting surface; supplied by customer)
- Optional: appropriate tools for preparing the mounting surface for installation (such as a hand drill and metal, masonry, or wood drilling bit)

Required Hardware and Software

To configure an RM3000 Series unit in the field using a laptop computer or mobile device, you will need the following hardware and software specifications:

- Pentium processor or equivalent with USB port
- 2 GB RAM (minimum)
- 400 MB free hard drive space
- Spare USB port
- Microsoft Windows operating system — Windows 10; XP with Service Pack 2 or 3; Vista Home Premium, Business, or Ultimate with Service Pack 1 or higher; or Windows 7 Home Premium, Professional, or Ultimate
- For the RM3011 and RM3012 configuration:
  - Universal Configuration Toolkit software (provided in the installation kit)
  - Windows .NET Framework version 4.0 or higher (provided in installation kit)
  - USB device driver (provided in the installation kit)
  - Windows Internet Explorer version 8.0 or higher
  - Adobe Reader version 5.0 or higher
- For the RM3250 configuration:
  - smartphone or tablet (with Bluetooth), running either iOS 8 or Android 7
  - Bullhorn Tools (available from Bullhorn Tools launch page) or Bullhorn Tools Mobile (available from Apple App Store or Google Play)

Safety and Equipment Symbols

WARNING: If a Bullhorn remote monitoring unit is used in a manner not specified by AI, the protection provided for the equipment may be impaired.

The following table provides a description of various safety and equipment symbols. Safety symbols alert you to safety hazards or conditions that have the potential to cause personal injury, death, or equipment damage. Equipment symbols may indicate a functional state (such as on and off) and connections (such as a Earth ground terminal).

Table 1-1. Safety and Equipment Symbols

Symbol	Description
	**Caution** — Failure to observe this warning may result in personal injury, death, or equipment damage. A potential risk exists if the installation instructions are not followed.
	**Warning** — Risk of electrical shock. Failure to observe this warning may result in personal injury, death, or equipment damage. A potential risk exists if the installation instructions are not followed.
	**Earth (ground) terminal** — Indicates a protective earth ground connection is required.
	On (Supply) — Indicates power is on when the toggle switch is in the "ON" position.
	**Off (Supply)** — Indicates power is off when the toggle switch is in the "OFF" position.
	**DC power** — Indicates that the input requires DC power.
	**AC/DC** — Both direct and alternating current.
	**Positive** — Indicates a positive input. **Negative** — Indicates a negative input.

Electrostatic Discharge

Electrostatic Discharge (ESD) can damage electronic components. To prevent ESD damage when handling electronic equipment, always wear an anti-static wrist strap attached to an unpainted, grounded metal object. Ensure the wrist strap has maximum contact with bare skin. If an anti-static wrist strap is available, discharge static electricity from yourself and your clothing by touching a grounded metal object before handling electronic equipment.

Bullhorn Information Line

The Bullhorn Information Line is an automated attendant telephone system. It is typically used when installing units in the field. The system identifies when the last data transmission (or test packet) was received on your website account for a unit you specify.

Complete the following steps to use the Bullhorn Information Line:

1. Call the Bullhorn Information Line at **866-287-6739.**
2. Press **1** to access the packet log when prompted.
3. Use your telephone keypad to enter the unit serial number when prompted. The unit serial number is included on the bar code label on the unit. It is also included on the label of the shipping carton. If required, repeat this step to check another unit.

Technical Services

AI Technical Support is available to provide assistance with Bullhorn Remote Monitoring Units, accept feedback about Bullhorn Remote Monitoring Units, or discuss your organization's training needs. Use the following information to contact AI Technical Support:

Telephone:

1-800-229-3404

Email:

techservices@aiworldwide.com

Address:

American Innovations, Ltd.
Attn: AI Technical Support
12211 Technology Blvd.
Austin, TX 78727

2 RM3011 Installation

The RM3011 is housed in a NEMA-rated weatherproof enclosure that includes four magnets for quickly attaching the unit to a metal surface. The unit can also be mounted on a pole using additional hardware.

NOTE: To ensure consistent communication with the satellite, the enclosure *must* be pointing in the direction of the satellite with no obstructions between the two, such as buildings, trees, or hills.

This chapter includes the following topics:

Preparing to Install the RM3011

Use the following items as a checklist prior to installing the RM3011:

- Is the latest version of the UCT software installed on the computer you plan to use during the installation? For more information, refer to *Installing the UCT and Support Files on page 31*.
- To ensure uninterrupted service, the location you plan to install the satellite terminal must meet the following qualifications:
  - The area must be clear of all obstructions such as buildings, trees, and hills.
  - The satellite terminal must have a clear line-of sight pointing in the same direction as the satellite. To ensure consistent communication with the satellite, use the UCT software to determine which direction to point the satellite terminal.

NOTE: Because of the variations in customer's installation and grounding methods, AI cannot warranty any damage to equipment caused by lightning strikes.

Mounting the RM3011

The RM3011 enclosure is shipped with four mounting magnets. The enclosure is typically mounted on top of the compressor, with the enclosure sitting face-up. The enclosure can also be mounted to the side of the compressor.

Figure 2-1. RM3011 Enclosure (Bottom) with Magnetic Mounts

Optionally, the enclosure can be mounted on a pole with additional hardware. Please contact Technical Services for ordering and installation information.

Installing the RM3011

The following steps provide an overview of a typical installation and set up for an RM3011.

1. Mount the RM3011 enclosure using the mounting magnets or alternative mounting hardware.
2. Connect devices to the unit. Refer to *Connecting Devices to the RM3011 on page 11* for details.
3. Start Universal Configuration Toolkit software and configure the RM3011 for service.

Connecting Devices to the RM3011

NOTE: To ensure a clean, stable reading, keep field wiring as short as possible and use shielded twisted pair wire such as Alpha 2463C.

The RM3011 is connected to the oil sensor switch, annunciator, and a DC power source with the circular 9-pin cable assembly, which is shipped with the unit.

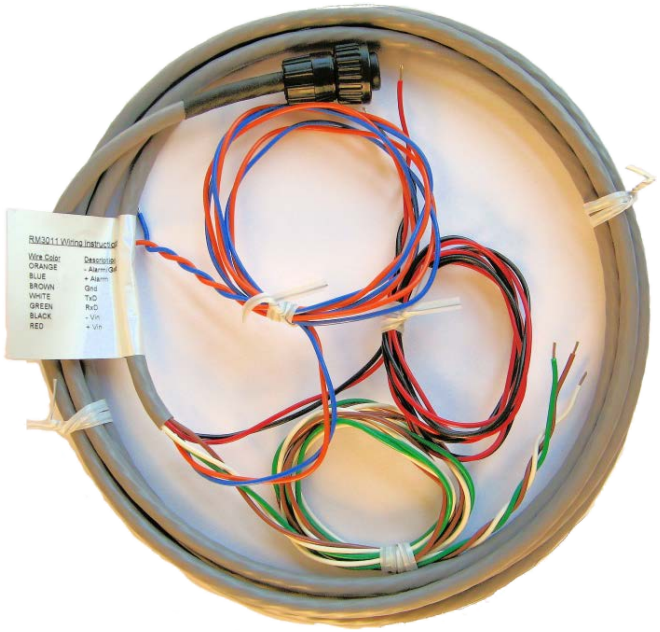

Figure 2-1. Circular 9-Pin Cable Assembly

The cable assembly is labeled with wiring descriptions to help with the installation of the oil sensor switch, annunciator, and DC power.

Table 2-1. Circular 9-Pin Cable Assembly Wiring

Front Panel Pin	Wire Color	Description
3	Orange	-Alarm/GND
4	Blue	+Alarm
5	Brown	Gnd (ground)
1	White	TxD
2	Green	RxD
8	Black	-Vin (voltage in)
9	Red	+Vin (voltage in)

Complete the following steps to connect the devices to the RM3011:

1. Splice the oil line into the compression tee. Secure the line by tightening the end bolts.

Figure 2-2. Compression Tee

2. Wrap Teflon tape around the oil sensor threads.
3. Attach the oil sensor switch to the compression tee.

Figure 2-3. Oil Pressure Sensor Switch

4. If needed, connect spade lugs to the alarm wires (blue/orange) for connection to the oil sensor switch terminals.
5. Connect alarm wires to the oil sensor switch terminals.
6. If applicable, connect the receive/transmit/ground wires (white/green/brown) to annunciator.
7. For Altronic annunciators, connect the receive/transmit/ground wires to the screw terminals of the DB-9 adapter, using the following connections:
    a. Connect green wire to wire terminal marked **RXD** (2).
    b. Connect white wire to the screw terminal marked **TXD** (3).
    c. Connect ground (brown) wire to the screw terminal marked **GND** (5).

Figure 2-4. Annunciator DB-9 Adapter

8. Connect voltage wires (black = negative; red = positive) to DC source on compressor (requires 12-36Vdc input).

   Connect the voltage wires from the 9-pin cable assembly to the non-switched side of the power strip of the compressor or to a continuous power source. This will ensure that power to the RM3011 is not interrupted if the compressor shuts down.

9. Line up notch on the circular 9-pin connector to the 9-pin connector on the RM3011. Secure connector by tightening coupling ring until it clicks in place.

Figure 2-5. RM3011 9-Pin Connector and USB Port

Continue with *RM3011 Configuration on page 34* to configure the RM3011 for service.

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RM3012 Installation

The RM3012 is housed in a NEMA-rated weatherproof enclosure that includes four magnets for quickly attaching the unit to a metal surface. The unit can also be mounted on a pole using additional hardware.

NOTE: To ensure consistent communication with the satellite, the enclosure *must* be pointing in the direction of the satellite with no obstructions between the two, such as buildings, trees, or hills.

This chapter includes the following topics:

Preparing to Install the RM3012

Use the following items as a checklist prior to installing the RM3012:

- Is the latest version of the UCT software installed on the computer you plan to use during the installation? For more information, refer to *Installing the UCT and Support Files on page 31*.
- To ensure uninterrupted service, the location you plan to install the satellite terminal must meet the following qualifications:
  - The area must be clear of all obstructions such as buildings, trees, and hills.
  - The satellite terminal must have a clear line-of sight pointing in the same direction as the satellite. To ensure consistent communication with the satellite, use the UCT software to determine which direction to point the satellite terminal.

NOTE: Because of the variations in customer's installation and grounding methods, AI cannot warranty any damage to equipment caused by lightning strikes.

Mounting the RM3012

The RM3012 enclosure is shipped with four mounting magnets. The enclosure is typically mounted on top of the compressor, with the enclosure sitting face-up. The enclosure can also be mounted to the side of the compressor or other metal surface.

Figure 3-1. RM3012 Enclosure (Bottom) with Magnetic Mounts

NOTE: Optionally, the enclosure can be mounted on a pole with additional hardware. Please contact Technical Services for ordering and installation information.

Installing the RM3012

The following steps provide an overview of a typical installation and set up for an RM3012.

1. Mount the RM3012 enclosure using the mounting magnets or alternative mounting hardware.
2. Connect devices to the unit. Refer to *Connecting Devices to the RM3012 on page 16* for details.
3. Start Universal Configuration Toolkit software and configure the RM3012 for service.

Connecting Devices to the RM3012

NOTE: To ensure a clean, stable reading, keep field wiring as short as possible and use shielded

twisted pair wire such as Alpha 2463C.

The RM3012 is connected to the oil sensor switch, annunciator, and a DC power source with the circular 9-pin cable assembly, which is shipped with the unit. The cable assembly is 20 feet long.

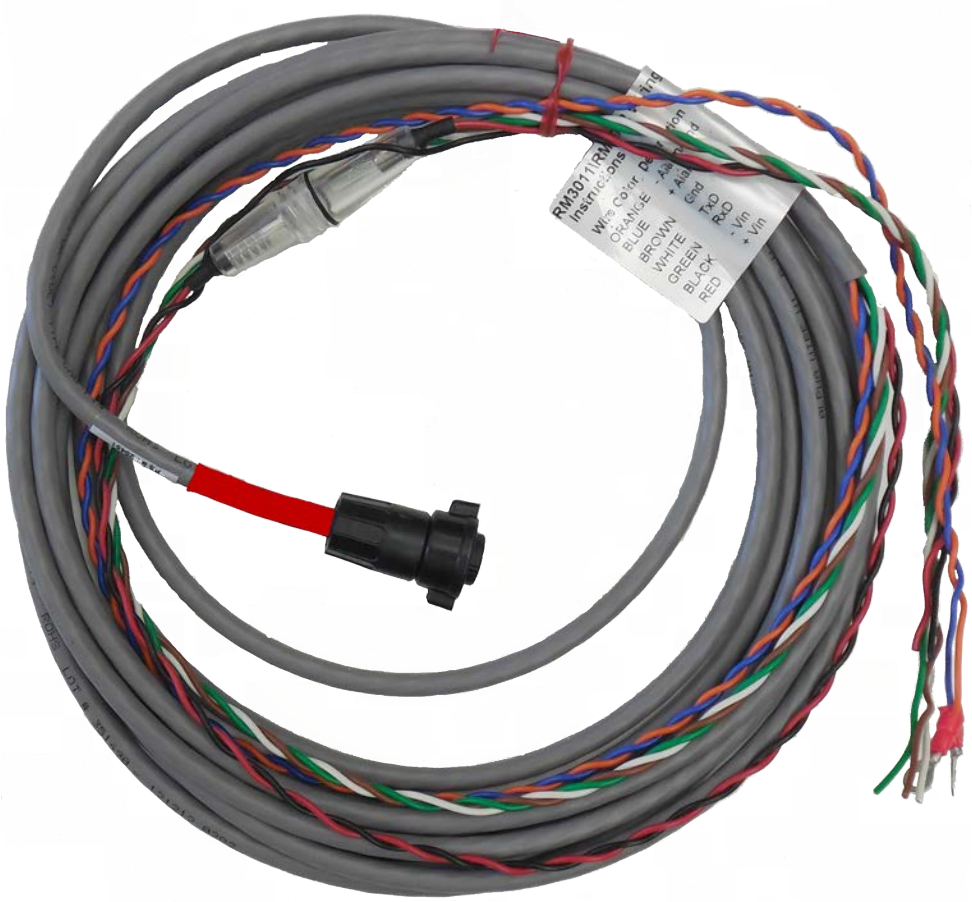

Figure 3-1. Circular 9-Pin Cable Assembly

The cable assembly is labeled with wiring descriptions to help with the installation of the oil sensor switch, annunciator, and DC power.

Table 3-1. Circular 9-Pin Cable Assembly Wiring

Front Panel Pin	Wire Color	Description
3	Orange	-Alarm/GND
4	Blue	+Alarm
5	Brown	Gnd (ground)
1	White	TxD
2	Green	RxD
8	Black	-Vin (voltage in)
9	Red	+Vin (voltage in)

Complete the following steps to connect the devices to the RM3012:

1. Splice the compressor oil line into the compression tee. Secure the line by tightening the end compression fittings.

Figure 3-2. Compression Tee

2. Wrap Teflon tape around the oil sensor threads.
3. Attach the oil pressure sensor switch to the compression tee.

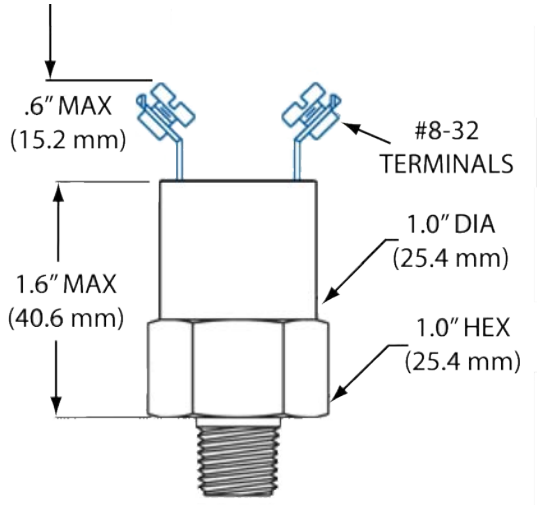

Figure 3-3. Oil Pressure Sensor Switch

4. If needed, connect spade lugs to the alarm wires (blue/orange) for connection to the oil pressure sensor switch terminals.
5. Connect alarm wires to the oil pressure sensor switch terminals.
6. If applicable, connect the receive/transmit/ground wires (white/green/brown) to annunciator.
7. For Altronic annunciators, connect the receive/transmit/ground wires to the screw terminals of the DB-9 adapter, using the following connections:
   a. Connect green wire to wire terminal marked **RXD** (2).
   b. Connect white wire to the screw terminal marked **TXD** (3).
   c. Connect ground (brown) wire to the screw terminal marked **GND** (5).

Figure 3-4. Annunciator DB-9 Adapter

8. Connect voltage wires (black = negative; red = positive) to DC source on compressor (requires 12-36Vdc input).

   Connect the voltage wires from the 9-pin cable assembly to the non-switched side of the power strip of the compressor or to a continuous power source. A backup battery will provide temporary power to the RM3012 if the compressor or other power source shuts down.

9. Line up notch on the circular 9-pin connector to the 9-pin connector on the RM3012. Secure connector by tightening the wing nut ring until it clicks in place. The RM3012 powers on as soon as a connection is made with the connector pins.

Figure 3-5. RM3012 Front Panel Features

The LED light located below the 9-pin connector will begin to flash on and off if you do not connect and power on an external DC power source to the RM3012. The RM3012 will use the internal battery, and the LED will continue to flash (except when transmitting when the light remains on), until a DC power source is supplied. Refer to *Battery Replacement on page 91* for instruction on how to replace the internal backup battery.

Continue with *RM3012 Configuration on page 53* to configure the RM3012 for service.

4

RM3250 Installation

The RM3250 is typically installed on a flat base and connected to an index or other pulse device. Alternate mounting options and accessories are available for purchase. Contact the American Innovations Sales team at sales@aiworldwide.com.

For technical details on the input ratings, accessories, and part numbers, refer to *RM3250 Technical Specifications on page 94*.

IMPORTANT: If the RM3250 is used in a manner not specified by American Innovations, the protection provided by the equipment may be impaired.

This chapter includes the following topics:

Pre-installation Notes

Before you install an RM3250, use the following information as a checklist to ensure a successful installation:

Power Disconnect and Branch Circuit Protection — A customer-supplied, power disconnect device is required for the unit installation. The power disconnect device (such as a switch, main circuit breaker, or other type of power disconnect) should provide an easy and accessible means for removing the main input supply power source from the unit. Multiple-pole circuit breakers shall interrupt all neutral and ungrounded connectors of mains supply simultaneously. The power disconnect device must be clearly marked to identify it as the disconnect device for the unit. The power disconnect or separate overcurrent protection device should also provide overcurrent protection in the form of a 20 amp fuse or circuit breaker suitable for branch circuit protection per local codes and requirements.

Backup Battery — Please contact Sales for information about purchasing a replacement battery (American Innovations part number 517206-000).

Wiring Requirements — For optimum protection from transient voltages, all analog inputs must be in their own multi-conductor jacket cable (such as cable AI part number 211061-000 - Belden 5308UE, or its equivalent). All cables must have intact outer jackets, except for end cuts. Do not remove cable jackets as they protect the unit input cable from transient voltages. Cable insulation should be suited for voltage range of inputs. Cables should be rated at a minimum of 600 V and 105° C.

Input Channel Voltage Levels — All input channels are marked with acceptable input voltage ranges. Ensure that devices connected to the RM3250 units fall within the voltages ranges listed next to the channel input connections.

Mounting the Enclosure — Choose an area that provides enough room to easily access the unit or to perform routine maintenance after completing the installation.

Preparing to Install the RM3250

WARNING: Only accessories that meet American Innovations specifications may be used with the RM3250. Refer to *RM3250 Technical Specifications on page 94* for a list of approved accessories.

Use the following items as a checklist prior to installing the RM3250:

1. For information regarding safety symbols found on the unit, refer to *Safety and Equipment Symbols on page 7*.
2. Ensure that the latest version of Bullhorn Tools or Bullhorn Tools Mobile is installed on the computer or mobile device that you plan to use to configure the unit. Bullhorn Tools can be downloaded from the Bullhorn Tools launch page. For more information, refer to *RM3250 Configuration on page 73*.

RM3250 Enclosure Dimensions

The RM3250 is designed for easy installation and configuration. The unit is housed in a dome enclosure and fits onto a customized base. The dimensions of the unit dome enclosure are shown below.

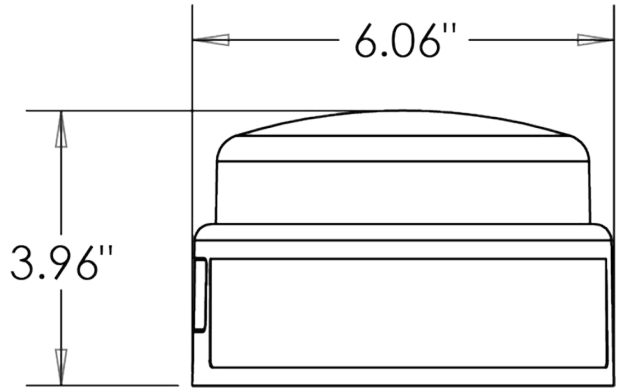

Figure 4-1. RM3250 Enclosure Dimensions

Before installing the unit, ensure that the area around the installation site provides enough working space to easily access the unit to wire inputs, configure the unit for service, or perform routine maintenance.

Installing the RM3250

IMPORTANT: Electrostatic Discharge (ESD) can damage electronic components. Provide ESD protection by wearing an anti-static wrist strap attached to any unpainted metal surface before accessing the unit or handling electronic parts. If an anti-static wrist strap is unavailable, discharge static electricity from yourself and your clothing by touching a nearby metal surface before accessing the unit or handling electronic components.

The following section explains how to install the RM3250 with the flat base. For alternative installation options, please contact Technical Services (techservices@aiworldwide.com).

NOTE: To ensure a clean stable reading, keep field wiring as short as possible and use shielded twisted pair wire such as Alpha 2463C. American Innovations recommends using AI part number 211061-000 (Belden 5308UE), or equivalent, for wiring inputs.

Complete the following steps to install the RM3250:

1. Attach the flat base to a mounting bracket (either an existing bracket or the optional adjustable bracket).

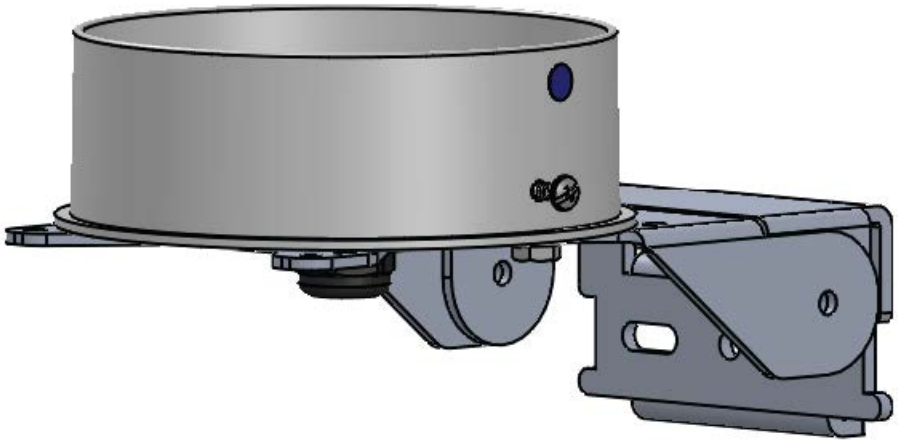

Figure 4-1. RM3250 Flat Base and Adjustable Mounting Bracket

2. If necessary, mount assembly to a structure, such as a pole, which is near the external device.
3. Bring the wires connecting the external device up through the bottom of the flat base.
4. Connect the external device to the 10-pin terminal.
5. Connect the 10-pin terminal to the corresponding connection on the RM3250.

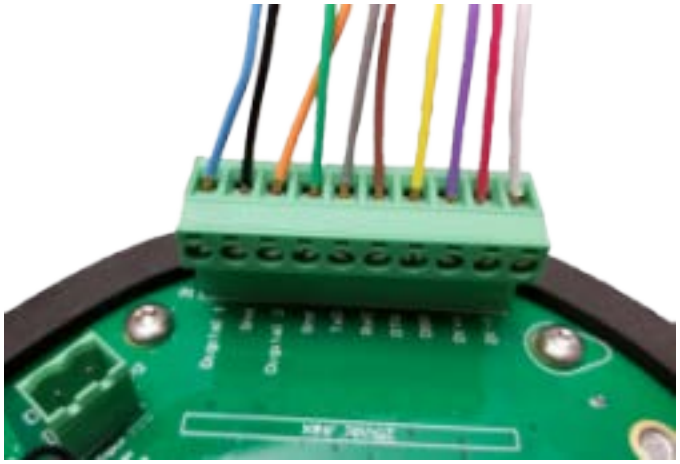

Figure 4-2. RM3250 10-pin Terminal and Connection

6. Install the batteries into the bracket inside the RM3250. Secure with strap.

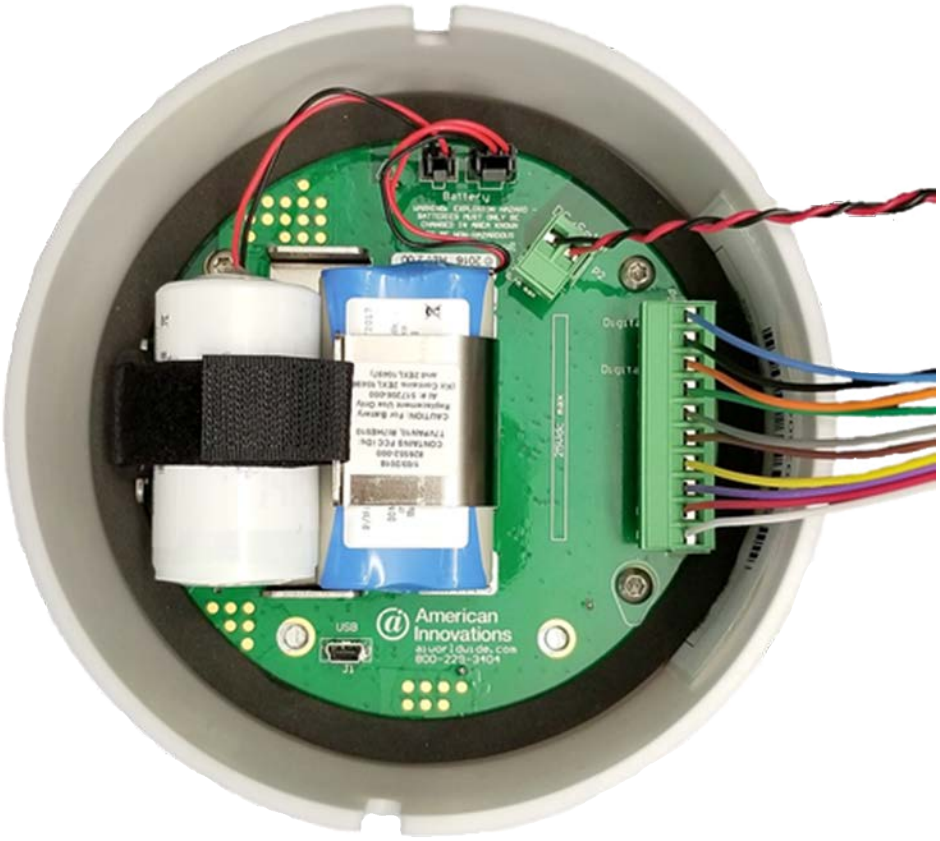

Figure 4-3. Battery Bracket and Battery Placement (wired with optional Solar connection)

7. Connect the two battery connectors to the battery connections on the RM3250 board.

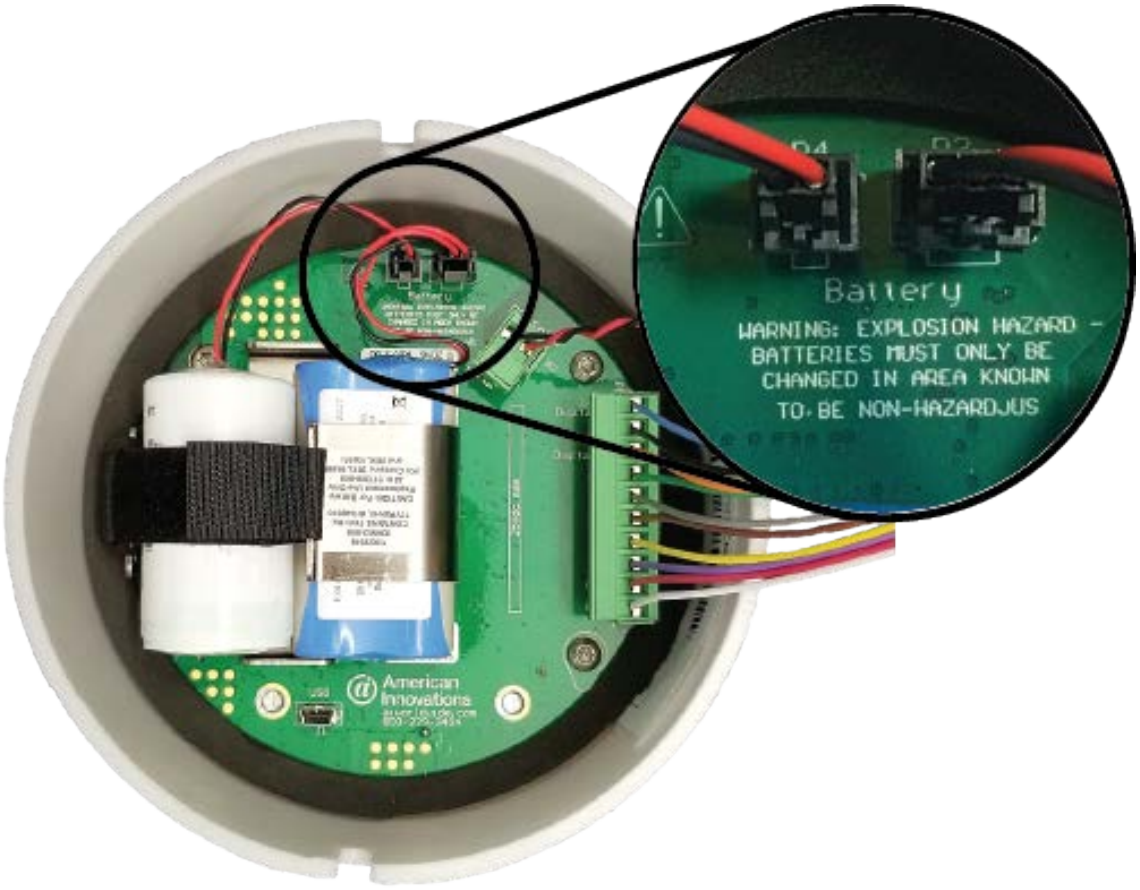

Figure 4-4. Battery Connections

a. Connect the larger, round battery to the **P4** connection.

b. Connect the bundled pair of batteries to the **P3** connection.

Once the batteries are connected to the unit, a Startup packet is sent to yourBullhorn Web account.

8. Place the RM3250 unit onto the base. Align the cut-out below the Bullhorn label on the dome to the screw (next to blue dot) on the base.

If you plan to configure the unit using a USB 5-pin mini-b cable instead of Bluetooth, **do not place the unit on the flat base**. Configure the unit first and then secure the unit on the base. Refer to *RM3250 Configuration on page 73* for configuration instructions. Otherwise, continue with next step.

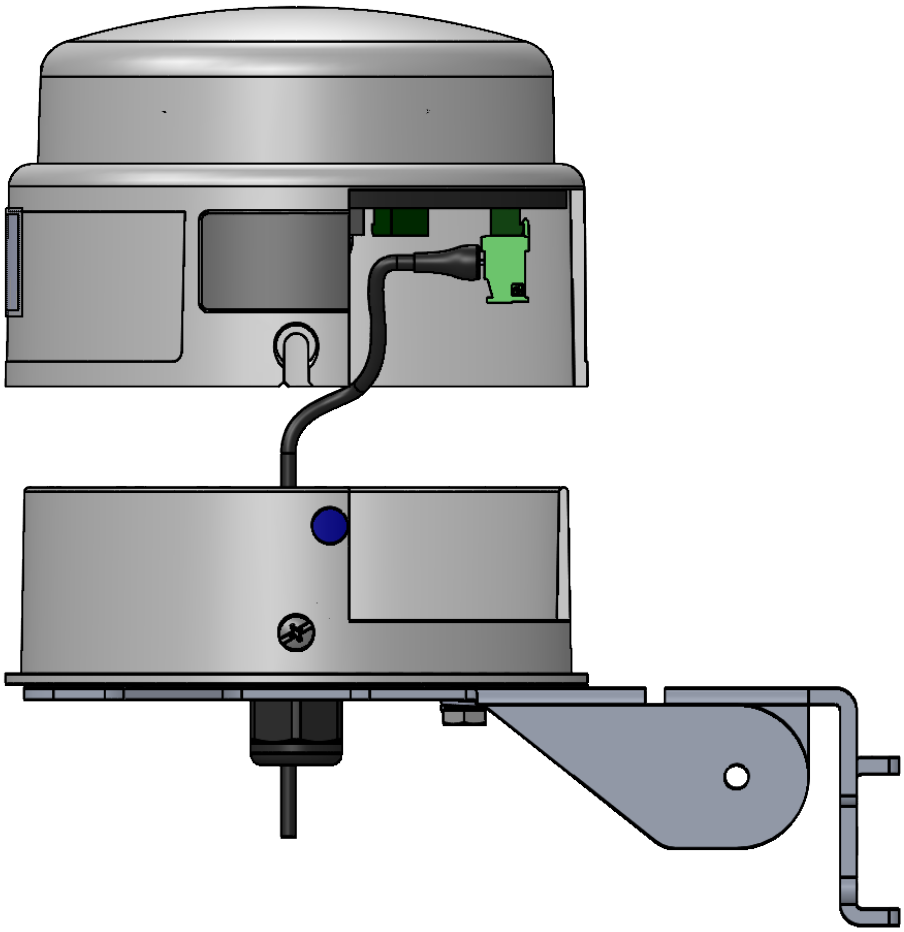

Figure 4-5. RM3250 Aligned to Base

9. Optionally, you can test the satellite signal before completing the installation. Refer to *Testing Satellite Reception on page 27* and then continue with the next step.

10. Secure the unit by tightening the screws. Torque the dome screws and fitting to the following measurements:

    - dome screws - 10-12 in-lbs.
    - cord grip body - 60 in-lbs.
    - cord grip gland nut - 30 in-lbs.

    Do not twist the dome on the base if the cut-outs do not line up with the screws. Lift the dome off of the adapter and replace it in the correct position.

    Only if using AC power — turn rectifier **ON** to restore power to field wiring.

Continue with *RM3250 Configuration on page 73* to configure the RM3250 for service.

Testing Satellite Reception

Before completing the final installation, you can ensure that the RM3250 has adequate satellite signal to communicate with the Bullhorn Web account using Bullhorn Tools - either the software version or the mobile app. If reception is minimal, the unit may not be able to send information to . The **Radio SNR** reading should be at least 40 dB for a stable communication link with the satellite. If this reading falls below 37 dB, contact *Technical Services on page 9* for instructions. You can also email Technical Services by tapping ⓘ in Bullhorn Tools Mobile, which will include unit information and a log file with your email.

NOTE: For instructions on how to use the Bullhorn Tools software on a laptop to verify signal strength, refer to *RM3250 Configuration on page 73*.

1. Activate the unit by swiping a magnet across the access point on the unit (marked with an arrow on the enclosure). A red light flashes to indicates that the unit is waiting to pair with your device.

Figure 4-1. RM3250 Access Point - Activated

2. Depending on whether you are using Bullhorn Tools on a mobile device or on a laptop, ensure that one of the following has been completed:
   a. Bluetooth is enabled on your iOS device.
   b. The AI USB Bluetooth dongle has been plugged into your laptop's USB port.
3. Open Bullhorn Tools and connect to the unit. The unit name includes the unit serial number (**S/N**), which can be found on the Bullhorn sticker on the dome.

Figure 4-2. RM3250 Unit Label

4. Click or tap **Refresh** on the main window to update the **Radio SNR** reading. The Radio SNR reading should be at least **40 dB**.
5. Complete the final installation step of securing the unit to the bracket (return to *Installing the RM3250 on page 22*).

RM3250 Maintenance

If performing maintenance on the RM3250, first disconnect the equipment from hazardous voltages before gaining access to the enclosure.

5 Configuration Overview

Bullhorn RM3000 Series remote monitoring units can be configured for service using unit-specific configuration software. Depending on the unit type, you can use one (or sometimes two) of the following configuration software versions:

- *Universal Configuration Toolkit Software* — installed on your computer or laptop.
- *Bullhorn Tools Software on page 32* — installed on your computer or laptop.
- Bullhorn Tools Mobile — downloaded as an app to your mobile device running either iOS or Android.

The RM3000 Series units and the configuration software used to configure them are as follows:

- RM3011 and RM3012 units can be configured with the Universal Configuration Toolkit.
- RM3250 units can be configured with either Bullhorn Tools configuration software or with Bullhorn Tools Mobile.

Universal Configuration Toolkit Software

Universal Configuration Toolkit (UCT) is a software program you use to set and read the adjustable parameters of the unit. After installing the unit, you then configure it for service using the UCT software.

The UCT software also provides diagnostic tools for checking input channel measurements, RSSI level, and transmitting a test packet to confirm communications with Bullhorn Web.

The UCT software requires your computer be installed with Microsoft .NET Framework version 2.0 or higher. Also, your computer must be installed with the appropriate USB device driver. All three of these programs are included in the BATtools Suite Installer that was included in the installation kit.

You must log on as an administrator or your computer user name must be a member of the Administrators group in order to install the USB device driver. If needed, contact your network administrator or IT department to determine if your user name is setup with administrator rights or privileges.

BATtools Suite Installer

Before installing BATtools Suite Installer (includes UCT and support files), review the following information if a prior version of the software is installed on your computer. If a previous version of the UCT is not installed on your computer, continue with installing the software.

Everyone Installation Option If you installed a previous version of the UCT software using the **Everyone** option, the previous version must first be uninstalled prior to installing the new version.

Just Me Installation Option If you installed a previous version of the UCT software using the **Just Me** option, it is not necessary to uninstall the previous version prior to installing the new version.

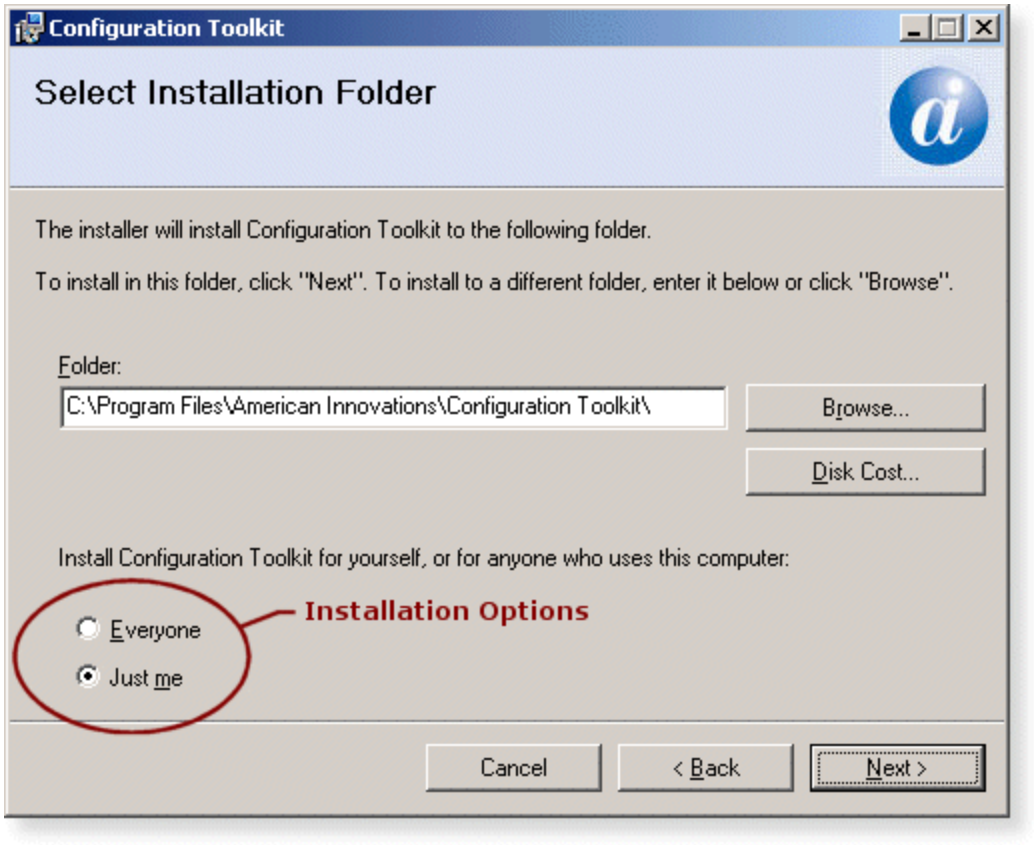

Figure 5-1. Just me Option for Configuration Toolkit

NOTE: If the installation media is unavailable, download the files from Bullhorn Remote Monitoring Units Downloads page.

Microsoft .NET Framework

Microsoft .NET Framework is a set of software components that enable your computer to run any software program that has been developed using Microsoft .NET technology. Your computer must be installed with Microsoft .NET Framework version 4.0 or higher in order to use

Bullhornconfiguration software. Microsoft .NET Framework is automatically installed during installation if the software detects that your computer does not already have it installed. For more information about Microsoft .NET Framework, visit the Microsoft website (http://www.microsoft.com).

USB Device Driver

The USB device driver is software that allows your computer to communicate with the Bullhorn unit via the USB configuration cable when configuring the unit for service. Installing the USB device driver is a one-time process and does not need to be repeated if you have already installed the driver on your computer. Once it is installed on your computer, it will work for any Bullhorn unit that includes a USB configuration port. The USB device driver should be installed prior to connecting the Bullhorn unit to your computer. If the USB device driver is not installed and you connect the Bullhorn unit to the USB port on your computer, Windows displays the "Found New Hardware" message and icon in the System Tray of your computer. Windows will then attempt to locate a suitable device driver already installed on your computer. Exit any open windows and then complete the procedure in the next section to install the USB device driver.

Installing the UCT and Support Files

To install the UCT, Microsoft .NET Framework, and USB driver using the BATtools Suite Installer:

IMPORTANT: In order to install the USB device driver on your computer, you must log on as an administrator or your computer user name must be a member of the Administrators group. If needed, contact your network administrator or IT department to determine if your user name is setup with administrator rights or privileges.

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1. Copy BATtools Suite Installer to your computer from the media included in the configuration kit or download the executable file from the Bullhorn Remote Monitoring Support Downloads page. Make sure that all files are extracted.
2. If necessary, open `BATtools.zip` file to extract all files.
3. Double-click the `BatToolsSuiteInstaller.exe` file to begin the installation.
4. Check the **Universal Config Tool** check box.
5. Check the **Silicon Laboratories USB to UART Driver** check box and the **Microsoft .NET Framework** check box, if available and unchecked. If either of these are already installed on your computer, a check box will not display next to the name.

   NOTE: The MicroMax Programmer is included in the BATtools Suite Installer. You will not

   ---

need to install this program.

6. Click the **Install** button.

   The battery and power cable does not need to be connected to the Bullhorn unit in order for Windows to recognize the Bullhorn USB connection. The Bullhorn USB connection draws power from the USB port on your computer.

7. Follow the prompts to install the programs.

Bullhorn Tools Software

Bullhorn Tools is a software program you use to set and read the adjustable parameters of the unit after the unit has been installed. Bullhorn Tools also allows you to set alarms and transmission schedules or transmit a test packet to confirm communications with Bullhorn Web. Bullhorn Tools is available in a software version and as a mobile app. The software can be downloaded from the Bullhorn Tools launch page. The mobile app is available from the Apple App store or Google Play.

Refer to the unit's configuration section for instructions on using Bullhorn Tools.

NOTE: Bullhorn Tools requires a minimum of 194MB of hard disk space.

To install the software for the first time, complete the following steps:

1. Use the Bullhorn Tools launch page to download Bullhorn Tools.
2. Click **Launch**.
3. Depending on your browser, either click **Run** (or **Save** to save the file to you computer) or double-click the downloaded *setup.exe* file. The software installs and launches.
4. To start Bullhorn Tools after installation, click the Bullhorn Tools desktop icon or click Windows Start menu and select Bullhorn Tools.

After you have successfully installed and opened Bullhorn Tools, whenever you open Bullhorn Tools in the future, it automatically updates when updates are available. You will not need to download and install new versions of Bullhorn Tools to the computer where Bullhorn Tools has been installed.

Bullhorn Tools Mobile App

Bullhorn Tools Mobile is the mobile version of the Bullhorn Tools configuration program. The mobile app gives you the ability to configure remote monitoring units using your mobile device

running either iOS or Android. Only remote monitoring units with Bluetooth capability can use the mobile app.

Bullhorn Tools Mobile can be downloaded from Apple iTunes store (iOS) or Google Play (Android).

6 RM3011 Configuration

RM3011remote monitoring units units are configured for compressor application during production. The RM3011 is shipped with the Universal Configuration Toolkit (UCT), which is used to verify the Skywave signal level, set up input channels for an annunciator, and to send test packets.

For information on how to upgrade the unit firmware, refer to *Updating RM3011 Firmware on page 87*.

RM3011 Configuration Overview

The RM3011 configuration process includes the following tasks:

Connecting the RM3011 and Starting UCT

Complete the following steps to begin the configuration process:

1. Connect the configuration cable in the USB port of your computer. Connect the other end of the cable in the **USB CONFIG** port on the front panel of the unit.
2. Double-click the UCT program icon on the desktop to start the UCT software. Or click **Start** > **Programs** > **Configuration Toolkit**.
3. Select a unit in the drop-down list of the *Find Devices* window and then click **Select.**

Figure 6-1. Find Devices

4. The main configuration window displays. Press **F2** to read unit settings and verify that the unit and UCT software are communicating.

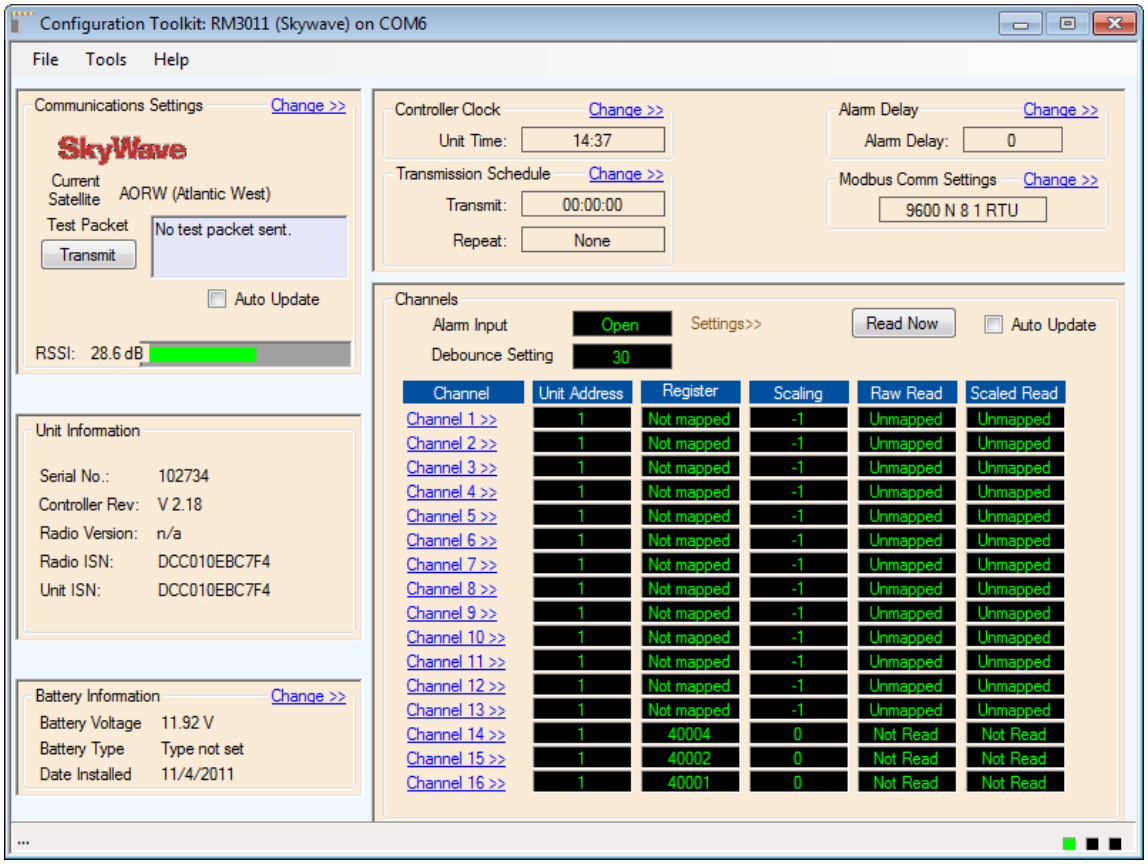

Figure 6-2. RM3011 Main Configuration Window

Selecting a Folder for Templates and Log Files

Templates and log files store in *My Documents* by default. If you want to store these files in a different folder on your computer, complete the following steps:

1. Click **Tools** > **Options** to display the *Options* window.
2. Click **Folder for Log files** to display the *Browse for folder* window.
3. Select an existing folder or click **Make New Folder** to create a new folder.
4. Click **Ok** and then click **Done** to close the window.

Loading a Template

If a template is available, load the template using the following steps:

1. Click **Tools** > **Advanced** > **Template** > **Load from Template**.
2. When the *Open Template* window displays, locate the folder that contains the template. Select the template and then click **Open**.
3. After UCT applies the template, press **F2** to read settings or click **Tools** > **Read Unit Settings**. Click **File** > **Save Current Setup in Event Log** to save settings.

Verifying Satellite Signal Strength

The signal strength of the SkyWave satellite for the RM3011 can be viewed in the *Communications Settings* box on the main configuration window.

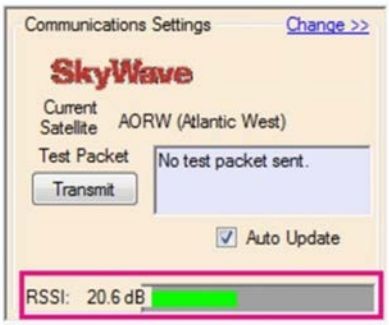

Figure 6-1. Satellite Signal Strength

The satellite signal strength is displayed in the RSSI field. The RM3011 uses an RSSI scale of 0.00dB to 50.00dB. If the signal strength is weak (less than 10.5 dB for more than 30 seconds), a pop-up message will display to notify the user. The pop-up window also includes a Satellite Wizard tool to help acquire a stronger signal.

Use the following information to verify that the RM3011 is receiving a strong satellite signal:

- Click **Auto Update** to display latest "live" RSSI reading.
- An RSSI of **14dB** or higher indicates a strong signal.
- Levels below 14dB indicate no satellite communication.
- A green status bar in the RSSI field indicates that satellites have been found.
- A red status bar in the RSSI field indicates that no satellites have been found.

If the RSSI signal is below 14dB or if the status bar is red, adjust the RM3011 enclosure and recheck the satellite signal strength.

Setting Up the Controller Clock

The controller clock is a time-of-day clock running inside the unit. It does not keep track of the month or year, or correct itself for daylight savings time. The unit uses the controller clock as a basis for all time-related operations.

Complete the following steps to set up the controller clock:

1. Click **Change** in *Controller Clock*.
2. Select a **Controller time** field. Use the up and down arrows to adjust the time. Repeat this step for remaining time fields as needed.

   Or, click **Set to PC Time** if your computer is set up with the correct date and time in *Windows Control Panel*.
3. If you want to match a time zone, click the up or down arrow in the **UTC Offset (h)** field to subtract or add hours from Coordinated Universal Time (UTC), which is the same as Greenwich Mean Time.
4. Click **Save** when finished.

Set Up Transmission Schedule

A transmission schedule determines when and how often channel readings are transmitted to your website account.

Complete the following steps:

1. Click **Change** in *Transmission Schedule*.
2. Select a field in the **Transmit report at** field. Use the up and down arrows to adjust the time. Repeat this step for remaining time fields as needed.
3. If you want to include a delay in the transmission schedule, click **Add Delay** to place a check mark in the check box.

   Add Delay is based on the unit serial number. The unit serial number is equivalent to the number of seconds added to the reporting time. This feature is typically used to offset the transmission schedule for several units set up with the same reporting time.
4. Choose a repeat interval option in the **And repeat every** drop-down list.
5. Click **Save**.

Setting Up an Alarm Delay

Complete the following steps to set up an alarm delay:

1. Click **Change** in *Alarm Delay*.
2. Type the number of seconds in the alarm delay field that indicates how much time should pass between recognized alarms.
3. Click **Save**.

Setting Up Alarm Input and Debounce Setting

Before setting up the alarm and Debounce setting, complete the following:

1. Click the **Read Now** button in *Channels* to read the value(s) of any input or register connected to the RM3011.
2. Click the **Auto Update** check box to have the values of inputs continuously updated.

Complete the following steps to set up alarms based on an input state and an optional Debounce setting:

1. Click **Settings** in *Channels* to display the *Digital Input State Trigger* window.

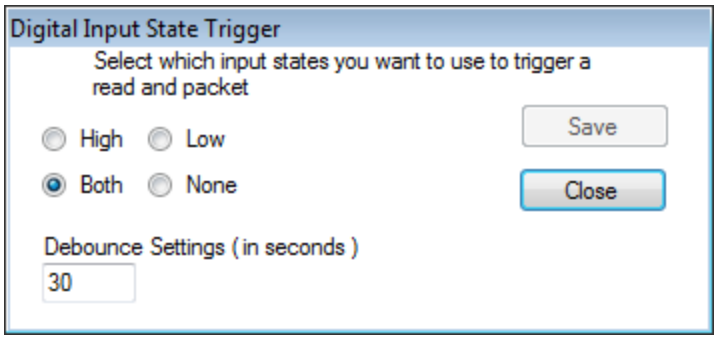

Figure 6-1. Input State Selection and Debounce Settings

2. Select one of the following options that specifies which digital input state should trigger an alarm packet transmission:
   - **High** (open)
   - **Low** (closed)
   - **Both** (High and Low)
   - **None**

3. If you want to include an optional Debounce setting in alarm settings, type the number of seconds the input switch must remain in an alarm state before the RM3011 transmits an alarm packet.

   If you want alarm states recognized immediately, enter zero (0) in the **Debounce Settings** field.

4. Click **Save**.

Setting Up Modbus Comm Settings

This procedure explains how to set up communication parameters for the RM3011 based on the type of input device connected to the unit.

Complete the following steps to set up the Modbus communication settings:

1. Click **Change** in *Modbus Comm Settings* to view the *Modbus Communication Settings* window.

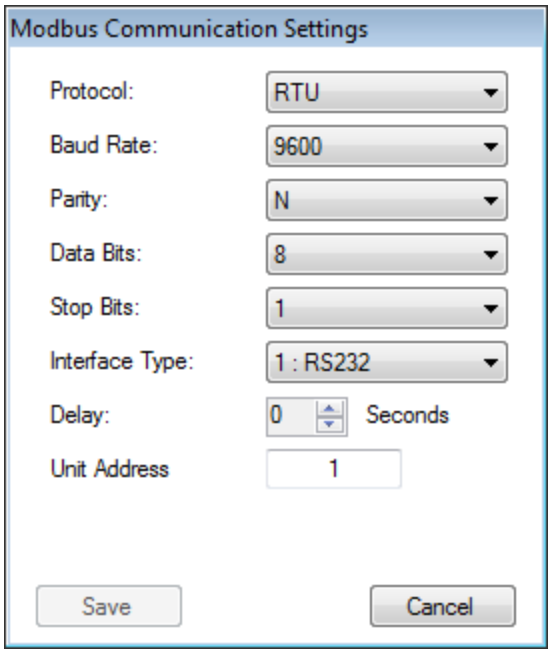

Figure 6-1. Modbus Communication Settings

2. Select a protocol from the list of options in the **Protocol** field that identifies the type of input device connected to the RM3011.

   If you are working with a Dresser input device, choose **Dresser I** if the input device was manufactured before 2005 or **Dresser II** if the device was manufactured after 2005.

   If needed, refer to the input device technical specifications or contact the manufacturer to determine the appropriate settings for the remaining steps in this procedure.

3. Select a Baud rate from the list of options in the **Baud Rate** field.
4. In the **Parity** field, select **N** (none), **E** (even), or **O** (odd).
5. In the **Data Bits** field, select either **7** or **8**.
6. In the **Stop Bits** field, select either **1** or **2**.
7. Verify **1:RS232** is selected in the **Interface Type** field.
8. If the input device requires a handshake signal from the RM3011, use the up and down arrows in the **Delay** field to choose a time option. Valid selections are in a range of 0 to 10 seconds with 0 indicating an instant response.
9. If you are working with a Modbus ASCII or RTU, Mercury, or Reynolds input device, complete one of the following steps:
    a. **Modbus ASCII or RTU:** Type the unit address assigned to the input device in the **Unit Address** field. Valid entries are any number from 1 to 255. Entering zero (0) disables this feature.
    b. **Mercury:** Select an option in the **Instrument Type** field that identifies the type of Mercury device connected to the RM3011.
    c. **Reynolds:** Type the unit identification number assigned to the Reynolds input device in the **Unit Id** field. Valid entries are any number from 1 to 255. Entering zero disables this feature.
10. Click **Save**.

Mapping Registers to Channels

The information in the following sections explain how to map registers to the input channels of the RM3011. Instructions for unmapping a register are provided in *Unmapping a Register on page 50*

The RM3011 supports up to sixteen 6-digit registers, eight 12-digit registers, or a combination of both. Registers are mapped to the RM3011 by clicking a particular channel number listed in the *Channels* group box on the main configuration window. Channels are labeled **Channel 1** through **Channel 16**.

If you plan to map one or more 12-digit registers, use only the odd-numbered *Channel* configuration windows (channel 1, 3, 5, and so on). These windows include an option labeled **Double Register** that refers to a 12-digit register.

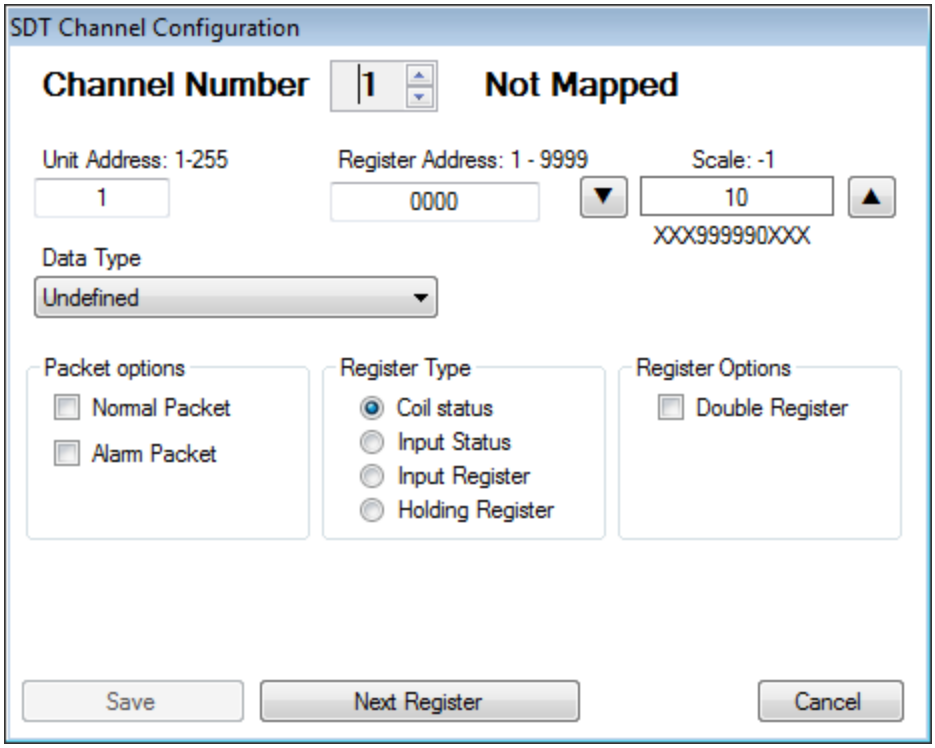

Figure 6-1. Channel 1 Configuration

The **Double Register** option is unavailable for selection on even-numbered *Channel* configuration windows. When an odd-numbered Channel is configured for a 12-digit register, the next even-numbered Channel on the main configuration window is unavailable for selection.

When mapping a register for a Modbus RTU or ASCII input device, you'll need to specify the register **Data Type** and **Register Type** in order for the RM3011 to correctly read the register. If you are working with a Mercury, Reynolds 16-bit, or Reynolds 32-bit input device, you only need to specify the register **Data Type**. The RM3011 does not require either type of information when working with a Dresser input device. If needed, refer to the technical specifications for the input device or contact the manufacturer to help determine the correct **Data Type** and **Register Type**.

Depending on the type of input device connected to the RM3011, map the registers using the instructions in the following sections:

- **Modbus ASCII or RTU** — If you are working with a Modbus ASCII or RTU input device, continue with *Mapping Registers for Modbus ASCII or RTU Input Device on page 43*.
- **Reynolds 16 or 32-Bit** — If you are working with a Reynolds 16- or 32-bit input device, continue with *Mapping Registers for Reynolds 16- or 32-Bit Input Device on page 45*
- **Mercury** — If you are working with a Mercury input device, continue with *Mapping Registers for Mercury Input Device on page 46*.

- **Dresser** — If you are working with a Dresser input device, continue with *Mapping Registers for Dresser Input Device on page 48*.

NOTE: If you need to unmap a register, refer to *Unmapping a Register on page 50*.

Mapping Registers for Modbus ASCII or RTU Input Device

Complete the following steps to map a register to a Modbus ASCII or RTU device:

1. On the main configuration window, click the channel number you want to configure. For example, click **Channel 1** to display a window similar to the example shown below.

   You can also display a channel configuration window by clicking **Tools > Settings > Channels**. When the window displays, click **Next Register** to display the channel number you want to configure. If you are mapping a 12-digit register, make sure to select an odd-numbered channel on the main configuration window.

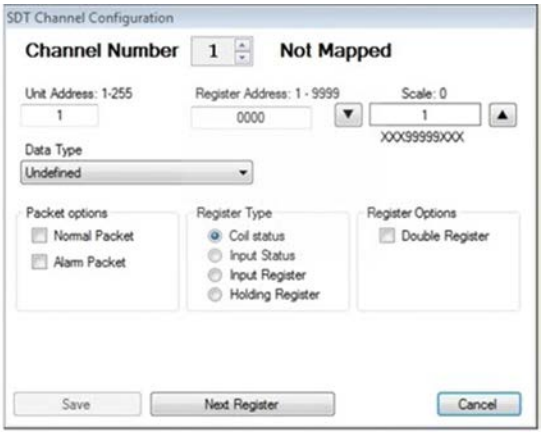

Figure 6-1. Modbus ASCII or RTU Configuration

2. Type the unit address assigned to the input device in the **Unit Address** text box. Valid entries are any number from 1 to 255. Entering zero (0) disables this feature.

3. Type the register address of the input device in the **Register Address** text box. Valid entries include any address from 1 to 9,999. Entering zero disables this feature.

4. Choose a scale value by clicking the up or down arrow buttons located next to the **Scale** text box. The up arrow moves the decimal to the left and the down arrow moves the decimal to the right.

   The scale value you select displays below the text box. It shows an example of how the selected scale value applies to the register reading. The process the RM3011 uses to scale a raw register readings is as follows:

- Divide the raw reading by the scale value.
- Select the first six digits to the left of the decimal point for a 6-digit register or the first twelve digits to the left of the decimal point if working with a Double Register (12-digit register).
- If necessary, add leading zeroes to the left of the number to produce either a 6-digit scaled reading or a 12-digit scaled reading if working with a Double Register.

If you are working with a 6 or 12-digit register and the scaled reading is larger than 6 or 12 digits respectively, the RM3011 reports a register reading of "999999". The Bullhorn website displays scaled readings according to the "multiplier" value you select on the website.

5. Click the arrow in the **Data Type** list box and select an option from the list that identifies the register data type.

   If needed, refer to the technical specifications for the input device or contact the manufacturer to help determine the correct data type. An incorrect data type causes the RM3011 to report an incorrect register reading.

6. Choose either a **Normal Packet** or **Alarm Packet** from **Packet Options**.

7. Identify the **Register Type** by clicking the **Coil Status**, **Input Status**, **Input Register**, or **Holding Register** option button.

   If needed, refer to the technical specifications for the input device or contact the manufacturer to help you determine the correct register type. An incorrect register type causes the RM3011 to report an incorrect register reading.

   After choosing a register type, the UCT software modifies the register address by applying an offset value. The modified register address displays in the *Register* column of the *Channels* group box on the main configuration window. Offset values are automatically applied as follows:

   - Coil Status: zero (0) offset value
   - Input Status: 10,000 offset value
   - Input Register: 30,000 offset value
   - Holding Register: 40,000 offset value

8. If you are working with an odd-numbered channel and you want to map a 12-digit register, click the **Double Register** option box.

   A check mark inside the check box indicates the channel is enabled. To disable the channel, clear the check mark by clicking the check box again.

9. Click **Save + Next Register** to save settings and display the next *Channel Configuration*

window. If you do not want to configure another channel, click **Save** to save settings and close the configuration window.

Mapping Registers for Reynolds 16- or 32-Bit Input Device

Complete the following steps to map a register for a Reynolds device:

1. On the main configuration window, click the channel number you want to configure. For example, click **Channel 1** to display a window similar to the figure below.

   You can also display a channel configuration window by clicking **Tools > Settings > Channels**. When the window displays, click **Next Register** to display the channel number you want to configure. If you are mapping a 12-digit register, make sure to select an odd-numbered channel on the main configuration window. If you are mapping a 12-digit register, make sure to choose an odd-numbered channel on the main configuration window.

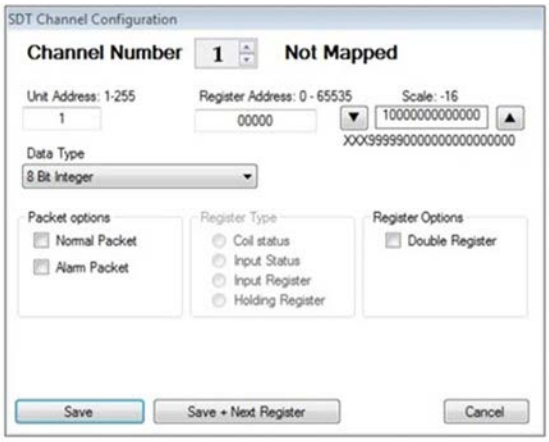

Figure 6-1. Reynolds Register Configuration

2. Type the unit address assigned to the input device in the **Unit Address** text box. Valid entries are any number from 1 to 255. Entering zero (0) disables this feature.

3. Type the register address of the input device in the **Register** text box. Valid entries include any address from 1 to 65,535. Entering zero (0) disables this feature.

4. Choose a scale value by clicking the up or down arrow buttons located next to the **Scale** text box. The up arrow moves the decimal to the left and the down arrow moves the decimal to the right.

   The scale value you select displays below the text box. It shows an example of how the selected scale value applies to the register reading. The process the RM3011 to scale a raw register readings is as follows:

   - Divide the raw reading by the scale value.
   - Select the first six digits to the left of the decimal point for a 6-digit register or the first

twelve digits to the left of the decimal point if working with a Double Register (12-digit register).

- If necessary, add leading zeroes to the left of the number to produce either a 6-digit scaled reading or a 12-digit scaled reading if working with a Double Register.

If you are working with a 6 or 12-digit register and the scaled reading is larger than 6 or 12 digits respectively, the RM3011 reports a register reading of "999999". The Bullhorn website displays scaled readings according to the "multiplier" value you select on the website.

5. Click the arrow in the **Data Type** list box and select an option from the list that identifies the register data type.

   If needed, refer to the technical specifications for the input device or contact the manufacturer to help determine the correct data type. An incorrect data type causes the RM3011 to report an incorrect register reading.

   The options in the *Register Type* group box are unavailable for selection.

6. Choose either a **Normal Packet** or **Alarm Packet** from **Packet Options**.

7. If you are working with an odd-numbered channel and you want to map a 12-digit register, click the **Double Register** option box.

   A check mark inside the check box indicates the channel is enabled. To disable the channel, clear the check mark by clicking the check box again.

8. Click **Save + Next Register** to save settings and display the next *Channel Configuration* window. If you do not want to configure another channel, click **Save** to save settings and close the configuration window.

Mapping Registers for Mercury Input Device

Complete the following steps to map a register for a mercury device:

1. On the main configuration window, click the channel number you want to configure. For example, click **Channel 1** to display a window similar to the figure below.

   You can also display a channel configuration window by clicking **Tools > Settings > Channels**. When the window displays, click **Next Register** to display the channel number you want to configure. If you are mapping a 12-digit register, make sure to select an odd-numbered channel on the main configuration window.

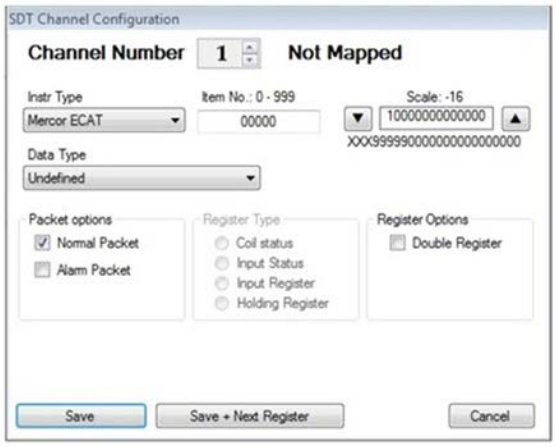

Figure 6-1. Mercury Register Configuration

2. The **Instr Type** (instrument type) list box shows the current selection. To change the instrument type, click the arrow in the list box and choose an option from the list.

   Selecting an instrument type for one channel configures all remaining channels with the same instrument type. Each instrument type is assigned an identification (ID) number by the UCT software. The ID number displays in the **Instr Type** column on the main configuration window instead of the name of the instrument type. When changing the instrument type, make sure the RM3011 is configured with the correct Mercury item number and scale value.

3. Type the item number of the Mercury instrument you want to monitor in the **Item No.** text box. Valid entries are any number from 1 to 999. Entering zero (0) disables this feature.

   For example, if the Mercury instrument is configured to report item number "522" (Batt Low Volt Limit) and you want the RM3011 to monitor this item number, type 522 in the **Item No.** text box.

4. Choose a scale value by clicking the up or down arrow buttons located next to the **Scale** text box. The up arrow moves the decimal to the left and the down arrow moves the decimal to the right.

   The scale value you select displays below the text box. It shows an example of how the selected scale value applies to the register reading. The process the RM3011 uses to scale a raw register readings is as follows:

   - Divide the raw reading by the scale value.
   - Select the first six digits to the left of the decimal point for a 6-digit register or the first twelve digits to the left of the decimal point if working with a Double Register (12-digit register).
   - If necessary, add leading zeroes to the left of the number to produce either a 6-digit scaled reading or a 12-digit scaled reading if working with a Double Register.

If you are working with a 6 or 12-digit register and the scaled reading is larger than 6 or 12 digits respectively, the RM3011 reports a register reading of "999999". The Bullhorn website displays scaled readings according to the "multiplier" value you select on the website.

5. Click the arrow in the **Data Type** list box and select an option from the list that identifies the register data type.

   If needed, refer to the technical specifications for the input device or contact the manufacturer to help determine the correct data type. An incorrect data type causes the RM3011 to report an incorrect register reading.

   Channel readings in the *Channels* group box on the main configuration window display as a 5 or 6 digit number when you configure the channel with the Data Type option labeled **Mercury String Date/Time format**. For example, the UCT software displays the date 03/02/2008 as 30208.

6. Choose either a **Normal Packet** or **Alarm Packet** from **Packet Options**.

7. If you are working with an odd-numbered channel and you want to map a 12-digit register, click the **Double Register** option box.

   A check mark inside the check box indicates the channel is enabled. To disable the channel, clear the check mark by clicking the check box again.

8. Click **Save + Next Register** to save settings and display the next *Channel Configuration* window. If you do not want to configure another channel, click **Save** to save settings and close the configuration window.

Mapping Registers for Dresser Input Device

Complete the following steps to map a register for a Dresser device:

1. On the main configuration window, click the channel number you want to configure. For example, Channel 1. For example, click **Channel 1** to display a window similar to the example shown below.

   You can also display a channel configuration window by clicking **Tools > Settings > Channels**. When the window displays, click **Next Register** to display the channel number you want to configure. If you are mapping a 12-digit register, make sure to select an odd-numbered channel on the main configuration window.

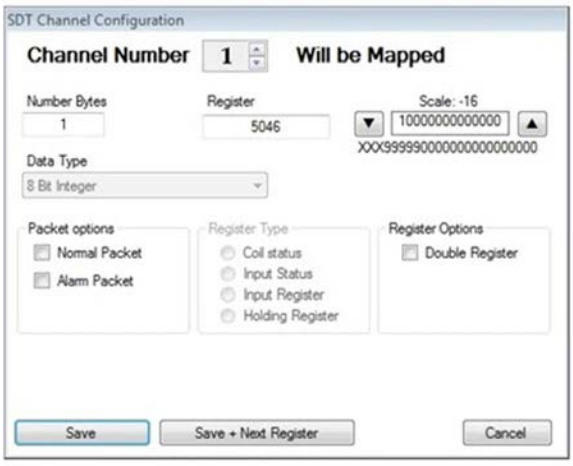

Figure 6-1. Dresser Register Configuration

2. Type the register address (or variable number) of the input device in the **Register** text box.

   Valid register addresses are any number from 4,000 to 9,999 when the RM3011 is configured with the **Dresser I** communication protocol. When configured with the **Dresser II** protocol, valid register addresses are any number from 1 to 18. Entering zero (0) disables this feature. For a list of valid register addresses or variable numbers, also refer to the manufacturer's documentation provided with the Dresser input device.

   After you enter a register address, the UCT software automatically enters a value in the **Number Bytes** text box. The options in the group boxes **Data Type** and **Register Type** are unavailable for selection.

3. Choose a scale value by clicking the up or down arrow buttons located next to the **Scale** text box. The up arrow moves the decimal to the left and the down arrow moves the decimal to the right.

   The scale value you select displays below the text box. It shows an example of how the selected scale value applies to the register reading. The process the RM3011 uses to scale a raw register readings is as follows:

   - Divide the raw reading by the scale value.
   - Select the first six digits to the left of the decimal point for a 6-digit register or the first twelve digits to the left of the decimal point if working with a Double Register (12-digit register).
   - If necessary, add leading zeroes to the left of the number to produce either a 6-digit scaled reading or a 12-digit scaled reading if working with a Double Register.

   If you are working with a 6 or 12-digit register and the scaled reading is larger than 6 or 12 digits respectively, the RM3011 reports a register reading of "999999". The Bullhorn website displays scaled readings according to the "multiplier" value you select on the website.

4. If you are working with an odd-numbered channel and you want to map a 12-digit register, click the **Double Register** option box.

   A check mark inside the check box indicates the channel is enabled. To disable the channel, clear the check mark by clicking the check box again.

5. Click **Save + Next Register** to save settings and display the next *Channel Configuration* window. If you do not want to configure another channel, click **Save** to save settings and close the configuration window.

Unmapping a Register

Complete the following steps to unmap a register that has previously been mapped to a channel on the RM3011:

1. On the main configuration window, click the channel number you want to unmap.
2. Click **Unmap** to unmap the register and close the channel configuration window. When you open the channel configuration window again, **Not Mapped** displays near the top of the window to indicate the channel is not mapped to a register.
3. Save all configuration settings in the event log by clicking **File > Save Current Setup in Event Log**.

   For more information about the Event Log, refer to the sections *Transmitting a Test Packet on page 50* and *Saving Settings in the Event Log on page 51*.
4. When you finish configuring the RM3011, continue with *Transmitting a Test Packet on page 50*.

Transmitting a Test Packet

To transmit a test packet, click **Transmit** in *Communication Settings* on the main configuration window.

Status messages display in the window beside the **Transmit** button. When the status message **Acknowledgement received from server** appears, communication has been established.

IMPORTANT: If the status message **Test Packet Return Transmission Failed** appears, communication has not been established with the server. Click **Transmit** again to send another test packet. If communication cannot be established after several attempts, please call Technical Support for assistance.

Saving Settings in the Event Log

To save configuration settings, click **File** > **Save Current Setup in Event Log**.

NOTE: The Event Log is used later when setting up the unit on Bullhorn Web. The file is saved on your hard drive in the same folder as the UCT software. The UCTsoftware automatically gives the Event Log a file name that includes the unit's serial number with a *.bhs* extension.

Saving Settings in a Template

Unit settings can be saved in a template, which can then be used to set up another unit of the same type.

Complete the following steps to save settings to a template:

1. Click **Tools** > **Advanced** > **Template** > **Save to Template** to display the *Save Template* window.
2. Open an existing folder or create a new folder to store the template.
3. If you want to change the default file name of the template, type a name for the template in the **File name** field making sure to use the **.***bht* file extension. Click **Save** when you finish.

Completing Configuration and Installation

Complete the following steps to exit the UCT and close the enclosure:

1. Click **File** > **Exit** or press **Alt**+**F4**.
2. Disconnect the configuration cable from the unit and your computer.
3. Line up the notch on the USB port cap to the USB port on the RM3011. Secure cap by tightening ring until it clicks in place.

Figure 6-1. USB Port

7

RM3012 Configuration

RM3012 remote monitoring units are configured for compressor application during production. The RM3012 is shipped with the Universal Configuration Toolkit (UCT), which is used to verify the Skywave signal level, set up input channels for an annunciator, and to send test packets. This chapter contains information on how to use the UCT software with RM3012 units that are configured for compressor applications.

NOTE: You will need UCT version 2.2.22.0 or later to configure the RM3012.

For information on how to upgrade the unit firmware, refer to *Firmware Updates on page 87*.

RM3012 Configuration Overview

The RM3012 configuration process includes the following tasks:

Connecting the RM3012 and Starting UCT

Complete the following steps to begin the configuration process:

1. Connect the configuration cable to the USB port of your computer. Connect the other end of the cable to the **USB** port on the front panel of the unit.

Figure 7-1. RM3012 USB Port

2. Double-click the UCT program icon on the desktop to start the UCT software. Or click **Start** > **Programs** > **Configuration Toolkit**.
3. Select a unit in the drop-down list of the **Find Devices** window, and then click **Select**.

Figure 7-2. Find Devices

4. The main configuration window displays. Press **F2** to read unit settings and verify that the unit and UCT software are communicating.

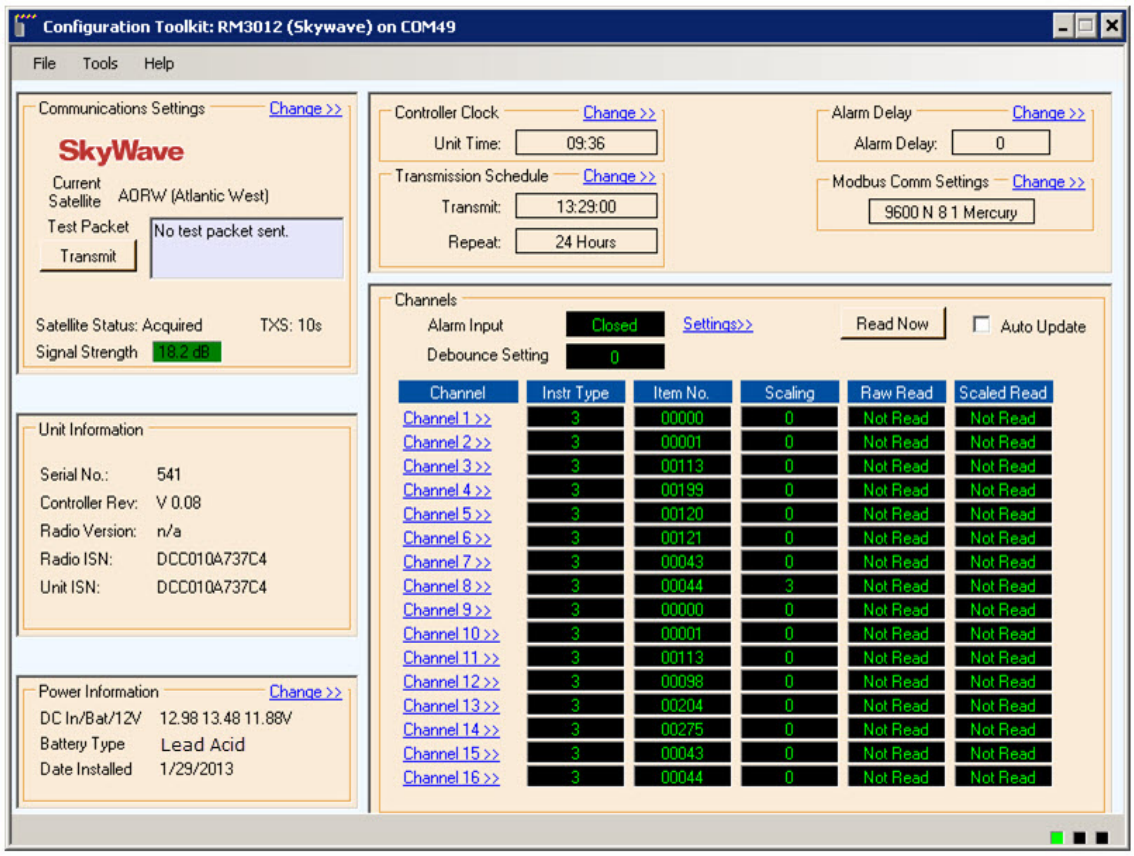

Figure 7-3. UCT Main Configuration Window

Selecting a Folder for Templates and Log Files

Templates and log files store in *My Documents* by default. If you want to store these files in a different folder on your computer, complete the following steps:

1. Click **Tools** > **Options** to display the **Options** window.
2. Click **Folder for Log files** to display the **Browse for folder** window.
3. Select an existing folder or click **Make New Folder** to create a new folder.
4. Click **OK** and then click **Done** to close the window.

Loading a Template

If a template is available, load the template using the following steps:

1. Click **Tools** > **Advanced** > **Template** > **Load from Template**.
2. When the**Open Template** window displays, locate the folder that contains the template. Select the template and then click **Open**.
3. After UCT applies the template, press **F2** to read settings or click **Tools** > **Read Unit Settings**. Click **File** > **Save Current Setup in Event Log** to save settings.

Verifying Satellite Signal Strength

The current satellite for the RM3012 can be viewed in the *Communications Settings* pane on the main configuration window. Verify that the current satellite is in the region near your location.

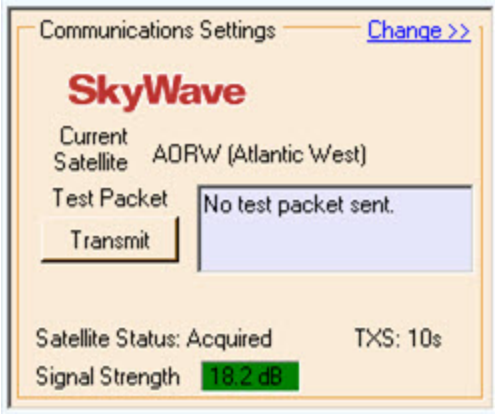

Figure 7-1. Satellite Signal Strength

The satellite signal strength is displayed in the **Signal Strength** field. The RM3012 uses a scale of 0.00dB to 50.00dB for satellite signal strength. If the signal strength is weak (less than 10.5 dB for more than 30 seconds), a pop-up message will display to notify the user. The pop-up window also includes a Satellite Wizard tool to help acquire a stronger signal.

NOTE: If the unit is moved, you must re-verify that the unit is acquiring satellite signal.

Use the following information to verify that the RM3012 is receiving a strong satellite signal:

- **Satellite Status** is **Acquired**.
- **Signal Strength** of **14dB** or higher indicates a strong signal; levels below 14dB indicate no satellite communication.
- A green status bar in the **Signal Strength** field indicates that satellites have been found.
- A red status bar in the **Signal Strength** field indicates that no satellites have been found.

NOTE: If the **Signal Strength** is below 14dB, or if the status bar is red, adjust the RM3012 enclosure and recheck the satellite signal strength.

Setting a Transmission Schedule

A transmission schedule determines when and how often channel readings are transmitted to your Bullhorn Web account.

Complete the following steps to set up a transmission schedule:

1. Click **Change** in the *Transmission Schedule* pane on the main configuration window to open the **Transmission Schedule** window.

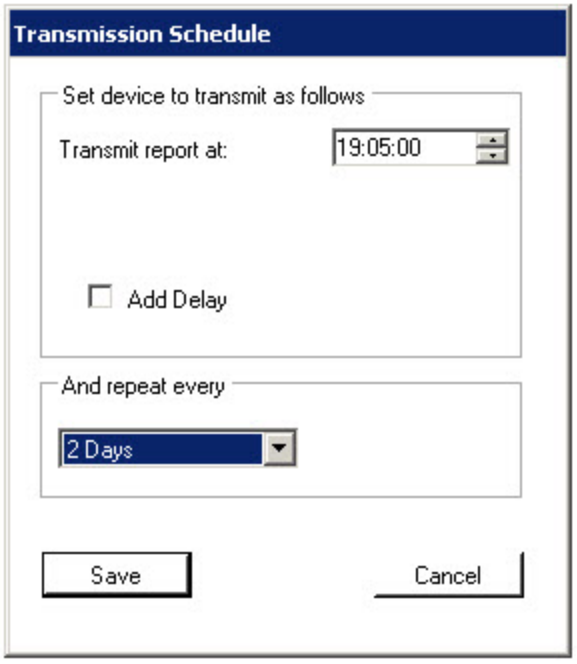

Figure 7-1. Transmission Schedule Window

2. Select a time in the **Transmit report at** field. Use the up and down arrows to adjust the time.
3. If you want to include a delay in the transmission schedule, click **Add Delay** to place a check mark in the check box.

   Add Delay is based on the unit serial number. The unit serial number is equivalent to the number of seconds added to the reporting time. This feature is typically used to offset the transmission schedule for several units set up with the same reporting time.

4. Choose a repeat interval option in the **And repeat every** drop-down list.
5. Click **Save**.

Setting Up an Alarm Delay

Complete the following steps to set up an alarm delay:

1. Click **Change** in the *Alarm Delay* pane on the main configuration window to open the **Alarm Delay** window.

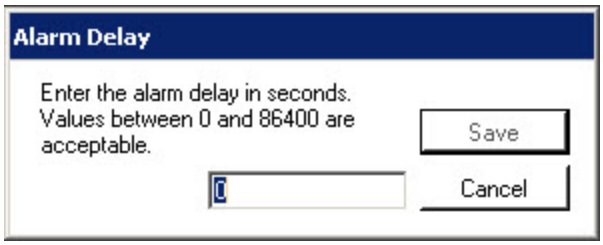

Figure 7-1. Alarm Delay Window

2. Type the number of seconds in the field to indicate how much time should pass between recognized alarms. The value should be between 0 and 86400 seconds.
3. Click **Save**.

Setting Up Alarm Input and Debounce Setting

Before setting up the alarm and Debounce setting, complete the following:

1. Click the **Read Now** button on the *Channels* pane of the main configuration window to read the value(s) of any input or register connected to the RM3012.
2. Click the **Auto Update** check box to have the values of inputs continuously updated.

Complete the following steps to set up alarms based on an input state and an optional Debounce setting:

- Click **Settings** in the *Channels* pane on the main configuration window to display the **Digital Input State Trigger** window.

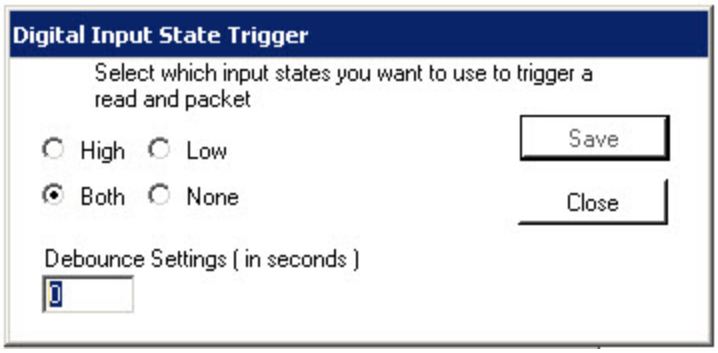

Figure 7-1. Input State Trigger and Debounce Settings

- Select one of the following options that specifies which digital input state should trigger an alarm packet transmission:
  - **High** (open)
  - **Low** (closed)
  - **Both** (High and Low)
  - **None**
- If you want to include an optional Debounce setting in alarm settings, type the number of seconds the input switch must remain in an alarm state before the RM3012 transmits an alarm packet.

  If you want alarm states recognized immediately, enter zero (0) in the **Debounce Settings** field.
- Click **Save**.

Setting Up Modbus Comm Settings

This procedure explains how to set up communication parameters for the RM3012 based on the type of input device connected to the unit.

Complete the following steps to set up the Modbus communication settings:

1. Click **Change** in the *Modbus Comm Settings* pane on the main configuration window to view the *Modbus Communication Settings*window.

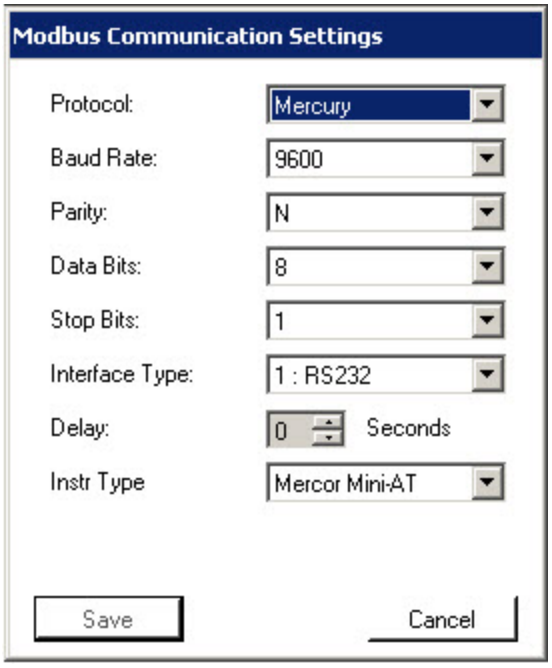

Figure 7-1. Modbus Communication Settings Window

2. Select a protocol from the list of options in the **Protocol** field that identifies the type of input device connected to the RM3012.

   If you are working with a Dresser input device, choose **Dresser I** if the input device was manufactured before 2005 or **Dresser II** if the device was manufactured after 2005.

   If needed, refer to the input device technical specifications or contact the manufacturer to determine the appropriate settings for the remaining steps in this procedure.

3. Select a Baud rate from the list of options in the **Baud Rate** field.

4. In the **Parity** field, select **N** (none), **E** (even), or **O** (odd).

5. In the **Data Bits** field, select either **7** or **8**.

6. In the **Stop Bits** field, select either **1** or **2**.

7. Verify that **1:RS232** is selected in the **Interface Type** field.

8. If the input device requires a handshake signal from the RM3012, use the up and down arrows in the **Delay** field to choose a time option. Valid selections are in a range of 0 to 10 seconds with 0 indicating an instant response.

9. If you are working with a Modbus ASCII or RTU, Mercury, or Reynolds input device, complete one of the following steps:

a. **Modbus ASCII or RTU:** Type the unit address assigned to the input device in the **Unit Address** field. Valid entries are any number from 1 to 255. To disable this feature, enter a zero (0).

b. **Mercury:** Select an option in the **Instrument Type** field that identifies the type of Mercury device connected to the RM3012.

c. **Reynolds:** Type the unit identification number assigned to the Reynolds input device in the **Unit Id** field. Valid entries are any number from 1 to 255. To disable this feature, enter a zero (0).

10. Click **Save**.

Mapping Registers to Channels

The information in the following sections explain how to map registers to the input channels of the RM3012 . Instructions for unmapping a register are provided in *Unmapping a Register on page 69*.

The RM3012 supports up to sixteen 6-digit registers, eight 12-digit registers, or a combination of both. Registers are mapped to the RM3012 by clicking a particular channel number listed in the *Channels* pane on the main configuration window. Channels are labeled **Channel 1** through **Channel 16**.

If you plan to map one or more 12-digit registers, use only the odd-numbered **Channel Configuration** windows (channel 1, 3, 5, and so on). These windows include an option labeled **Double Register** that refers to a 12-digit register.

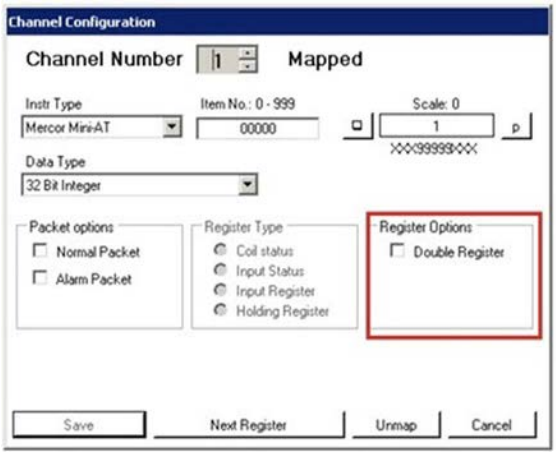

Figure 7-1. Channel 1 Configuration Window

The **Double Register** option is unavailable for selection on even-numbered **Channel Configuration** windows. When an odd-numbered Channel is configured for a 12-digit register, the next even-numbered Channel on the main configuration window is unavailable for selection.

When mapping a register for a Modbus RTU or ASCII input device, you must specify the register **Data Type** and **Register Type** for the RM3012 to correctly read the register. If you are working with a Mercury, Reynolds 16-bit, or Reynolds 32-bit input device, you only need to specify the register **Data Type**. The RM3012 does not require either type of information when working with a Dresser input device. If needed, refer to the technical specifications for the input device or contact the manufacturer to help determine the correct **Data Type** and **Register Type**.

Depending on the type of input device connected to the RM3012, map the registers using the instructions in the following sections:

- **Modbus ASCII or RTU:** If you are working with a Modbus ASCII or RTU input device, continue with the section *Map Registers for Modbus ASCII or RTU Input Device*.
- **Reynolds 16- or 32-Bit:** If you are working with a Reynolds 16- or 32-bit input device, continue with *Mapping Registers for Reynolds 16- or 32-Bit Input Device on page 64*.
- **Mercury:** If you are working with a Mercury input device, continue with the *Mapping Registers for Mercury Input Device on page 66*.
- **Dresser:** If you are working with a Dresser input device, continue with *Mapping Registers for Dresser Input Device on page 68*.

NOTE: If you need to unmap a register, refer to *Unmapping a Register on page 69*.

Mapping Registers for Modbus ASCII or RTU Input Device

Complete the following steps to map a register for a Modbuss ASCII or RTU device:

1. On the main configuration window, click the channel number you want to configure. For example, click **Channel 2**.

   You can also display a channel configuration window by clicking **Tools > Settings > Channels**. When the window displays, click **Next Register** to display the channel number you want to configure.

   If you are mapping a 12-digit register, make sure to choose an odd-numbered channel on the main configuration window. For more information, refer to *Mapping Registers to Channels on page 61*

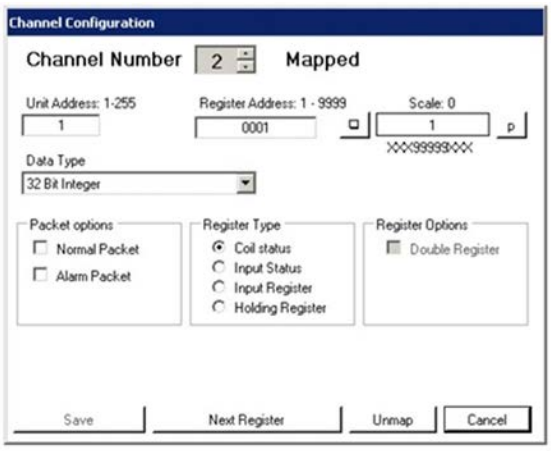

Figure 7-1. Modbus ASCII or RTU Configuration

2. Type the unit address assigned to the input device in the **Unit Address** text box. Valid entries are any number from 1 to 255. To disable this feature, enter a zero (0).

3. Type the register address of the input device in the **Register Address** text box. Valid entries include any address from 1 to 9,999. To disable this feature, enter a zero (0).

4. Choose a scale value by clicking the up or down arrow buttons located next to the **Scale** text box. The up arrow moves the decimal to the left and the down arrow moves the decimal to the right.

   The scale value you select displays below the text box. It shows an example of how the selected scale value applies to the register reading. The process the RM3012 uses to scale a raw register readings is as follows:

   - Divide the raw reading by the scale value.
   - Select the first six digits to the left of the decimal point for a 6-digit register or the first twelve digits to the left of the decimal point if working with a Double Register (12-digit register).
   - If necessary, add leading zeroes to the left of the number to produce either a 6-digit scaled reading or a 12-digit scaled reading if working with a Double Register.

   If you are working with a 6- or 12-digit register and the scaled reading is larger than 6 or 12 digits, respectively, the RM3012 reports a register reading of "999999". Bullhorn Web displays scaled readings according to the "multiplier" value you select on the website.

5. Click the arrow in the **Data Type** list box and select an option from the list that identifies the register data type.

   If needed, refer to the technical specifications for the input device or contact the manufacturer to help determine the correct data type. An incorrect data type causes the RM3012 to report an incorrect register reading.

6. Choose either a **Normal Packet** or **Alarm Packet** from **Packet Options**.
7. Identify the **Register Type** by clicking the **Coil Status**, **Input Status**, **Input Register**, or **Holding Register** option button.

   If needed, refer to the technical specifications for the input device or contact the manufacturer to help you determine the correct register type. An incorrect register type causes the RM3012 to report an incorrect register reading.

   After choosing a register type, the UCT software modifies the register address by applying an offset value. The modified register address displays in the *Register* column of the *Channels* pane on the main configuration window. Offset values are automatically applied as follows:

   - Coil Status: zero (0) offset value
   - Input Status: 10,000 offset value
   - Input Register: 30,000 offset value
   - Holding Register: 40,000 offset value
8. If you are working with an odd-numbered channel and you want to map a 12-digit register, click the **Double Register** option box.

   A check mark inside the check box indicates the channel is enabled. To disable the channel, clear the check mark by clicking the check box again.
9. Click **Save + Next Register** to save settings and display the next **Channel Configuration** window. If you do not want to configure another channel, click **Save** to save settings and close the configuration window.

Mapping Registers for Reynolds 16- or 32-Bit Input Device

Complete the following steps to map a register for a Reynolds device:

1. On the main configuration window, click the channel number you want to configure. For example, click **Channel 2** to display a *Channel Configuration* window.

   If you are mapping a 12-digit register, make sure to choose an odd-numbered channel on the main configuration window.

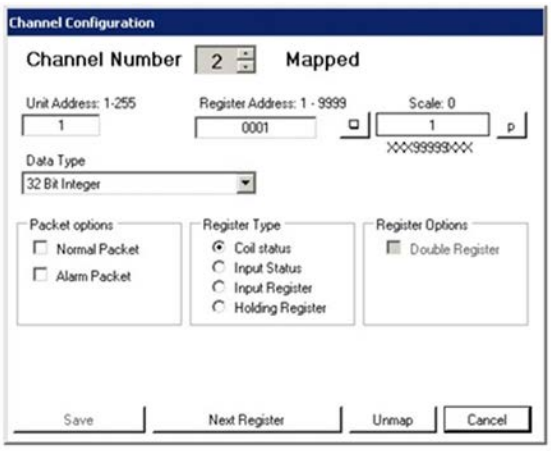

Figure 7-1. Reynolds Register Configuration

2. Type the unit address assigned to the input device in the **Unit Address** text box. Valid entries are any number from 1 to 255. To disable this feature, enter a zero (0).

3. Type the register address of the input device in the **Register** text box. Valid entries include any address from 1 to 65,535. To disable this feature, enter a zero (0).

4. Choose a scale value by clicking the up or down arrow buttons located next to the **Scale** text box. The up arrow moves the decimal to the left and the down arrow moves the decimal to the right.

   The scale value you select displays below the text box. It shows an example of how the selected scale value applies to the register reading. The process the RM3012 uses to scale a raw register readings is as follows:

   - Divide the raw reading by the scale value.
   - Select the first six digits to the left of the decimal point for a 6-digit register or the first twelve digits to the left of the decimal point if working with a Double Register (12-digit register).
   - If necessary, add leading zeroes to the left of the number to produce either a 6-digit scaled reading or a 12-digit scaled reading if working with a Double Register.

   If you are working with a 6- or 12-digit register and the scaled reading is larger than 6 or 12 digits, respectively, the RM3012 reports a register reading of "999999". Bullhorn Web displays scaled readings according to the "multiplier" value you select on the website.

5. Click the arrow in the **Data Type** list box, and select an option from the list that identifies the register data type.

If needed, refer to the technical specifications for the input device or contact the manufacturer to help determine the correct data type. An incorrect data type causes the RM3012 to report an incorrect register reading.

The options in the *Register Type* group box are unavailable for selection.

6. Choose either a **Normal Packet** or **Alarm Packet** from **Packet Options**.
7. If you are working with an odd-numbered channel and you want to map a 12-digit register, click the **Double Register** option box.

   A check mark inside the check box indicates the channel is enabled. To disable the channel, clear the check mark by clicking the check box again.
8. Click **Save + Next Register** to save settings and display the next **Channel Configuration** window. If you do not want to configure another channel, click **Save** to save settings and close the configuration window.
9. When you finish configuring all channels, continue with *Setting Battery Install Date on page 70*.

Mapping Registers for Mercury Input Device

Complete the following steps to map a register for a Mercury device:

1. On the main configuration window, click the channel number you want to configure. For example, click **Channel 1** to display a *Channel Configuration* window.

   If you are mapping a 12-digit register, make sure to choose an odd-numbered channel on the main configuration window. For more information, refer to *Mapping Registers to Channels on page 61*.

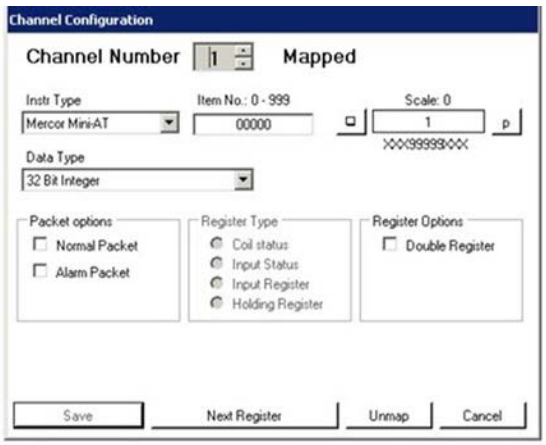

Figure 7-1. Mercury Register Configuration

The **Instr Type** (instrument type) list box shows the current selection. To change the instrument type, click the arrow in the list box and choose an option from the list.

Selecting an instrument type for one channel configures all remaining channels with the same instrument type. Each instrument type is assigned an identification (ID) number by the UCT software. The ID number displays in the **Instr Type** column on the main configuration window instead of the name of the instrument type. When changing the instrument type, make sure the RM3012 is configured with the correct Mercury item number and scale value.

2. Type the item number of the Mercury instrument you want to monitor in the **Item No.** text box. Valid entries are any number from 1 to 999. To disable this feature, enter a zero (0).

   For example, if the Mercury instrument is configured to report item number "522" (Batt Low Volt Limit), and you want the RM3012 to monitor this item number, type 522 in the **Item No.** text box.

3. Choose a scale value by clicking the up or down arrow buttons located next to the **Scale** text box. The up arrow moves the decimal to the left and the down arrow moves the decimal to the right.

   The scale value you select displays below the text box. It shows an example of how the selected scale value applies to the register reading. The process the RM3012 uses to scale a raw register readings is as follows:

   - Divide the raw reading by the scale value.
   - Select the first six digits to the left of the decimal point for a 6-digit register or the first twelve digits to the left of the decimal point if working with a Double Register (12-digit register).
   - If necessary, add leading zeroes to the left of the number to produce either a 6-digit scaled reading or a 12-digit scaled reading if working with a Double Register.

   If you are working with a 6- or 12-digit register and the scaled reading is larger than 6 or 12 digits, respectively, the RM3012 reports a register reading of "999999". Bullhorn Web displays scaled readings according to the "multiplier" value you select on the website.

4. Click the arrow in the **Data Type** list box, and select an option from the list that identifies the register data type.

   If needed, refer to the technical specifications for the input device or contact the manufacturer to help determine the correct data type. An incorrect data type causes the RM3012 to report an incorrect register reading.

   Channel readings in the *Channels* pane on the main configuration window display as a 5 or 6 digit number when you configure the channel with the Data Type option labeled **Mercury String Date/Time format**. For example, the UCT software displays the date 03/02/2008 as 30208.

5. Choose either a **Normal Packet** or **Alarm Packet** from **Packet Options**.

6. If you are working with an odd-numbered channel and you want to map a 12-digit register,

click the **Double Register** option box.

A check mark inside the check box indicates the channel is enabled. To disable the channel, clear the check mark by clicking the check box again.

7. Click **Save + Next Register** to save settings and display the next **Channel Configuration** window. If you do not want to configure another channel, click **Save** to save settings and close the configuration window.

Mapping Registers for Dresser Input Device

Complete the following steps to map a register for a Dresser device:

1. On the main configuration window, click the channel number you want to configure. For example, Channel 1. For example, click **Channel 1** to display a *Channel Configuration* window

   If you are mapping a 12-digit register, make sure to choose an odd-numbered channel on the main configuration window. For more information, refer to *Mapping Registers to Channels on page 61*.

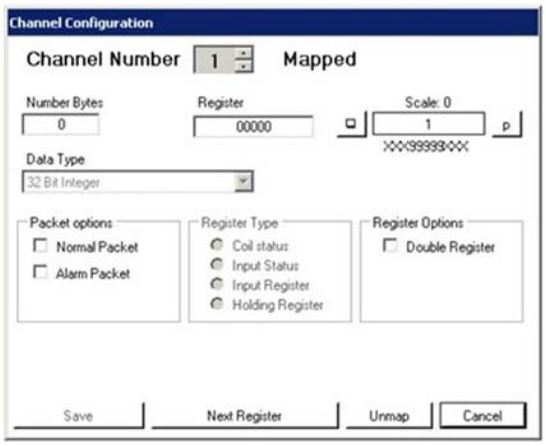

Figure 7-1. Dresser Register Configuration

2. Type the register address (or variable number) of the input device in the **Register** text box.

   Valid register addresses are any number from 4,000 to 9,999 when the RM3012 is configured with the **Dresser I** communication protocol. When configured with the **Dresser II** protocol, valid register addresses are any number from 1 to 18. To disable this feature, enter a zero (0). For a list of valid register addresses or variable numbers, also refer to the manufacturer's documentation provided with the Dresser input device.

   After you enter a register address, the UCT software automatically enters a value in the **Number Bytes** text box. The options in the group boxes **Data Type** and **Register Type** are unavailable for selection.

3. Choose a scale value by clicking the up or down arrow buttons located next to the **Scale** text

box. The up arrow moves the decimal to the left and the down arrow moves the decimal to the right.

The scale value you select displays below the text box. It shows an example of how the selected scale value applies to the register reading. The process the RM3012 uses to scale a raw register readings is as follows:

- Divide the raw reading by the scale value.
- Select the first six digits to the left of the decimal point for a 6-digit register or the first twelve digits to the left of the decimal point if working with a Double Register (12-digit register).
- If necessary, add leading zeroes to the left of the number to produce either a 6-digit scaled reading or a 12-digit scaled reading if working with a Double Register.

If you are working with a 6- or 12-digit register and the scaled reading is larger than 6 or 12 digits, respectively, the RM3012 reports a register reading of "999999". Bullhorn Web displays scaled readings according to the "multiplier" value you select on the website.

4. If you are working with an odd-numbered channel and you want to map a 12-digit register, click the **Double Register** option box.

   A check mark inside the check box indicates the channel is enabled. To disable the channel, clear the check mark by clicking the check box again.

5. Click **Save + Next Register** to save settings and display the next **Channel Configuration** window. If you do not want to configure another channel, click **Save** to save settings and close the configuration window.

Unmapping a Register

Complete the following steps to unmap a register that has previously been mapped to a channel on the RM3012:

1. On the main configuration window, click the channel number you want to unmap.
2. Click **Unmap** to unmap the register, and close the channel configuration window. When you open the channel configuration window again, **Not Mapped** displays near the top of the window to indicate the channel is not mapped to a register.
3. Save all configuration settings in the event log by clicking **File > Save Current Setup in Event Log**.

   For more information about the Event Log, refer to *Setting Battery Install Date on page 70* and *Saving Settings in the Event Log on page 71*.

4. When you finish configuring the RM3012, continue with *Setting Battery Install Date on page 70*.

Setting Battery Install Date

Complete the following steps to set the installation date for the RM3012 internal backup battery:

- Click **Change** in *Power Information* pane to display the **Power/Battery** window.

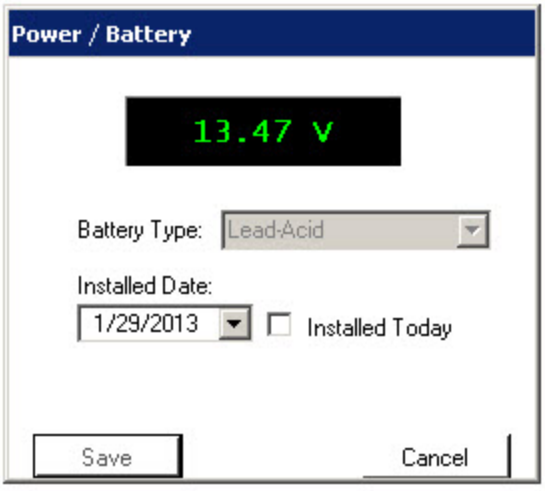

Figure 7-1. Power/Battery

- Select date from **Installed Date** field or check the **Installed Today** check box.
- Click **Save**.

Transmitting a Test Packet

To transmit a test packet, click **Transmit** in the *Communications Settings* pane on the main configuration window.

Status messages display in the window beside the **Transmit** button. When the status message **Acknowledgment received from server** appears, communication has been established.

IMPORTANT: If the status message **Test Packet Return Transmission Failed** appears, communication has not been established with the server. Click **Transmit** again to send another test packet. If communication cannot be established after several attempts, please call Technical Support for assistance.

Saving Settings in the Event Log

To save configuration settings, click **File** > **Save Current Setup in Event Log**.

NOTE: The Event Log is used later when setting up the unit on Bullhorn Web. The file is saved on your hard drive in the same folder as the UCT software. The UCT software automatically gives the Event Log a file name that includes the unit's serial number with a *.bhs* extension.

Saving Settings in a Template

Unit settings can be saved in a template, which can then be used to set up another unit of the same type.

Complete the following steps to save settings to a template:

1. Click **Tools** > **Advanced** > **Template** > **Save to Template** to display the *Save Template* window.
2. Open an existing folder or create a new folder to store the template.
3. If you want to change the default file name of the template, type a name for the template in the **File name** field making sure to use the ***.bht*** file extension. Click **Save** when you finish.

Completing Configuration and Installation

Complete the following steps to exit the UCT and close the enclosure:

1. Click **File** > **Exit** or press **Alt**+**F4**.
2. Disconnect the configuration cable from the unit and your computer.
3. Line up the notch on the USB port cap to the USB port on the RM3012. Secure cap by tightening ring until it clicks in place.

Figure 7-1. USB Port

8 RM3250 Configuration

Remote monitoring units with Bluetooth, such as the RM3250, can be configured for service using Bullhorn Tools - either on your laptop with the software version or on a smartphone or tablet running iOS 8.1 or Android 7. The software version can be downloaded from Bullhorn Tools launch page, while Bullhorn Tools Mobile can be downloaded from the Apple App Store or Google Play. This section describes the process for configuring units with the software version of Bullhorn Tools. For instructions on using the mobile app, refer to Bullhorn Tools Mobile User Guide.

After configuring the unit, the unit information and settings can be accessed through Bullhorn Web.

Before beginning the configuration process, download and install Bullhorn Tools software from the Bullhorn Tools launch page. If the software is already loaded on your laptop or computer, any updates to the software will automatically be installed when you open Bullhorn Tools (with Internet access).

Configuration Overview

The configuration process for the RM3250 includes the following tasks:

1. *Activating Bluetooth on page 73* — activate Bluetooth on the unit (or connect USB cable to unit).
2. *Configuring the RM3250 with Bullhorn Tools Software on page 74* — including viewing unit information, setting serial settings, and configuring readings.
3. *De-activate Bluetooth on page 86* — when finished with configuring the unit, de-active the unit's Bluetooth.

Activating Bluetooth

Complete the following steps to activate the unit's Bluetooth to enable it for configuration via a Bluetooth connection.

NOTE: The unit will disconnect automatically after 10 minutes. It is not necessary to swipe the activation point again unless you wish to de-activate the Bluetooth connection immediately.

---

1. Swipe a magnet across the access point on the unit (marked with an arrow on the enclosure. A red light flashes to indicates that the unit is waiting to pair with a Bluetooth-enabled device.

   If you are using Bullhorn Tools on a laptop and connecting to the unit with a USB mini-b cable instead of the Bluetooth connection, you do not need to activate the unit. The unit will be ready to configure with Bullhorn Tools once the cable has been connected to both the unit and the laptop.

Figure 8-1. Access Point - Activated

NOTE: The unit will stop waiting to pair (light flashing) after 10 minutes. It is not necessary to swipe the activation point again unless you wish to de-activate the Bluetooth connection immediately.

Configuring the RM3250 with Bullhorn Tools Software

Use Bullhorn Tools to complete the following configuration tasks on the RM3250 unit:

- *Viewing Unit Information on page 75* — the main RM3250 *Unit Overview* window displays current unit information. You can also enable or disable Scaling by clicking the **Scaling** slider on the *Readings* line.
- *Loading or Importing a Template on page 76* — units can be configured from a previously-saved template that contains unit settings. Current unit settings are overwritten by the applied template.
- *Setting Reporting and Battery Information on page 76* — set a transmission schedule and the battery install date.
- *Setting Serial Settings on page 77* — set communication parameters for the device that the RM3250 is connected to and communicating with.
- *Enabling or Disabling Readings on page 78* — enable or disable the unit registers as necessary.

- *Configuring Readings on page 80* — configure up to ten Readings (registers) and one digital input.
- *Sending a Test Message on page 82* — send a test message to the unit to verify communications.
- *Working with Templates on page 83* — to save time when configuring multiple units, unit settings can be saved to a template that can be used to configure other similar units.
- *Upgrading RM3250 Firmware on page 85* — if available, firmware upgrades can be done through Bullhorn Tools.

When finished, click **File > Disconnect** to disconnect from the unit or **File > Exit** to close Bullhorn Tools.

Viewing Unit Information

Use the following steps to check unit and transmission information:

1. Click the name of the unit in the navigation pane to view **Readings**, **Test Message Status**, **Power, Unit Information**, **Reporting**, and **Serial Settings** panes.

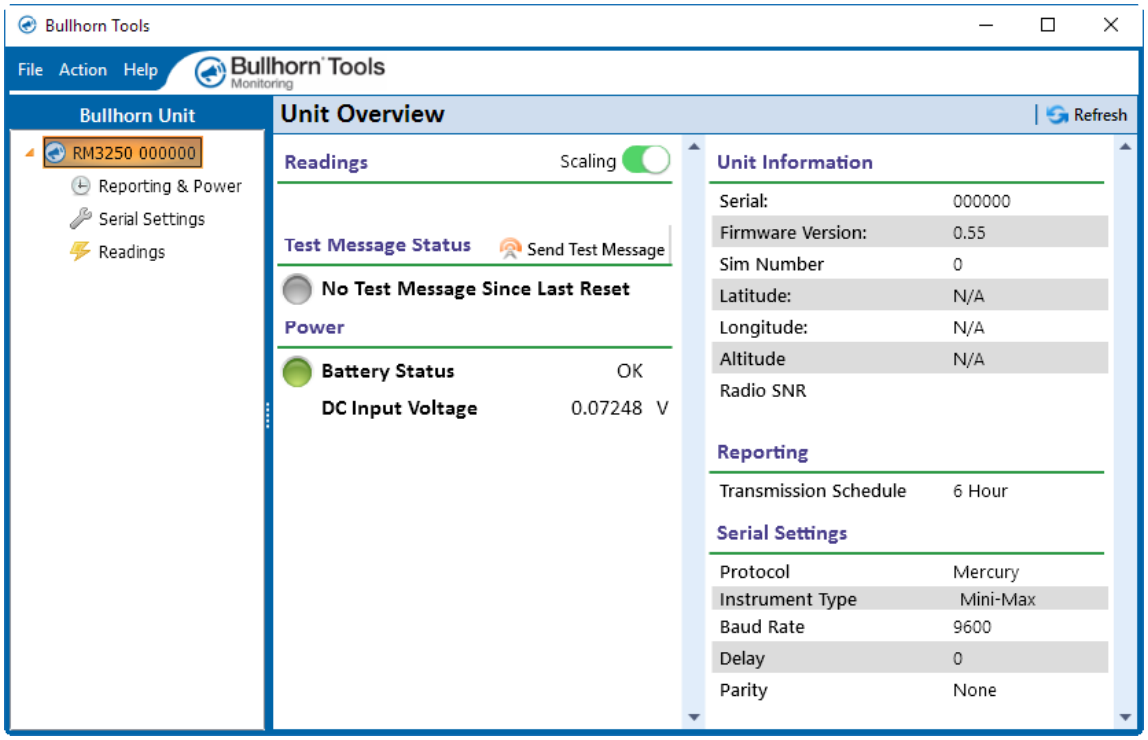

Figure 8-1. Unit Overview - No Enabled Registers

2. If registers have not yet be enabled, the *Readings* pane will be empty. After enabling registers

(refer to *Enabling or Disabling Readings on page 78*), click **Refresh** to update the information.

Loading or Importing a Template

If a template is available for the unit type you plan to configure, you can load the template using the following steps:

1. Click **File** > **Load Template**.
2. In the *Apply Template* window, select a saved template from the **Select template** list.

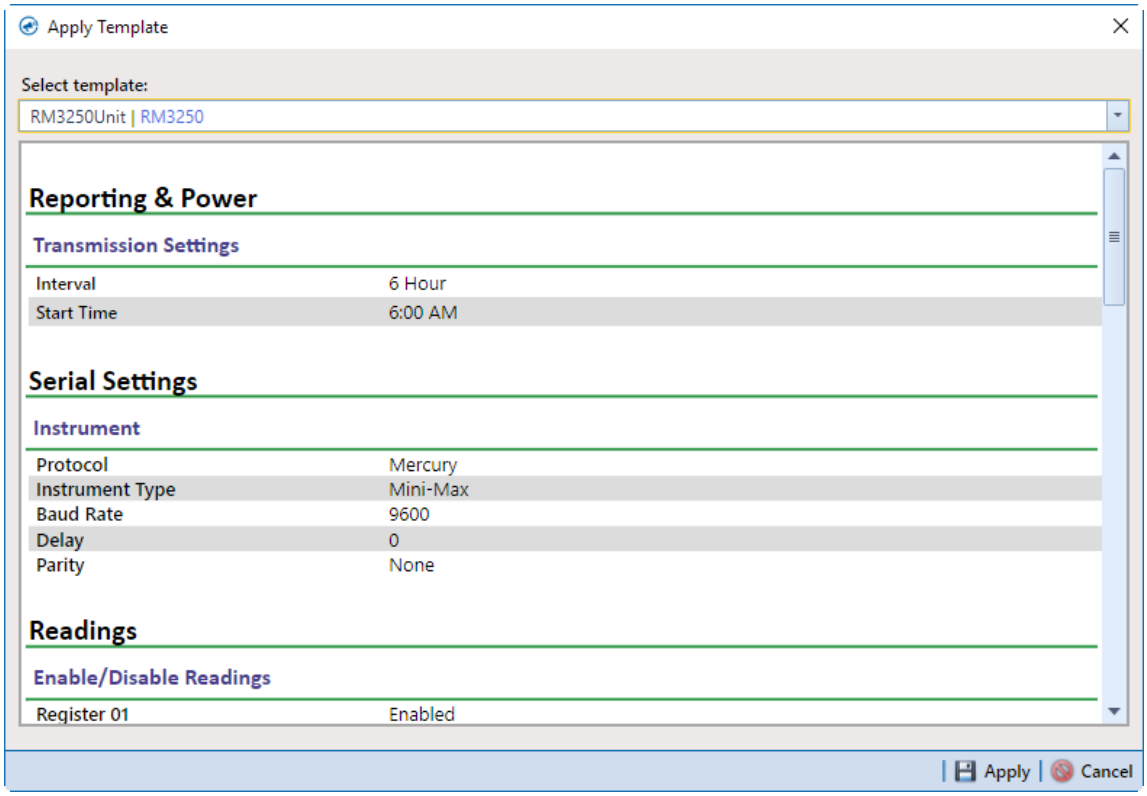

Figure 8-1. Apply Template

3. Verify unit information, then click **Apply**.

Setting Reporting and Battery Information

The reporting schedule determines when and how often Reading measurements transmit to your Bullhorn Web account.

Complete the following steps to schedule reports or add a battery installation date:

1. Click **Reporting & Power** to open the *Reporting* window.

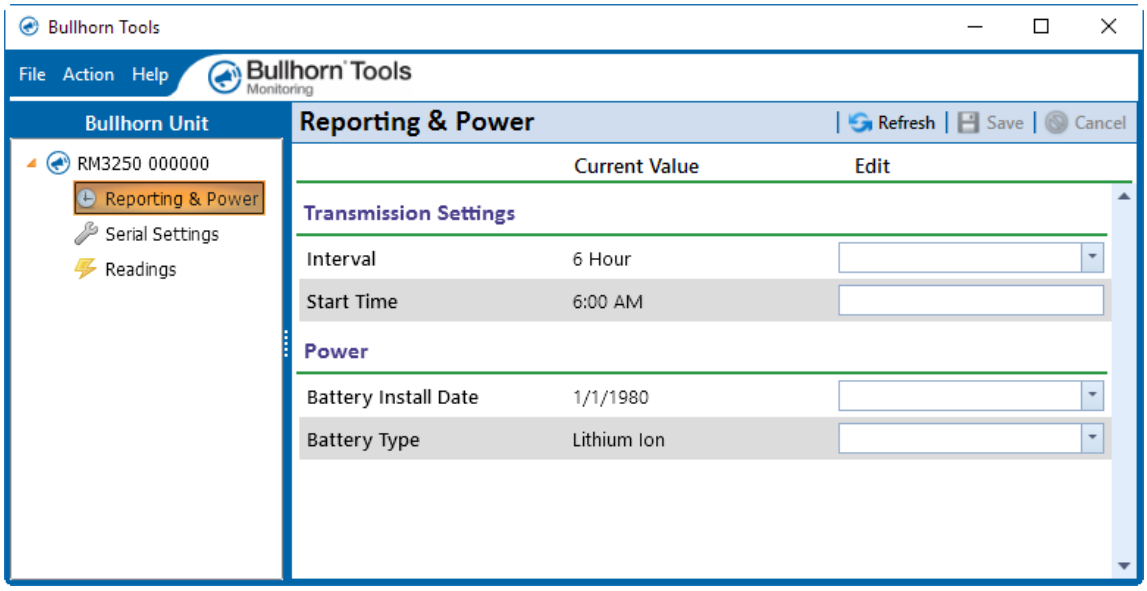

Figure 8-1. Reporting & Power Settings

2. Select a reporting transmission interval (**4 Hour**, **6 Hour**, or **Daily**) in the **Interval** field or leave blank for no transmission.
3. Enter a time in **Start Time** field. For example, typing a 2 will display **2:00 AM**.

   If the data log becomes full, the unit may report to the website in-between the scheduled interval time.
4. Select a date from the pop-up calendar in the **Battery Install Date**.
5. Click **Save** to save settings or **Cancel** to clear all fields.

Setting Serial Settings

Complete the following steps to configure the serial settings on the enabled registers:

1. Click **Serial Settings**.

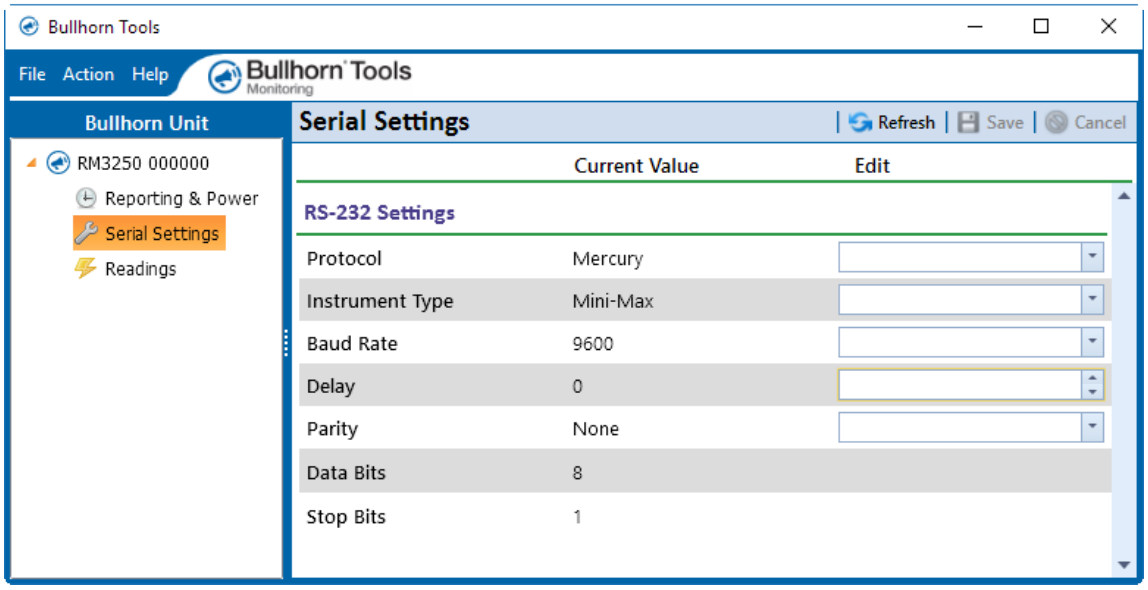

Figure 8-1. Serial Settings

2. Select a protocol from the **Protocol** drop-down list: either Mercury or Modbus RTU.
3. Complete **one** of the following, depending on the protocol selected in the **Protocol** field:
   a. For *Mercury* protocol, select a device from the **Instrument Type** drop-down list: either Mini-AT or Mini-Max.
   b. For *Modbus RTU* protocol, enter a unit address in the **Unit Address** field: a number from 1 to 9.
4. Select a baud rate from the **Baud Rate** drop-down list: 115200, 19200, or 9600.
5. Enter a value for delay in the **Delay** field.
6. Select a parity from the **Parity** drop-down list: either None or Even.
7. Click **Save** to save settings or **Cancel** to clear all fields.

Enabling or Disabling Readings

Registers **must** be enabled through Bullhorn Tools as well as on the Bullhorn Web account. When the register is enabled through Bullhorn Tools, a reading is captured for that register. Then, when data is sent to the Bullhorn Web account, that value is decoded, paired with the same enabled register that was enabled through Bullhorn Tools, and then displayed on the unit's Unit Detail page.

Enabled registers on Bullhorn Web will only display correct data if the corresponding register was enabled through Bullhorn Tools.

Complete the following steps to enable or disable unit Readings (registers).

1. Click **Readings**.

   Double-click **Readings** or click the expand arrow next to **Readings** to show the enabled readings.

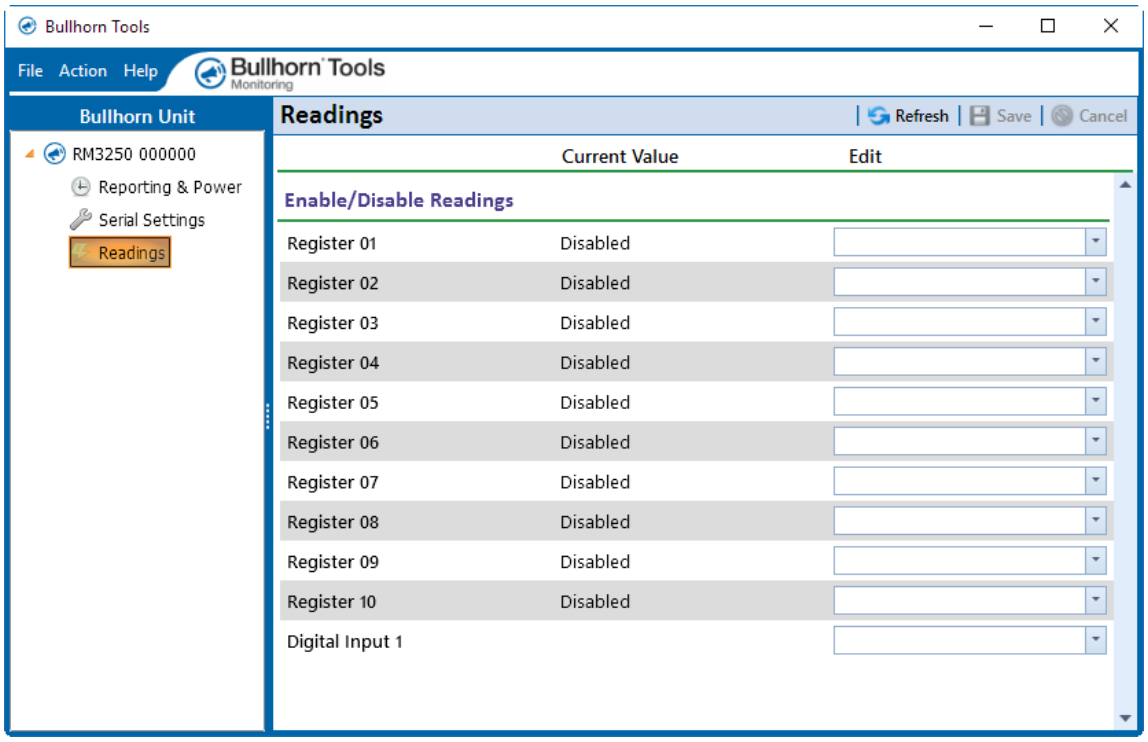

Figure 8-1. Enable/Disable Readings

2. To enable a reading, select **Enabled**.
3. To disable a reading, select **Disabled**.
4. Click **Save** to save settings or **Cancel** to clear all fields.
5. Click **Refresh** to update the information. Enabled Register information will update.

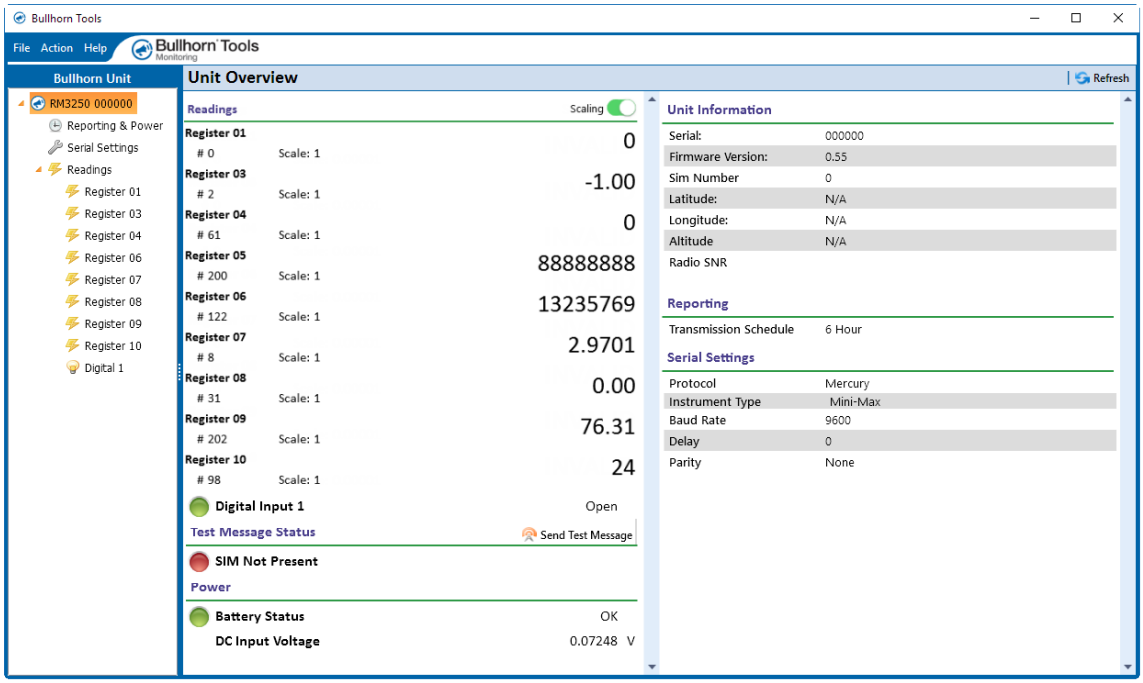

Figure 8-2. Unit Overview with Register Readings

Configuring Readings

Complete the following steps to configure the enabled registers and the digital input:

1. Click the name of the register under ⚡ **Readings**.
   Only enabled registers display in the list.
2. For each enabled register, complete the following fields in the *Register Settings* pane:

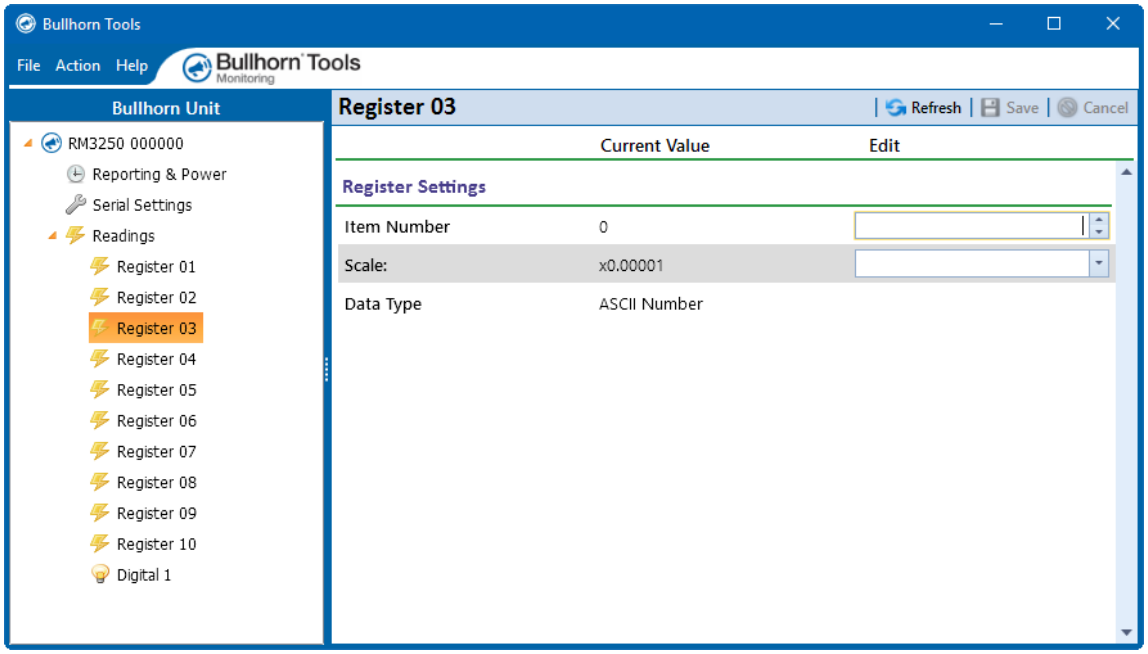

Figure 8-1. Register Settings

a. **Item Number** — user-defined number for the register.

b. **Scale** — sets a scaling value for the register's value when read from the meters, which is multiplied or divided by factors of 10. Accepted scaling values include 0.00001, 0.0001, 0.001, 0.01, 0.1, 1, 10, 100, 1000, 10000, or 100000.

3. Click **Save** to save settings or **Cancel** to clear all fields.

4. For digital inputs, complete the following configuration steps in the *Digital Input 1* pane:

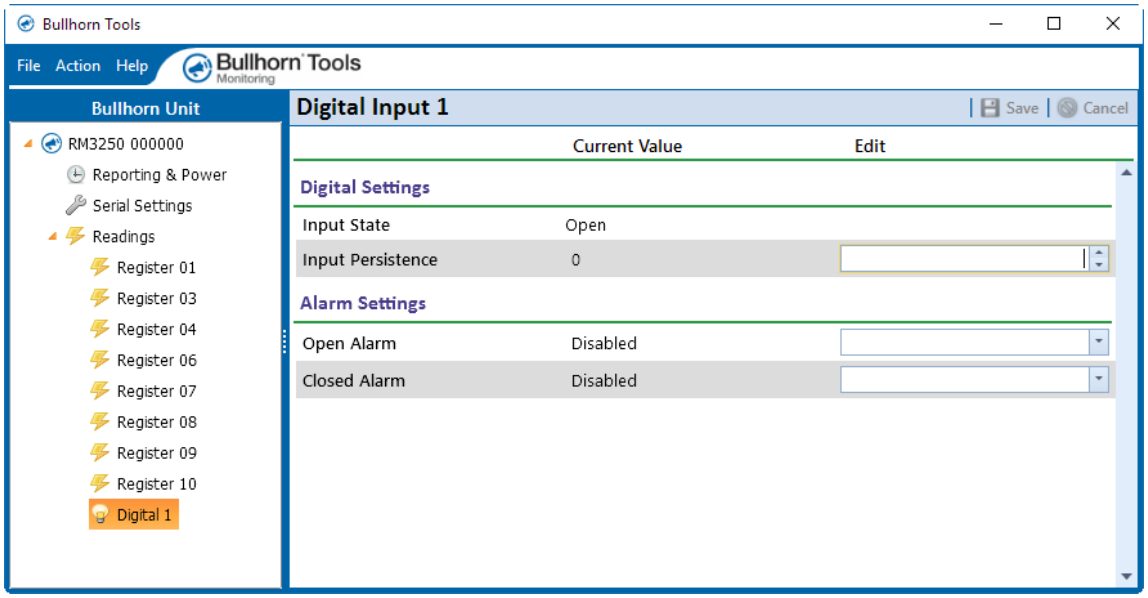

Figure 8-2. Digital Input Settings and Alarms

a. The **Input State** is a fixed field.

b. Enter a value (in milliseconds) to set how long the input must remain in a state other than the current state before an alarm is sent in the **Input Persistence** field.

c. To set an alarm that will send an alarm packet to your Bullhorn Web account whenever there is a change to the **Input State**, enable one or both of the alarms (**Open** or **Closed**).

5. Click **Save** to save settings or **Cancel** to clear all fields.
6. Click **Refresh** to update the information.

Sending a Test Message

Complete the following steps to send a test message to the Bullhorn Web account:

NOTE: After the batteries have been connected, the unit sends a **Startup** packet to the Bullhorn Web account. Refer to *Installing the RM3250 on page 22*.

---

1. Click the **Send Test Message** button or select **Action** > **Send Test Message**.
2. In the *Info* message window, click **OK**.

   A packet is sent to your Bullhorn Web account with current data point information. View the packet (labeled **Test**) on the Unit Detail page, under the **Incoming Packets** tab.

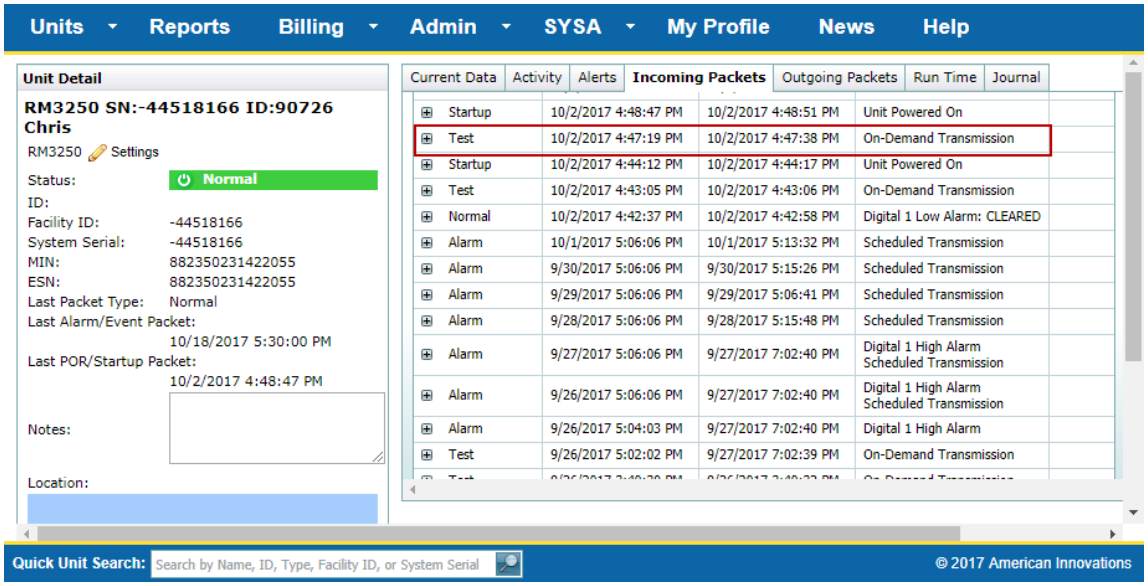

Figure 8-1. Unit Detail on Bullhorn Web

Working with Templates

After configuring a unit, the settings can be saved in a template. You can use the template to set up another unit of the same type. The saved templates can also be exported to your computer or deleted.

- *Creating Templates on page 83*
- *Importing, Exporting, and Deleting Templates on page 84*

Creating Templates

Complete the following steps to create a new template:

1. Click **File** > **Create Template**.
2. Enter a name for the new template in the **Name** field.

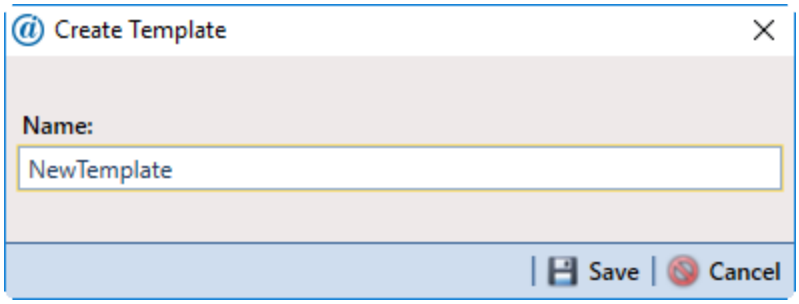

Figure 8-1. Create New Template

3. Click **Save** to save settings or **Cancel** to reset all fields.

Importing, Exporting, and Deleting Templates

Saved templates can be imported or exported to your computer or deleted from Bullhorn Tools.

Complete the following steps to import, export, or delete a template:

1. Click **File > Template Management**.

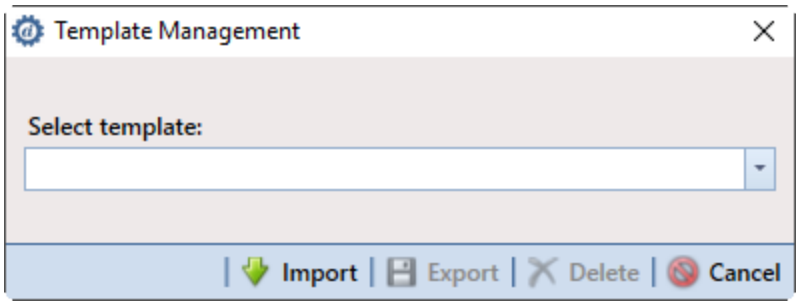

Figure 8-1. Template Management

2. To import a saved template from your computer, click **Import**. Browse to the saved template and click **Open**. The template is added to the list of available templates.
3. To export a saved template to your computer as a Bullhorn Template (*.bht*) file:
   a. Select the template from the Select template drop-down list.
   b. Click **Export**.
   c. Select a destination for the file, and then click **Save**.
4. To delete a template, select the template from the drop-down list and click **Delete**.

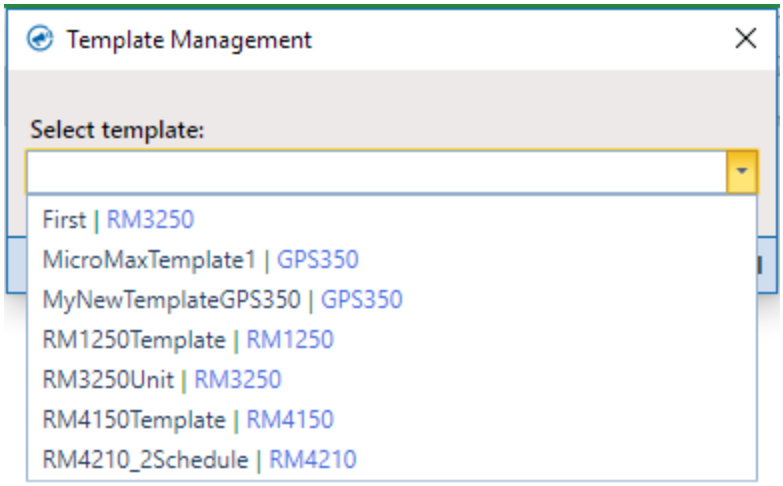

Figure 8-2. Template Management - Select Template

Upgrading RM3250 Firmware

Available upgrades to the RM3250 firmware can be applied to the unit using Bullhorn Tools. Complete the following steps to upgrade unit firmware:

NOTE: Contact the Technical Services team for more information on the latest firmware available.

1. Click **Action** > **Upgrade Firmware**.

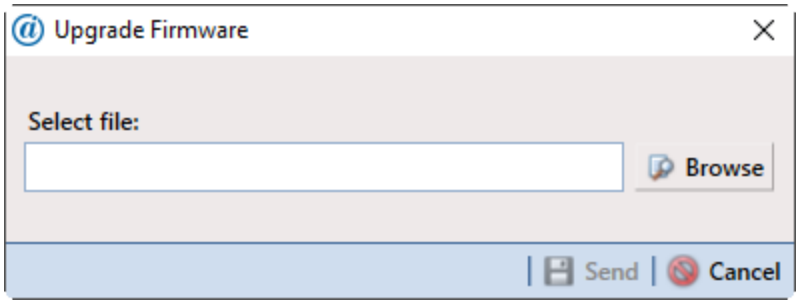

Figure 8-1. Upgrade Firmware

2. Click **Browse** to search for the firmware file. This file should have the extension *.bhf*.
   a. Open the firmware file.
   b. Click **Send**.

   After the upgrade process is complete, the unit will reset. If you are using a Bluetooth connection with Bullhorn Tools, you may have to re-activate the unit.
3. To verify that the firmware was updated, click the unit name in the navigation pane. **Firmware**

Version is displayed in the *Unit Information* pane of the *Unit Overview* window. The firmware version number should match the version you just sent to the unit.

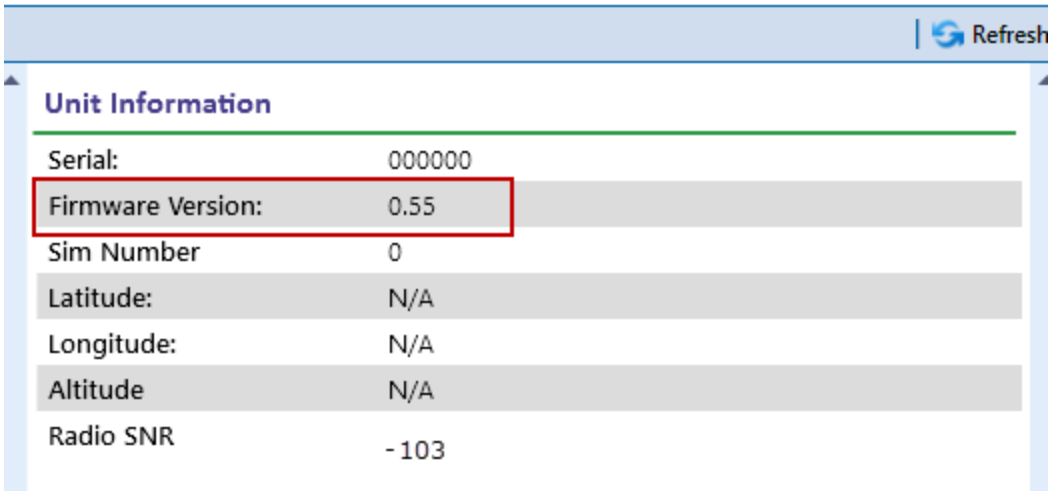

Figure 8-2. Firmware Version

De-activate Bluetooth

The unit will disconnect automatically after 10 minutes. It is not necessary to swipe the activation point again unless you wish to de-activate the Bluetooth connection immediately.

A Firmware Updates

When firmware updates are available, they can be applied to the unit using one of the following methods:

- Bullhorn Tools software or mobile app — the RM3250 can be upgraded using either of the Bullhorn Tools applications. Refer to *Upgrading RM3250 Firmware on page 85* for more information.
- The Field Update Tool (FUT) — the RM3011 and RM3012 use a FUT to update the unit's firmware. The FUT includes a 10-pin ISP (In System Programming) connector. It may take between 50 seconds and 5 minutes to update the firmware.

WARNING: The firmware on the FUT device is compatible ONLY with the type of unit identified on the label of the FUT device. Also make sure NOT to update the with an older version of firmware. Use the UCT software to compare the firmware version of the unit with the firmware version on the FUT label.

Use the FUT to update firmware on the following RM3000 Series units:

- *Updating RM3011 Firmware on page 87*
- *Updating RM3012 Firmware on page 89*

Updating RM3011 Firmware

WARNING: To prevent electrostatic discharge (ESD) damage when handling electronic equipment, always wear an anti-static wrist strap attached to an unpainted, grounded metal object. Ensure the wrist strap has maximum contact with bare skin. If an anti-static wrist strap is unavailable, discharge static electricity from yourself and your clothing by touching a grounded metal object before handling electronic equipment.

Complete the following steps to update the RM3011 firmware:

1. Open the enclosure of the RM3011 and then verify the unit is receiving power.
2. Run the UCT software and then record all RM3011 configuration settings including the

accumulator value, if applicable.

3. Exit the UCT software and then disconnect the configuration cable from the RM3011.
4. Plug one end of the provided FUT cable in the ISP connector on the RM3011. Plug the other end of the cable in the 10-pin connector on the FUT.

IMPORTANT: Do not disconnect the FUT cable during the firmware update. If the cable disconnects, reconnect the cable to restart the process.

---

5. Verify the update process by viewing the following LEDs (light emitting diodes) on the FUT device:

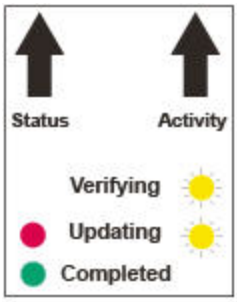

Figure A-1. LED Lights

- **Yellow Activity Indicator:** Begins flashing five (5) seconds after connecting the cable. FUT device is verifying if the RM3011 requires updating.
- **Red Status and Yellow Activity Indicators:** Red LED turns ON, and yellow LED flashes during the update.
- **Green Status Indicator:** Green LED turns ON when update completes or if the firmware does not require updating.
- When the green status indicator turns ON, disconnect the cable from the FUT device and the RM3011.

6. Power cycle the unit.
7. Run the UCT software and then complete the following steps:
   a. Reconfigure the time.
   b. If applicable, reconfigure the accumulator value.
   c. Verify all configuration settings are correct.
8. Secure the enclosure covering.

Updating RM3012 Firmware

WARNING: To prevent electrostatic discharge (ESD) damage when handling electronic equipment, always wear an anti-static wrist strap attached to an unpainted, grounded metal object. Ensure the wrist strap has maximum contact with bare skin. If an anti-static wrist strap is unavailable, discharge static electricity from yourself and your clothing by touching a grounded metal object before handling electronic equipment.

Complete the following steps:

1. Place RM3012 on a flat surface.
2. Use a screwdriver to loosen the screws at each corner of the enclosure top.

   You do not need to remove the screws from the enclosure; only loosen enough to remove cover.

Figure A-1. Enclosure Cover Screws

3. Remove cover and set next to enclosure bottom.

   The RM3012 internal battery should still be connected and supplying power even if external DC source is terminated.
4. Run the UCT software and then record all RM3012 configuration settings including the accumulator value, if applicable.
5. Exit the UCT software and then disconnect the configuration cable from the RM3012.

6. Plug one end of the provided FUT cable in the ISP connector on the RM3012. Plug the other end of the cable in the 10-pin connector on the FUT.

IMPORTANT: Do not disconnect the FUT cable during the firmware update. If the cable disconnects, reconnect the cable to restart the process.

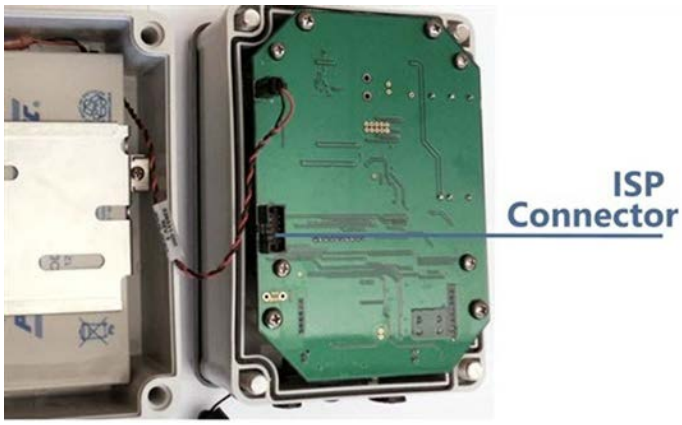

Figure A-2. ISP Connector

7. Verify the update process by viewing the following LEDs (light emitting diodes) on the FUT device:

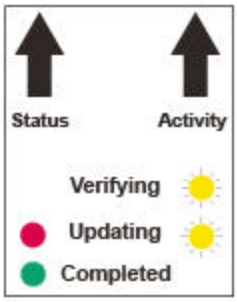

Figure A-3. LED Lights

- **Yellow Activity Indicator** — begins flashing five (5) seconds after connecting the cable. FUT device is verifying if the RM3012 requires updating.
- **Red Status and Yellow Activity Indicators** — red LED turns ON, and yellow LED flashes during the update.
- **Green Status Indicator** — green LED turns ON when update completes or if the firmware does not require updating.

B

Battery Replacement

The RM3012 backup 12 volt sealed, rechargeable battery that is installed inside the enclosure can be replaced.

CAUTION: If the RM3012 is operating in low power mode or if power is terminated to the RM3012, the unit will be unable to send any information to Bullhorn Web.

Replacing the Backup Battery

WARNING: To prevent electrostatic discharge (ESD) damage when handling electronic equipment, always wear an anti-static wrist strap attached to an unpainted, grounded metal object. Ensure the wrist strap has maximum contact with bare skin. If an anti-static wrist strap is unavailable, discharge static electricity from yourself and your clothing by touching a grounded metal object before handling electronic equipment.

Complete the following steps:

1. Turn **OFF** DC power to the RM3012.
2. Power off the RM3012 by disconnecting the cable assembly from the 9-pin connector.

Figure B-1. RM3012 Connector

3. Place RM3012 on a flat surface.
4. Use a screwdriver to loosen the screws at each corner of the enclosure top.
5. You do not need to remove the screws from the enclosure; only loosen enough to remove cover.

Figure B-2. Enclosure Cover Screws

6. Remove cover and set next to enclosure bottom.
7. Disconnect battery connection.

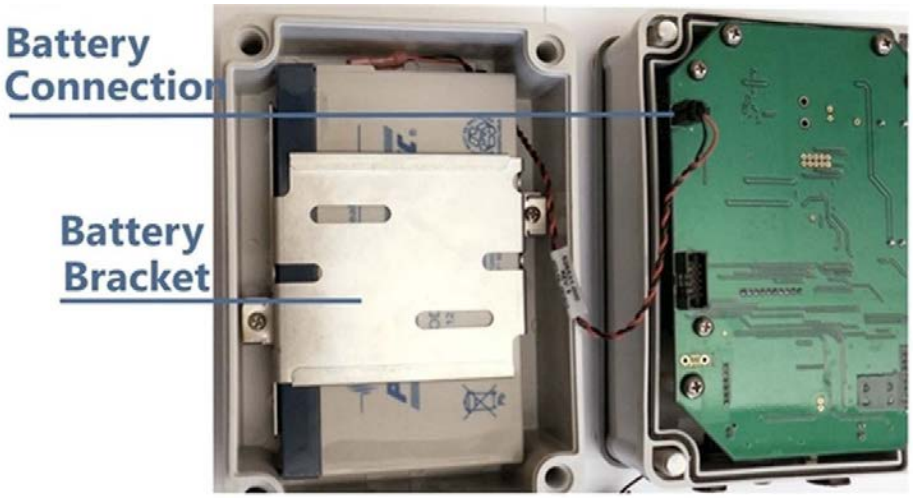

Figure B-3. Battery Connection and Bracket

8. Remove battery bracket screws.
9. Remove battery bracket.
10. Remove battery.
11. Place new battery in enclosure and replace battery bracket. Ensure that the battery cable is free

from the bracket.

12. Replace the cover over the battery compartment. Ensure that the battery cable and connector are secure in enclosure.
13. Tighten the four (4) corner screws on cover.
14. Reconnect input wiring to 9-pin connector
15. Turn DC power **ON** to restore power to field wiring.

C

Technical Specifications

The technical specifications for the following RM3000 Series units include important information to consider before installing or configuring a unit for service. If available, American Innovations parts numbers are included for reference. If you need to order new or replacement parts or accessories for any unit, please contact the American Innovations sales team at sales@aiworldwide.com.

RM3012 Technical Specifications

This appendix includes technical specifications for the RM3012 and any included parts.

- **Inputs**
  - up to sixteen 6-digit register readings
  - eight 12-digit registers readings
  - or combination of both
- **Power** — 12 - 36 V DC input with backup battery
- **Included Parts**:
  - four mounting magnets
  - circular 9-pin cable assembly
  - oil sensor switch

RM3250 Technical Specifications

This appendix includes technical specifications for theRM3250 and any included parts.

- **Environmental conditions**:
  - Indoor or outdoor use
  - Maximum altitude: 3,000 m
  - Temperature range: -30° C to +60° C
  - Units can be used in 100% humidity (rain)

- **Inputs** — 10 registers and 1 digital dry contact closure
  - **Dry contact**:
    - 100 µA source current
    - Maximum cycle rate = 8 cycle/s; minimum state change duration = 125 ms
  - **Digital input**:
    - Accumulates up to a 9-digit reading
    - Minimum Logic 1 = 1 V; maximum Logic 0 = 800 mV
    - Accumulator: maximum rate = 8 count/second
    - Minimum state change duration = 125 ms

- **Interconnect cable** — Belden 5308UE; 300 Vrms; rated FT4; 600 V - 105° C, or equivalent.
- **Battery** — Specified batteries shall be used - part number 517206-000 (included).
- **Included Parts**:
  - dome assembly (part number 826552-000)
  - flat base adapter (part number 517208-000)
  - batteries, set of 2 (part number 517206-000):
  - Li-Ion, 7.4 V, 2.0 Ah capacity
  - Lithium, 3.6 V, 13.0 Ah capacity
  - American Innovations USB dongle (part number 626595-000)

D Equipment and Regulatory Notices

The following regulatory notices pertain to the RM3000 Series remote monitoring units included in this User Guide:

RM3250 Equipment Notes

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D Hazardous Locations or Non-Hazardous Locations only.

The RM3250 are intended for transmissions at a frequency of no greater than once per hour.

FCC Requirements

The following FCC requirements are met by the products described in this guide.

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 in an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Export Control Classification Number

The Export Control Classification Number (ECCN) assigned to the Bullhorn Tools software by the U.S. Bureau of Industry and Security (BIS) is as follows:

- **ECCN Classification:** No Classification
- **ECCN Code:** EAR99 or NLR