

Rosemount™ 248 Wireless Temperature Transmitter



CE IEC WirelessHART



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Rosemount™ 248 Wireless Temperature Transmitter

Rosemount 248 Wireless Hardware Revision	1
HART® Device Revision	1
Device Install Kit/DD Revision	Device Revision 01, DD Revision 01 or greater
Device Type	2676

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure to thoroughly understand the contents before installing, using or maintaining this product.

For technical assistance, contacts are listed below:

Customer Central

Technical support, quoting, and order-related questions.

United States - 1-800-999-9307 (7:00 am to 7:00 pm CST)

Asia Pacific- 65 777 8211

Europe/Middle East/Africa - 49 (8153) 9390

North American Response Center

Equipment service needs

1-800-654-7768 (24 hours—includes Canada)

Outside of these areas, contact your local Emerson™ representative.

⚠ CAUTION

The products described in this document are NOT designed for nuclear-qualified applications. Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings.

For information on Rosemount nuclear-qualified products, contact a Emerson Sales Representative.

⚠ WARNING

Failure to follow these installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.

Explosions could result in death or serious injury.

- Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Review the approvals section of this manual for any restrictions associated with a safe installation.
- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

Process leaks may cause harm or result in death.

- Do not remove the thermowell while in operation.
- Install and tighten thermowells and sensors before applying pressure.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.
- This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

The power module may be replaced in a hazardous area. The power module has surface resistivity greater than one gigaohm and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

NOTICE

The Rosemount 248 Wireless and all other wireless devices should be installed only after the Smart Wireless Gateway has been installed and is functioning properly. Wireless devices should also be powered up in order of proximity from the Smart Wireless Gateway, beginning with the closest. This will result in a simpler and faster network installation.

NOTICE

Shipping considerations for wireless products (lithium batteries: Green Power Module, model number 701PGNKF):

The unit was shipped to you without the power module installed. Remove the power module prior to shipping the unit.

Each Green Power Module contains one “D” size primary lithium-thionyl chloride battery. Primary lithium batteries are regulated in transportation by the U. S. Department of Transportation, and are also covered by IATA (International Air Transport Association), ICAO (International Civil Aviation Organization), and ARD (European Ground Transportation of Dangerous Goods). It is the responsibility of the shipper to ensure compliance with these or any other local requirements. Consult current regulations and requirements before shipping.

Power Module Considerations (Green Power Module, model number 701PGNKF):

The Green Power Module with the wireless unit contains one “D” size primary lithium-thionyl chloride battery (model number 701PGNKF). Each battery contains approximately 5.0 grams of lithium. Under normal conditions, the battery materials are self-contained and are not reactive as long as the batteries and the pack integrity are maintained. Care should be taken to prevent thermal, electrical or mechanical damage. Contacts should be protected to prevent premature discharge.

Battery hazards remain when cells are discharged.

Power modules should be stored in a clean and dry area. For maximum power module life, storage temperature should not exceed 30 °C.

Section 1 Introduction

1.1 Using this manual

The sections in this manual provide information on installing, operating, and maintaining the Rosemount™ 248 Wireless Temperature Transmitter with *WirelessHART*® protocol. The sections are organized as follows:

- Section 2: Configuration provides instruction on commissioning and operating Rosemount 248 Wireless Transmitters. Information on software functions, configuration parameters, and online variables is also included.
- Section 3: Installation contains mechanical and electrical installation instructions.
- Section 4: Commissioning contains techniques for properly commissioning the device.
- Section 5: Operation and Maintenance contains operation and maintenance techniques.
- Section 6: Troubleshooting provides troubleshooting techniques for the most common operating problems.
- Appendix A: Specifications and Reference Data supplies reference and specification data, as well as ordering information.
- Appendix B: Product Certifications contains approval information.
- Appendix C: Alert Message Mapping contains important alerts in the HART® command 48 additional status field for the 248 Wireless Transmitter.

Rosemount 248 Wireless Transmitter

Features of the Rosemount 248 Wireless Transmitter include:

- An installation-ready solution that provides a variety of mounting options, transmitter configurations, and sensors/thermowells
- Flexibility to meet your most demanding applications
- Wireless output with >99% data reliability delivers rich HART data, protected by industry leading security
- The integral LCD display conveniently shows the primary sensor input and diagnostics of the transmitter.
- Simple and easy installation practices already used today for robust installations

Refer to the following literatures for a full range of compatible connection heads, sensors, and thermowells provided by Emerson.

- Rosemount 214 Temperature Sensors [Product Data Sheet](#).
- Rosemount 114 Thermowells [Product Data Sheet](#).

1.2 Product recycling/disposal

Recycling of equipment and packaging should be taken into consideration and disposed of in accordance with local and national legislation/regulations.

Section 2 Configuration

Overview	page 3
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2.1 Overview

This section contains information on configuration and verification that should be performed prior to installation.

Field Communicator and AMS™ Device Manager instructions are given to perform configuration functions. For convenience, Field Communicator Fast Key sequences are labeled “Fast Keys” for each software function below the appropriate headings.

Sensor input trim example

Fast Key sequence	1, 2, 3, etc.
-------------------	---------------

2.2 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow these installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.

Explosions could result in death or serious injury.

- Before connecting a Field Communicator in an explosive atmosphere, make sure the instruments are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

Process leaks could result in death or serious injury.

- Do not remove the thermowell while in operation.
- Install and tighten thermowells and sensors before applying pressure.

⚠ WARNING

Electrical shock could cause death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.
- This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.
- The power module may be replaced in a hazardous area. The power module has surface resistivity greater than one gigaohm and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

2.3 Sensor connections

The Rosemount 248 Wireless Transmitter is compatible with a number of RTD and thermocouple sensor types. Figure 2-1 shows the correct input connections to the sensor terminals on the transmitter. To ensure a proper sensor connection, anchor the sensor lead wires into the appropriate compression terminals and tighten the screws.

Thermocouple or Millivolts inputs

The thermocouple can be connected directly to the transmitter. Use appropriate thermocouple extension wire if mounting the transmitter remotely from the sensor.

RTD or Ohm inputs

The transmitters will accept a variety of RTD or ohmic configurations, including 2-, 3- or 4-wire connections. If the transmitter is mounted remotely from a 3- or 4-wire RTD, it will operate within specifications, without recalibration, for lead wire resistances of up to 5 ohms per lead (equivalent to 500 feet of 20 AWG wire). In this case, the leads between the RTD and transmitter should be shielded. If using a 2-wire connection, both RTD leads are in series with the sensor element, so significant errors can occur if the lead lengths exceed three feet of 20 AWG wire (approximately 0.05 °C/ft.). For longer runs, attach a third or fourth lead to achieve a 3- or 4-wire connection as described above.

Effect-RTD input

Since the lead wires are part of the RTD circuit, the lead wire resistance needs to be compensated for to achieve the best accuracy. This becomes especially critical in applications where long sensor and/or lead wires are used. There are three lead wire configurations commonly available. In a two-wire configuration there can be no compensation for lead wire resistance since the lead wires are in series with the element and appear to the transmitter as part of the sensor's resistance causing inherent accuracy degradation. In a 3-wire configuration, compensation is accomplished using the third wire with the assumption that it will be the same resistance as the other two wires and the same

compensation is applied to all three wires. A 4-wire design is ideal because the lead wire resistance is inconsequential to the measurement. It uses a measurement technique where a very small constant current of about 150 micro amps is applied to the sensor through two leads and the voltage developed across the sensor is measured over the other two wires with a high-impedance and high resolution measuring circuit. In accordance with Ohm's Law, the high impedance virtually eliminates any current flow in the voltage measurement leads and therefore the resistance of the leads is not a factor.

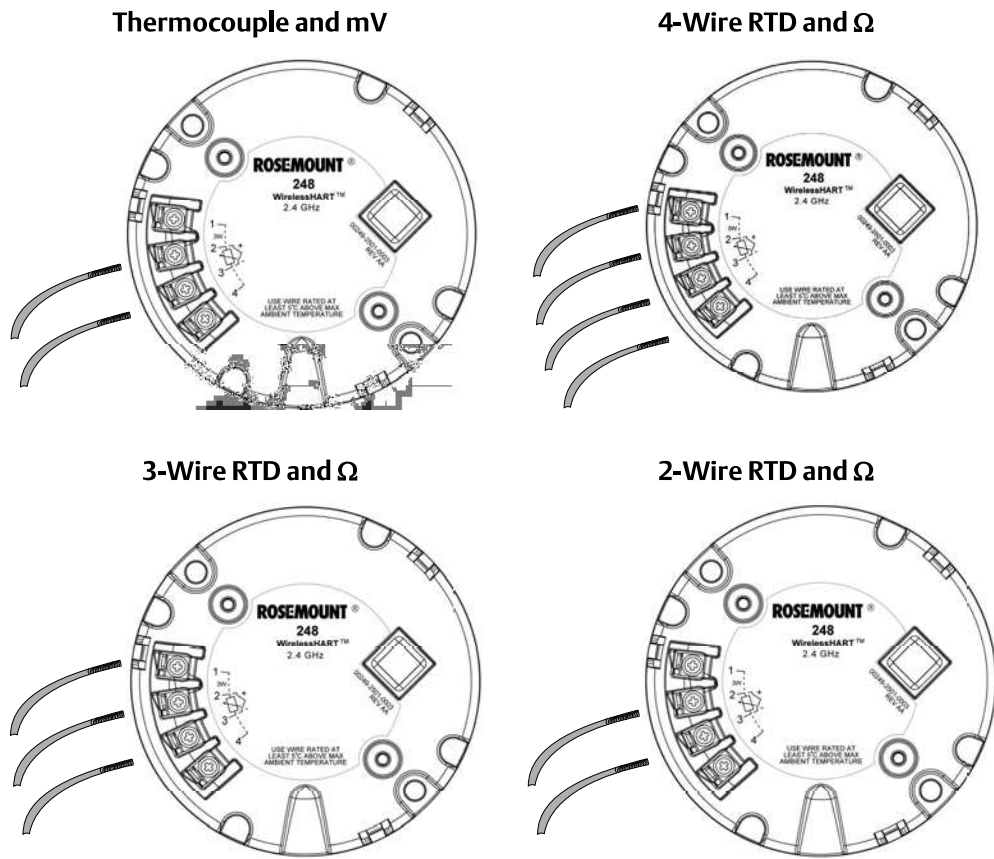
Table 2-1. Examples of Approximate Basic Error

Sensor input	Approximate basic error
4-wire RTD	Negligible ⁽¹⁾
3-wire RTD	Error in reading is equivalent to unbalanced lead wire resistance ⁽²⁾
2-wire RTD	Error in reading is equivalent to total lead wire resistance

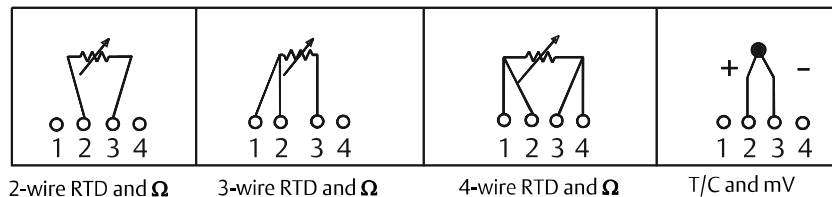
1. Independent of lead wire resistance up to 5 Ω per lead.

2. Unbalanced lead wire resistance is the maximum resistance differences between any two leads.

Figure 2-1. Sensor Wiring



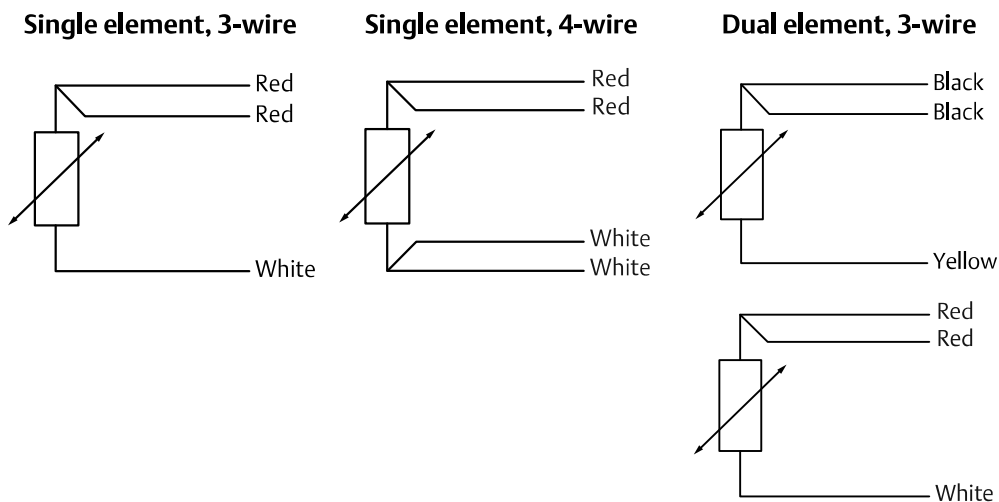
248 Wireless Sensor Connections



Note

Emerson provides 4-wire sensors for all single element RTDs. Use these RTDs in 3- or 2-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.

Figure 2-2. Rosemount 214C RTD Lead Wire Configurations per IEC 60751

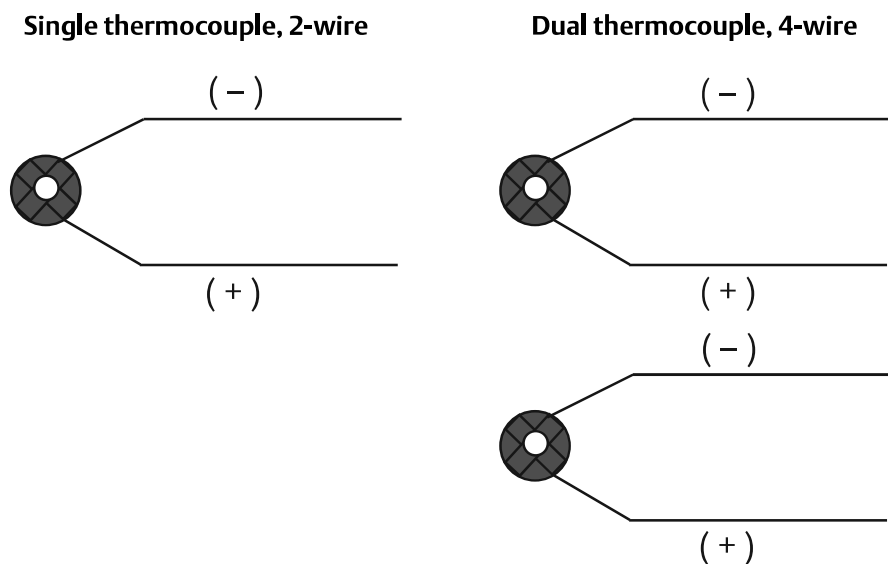


Note

To configure a single element, 4-wire RTD as a 3-wire system, connect only one white lead. Insulate or terminate the unused white lead in a manner that prevents shorting to the ground.

To configure a single element, 4-wire RTD as a 2-wire system, connect matching colored wires first and then connect the paired wires to the terminal.

Figure 2-3. Rosemount 214C Thermocouple Lead Wire Configurations



	IEC 60584 thermocouple colors		ASTM E- 230 thermocouple colors	
Type	POS (+)	NEG (-)	POS (+)	NEG (-)
J	Black	White	White	Red
K	Green	White	Yellow	Red
T	Brown	White	Blue	Red

Note

Dual thermocouple sensors are shipped with one pair of the wires shrink wrapped together.

Sensor leads

 If the sensor is installed in a high-voltage environment and a fault condition or installation error occurs, the sensor leads and transmitter terminals could carry lethal voltages. Use extreme caution when making contact with the leads and terminals.

Use the following steps to wire the sensor and supply power to the transmitter:

1. Remove the power module cover (if applicable).
2. Remove the transmitter enclosure cover (if applicable).
3. Remove the LCD display (if applicable).
4. Loosen the captive screws and Remove LCD adapter plate (if applicable).
5. Attach the sensor leads according to Figure 2-1.
6. Reattach and secure LCD adapter plate to 5 in-lbs of torque (if applicable).
7. Reattach the LCD display (if applicable).
8. Connect the Green Power Module.
9. Verify the connection by observing the LCD display (if applicable).
10. Reattach and tighten the covers (if applicable).
11. Always ensure a proper seal by installing the covers so that polymer contacts polymer (i.e. no O-ring visible). Use Rosemount O-rings.

2.4 Bench top configuration

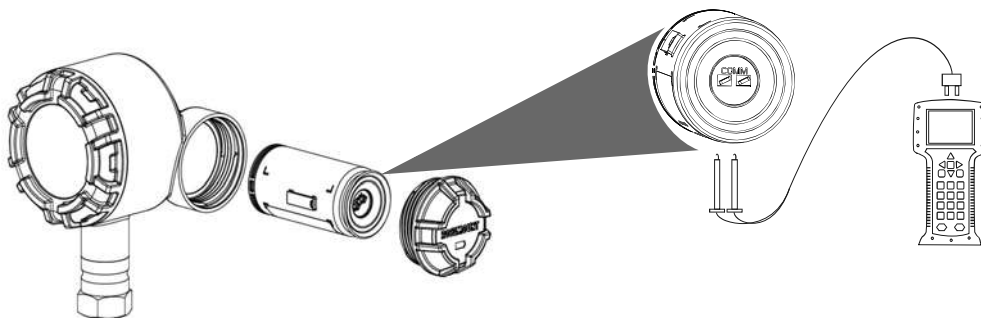
Bench top configuration consists of testing the transmitter and verifying transmitter configuration data. The Rosemount 248 Wireless temperature transmitters must be configured before installation, which may be performed either directly or remotely. Direct configuration can be performed using a Field Communicator, AMS Device Manager, AMS Wireless Configurator, or any *WirelessHART*® Communicator. Remote configuration can be performed using AMS Device Manager, AMS Wireless Configurator, or the Smart Wireless Gateway.

When using a Field Communicator, any configuration changes made must be sent to the transmitter by using the **Send** key (**F2**). AMS configuration changes are implemented when the **Apply** button is clicked.

The power module must be installed to provide power to the Rosemount 248 Wireless for configuration. To communicate to the transmitter, begin by removing the power module

cover. This will expose the HART communication terminals located on the Green Power Module. Next, connect the Field Communicator leads to the COMM port connections on the Green Power Module.

Figure 2-4. Field Communicator Connections



Field Communicator

If performing device configuration directly, connect the bench equipment and turn on the Field Communicator by pressing the **ON/OFF** key. When using a Field Communicator, any configuration changes must be sent to the transmitter by using the **Send** key (**F2**).

The Field Communicator will search for a HART®-compatible device and indicate when the connection is made. If the Field Communicator fails to connect, it will indicate that no device was found. If this occurs, refer to Section 6: Troubleshooting.

AMS Device Manager and AMS Wireless Configurator

When configuring the Rosemount 248 Wireless using AMS Device Manager or AMS Wireless Configurator, double click the **Rosemount 248 Wireless device** icon (or right click and select **Con/Setup**), then select the *Configure Menu*. AMS configuration changes are implemented when the **Apply** button is clicked.

During direct connection configuration, AMS will search for a HART-compatible device and indicate when the connection is made. If AMS fails to connect, it indicates that no device was found. If this occurs, refer to Section 6: Troubleshooting.

Emerson Smart Wireless Gateway

The Rosemount 248 Wireless supports limited remote configuration through the Smart Wireless Gateway. The Gateway allows configuration of the following device parameters: HART Tag, Short Tag, Descriptor, Engineering Units, Update Rate and Range Values.

Device sensor configuration

Every temperature sensor has unique characteristics. In order to ensure the most accurate measurement, the Rosemount 248 Wireless should be configured to match the specific sensor that it will be connected to. Prior to installation, verify the configuration and connection settings of the temperature sensor through a Field Communicator or AMS.

Default settings

The Rosemount 248 Wireless default configuration is shown below:

Sensor Type	Pt 100 ($\alpha = 0.00385$)
Engineering Units	°C
Number of Lead Wires	4
Network ID	Factory generated network parameters
Join Key	Factory generated network parameters
Update Rate	1 minute

Note

The C1 option code can be used to enable factory configuration of the Update Rate, Date, Descriptor and Message fields. This code is not required to have the factory configure the Sensor Type, Connection or the Self Organizing Network parameters.

2.5 Device network configuration

2.5.1 Join to network

Fast Keys	2, 1, 2
------------------	---------

In order to communicate with the Smart Wireless Gateway, and ultimately the Host System, the transmitter must be configured to communicate over the wireless network. This step is the wireless equivalent of connecting wires from a transmitter to the host system.

1. From the *Home* screen, select **2: Configure**.
2. Select **1: Guided Setup**.
3. Select **2: Join to Network**.

Using a Field Communicator or AMS to communicate with the transmitter, enter the Network ID and Join Key so they match the Network ID and Join Key of the Smart Wireless Gateway and the other devices in the network. If the Network ID and Join Key are not identical to those set in the Gateway, the transmitter will not communicate with the network. The Network ID and Join Key may be obtained from the Smart Wireless Gateway on the *Setup>Network>Settings* page on the web server.

2.5.2 Configure update rate

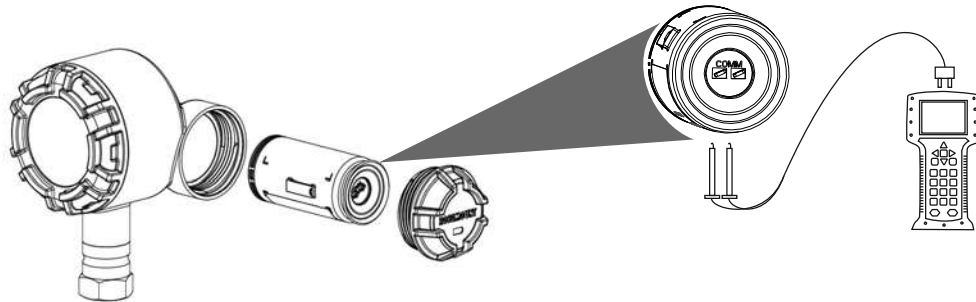
Fast Keys	2, 1, 3
------------------	---------

The Update Rate is the frequency at which a new measurement is taken and transmitted over the wireless network. This by default is 1 minute. This may be changed at commissioning, or at any time via AMS. The Update Rate is user selectable from 1 second to 60 minutes.

1. From the *Home* screen, select **2: Configure**.
2. Select **1: Guided Setup**.
3. Select **3: Configure Update Rate**.

When the device configuration is completed, remove the power module and replace the module cover. The power module should be inserted only when the device is ready to be commissioned. Use caution when handling the power module.

Figure 2-5. Field Communicator Connections



2.5.3 HART menu tree

Figure 2-6. Overview

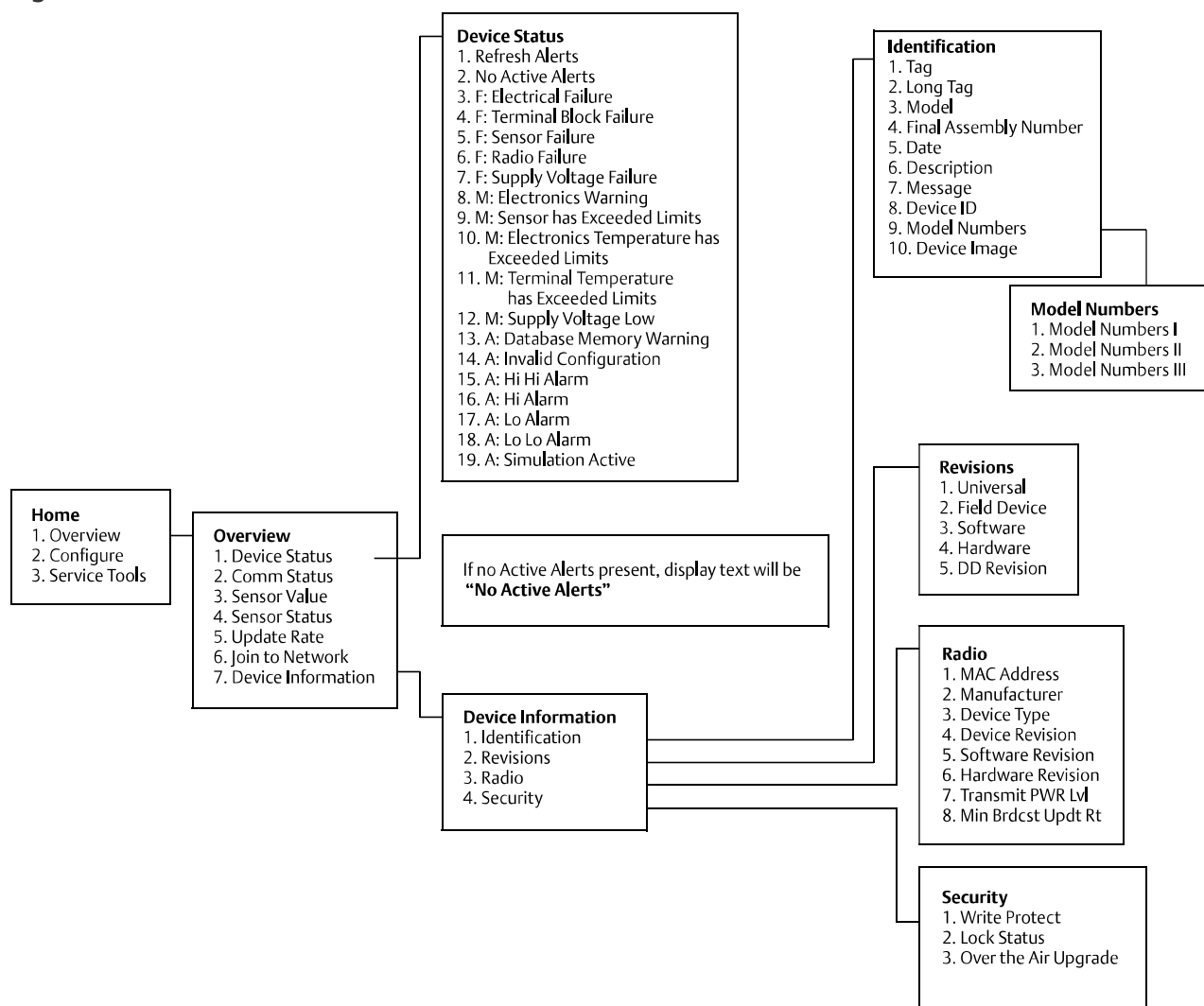


Figure 2-7. Configure

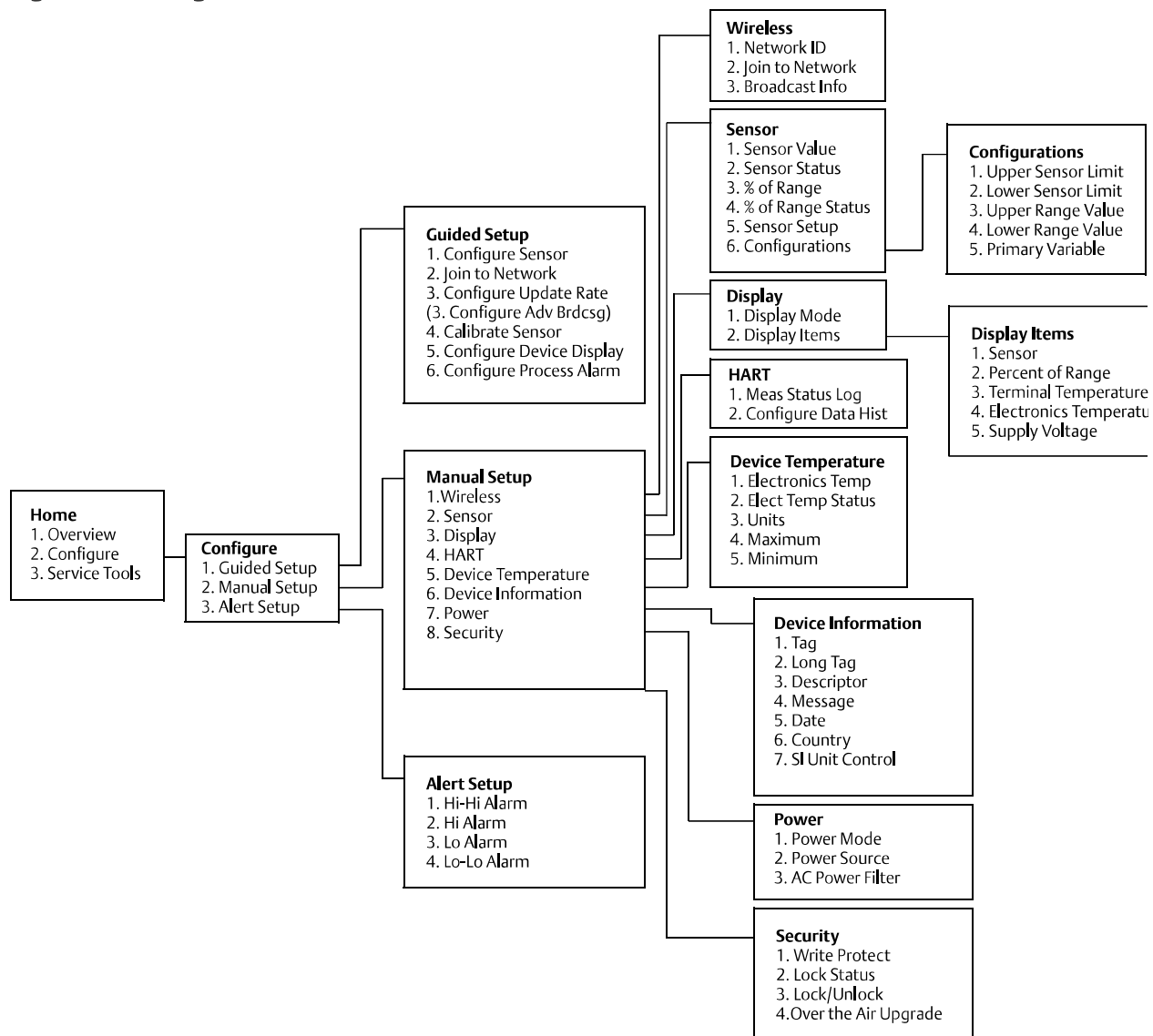
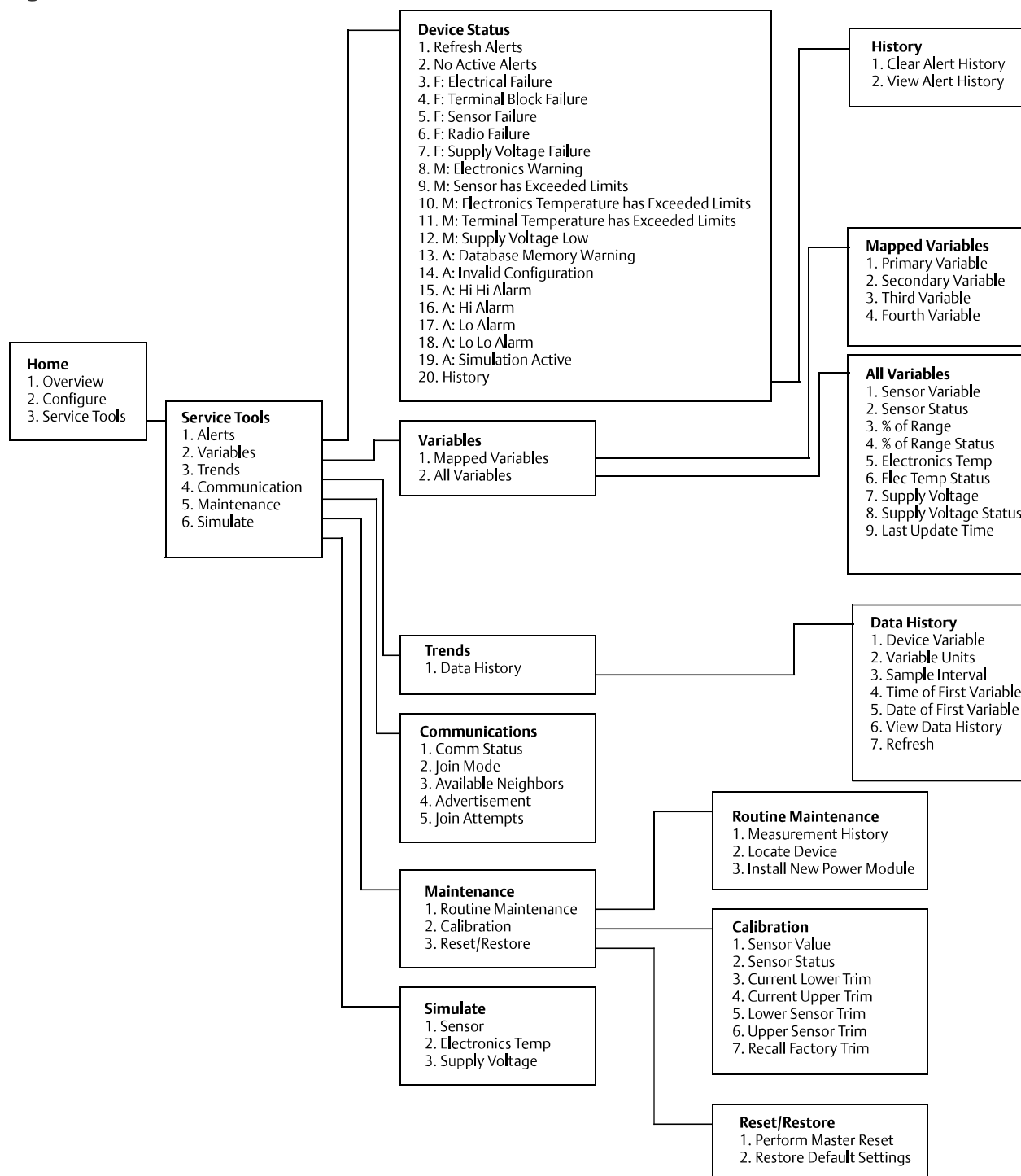


Figure 2-8. Service Tools



2.5.4 Fast Key sequence

Table 2-2 lists the Fast Key sequences for common transmitter functions.

Note

The Fast Key sequences assume that Device Revision 01, DD Revision 01 or greater is being used.

Table 2-2. Rosemount 248 Wireless Fast Key Sequence

Function	Key sequence	Menu items
Device Information	1, 7	Identification, Revisions, Radio, Security
PV Range Values	2, 2, 3	PV LRV, PV URV, LSL, USL
Lower Range Value	2, 2, 2, 6, 3, 2	Set the temperature for the 0% point to configure the Percent of Range
Upper Range Value	2, 2, 2, 6, 3, 1	Set the temperature for the 100% point to configure the Percent of Range
Sensor Trim (Calibration)	2, 1, 4	Lower Sensor Trim, and Upper Sensor Trim
Wireless Network	2, 1, 2	N/A
Sensor Configuration	2, 1, 1	Configure Sensor Type and Units, View Current Sensor Configuration

2.5.5 Calibration

Calibrating the transmitter increases the measurement precision by allowing corrections to be made to the factory-stored characterization curve by digitally altering the transmitter's interpretation of the sensor input.

To understand calibration, it is necessary to understand that smart transmitters operate differently from analog transmitters. An important difference is that smart transmitters are factory-characterized, meaning that they are shipped with a standard sensor curve stored in the transmitter firmware. In operation, the transmitter uses this information to produce a process variable output, in engineering units, dependent on the sensor input.

Calibration of the Rosemount 248 Wireless may include the following procedure:

- Sensor Input Trim: Digitally alter the transmitter's interpretation of the input signal

Trim the transmitter

The Sensor Input Trim function may be used when calibrating.

Sensor calibration

Fast Keys	3, 5, 2
------------------	---------

Perform a sensor trim if the transmitters digital value for the primary variable does not match the plant's standard calibration equipment. The sensor trim function calibrates the sensor to the transmitter in temperature units or raw units. Unless your site-standard input source is NIST-traceable, the trim functions will not maintain the NIST-traceability of the system.

The Sensor Input Trim command allows the transmitter's interpretation of the input signal to be digitally altered. The sensor reference command trims, in engineering(°F, °C, °R, K) or raw(Ω , mV) units, the combined sensor and transmitter system to a site standard using a known temperature source. Sensor trimming is suitable for validation procedures or for applications that require calibrating the sensor and transmitter together.

Use the following procedure to perform a sensor trim with a Rosemount 248 Wireless:

1. Connect the calibration device or sensor to the transmitter. Refer to Figure 2-1 on page 6 or on the device terminal block for sensor wiring diagrams.
2. Connect the communicator to the transmitter.
3. From the *Home* screen, select *Service Tools>Maintenance>Calibration* to prepare to trim the sensor.
4. Select **6 Lower Sensor Trim** or **7 Upper Sensor Trim**.

Note

It is recommended to perform lower offset trims first, before performing upper slope trims.

5. Answer the question about configuring device for steady state sensor drive.
6. Select the appropriate sensor trim units at the prompt.
7. Adjust the calibration device to the desired trim value (must be within the selected sensor limits). If a combined sensor and transmitter system are being trimmed, expose the sensor to a known temperature and allow the temperature reading to stabilize. Use a bath, furnace or isothermal block, measured with a site-standard thermometer, as the known temperature source.
8. Select **OK** once the temperature stabilizes. The communicator displays the output value the transmitter associates with the input value provided by the calibration device.
9. Accept new calibration.

AMS Device Manager

For AMS Device Manager, configure the sensor as indicated above.

1. From the *Overview* screen select the **Calibrate** button.
2. Select **Lower Input Trim** or **Upper Limit Trim**.
3. The wizard will continue through the process.
4. The transmitter may be restored to the factory default by selecting:
Service Tools>Maintenance>Sensor Calibration>Recall Factory Trim.
5. The *wizard* will revert the transmitter to the factory trim for a given sensor.
6. Apply changes.

2.5.6 Configuring the LCD display

The LCD Display configuration command allows customization of the LCD display to suit application requirements. The LCD display will alternate between the selected items.

- Temperature Units
- Sensor Temperature
- % of Range
- Supply Voltage

Reference “LCD screen messages” on page 34 for images of LCD screens.

Enabling and configuring LCD display with a Field Communicator

From the *Home* screen, enter the Fast Key sequence

Fast Keys	2, 1, 5
------------------	---------

Transmitter ordered with the LCD display will be shipped with the display enabled and installed.

If the transmitter was ordered without the LCD display (and the LCD display was ordered as a spare part) or if the LCD display was disabled, follow these steps to enable the LCD display on the transmitter.

1. From the *Home* screen, select **2: Configure**.
2. Select **1: Guided Setup**.
3. Select **5: Configure Device Display**.
4. Select the option **Periodic**.
5. Select desired display options and click **Enter**.

Configuring LCD display with AMS Device Manager

Right click on the device and select **Configure**.

1. Click on **Configure Device Display** button under **Optional Setup**.
2. Select desired display options and click **Enter**.

2.5.7 Alerts

Fast Keys	2, 3
------------------	------

Alerts allow the user to configure the transmitter to output a HART message when the configured data point is exceeded. A process alert will be transmitter continuously if the set points are exceeded and the alert mode is ON. An alert will be displayed on a Field Communicator, AMS Device Manager status screen or in the error section of the LCD display. The alert will reset once the value returns within range.

Note

HI alert value must be higher than the LO alert value. Both alert values must be within the temperature sensor limits.

Figure 2-9. Rising Alert

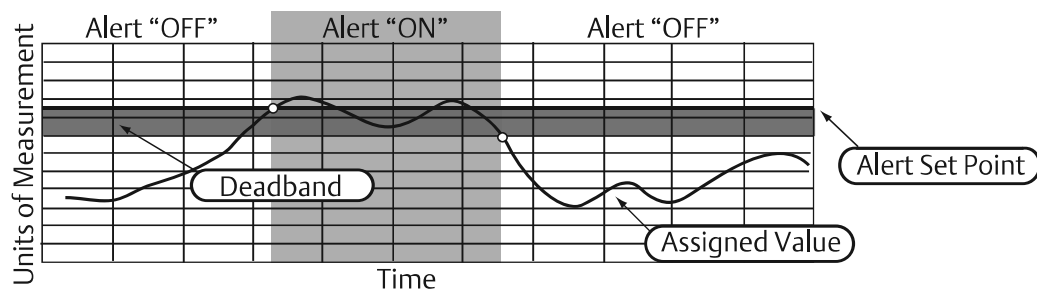
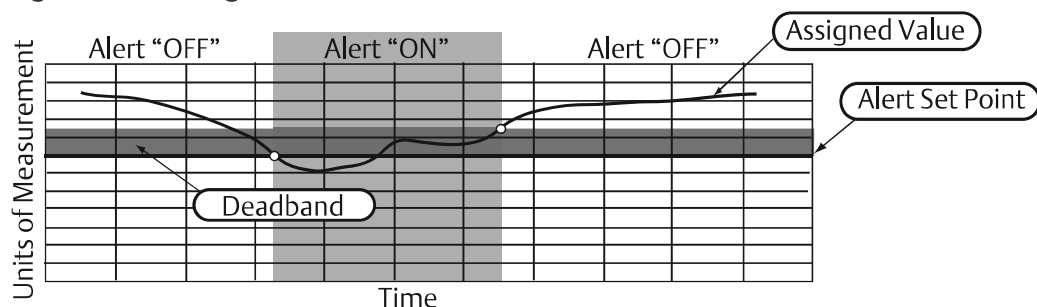


Figure 2-10. Falling Alert



Field Communicator

To configure the process alerts with a Field Communicator, perform the following procedure:

1. From the *HOME* screen, follow the Fast Key sequence, **2 Configure, 3 Alert Setup**.
2. Select **1** for HI-HI Alarm, or
3. Select **2** for HI Alarm, or
4. Select **3** for LO Alarm, or
5. Select **4** for LO-LO Alarm.
6. Select **1** to configure the alert.

2.6 Remove power module

After the sensor and network have been configured, remove the Power Module and replace the module cover. The power module should be inserted only when the device is ready to be commissioned. Use caution when handling the power module. The Power Module may be damaged if dropped from heights in excess of 20 feet.

Section 3 Installation

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Wireless consideration	page 20
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Mounting	page 22
Physical installation	page 23

3.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow these installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.

Explosions could result in death or serious injury.

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- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

Process leaks may cause harm or result in death.

- Do not remove the thermowells while in operation.
- Install and tighten thermowells and sensors before applying pressure.

Electrical shock can result in death or serious injury.

Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

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- This device must accept any interference received, including interference that may cause undesired operation.
- This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

The power module may be replaced in a hazardous area. The power module has surface resistivity greater than one gigaohm and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

3.2 Wireless consideration

3.2.1 Power up sequence

The Rosemount 248 Wireless Transmitter and all other devices should be installed only after the Smart Wireless Gateway (“Gateway”) has been installed and is functioning properly. Wireless devices should also be powered up in order of proximity from the Gateway, beginning with the closest. This will result in a simpler and faster network installation. Enable Active Advertising on the Gateway to ensure new devices join the network faster. For more information see the Emerson Smart Wireless Gateway [Reference Manual](#).

3.2.2 Antenna position

The internal antenna is designed for multiple mounting orientations. The transmitter should be mounted according to best practices for your temperature measurement application. The transmitter should be approximately 3 ft. (1 m) from any large structure or building to allow clear communication to other devices.

3.2.3 Network design best practices

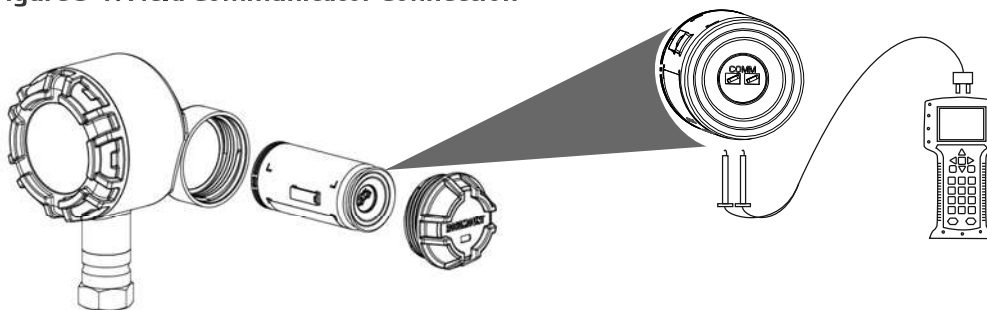
When mounting the device, recommended practices should be considered to achieve the best wireless performance. See “Mounting” on page 22 for more information on recommended practices.

3.3 Field Communicator connections

The power module must be installed in the device for the Field Communicator to interface with the Rosemount 248 Wireless Temperature Transmitter. The Field Communicator connections are located on the Green Power Module. To communicate to the transmitter, begin by removing the power module cover. This will expose the HART® communication terminals located on the Green Power Module. Next, connect the Field Communicator leads to the COMM port connections on the Green Power Module.

This transmitter uses the Green Power Module; order model number 701PGNKF. The power module is keyed and can only be inserted in one orientation. Field communication with this device requires a HART-based Field Communicator. Refer to Figure 3-1 for instructions on connecting the Field Communicator to the Rosemount 248 Wireless.

Figure 3-1. Field Communicator Connection



3.3.1 Mechanical

Location

When choosing an installation location and position, take into account the need for access to the mesh network, access to the transmitter and to the power module compartment for ease of power module replacement.

Electronics cover

The electronics cover is tightened so that polymer contacts polymer. When removing the electronics cover, ensure that there is no damage done to the O-ring. If damaged replace with a Rosemount O-ring before reattaching cover, ensuring polymer contacts polymer (i.e. no O-ring visible).

3.3.2 Electrical

Power module

The Rosemount 248 Wireless Temperature transmitter is self-powered. The power module contains a primary lithium-thionyl chloride battery (Green Power Module, model number 701PGNKF). Each battery contains approximately 5 grams of lithium. Under normal conditions, the battery materials are self-contained and are not reactive as long as the battery and the power module are maintained. Care should be taken to prevent thermal, electrical, or mechanical damage. Contacts should be protected to prevent premature discharge.

⚠ Use caution when handling the power module, it may be damaged if dropped from heights in excess of 20 feet.

Battery hazards remain when cells are discharged.

Power modules should be stored in a clean and dry area. For maximum power module life, storage temperature should not exceed 30 °C.

Sensor

Make sensor connections with the threaded 1½-in. NPT connection sensor adapter.

3.3.3 Environmental

Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

Temperature effects

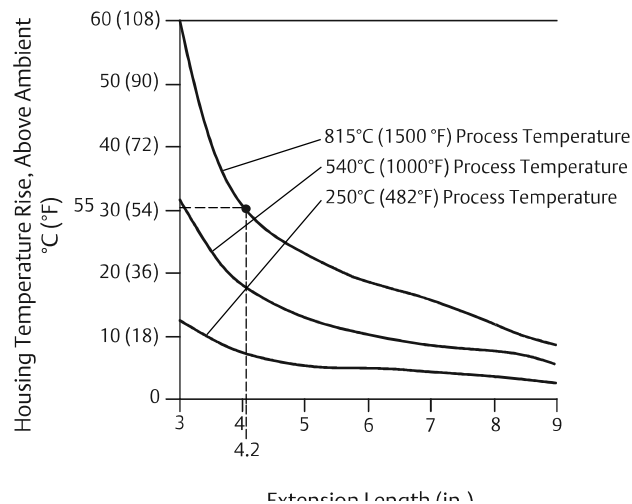
The transmitter will operate within specifications for ambient temperatures between -40 and 185°F (-40 and 85°C). Heat from the process is transferred from the thermowell to the transmitter housing. If the expected process temperature is near or beyond specification limits, consider the use of additional thermowell and extension, or remote mounting the transmitter to thermally isolate it from the process. See “Mounting” on page 22 for process temperature derating.

3.4 Mounting

The Rosemount 248 Wireless can be installed in one of two configurations: Direct Mount, where the sensor is connected directly to the 248 Wireless housing’s conduit entry, or Remote Mount, where the sensor is mounted separate from the 248 Wireless housing, then connected to the 248 Wireless via conduit. Select the installation sequence that corresponds to the mounting configuration.

Figure 3-2 provides an example of the relationship between transmitter housing temperature rise and extension length.

Figure 3-2. Rosemount 248 Wireless Transmitter Temperature Rise vs. Extension Length



Example

The transmitter specification limit is 85°C . If the ambient temperature is 55°C and the max process temperature to be measured is 815°C , the maximum permissible temperature rise is the transmitter specification limit minus the ambient temperature (moves 85 to 55 $^{\circ}\text{C}$), or 30°C .

In this case, an extension of 5-in. meets this requirement, but 6-in. provides an additional margin of thermowells protection, thereby reducing risk of ambient thermal damage.

Temperature limits

	Operating limit	Storage limit
With LCD display	-4 to 185 °F -20 to 85 °C	-40 to 185 °F -40 to 85 °C
Without LCD display	-40 to 185 °F -40 to 85 °C	-40 to 185 °F -40 to 85 °C

3.5 Physical installation

The Rosemount 248 Wireless can be installed in one of two configurations: Direct Mount, where the sensor is connected directly to the Rosemount 248 Wireless conduit entry, or Remote Mount, where the sensor is mounted separately from the Rosemount 248 Wireless housing, then connected to the Rosemount 248 Wireless via conduit. Choose the installation sequence that corresponds to the mounting configuration.

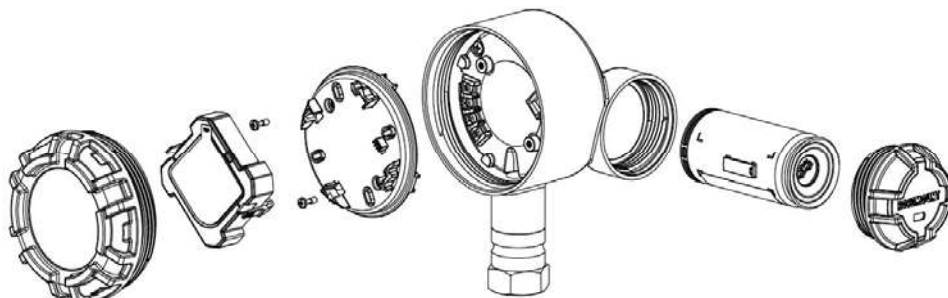
Upon installation of the Rosemount 248 Wireless, ensure that the conduit entry has an installed conduit fitting or cable gland with approved thread sealant.

3.5.1 Direct mount

The direct mount installation should not be used when installing with a Swagelok® fitting.

1. Remove the transmitter enclosure cover.
2. Remove the LCD display (if applicable).
3. Loosen the captive screws and remove LCD adapter plate (if applicable).

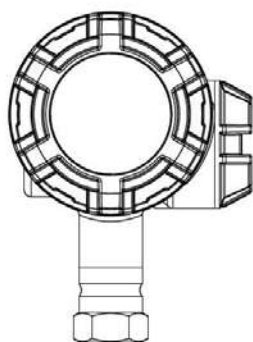
Figure 3-3. Exploded View of LCD Assembly



4. Attach the sensor to the 248 Wireless housing using the threaded conduit entry. Be sure to use an approved thread sealant on all connections.
5. Attach the sensor wiring to the terminals as indicated on Figure 2-1.
6. Reattach and secure LCD adapter plate to 5 in-lbs of torque (if applicable).
7. Reattach the LCD display (if applicable).
8. Reattach and tighten the transmitter enclosure cover.

9. Remove the power module cover.
10. Connect the Green Power Module.
11. Reattach and tighten the power module cover.
12. Always ensure a proper seal by installing the electronics housing cover(s) so that polymer contacts polymer (i.e. no O-ring visible). Use Rosemount O-rings.
13. Provide 1.75-in. (45 mm) of clearance for units without an LCD display. Provide 3-in. (76 mm) of clearance for units with an LCD display for cover removal.

Figure 3-4. Direct Mount



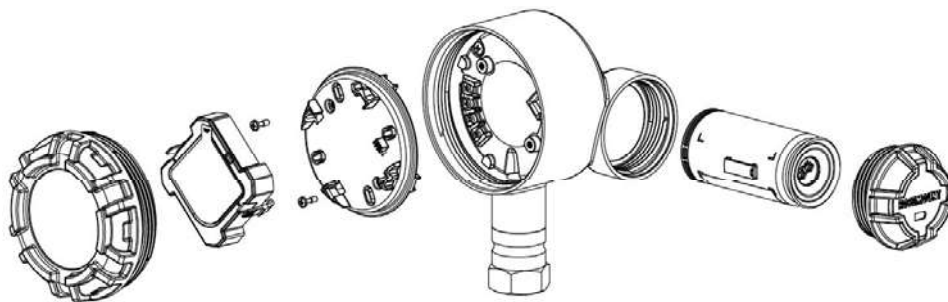
Note

Wireless devices should be powered up in order of proximity from the Smart Wireless Gateway, beginning with the closest device to the Gateway. This will result in a simpler and faster network installation.

3.5.2 Remote mount

1. Remove the transmitter enclosure cover.
2. Remove the LCD display (if applicable).
3. Loosen the captive screws and remove LCD display adapter plate (if applicable).

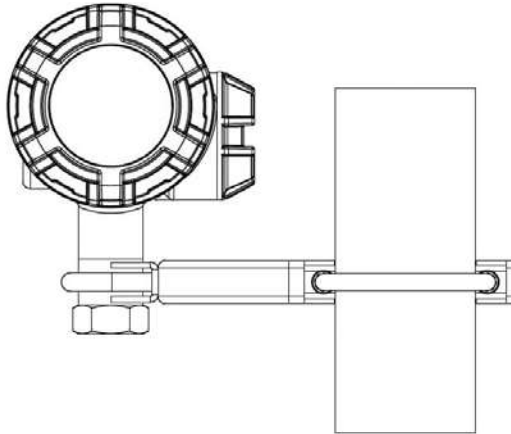
Figure 3-5. Exploded View of LCD Assembly



4. Run wiring (and conduit, if necessary) from the sensor to the Rosemount 248 Wireless.
5. Pull the wiring through the threaded conduit entry of the Rosemount 248 Wireless.

6. Attach the sensor wiring to the terminals as indicated on Figure 2-1.
7. Reattach and secure LCD display adapter plate to 5 in-lbs of torque (if applicable).
8. Reattach the LCD display (if applicable).
9. Reattach and tighten the transmitter enclosure cover.
10. Remove the power module cover.
11. Connect the Green Power Module.
12. Reattach and tighten the power module cover.
13. Always ensure a proper seal by installing the electronics housing cover(s) so that polymer contacts polymer (i.e. no O-ring visible). Use Rosemount O-rings.
14. Provide 1.75-in. (45 mm) of clearance for units without an LCD display. Provide 3-in. (76 mm) of clearance for units with an LCD display for cover removal.

Figure 3-6. Remote Mount



Note

Wireless devices should be powered up in order of proximity from the Smart Wireless Gateway, beginning with the closest device to the Gateway. This will result in a simpler and faster network installation.

3.5.3 LCD display

Transmitters ordered with the LCD display will be shipped with the display installed.

The optional LCD display can be rotated in 90-degree increments by squeezing the two tabs, pulling out, rotating and snapping back into place.

Use the following procedure and Figure 3-7 to install the LCD display:

1. Remove the power module cover and Green Power Module
2. Remove the transmitter enclosure cover. Do not remove the instrument covers in explosive environments when the circuit is live.
3. Tighten the captive screws and secure LCD adapter plate to 5 in-lbs of torque.
4. Attach the LCD display on the LCD adapter plate, rotate to the desired position and snap into place.
5. Reattach and tighten the transmitter enclosure cover.
6. Connect the Green Power Module.
7. Reattach and tighten the power module cover.
8. Always ensure a proper seal by installing the covers so that polymer contacts polymer (i.e. no O-ring visible). Use Rosemount O-rings.

To enable and configure the LCD display, refer to “Configuring the LCD display” on page 17.

Note the following LCD display temperature limits:

Operating: –40 to 185 °F (–40 to 85 °C)

Storage: –40 to 185 °F (–40 to 85 °C)

Note

Only use Rosemount Wireless LCD Part Number: 00753-3203-0001.

Note

A LCD display from a wired device will not function in a wireless device.

Figure 3-7. Optional LCD Display



Section 4 Commissioning

Safety messages	page 27
Verify operations	page 28
AMS Wireless Configurator	page 30
Troubleshooting	page 30
Reference information	page 31

4.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow these installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.

Explosions could result in death or serious injury.

- Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Review the approvals section of this manual for any restrictions associated with a safe installation.
- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

Process leaks may cause harm or result in death.

- Do not remove the thermowells while in operation.
- Install and tighten thermowells and sensors before applying pressure.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.
-

⚠ WARNING

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.
- This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.
- The power module may be replaced in a hazardous area. The power module has surface resistivity greater than one gigaohm and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

Note

The Rosemount 248 Wireless and all other wireless devices should be installed only after the Smart Wireless Gateway has been installed and is functioning properly. Wireless devices should also be powered up in order of proximity from the Smart Wireless Gateway, beginning with the closest device to the Gateway. This will result in a simpler and faster network installation.

4.2 Verify operations

Operations can be verified in four locations: at the device via the Local Display, using the Field Communicator, at the Smart Wireless Gateway's integrated web interface, or using AMS™ Suite Wireless Configurator or AMS Device Manager.

4.2.1 Local display

During normal operation, the LCD display will display the PV value at the configured update rate.

For Device Status screens, see “LCD screen messages” on page 34.

4.2.2 Field Communicator

For HART® Wireless transmitter communication, a Rosemount 248 Wireless DD is required. To obtain the latest DD, visit the Emerson Easy Upgrade site at:

Emerson.com/Rosemount/Device-Install-Kits/Device-Install-Kits-Search

The communication status may be verified in the wireless device using the following Fast Key sequence.

Table 4-1. Rosemount 248 Wireless Fast Key Sequence

Function	Key sequence	Menu items
Communications	3, 4	Comm Status, Join Mode, Available Neighbors, Advertisement, Join Attempts

4.2.3 Emerson Smart Wireless Gateway

In the integrated web interface from the Gateway, navigate to the *Explorer> Status* page. This page shows whether the device has joined the network and if it is communicating properly.

Note

It may take several minutes for the device to join the network.

Note

If the device joins the network and immediately has an alarm present, it is likely due to sensor configuration. Check the sensor wiring (see “Sensor Wiring” on page 31).

Figure 4-1. Smart Wireless Gateway Network Settings

The screenshot displays the 'Network Settings' page of the Emerson Smart Wireless Gateway web interface. The interface has a dark header with the Emerson logo, 'Smart Wireless Gateway Version: 4.5.27', and user links (admin, About, Help, Logout). A navigation bar below the header includes 'Home', 'Devices', 'System Settings', and a '+ Network Information' button. The left sidebar shows a tree view with 'Gateway' expanded, containing 'Network' (selected), 'Channels', 'Network Settings', 'Access Control List', and 'Network Statistics'. Below this are 'Protocols' and 'Users'. The main content area is titled 'Network Settings' and contains the following fields and options:

- Network name:** A text input field containing 'myNet'.
- Network ID:** A text input field containing '33333'.
- Join Key:** Four masked text input fields (each showing '*****'). Below them is a checkbox labeled 'Show join key'.
- Rotate network key?:** Radio buttons for 'Yes' and 'No' (selected).
- Change network key now?:** Radio buttons for 'Yes' and 'No' (selected).
- Security mode:** Radio buttons for 'Common join key' (selected) and 'Access control list'.
- Active Advertising:** Radio buttons for 'Yes' and 'No' (selected).

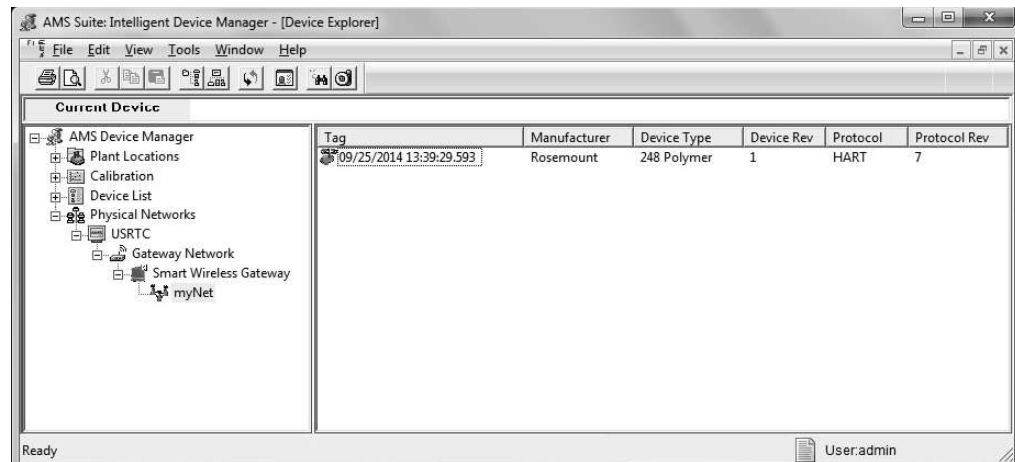
At the bottom of the settings area are two buttons: 'Save Changes' and 'Cancel'. The footer of the page includes the Emerson logo, navigation links (HOME, DEVICES, SYSTEM SETTINGS, ABOUT, HELP), and copyright information: 'Feedback Terms Of Use Privacy 4.5.27', '© 2013 Emerson Electric Co. All Rights Reserved', and 'Emerson is a trademark'.

4.3 AMS Wireless Configurator

When the device has joined the network, it will appear in the Wireless Configurator window as illustrated in figure below. For HART Wireless transmitter communication, a Rosemount 248 Wireless DD is required. To obtain the latest DD, visit the Emerson Easy Upgrade site at:

Emerson.com/Rosemount/Device-Install-Kits/Device-Install-Kits-Search

Figure 4-2. AMS Wireless Configurator



4.4 Troubleshooting

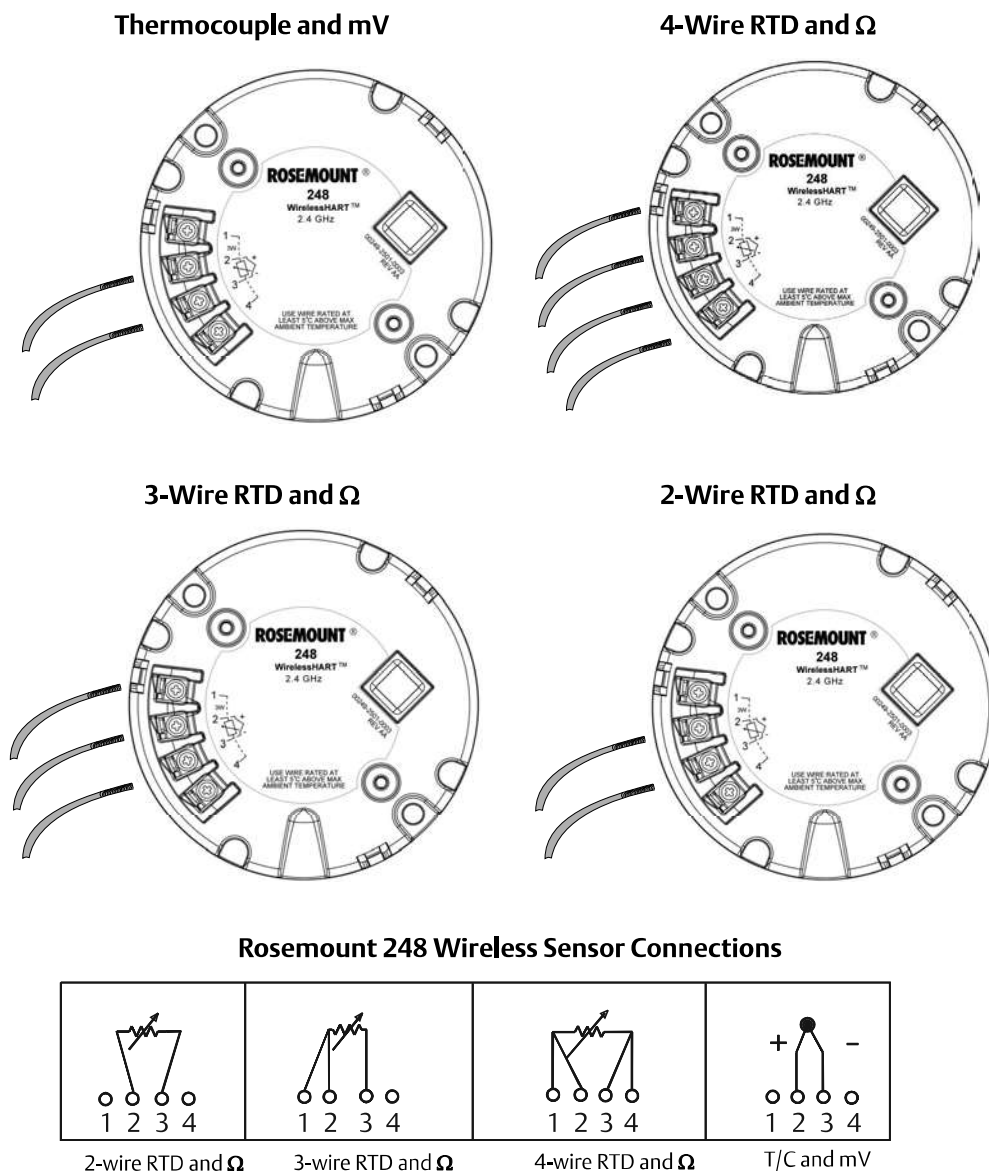
If the device is not joining to the network, check to make sure that you have a power supply in your device. If the device is not joined to the network after power up, verify the correct configuration of the Network ID and Join Key, and verify that Active Advertising has been enabled on the Smart Wireless Gateway. The Network ID and Join Key in the device must match the Network ID and Join Key of the Gateway.

The Network ID and Join Key may be obtained from the Gateway on the *Setup>Network>Settings* page on the web server (see Figure 4-1 on page 29). The Network ID and Join Key may be changed in the wireless device by using the following Fast Key sequence.

Function	Key sequence	Menu items
Join Device to Network	2,1,1	Join to Network

4.5 Reference information

Figure 4-3. Sensor Wiring



Note

Emerson provides 4-wire sensors for all single element RTDs. Use these RTDs in 3- or 2-wire configurations by leaving the unused leads disconnected and insulated with electrical tape.

Table 4-2. Rosemount WirelessHART® 248 Fast Key Sequences

Function	Key sequence	Menu items
Device Information	1, 7	Identification, Revisions, Radio, Security
Guided Setup	2, 1	Join Device to Network, Configure Update Rate, Configure Sensor, Calibrate Sensor
Manual Setup	2, 2	Wireless, Process Sensor, Percent of Range, Device Temperatures, Device Information, Other
Wireless Configuration	2, 2, 1	Network ID, Join to Network, Broadcast Info
Sensor Calibration	3, 5, 2	Sensor Value, Sensor Status, Current Lower Trim, Current Upper Trim, Lower Sensor Trim, Upper Sensor Trim, Recall Factory Trim

Section 5 Operation and Maintenance

Safety messages	page 33
LCD screen messages	page 34
Power module replacement	page 36

5.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow these installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.

Explosions could result in death or serious injury.

- Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Review the approvals section of the 248 Reference Manual for any restrictions associated with a safe installation.
- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

Process leaks may cause harm or result in death.

- Do not remove the thermowells while in operation.
- Install and tighten thermowells and sensors before applying pressure.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.
-

⚠ WARNING

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

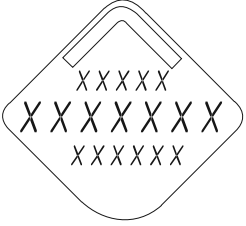
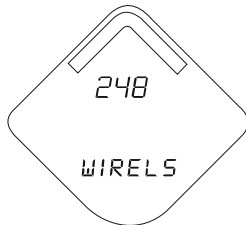
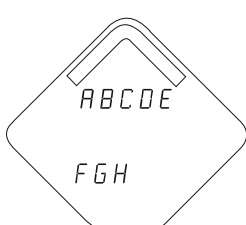
- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.
- This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

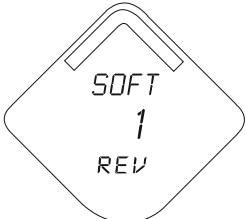
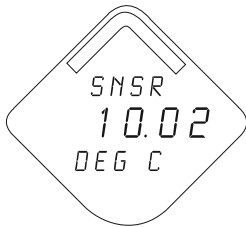
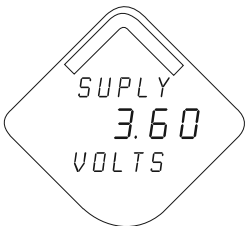
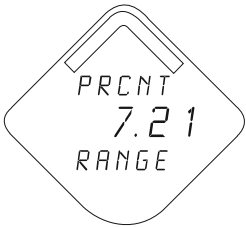
The power module may be replaced in a hazardous area. The power module has surface resistivity greater than one gigaohm and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

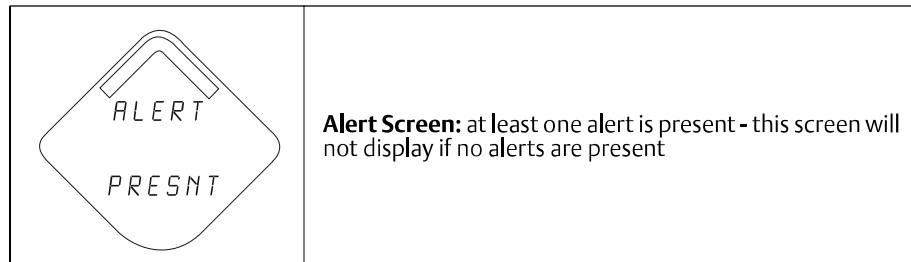
5.2 LCD screen messages

5.2.1 Startup screen sequence

The following screens will display when the power module is first connected to the Rosemount 248 Wireless.

	All Segments On: used to visually determine if there are any bad segments on the LCD
	Device Identification: used to determine Device Type.
	Device Information - Tag: user entered tag which is eight characters long - will not display if all characters are blank

	Software Revision: device software revision
	PV Screen: process temperature, ohms, or mV value depending on how the device is configured
	SV Screen: terminal temperature value
	TV Screen: device temperature value
	QV Screen: voltage reading at the power supply terminals
	Percent Range Screen: percent range reading



Note

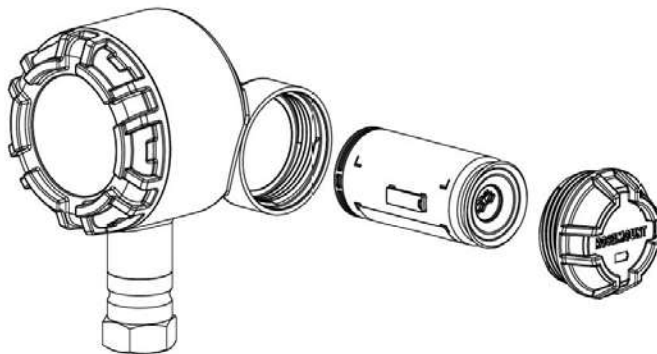
Use the Rosemount Wireless LCD Part Number: 00753-3203-0001.

5.3 Power module replacement

Expected power module life is 10 years at reference conditions.⁽¹⁾

When power module replacement is required, remove the cover and remove the Green Power Module. Replace the Green Power Module (part number 701PGNKF) and replace the cover. Tighten to specification and verify operation.

Figure 5-1. Exploded Power Module View



5.3.1 Handling considerations

The Green Power Module with the wireless unit contains one “D” size primary lithium-thionyl chloride battery (Green Power Module, model number 701PGNKF). Each battery contains approximately 5.0 grams of lithium. Under normal conditions, the battery materials are self-contained and are not reactive as long as the batteries and the pack integrity are maintained. Care should be taken to prevent thermal, electrical or mechanical damage.

Contacts should be protected to prevent premature discharge.

Power modules should be stored in a clean and dry area. For maximum power module life, storage temperature should not exceed 30 °C.

Use caution when handling the power module, it may be damaged if dropped from heights in excess of 20 feet.

 Battery hazards remain when cells are discharged.

1. Reference conditions are 70° F (21° C), transmit rate of once per minute, and routing data for three additional network devices.

5.3.2 Environmental considerations

As with any battery, local environmental rules and regulations should be consulted for proper management of spent batteries. If no specific requirements exist, recycling through a qualified recycler is encouraged. Consult the material's safety data sheet for battery specific information.

5.3.3 Shipping considerations

The unit was shipped to you without the power module installed. Remove the power module prior to shipping the unit.

Section 6 Troubleshooting

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Safety messages	page 39
Rosemount 248 Wireless Device Status Information	page 40
Rosemount 248 Wireless Troubleshooting	page 41
Wireless Network Troubleshooting	page 42

6.1 Overview

Table 6-2 provides summarized maintenance and troubleshooting suggestions for the most common operating problems. If you suspect malfunction despite the absence of any diagnostic messages on the Field Communicator display, follow the procedures described here to verify that transmitter hardware and process connections are in good working order. Always deal with the most likely checkpoints first.

6.2 Safety messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow these installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.

Explosions could result in death or serious injury.

- Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Review the approvals section of the 248 Reference Manual for any restrictions associated with a safe installation.
- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

Process leaks may cause harm or result in death.

- Do not remove the thermowells while in operation.
 - Install and tighten thermowells and sensors before applying pressure.
-

⚠ WARNING

Electrical shock can result in death or serious injury.

Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.
- This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

The power module may be replaced in a hazardous area. The power module has surface resistivity greater than one gigaohm and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

Table 6-1. Rosemount 248 Wireless Device Status Information

Device status	Description	Recommended action
Electronics Failure	An electronics error that could impact the device measurement reading has occurred.	1. Reset the device. 2. Reconfirm all configuration items in the device. 3. If the condition persists, replace the electronics.
Radio Failure	The wireless radio has detected a failure or stopped communicating.	1. Reset the device. 2. If the condition persists, replace the electronics.
Supply Voltage Failure	The supply voltage is too low for the device to function properly.	1. Replace the power module.
Electronics Warning	The device has detected an electronics error that does not currently impact the device measurement reading.	1. Reset the device. 2. Reconfirm all configuration items in the device. 3. If the condition persists, replace the electronics.
Electronics Temperatures has Exceeded Limits	The electronics temperature has exceeded the transmitter's maximum range.	1. Verify environmental temperature is within the transmitter's range. 2. Remote mount the transmitter away from process and environmental conditions. 3. Reset the device. 4. If the condition persists, replace the electronics.
Supply Voltage Low	The supply voltage is low and may soon affect broadcast updates.	1. Replace the power module.
Database Memory Warning	The device has failed to write to the database memory. Any data written during this time may have been lost.	1. Reset the device. 2. Reconfirm all configuration items in the device. 3. If logging dynamic data not needed, this advisory can be safely ignored. 4. If the condition persists, replace the electronics.
Configuration Error	The device has detected a configuration error based on a change to the device.	1. Click on details for more information. 2. Correct the parameter that has a configuration error. 3. Reset the device. 4. If the condition persists, replace the electronics.

Table 6-1. Rosemount 248 Wireless Device Status Information

Device status	Description	Recommended action
HI HI LIM	The primary variable has surpassed the user defined limit.	1. Verify the process variable is within user specified limits. 2. Reconfirm the user defined alarm limit. 3. If not needed, disable this alert.
HI LIM	The primary variable has surpassed the user defined limit.	1. Verify the process variable is within user specified limits. 2. Reconfirm the user defined alarm limit. 3. If not needed, disable this alert.
LO LIM	The primary variable has surpassed the user defined limit.	1. Verify the process variable is within user specified limits. 2. Reconfirm the user defined alarm limit. 3. If not needed, disable this alert.
LO LO LIM	The primary variable has surpassed the user defined limit.	1. Verify the process variable is within user specified limits. 2. Reconfirm the user defined alarm limit. 3. If not needed, disable this alert.
Simulation Active	The device is in simulation mode and may not be reporting actual information.	1. Verify that simulation is no longer required. 2. Disable Simulation mode in Service Tools. 3. Reset the device.

Table 6-2. Rosemount 248 Wireless Troubleshooting

Symptom	Potential source	Recommended action
High Output Temperature Detected	Sensor Input Failure or Connection	Connect a Field Communicator and enter the transmitter test mode to isolate a sensor failure. Check for a sensor open or short circuit. Check the process variable to see if it is out of range.
	Electronics Module	Connect a Field Communicator and enter the transmitter status mode to isolate module failure. Connect a Field Communicator and check the sensor limits to ensure calibration adjustments are within the sensor range.
Digital Temperature Output is Erratic	Wiring	Check sensor wiring integrity at all junctions to ensure proper connections.
	Electronics Module	Connect a Field Communicator and enter the transmitter test mode to isolate module failure.
Low Output or No Output	Sensor Element	Connect a Field Communicator and enter the transmitter test mode to isolate a sensor failure. Check the process variable to see if it is out of range.
	Electronics Module	Connect a Field Communicator and check the sensor limits to ensure calibration adjustments are within the sensor range. Connect a Field Communicator and enter the transmitter test mode to isolate an electronics module failure.
LCD display not operating	Electronics Module	Make sure the LCD display is enabled
	Connector	Make sure the LCD display pins are not bent
	LCD Display	Make sure the LCD display is properly seated with the tabs snapped in place and fully engaged

Table 6-3. Wireless Network Troubleshooting

Symptom	Recommended action
Device not joining the network	Verify network ID and join key. Verify network is in active network advertise. Wait longer (30 minutes). Check power module. Verify device is within range of at least one other device. Power Cycle device to try again. Verify device is configured to join. Ensure the Join Mode is configured to "Join on Powerup or Reset." See troubleshooting section of Smart Wireless Gateway for more information.
Short battery life	Check that "Power Always On" mode is off. Verify device is not installed in extreme temperatures. Verify that device is not a network pinch point. Check for excessive network rejoins due to poor connectivity. Increase the update rate. Reduce the variables displayed on LCD display.
Limited bandwidth error	Reduce the update rate on transmitter. Increase communication paths by adding more wireless points. Check that device has been on line for at least an hour. Check that device is not routing through a "limited" routing node. Create a new network with an additional Smart Wireless Gateway.

6.3 Service support

To expedite the return process outside of the United States, contact the nearest Emerson representative.

Within the United States, call the Emerson Instrument and Valves Response Center using the 1-800-654-RSMT (7768) toll-free number. This center, available 24 hours a day, will assist you with any needed information or materials.

The center will ask for the following information:

- Product model
- Serial numbers
- The last process material to which the product was exposed

The center will provide:

- A Return Material Authorization (RMA) number
- Instructions and procedures that are necessary to return goods that were exposed to hazardous substances.

▲ CAUTION

Individuals who handle products exposed to a hazardous substance can avoid injury if they are informed of and understand the hazard. If the product being returned was exposed to a hazardous substance as defined by OSHA, a copy of the required Material Safety Data Sheet (MSDS) for each hazardous substance identified must be included with the returned goods.

Note

If the device has been exposed to a hazardous substance, a Material Safety Data Sheet (MSDS) must be included with the returned materials. An MSDS is required by law to be available to people exposed to specific hazardous substances.

Appendix A Specifications and Reference Data

Specifications	page 45
Dimensional drawings	page 51
Ordering information	page 52

A.1 Specifications

A.1.1 Functional specifications

Input

Supports thermocouple, RTD, millivolt and ohm input types. See “Accuracy” on page 47 for sensor options.

Output

IEC 62591 (*WirelessHART*®), 2.4 GHz DSSS.

Wireless radio

Frequency: 2.4 - 2.4835 GHz

Channels: 15

Modulation: IEEE 802.15.4 compliant DSSS

Local display

The optional five-digit integral LCD display can display user-selectable information such as primary variable in engineering units, percent of range, and electronics temperature. The display updates based on the wireless update rate.

Humidity limits

0–99% relative humidity (non-condensing)

Update rate

WirelessHART, User selectable, 1 sec. to 60 min.

Accuracy

(PT 100 @ reference conditions: 20 °C)

±0.45 °C (±0.81 °F)

A.1.2 Physical specifications

Conformance to specification ($\pm 3\sigma$ [Sigma])

Technology leadership, advanced manufacturing techniques, and statistical process control ensure specification conformance to at least $\pm 3\sigma$.

Electrical connections

Power module

The SmartPower™ Power Module is field replaceable, featuring keyed connections that eliminate the risk of incorrect installation.

The power module is an Intrinsically Safe solution, containing lithium-thionyl chloride with a polybutadine terephthalate (PBT) enclosure.

The Rosemount 248 Wireless has a power module life time rating of 10 years with a one-minute update rate at reference conditions.⁽¹⁾

Note

Continuous exposure to ambient temperature limits of –40 °F or 185 °F (–40 °C or 85 °C) may reduce specified life by less than 20 percent.

1. Reference conditions are 70 °F (21 °C) and routing data for three additional network devices.

Note: Continuous exposure to ambient temperature limits of –40 °F or 185 °F (–40 °C or 85 °C) may reduce specified life by less than 20 percent.

Sensor terminals

Sensor terminals permanently fixed to terminal block.

Field Communicator connections

Communication terminals

HART® interface connections fixed to the green power module.

Materials of construction

Enclosure

Housing: PBT/PC with NEMA® 4X and IP66/67

Cover O-ring: Silicone

Conduit entry: 316 SST

Mounting

Transmitters may be attached directly to the sensor. Mounting brackets also permit remote mounting. See “Dimensional drawings” on page 51.

Weight

Rosemount 248 Wireless without M5 LCD display:

0.99 lb. (0.45 kg)

Rosemount 248 Wireless with M5 LCD display:

1.11 lb. (0.51 kg)

Enclosure ratings

NEMA 4X and IP66/67

A.1.3 Performance specifications

Electro Magnetic Compatibility (EMC)

The Rosemount 248 Wireless meets all requirements listed under IEC 61326 and NAMUR NE-21.

Transmitter measurement stability

The Rosemount 248 Wireless has a stability of $\pm 0.15\%$ of output reading or $0.15\text{ }^{\circ}\text{C}$ (whichever is greater) for 12 months.

Self calibration

The analog-to-digital measurement circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements.

Vibration effect

The Rosemount 248 Wireless in direct mounted configuration is tested to the following specifications with no effect on performance per IEC 60770-1, 1999:

Frequency	Acceleration
10–60 Hz	0.21 mm peak displacement
60–2000 Hz	3 g

The Rosemount 248 Wireless in remote counted configuration is tested to the following specifications with no effect on performance per IEC 60770-1, 1999:

Frequency	Acceleration
10–60 Hz	0.15 mm peak displacement
60–500Hz	2 g

A.1.4 Accuracy

Table A-1. Rosemount 248 Wireless Accuracy

Sensor options	Sensor reference	Input ranges		Digital accuracy ⁽¹⁾	
2-, 3-, 4-wire RTDs		°C	°F	°C	°F
Pt 100 ($\alpha = 0.00385$)	IEC 751	-200 to 850	-328 to 1562	± 0.45	± 0.81
Pt 200 ($\alpha = 0.00385$)	IEC 751	-200 to 850	-328 to 1562	± 0.45	± 0.81
Pt 500 ($\alpha = 0.00385$)	IEC 751	-200 to 850	-328 to 1562	± 0.57	± 1.026
Pt 1000 ($\alpha = 0.00385$)	IEC 751	-200 to 300	-328 to 572	± 0.57	± 1.026
Pt 100 ($\alpha = 0.003916$)	JIS 1604	-200 to 645	-328 to 1193	± 0.45	± 0.81
Pt 200 ($\alpha = 0.003916$)	JIS 1604	-200 to 645	-328 to 1193	± 0.45	± 0.81
Ni 120	Edison Curve No. 7	-70 to 300	-94 to 572	± 0.45	± 0.81
Cu 10	Edison Copper Winding No. 15	-50 to 250	-58 to 482	± 4.16	± 7.488
Pt 50 ($\alpha = 0.00391$)	GOST 6651-94	-200 to 550	-328 to 990	± 0.9	± 1.62
Pt 100 ($\alpha = 0.00391$)	GOST 6651-94	-200 to 550	-328 to 990	± 0.45	± 0.81
Cu 50 ($\alpha = 0.00426$)	GOST 6651-94	-50 to 200	-58 to 392	± 1.44	± 2.592
Cu 50 ($\alpha = 0.00428$)	GOST 6651-94	-185 to 200	-301 to 392	± 1.44	± 2.592
Cu 100 ($\alpha = 0.00426$)	GOST 6651-94	-50 to 200	-58 to 392	± 0.72	± 1.296
Cu 100 ($\alpha = 0.00428$)	GOST 6651-94	-185 to 200	-301 to 392	± 0.72	± 1.296
Thermocouples ⁽²⁾					
Type B ⁽³⁾	NIST Monograph 175, IEC 584	100 to 1820	212 to 3308	± 2.25	± 4.05
Type E	NIST Monograph 175, IEC 584	-50 to 1000	-58 to 1832	± 0.60	± 1.08
Type J	NIST Monograph 175, IEC 584	-180 to 760	-292 to 1400	± 1.05	± 1.89
Type K ⁽⁴⁾	NIST Monograph 175, IEC 584	-180 to 1372	-292 to 2501	± 1.46	± 2.628
Type N	NIST Monograph 175, IEC 584	-200 to 1300	-328 to 2372	± 1.46	± 2.628
Type R	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	± 2.25	± 4.05
Type S	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	± 2.1	± 3.78
Type T	NIST Monograph 175, IEC 584	-200 to 400	-328 to 752	± 1.05	± 1.89
DIN Type L	DIN 43710	-200 to 900	-328 to 1652	± 1.05	± 1.89
DIN Type U	DIN 43710	-200 to 600	-328 to 1112	± 1.05	± 1.89
Type W5Re/W26Re	ASTM E 988-96	0 to 2000	-32 to 3632	± 2.1	± 3.78
GOST Type L	GOST R 8.585-2001	-200 to 800	-328 to 1472	± 1.80	± 3.24
Other sensor types					
Millivolt Input		-10 to 100 mV		± 0.045 mV	
2-, 3-, 4-wire Ohm Input		0 to 2000 ohms		± 1.35 ohm	

1. The published digital accuracy applies over the entire sensor input range. Digital output can be accessed by HART Communications or wireless protocol.
2. Total digital accuracy for thermocouple measurement: sum of digital accuracy + 0.8 °C. (cold junction accuracy).
3. Digital accuracy for NIST Type B T/C is ± 9.0 °C (± 16.2 °F) from 100 to 300 °C (212 to 572 °F).
4. Digital accuracy for NIST Type K T/C is ± 2.1 °C (± 3.79 °F) from -180 to -90 °C (-292 to -130 °F).

A.1.5 Ambient temperature effect

Table A-2. Rosemount 248 Wireless Ambient Temperature Effects

Sensor options	Sensor reference	Input range °C	Temperature effects per 1.0 °C (1.8 °F) change in ambient temperature ⁽¹⁾⁽²⁾ °F	Digital accuracy
2-, 3-, 4-wire RTDs				
Pt 100 ($\alpha = 0.00385$)	IEC 751	–200 to 850	0.009 °C (0.0162 °F)	Entire sensor input range
Pt 200 ($\alpha = 0.00385$)	IEC 751	–200 to 850	0.012 °C (0.0216 °F)	Entire sensor input range
Pt 500 ($\alpha = 0.00385$)	IEC 751	–200 to 850	0.009 °C (0.0162 °F)	Entire sensor input range
Pt 1000 ($\alpha = 0.00385$)	IEC 751	–200 to 300	0.009 °C (0.0162 °F)	Entire sensor input range
Pt 100 ($\alpha = 0.003916$)	JIS 1604	–200 to 645	0.009 °C (0.0162 °F)	Entire sensor input range
Pt 200 ($\alpha = 0.003916$)	JIS 1604	–200 to 645	0.012 °C (0.0216 °F)	Entire sensor input range
Ni 120	Edison Curve No. 7	–70 to 300	0.009 °C (0.0162 °F)	Entire sensor input range
Cu 10	Edison Copper Winding No. 15	–50 to 250	0.06 °C (0.162 °F)	Entire sensor input range
Pt 50 ($\alpha = 0.00391$)	GOST 6651-94	–200 to 550	0.018 °C (0.0324 °F)	Entire sensor input range
Pt 100 ($\alpha = 0.00391$)	GOST 6651-94	–200 to 550	0.009 °C (0.0162 °F)	Entire sensor input range
Cu 50 ($\alpha = 0.00426$)	GOST 6651-94	–50 to 200	0.012 °C (0.0216 °F)	Entire sensor input range
Cu 50 ($\alpha = 0.00428$)	GOST 6651-94	–185 to 200	0.012 °C (0.0216 °F)	Entire sensor input range
Cu 100 ($\alpha = 0.00426$)	GOST 6651-94	–50 to 200	0.009 °C (0.0162 °F)	Entire sensor input range
Cu 100 ($\alpha = 0.00428$)	GOST 6651-94	–185 to 200	0.009 °C (0.0162 °F)	Entire sensor input range
Thermocouples				
Type B	NIST Monograph 175, IEC 584	100 to 1820	0.0435 °C	$T \geq 1000$ °C
			0.096 °C - (0.0075% of (T - 300))	300 °C $\leq T < 1000$ °C
			0.162 °C - (0.033% of (T - 100))	100 °C $\leq T < 300$ °C
Type E	NIST Monograph 175, IEC 584	–50 to 1000	0.015 °C + (0.00129% of absolute value T)	All

Table A-2. Rosemount 248 Wireless Ambient Temperature Effects

Sensor options	Sensor reference	Input range °C	Temperature effects per 1.0 °C (1.8 °F) change in ambient temperature ⁽¹⁾⁽²⁾ °F	Digital accuracy
Type J	NIST Monograph 175, IEC 584	−180 to 760	0.0162 °C + (0.00087% of T)	T ≥ 0 °C
			0.0162 °C + (0.0075% of absolute value T)	T < 0 °C
Type K	NIST Monograph 175, IEC 584	−180 to 1372	0.0183 °C + (0.0027% of T)	T ≥ 0 °C
			0.0183 °C + (0.0075% of absolute value T)	T < 0 °C
Type N	NIST Monograph 175, IEC 584	−200 to 1300	0.0204 °C + (0.00108% of absolute value T)	All
Type R	NIST Monograph 175, IEC 584	0 to 1768	0.048 °C	T ≥ 200 °C
			0.069 °C - (0.0108% of T)	T < 200 °C
Type S	NIST Monograph 175, IEC 584	0 to 1768	0.048 °C	T ≥ 200 °C
			0.069 °C - (0.0108% of T)	T < 200 °C
Type T	NIST Monograph 175, IEC 584	−200 to 400	0.0192 °C	T ≥ 0 °C
			0.0192 °C + (0.0129% of absolute value T)	T < 0 °C
DIN Type L	DIN 43710	−200 to 900	0.0162 °C + (0.00087% of T)	T ≥ 0 °C
			0.0162 °C + (0.0075% of absolute value T)	T < 0 °C
DIN Type U	DIN 43710	−200 to 600	0.0192 °C	T ≥ 0 °C
			0.0192 °C + (0.0129% of absolute value T)	T < 0 °C
Type W5Re/W26Re	ASTM E 988-96	0 to 2000	0.048 °C	T ≥ 200 °C
			0.069 °C - (0.0108% of T)	T < 200 °C
GOST Type L	GOST R 8.585-2001	−200 to 800	0.021 °C	T ≥ 0 °C
			0.0105 °C + (0.0045% of absolute value T)	T < 0 °C
Other sensor types				
Millivolt Input		−10 to 100 mV	0.0015 mV	Entire sensor input range
2-, 3-, 4-wire Ohm		0 to 2000 Ω	0.0252 Ω	Entire sensor input range

1. Change in ambient is with reference to the calibration temperature of the transmitter 68 °F (20 °C) from factory.

2. Ambient temperature effect specification valid over minimum temperature span of 28 °C (50 °F).

Transmitters can be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F). In order to maintain excellent accuracy performance, each transmitter is individually characterized over this ambient temperature range at the factory.

Temperature effects example

When using a Pt 100 ($\alpha = 0.00385$) sensor input at 30 °C ambient temperature:

- Digital Temperature Effects: $0.009\text{ °C} \times (30 - 20) = 0.09\text{ °C}$
- Worst Case Error: Digital + Digital Temperature Effects = $0.45\text{ °C} + 0.09\text{ °C} = 0.54\text{ °C}$
- Total Probable Error:
 $\sqrt{0.45^2 + 0.09^2} = 0.459\text{ °C}$

A.1.6 Lead wire resistance effect

Sensor lead wire resistance effect—RTD input

Examples of approximate lead wire resistance effect calculations

Given	α Pt 100 385 RTD
Total cable length	150 m
Imbalance of the lead wires at 20 °C	0.5 Ω
Resistance/length (18 AWG Cu)	0.025 Ω/m
Temperature coefficient of Cu (α_{Cu})	0.039 $\Omega/\Omega\text{ °C}$
Temperature coefficient of Pt (α_{Pt})	0.00385 $\Omega/\Omega\text{ °C}$
Change in Ambient Temperature (ΔT_{amb})	25 °C
RTD Resistance at 0 °C (R_0)	100 Ω (for Pt 100 RTD)

- Pt100 4-wire RTD: Negligible (independent of lead wire resistance up to 5 Ω per lead)
- Pt100 3-wire RTD:
Basic Error = $\frac{\text{Imbalance of Lead Wires}}{(\alpha_{\text{Pt}} \times R_0)}$

$$\text{Error due to amb. temperature variation} = \frac{(\alpha_{\text{Cu}}) \times (\Delta T_{\text{amb}}) \times (\text{Imbalance of Lead Wires})}{(\alpha_{\text{Pt}} \times R_0)}$$

Lead wire imbalance seen by the transmitter = 0.5 Ω

$$\text{Basic Error} = \frac{0.5\text{ } \Omega}{(0.00385\text{ } \Omega/\Omega\text{ °C}) \times (100\text{ } \Omega)} = 1.3\text{ °C}$$

Error due to amb. temp. var. of $\pm 25\text{ °C}$

$$= \frac{(0.0039\text{ } \Omega/\Omega\text{ °C}) \times (25\text{ °C}) \times (0.5\text{ } \Omega)}{(0.00385\text{ } \Omega/\Omega\text{ °C}) \times (100\text{ } \Omega)} = \pm 0.1266\text{ °C}$$

- Pt100 2-wire RTD:

$$\text{Basic Error} = \frac{\text{Imbalance of Lead Wires}}{(\alpha_{\text{Pt}} \times R_0)}$$

$$\text{Error due to amb. temperature variation} = \frac{(\alpha_{\text{Cu}}) \times (\Delta T_{\text{amb}}) \times (\text{Lead Wire Resistance})}{(\alpha_{\text{Pt}} \times R_0)}$$

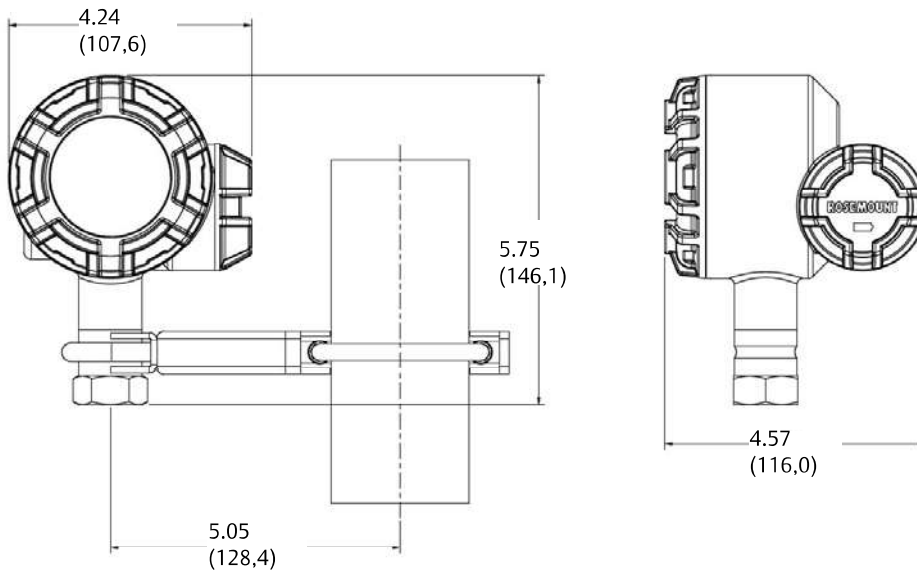
Lead wire resistance seen by the transmitter = 150 m
x 2 wires x 0.025 Ω/m = 7.5 Ω

$$\text{Basic Error} = \frac{7.5\text{ } \Omega}{(0.00385\text{ } \Omega/\Omega\text{ °C}) \times (100\text{ } \Omega)} = 19.5\text{ °C}$$

- Error due to amb. temp. var. of $\pm 25\text{ °C}$ =
 $\frac{(0.0039\text{ } \Omega/\Omega\text{ °C}) \times (25\text{ °C}) \times (7.5\text{ } \Omega)}{(0.00385\text{ } \Omega/\Omega\text{ °C}) \times (100\text{ } \Omega)} = \pm 1.9\text{ °C}$

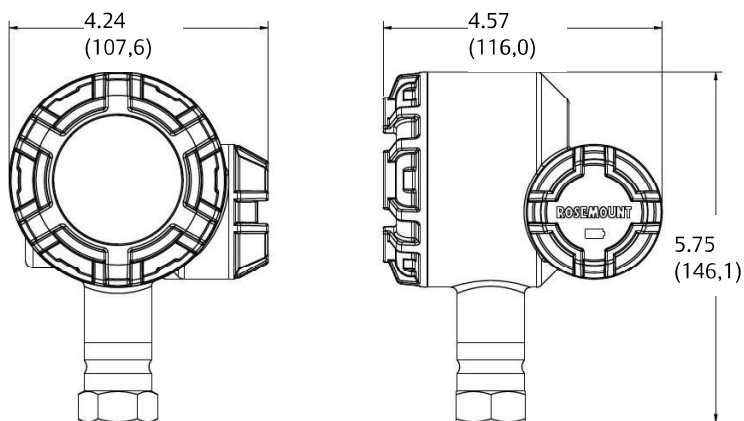
A.2 Dimensional drawings

Figure A-1. Rosemount 248 Wireless Remote Mount



Dimensions are in inches (millimeters).

Figure A-2. Rosemount 248 Wireless Direct Mount



Dimensions are in inches (millimeters).

A.3 Ordering information

Table A-3. Rosemount 248 Wireless Temperature Transmitter

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code	Product description			
248	Temperature Transmitter			
Transmitter type				
D	Wireless Field Mount			★
Transmitter output				
X	Wireless			★
Product certifications				
NA	No Approval			★
I5	USA Intrinsically Safe and Non-incendive			★
I6	Canada Intrinsically Safe			★
I1	ATEX Intrinsic Safety			★
I7	IECEX Intrinsic Safety			★
I2	INMETRO Intrinsic Safety			★
I4	TIIS Intrinsic Safety			★
I3	NEPSI Intrinsic Safety			★
IM	Technical Regulation Customs Union (EAC), Intrinsic Safety			★
Enclosure options			Material	IP rating
P	Wireless Engineered Polymer Housing		Engineered Polymer	IP66/67
Conduit entry size				
2	1/2-14 NPT			★

Options (Include with selected model number)

Assemble to options		
NS	No Sensor	★
XA ⁽¹⁾	Sensor Specified Separately and Assembled to Transmitter	★
Wireless update rate, operating frequency, and protocol		
WA3	User Configurable Update Rate, 2.4GHz DSSS, WirelessHART	★
Omnidirectional wireless antenna and SmartPower		
WP5 ⁽²⁾	Internal Antenna, Compatible with Green Power Module (I.S. Power Module sold separately)	★
Mounting bracket		
B5	Universal “L” Mounting Bracket for 2-in. pipe mounting - SST bracket and bolts	★

Table A-3. Rosemount 248 Wireless Temperature Transmitter

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Display		
M5	LCD Display	★
Cable gland option		
G2	Cable Gland (7.5 mm - 11.9 mm)	★
G4	Thin Wire Cable Gland (3 mm - 8 mm)	★
5-point calibration		
C4	5-Point Calibration (requires the Q4 option code to generate a Calibration Certificate)	★
Calibration certificate		
Q4	Calibration Certificate (3-Point Calibration)	★
Line filter		
F5	50 Hz Line Voltage Filter	★
F6	60 Hz Line Voltage Filter	★
Software configuration		
C1	Custom Configuration of Date, Descriptor, Message, and Wireless Parameters (requires CDS with order)	★
Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Typical model number: 248 D X NA P 2 NS WA3 WP5 B5 M5 F6 WR3		

1. When ordering a Rosemount 248 wireless with the XA option, a mounting bracket is not included. If a bracket is required, order option code B5.
2. Green Power Module must be shipped separately, order Model 701PGNKF.

Appendix B Product Certifications

Rev 1.7

European Directive Information	page 55
Ordinary Location Certification	page 55
Telecommunication compliance	page 55
FCC and IC	page 55
North America	page 55

B.1 European Directive Information

A copy of the EU Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EU Declaration of Conformity can be found at Emerson.com/Rosemount.

B.2 Ordinary Location Certification

As standard, the transmitter has been examined and tested to determine that the design meets the basic electrical, mechanical, and fire protection requirements by a nationally recognized test laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

B.3 Telecommunication compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

B.4 FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons. Changes or modifications not expressly approved by Rosemount can void the user's authority to operate the equipment.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

B.5 North America

The US National Electrical Code® (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

USA

- 15 USA Intrinsically Safe
Certificate: 70008071
Standards: FM 3600: 2011; FM 3610: 2010; FM 3611: 2004; UL 61010-1: 2012; UL 50E: 2012; ANSI/IEC 60529: 2004
Markings: Intrinsically Safe: CL I, DIV 1, GPA, B, C, D; CL I, DIV 2, GP A, B, C, D; Class I, Zone 0, AExia IIC T4/T5 Ga; T4 (–50°C □T_a □+70°C); T5 (–50°C □T_a □+40°C); when installed per Rosemount drawing 00249-2020; Type 4x, IP66/67

See Table 1 for entity parameters.

Special Condition for Safe Use (X):

1. Battery exchange: The battery module can be changed inside hazardous gas-explosive locations. During battery change it must be assured that the connections are free from dust or dirt.

Canada

- 16 Canada Intrinsically Safe
Certificate: 70008071
Standards: CSA C22.2 No. 0-10; CSA C22.2 No. 94.2-07 (R2012); CSA C22.2 No. 213-M1987 (R2013); CAN/CSA-60079-0-11; CAN/CSA-60079-11-14; CAN/CSA C22.2 No. 60529-05; CAN/CSA-C22.2 No. 61010-1-12
Markings: Intrinsically Safe: CL I, DIV 1, GPA, B, C, D; CL I, DIV 2, GP A, B, C, D; Exia IIC T4/T5 Ga; T4 (–50°C □T_a □+70°C); T5 (–50°C □T_a □+40°C); when installed per Rosemount drawing 00249-2020; Type 4X, IP66/67

See Table 1 for entity parameters.

Special Condition for Safe Use (X):

1. Battery exchange: The battery module can be changed inside hazardous gas-explosive locations.

During battery change it must be assured that the connections are free from dust or dirt.

Europe

- 11 ATEX Intrinsic Safety
Certificate: Baseefa14ATEX0359X
Standards: EN 60079-0: 2012; EN 60079-11: 2012
Markings: II 1 G Exia IIC T4/T5 Ga; T4 (–60°C □T_a □+70°C); T5 (–60°C □T_a □+40°C)
See Table 1 for entity parameters.

Special Condition for Safe Use (X):

1. The plastic enclosure may present a potential electrostatic ignition hazard and must not be rubbed or cleaned with a dry cloth.

International

- 17 IECEx Intrinsic Safety
Certificate: IECEx BAS 14.14.0158X Standards: IEC 60079-0: 2011; IEC 60079-11: 2011
Markings: Exia IIC T4/T5 Ga; T4 (–60°C □T_a □+70°C); T5 (–60°C □T_a □+40°C) See Table 1 for entity parameters.

Special Conditions for Safe Use (X):

1. The plastic enclosure may present a potential electrostatic ignition hazard and must not be rubbed or cleaned with a dry cloth.

Brazil

- 12 INMETRO Intrinsic Safety
Certificate: UL-BR 15.0222X
Standards: ABNT NBR IEC 60079-0: 2008 + Corrigendum 1: 2011; ABNT NBR IEC 60079-11: 2009
Markings: Exia IIC T4/T5 Ga; T4 (–60°C □T_a □+70°C); T5 (–60°C □T_a □+40°C)
See Table 1 for entity parameters.

Special Condition for Safe Use (X):

1. The plastic enclosure may present a potential electrostatic ignition hazard and must not be rubbed or cleaned with a dry cloth.

China

- I3 NEPSI Intrinsic Safety
Certificate: GYJ15.1143X
Standards: GB3836.1-2010, GB3836.4-2010,
GB3836.20-2010
Markings: Ex ia IIC T4/T5 Ga; T4 (–60 °C □ T_a □
+70 °C);
T5 (–60 °C □ T_a □ +40 °C)
See Table 1 for entity parameters.

Special Conditions for Safe Use (X):

1. Non-metallic parts incorporated in the enclosure of the product shall only be cleaned with a damp cloth to avoid electrostatic charge.
2. Must use Rosemount Model 701PGNKF SmartPower Green Power Module provided by the manufacture.

Japan

- I4 TIIS Intrinsic Safety
Certificate: TC21031
Markings: Ex ia IIC T4 X (–20 °C ~ +60 °C) See
Table 1 for entity parameters.

EAC

- IM Technical Regulation Customs Union (EAC)
Intrinsic Safety
Certificate: TC RU C-US.AA87.B.00057
Markings: 0Ex ia IIC T4, T5 Ga X, T5 (–60 °C □ T_a
□ +40 °C), T4 (–60 °C □ T_a □ +70 °C);
IP66/IP67

Special Condition for Safe Use (X):

1. See certificate for special conditions.
- Table 1. Entity Parameters

Voltage UO	6.6 V
Current IO	26.2 mA
Power PO	42.6 mW
Capacitance CO	11 µF
Inductance LO	25 mH