Reference Manual
00809-0100-4045,Rev 01
December2015

Rosemount™ Wireless Pressure Gauge

with WirelessHART® Protocol

WirelessHART

EMERSON.
Process Management

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Rosemount™ Wireless Pressure Gauge

⚠WARNING

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

Explosions could result in death or serious injury.

- Installation of this device 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 gauge reference manual for any restrictions associated with a safe installation.
- Ensure device is installed in accordance with intrinsically safe or non-incendive field practices.

Process leaks could result in death or serious injury.

To avoid process leaks, only use the O-ring designed to seal with the corresponding flange adapter.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and the terminals. High voltage that may be present on leads can cause electrical shock.
- Care must be taken during transportation of device to prevent electrostatic charge build-up.
- Device must be installed to ensure a minimum antenna separation distance of 8 in. (20 cm) from all persons.

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

- Only qualified personnel should install the equipment.

⚠ 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 Emerson™ Process Management nuclear-qualified products, contact your local Rosemount Sales Representative.

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.

Changes or modifications not expressly approved by Rosemount Inc. could void the user's authority to operate the equipment.

Using the Rosemount Wireless Pressure Gauge in a manner other than what is specified by the manufacturer may impair the protection provided by the equipment.

Shipping considerations

The unit is shipped with the battery installed.

Each device 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.

Section 1 Introduction

1.1 Using this manual

The sections in this manual provide information on installing, operating, and maintaining the Rosemount™ Wireless Pressure Gauge with *Wireless*HART® protocol. The sections are organized as follows:

Section 2: Hardware Installation contains mechanical and electrical installation instructions and considerations.

Section 3: Configuration provides instruction on commissioning and operating the gauge. Information on software functions, configuration parameters, and online variables are also included.

Section 4: Operation and Maintenance contains operation and maintenance techniques.

Section 5: 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: Field Communicator Menu Trees provides full menu trees and abbreviated fast key sequences for commissioning tasks.

Appendix D: Network Design Best Practices provides information on how to optimize network reliability and performance.

1.2 Models covered

This manual covers the Rosemount Wireless Pressure Gauge.

- Measures gage/absolute/compound/vacuum pressure up to 4000 psi (275 bar)

1.3 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 Hardware Installation

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Safety messages . . . . . page 5
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2.1 Overview

The information in this section covers installation considerations. A Quick Start Guide (document number 00825-0100-4045) is shipped with every device to describe basic installation and startup procedures. Dimensional drawings for the Rosemount Wireless Pressure Gauge can be found in Appendix A: Specifications and Reference Data.

2.2 Safety messages

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

⚠WARNING

Explosions could result in death or serious injury.

Installation of device in an explosive environment must be in accordance with appropriate local, national and international standards, codes, and practices.

Ensure device is installed in accordance with intrinsically safe or non-incendive field practices.

Electrical shock can result in death or serious injury.

Care must be taken during transportation of device to prevent electrostatic charge build-up.

Device must be installed to ensure a minimum antenna separation distance of 8 in. (20 cm) from all persons.

Process leaks could result in death or serious injury.

Handle the device carefully.

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

Only qualified personnel should install the equipment.

2.3 Considerations

2.3.1 Pre-installation

Optional: power/device check

The device is designed to be installation-ready. To check device battery prior to installation, perform the following:

1. Perform "Turn on device" on page 9.
2. Slide the ON/OFF switch to the **OFF** position until ready for use.

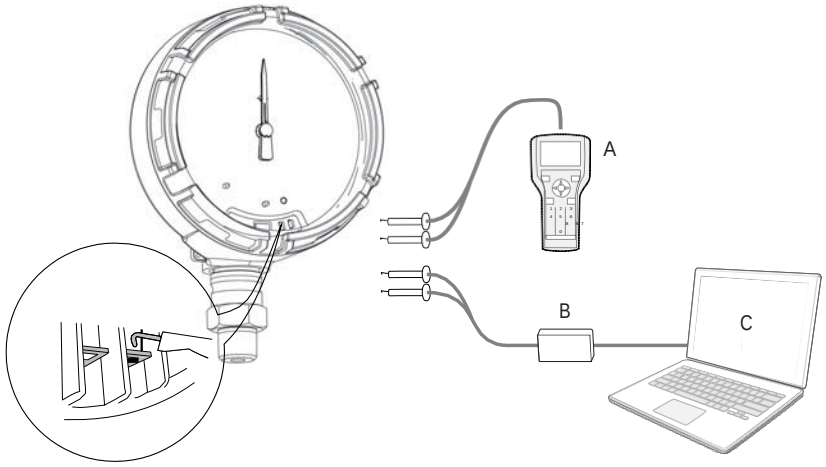
Network design best practices

When mounting the device, recommended practices should be considered to achieve the best wireless performance. See Appendix D: Network design best practices for more information on recommend practices.

Field Communicator connections

The device needs to be on in order for the Field Communicator to interface with the Rosemount Wireless Pressure Gauge. The Field Communicator connection is located to the right of the ON/OFF switch. To communicate with the device, connect the Field Communicator to connections labeled "COMM". Field communication with this device requires a HART-based tool using the correct Rosemount Wireless Pressure Gauge device driver (DD). Refer to Figure 2-1 for instructions on connecting the Field Communicator to the device.

Figure 2-1. Connect to Device



A. Field Communicator B. HART Modem C. AMS Wireless Configurator

2.3.2 Installation

Measurement performance depends upon proper installation of the device and impulse piping. Mount the device close to the process and use a minimum of piping to achieve best performance. Also, consider the need for easy access, personnel safety, and a suitable

device environment. Install the device to minimize vibration, shock, and temperature fluctuation.

2.3.3 Mechanical

Location

When choosing an installation location and position, take into account the direction of the device for future access to the COMM connections and readability of the analog display.

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 before reattaching cover, ensuring polymer contacts polymer (i.e. no O-ring visible).

2.3.4 Electrical

Battery

The Rosemount Wireless Pressure Gauge is self-powered. The battery contains approximately 5 grams of lithium-thionyl chloride. Under normal conditions, the battery materails are self-contained and are not reactive as the as the battery is maintained inside the enclosure of the device. Care should be taken to prevent thermal, electrical, or mechanical damage. Contacts should be protected to prevent premature discharge.

Use caution when handling the battery, it may be damaged if dropped.

The battery should be stored in a clean dry area, For maximum battery life, storage temperature should not exceed 86 °F (30 °C).

2.3.5 Environmental

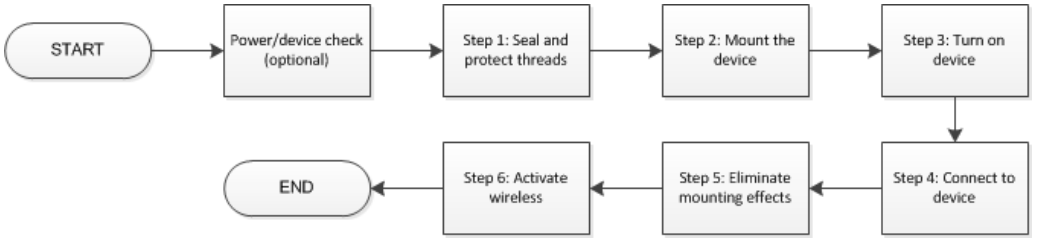
Verify the operating atmosphere of the device is consistent with the appropriate hazardous locations certifications.

Temperature effects

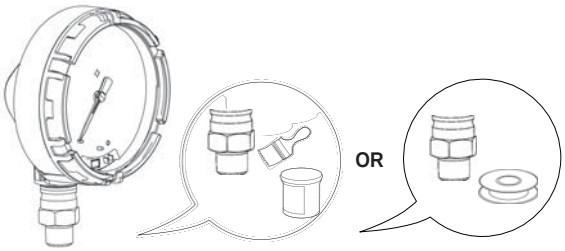
The device will operate within specifications for ambient temperatures as outlined on page 34 in the specifications section. Heat from the process is transferred to the device housing. If the process temperature is high, the ambient temperature will need to be lower to account for heat transferred to the device housing. See Temperature limits for process temperature derating.

2.4 Installation procedure

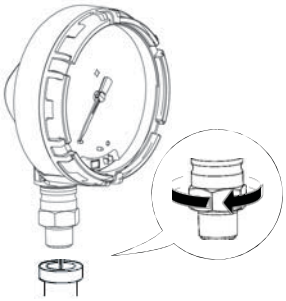
Figure 2-2. Installation Flowchart



2.4.1 Seal and protect threads



2.4.2 Mount device



Note
Use wrench on flats, not on housing.

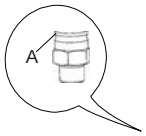
Mounting orientation

The low side pressure port (atmospheric reference) on the process pressure gauge is located in the neck of the device behind the housing. The vent path is between the housing and sensor. (See Figure 2-3.)

⚠ CAUTION

Keep the vent path free of any obstruction, including but not limited to paint, dust, and lubrication by mounting the device so the process can drain away.

Figure 2-3. Low Side Pressure Port

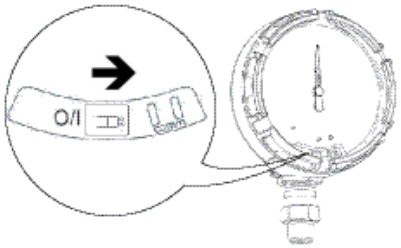


A. Low side pressure port (atmospheric reference)

2.4.3 Turn on device

Check to ensure the device and battery are working properly.

1. Twist the cover counterclockwise to remove it.
2. Slide the OFF/ON switch to the **ON** position to initiate the power sequence.



Note
During the power sequence, the dial tests full range of motion and LED flashes amber.

3. Once the power sequence ends, verify the LED flashes green.

Note
The LED may display several colors; see Table 4-2 on page 28 for device statuses.

2.5 Impulse piping considerations

2.5.1 Best practices

The piping between the process and the device must accurately transfer the pressure to obtain accurate measurements. There are five possible sources of error: leaks, friction loss (particularly if purging is used), trapped gas in a liquid line, liquid in a gas line, and density variations between the legs.

The best location for the device in relation to the process pipe depends on the process itself. Use the following guidelines to determine device location and placement of impulse piping:

- Keep impulse piping as short as possible.
- For liquid service, slope the impulse piping at least 1 inch per foot (8 cm per m) upward from the device toward the process connection.
- For gas service, slope the impulse piping at least 1 inch per foot (8 cm per m) downward from the device toward the process connection.
- Avoid high points in liquid lines and low points in gas lines.
- Make sure both impulse legs are the same temperature.
- Use impulse piping large enough to avoid friction effects and blockage.
- Vent all gas from liquid piping legs.
- When using a sealing fluid, fill both piping legs to the same level.
- When purging, make the purge connection close to the process taps and purge through equal lengths of the same size pipe. Avoid purging through the device.
- Keep corrosive or hot (above 250 °F [121 °C]) process material out of direct contact with the sensor module and flanges.
- Prevent sediment deposits in the impulse piping.
- Keep the liquid head balanced on both legs of the impulse piping.
- Avoid conditions that might allow process fluid to freeze within the process flange.

2.5.2 Mounting requirements

Liquid flow measurement

- Place taps to the side of the line to prevent sediment deposits on the process isolators.
- Mount the device beside or below the taps so gases vent into the process line.
- Mount drain/vent valve upward to allow gases to vent.

Gas flow measurement

- Place taps in the top or side of the line.
- Mount the device beside or above the taps so to drain liquid into the process line.

Steam flow measurement

- Place taps to the side of the line.
- Mount the device below the taps to ensure that impulse piping will remain filled with condensate.
- Fill impulse lines with water to prevent steam from contacting the device directly and to ensure accurate measurement start-up.

Note
For steam or other elevated temperature services, it is important that temperatures do not exceed 250 °F (121 °C) for devices with silicone fill. For vacuum service, these temperature limits are reduced to 220 °F (104 °C) for silicone fill.

2.6 Process connection

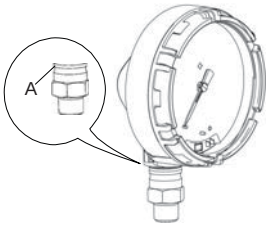
⚠ CAUTION

Interfering or blocking the atmospheric reference port will cause the device to output erroneous pressure values.

Keep the vent path free of any obstruction, including but not limited to paint, dust, and lubrication by mounting the device so the process can drain away.

The low side pressure port (atmospheric reference) on the process pressure gauge is located in the neck of the device behind the housing. The vent path is between the housing and sensor. (See Figure 2-3.)

Figure 2-4. Low Side Pressure Port



A. Low side pressure port (atmospheric reference)

⚠ WARNING

Do not apply torque directly to the sensor module. Rotation between the sensor module and the process connection can damage the electronics. To avoid damage, apply torque only to the hex-shaped process connection.

2.7 Rosemount manifolds

The Rosemount 306 Integral Manifold mounts directly to the device. The manifold is used with this device to provide block-and-bleed valve capabilities of up to 4000 psi (275 bar).

2.7.1 Installation procedure

The 306 Manifold is for use only with a Wireless Pressure Gauge.

⚠ Assemble the 306 Manifold to the device with a thread sealant.

1. Place device into holding fixture.
2. Apply appropriate thread paste or tape to threaded instrument end of the manifold.
3. Count total threads on the manifold before starting assembly.
4. Start turning the manifold by hand into the process connection on the device.

Note
If using thread tape, be sure the thread tape does not strip when the manifold assembly is started.

5. Wrench tighten manifold into process connection (minimum toque value is 425 in-lbs).
6. Count how many threads are still showing (minimum engagement is 3 revolutions).
7. Subtract the number of threads showing (after tightening) from the total threads to calculate the revolutions engaged. Further tighten until a minimum of 3 rotations is achieved.
8. For block and bleed manifold, verify the bleed screw is installed and tightened. For 2-valve manifold, verify the vent plug is installed and tightened.
9. Leak-check assembly to maximum pressure range of device.

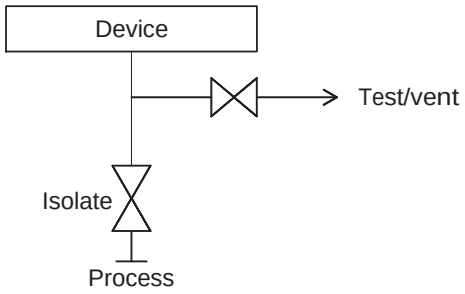
2.7.2 Manifold operation

⚠ Improper installation or operation of manifolds may result in process leaks, which may cause death or serious injury.

Always perform a zero trim on the device/manifold assembly after installation to eliminate any shift due to mounting effects. See Section 5: Operation and maintenance, "Sensor Trim Overview" on page 67.

The 2-valve configuration is available on Rosemount 305, 306, and 304 Manifolds for use with absolute and gage pressure devices. A block valve provides instrument isolation and a drain/vent valve allows venting, draining, or calibration.

306 Manifolds



Section 3 Configuration

Overview . . . . . page 13
Safety messages . . . . . page 13
System readiness . . . . . page 14
Configuration basics . . . . . page 15
Basic gauge setup . . . . . page 15
Configuration verification . . . . . page 17
Advanced device parameter setup . . . . . page 19
Notifications and service . . . . . page 20

3.1 Overview

This section contains information on commissioning and tasks.

Field Communicator and AMS™ Device Manager Instructions are given to perform configuration functions.

Full Field Communicator menu trees are available in Appendix C: Field Communicator Menu Trees.

3.2 Safety messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operation. Information that raises potential safety issues is indicated with 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 device 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 Wireless Pressure Gauge Reference Manual for any restrictions associated with a safe installation.

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 device is consistent with the appropriate hazardous locations certifications

Process leaks could result in death or serious injury.

Install and tighten process connectors before applying pressure.

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.

⚠ CAUTION

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 20cm (8 in.) from all persons.

3.3 System readiness

3.3.1 Confirm correct device driver

Verify the latest Device Driver (DD/DTM) is loaded on your systems to ensure proper communications.

1. Download the latest DD at www.emersonprocess.com or www.hartcomm.org.
2. In the *Browse by Member* dropdown menu, select Rosemount business unit of **Emerson Process Management**.
3. Select desired product.
   a. Within Table 3-1, use the HART Universal Revision and Device Revision numbers to find the correct Device Driver

Table 3-1. Rosemount Wireless Pressure Gauge Device Revisions and Files

Software release date	Identify device		Find device driver		Review instructions	Review functionality
	NAMUR software revision(1)	HART software revision(2)	HART universal revision	Device revision (3)	Manual document number	Changes to software
January 2015	??	??	??	??	00809-0100-4045	Initial release

1. NAMUR Software Revision is located on the hardware tag of the device.
2. HART Software Revision can be read using a HART capable configuration tool.
3. Device Driver file names use Device and DD Revision, e.g. 10_01. HART Protocol is designed to enable legacy device driver revisions to continue to communicate with new HART devices. To access new functionality, the new Device Driver must be downloaded. It is recommended to download new Device Driver files to ensure full functionality.

3.4 Configuration basics

3.4.1 Configuration tools

Configuration requires a Field Communicator, AMS Device Manager, or any *Wireless*HART® Communicator. Connect the Field Communicator leads to the terminals labeled "COMM" on the front of the device (see Figure 3-1).

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

AMS Wireless Configurator

AMS Wireless Configurator is capable of connecting to devices either directly, using a HART modem, or wirelessly via the wireless Gateway. When configuring the device, double click the device icon or right click and select **Configure**.

3.4.2 Connection diagrams

Figure 3-1 on page 14 illustrates the wiring for a field hook-up with a Field Communicator or AMS Device Manager. The Field Communicator or AMS Device Manager may be connected at "COMM" on the device.

3.5 Basic gauge setup

3.5.1 Eliminate mounting effects

Devices are factory-calibrated. Once installed, it is recommended to perform this step to eliminate potential error caused by mounting position or static pressure. Instructions for using a Field Communicator are listed below.

1. Vent the device.
2. Connect the Field Communicator.
3. From the *HOME* screen, enter the HART Fast Key sequence.

Fast Keys	2, 1, 1

4. Follow the commands to perform the procedure.

3.5.2 Activate wireless

Do not activate wireless until Emerson Wireless Gateway is installed and functioning properly; toggling off and on reduces battery life.

Join device to network

1. Obtain Network ID and Join Key for the wireless network (available in wireless gateway).
2. From the *HOME* screen, enter the HART Fast Key sequence.

Fast Keys	2, 1, 2

3. Follow the commands to perform the procedure.
4. Select **Overview**>**Status**.
5. Verify communication status displays *Connected.*

Note
Joining the device to the network could take several minutes.

3.5.3 Considerations for devices with percent of range engineering unit

Set range points

The range values command sets the lower and upper range values used for the percent of range engineering unit.

Note
Devices are shipped from Emerson fully calibrated to the factory default of full scale (scale range = upper range limit).

From the *HOME* screen, enter the Fast Key sequence .

Fast Keys	2, 2, 1, 2

1. Select lower or upper range value as applicable.
2. Follow the commands to perform the procedure.

3.6 Configuration verification

The following is a list of factory default configurations that can be viewed by using the Field Communicator or AMS Device Manager. Follow the steps below to review the gauge configuration information.

Note
Information and procedures in this section that make use of Field Communicator Fast Key sequences and AMS Device Manager assume the gauge and communication equipment are connected, powered, and operating correctly.

3.6.1 Review pressure information

From the *HOME* screen, enter the Fast Key sequence .

Fast Keys	1, 3

1. From the *Home* screen, select **1: Overview**.
2. Select **3: Pressure**.

3.6.2 Review device information

From the *HOME* screen, enter the Fast Key sequence .

Fast Keys	1, 9

1. From the *Home* screen, select **1: Overview**.
2. Select **9: Device Information**.
3. Select from the corresponding number to view each field:
   - 1 Identification
   - 2 Revisions
   - 3 Radio
   - 4 Materials of Construction
   - 5 Security
   - 6 Dial Faceplate
   - 7 Capabilities

3.6.3 Review radio information

From the *HOME* screen, enter the Fast Key sequence .

Fast Keys	1, 9, 3

1. From the *Home* screen, select **1: Overview**.
2. Select **9: Device Information**.
3. Select **3: Radio**.

4. Select from the corresponding number to view each field:

   1 MAC Address
   2 Manufacturer
   3 Device Type
   4 Device Revision
   5 Software Revision
   6 Hardware Revision
   7 Xmit Power Level
   8 Min Brdcst Rate

3.6.4 Review operating parameters

The pressure output value in both engineering units and percent of range will reflect the applied pressure even when the applied pressure is outside of the configured range as long as the applied pressure is between the upper and lower range limit of the device. For example, if a scale range 0 - 150 psi (LRL = 0 psi, URL = 150 psi) is ranged from 0 to 100 psi, an applied pressure of 150 psi will return a % of range output of 150%.

From the *HOME* screen, enter the Fast Key sequence .

Fast Keys	3, 2

1. From the *Home* screen, select **3: Service Tools**.

2. Select **2: Variables**.

The *Operating Parameters* menu displays the following information pertaining to the device:

- Mapped Variables
  - Primary Variable
  - Secondary Variable
  - Tertiary Variable
  - Quaternary Variable
- All Variables
  - Pressure
  - Pressure Quality
  - Custom Scale
  - Cust Scale Quality
  - Percent of Range
  - Percent of Rng Quality
  - Sensor Temp
  - Sensor Temp Quality
  - Supply Voltage
  - Supply Voltage Quality

3.7 Advanced device parameter setup

3.7.1 Write protect

The device has a software write protect security feature.

From the *HOME* screen, enter the Fast Key sequence .

Fast Keys	2, 2, 4, 1

1. Select **Write Protect** to enable.
2. Right click on device and select **2: Configure.**
3. Select **2: Advanced Setup.**
4. Select the tab labeled **4: Security.**
5. Select **Write Protect** to enable this feature.

3.7.2 Wireless update rate

From the *HOME* screen, enter the Fast Key sequence.

Fast Keys	2, 2, 3, 2

1. From the *Home* screen, select **2: Configure.**
2. Select **2: Advanced Setup.**
3. Select **3: Wireless.**
4. Select **2: Update Rate.**
5. Follow the commands to perform the procedure.

3.7.3 Dial update rate

From the *HOME* screen, enter the Fast Key sequence .

Fast Keys	2, 2, 1, 1, 2

1. From the *Home* screen, select **2: Configure.**
2. Select **2: Advanced Setup.**
3. Select **1: Measurements.**
4. Select **1: Dial/Pressure.**
5. Select **2: Dial Update Rate.**
6. Follow the commands to perform the procedure.

3.8 Notifications and service

Notifications and service functions listed below are primarily for the user after field installation. The device simulation feature is designed to verify proper operating functionality, and can be performed either on the bench or in the field.

3.8.1 Overpressure notification

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

Fast Keys	2, 2, 1, 1, 3

1. From the home screen, select **2: Configure**.
2. Select **2: Advanced Setup**.
3. Select **1: Measurements**.
4. Select **1: Dial / Pressure**.
5. Select **3: Over-Press Ind**.
6. Follow the commands to perform the procedure.

Note
When this parameter has been set to activate, the notification must be acknowledged and cleared for the device to return to normal operation.

3.8.2 Simulating device variables

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

Fast Keys	3, 5

1. From the *Home* screen, select **3: Service Tools.**
2. Select **5: Simulate.**

Note
The following parameters pertaining to the device can be simulated:
Pressure, Sensor Temperature, and Supply Voltage

3.8.3 Device reset

The master reset function will reset the device electronics. To perform a device reset:

From the *HOME* screen, enter theFast Key sequence

Fast Keys	3, 4, 1

1. From the *Home* screen, select **3: Service Tools**.
2. Select **4: Maintenance**
3. Select **1: Device Reset**

3.8.4 Join status

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

Fast Keys	3, 3, 1

1. From the *Home* screen, select **3: Service Tools**.
2. Select **3: Communications**.
3. Select **1: Join Status**.

Wireless devices join the secure network through a four-step process:

- Step 1. Network Found
- Step 2. Network Security Clearance Granted
- Step 3. Network Bandwidth Allocated
- Step 4. Network Join Complete

3.8.5 Number of available neighbors

In a self-organizing network, the more neighbors a device has, the more robust the network will be. To view the number of available neighbors for the wireless device, perform the following procedure:

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

Fast Keys	3, 3, 3

1. From the *Home* screen, select **3: Service Tools**.
2. Select **3: Communications**.
3. Select **3: Available Neighbors**.

3.8.6 Acknowledge and reset overpressure notification

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

Fast Keys	3, 4, 3

1. From the *Home* screen, select **3: Service Tools**.
2. Select **4: Maintenance**.
3. Select **3: Acknowledge Over-Pressure**.
4. Follow the commands to perform the procedure.

Section 4 Operation and Maintenance

Overview . . . . . page 23
Safety messages . . . . . page 23
Pressure signal trimming . . . . . page 23
Replacing the battery . . . . . page 27
Local device status and notifications . . . . . page 28

4.1 Overview

This section contains information on commissioning and operation Wireless Pressure Gauges.

Field Communicator and AMS Device Manager instructions are provided for convenience.

4.2 Safety messages

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

4.3 Pressure signal trimming

Calibrating a Wireless Pressure Gauge may include the sensor trim procedure to adjust for mounting effects.

Sensor trimming requires an accurate pressure input and adds additional compensation that adjusts the position of the factory trim to optimize performance over a specific pressure range.

Note
Sensor trimming adjusts the position of the factory trim. It is possible to degrade the performance of the gauge if the trim is done improperly or with inaccurate equipment.

⚠ CAUTION

Absolute pressure devices are calibrated at the factory. Trimming adjusts the position of the factory characterization curve. It is possible to degrade performance of the device if any trim is done improperly or with inaccurate equipment.

Table 4-1. Recommended Calibration Tasks

Measurement type	Tasks
Gage Compound Vacuum	1. Reconfigure parameters if necessary. 2. Zero trim the device to compensate for mounting effects or static pressure effects. 3. *Optional*: Perform a sensor trim. (Accurate pressure source required.)
Absolute	1. Reconfigure parameters if necessary. 2. Perform low trim value section of the sensor trim procedure to correct for mounting position effects. 3. *Optional*: Perform a sensor trim if equipment available (accurate absolute pressure source required), otherwise perform the low trim value section of the sensor trim procedure.

Note
For devices with absolute measurement type, an accurate absolute pressure source is required.

4.3.1 Determining necessary sensor trims

Bench calibrations allow for calibrating the instrument for its desired range of operation. Straight forward connections to pressure source allow for a full calibration at the planned operating points. Exercising the device over the desired pressure range allows for verification of the output value. "Sensor trim" on page 26 discusses how the trim operations change the calibration. It is possible to degrade the performance of the device if a trim is done improperly or with inaccurate equipment. The device can be set back to factory settings using the Recall Factory Trim command in "Recall factory trim—sensor trim" on page 27.

For devices that are field installed, the manifolds discussed in "Manifold operation" on page 20 allow the device to be zeroed using the zero trim function. This field calibration will eliminate any pressure offsets caused by mounting effects (head effect of the oil fill) and static pressure effects of the process.

Determine the necessary trims with the following steps.

1. Apply pressure.
2. Check pressure. If the pressure does not match the applied pressure, perform a digital zero trim. See "Sensor trim" on page 26.

4.3.2 Sensor trim overview

A sensor trim corrects the pressure offset and pressure range to match a pressure standard. The upper sensor trim corrects the pressure range and the lower sensor trim (zero trim) corrects the pressure offset. An accurate pressure standard is required for full calibration. A zero trim can be performed if the process is vented.

Zero trim is a single-point offset adjustment. It is useful for compensating for mounting position effects and is most effective when performed with the device installed in its final mounting position. Since this correction maintains the slope of the characterization curve, it should not be used in place of a sensor trim over the full sensor range.

When performing a zero trim, ensure that the equalizing valve is open and all wet legs are filled to the correct levels. Line pressure should be applied to the device during a zero trim to eliminate line pressure errors. Refer to "Manifold operation" on page 20.

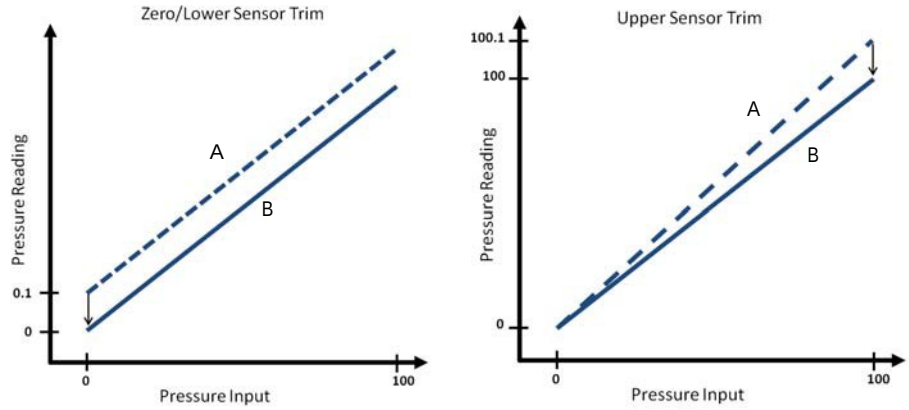
Note

Do not perform a zero trim on the Wireless Pressure Gauge with absolute measurement type. Zero trim is zero based, and absolute pressure devices reference absolute zero. To correct mounting position effects on a Wireless Pressure Gauge with absolute measurement type, perform a low trim within the sensor trim function. The low trim function provides an offset correction similar to the zero trim function, but it does not require zero-based input.

Sensor trim is a two-point sensor calibration where two end-point pressures are applied, and all output is linearized between them. Always adjust the low trim value first to establish the correct offset. Adjustment of the high trim value provides a slope correction to the characterization curve based on the low trim value. The trim values allow you to optimize performance over your specified measuring range at the calibration temperature.

During a trim operation, the device is placed in high power refresh mode, which provides frequent pressure measurement updates. This behavior allows for more accurate calibration of the device. When the device is in high power refresh mode, the battery power supply will be depleted more rapidly.

Figure 4-1. Sensor Trim Example



A. Before trim
B. After trim

4.3.3 Sensor trim

When performing a sensor trim, both the upper and lower limits can be trimmed. If both upper and lower trims are to be performed, the lower trim must be done before the upper trim.

Note
Use a pressure input source at least four times more accurate than the device, and allow the input pressure to stabilize for 10 seconds before entering any values.

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

Fast Keys	2, 2, 1, 1, 1

1. Assemble and power the entire calibration system including the gauge, Field Communicator or AMS Device Manager, power supply, pressure input source, and readout device.
2. From the *Home* screen, select **2: Configure**.
3. Select **2: Advanced Setup**.
4. Select **1: Measurements**.
5. Select **1: Dial/Pressure**.
6. Select **1: Verify/Calibrate**.

Note
Select pressure points so that lower and upper values are equal to or outside the expected process operation range.

7. Follow the on-screen instructions to complete the adjustment of the lower value.
8. Repeat the procedure for the upper value.

Performing a digital zero trim

Devices are factory-calibrated. Once installed, it is recommended to perform this step to eliminate potential error caused by mounting position or static pressure. Instructions for using a Field Communicator are listed below.

1. Vent the device.
2. Connect the Field Communicator.
3. From the *HOME* screen, enter the HART Fast Key sequence.

Fast Keys	2, 1, 1

4. Follow the commands to perform the procedure.

4.3.4 Recall factory trim—sensor trim

The recall factory trim—sensor trim command allows the restoration of the as-shipped factory settings of the sensor trim. This command can be useful for recovering from an inadvertent zero trim of an absolute pressure unit or inaccurate pressure source.

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

Fast Keys	3, 4, 2

1. Select **3: Service Tools**.
2. Select **4: Maintenance**.
3. Select **2: Restore to Default Settings**.
4. Follow the screen prompts to recall sensor and dial trim.

4.4 Replacing the battery

⚠WARNING

The battery is not replaceable in a hazardous location.

1. Remove enclosure cover and O-ring.
2. Switch the device "OFF".
3. Loosen the screw holding the electronics assembly to the enclosure.

Note
Use caution as the electronics assembly is connected to the pressure sensor via a cable. Take care not to over stretch this cable as this could damage the device.

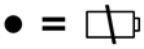
4. Loosen the two screws on the battery holder and slide the battery holder to the left.
5. Release battery connection from electronics shroud.
6. Connect battery to connection on electronics should.
7. Place battery within enclosure.
8. Slide battery holder into place and tighten two screws.
9. Insert electronics assembly into enclosure and tighten screw.
10. Turn device "ON".
11. Tighten enclosure cover and O-ring ensuring the engineered polymer is touching.

4.5 Local device status and notifications

4.5.1 Device status

The flashing LED indicates device status using the colors descibed in Table 4-2.

Table 4-2. Status Descriptions

LED color		Device status
	Green	Functioning properly
	Amber	Battery is low, battery replacement recommended
	Red	Battery replacement required OR Device is malfunctioning
	No color	No power, verify ON/OFF switch is in “on” position

4.5.2 Device notifications

If the dial is pointing towards the red “X”, refer to Section 6: Troubleshooting for more information.

Section 5 Troubleshooting

Service support . . . . . page 29
Local troubleshooting . . . . . page 30
Remote troubleshooting . . . . . page 30

5.1 Service support

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

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

The center will ask for product model and serial numbers, and will provide a Return Material Authorization (RMA) number. The center will also ask for the process material to which the product was last exposed.

For inquiries outside of the United States, contact the nearest Emerson Process Management representative for RMA instructions.

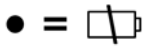
⚠ CAUTION

Individuals who handle products exposed to a hazardous substance can avoid injury if they are informed of and understand the hazard. The product being returned will require a copy of the required Material Safety Data Sheet (MSDS) for each substance must be included with the returned goods.

Emerson Process Management Instrument and Valve Response Center representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

5.2 Local troubleshooting

Table 5-1. Interpreting Local Notifications

LED color	Dial location	Description	Recommended action(s)
Green	On-scale	Functioning properly	No action required.
	Off-scale	Device is malfunctioning	Investigate active notification via a HART communicator.
Amber	On-scale	Battery is low	Battery replacement recommended.
	Off-scale	Battery is low, device is malfunctioning	Investigate active notification via a HART communicator. Replace battery if device is determined to be functioning properly and notifications have been verified.
Red	On-scale	Device is malfunctioning	Investigate active notification via a HART communicator.
	Off-scale	Device is malfunctioning	Investigate active notification via a HART communicator.
Black, no color 	N/A	No power	Verify ON/OFF switch is in "ON" position.

5.3 Remote troubleshooting

This section outlines the most important alerts in the HART® command 48 additional status field for Rosemount Wireless Pressure Gauge. The information in this section can be used by DeltaV™ for notification monitoring, and in the Emerson Smart Wireless Gateways for additional status mapping in Modbus®, OPC, etc.

A complete list of additional status bits is available in the Gateway.

Table 5-2 to Table 5-4 shows a list of the most important messages that may be displayed.

Table 5-2. Failures

Message	Additional status(1)	Description
Radio failure	Byte 12::Bit 4	Wireless radio has detected a failure or stopped communicating
Configuration alert	Byte 2::Bit 6	Device has detected a configuration error
Over-pressure seen	Byte 4::Bit 0	Pressure has gone beyond the maximum operating limits of the device, which may have caused permanent damage to the sensor
Critical power failure	Byte 6::Bit 2	Supply voltage is too low for the device to broadcast updates
Electronics failure	Byte 8::Bit 6	Electronics error that could impact the device measurement reading has occurred
Dial failure	Byte X::Bit X	Device has detected a failure or unable to confirm dial location

1. Location of the alert in the HART command 48 Additional Status field.

Table 5-3. Maintenance

Message	Additional status[1]	Description
Voltage conditions out of range	Byte 8::Bit 4	Supply voltage is low and may soon affect device operation
Pressure out of limits	Byte 3::Bit 5	Pressure has exceeded the maximum measurement range
Capacity denied	Byte 12::Bit 0	Device has failed to acquire the wireless communication bandwidth necessary to support the configured update rates
Sensor temperature beyond sensor limits	Byte 3::Bit 1	Sensor temperature has exceeded its safe operating range
Environmental conditions out of range	Byte 8::Bit 5	Device is outside its normal environmental operating conditions which may affect accuracy and/or proper operation

1. Location of the alert in the HART command 48 Additional Status field.

Table 5-4. Advisory

Message	Additional status[1]	Description
Database storage error	Byte 0::Bit 2	Device has failed to write to the database memory at some point in the past; any data written during this time may have been lost
Simulation active	Byte 8::Bit 0	Device is in simulation mode and is not reporting actual information
High power active	Byte 1::Bit 7	Device is operating in a high power mode; this is not recommended for this device
Non-critical user data warning	Byte 2::Bit 1	User-written parameter does not match its expected value

1. Location of the alert in the HART command 48 Additional Status field.

Appendix A Specifications and Reference Data

Physical specifications . . . . . page 33
Operating specifications . . . . . page 34
Dial update rate . . . . . page 35
Dimensional Drawings . . . . . page 39
Ordering Table . . . . . page 40

Specifications

A.1 Physical specifications

A.1.1 Material selection

Emerson Process Management provides a variety of Rosemount products with various product options and configurations including materials of construction that can be expected to perform well in a wide range of applications. The Rosemount product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product materials, options, and components for the particular application. Emerson is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product options, configuration, or materials of construction selected.

A.1.2 Dial size

4.5-in. (114.3 millimeter)

A.1.3 Scale ranges

From vacuum up to 4,000 psi (275 bar)

Single scale considerations

The number of major graduations is a direct result of the specified combination of Primary Engineering Unit and Scale Range. There are always 10 minor graduations between each major graduation.

Dual scale considerations

The number of major graduations on the inner scale is the direct result of the combination of Primary Engineering Unit and Secondary Engineering Unit. There are always five minor graduations between each major graduation.

A.1.4 Process connections

½-14 NPT male, G1/2 male (EN 837)

A.1.5 Field Communicator connections

Communication terminals are accessible by removing cover.

A.1.6 Material of construction

Housing

Engineered Polymer, NEMA 4X and IP66/67

Cover O-ring Silicone

rubber **Process-**

wetted parts

316L SST, Alloy C-276

A.1.7 Shipping weight

1.8 lb (0.82 kg)

Options

Mounting bracket (Code B4)
1.0 lb (0.5 kg)

Rosemount 1199 Seal Systems
Reference document number 00813-0100-4016 for shipping weights.

A.2 Operating specifications

A.2.1 Conformance to specification (±3σ [Sigma])

Technology leadership, advanced manufacturing techniques, and statistical process control ensure specification conformance to at least ±3σ.

A.2.2 Accuracy

ASME B40.1 – Grade 2A (0.5% of span)

A.2.3 Temperature limits

Ambient

-40 to 185 °F (-40 to 85 °C)

Storage

-40 to 185 °F (-40 to 85 °C)

Process

-40 to 250 °F (-40 to 121 °C)[1][2]

A.2.4 Electrical connections/battery

Replaceable, non-rechargeable, 3.6V primary cell, lithium-thionyl chloride battery
10-year battery life at reference conditions[3]

A.2.5 Overpressure limit

Scale range	Maximum overpressure limit
5 – 30 psi (0.35 – 2 bar)	750 psi (51.7 bar)
31 – 150 psi (2.1 – 10.3 bar)	1,500 psi (103.4 bar)
151 – 800 psi (10.4 – 55.1 bar)	1,600 psi (110.3 bar)
801 – 4,000 psi (55.2 – 275 bar)	6,000 psi (413.7 bar)

A.2.6 Burst pressure limit

Scale ranges up to 4,000 psi (275 bar): up to 11,000 psi (758 bar)

A.2.7 Minimum span limits for percent of range engineering unit

The maximum rangedown is 10:1. The device maintains reference accuracy specification up to 6:1 rangedown. After 6:1 rangedown the reference accuracy decreases to 1% of span.

Scale range	Span (6:1 ratio)	Minimum span (10:1 ratio)
5 – 30 psi (0.35 – 2 bar)	5 psi (0.34 bar)	3 psi (0.21 bar)
31 – 150 psi (2.1 – 10.3 bar)	25 psi (1.72 bar)	15 psi (1.03 bar)
151 – 800 psi (10.4 – 55.1 bar)	134 psi (9.24 bar)	80 psi (5.51 bar)
801 – 4,000 psi (55.2 – 275 bar)	667 psi (45.99 bar)	400 psi (27.5 bar)

A.2.8 Ambient temperature effect per 18 °F (10 °C)

Scale range	Ambient temperature effect
Wireless pressure gauge	
Up to 4,000 psi (275 bar)	±0.3 of span
Wireless pressure gauge with remote seal	
Up to 4,000 psi (275 bar)	See Instrument Toolkit™ software.

A.2.9 Digital zero trim

An offset adjustment to compensate for mounting position effects, up to 5% of Span

A.2.10 Humidity limits

0-95% relative humidity

A.2.11 Electromagnetic compatibility (EMC)

Meets all relevant requirements of CE 61326-1: 2006.

A.2.12 Status indication

Device status is indicated by local LED. Reference Wireless Pressure Gauge Quick Start Guide (document number 00825-0100-4045) for further detail.

A.2.13 Output

IEC 62591 (*Wireless*HART), 2.4 GHz DSSS

1. *Process temperatures above 185 °F (85 °C) require de-rating the ambient limits by a 1.5:1 ratio.*
2. *220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.*
3. *Reference conditions are 70 °F (21 °C), Stable operating pressure with periodic changes, transmit rate of once per minute, and routing data for three additional network devices.*

A.2.14 Wireless radio (internal antenna)

- Frequency: 2.400 – 2.485 GHz
- Channels: 15
- Modulation: IEEE 802.15.4 compliant DSSS
- Transmission: Maximum of 10 dBm EIRP
- Integrated omni-directional antenna

A.2.15 Wireless update rate

Wireless update rate is user-selectable from 1 minute to 60 minutes and is separate from local display.

A.2.16 Vibration effect

No significant effect when tested per IEC60770-1 or ASME B40.1 requirements

IEC60770-1 high vibration level - field or pipeline: 10-60 Hz 0.21 mm displacement peak amplitude/ 60-2000 Hz 3g

A.3 Dial update rate

Dial update rate is user-selectable for 4 seconds or 2 seconds and is separate from the wireless update rate. Factory default is 4 seconds.

A.4 Pressure scale ranges

Additional scale ranges available. Contact Emerson Process Management for additional information.

Psi		
Code	**Vacuum**	
000000	-15/0	
	Gage/absolute	**Compound[1]**
000005	5	5
000010	10	10
000015	15	15
000020	20	20
000030	30	30
000050	50	50
000060	60	60
000075	75	75
000100	100	100
000150	150	150
000160	160	160
000200	200	200
000300	300	300
000400	400	N/A
000500	500	N/A
000600	600	N/A
000800	800	N/A
001000	1000	N/A
001500	1500	N/A
002000	2000	N/A
003000	3000	N/A
004000	4000	N/A

1. Vacuum scale will be in inHg and positive pressure in psi. Only applies to psi.

Bar-kg/cm^2		
Code	**Vacuum**	
000000	-1/0	
	Gage/absolute	**Compound**
000000D40	0.4	0.4
000000D60	0.6	0.6
000001	1	1
000001D50	1.5	1.5
000001D60	1.6	1.6
000002	2	2
000002D50	2.5	2.5
000003	3	3
000004	4	4
000005	5	5
000006	6	6
000009	9	9
000010	10	10
000015	15	15
000016	16	16
000020	20	20
000024	24	N/A
000025	25	N/A
000040	40	N/A
000050	50	N/A
000060	60	N/A
000070	70	N/A
000100	100	N/A
000160	160	N/A
000250	250	N/A

kiloPascals (kPa)		
Code	**Vacuum**	
000000	-100/0	
	Gage/absolute	**Compound**
000040	40	40
000060	60	60
000100	100	100
000150	150	150
000160	160	160
000200	200	200
000250	250	250
000300	300	300
000400	400	400
000500	500	500
000600	600	600
000900	900	900
001000	1000	1000
001500	1500	1500
001600	1600	1600
002000	2000	2000
002400	2400	N/A
002500	2500	N/A
004000	4000	N/A
005000	5000	N/A
006000	6000	N/A
010000	10000	N/A
025000	25000	N/A

mbar		
Code	**Vacuum**	
000000	-1000/0	
	Gage/absolute	**Compound**
000400	400	400
000600	600	600
001000	1000	1000
001500	1500	1500
002000	2000	2000
003000	3000	3000
004000	4000	4000
005000	5000	5000
006000	6000	6000
009000	9000	9000
MegaPascals (MPa)		
Code	**Vacuum**	
000000	-0.1/0	
	Gage/absolute	**Compound**
000000D20	0.2	0.2
000000D50	0.5	0.5
000001	1	1
000001D50	1.5	1.5
000002	2	2
000002D50	2.5	N/A
inH_2O		
Code	**Vacuum**	
000000	-400/0	
	Gage/absolute	**Compound**
000200	200	200
000300	300	300
000800	800	800

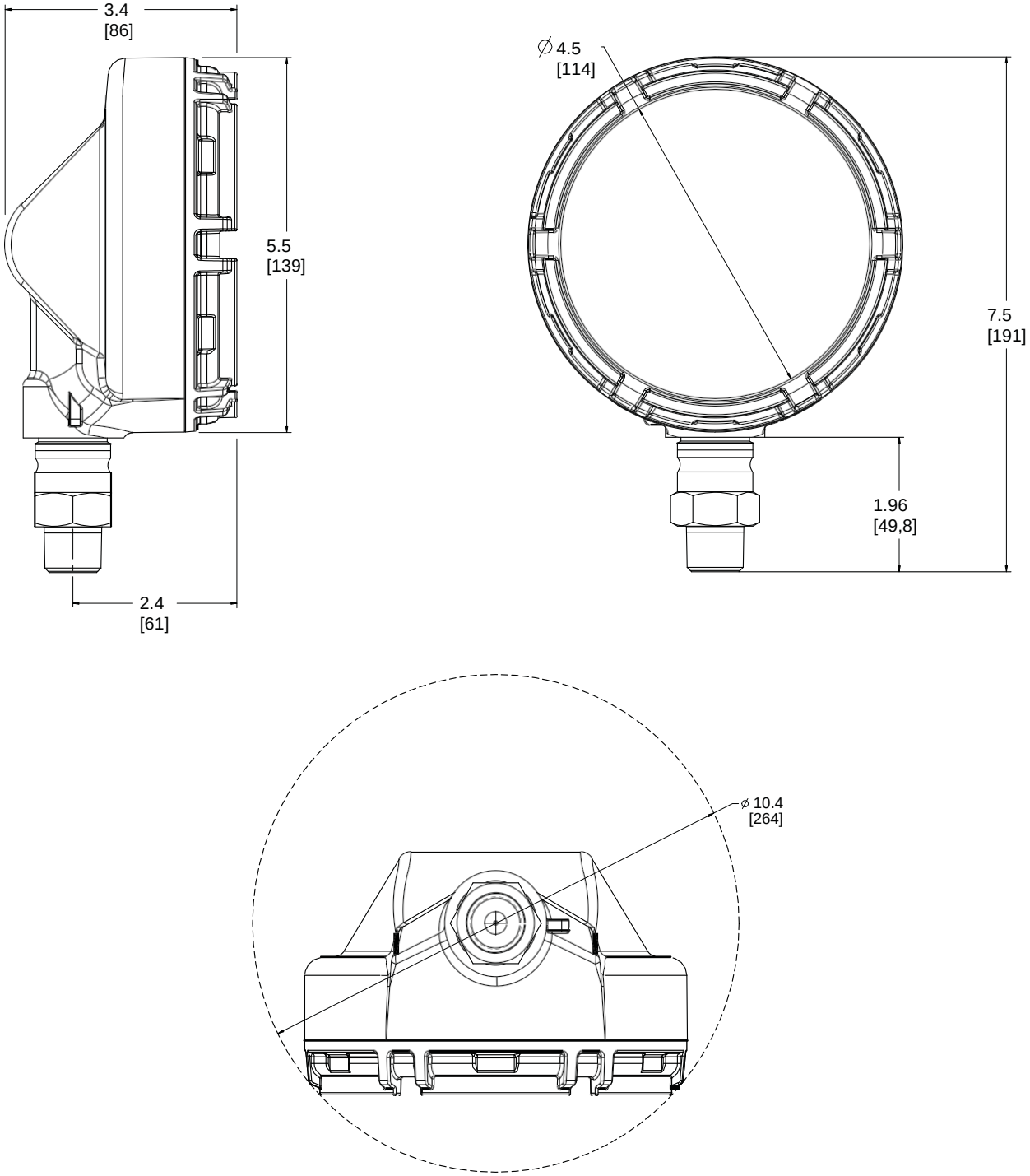
ftH_2O		
Code	**Vacuum**	
000000	-35/0	
	Gage/absolute	**Compound**
000035	35	35
000060	60	60
000070	70	70
000100	100	100
000140	140	140
000240	240	240
000400	400	400
000500	500	500
000700	700	700
000900	900	N/A
mmH_2O		
Code	**Vacuum**	
000000	-10000/0	
	Gage/absolute	**Compound**
001500	1500	1500
007500	7500	7500
040000	40000	40000
200000	200000	200000
inHg		
Code	**Vacuum**	
000000	-10000/0	
	Gage/absolute	**Compound**
000012	12	12
000015	15	15
000016	16	16
000020	20	20
000030	30	30
000060	60	60
000300	300	300

cmH_2O		
Code	**Vacuum**	
000000	-1000/0	
	Gage/absolute	**Compound**
000500	500	500
000900	900	900
cmHg		
Code	**Vacuum**	
000000	-75/0	
	Gage/absolute	**Compound**
000150	150	150
000750	750	750
004000	4000	N/A
020000	20000	N/A
mmHg		
Code	**Vacuum**	
000000	-750/0	
	Gage/absolute	**Compound**
001500	1500	1500
007500	7500	7500
040000	40000	N/A
200000	200000	N/A
Percent of range[(1)]		
Code	**Gage/absolute**	
000030	30	
000150	150	
000800	800	
004000	4000	

1. Scale will read 0-100%. Code selected is representative of the desired working pressure range in psi.

Dimensional Drawings

Figure A-1. Rosemount Wireless Pressure Gauge



Dimensions are in inches (millimeters).

Ordering Table

Table A-1. Rosemount Wireless Pressure Gauge Ordering Information

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

Model	Device type		
WPG	Wireless Pressure Gauge		H
Dial size			
45	4.5-in. (114.3 mm)		H
Gauge output			
X	Wireless with user-configurable update rate, 2.4 GHz DSSS, *Wireless*HART		H
Product certifications			
I1	ATEX Intrinsic Safety		H
I5	US Intrinsically Safe		H
I6	Canada Intrinsically Safe		H
I7	IECEx Intrinsic Safety		H
NA	No approval		H
Measurement type			
G	Gage		H
A	Absolute		H
C	Compound		H
V	Vacuum		H
Process connection style(1)			
	Connection style	**Wetted parts material**	H
11	1/2-14 NPT male	316L SST	H
12	1/2-14 NPT male	Alloy C-276	H
21	G1/2 male (EN 837)	316L SST	H
22	G1/2 male (EN 837)	Alloy C-276	H
Primary engineering unit			
A	psi		H
B	kiloPascals (kPa)		H
D	bar		H
E	mBar		H
F	MegaPascals (MPa)		H
G	inH_2O		H

Table A-1. Rosemount Wireless Pressure Gauge Ordering Information

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

H	kg/cm^2	H
I	ftH_2O	
J	mmH_2O	
K	inHg	H
L	cmH_2O	H
M	cmHg	H
N	mmHg	H
P[2][3]	Percent of range (% of range)	H
Scale ranges		
Reference tables in Pressure scale ranges section for scale ranges by engineering unit.		H

Options (include with selected model number)

Secondary engineering unit (dual scale)		
DA[4]	psi	H
DB[4]	kiloPascals (kPa)	H
DD[4]	bar	H
DH[4]	kg/cm^2	H
DC[5][6]	Custom units	
Diaphragm seal assembly[7][8][9]		
S1	Assemble to one Rosemount 1199 Diaphragm Seal	
Extended product warranty		
WR3	3-year limited warranty	H
WR5	5-year limited warranty	H
Mounting bracket		
B4	Bracket for 2-in. pipe or panel mounting, all SST	H
Custom configuration		
C1	Custom configuration	H
Calibration certification		
Q4	Calibration certificate	H
Material traceability certification		
Q8	Material traceability certification per EN 10204 3.1	H

Table A-1. Rosemount Wireless Pressure Gauge Ordering Information

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

NACE certificate		
Q15	Certificate of compliance to NACE® MR0175/ISO 15156 for wetted materials	H
Q25	Certificate of compliance to NACE MR0103 for wetted materials	H

1. Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.
2. Not available with Measurement Type Compound.
3. Not available with Measurement Type Vacuum.
4. Not available with Primary Engineering Unit "P" (Percent of Range).
5. Requires Primary Engineering Unit of "A" (psi) or "D" (bar).
6. Requires Custom Configuration model code "C1".
7. Requires Process Connection Style "11" or "12".
8. Integrated manifold and diaphragm seal assemblies cannot be combined.
9. "Assemble-to" items are specified separately and require a completed model number.

Appendix B Product Certifications

Approvals will be listed here when the certification has been received from the distributing agency.

European Union Directive Information . . . . . page 43
Telecommunication compliance . . . . . page 43
FCC and IC . . . . . page 43
Ordinary location certification . . . . . page 43
Installing in North America . . . . . page 43

B.1 European Union Directive Information

A copy of the EC Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EC Declaration of Conformity can be found at www.rosemount.com.

B.2 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.3 Ordinary location certification

As standard, the device 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.4 Installing in 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.

B.5 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 devices 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.
This device complies with Industry Canada license-exempt RSS-247. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
Changes or modification to the equipment not expressly approved by Rosemount Inc. could void the user's authority to operate the equipment.

Cet appareil est conforme à la Partie 15 de la réglementation FCC. Son fonctionnement est soumis aux conditions suivantes: Cet appareil ne doit pas causer d'interférences nuisibles. Cet appareil doit accepter toute interférence reçue, incluant toute interférence pouvant causer un fonctionnement indésirable. Cet appareil doit être installé pour assurer une distance minimum de l'antenne de séparation de 20 cm de toute personne. Cet appareil est conforme à la norme RSS-247 Industrie Canada exempt de licence. Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne doit pas provoquer d'interférences et (2) cet appareil doit accepter toute interférence, y compris les interférences pouvant causer un mauvais fonctionnement du dispositif. Les changements ou les modifications apportés à l'équipement qui n'est pas expressément approuvé par Rosemount Inc pourraient annuler l'autorité de l'utilisateur à utiliser cet équipement

Appendix C Field Communicator Menu Trees

C.1 Overview

Figure C-1. Overview

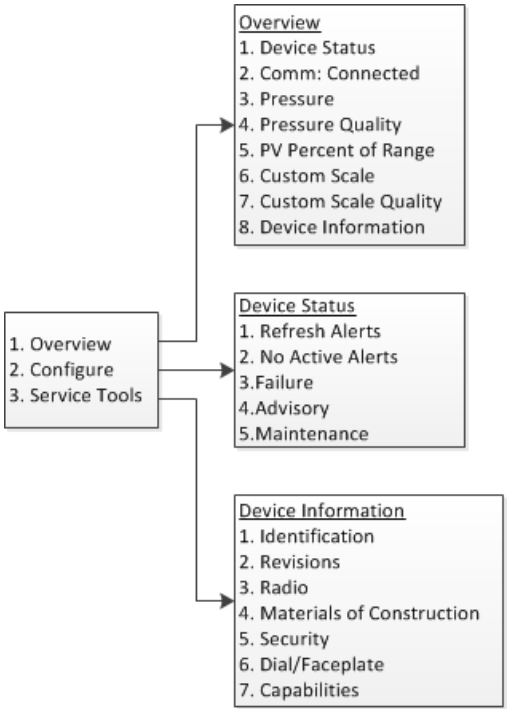


Figure C-2. Configure

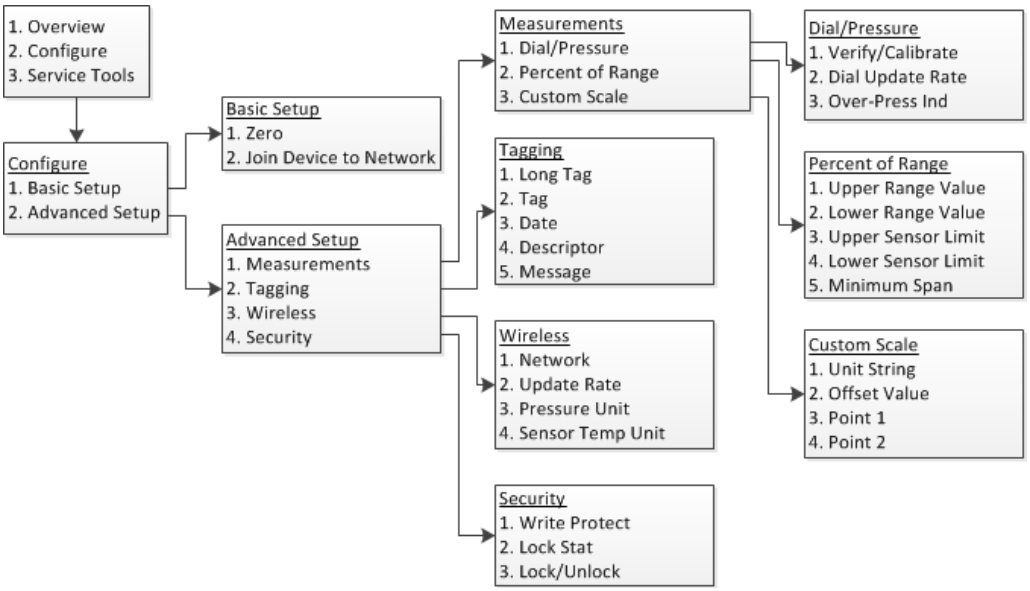


Figure C-3. Service Tools

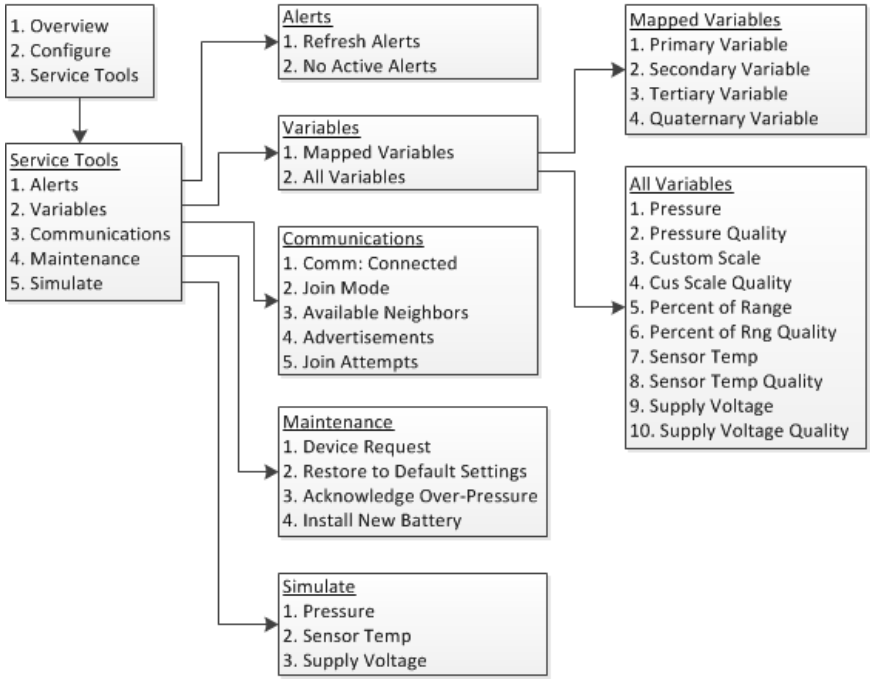


Figure C-4. Device Information

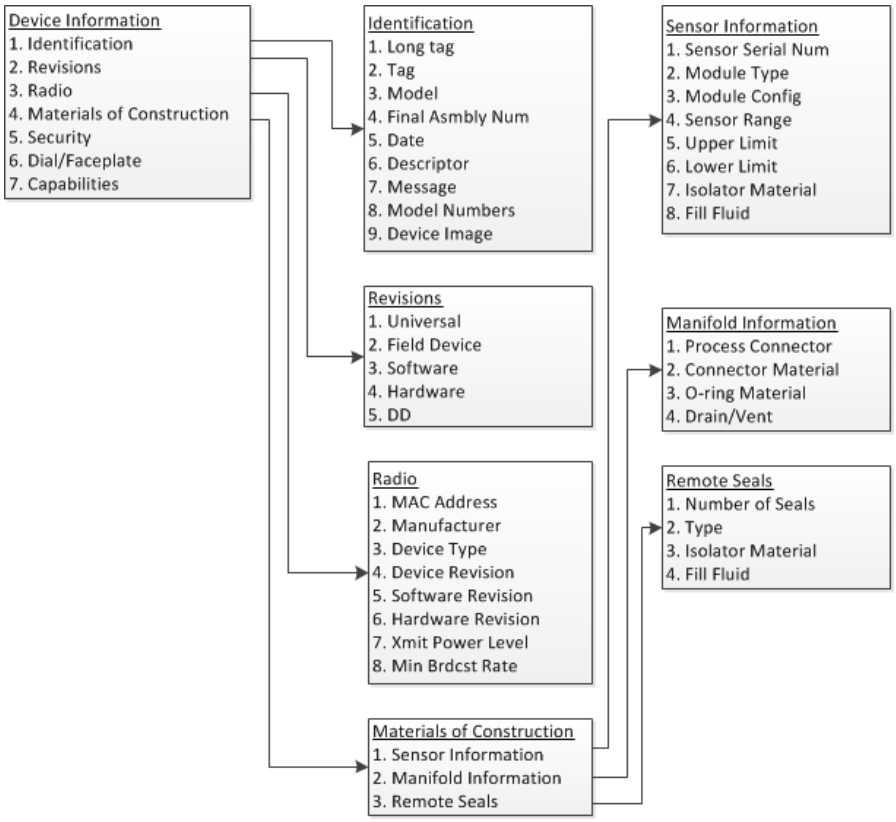
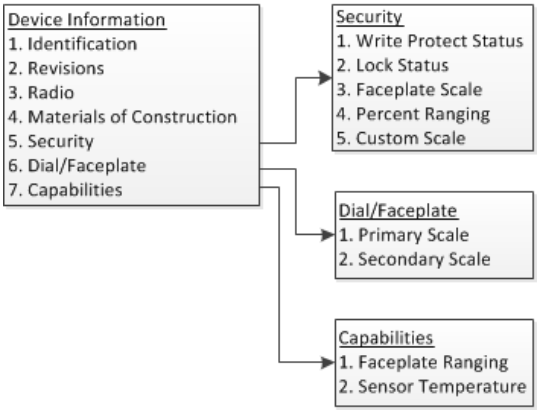


Figure C-5. Device Information (continued)



Appendix D Network Design Best Practices

Overview . . . . . page 49
Effective range . . . . . page 49

D.1 Overview

All recommended practices should be followed to ensure highest data reliability. Deviation from these best practices may require device repeaters in the network to maintain 99% data reliability. The following are guidelines to achieve the best possible wireless network.

- Each wireless network field should be scoped to a single process unit.
- Minimize the number of hops to the Gateway in order to reduce latency. A minimum of five wireless instruments should be within effective range of the Emerson Wireless Gateway.
- Each device in the network should have at minimum three devices with potential communication paths. A mesh network gets its reliability from multiple communication pathways. Ensuring each device has multiple neighbors within range will result in the most reliable network.
- Have 25 percent of wireless instruments in the network within range of Emerson Wireless Gateway. Other enhancing modifications include creating a higher percentage of devices within effective range of the gateway to 35 percent or more. This clusters more devices around the gateway and ensures fewer hops and more bandwidth available to *Wireless*HART devices with fast scan rates.
- Effective range is determined by type of process unit and the density of the infrastructure that surrounds the network.

D.2 Effective range

Heavy Obstruction: 100 ft. (30 m). Typical heavy density plant environment. Cannot drive a truck or equipment through.

Medium Obstruction: 250 ft. (76 m). Typical light process areas, lots of space between equipment and infrastructure.

Light Obstruction: 500 ft. (152 m). Typical of tank farms. Despite tanks being big obstructions themselves, lots of space between and above makes for good RF propagation.

Line of Sight: 750 ft. (230 m). No obstructions between *Wireless*HART devices and devices mounted a minimum of 6 ft. (2 m) above ground or obstructions.

For examples and complete explanations, refer to the IEC62591 *Wireless*HART System Engineering Guide.

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