

Rosemount™ 3051S Wireless Series

Pressure, Level, and Flow Solutions with IEC 62951
(WirelessHART®) Protocol



WirelessHART

ROSEMOUNT™



EMERSON™

Contents

| | | |
|-------------------|---|-----------|
| Chapter 1 | Introduction..... | 5 |
| | 1.1 Models covered..... | 5 |
| | 1.2 Service support..... | 5 |
| | 1.3 Product Recycling/Disposal..... | 6 |
| Chapter 2 | Configuration..... | 7 |
| | 2.1 Overview..... | 7 |
| | 2.2 Safety Messages..... | 7 |
| | 2.3 System readiness..... | 7 |
| | 2.4 Required benchtop configuration..... | 9 |
| | 2.5 Device network configuration..... | 10 |
| | 2.6 Review configuration data..... | 11 |
| | 2.7 Check output..... | 12 |
| | 2.8 Basic setup..... | 13 |
| | 2.9 LCD display..... | 16 |
| | 2.10 Detailed setup..... | 17 |
| | 2.11 Diagnostics and service..... | 23 |
| | 2.12 Advanced functions for HART [®] Protocol..... | 24 |
| Chapter 3 | Installation..... | 27 |
| | 3.1 Overview..... | 27 |
| | 3.2 Considerations..... | 27 |
| | 3.3 Installation procedures..... | 30 |
| | 3.4 Rosemount 304, 305 and 306 integral manifolds..... | 42 |
| Chapter 4 | Commissioning..... | 49 |
| | 4.1 Network status..... | 49 |
| | 4.2 Verifying operation..... | 49 |
| Chapter 5 | Operation and Maintenance..... | 53 |
| | 5.1 Overview..... | 53 |
| | 5.2 Calibration..... | 53 |
| | 5.3 LCD screen messages..... | 57 |
| Chapter 6 | Troubleshooting | 67 |
| | 6.1 Overview..... | 67 |
| | 6.2 Wireless device status information..... | 67 |
| | 6.3 Wireless troubleshooting..... | 70 |
| | 6.4 Wireless network troubleshooting..... | 71 |
| | 6.5 Disassembly procedures..... | 72 |
| | 6.6 Reassembly procedures..... | 75 |
| Appendix A | Specifications and Reference Data..... | 77 |
| | A.1 Specifications..... | 77 |
| Appendix B | Product Certifications..... | 79 |

| | | |
|-------------------|---|-----------|
| | B.1 Product certifications..... | 79 |
| Appendix C | High Gain Remote Antenna Option..... | 81 |
| | C.1 Functional specifications..... | 81 |
| | C.2 Installation considerations..... | 82 |
| | C.3 Transient/lightning considerations..... | 82 |
| | C.4 Dimensional drawings..... | 83 |
| | C.5 Installation steps..... | 83 |
| Appendix D | Field Communicator Menu Trees and Fast Keys..... | 87 |
| | D.1 Communication device menu trees..... | 87 |

1 Introduction

1.1 Models covered

The following tables describe the Rosemount 3051S Wireless pressure transmitters covered in this manual.

Table 1-1: 3051S Wireless Coplanar™ Pressure Transmitter

| Performance class | Measurement type | | |
|-------------------|------------------|-------|----------|
| | Differential | Gauge | Absolute |
| Classic | X | X | X |
| Ultra | X | X | X |
| Ultra for flow | X | - | - |

Table 1-2: 3051S Wireless In-Line Pressure Transmitter

| Performance class | Measurement type | | |
|-------------------|------------------|-------|----------|
| | Differential | Gauge | Absolute |
| Classic | - | X | X |
| Ultra | - | X | X |

Table 1-3: 3051S Wireless Liquid Level Pressure Transmitter

| Performance class | Measurement type | | |
|-------------------|------------------|-------|----------|
| | Differential | Gauge | Absolute |
| Classic | X | X | X |
| Ultra | X | X | X |

1.2 Service support

To expedite the return process, contact Emerson.

Emerson will:

- assist you with obtaining any needed information or materials
- ask for product model and serial numbers
- provide a Return Material Authorization (RMA) number
- ask for the process material to which the product was last exposed

⚠ 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.

NOTICE

Shipping considerations for wireless products (lithium batteries):

The unit was shipped without the power module installed. Prior to re-shipment, ensure that the power module has been removed.

Primary lithium batteries (charged or discharged) 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. Before shipping, consult current regulations and requirements.

The Power Module contains two "C" size primary lithium/thionyl chloride batteries. Each Power Module contains approximately 2.5 grams of lithium, for a total of 5 grams in each module. Under normal conditions, the Power Module materials are self-contained and are not reactive while the batteries and the module integrity are maintained. Ensure prevention of thermal, electrical or mechanical damage. Protect contacts to prevent premature discharge. Power Module hazards remain when cells are discharged.

Store Power Module in a clean and dry area. Temperatures ≤ 86 °F (30 °C) provide maximum battery life.

Emerson representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

1.3 Product Recycling/Disposal

When finished with equipment and packaging, recycle where possible. Dispose of remaining items in accordance with all applicable legislation/regulations.

2 Configuration

2.1 Overview

This section contains configuration and verification information to perform prior to installation.

Communication Device and AMS instructions are given to perform configuration functions. For convenience, Communication Device fast key sequences are labeled “Fast Keys” for each software function below the appropriate headings.

Example software function

Fast Keys 1, 2, 3, etc.

Safety

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 [Safety messages](#) before performing an operation preceded by this symbol.

2.2 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

Explosions could result in death or serious injury.

Before connecting a 375 Field Communicator in an explosive atmosphere, ensure the instruments are installed in accordance with intrinsically safe or nonincendive field wiring practices.

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 Federal Communication Commission (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 8-in. (20 cm) from all persons.

2.3 System readiness

- If using HART® based control or asset management systems, confirm the HART capability of such systems prior to commissioning and installation. Not all systems are capable of communicating with HART Revision 7 devices.

2.3.1 Confirm correct Device Descriptor

To ensure proper communications, verify the latest Device Descriptor (DD/DTM) is loaded on your systems.

Procedure

1. Locate the latest DD at www.emerson.com/global.
 - a) Navigate to the [Emerson Software & Drivers webpage](#).
 - b) Select the **Device Drivers** button.
 - c) Select **DD - Device Descriptor** from the **Choose a Software Type** dropdown menu.
 - d) Select **Wireless HART** from the **Choose a Communication Protocol** dropdown menu.
 - e) Select **Rosemount** from the **Choose a Brand** dropdown menu. Search results load.
 - f) Select radial button in front of **3051 Pressure Transmitter**. Search results are filtered to display 3051 Pressure Transmitter Device Descriptors.
2. Select desired Device Descriptor.

Note

Within [Table 2-1](#), use the HART® Universal Revision and Device Revision numbers to find the correct Device Descriptor.

Table 2-1: Rosemount 3051S Wireless Device Revisions and files

| Software release date | Identify device | | Find device descriptor | | Review instructions | Review functionality |
|-----------------------|--|---------------------------------------|-------------------------|--------------------------------|------------------------------|-----------------------|
| | NAMUR Software Revision ⁽¹⁾ | HART Software Revision ⁽²⁾ | HART Universal Revision | Device Revision ⁽³⁾ | Document number and revision | Changes to software |
| April 2013 | 3.1.0 | 3 | 7 | 3 | 00809-0200-4802 Rev BA | Added Scaled Variable |
| June 2010 | 2.0.0 | 2 | 7 | 2 | 00809-0200-4802 Rev AA | N/A |

- (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 Descriptor (DD) file names use Device and DD Revision; for example, 10_01. HART Protocol is designed to enable legacy DD revisions to continue to communicate with new HART devices. To access new functionality, the new DD must be downloaded. Emerson recommends downloading new DD files to ensure full functionality.

2.4 Required benchtop configuration

Note

3051S Wireless Transmitters must be configured before installation.

Benchtop configuration requires a 375 Communication Device, AMS, or any IEC 62591 (*WirelessHART*[®]) Communicator. Connect the Communication Device leads to the terminals labeled **COMM** on the terminal block. See [Figure 2-1](#).

Benchtop configuration consists of testing the transmitter and verifying transmitter configuration data. Configuring the transmitter on the bench before installation using a 375 Communication Device, AMS, or any IEC 62591 (*WirelessHART*) Communicator ensures that all network settings are working correctly.

When using a Communication Device, 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.

AMS Wireless Configurator

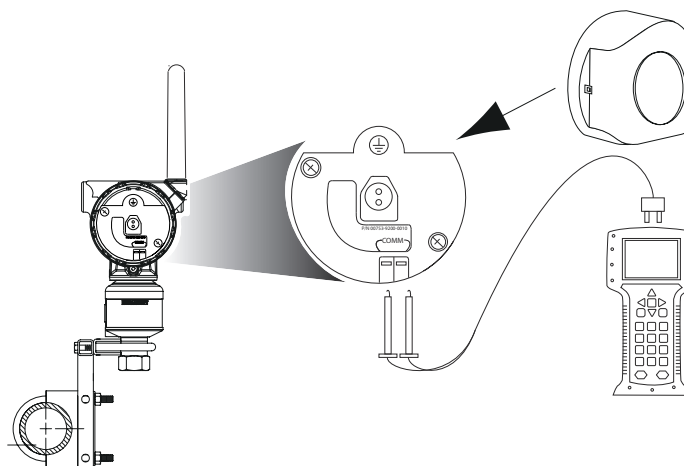
AMS can connect to devices either directly, using a HART modem, or wirelessly via the Smart Wireless Gateway. When configuring the device, double-click the device icon or right-click and select **Configure**.

2.4.1 Connection diagrams

NOTICE

For HART[®] communication, a Rosemount 3051S *WirelessHART*[®] Device Descriptor is required. See [Confirm correct Device Descriptor](#).

Figure 2-1: Communication Device Connection



Bench hook-up

Procedure

1. Connect the bench equipment as shown in [Figure 2-1](#).
2. Turn on the Communication Device by pressing the **ON/OFF** key or log into AMS.

The Communication Device or AMS will search for a HART[®]-compatible device and indicate when the connection is made.

Need help?

If the Communication Device or AMS fail to connect, it indicates that no device was found. If this occurs, refer to [Device not joining the network](#).

Field hook-up

Procedure

The Communication Device or AMS may be connected at COMM on the transmitter terminal block. [Figure 2-1](#) illustrates the wiring for a field hook-up with a Communication Device or AMS.

2.5 Device network configuration

2.5.1 Join device to network

Fast Keys 2, 1, 3

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.

Procedure

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

Using a communication device or AMS, enter the **Network ID** and **Join Key** so that they match the **Network ID** and **Join Key** of the Smart Wireless Gateway and other devices in the network. If the **Network ID** and **Join Key** are not identical to those set in the Smart Wireless Gateway, the transmitter will not communicate with the network. To obtain the **Network ID** and **Join Key** from the Smart Wireless Gateway, go to **Setup** → **Network** → **Settings** page on the web server.

2.5.2 Configure update rate

Fast Keys 2, 1, 4

The update rate is the frequency at which a new measurement is taken and transmitted over the wireless network. The default update rate is 1 minute.

Modify the update rate at:

- commissioning
- any time via AMS Wireless Configurator

The Update Rate is user-selectable from 1 second to 60 minutes.

Procedure

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

3. Select **4: Configure Update Rate**.
4. Wait for device configuration to finish.
5. Remove the power module.
6. Replace the housing cover.

Note

When tightening the housing cover, verify metal contacts metal.

2.5.3 Remove power module

NOTICE

When handling the power module, use caution. If the power module is dropped onto a hard surface, it may be damaged. When cells are discharged, battery hazards remain.

After the sensor and network have been configured, remove the power module and replace the housing cover. When the device is ready to be commissioned, insert the power module.

This transmitter uses the black power module. Order model number 701PBKKF or spare part number 00753-9200-0001.

2.6 Review configuration data

The following is a list of factory default configurations that can be viewed by using the communication device or AMS. To review the transmitter configuration information, use the following procedures.

Note

Information and procedures in this section that make use of communication device fast key sequences and AMS assume that the transmitter and communication equipment are connected, powered, and operating correctly.

2.6.1 Review pressure information

Fast Keys 2, 2, 2

To view pressure information:

Procedure

1. From the **Home** screen, select **2: Configure**.
2. Select **2: Manual Setup**.
3. Select **2: Pressure**.
4. Select from the corresponding number to view each field:
 - 1 Pressure
 - 2 Pressure Status
 - 3 Units
 - 4 Damping

5 Sensor Limits

2.6.2 Review device and sensor information

Fast Keys 2, 2, 9

To view device information:

Procedure

1. From the *Home* screen, select **2: Configure**.
2. Select **2: Manual Setup**.
3. Select **9: Device Information**.
4. Select from the corresponding number to view each field:
 - 1 Identification
 - 2 Revisions
 - 3 Radio
 - 4 Sensor information
 - 5 Flange information
 - 6 Remote seal information

2.6.3 Review radio information

Fast Keys 2, 2, 9, 3

To view radio information:

Procedure

1. From the *Home* screen, select **2: Configure**.
2. Select **2: Manual Setup**.
3. Select **9: Device Information**.
4. Select **3: Radio**.
5. Select from the corresponding number to view each field:
 - 1 Manufacturer
 - 2 Device Type
 - 3 Device Revision
 - 4 Software Revision
 - 5 Hardware Revision

2.7 Check output

Before performing other transmitter operations, ensure that the transmitter is operating properly by checking the operating parameters.

2.7.1 View operating parameters

Fast Keys 3, 2

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 transmitter.

For example, if a Range 2 3051S_T [Lower Range Limit (LRL) = 0 psi, Upper Range Limit (URL) = 150 psi] is ranged from 0 to 100 psi, an applied pressure of 150 psi will return:

- a % of range output of 150%
- an engineering output of 150 psi

To view the **Operating Parameters** menu:

Procedure

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:

- Percent of Range
- Pressure
- Pressure Status
- Sensor Temperature
- Sensor Temperature Status
- Electronics Temperature
- Electronics Temperature Status
- Supply Voltage
- Supply Voltage Status
- Last Update Time

2.8 Basic setup

2.8.1 Set process variable unit

Fast Keys 2, 2, 2, 3

The `PV Unit` command sets the process variable units to allow you to monitor your process using the appropriate units of measure.

To select a unit of measure for the PV:

Procedure

1. From the **Home** screen, select **2: Configure**.
2. Select **2: Manual Setup**.
3. Select **2: Pressure**.

4. Select **3: Unit** to select from the following engineering units:

- inH₂O at 4 °C
- inH₂O at 60 °F
- inH₂O at 68 °F
- ftH₂O at 4 °C
- ftH₂O at 60 °F
- ftH₂O at 68 °F
- mmH₂O at 4 °C
- mmH₂O at 68 °F
- cmH₂O at 4 °C
- mH₂O at 4 °C
- inHg at 0 °C
- mmHg at 0 °C
- cmHg at 0 °C
- mHg at 0 °C
- mmHg
- Psi
- Atm
- Torr
- Pascals
- hectoPascals
- Kilopascals
- Mpa
- Bar
- Mbar
- g/cm²
- kg/cm²
- kg/m²

2.8.2 Set transfer function

Fast Keys 2, 2, 4, 2

The Rosemount 3051S Wireless has two transfer function settings: `Linear` and `Square Root`.

Activate the `Square Root` option to make output proportional to flow. As input approaches zero, the 3051S Wireless automatically switches to `Linear` to ensure a more smooth, stable output near zero (see [Figure 2-2](#)).

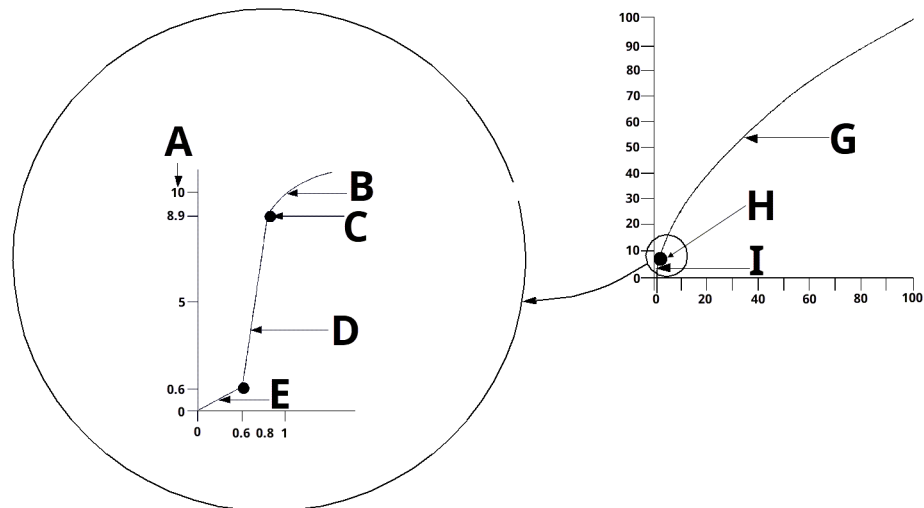
From 0 to 0.6 percent of the ranged pressure input, the slope of the curve is unit y (y = x). This allows accurate calibration near zero. Greater slopes would cause large changes in output (for small changes at input). From 0.6 percent to 0.8 percent, curve slope equals 42 (y = 42x) to achieve continuous transition from linear to square root at the transition point.

To select the output transfer function:

Procedure

1. From the **Home** screen, select **2: Configure**.
2. Select **2: Manual Setup**.
3. Select **4: Percent of Range**.
4. Select **2: Transfer Function**.
5. Select either `Linear` or `Square Root`.

Figure 2-2: Square Root output transition point



- A. Full scale flow (%)
- B. Square Root curve
- C. Transition point
- D. Slope = 42
- E. Slope = 1
- F. Square Root curve
- G. Transition point
- H. Linear section

2.8.3 Set *Damping*

Fast Keys 2, 2, 2, 4

The *Damping* command introduces a delay in processing which increases the response time of the transmitter, smoothing variations in output readings caused by rapid input changes. In the Rosemount 3051S Wireless Pressure Transmitter, damping only takes effect when the device is placed in *High Power Refresh* mode and during calibration. In *Normal Power* mode, the effective damping is 0.

NOTICE

When the device is in *High Power Refresh* mode, battery power will be depleted rapidly.

Determine the appropriate damp setting based on the necessary response time, signal stability, and other requirements of the loop dynamics of your system. The damping value of your device is user selectable from 0 to 60 seconds.

To determine the current damping value:

Procedure

1. From the *Home* screen, select **2: Configure**.

2. Select **2: Manual Setup**.
3. Select **2: Pressure**.
4. Select **4: Damping**.

2.8.4 View *Write Protect* settings

Fast Keys 2, 2, 7, 1

The Rosemount 3051S Wireless has a software write protect security feature.

The view write protect security settings:

Procedure

1. From the *Home* screen, select **2: Configure**.
2. Select **2: Manual Setup**.
3. Select **9: Device Information**.
4. Select **1: Write Protect**.

2.9 LCD display

2.9.1 Configure LCD display

Fast Keys 2, 1, 5

The LCD display indicates output and abbreviated diagnostic messages.

Note

Use Rosemount Wireless LCD Part Number: 00753-9004-0002.

The LCD display features a four-line display and a bar graph.

| Line | Number of alphanumeric characters | Displays |
|------|-----------------------------------|--|
| 1 | 5 | Output description |
| 2 | 7 | Actual value |
| 3 | 6 | Engineering units |
| 4 | 5 (when needed) | "Error" indicates when transmitter is in alarm |

The LCD display also displays diagnostic messages. The bar graph represents the network connectivity status.

See [LCD screen messages](#) for more information on LCD messages.

To configure LCD display options,:

Procedure

1. From the *Home* screen, select **2: Configure**.
2. Select **1: Guided Setup**.
3. Select **5: Configure Device Display**.

2.10 Detailed setup

2.10.1 Configure process alerts

Fast Keys 2, 1, 6

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 transmitted continuously if the set points are exceeded and the alert mode is ON.

A process alert displays on a:

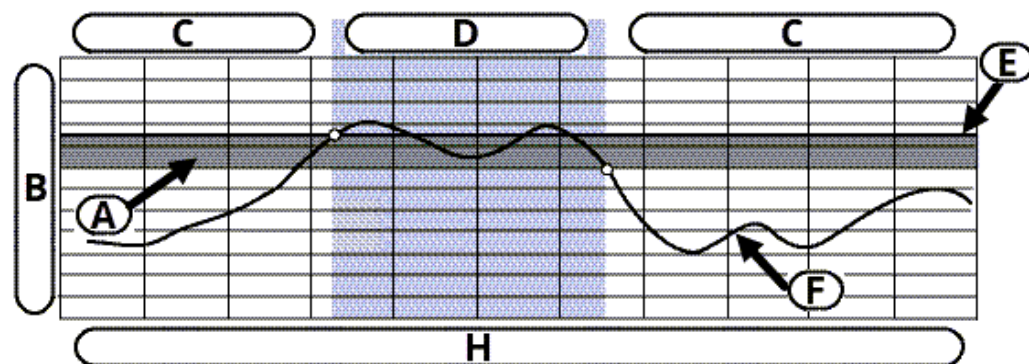
- communication device
- AMS status screen
- in the error section of the LCD display

The process alert resets when the value returns within range.

Note

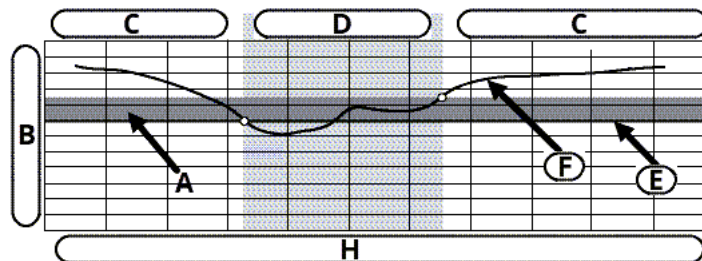
HI alert value must be higher than the **LO** alert value. Both alert values must be within the pressure or temperature sensor limits.

Figure 2-3: Rising Alert



- A. Deadband
- B. Units of Measurement
- C. Alert "OFF"
- D. Alert "ON"
- E. Alert Set Point
- F. Assigned Value

Figure 2-4: Falling Alert



- A. Deadband
- B. Units of Measurement
- C. Alert "OFF"
- D. Alert "ON"
- E. Alert Set Point
- F. Assigned Value

To configure the process alerts:

Procedure

1. From the **Home** screen, select **2: Configure**.
2. Select **1: Guided Setup**.
3. Select **6: Configure Process Alerts**.
4. Follow the on-screen instructions to complete configure of process alerts.

2.10.2 Select sensor temperature unit

Fast Keys 2, 2, 8, 3

The **Sensor Temperature Unit** command selects between Celsius and Fahrenheit units for the sensor temperature. The sensor temperature output is accessible via HART® only.

To select the sensor temperature unit:

Procedure

1. From the **Home** screen, select **2: Configure**.
2. Select **2: Manual Setup**.
3. Select **8: Device Temperatures**.
4. Select **3: Sensor Temperature**.

2.10.3 Configure scaled variable

Fast Keys 2, 2, 3

The scaled variable configuration allows the user to create a relationship/conversion between the pressure units and user-defined/custom units. There are two use cases for scaled variable:

- Allow custom units to be displayed on the transmitter's LCD display.
- Allow custom units to drive the transmitter's 4-20 mA output.

To use custom units to drive the 4-20 mA output, scaled variable must be re-mapped as the primary variable. Refer to [Table 2-2](#).

The scaled variable configuration defines the following:

| | |
|---|--|
| Scaled variable units | Custom units to be displayed. |
| Scaled data options | Defines the transfer function for the application. <ul style="list-style-type: none"> • Linear • Square root |
| Pressure value position 1 | Lower known value point (possible 4 mA point) with consideration of linear offset. |
| Scaled variable value position 1 | Custom unit equivalent to the lower known value point (The lower known value point may or may not be the 4 mA point.) |
| Pressure value position 2 | Upper known value point (possible 20 mA point) |
| Scaled variable value position 2 | Custom unit equivalent to the upper known value point (possible 20 mA point) |
| Linear offset | The value required to zero out pressures effecting the desired pressure reading. |
| Low flow cutoff | Point at which output is driven to zero to prevent problems caused by process noise. |

Note

To have a stable output and avoid problems due to process noise at a low flow or no flow condition, use the low flow cutoff function. Enter a low flow cutoff value that is practical for the flow element in the application.

Note

If scaled variable is mapped as the primary variable and square root mode is selected, ensure transfer function is set to **Linear**. Refer to [Set transfer function](#).

Communication Device v3.3

To configure the scaled variable with a communication device:

Procedure

1. From the *HOME* screen, follow the fast key sequence “Scaled Variable Configuration.”
2. Select **OK** after the control loop is set to **Manual**.
3. Enter the scaled variable units.

Units can be up to five characters long and include A — Z, 0 — 9, -, /, %, and *.

Default unit is DEFLT. The first character is always an asterisk (*), which identifies the units displayed are scaled variable units.

- a)
 - b)
4. Select scaled data options:
 - a) Select **Linear** if the relationship between PV and scaled variable units are linear. **Linear** prompts for two data points.

- b) Select **Square Root** if the relationship between PV and scaled variable is square root (flow applications). **Square Root** will prompt for one data point.
5. Enter pressure value position 1. Pressure values must be within the range of the transmitter.
 - a) **Linear** function: Enter the lower known value point considering any linear offset.
 - b) **Square Root** function: Select **OK** to acknowledge pressure value is set to zero.
6. Enter scaled variable position 1.
 - a) **Linear** function: Enter the lower known value point which must be seven digits or less.
 - b) **Square Root** function: Select **OK** to acknowledge scaled variable value is set to zero.
7. Enter pressure value position 2. Pressure values must be within the range of the transmitter.
 - a) Enter the upper known value point.
8. Enter scaled variable position 2.
 - a) **Linear** function: Enter custom unit equivalent to the upper known value point.

Note
For both functions, value entered must be seven digits or less.

 - b) **Square Root** function: Enter custom unit equivalent to the value in [Step 7](#). Skip to [Step 10](#).
9. **Linear** function: Enter linear offset value in scaled variable (custom) units. Skip to [Step 11](#).
10. **Square Root** function: Enter Low Flow cutoff mode. If:
 - If not wanting a low flow cutoff value, select **OFF**.
 - If wanting a low flow cutoff value, select **ON** and enter this value in scaled variable (custom) units on the next screen.
11. To acknowledge that the loop can be returned to automatic control, select **OK**.

AMS v7.0

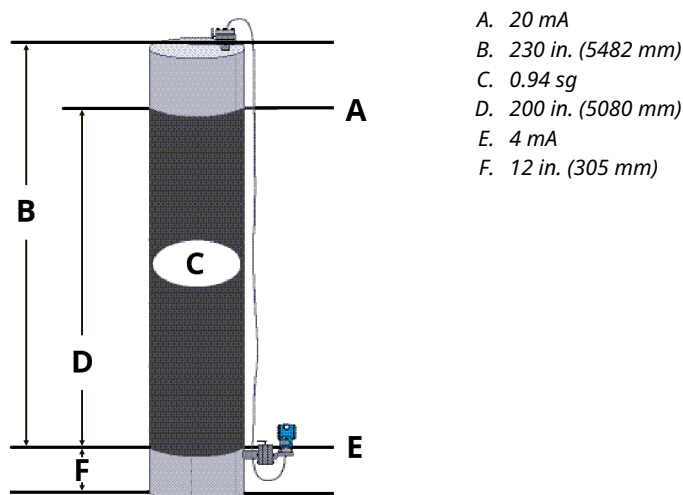
Procedure

1. Right click on the device.
2. Select **Device Configuration**.
3. Select **SV Config**.
4. Set the control loop to **Manual**.
5. Select **Next**.
6. Enter desired scaled variable units in **Enter SV units** box and select **Next**.
7. Select scaled data options: **Linear** or **Square Root** and select **Next**. If square root is selected, skip to [Step 13](#).
8. Enter pressure value position 1 and select **Next**.
9. Enter scaled variable position 1 and select **Next**.

10. Enter pressure value position 2 and select **Next**.
11. Enter scaled variable position 2 and select **Next**.
12. Enter linear offset and select **Next**. Skip to [Step 19](#).
13. Select **Next** to acknowledge that *Pressure value for position 1* is set to zero.
14. Select **Next** to acknowledged that *Square root value for position 1* is set to zero.
15. Enter pressure value for position 2 and select **Next**.
16. Enter square root value for position 2 and select **Next**.
17. Enter low flow cutoff mode: **Off** or **On**. If **Off** is selected, skip to [Step 19](#).
18. Enter low flow cutoff value in scaled variable (custom) units and select **Next**.
19. Select **Next** to acknowledge that the loop can be returned to **automatic** control.
20. Select **Finish** to acknowledge the method is complete.

DP Level example

Figure 2-5: Example tank



In this example:

- A differential transmitter is used in a level application where the span is 188 inH₂O (200 in. * 0.94 sg).
- Once installed on an empty tank and taps vented, the process variable reading is -209.4 inH₂O.
- The process variable reading is the head pressure created by fill fluid in the capillary.

Based on [Figure 2-5](#), the scaled variable configuration would be as follows:

| | |
|-----------------------------------|-----------------------------------|
| Scaled Variable units | inches |
| Scaled data options | linear |
| Pressure value position 1 | 0 inH ₂ O (0 mbar) |
| Scaled variable position 1 | 12 in. (305 mm) |
| Pressure value position 2 | 188 inH ₂ O (0.47 bar) |

| | |
|-----------------------------------|---------------------------------------|
| Scaled Variable position 2 | 212 in. (5385 mm) |
| Linear offset | -209.4 inH ₂ O (-0.52 bar) |

Differential pressure flow example

To have a stable output and avoid problems due to process noise at a low flow or no flow condition, Emerson recommends using the low flow cutoff function. A low flow cutoff value that is practical for the flow element in the application should be entered.

In this example:

- A differential transmitter is used in conjunction with an orifice plate in a flow application where the differential pressure at full scale flow is 125 inH₂O.
- The flow rate at full scale flow is 20,000 gallons of water per hour.
- The low flow cutoff value is 1,000 gallons of water per hour.

Based on this information, the scaled variable configuration would be as follows:

| | |
|-----------------------------------|-----------------------------------|
| Scaled variable units | gal/h |
| Scaled data options | square root |
| Pressure value position 2 | 125 inH ₂ O (311 mbar) |
| Scaled variable position 2 | 20,000 gal/h (75,708 lt/hr) |
| Low flow cutoff | 1000 gal/h (ON) |

Note

Pressure value position 1 and Scaled variable position 1 are always set to zero for a flow application. No configuration of these values is required.

2.10.4 Remapping device variables

The remapping function allows configuring of the following transmitter variables:

- Primary Variable (PV)

Note

The variable assigned to the primary variable drives the output. This value can be selected as Pressure or Scaled Variable.

- Secondary Variable (SV)
- Tertiary Variable (TV)
- Quaternary Variable (QV)

Two configurations are available:

- Classic Mapping
- Scaled Variable Mapping

To see what value is mapped to each variable, see [Table 2-2](#). All variables can be remapped with a communication device or AMS Device Manager.

Table 2-2: Variable mapping

| Variable | Classic Mapping | Scaled Variable Mapping |
|----------|-----------------|-------------------------|
| PV | Pressure | Scaled variable |

Table 2-2: Variable mapping (continued)

| Variable | Classic Mapping | Scaled Variable Mapping |
|----------|------------------------|-------------------------|
| SV | Sensortemperature | Pressure |
| TV | Electronicstemperature | Sensor temperature |
| QV | Supply voltage | Supply voltage |

Remapping using a communication device

Procedure

From the **Home** screen, enter the fast key sequence.

Fast Keys: 2, 1, 7
guided setup

Fast Keys: 2, 2, 3, 5
manual setup

Remapping using AMS Device Manager

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

Procedure

1. Select **Manual Setup** and click on the **HART** tab.
2. Assign device variables (primary, secondary, tertiary, and quaternary) under **Variable Mapping**.
3. Click **Send**.
4. Carefully read the warning and click **Yes** if it is safe to apply the changes.

2.11 Diagnostics and service

Diagnostics and service functions listed below are primarily for use after field installation. The Transmitter Test feature is designed to verify that the transmitter is operating properly, and can be performed either on the bench or in the field.

2.11.1 Perform a master reset

Fast Keys 3, 5, 4

The master reset function will reset the device electronics.

To perform a master reset:

Procedure

1. From the **Home** screen, select **3: Service Tools**.
2. Select **5: Routine Maintenance**.
3. Select **4: Other**.

2.11.2 View join status

Fast Keys 3, 4, 1

To view the join status of the device:

Procedure

1. From the **Home** screen, select **3: Service Tools**.
2. Select **4: Communications**.
3. Select **1: Join Status**.

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

- a. Network Found
- b. Network Security Clearance Granted
- c. Network Bandwidth Allocated
- d. Network Join Complete

2.11.3 View number of available neighbors

Fast Keys 3, 4, 3

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:

Procedure

1. From the **Home** screen, select **3: Service Tools**.
2. Select **4: Routine Maintenance**.
3. Select **3: Number of Available Neighbors**.

2.12 Advanced functions for HART® Protocol

2.12.1 Saving, recalling, and cloning configuration data

Fast Keys left arrow, 1, 2

Use the cloning feature of the communication device or the AMS *User Configuration* feature to configure several Rosemount 3051S Wireless Pressure Transmitters similarly. Cloning involves:

1. Configuring a transmitter.
2. Saving the configuration data.
3. Sending a copy of the data to a separate transmitter.

Several possible procedures exist when saving, recalling, and cloning configuration data. For complete instructions, refer to the communication device manual or AMS Books Online.

Clone configuration data using a communication device

Procedure

1. Completely configure the first transmitter.
2. Save the configuration data:

- a) Select **F2 SAVE** from the communication device **HOME/ONLINE** screen.
 - b) Ensure the location to which the data will be saved is set to `Module`.
To set the save location to `Module`, select **1: Location**.
 - c) Select **2: Name** to name the configuration data.
The default is the transmitter tag number.
 - d) Ensure the data type is set to `STANDARD`.
To set the data type to `STANDARD`, select **3: Data Type**.
 - e) Select **F2 SAVE**.
3. Connect and power the receiving transmitter and communication device.
 4. Select the back arrow from the **HOME/ONLINE** screen.
The communication device menu appears.
 5. Select **1: Offline, 2: Saved Configuration, 1: Module Contents** to reach the **MODULE CONTENTS** menu.
 6. Use the **DOWN ARROW** to scroll through the list of configurations in the memory module, and use the **RIGHT ARROW** to select and retrieve the required configuration.
 7. Select **1: Edit**.
 8. Select **1: Mark All**.
 9. Select **F2 SAVE**.
 10. Use the **DOWN ARROW** to scroll through the list of configurations in the memory module, and use the **RIGHT ARROW** to select the configuration again.
 11. Select **3: Send** to download the configuration to the transmitter.
 12. Select **OK** after the control loop is set to manual.
 13. After the configuration has been sent, choose **OK**.

When finished, the communication device informs you of the status. Repeat [Step 3](#) through [Step 13](#) to configure another transmitter.

Note

The transmitter receiving cloned data must have the same software version (or later) as the original transmitter.

Create a reusable copy using AMS

Procedure

1. Completely configure the first transmitter.
2. Select **View** → **User Configuration View** from the menu bar (or click the toolbar button).
3. In the **User Configuration** window, right-click and select **New** from the context menu.
4. In the **New** window, select a device from the list of templates shown, and click **OK**.
The template is copied into the **User Configurations** window with the tag name highlighted.
5. Rename the copied template as appropriate and select **Enter**.

Note

A device icon can also be copied by dragging and dropping a device template or any other device icon from AMS Explorer or *Device Connection View* into the **User Configurations** window.

The **Compare Configurations** window appears, showing the current values of the copied device on one side and mostly blank fields on the **User Configuration** side.

6. Transfer values from the current configuration to the user configuration as appropriate or enter values by typing them into the available fields.
7. Select **Apply** to apply the values or **OK** to apply the values and close the window.

Apply a user configuration using AMS

Any amount of user configurations can be created for the application. They can also be saved, and applied to connected devices or to devices in the Device List or Plant Database.

To apply a user configuration:

Procedure

1. Select the desired user configuration in the **User Configurations** window.
2. Drag the icon onto a like device in AMS Explorer or *Device Connection View*.
The **Compare Configurations** window opens, showing the parameters of the target device on one side and the parameters of the user configuration on the other.
3. Transfer parameters from the user configuration to the target device as desired.
Select **OK** to apply the configuration and close the window.

3 Installation

3.1 Overview

The information in this section covers installation considerations. A [Quick Installation Guide](#) is shipped with every transmitter to describe basic installation and startup procedures. Dimensional drawings for each Rosemount 3051S Wireless variation and mounting configuration are included in the [Product Data Sheet](#).

communication device and AMS instructions are given to perform configuration functions. For convenience, communication device fast key sequences are labeled “Fast Keys” for each software function below the appropriate headings.

3.2 Considerations

3.2.1 General considerations

Measurement performance depends upon proper installation of the transmitter and impulse piping. Mount the transmitter close to the process and use a minimum of piping to achieve best performance.

Consider the need for:

- easy access
- personnel safety
- practical field calibration
- suitable transmitter environment

Install the transmitter to minimize vibration, shock, and temperature fluctuation.

3.2.2 Wireless considerations

Power up sequence

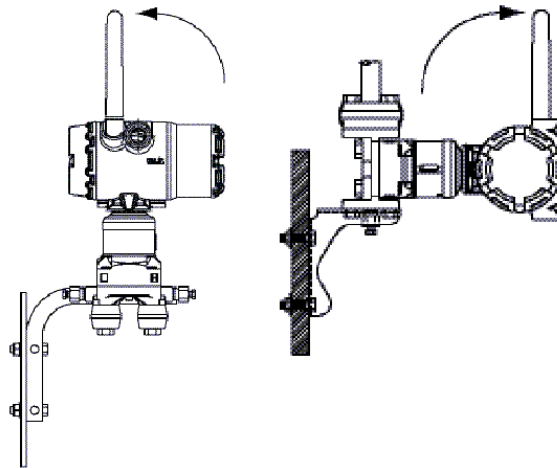
The power module should not be installed on any wireless device until the Smart Wireless Gateway is installed and functioning properly. This transmitter uses the Black Power Module. Please order model number 701PBKKE or spare part number 00753-9200-0001. Wireless devices should also be powered up in order of proximity from the Smart Wireless Gateway beginning with the closest. This will result in a simpler and faster network installation. Enable High Speed Operation on the Gateway to ensure that new devices join the network faster. For more information, see the [Emerson Wireless 1410 Gateway Manual](#).

Antenna position

To allow clear communication to other devices, position the antenna:

- vertically, either straight up or straight down
- approximately 3 ft (1 m) from any large structure or building

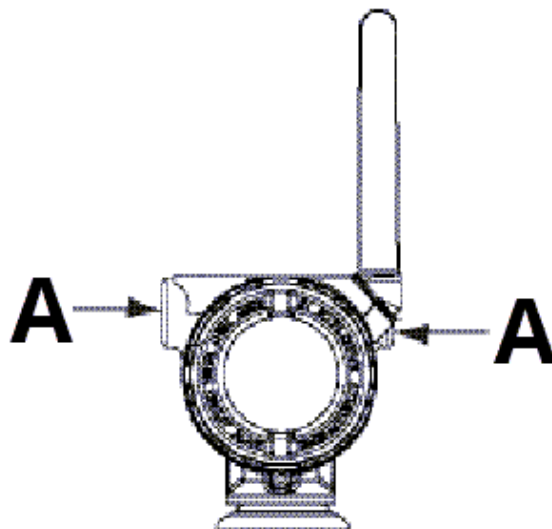
Figure 3-1: Antenna position



Note

Replace temporary orange plugs with included conduit plugs using approved thread sealant.

Figure 3-2: Conduit plug location

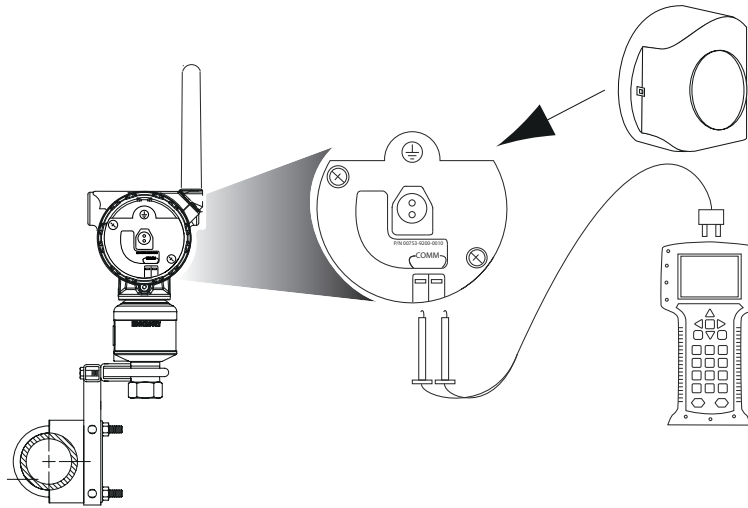


A. Conduit plug

Communication device connections

In order for the communication device to interface with the Rosemount 3051S, the power module must be connected.

Figure 3-3: 375 communication device connections



3.2.3 Mechanical considerations

Note

For steam service or for applications with process temperatures greater than the limits of the transmitter, do not blow down impulse piping through the transmitter. Before resuming measurement, flush lines with the blocking valves closed and refill lines with water.

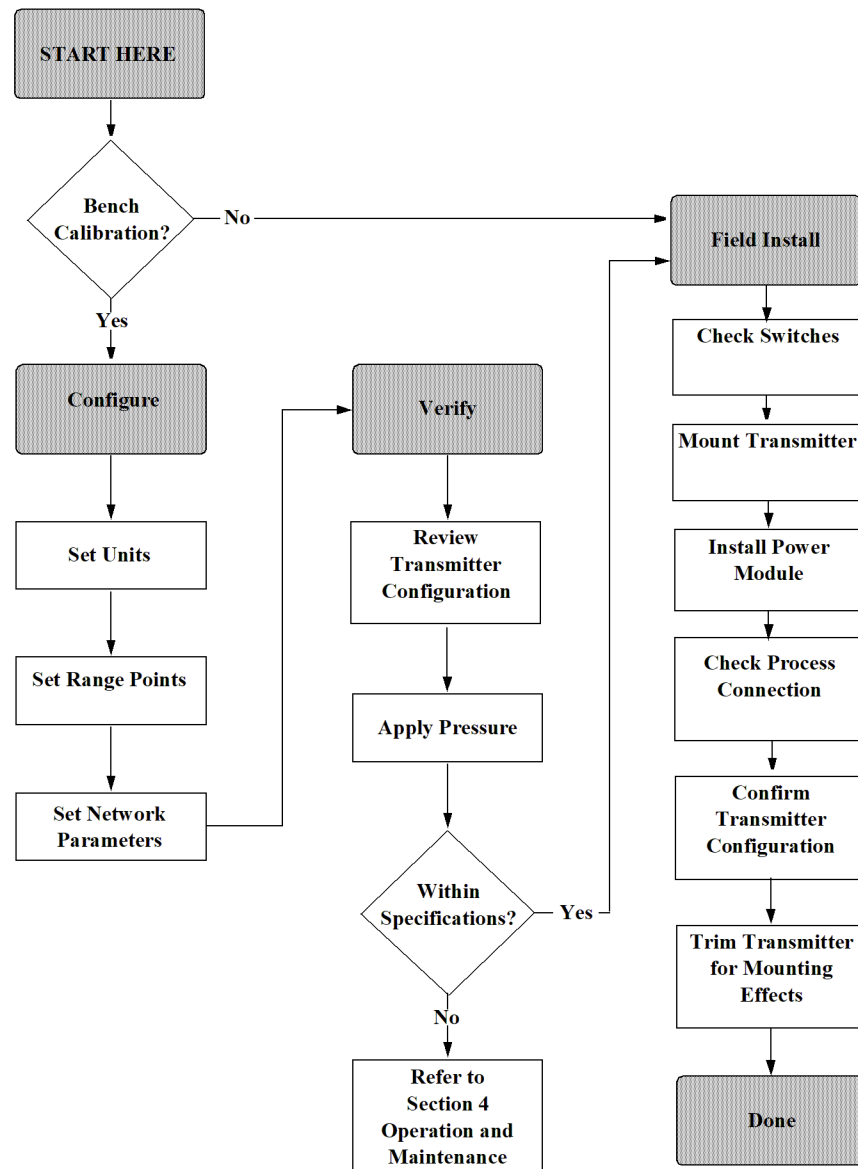
Note

When the transmitter is mounted on its side, position the Coplanar™ flange to ensure proper venting or draining. Mount the flange as shown in [Figure 3-7](#), keeping drain/vent connections on the bottom for gas service and on the top for liquid service.

3.2.4 Environmental considerations

Access requirements and cover installation on [Mounting the transmitter](#) can help optimize transmitter performance. Mount the transmitter to minimize ambient temperature changes, vibration, mechanical shock, and to avoid external contact with corrosive materials. To view temperature operating limits and other specifications, refer to [Locating additional information](#).

Figure 3-4: Installation flowchart



3.3 Installation procedures

Process flange orientation

Mount the process flanges with sufficient clearance for process connections.

⚠ CAUTION

Contact hazard

Position the drain/vent valves to direct the process fluid away from potential human contact when the vents are used.

Evaluate the need for a testing or calibration input.

Housing rotation

See [Rotate housing](#).

Power module side of electronics housing

Mount the transmitter so the power module side is accessible. Clearance of 2.75 in. (70 mm) is required for cover removal.

Circuit side of electronics housing

The necessary clearance to be provided for:

- Units without an LCD display: 0.75 in. (19 mm)
- Units with a meter installed: 3.0 in. (7.62 mm)

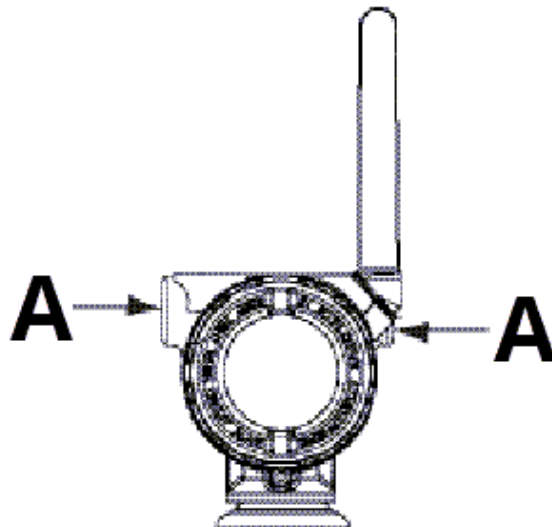
Cover installation

Always ensure a proper seal by installing the electronics housing cover(s) so that metal contacts metal. Use Rosemount O-rings.

Conduit plugs

Replace temporary orange plugs with included conduit plugs (found in the box) using approved thread sealant. For material compatibility considerations, see [Corrosion and Its Effects](#).

Figure 3-5: Conduit plug locations



A. Conduit plug

3.3.1 Mounting the transmitter

Mounting brackets

Facilitate mounting transmitter to a two-inch pipe, or to a panel. The B4 Bracket (stainless steel) option is standard for use with the Coplanar™ and In-Line flanges. Refer to [Locating additional information](#) to locate dimensional drawings and mounting configurations for the B4 option.

Options B1–B3 and B7–B9 are sturdy, epoxy/polyester-painted brackets designed for use with the traditional flange. The B1–B3 brackets have carbon steel bolts, while the B7–B9 brackets have stainless steel bolts. The BA and BC brackets and bolts are stainless steel. The B1/B7/BA and B3/B9/BC style brackets support 2-inch pipe-mount installations, and the B2/B8 style brackets support panel mounting.

Note

Most transmitters are calibrated in the horizontal position. Mounting the transmitter in any other position will shift the zero point to the equivalent amount of liquid head caused by the varied mounting position. To reset zero point, refer to [Sensor trim](#).

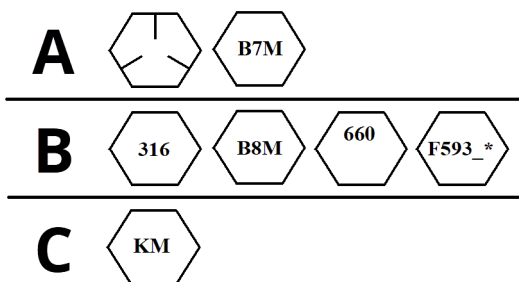
Position the antenna such that it is vertical, typically straight up (antenna may be pointed down as well).

Flange bolts

The Rosemount 3051S Wireless Pressure Transmitter can be shipped with a Coplanar™ flange or a Traditional flange installed with four 1.75-inch flange bolts.

Stainless steel bolts supplied by Emerson are coated with a lubricant to ease installation. Carbon steel bolts do not require lubrication. No additional lubricant should be applied when installing either type of bolt. Bolts supplied by Emerson are identified by their head markings:

Figure 3-6: Bolt head markings



- A. Carbon Steel (CS)
- B. Stainless Steel (SST)⁽¹⁾
- C. Alloy K-500

Installing bolts

Only use bolts supplied with the Rosemount 3051S or sold by Emerson as spare parts. When installing the transmitter to one of the optional mounting brackets, torque the bolts to 125 in-lb. (14.1 N-m).

To install bolts:

⁽¹⁾ The last digit in the F593_ head marking may be any letter between A and M.

Procedure

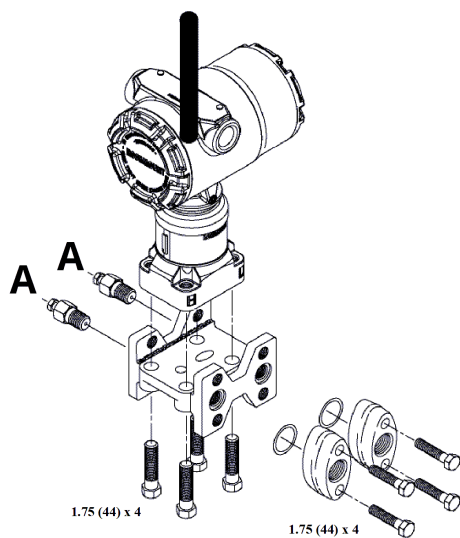
1. Finger-tighten the bolts.
2. Torque the bolts to the initial torque value using a crossing pattern.
3. Torque the bolts to the final torque value using the same crossing pattern.

Torque values for the flange and manifold adapter bolts are as follows:

Table 3-1: Bolt installation torque values

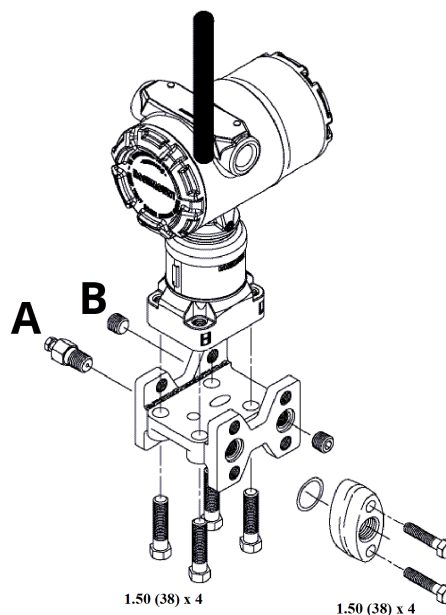
| Bolt material | Initial torque value | Final torque value |
|--------------------------|----------------------|---------------------|
| CS-ASTM-A445 Standard | 300 in.-lb (34 N-m) | 650 in.-lb (73 N-m) |
| 316 SST—Option L4 | 150 in.-lb (17 N-m) | 300 in.-lb (34 N-m) |
| ASTM-A-193-B7M—Option L5 | 300 in.-lb (34 N-m) | 650 in.-lb (73 N-m) |
| Alloy K-500—Option L6 | 300 in.-lb (34 N-m) | 650 in.-lb (73 N-m) |
| ASTM-A-453-660—Option L7 | 150 in.-lb (17 N-m) | 300 in.-lb (34 N-m) |
| ASTM-A-193-B8M—Option L8 | 150 in.-lb (17 N-m) | 300 in.-lb (34 N-m) |

Differential transmitter



A. Drain/Vent
B. Plug

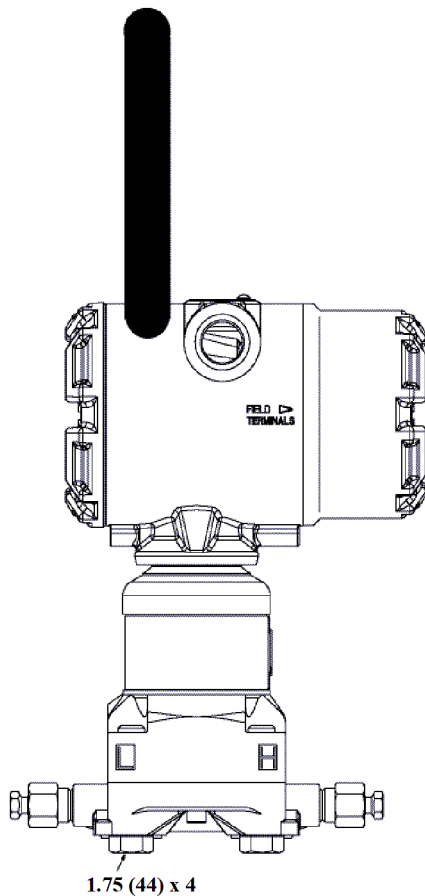
Gauge/Absolute transmitter



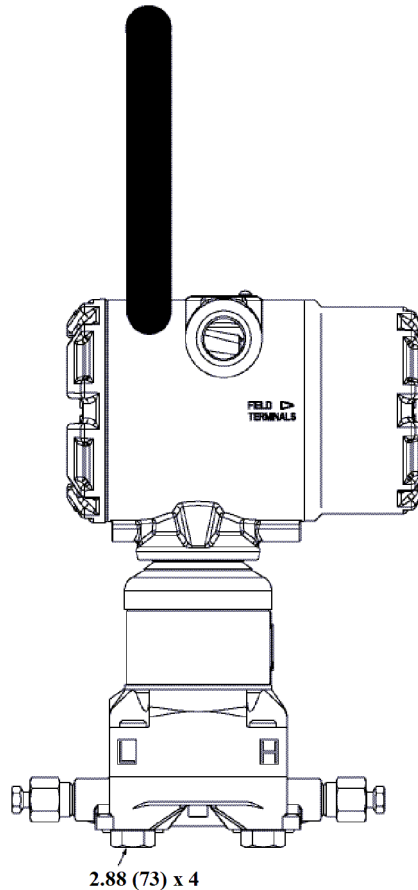
Note

Dimensions are in inches (millimeters).

Transmitter with flange bolts



Transmitter with flange adapters and flange/adapter bolts



Note

Dimensions are in inches (millimeters).

Table 3-2: Differential pressure

| Description | Quantity | Size |
|----------------------|----------|---------------------------------|
| Flange bolts | 4 | 1.75 in. (44 mm) |
| Adapter bolts | 4 | 1.50 in. (38 mm) ⁽¹⁾ |
| Flange/adapter bolts | 4 | 2.88 in. (73 mm) |

(1) DIN-compliant traditional flange requires 1.75 in. (44 mm) length adapter bolts.

Table 3-3: Gage/absolute pressure

| Description | Quantity ⁽¹⁾ | Size |
|---------------|-------------------------|---------------------------------|
| Flange bolts | 4 | 1.75 in. (44 mm) |
| Adapter bolts | 2 | 1.50 in. (38 mm) ⁽¹⁾ |

Table 3-3: Gage/absolute pressure (continued)

| Description | Quantity ⁽¹⁾ | Size |
|----------------------|-------------------------|------------------|
| Flange/adaptor bolts | 2 | 2.88 in. (73 mm) |

(1) 3051S In-line transmitters are direct mount and do not require bolts for process connection.

Impulse piping

The piping between the process and the transmitter 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
- density variations between the legs

The best location for the transmitter in relation to the process pipe depends on the process itself.

The following guidelines help determine best transmitter location and placement of impulse piping:

- For:
 - liquid service, slope the impulse piping at least 1 inch per foot (8 cm per m) upward from the transmitter toward the process connection
 - gas service, slope the impulse piping at least 1 inch per foot (8 cm per m) downward from the transmitter toward the process connection
- Avoid:
 - high points in liquid lines
 - low points in gas lines
- Keep impulse piping as short as possible.
- Ensure both impulse legs are the same temperature.
- To avoid friction effects and blockage, use impulse piping large enough.
- Vent all gas from liquid piping legs.
- When using a sealing fluid, fill both piping legs to the same level.
- When purging:
 1. Locate the purge connection close to the process taps.
 2. Purge through equal lengths of the same size pipe.

Note

Avoid purging through the transmitter.

- Keep corrosive or hot (above 250 °F [121 °C]) process material out of direct contact with the SuperModule 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.

Mounting requirements

Refer to [Figure 3-7](#) for examples of the following mounting configurations:

Liquid flow measurement

- Place taps to the side of the line to prevent sediment deposits on the process isolators.
- Mount the transmitter beside or below the taps so gases vent into the process line.
- Mount drain/vent valve upward to allow gases to vent.
- Position the antenna such that it is vertical.

Gas flow measurement

- Place taps in the top or side of the line.
- Mount the transmitter beside or above the taps to drain liquid into the process line.
- Position the antenna such that it is vertical.

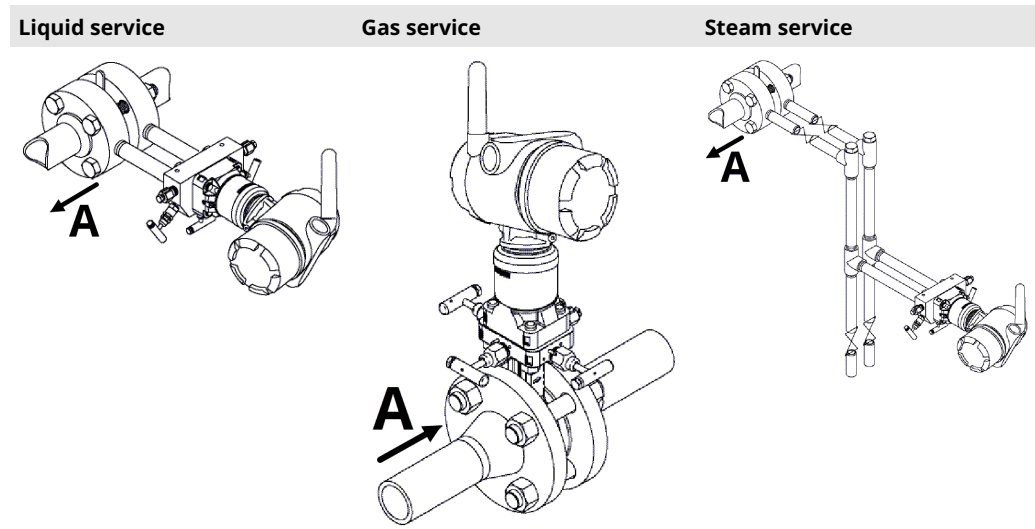
Steam flow measurement

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

Note

For steam or other elevated temperature services, it is important that temperatures at the Coplanar™ process flanges must not exceed 250 °F (121 °C) for transmitters with silicone fill, or 185 °F (85 °C) for inert fill. For vacuum service, these temperature limits are reduced to 220 °F (104 °C) for silicone fill and 160 °F (71 °C) for inert fill.

Figure 3-7: Installation Examples



A. Flow direction

3.3.2 Install flange adapters

Rosemount 3051S Wireless Pressure Transmitter flange process connection size is ¼–18 NPT. Flange adapters with ½–14 NPT connections are available as the D2 option. See the [Rosemount 3051S Series of Instrumentation Product Data Sheet](#) for additional information about product options.

Use your plant-approved lubricant or sealant when making the process connections. The process connections on the transmitter flange are on 2½ in. (54 mm) centers to allow direct mounting to a three-valve or five-valve manifold. Rotate one or both of the flange adapters to attain connection centers of 2 in. (51 mm), 2½ in. (54 mm), or 2¾ in. (57 mm).

To avoid leakage, install and tighten all four flange bolts before applying pressure. When properly installed, the flange bolts will protrude through the top of the SuperModule housing. Do not attempt to loosen or remove the flange bolts while the transmitter is in service.

To install adapters to a Coplanar™ flange:

Procedure

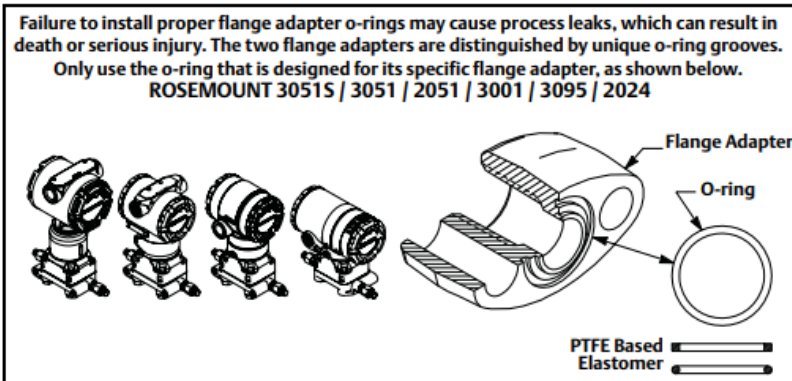
1. Remove the flange bolts.
2. Leaving the flange in place, move the adapters into position with the O-ring installed.
3. Clamp the adapters and the Coplanar flange to the transmitter module using the longer of the bolts supplied.
4. Tighten the bolts. Refer to [Flange bolts](#) for torque specifications.

⚠ WARNING

Avoid process leaks

Failure to install proper flange adapter o-rings may cause process leaks, which can result in death or serious injury. The two flange adapters are distinguished by unique o-ring grooves. Only use the o-ring that is designed for its specific flange adapter.

⚠ WARNING



Note

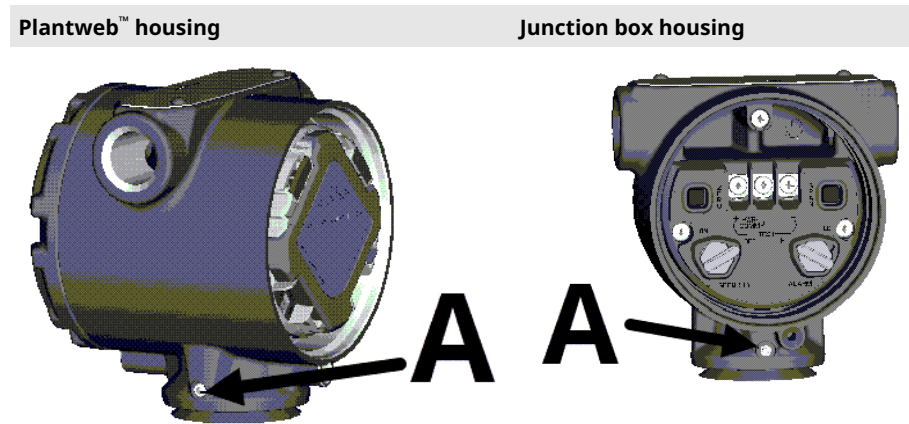
If the flange adapter is removed, replace the PTFE O-rings.

Whenever you remove flanges or adapters, visually inspect the PTFE O-rings. Replace them if there are any signs of damage, such as nicks or cuts. If you replace the O-rings, re-torque the flange bolts after installation to compensate for cold flow. Refer to [Reassemble the process flange](#).

3.3.3 Rotate housing

The housing can be rotated to improve field access to wiring or to better view the optional LCD display.

Figure 3-8: Housings



A. Housing rotation set screw

Procedure

1. Loosen the housing rotation set screw.
2. Turn the housing a maximum of 180 degrees to the left or right of its original (as shipped) position.

NOTICE

Avoid product damage

Do not rotate the housing more than 180 degrees without first performing a disassembly procedure (see [Removing the feature assembly and the SuperModule from the housing](#)). Overrotation may sever the electrical connection between the sensor module and the feature board.

3. Retighten the housing rotation set screw.

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

Note

If LCD pins are inadvertently removed from the interface board, carefully re-insert the pins before snapping the LCD display back into place.

3.3.4

Grounding

Transmitter case

Note

Always ground the transmitter case in accordance with national and local electrical codes.

The most effective transmitter case grounding method is a direct connection to earth ground with minimal impedance. The External Ground Assembly can be ordered:

- with the transmitter (Option Code D4)

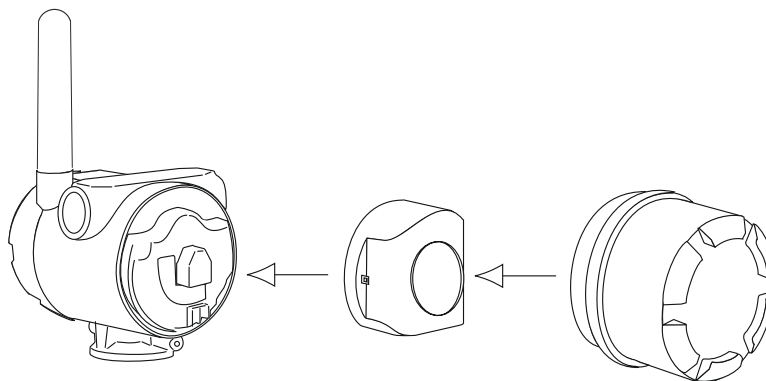
- as a spare part (03151-9060-0001)

3.3.5 High gain remote antenna (optional)

For detailed installation and product information on the high gain remote antenna (option *WN*), refer to [Remote mount antenna](#) in the [Rosemount 3051S Series of Instrumentation Product Data Sheet](#).

3.3.6 Install power module

Figure 3-9: Wireless power module installation



To make connections:

Note

Rosemount 3051S Wireless Pressure Transmitter uses the black power module. Order model number 701PBKKF or spare part number 00753-9200-0001.

Procedure

1. Remove the housing cover on the power module compartment side.
The power module supplies all power to the transmitter.

⚠ WARNING

Avoid explosion.

When the circuit is live, do not remove the housing cover in explosive atmospheres.

2. To avoid moisture accumulation in the terminal side, plug and seal both conduit connections on the transmitter housing.
3. Connect the power module.
4. Replace the power module cover.
5. Secure power module cover by tightening to safety specification (metal to metal).

3.3.7 Install the LCD display

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

Note

Only use Rosemount Wireless LCD Part Number: 00753-9004-0002.

Note

An LCD from a wired device will not function in a wireless device.

Note

If LCD pins are inadvertently removed from the interface board, carefully reinsert the pins before snapping the LCD display back into place.

In addition to housing rotation, the optional LCD display can be rotated in 90-degree increments by:

1. Squeeze the two tabs.
2. Pull out the display.
3. Rotate the display 90-degrees into position.
4. Return the display to transmitter.
5. Secure the display into the transmitter

Use the following procedure and [Figure 3-10](#) to install the LCD display:

Procedure

1. Remove the back cover and power module.
2. Remove the transmitter cover opposite the field terminal side.

⚠ WARNING**Avoid explosions.**

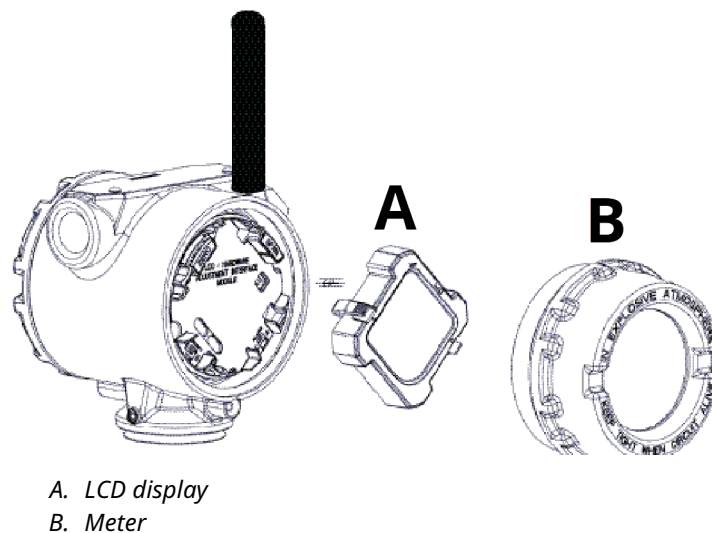
When the circuit is live, do not remove the instrument covers in explosive environments.

3. Engage the four-pin connector into the LCD display and snap into place.

Note the following LCD temperature limits:

- Operating: -40 to +175 °F (-40 to +80 °C)
- Storage: -40 to +185 °F (-40 to +85 °C)

Figure 3-10: Optional LCD Display



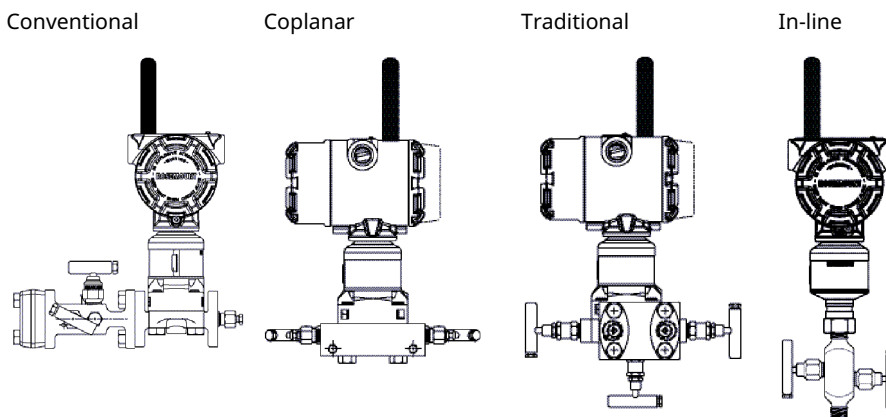
3.4 Rosemount 304, 305 and 306 integral manifolds

The Rosemount 306 Integral Manifold is used with in-line transmitters to provide block-and-bleed valve capabilities of up to 10000 psi (690 bar).

The Rosemount 305 Integral Manifold is available in two designs: traditional and Coplanar™. The traditional 305 Integral Manifold can be mounted to most primary elements with mounting adapters in the market today.

The Rosemount 304 Integral Manifold comes in two basic styles: traditional (flange x flange and flange x pipe) and wafer. The 304 traditional manifold comes in 2, 3, and 5-valve configurations. The 304 wafer manifold comes in 3 and 5 valve configurations.

Figure 3-11: Integral Manifold Designs



3.4.1 Install 304 Conventional Manifold

Procedure

1. Align the conventional manifold with the transmitter flange. Use the four manifold bolts for alignment.
2. Finger tighten the bolts; then tighten the bolts incrementally in a cross pattern to the final torque value.
When fully tightened, the bolts extend through the top of the sensor module housing.
3. Leak-check assembly to maximum pressure range of transmitter.

3.4.2 Install 305 Integral Manifold

Procedure

1. Inspect the PTFE sensor module O-rings.
You may reuse undamaged O-rings. If the O-rings are damaged (if they have nicks or cuts, for example), replace with O-rings designed for Rosemount transmitters.

NOTICE

If replacing the O-rings, take care not to scratch or deface the O-ring grooves or the surface of the isolating diaphragm while you remove the damaged O-rings.

2. Install the integral manifold on the sensor module. Use the four 2.25-inch (57 mm) manifold bolts for alignment.
3. If you have replaced the PTFE sensor module O-rings, re-tighten the flange bolts after installation to compensate for cold flow of the O-rings.

3.4.3 Install Rosemount 306 Integral Manifold

The 306 Manifold is for use only with in-line pressure transmitters, such as the 3051T and 2051T.

Assemble the 306 Manifold to the in-line transmitters with a thread sealant.

3.4.4 Manifold operation

⚠ CAUTION

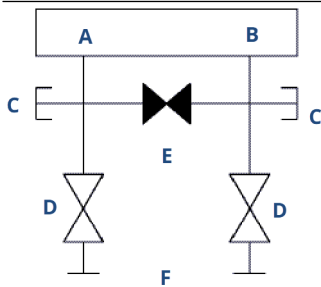
Avoid process leaks which may cause death or serious injury.

Improper installation or operation of manifolds may result in process leaks. Always perform a zero trim on the transmitter/manifold assembly after installation to eliminate any shift due to mounting effects. See [Operation and Maintenance](#) and [Sensor trim overview](#).

Three and five-valve configurations

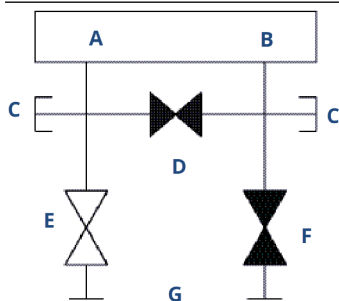
In normal operation:

1. The two block valves between the process and instrument ports will be open.
2. The equalizing valve will be closed.



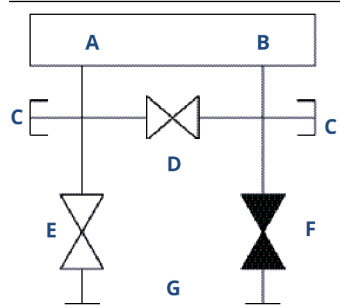
- A. High
- B. Low
- C. Drain/vent valve
- D. Isolate (open)
- E. Equalize (closed)
- F. Process

1. To zero the 3051S, close the block valve to the low pressure (downstream) side of the transmitter first.



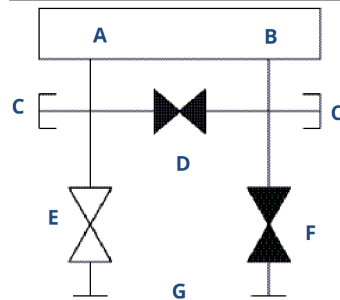
- A. High
- B. Low
- C. Drain/vent valve
- D. Equalize (closed)
- E. Isolate (open)
- F. Isolate (closed)
- G. Process

2. Open the center (equalize) valve to equalize the pressure on both sides of the transmitter. The manifold valves are now in the proper configuration for zeroing the transmitter.



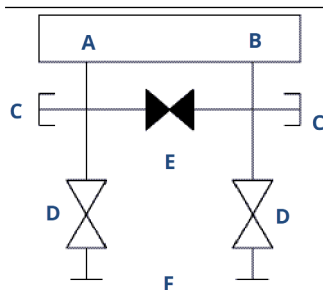
- A. High
- B. Low
- C. Drain/vent valve
- D. Equalize (open)
- E. Isolate (open)
- F. Isolate (closed)
- G. Process

3. After zeroing the transmitter, close the equalizing valve.



- A. High
- B. Low
- C. Drain/vent valve
- D. Equalize (closed)
- E. Isolate (open)
- F. Isolate (closed)
- G. Process

4. Open the block valve on the low pressure side of the transmitter to return the transmitter to service.

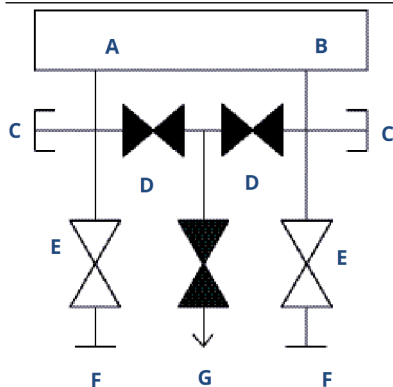


- A. High
- B. Low
- C. Drain/vent valve
- D. Isolate (open)
- E. Equalize (closed)
- F. Process

Five-valve natural gas configurations

In normal operation:

1. The two block valves between the process and instrument ports will be open.
2. The equalizing valves will be closed.

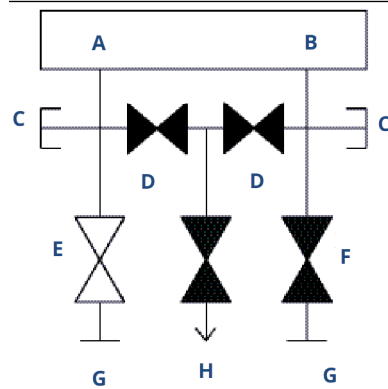


- A. High
- B. Low
- C. Test (plugged)
- D. Equalize (closed)
- E. Isolate (open)
- F. Process
- G. Drain vent

1. To zero the 3051S, first close the block valve on the low pressure (downstream) side of the transmitter.

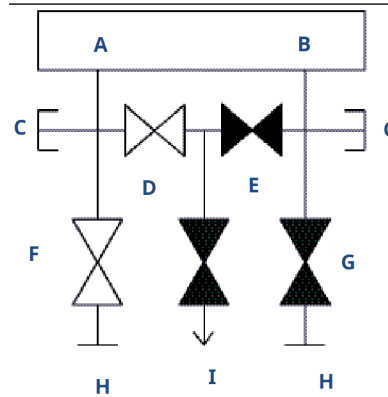
NOTICE

Do not overpressure the transmitter. Do not open the low side equalize valve before the high side equalize valve.



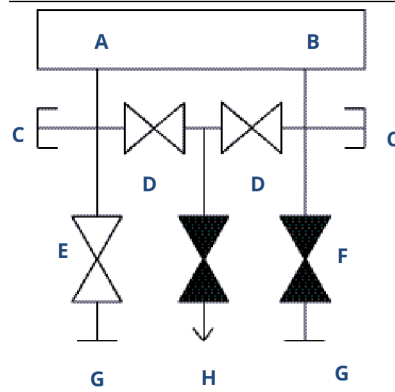
- A. High
- B. Low
- C. Test (plugged)
- D. Equalize (closed)
- E. Isolate (open)
- F. Isolate (closed)
- G. Process
- H. Drain vent

2. Open the equalize valve on the high pressure (upstream) side of the transmitter.



- A. High
- B. Low
- C. Test (plugged)
- D. Equalize (open)
- E. Equalize (closed)
- F. Isolate (open)
- G. Isolate (closed)
- H. Process
- I. Drain vent (closed)

3. Open the equalize valve on the low pressure (downstream) side of the transmitter. The manifold is now in the proper configuration for zeroing the transmitter.



- A. High
- B. Low
- C. Test (plugged)
- D. Equalize (open)
- E. Isolate (open)
- F. Isolate (closed)
- G. Process
- H. Drain vent (closed)

4. After zeroing the transmitter, close the equalize valve on the low pressure (downstream) side of the transmitter.
5. Close the equalize valve on the high pressure (upstream) side.
6. Finally, to return the transmitter to service, open the low side isolation valve.

4 Commissioning

4.1 Network status

If the Rosemount 3051S Wireless was configured with the Network ID and Join Key and sufficient time for network polling has passed, the transmitter should be connected to the network. To verify connectivity, open the Smart Wireless Gateway's integral web interface and navigate to the *Explorer* page.

The screenshot shows the 'Smart Wireless Gateway Explorer' interface. It features a navigation menu on the left with options like 'Diagnostics', 'Monitor', 'Options', and 'Setup'. The main area displays a table with the following columns: HART Tag, HART status, Last update, PV, SV, TV, QV, and Burst rate. The table lists various tags such as '2160_Level', '3051S_Pressure', '6081_Conductivity', etc., with their corresponding values and status indicators (green for good, red for error).

| HART Tag | HART status | Last update | PV | SV | TV | QV | Burst rate |
|-----------------------------------|-------------|-------------------|------------------|-------------|-------------|-------------|------------|
| 2160_Level | ● | 04/20/11 18:09:53 | 0.000 | 1394.483 Hz | 23.000 DegC | 7.502 V | 8 |
| 3051S_Pressure | ● | 04/20/11 18:09:55 | -0.027 inH2O 68F | 22.750 DegC | 22.750 DegC | 7.115 V | 8 |
| 6081_Conductivity | ● | 04/20/11 18:09:42 | 9.795 pH | 23.322 DegC | | 7.283 V | 16 |
| 6081_pH | ● | 04/20/11 18:09:50 | 9.803 pH | 22.822 DegC | -165.002 mV | 7.287 V | 16 |
| 649_Temperature | ● | 04/20/11 18:09:35 | 22.859 DegC | NaN DegC | 22.500 DegC | 7.116 V | 8 |
| 4320_Position | ● | 04/20/11 18:09:57 | 1.000 % | 1.000 | 0.000 | 23.000 DegC | 4 |
| 702_Discrete | ● | 04/20/11 18:09:53 | 1.000 | 0.000 | 23.250 DegC | 7.063 V | 8 |
| 849_Temperature | ● | 04/20/11 18:09:35 | 22.850 DegC | 22.822 DegC | 22.822 DegC | 24.861 DegC | 32 |
| 9420_Vibration | ● | 04/20/11 17:35:22 | 0.023 in/s | 0.022 g/s | 2.501 V | 7.143 V | 01:00:00 |
| 249_Temperature | ● | 04/20/11 18:09:55 | 22.959 DegC | NaN DegC | 22.550 DegC | 7.116 V | 16 |
| 708_Acoustic | ● | 04/20/11 18:09:54 | 6.378 Counts | 24.559 DegC | 22.550 DegC | 3.391 V | 16 |

This page will display the transmitter's HART tag, Primary Variable (PV), Secondary Variable (SV), Tertiary Variable (TV), Quaternary Variable (QV), and Update Rate. A green status indicator means that the device is working properly. A red indicator means that there is a problem with either the device or its communication path. For more detail on a specific device, click on the tag name.

4.2 Verifying operation

Operation can be verified in three locations:

- at the device via the local display
- using the 375 communication device
- at the Smart Wireless Gateway's integrated web interface

Local display

The LCD will display the output values based on the configured wireless update rate. Press the **Diagnostic** button to display the **Tag**, **Device ID**, **Network ID**, **Network Join Status**, and **Device Status** screens.

For Device Status screens, see [LCD screen messages](#).

Figure 4-1: Diagnostic screen sequence

| Tag | Device ID | Network ID | Network Join Status | Device Status |
|-----|-----------|------------|---------------------|---------------|
| | | | | |

Figure 4-2: Network join status screens

| Searching for Network | Joining Network | Connected with Limited Bandwidth | Connected |
|-----------------------|-----------------|----------------------------------|-----------|
| | | | |

Communication device

To verify device operation using a HART® Communication Device, a Rosemount 3051S Wireless DD is required. For connecting with a 375 Communication Device, refer to [Figure 2-1](#).

| Function | Key sequence | Menu items |
|----------------|--------------|---|
| Communications | 3, 3 | <ul style="list-style-type: none"> Join Status Wireless Mode Join Mode Number of Available Neighbors Number of Advertisements Heard Number of Join Attempts |

Smart Wireless Gateway

To verify device operation using the Smart Wireless Gateway's integrated web interface, navigate to the **Explorer** page. This page will show whether the device has joined the network and if it is communicating properly.

The screenshot shows the 'Smart Wireless Gateway' Explorer interface. On the left is a navigation tree with 'Diagnostics', 'Monitor', 'Setup', and 'HART' expanded. The main area displays a table of HART tags with columns for HART Tag, HART Status, Last update, PV, SV, TV, QV, and Burst rate. All status indicators are green, indicating proper operation.

| HART Tag | HART Status | Last update | PV | SV | TV | QV | Burst rate |
|-------------------|-------------|-------------------|------------------|-------------|-------------|-------------|------------|
| 2160_Level | ● | 04/20/11 18:09:53 | 0.000 | 1394.483 Hz | 23.000 DegC | 7.502 V | 8 |
| 3051S_Pressure | ● | 04/20/11 18:09:55 | -0.027 InH2O 66F | 22.750 DegC | 22.750 DegC | 7.115 V | 8 |
| 6081_Conductivity | ● | 04/20/11 18:09:42 | 9.795 pH | 23.322 DegC | | 7.283 V | 16 |
| 6081_pH | ● | 04/20/11 18:09:50 | 9.803 pH | 22.822 DegC | -165.002 mV | 7.287 V | 16 |
| 648_Temperature | ● | 04/20/11 18:09:55 | 22.859 DegC | NaN DegC | 22.500 DegC | 7.116 V | 8 |
| 4320_Position | ● | 04/20/11 18:09:57 | 1.000 % | 1.000 | 0.000 | 23.000 DegC | 4 |
| 702_Discrete | ● | 04/20/11 18:09:53 | 1.000 | 0.000 | 23.250 DegC | 7.063 V | 8 |
| 848_Temperature | ● | 04/20/11 18:09:25 | 22.850 DegC | 22.822 DegC | 22.822 DegC | 24.861 DegC | 32 |
| 9420_Vibration | ● | 04/20/11 17:25:22 | 0.023 m/s | 0.022 g's | 2.501 V | 7.143 V | 01:00:00 |
| 248_Temperature | ● | 04/20/11 18:09:55 | 22.959 DegC | NaN DegC | 22.550 DegC | 7.116 V | 16 |
| 708_Acoustic | ● | 04/20/11 18:09:54 | 6.378 Counts | 24.559 DegC | 22.550 DegC | 3.391 V | 16 |

A green status indicator means that the device is working properly. A red indicator means that there is a problem with either the device or its communication path. For more detail on a specific device, click on the HART tag.

Troubleshooting

The most common cause of incorrect operation is incorrect configuration of the Network ID and Join Key. The Network ID and Join Key in the device must match that of the Smart Wireless Gateway. The Network ID and Join Key may be obtained from the Smart Wireless Gateway on the **Setup** → **Network** → **Settings** page of the web interface.

The screenshot shows the 'Smart Wireless Gateway' Network Settings page. The left navigation tree has 'Setup', 'Network', and 'Settings' expanded. The main area contains configuration fields for Network name, Network ID, Security mode, Join key, Show join key, Generate random join key, Rotate network key?, Key rotation period, and Change network key now?.

Network name: myNet
 Network ID: 5465
 Security mode: Common join key Access control list
 Join key: 44555354 4a455457 48524b53 524434b
 Show join key: Yes No
 Generate random join key:
 Rotate network key?: Yes No
 Key rotation period (days): 3
 Change network key now?: Yes No

5 Operation and Maintenance

5.1 Overview

This section contains information on commissioning and operating 3051S Wireless Pressure Transmitters.

Communication device and AMS instructions are given to perform configuration functions. For convenience, communication device fast key sequences are labeled “Fast Keys” for each software function below the appropriate headings.

5.2 Calibration

Calibrating a Rosemount 3051S Wireless transmitter may include the following procedures:

- **Sensor Trim:** Adjusts the position of the factory sensor characterization curve to optimize performance over a specified pressure range, or to adjust for mounting effects.

The 3051S SuperModule uses a microprocessor that contains information about the sensor’s specific characteristics in response to pressure and temperature inputs. A smart transmitter compensates for these sensor variations. The process of generating the sensor performance profile is called factory sensor characterization.

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

Note

Sensor trimming adjusts the position of the factory sensor characterization curve. It is possible to degrade performance of the transmitter if the trim is done improperly or with inaccurate equipment.

Table 5-1: Recommended Calibration Tasks

| Transmitter | Bench Calibration Tasks | Field Calibration Tasks |
|------------------------------------|---|--|
| 3051S 2CD 3051S 2CG 3051S 2L | <ol style="list-style-type: none"> 1. Set output configuration parameters: <ol style="list-style-type: none"> a. Set the % range points. b. Set the output units. c. Set the output type. 2. Optional: Perform a sensor trim. (Accurate pressure source required) | <ol style="list-style-type: none"> 1. Reconfigure parameters if necessary. 2. Zero trim the transmitter to compensate for mounting effects or static pressure effects. |

Table 5-1: Recommended Calibration Tasks (continued)

| Transmitter | Bench Calibration Tasks | Field Calibration Tasks |
|-------------------------------------|--|---|
| 3051S 2CA 3051S 2TA 3051S 2TG | <ol style="list-style-type: none"> 1. Set output configuration parameters: <ol style="list-style-type: none"> a. Set the range points. b. Set the output units. c. Set the output type. 2. 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. | <ol style="list-style-type: none"> 1. Reconfigure parameters if necessary. 2. Perform low trim value section of the sensor trim procedure to correct for mounting position effects. |

Note

A 375 communication device or AMS is required for all sensor and output trim procedures. Rosemount 3051S2TG Range 5 transmitters use an absolute sensor that requires an accurate absolute pressure source to perform the optional sensor trim.

5.2.1 Sensor trim overview

Trim the sensor using either sensor or zero trim functions. Trim functions vary in complexity and are application-dependent. Both trim functions alter the transmitter's interpretation of the input signal.

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 transmitter 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.

Note

Do not perform a zero trim on 3051S Wireless absolute pressure transmitters. Zero trim is zero based, and absolute pressure transmitters reference absolute zero. To correct mounting position effects on a 3051S Wireless absolute pressure transmitter, 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 3051S Wireless is placed in high power refresh mode, which provides frequent pressure measurement updates and allows the configured damping to take effect. 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.

5.2.2 Zero trim

Fast Keys 2, 1, 2

Note

The transmitter must be within three percent of true zero (zero-based) in order to calibrate with zero trim function.

After properly venting the transmitter, calibrate the transmitter with the zero trim function:

Procedure

1. From the *Home* screen, select **2: Configure**.
2. Select **1: Guided Setup**.
3. Select **2: Zero Trim** and follow the on-screen instruction to complete the zero trim adjustment.

5.2.3 Sensor trim

Fast Keys 3, 5, 1

Note

Use a pressure input source that is at least three times more accurate than the transmitter, and allow the input pressure to stabilize for ten seconds before entering any values.

To calibrate the transmitter using the sensor trim function:

Procedure

1. Assemble and power the entire calibration system including the Rosemount 3051S, communication device/AMS, power supply, pressure input source, and readout device.
2. From the *Home* screen, select **3: Service Tools**.
3. Select **5: Routine Maintenance**.
4. Select **1: Sensor Calibration**.
5. Select **Lower Sensor Trim**. The lower sensor trim value should be the sensor trim point that is closest to zero.
6. Follow the on-screen instructions to complete the adjustment of the lower value.
7. Repeat the procedure for the upper value. Select **5: Upper Sensor Trim** and follow the on-screen instructions to complete the adjustment of the upper value.

Note

Select pressure input values so that lower and upper values are equal to or outside the Lower and Upper Operating points. Do not attempt to obtain reverse output by reversing the high and low points. The transmitter allows approximately five percent deviation.

5.2.4 Line pressure effect (Range 2 and Range 3)

The following specifications show the static pressure effect for the Rosemount 3051S Range 2 and Range 3 pressure transmitters used in differential pressure applications where line pressure exceeds 2000 psi (138 bar).

Zero effect

Ultra and Ultra for Flow: $\pm 0.05\%$ of the upper range limit plus an additional $\pm 0.1\%$ of upper range limit error for each 1000 psi (69 bar) of line pressure above 2000 psi (138 bar).

Classic: $\pm 0.1\%$ of the upper range limit plus an additional $\pm 0.1\%$ of upper range limit error for each 1000 psi (69 bar) of line pressure above 2000 psi (138 bar).

Example: Line pressure is 3000 psi (207 bar) for Ultra performance transmitter. Zero effect error calculation:

$$\pm \{0.05 + 0.1 \times [3 \text{ kpsi} - 2 \text{ kpsi}]\} = \pm 0.15\% \text{ of the upper range limit}$$

Span Effect

Refer to [Line pressure effect](#).

5.2.5 Compensating for line pressure (Range 4 and Range 5)

The Rosemount 3051S Wireless Range 4 and 5 pressure transmitters require a special calibration procedure when used in differential pressure applications. The purpose of this procedure is to optimize transmitter performance by reducing the effect of static line pressure in these applications. The Rosemount 3051S Wireless differential pressure transmitters (Ranges 0, 1, 2, and 3) do not require this procedure because optimization occurs in the sensor.

Applying high static pressure to the 3051S Wireless Range 4 and Range 5 pressure transmitters causes a systematic shift in the output. This shift is linear with static pressure; correct it by performing the [Sensor trim](#) procedure.

The following specifications show the static pressure effect for the 3051S Wireless Range 4 and Range 5 transmitters used in differential pressure applications:

Zero effect

$\pm 0.1\%$ of the upper range limit per 1000 psi (69 bar) for line pressures from 0 to 2000 psi (0 to 138 bar)

For line pressures above 2000 psi (138 bar), the zero effect error is $\pm 0.2\%$ of the upper range limit plus an additional $\pm 0.2\%$ of upper range limit error for each 1000 psi (69 bar) of line pressure above 2000 psi (138 bar).

Example: Line pressure is 3000 psi (3 kpsi). Zero effect error calculation:

$$\pm \{0.2 + 0.2 \times [3 \text{ kpsi} - 2 \text{ kpsi}]\} = \pm 0.4\% \text{ of the upper range limit}$$

Span effect

Correctable to $\pm 0.2\%$ of reading per 1000 psi (69 bar) for line pressures from 0 to 3626 psi (0 to 250 bar)

The systematic span shift caused by the application of static line pressure is -1.00% of reading per 1000 psi (69 bar) for Range 4 transmitters, and -1.25% of reading per 1000 psi (69 bar) for Range 5 transmitters.

Use the following example to compute corrected input values.

Example

A transmitter with model number 3051S_CD4 will be used in a differential pressure application where the static line pressure is 1200 psi (83 bar). The transmitter output is ranged with 4 mA at 500 inH₂O (1,2 bar) and 20 mA at 1500 inH₂O (3,7 bar).

To correct for systematic error caused by high static line pressure, first use the following formulas to determine corrected values for the low trim and high trim.

$$LT = LRV + S \times (LRV) \times P$$

| | | |
|--------|-------|---------------------------------|
| Where: | LT = | Corrected Low Trim Value |
| | LRV = | Lower Range Value |
| | S = | -(Span shift per specification) |
| | P = | Static Line Pressure |

$$HT = URV + S \times (URV) \times P$$

| | | |
|--------|-------|---------------------------------|
| Where: | HT = | Corrected High Trim Value |
| | URV = | Upper Range Value |
| | S = | -(Span shift per specification) |
| | P = | Static Line Pressure |

| | | |
|------------------|-------|------------------------------------|
| In this example: | URV = | 1500 inH ₂ O (3.74 bar) |
| | LRV = | 500 inH ₂ O (1.25 bar) |
| | P = | 1200 psi (82.74 bar) |
| | S = | ± 0.01/1000 |

| | | |
|---------------------------------------|------|-----------------------------------|
| To calculate the low trim (LT) value: | LT = | 500 + (0.01/1000)(500)(1200) |
| | LT = | 506 inH ₂ O (1.26 bar) |

| | | |
|--|------|------------------------------------|
| To calculate the high trim (HT) value: | HT = | 1500 + (0.01/1000)(1500)(1200) |
| | HT = | 1518 inH ₂ O (3.78 bar) |

Complete a Rosemount 3051S Wireless sensor trim and enter the corrected values for Low Trim (LT) and High Trim (HT), refer to [Sensor trim](#).

Enter the corrected input values for low trim and high trim through the communication device keypad after you apply the nominal value of pressure as the transmitter input.

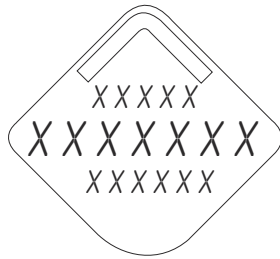
Note

After sensor trimming Rosemount 3051S Wireless Range 4 and 5 transmitters for high differential pressure applications, verify that the Lower and Upper Operating points are at nominal values using the communication device.

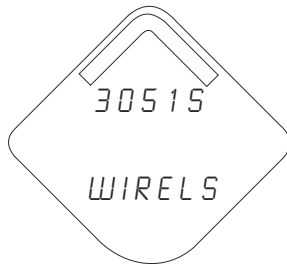
5.3 LCD screen messages

5.3.1 Startup screen sequence

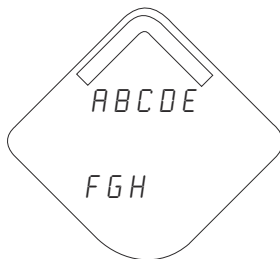
The following screens will display when the Power Module is first connected to the Rosemount 3051S Wireless.



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



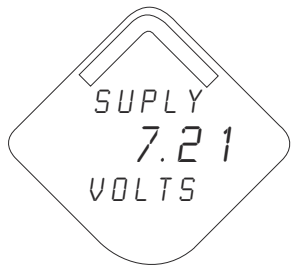
PV Screen: process pressure



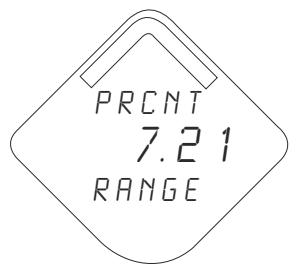
SV Screen: sensor temperature value



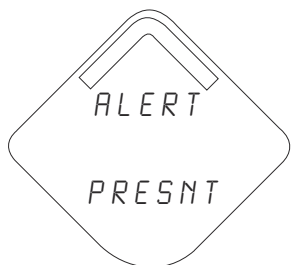
TV Screen: device temperature value



QV Screen: voltage reading at the power supply terminals



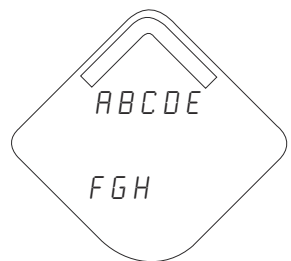
Percent Range Screen: percent range reading



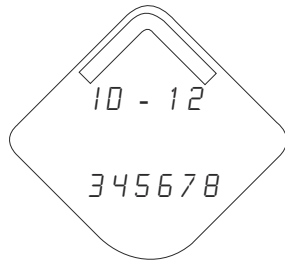
Alert Screen: at least one alert is present - this screen will not display if no alerts are present

5.3.2 Diagnostic Button Screen Sequence

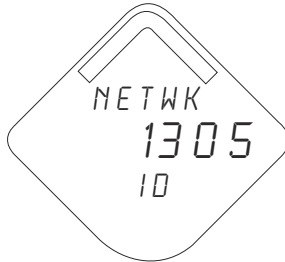
The following five screens will display when the device is operating properly and the Diagnostic Button has been pressed.



Device Information - Tag: user entered tag which is eight characters long - will not display if all characters are blank



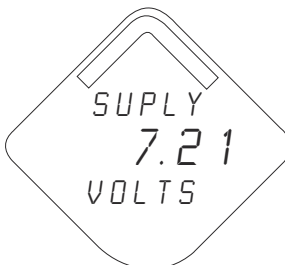
Device Identification: used to determine Device ID



Diagnostic Button Screen 3: assuming the device has the correct join key, this ID tells the user what network the device can connect with



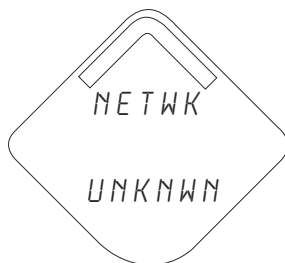
Diagnostic Button Screen 4: the device has joined a network and has been fully configured and has multiple parents



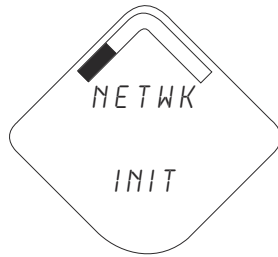
Diagnostic Button Screen 5: voltage reading at the power supply terminals

5.3.3 Network diagnostic status screens

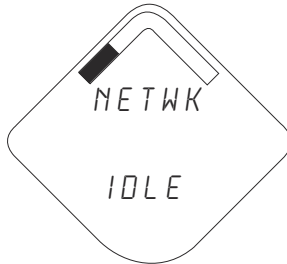
These screens display the network status of the device. Only one will be shown during the startup sequence or diagnostic sequence.



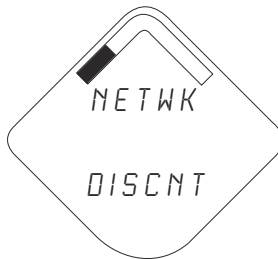
Diagnostic Button Screen 4.1: the device is attempting to start the radio



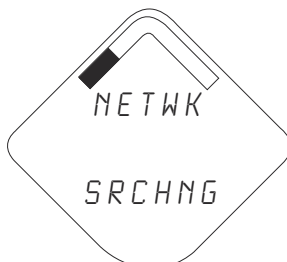
Diagnostic Button Screen 4.2: the device has just restarted



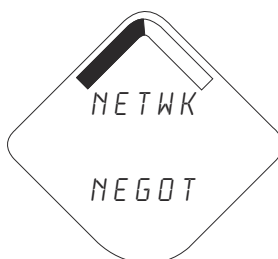
Diagnostic Button Screen 4.3: the device is starting to join the process



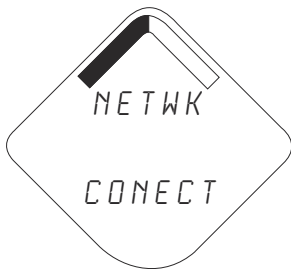
Diagnostic Button Screen 4.4: the device is in a disconnected state and requires a "Force Join" command to join the network



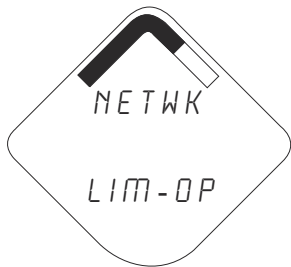
Diagnostic Button Screen 4.5: the device is searching for the Network



Diagnostic Button Screen 4.6: the device is attempting to join a network



Diagnostic Button Screen 4.7: the device is connected to the Network, but is in a “Quarantined” state



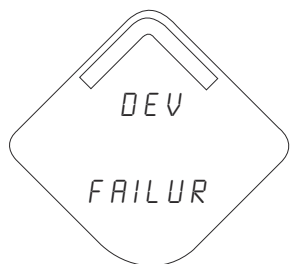
Diagnostic Button Screen 4.8: the device is joined and operational, but is running with limited bandwidth for sending periodic data



Diagnostic Button Screen 4.9: the device has joined a network and has been fully configured and has multiple parents

5.3.4 Device diagnostic screens

The following screens will show the device diagnostics depending on the state of the device.



Device Information - Status: there is a critical error which may prevent the device from operating correctly. Check additional status screens for more information.



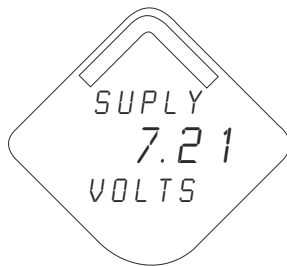
PV Screen: process pressure value



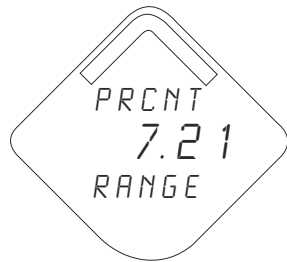
SV Screen: sensor temperature value



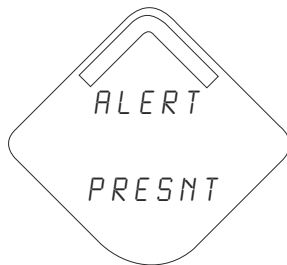
TV Screen: device temperature value



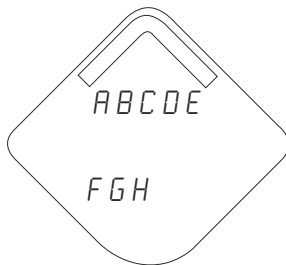
QV Screen: voltage reading at the power supply terminals



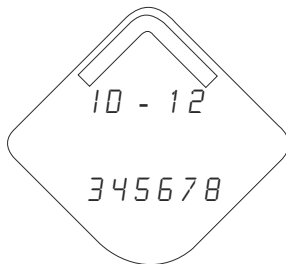
Percent Range Screen: percent range reading



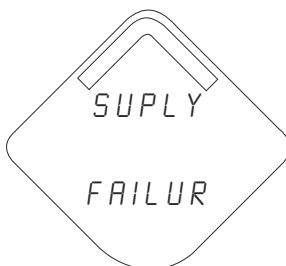
Alert Screen: at least one alert is present - this screen will not display if no alerts are present



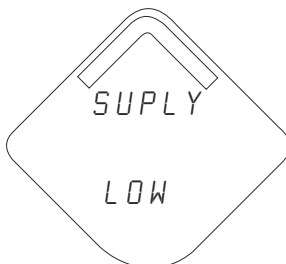
Diagnostic Button Screen 1 - Tag: user entered tag which is eight characters long - will not display if all characters are blank



Diagnostic Button Screen 2: the device's identifier that is used to make up the HART long address - the Smart Wireless Gateway may use this to help identify devices if no unique user tag is available



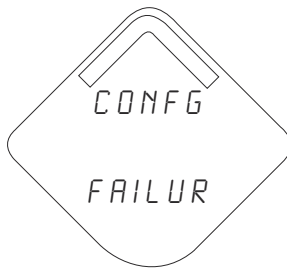
Diagnostic Button Screen 7.1: the terminal voltage has dropped below level of operating limit. Replace the Power Module (Part Number: 00753-9220-0001)



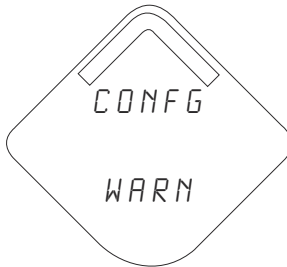
Diagnostic Button Screen 7.2: the terminal voltage is below the recommended operating range - if this is a battery operated device, the Power Module should be replaced - for line powered devices, the supply voltage should be increased



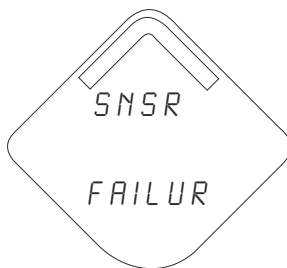
Diagnostic Button Screen 8: the device may not be able to communicate with the radio or the radio has an internal error. In this state, the device may still be operational and publishing HART data



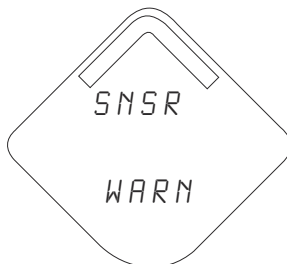
Diagnostic Button Screen 9.1: configuration of the transmitter is invalid such that critical operation of the device may be affected - check the extended configuration status to identify which configuration item(s) need to be corrected



Diagnostic Button Screen 9.2: configuration of the transmitter is invalid such that non-critical operation of the device may be affected - check the extended configuration status to identify which configuration item(s) need to be corrected



Diagnostic Button Screen 10.1: a sensor attached to the transmitter has failed, and valid readings from that sensor are no longer possible - check the sensor and sensor wiring connections - check additional status for more detailed information of the failure source



Diagnostic Button Screen 10.2: a sensor attached to the transmitter is degraded, readings from that sensor may not be within accuracy specifications - check the process, and sensor wiring connections - check additional status for more detailed information of the warning source

Note

Use the Rosemount Wireless LCD Part Number: 00753-9004-0002.

6 Troubleshooting

6.1 Overview

Table 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 communication device 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 Wireless device status information

6.2.1 Button stuck

Cause

A button on the Electronics Board is detected as stuck in the active position.

Recommended actions

1. Inspect the buttons for obstructions. Clear any obstructions found during inspection.
2. Reset the device.
3. If the condition persists, replace the electronics.

6.2.2 Configuration error

Cause

The device detected a configuration error based on a change to the device.

Recommended actions

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.

6.2.3 Database memory warning

Cause

The device failed to write to the database memory. Any data written during this time may have been lost.

Recommended actions

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.

6.2.4 Electronics failure

An electronics error that could impact the device measurement reading has occurred.

Recommended actions

1. Reset the device.
2. Reconfirm all configuration items in the device.
3. If the condition persists, replace the electronics.

6.2.5 Electronics temperature has exceeded limits

The electronics temperature has exceeded the transmitter's maximum range.

Recommended actions

1. Verify the 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.

6.2.6 Electronics warning

The device detected an electronic error that does not currently impact the device measurement reading.

Recommended actions

1. Reset the device.
2. Reconfirm all configuration items in the device.
3. If the condition persists, replace the electronics.

6.2.7 HI alert

Cause

The primary variable surpassed user-defined limit.

Recommended actions

1. Verify the process variable is within user-specified limits.
2. Reconfirm the user-defined alert limit.
3. If not needed, disable this alert.

6.2.8 HI HI alert

Cause

The primary variable surpassed the user-defined limit.

Recommended actions

1. Verify the process variable is within user-specified limits.

2. Reconfirm the user-defined alert limit.
3. If not needed, disable this alert.

6.2.9 LO alert

Cause

The primary variable surpassed the user-defined limit.

Recommended actions

1. Verify the process variable is within user-specified limits.
2. Reconfirm the user-defined alert limit.
3. If not needed, disable this alert.

6.2.10 LO LO alert

Cause

The primary variable surpassed the user-defined limit.

Recommended actions

1. Verify the process variable is within user-specified limits.
2. Reconfirm the user-defined alert limit.
3. If not needed, disable this alert.

6.2.11 Pressure has exceeded limits

The sensor exceeded the maximum measurement range.

Recommended actions

1. Check process for possible saturation condition.
2. Verify the appropriate sensor was chosen for the application.
3. Reconfirm sensor configuration.
4. Reset the device.
5. Replace the sensor.

6.2.12 Radio failure

The wireless radio has detected a failure or stopped communicating.

Recommended actions

1. Reset the device.
2. If the condition persists, replace the electronics.

6.2.13 Simulation Active

The device is in **Simulation** mode and may not be reporting actual information.

Recommended actions

1. Verify that simulation is no longer required.

2. Disable **Simulation** mode in **Service Tools**.
3. Reset the device.

6.2.14 Supply voltage failure

The supply voltage is too low for the device to function properly.

Recommended actions

Replace the Power Module.

6.2.15 Supply voltage low

Cause

The supply voltage is low and may soon affect broadcast updates.

Recommended actions

Replace the power module.

6.3 Wireless troubleshooting

6.3.1 Digital pressure variable reading is erratic

Recommended actions

1. Check application for faulty equipment in pressure line.
2. Verify transmitter is not reacting directly to equipment turning On/Off.

6.3.2 Digital pressure variable reading is low or high

Recommended actions

1. Check impulse piping for blockage or low fill in wet leg.
2. Verify transmitter is calibrated properly.
3. Check test equipment (verify accuracy).
4. Verify pressure calculations for application.

6.3.3 LCD display is not functioning

Recommended actions

1. Reseat the LCD according to [Install the LCD display](#).
2. Verify the LCD display is a wireless LCD meter. An LCD from a wired device will not function in a wireless device. Rosemount part number: 00753-9004-0002
3. Verify the LCD display mode is not disabled.

6.3.4 Transmitter will not respond to changes in applied pressure

Recommended actions

1. Check impulse piping or manifold for blockage.
2. Verify applied pressure is between 4 and 20 mA points.
3. Verify the **output** is not in **Alarm** condition.
4. Verify transmitter is not in **Loop Test** mode.
5. Verify transmitter is not in **Multidrop** mode.
6. Check test equipment.

6.4 Wireless network troubleshooting

6.4.1 Device not joining the network

Recommended actions

1. Verify the network ID and join key.
2. Wait 30 minutes.
3. Enable **High Speed Operation** on Smart Wireless Gateway.
4. Inspect the Power Module.
5. Verify the device is within range of at least one other device.
6. Verify the network is in active network advertise.
7. Power Cycle the device to try again.
8. Verify the device is configured to join. Send the **Force Join** command to the device.
9. See troubleshooting section of Smart Wireless Gateway for more information.

6.4.2 Limited bandwidth error

Recommended actions

1. Reduce the **Update Rate** on transmitter.
2. Increase communication paths by adding more wireless points.
3. Verify the device has been online for at least one hour.
4. Verify the device is not routing through a "limited" routing node.
5. Create a new network with an additional Smart Wireless Gateway.

6.4.3 Short battery life

Recommended actions

1. Verify **Power Always On** mode is off.
2. Verify the device is not installed in extreme temperatures.
3. Verify the device is not a network pinch point.
4. Check for excessive network rejoins due to poor connectivity.

6.5 Disassembly procedures

6.5.1 Remove from service

Be aware of the following:

- Follow all plant safety rules and procedures.
- Isolate and vent the process from the transmitter before removing the transmitter from service.
- Detach the process flange by removing the four flange bolts and two alignment screws that secure it.
- Do not scratch, puncture, or depress the isolating diaphragms.
- Clean isolating diaphragms with a soft rag and a mild cleaning solution, and rinse with clear water.
- Whenever you remove the process flange or flange adapters, visually inspect the PTFE o-rings. Replace the o-rings if they show any signs of damage, such as nicks or cuts. If they are not damaged, reuse them.

The Rosemount 3051S Wireless transmitter is attached to the process connection by four bolts and two cap screws. Remove the bolts and separate the transmitter from the process connection. Leave the process connection in place and ready for re-installation.

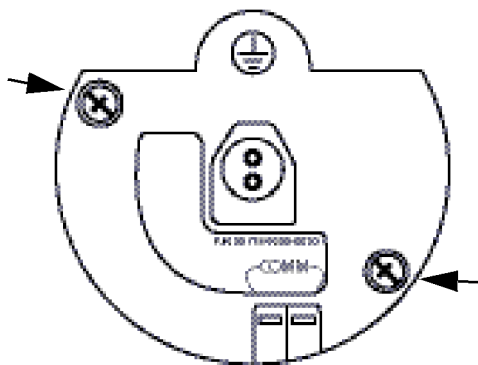
The Rosemount 3051S Wireless In-line transmitter is attached to the process by a single hex nut process connection. Loosen the hex nut to separate the transmitter from the process.

6.5.2 Remove terminal block

Wireless Plantweb™ housing

1. Remove the power module.
2. Loosen the two small screws.
3. Pull out the entire terminal block.

Figure 6-1: Wireless Plantweb terminals



6.5.3 Removing the feature assembly and the SuperModule from the housing

The Wireless Feature Board is located in the electronics compartment.

To remove the assembly:

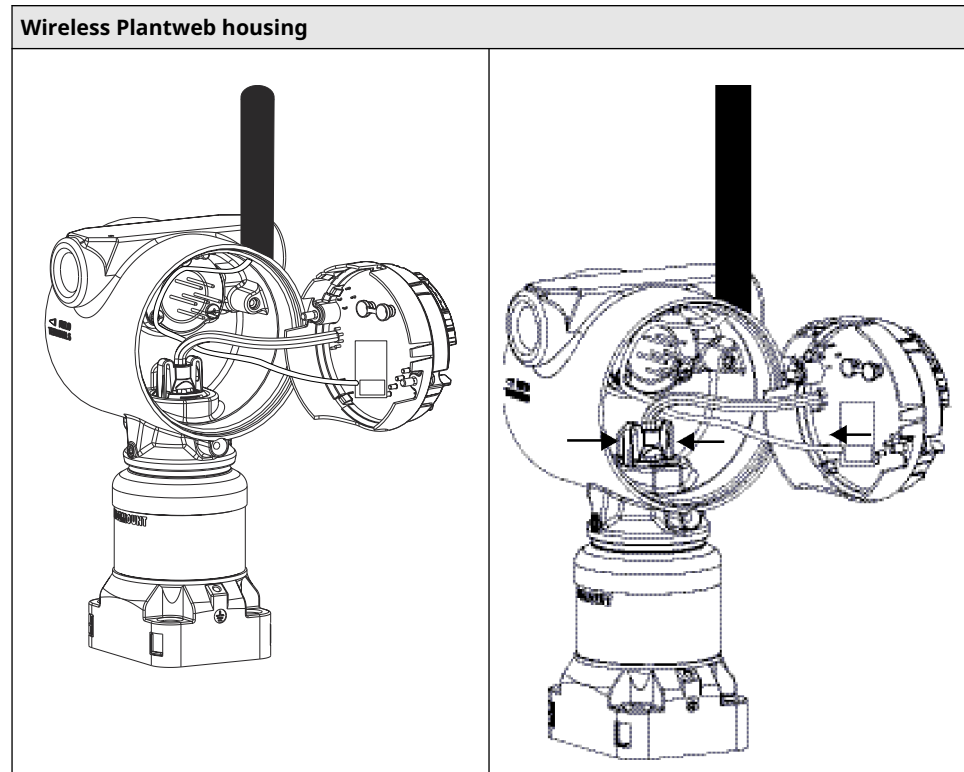
Procedure

1. Remove the housing cover opposite the field terminal side.
2. Remove the LCD display, if applicable, by holding in the two clips and pulling outward.
3. Loosen the two small screws located on the assembly.
4. Replace the LCD display.
This will help in removing the assembly.
5. Pull out the assembly to expose and locate the SuperModule connector and antenna connector.
6. Grasp antenna connector by the base and pull upwards to disconnect.
7. Grasp the SuperModule connector, squeeze the clips and pull upwards (avoid pulling wires).

NOTICE

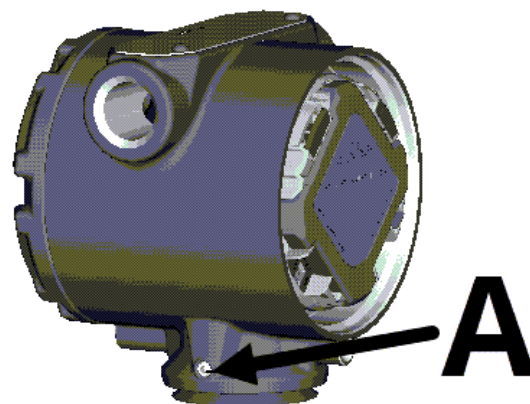
To prevent damage to the SuperModule cable, disconnect it from the Plantweb™ assembly before you remove the SuperModule from the housing.

Figure 6-2: SuperModule connector view



8. Loosen the housing rotation set screw with a 3/32-inch hex wrench, then rotate back one full turn.

Figure 6-3: Housing rotation set screw



A. Housing rotation set screw (3/32-inch allen)

9. Unscrew the housing from the SuperModule.

6.6 Reassembly procedures

Note

The V-Seal must be installed at the bottom of the housing.

6.6.1 Attach the SuperModule to the wireless housing

Procedure

1. Apply a light coat of low temperature silicon grease to the SuperModule connector.
2. Insert the SuperModule connector into the top of the SuperModule.
3. Reconnect the antenna wiring.
4. Gently slide the assembly into the housing, ensuring the Plantweb™ housing pins properly engage the assembly receptacles.
5. Tighten the captive mounting screws.
6. Attach the Plantweb housing cover.
7. Tighten Plantweb housing cover ensuring metal contacts metal.

6.6.2 Install the Terminal Block

Procedure

1. Gently slide the terminal block into the housing, ensuring the Plantweb™ housing pins properly engage the terminal block receptacles.
2. Tighten the captive screws on the terminal block.
3. Attach the Wireless Plantweb housing cover.
4. Tighten the Wireless Plantweb housing cover ensuring metal contacts metal.

6.6.3 Reassemble the process flange

Procedure

1. Inspect the PTFE SuperModule o-rings. If the o-rings are not damaged, reuse them. Replace o-rings that show any signs of damage, such as nicks, cuts, or general wear.

NOTICE

If you are replacing the o-rings, be careful not to scratch the o-ring grooves or the surface of the isolating diaphragm when removing the damaged o-rings.

2. Install the process flange on the SuperModule. To hold the process flange in place, install the two alignment screws to finger tight (screws are not pressure retaining).

NOTICE

Do not overtighten; this will affect module-to-flange alignment.

3. Install the appropriate flange bolts.
 - a) If the installation requires a ¼-18 NPT mounting, use four 1.75-in. flange bolts. Go to Step 3.f.

- b) If the installation requires a ½–14 NPT mounting, use four 2.88-in. process flange/adaptor bolts. For gage pressure configurations, use two 2.88-in. bolts and two 1.75-in. bolts. Go to Step 3.d.
- c) If the installation uses a manifold (differential pressure applications only), use appropriate bolts. Go to Step 3.e.
- d) Hold the flange adapters and adapter o-rings in place while finger-tightening the bolts. Go to Step 3.g.
- e) Align the process flange with the manifold.
- f) Finger tighten the bolts.
- g) Tighten the bolts to the initial torque value using a crossed pattern. See Table 6-1 for appropriate torque values.
- h) Tighten the bolts to the final torque value using a crossed pattern. See Table 6-1 for appropriate torque values. When fully tightened, the bolts extend through the top of the module housing.
- i) If the installation uses a manifold, then install flange adapters on the process end of the manifold using the 1.75-in. flange bolts supplied with the transmitter.

Table 6-1: Bolt Installation Torque Values

| Bolt material | Initial torque value | Final torque value |
|--------------------------|----------------------|---------------------|
| CS-ASTM-A445 Standard | 300 in-lb. (34 N-m) | 650 in-lb. (73 N-m) |
| 316 SST—Option L4 | 150 in-lb. (17 N-m) | 300 in-lb. (34 N-m) |
| ASTM-A-193-B7M—Option L5 | 300 in-lb. (34 N-m) | 650 in-lb. (73 N-m) |
| Alloy K-500—Option L6 | 300 in-lb. (34 N-m) | 650 in-lb. (73 N-m) |
| ASTM-A-453-660—Option L7 | 150 in-lb. (17 N-m) | 300 in-lb. (34 N-m) |
| ASTM-A-193-B8M—Option L8 | 150 in-lb. (17 N-m) | 300 in-lb. (34 N-m) |

- 4. If you replaced the PTFE SuperModule o-rings, re-torque the flange bolts after installation to compensate for cold flow.
- 5. Install the drain/vent valve.
 - a) Apply sealing tape to the threads on the seat. Starting at the base of the valve with the threaded end pointing toward the installer, apply two clockwise turns of sealing tape.
 - b) Take care to place the opening on the valve so that process fluid will drain toward the ground and away from human contact when the valve is opened.
 - c) Tighten the drain/vent valve to 250 in-lb. (28.25 N-m).

Note

After replacing o-rings on Range 1 transmitters and reinstalling the process flange, expose the transmitter to a temperature of 185 °F (85 °C) for two hours. Then retighten the flange bolts in a cross pattern, and again expose the transmitter to a temperature of 185 °F (85 °C) for two hours before calibration.

A Specifications and Reference Data

A.1 Specifications

A.1.1 Locating additional information

Procedure

1. Navigate to [Rosemount 3051S Wireless MultiVariable™ Transmitter product page](#).
2. Locate and click **Documents & Drawings** immediately below the **Product Description** section.
3. To view needed information, refer to the following:

| Information type | How to retrieve |
|--|---|
| Declaration of Conformity (DOC) | <ol style="list-style-type: none">a. Click Certificates & Approvals.b. Select the appropriate Product Data Sheet. |
| Dimensional drawings Ordering information Specifications | <ol style="list-style-type: none">a. Click Data Sheets & Bulletins.b. Select the appropriate Product Data Sheet. |
| Installation drawings | <ol style="list-style-type: none">a. Click Drawings & Schematics.b. Select the appropriate document. |
| Product certifications | <ol style="list-style-type: none">a. Click Manuals & Guides.b. Select the appropriate Quick Start Guide. |

B Product Certifications

B.1 Product certifications

See [Rosemount 3051 Pressure Transmitter and 3051CF Series Flow Meter Quick Start Guide](#) for current product certifications.

C High Gain Remote Antenna Option

C.1 Functional specifications

Output

WirelessHART® 2.4 GHz DSSS (Direct Sequence Spread Spectrum)

Radio Frequency Power Output from Antenna:

- High Gain Remote (WN option) antenna: Maximum of 40 mW (16 dBm) EIRP (Equivalent Isotropically Radiated Power)

Communications range

2/3 mile (3,300 feet) (1.0 km) with LOS

Coaxial length

25 feet (7.6 meters) with Type N Connections

Coaxial material

- Heavy duty, low loss LMR400 cable
- Minimum coaxial bend diameter: 1.0 ft (0.3 meter)

Antenna

- Remote mount Omni directional Antenna
- Fiberglass & Aluminum construction
- 8 Db Gain
- Meets MIL-STD-810G (Method 510.5, Procedure I and II)

Physical specifications

Weight : 1.0 lb (0.4 kg)

RF lightning arrestor

In-line lightning arrestor

Electrical Connection: Lightning arrestor MUST be grounded per local electrical codes and regulations.

Mounting Bracket

- Horizontal or vertical mast accommodation
- Supported mast diameter: 1.0-2.5 inch (2.5-6.4 cm)
- Aluminum bracket
- Nickel/Zinc plated mounting U-bolts

Ratings

NEMA 4X, and IP66/67

Vibration

3g Max vibration

C.2 Installation considerations

Antenna mounting

Mount antenna vertically ($\pm 5^\circ$)

Antenna height

Mount antenna 14 feet (4.3 meters) above infrastructure with clear line of sight.

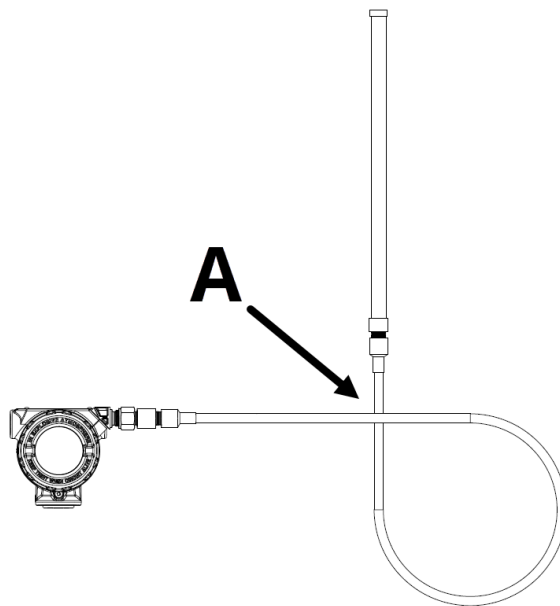
Coaxial Cable

Ensure that coaxial cable is securely affixed to the mast to avoid excessive cable movement.

Coaxial drip loop

Ensure a drip loop is installed not closer than 1 foot (0.3 meters) from the transmitter. To ensure condensation or rainwater will flow away from the coaxial connections, affix the drip loop to the lower portion of the mast.

Figure C-1: Coaxial drip loop



A. Coaxial drip loop

Moisture protection

Utilize the coaxial sealant that is included in the high gain remote mounting kit package. Follow included instructions for application on the coaxial connection.

C.3 Transient/lightning considerations

Gateway transient protection

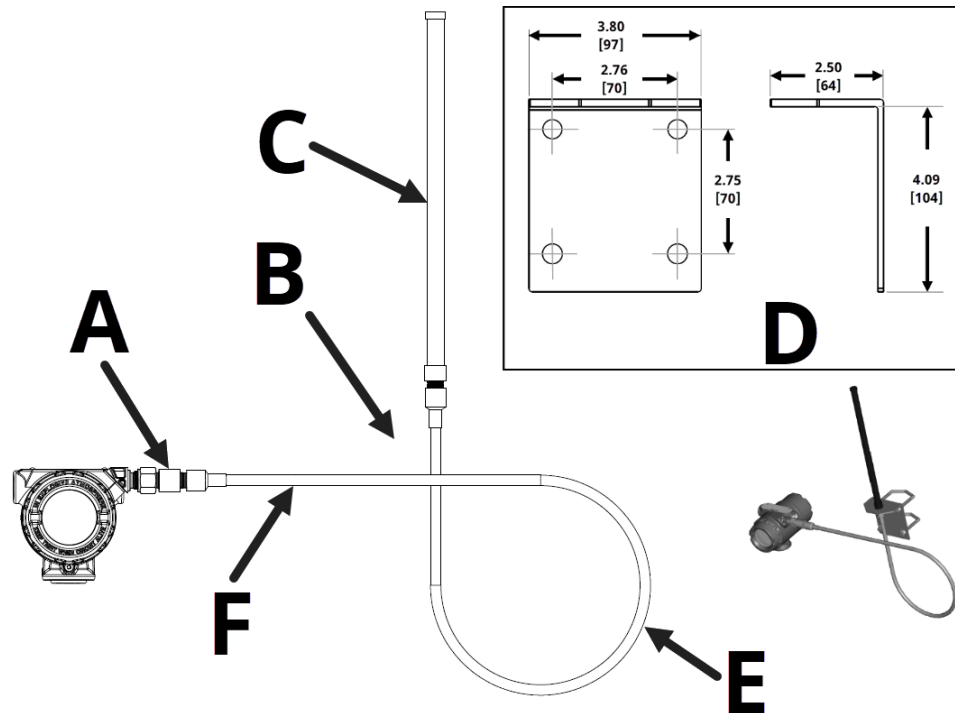
When installing, consider including transient/lightning protection (not provided) on interface connections (Ethernet, Modbus, and Coaxial connections) to other equipment.

RF lightning arrestor ground connection

Ensure grounding connection is made on the RF lightning arrestor ground connection point.

C.4 Dimensional drawings

Figure C-2: Device connection & RF lightning arrestor



- A. Mounting arrestor
- B. Mounting bracket
- C. Antenna
 - WJ1 antenna: 15 in. (381 mm)
 - WN1 antenna: 19.4 in. (490 mm)
- D. Remote mounting bracket dimensions
- E. Minimum drip loop: 12 in. (305 mm) diameter

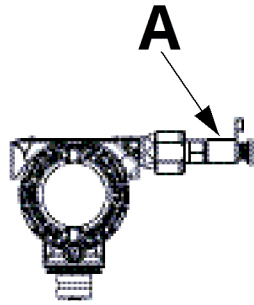
Note
Dimensions in inches [millimeters].

C.5 Installation steps

Procedure

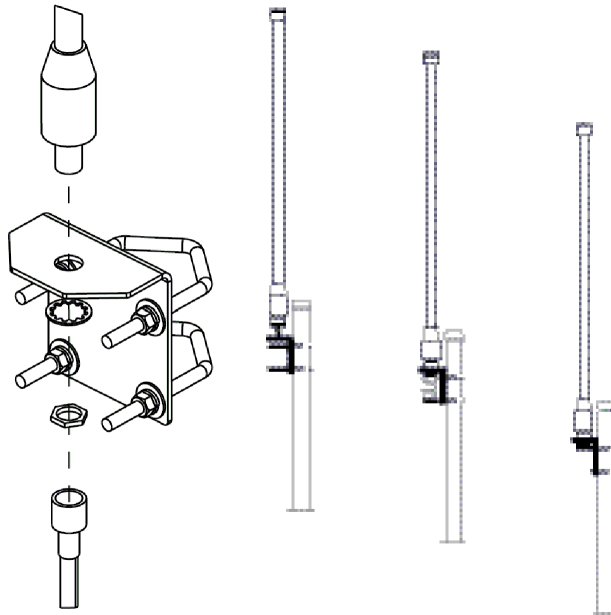
1. Mount the transmitter according to mounting procedures described in the Quick Installation Guide and Product Manual.
2. Connect the Radio Frequency (RF) lightning protector to the device and tighten.

Figure C-3: RF Lighting Protector

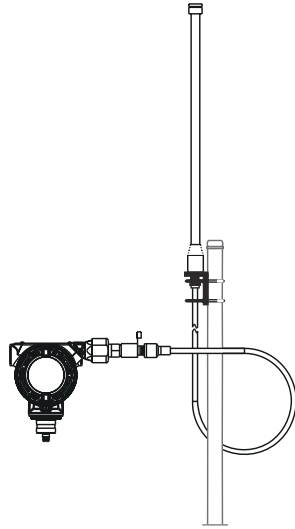


A. RF lightning protector

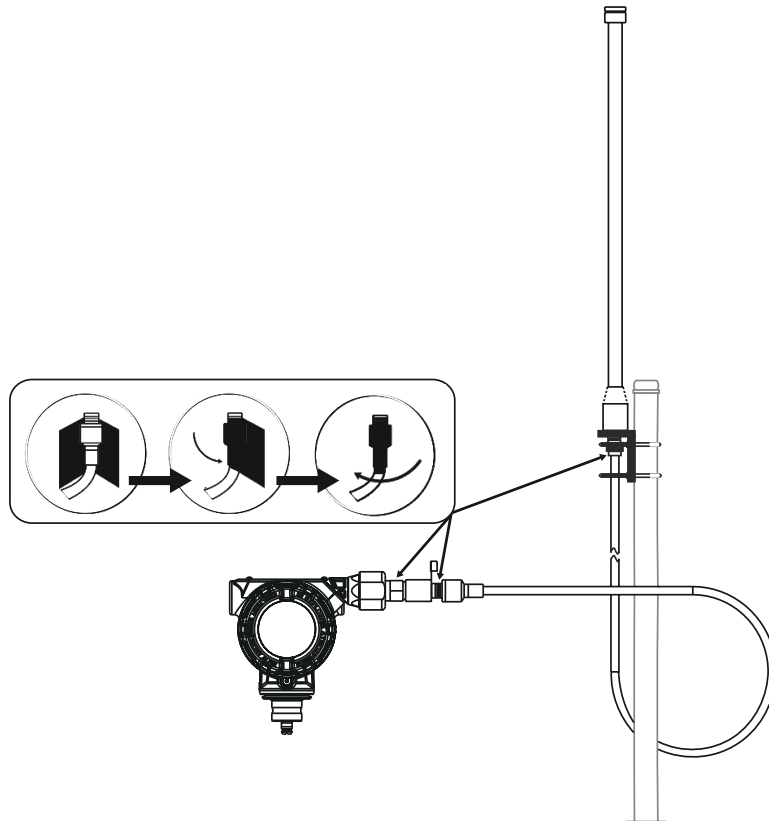
3. Connect antenna to mounting bracket and tighten nut carefully.



4. Unwind coaxial cable and connect the cable to both the antenna and the lightning protector connected to the transmitter. Leaving one loop minimum for a drip loop. Ensure the drip loop is lower than the device allowing water to flow away from the device.

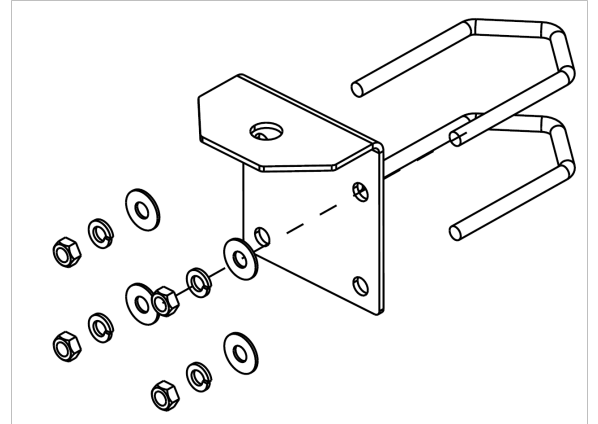
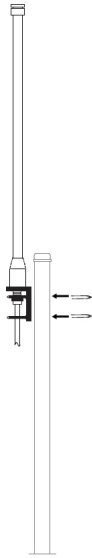


5. Apply the coaxial sealant around each of the coaxial connections and at the lightning arrester making sure the RF connections are completely sealed.

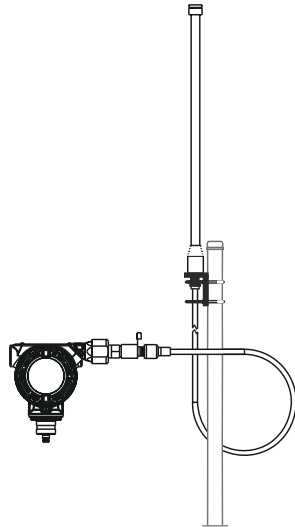


6. Attach u-bolts to mounting bracket in correct orientation ensuring that antenna will be positioned in a vertical position.

Table C-1:



7. Tighten u-bolts to mast and ensure that antenna is pointed in a vertical direction.



D Field Communicator Menu Trees and Fast Keys

D.1 Communication device menu trees

Figure D-1: Rosemount 3051S Wireless Communication Device menu tree: Overview

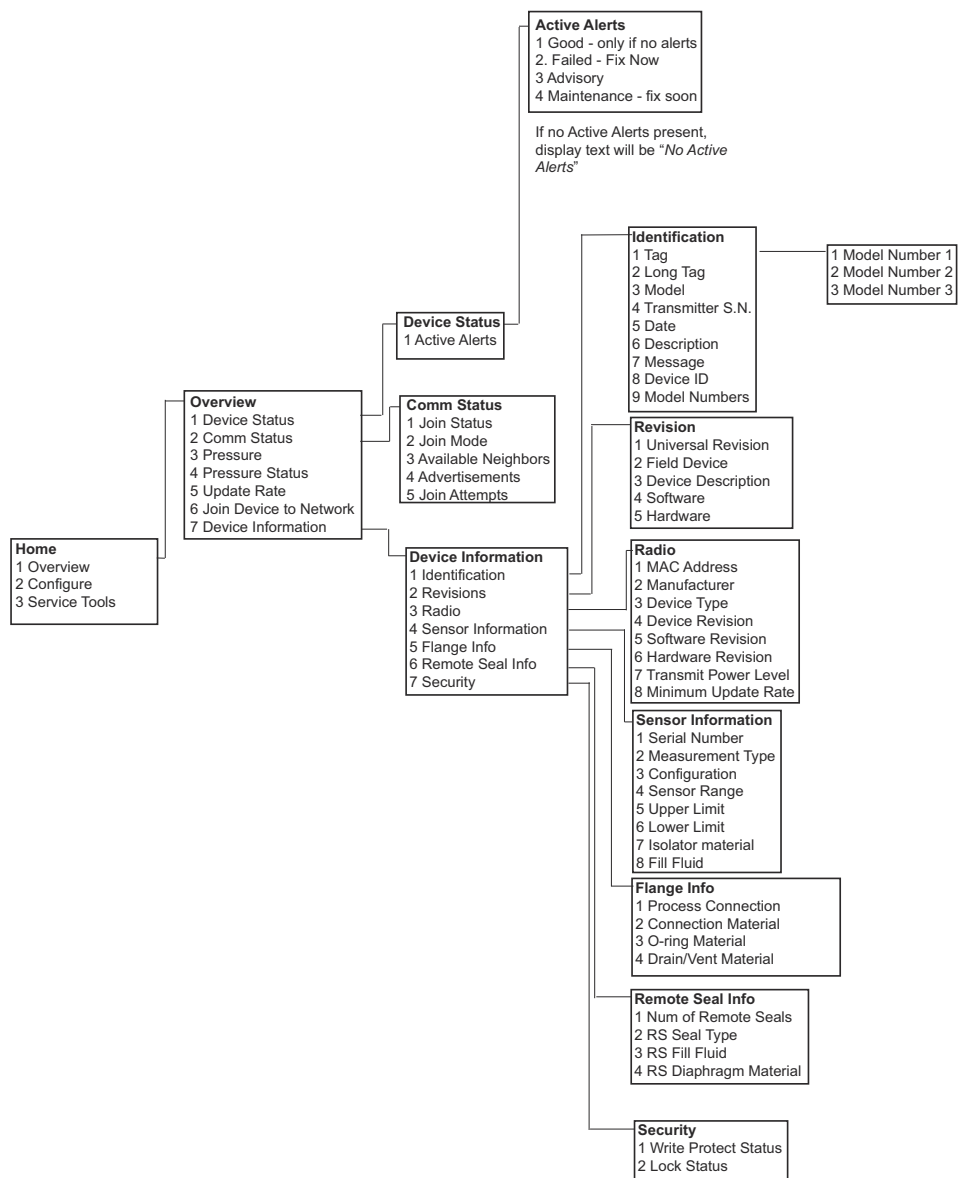


Figure D-2: Rosemount 3051S Wireless Communication Device menu tree: Configure

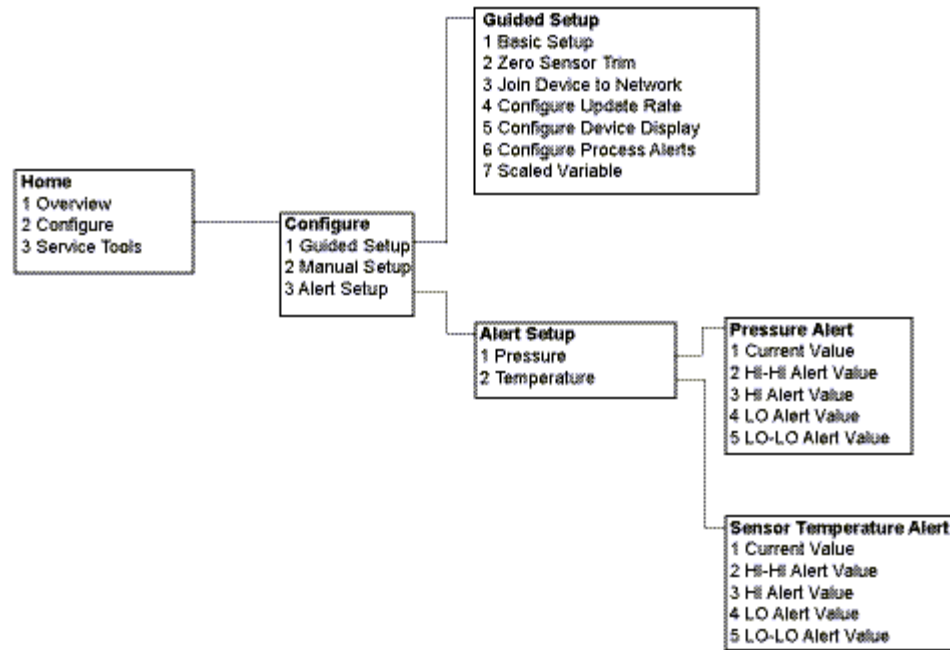


Figure D-3: Rosemount 3051S Wireless Communication Device menu tree: Manual Setup

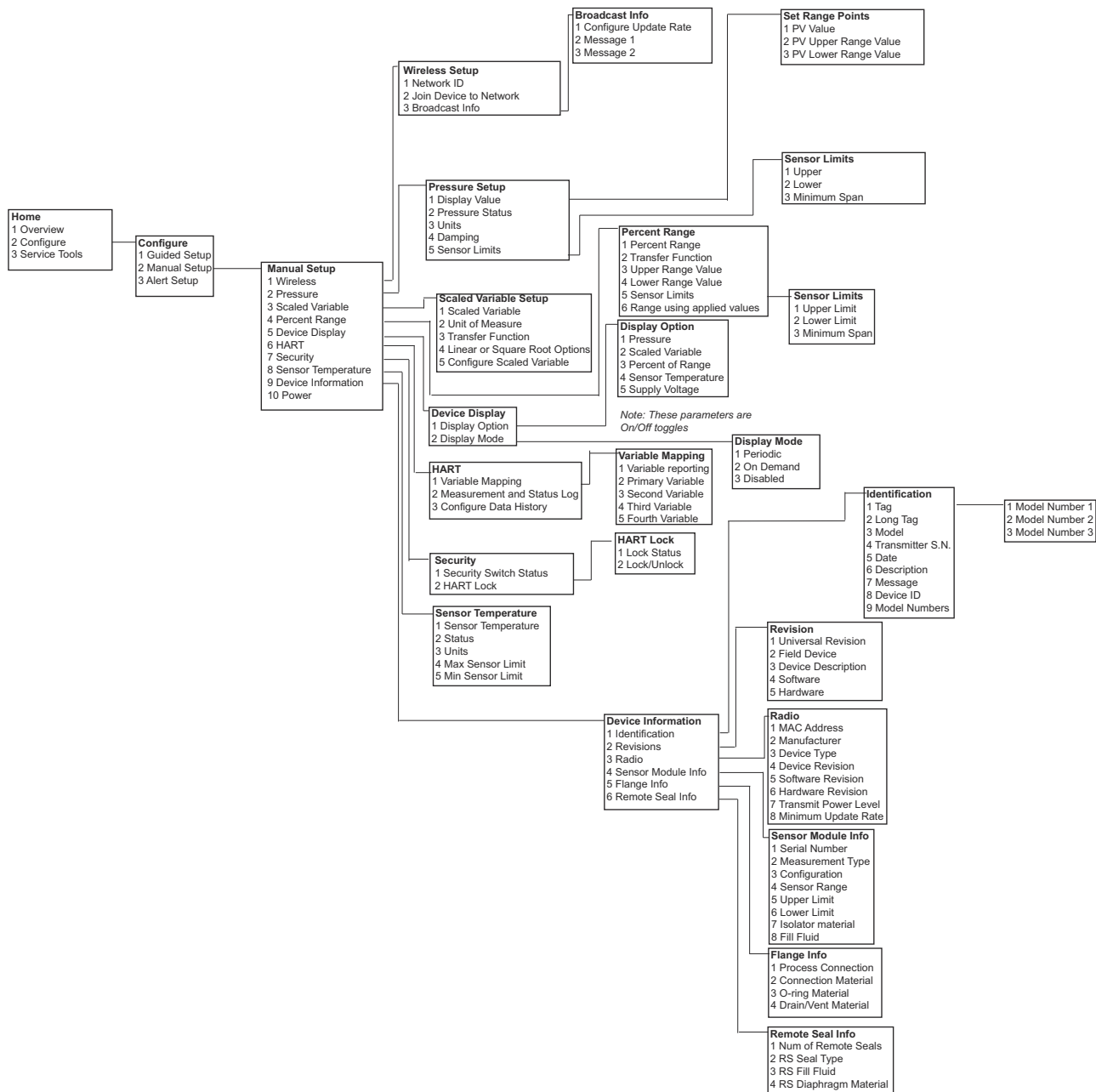
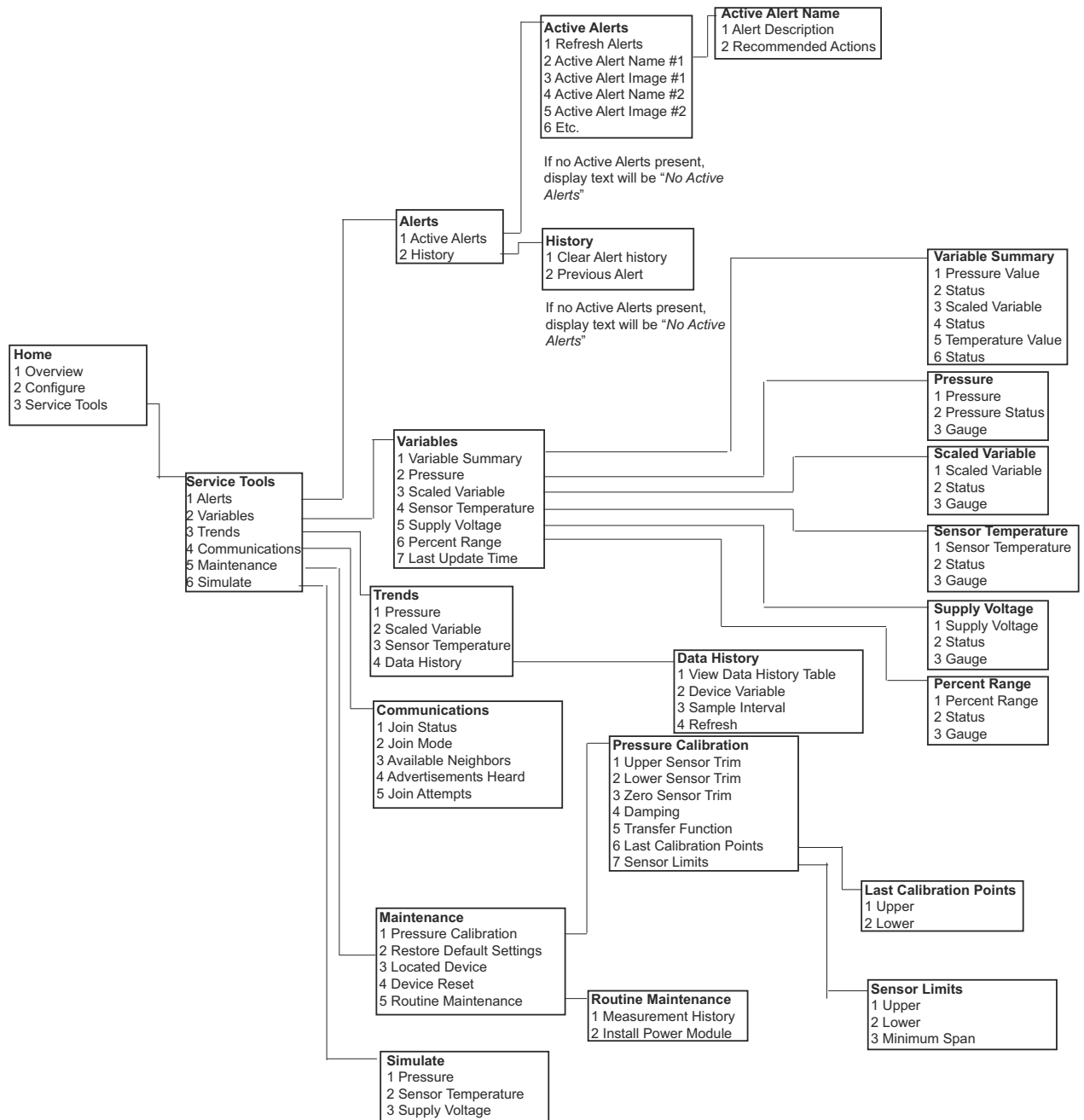


Figure D-4: Rosemount 3051S Wireless Communication Device menu tree: Manual Setup



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