Reference Manual
00809-0100-4928, Rev AE
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Rosemount™ 928 Wireless Gas Monitor

ROSEMOUNT™

EMERSON™

Safety information

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

The United States has two toll-free assistance numbers and one international number.

Customer Central: 1 800 999 9307 (7:00 a.m. to 7:00 p.m. Central Time)

National Reponse Center: 1 800 654 7768 (24 hours a day) for equipment service needs

International: 1 952 906 8888

NOTICE

Read this document before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product. For technical assistance, contacts are listed below:

Customer Central

Technical support, quoting, and order-related questions.
United States - 1-800-999-9307 (7:00 am to 7:00 pm Central Time)
Asia Pacific- 65 777 8211
Europe/Middle East/Africa - 49 (8153) 9390

North American Response Center

Equipment service needs.
1-800-654-7768 (24 hours—includes Canada)
Outside of these areas, contact your local Emerson representative.

⚠ WARNING

Explosions

Explosions could result in death or serious injury.

Installation of device in an explosive environment must be in accordance with appropriate local, national, and international standards, codes, and practices.
Review Product certifications for any restrictions associated with a safe installation.
Before connecting a handheld communication device in an explosive atmosphere, ensure the instruments are installed in accordance with Intrinsically Safe or non-incendive field wiring practices.
When connecting an external device to the Rosemount 928's discrete output in a hazardous area, ensure that the external device is installed in accordance with Intrinsically Safe or non-incendive field wiring practices.

⚠ WARNING

Electrical shock

Electrical shock could cause death or serious injury.

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

⚠ CAUTION

Nuclear applications

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

For information on Rosemount nuclear-qualified products, contact an Emerson sales representative.

⚠ CAUTION

Installation problems

Only install the Rosemount 928 and all other wireless devices after the Wireless Gateway has been installed and is functioning properly. Power up wireless devices in order of proximity from the Wireless Gateway, beginning with the closest. This will result in a simpler and faster network installation.

⚠ CAUTION

Shipping considerations for wireless products

Battery hazards remain when cells are discharged.

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

Each power module contains two "C" size primary lithium batteries. Primary lithium batteries are regulated in transportation by the US 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 shipper's responsibility to ensure compliance with these or any other local requirements. Consult current regulations and requirements before shipping.

The power module with the wireless unit contains two "C" size primary lithium/thionyl chloride batteries. Each battery contains approximately 2.5 grams of lithium, for a total of 5 grams in each pack. Under normal conditions, the battery materials are self-contained and are not reactive as long as the batteries and the pack integrity are maintained. Take care to prevent thermal, electrical, or mechanical damage. Protect contacts to prevent premature discharge.

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

The power module has surface resisitivity greater than one gigaohm and must be properly installed in the wireless device enclosure. Take care during transportation to and from the point of installation to prevent electrostatic charge buildup.

⚠ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

Contents

1 Introduction

1.1 Using this manual

The sections in this manual provide information on installing, operating, and maintaining the Rosemount™ 928 Wireless Gas Monitor. Models 928XSS00 and 928XUT00 are the standard wireless gas monitors. Models 928XXSS01 and 928XUT01 include discrete outputs, which can be used to trigger optional external device alarms, such as beacons or annunciators, when an alarm condition occurs.

The manual sections are organized as follows.

Configuration contains information on the configuration and calibration of the transmitter. You can configure with the AMS Wireless Configurator or Field Communicator. This section also includes Field Communicator menu trees.

Install contains information on the installation of the transmitter, installation of the sensor on the transmitter, and the wiring of external devices to the transmitter discrete output.

Commissioning contains information for the commissioning of the transmitter onto the wireless network and how to verify that the transmitter has successfully joined.

Operation and maintenance provides detailed information on operation of the transmitter. The chapter shows LCD display messages and includes maintenance information, such as power module replacement, bump testing, and periodic calibration.

Troubleshooting provides descriptions and recommended corrective actions for common errors and problems.

Specifications and reference data contains functional, physical, and performance specifications, as well as ordering information.

Product certifications contains telecommunication compliance information, ordinary location certification, hazardous locations certificates, and intrinsic safety installation drawings.

High gain remote antenna option contains specifications, description, and installation information for the optional high gain remote antenna.

Alert message mapping contains information about alerts in the HART® command, 48 additional status field and device variables, and variable mapping indexes for the transmitter. This information can be used by DeltaV™ for alert monitoring and in the Wireless Gateway for additional status mapping in Modbus®, OPC, or other communications protocols.

1.2 Models covered

This manual covers the following modules

- Rosemount 928XSS00 Wireless Gas Monitor
  - Ships with a separately specified Rosemount 628 Universal Gas Sensor.
- Rosemount 928UTX00 Wireless Gas Monitor
  - Ships without a Rosemount 628 Universal Gas Sensor.

- Rosemount 928XSS01 Wireless Gas Monitor
  - Wireless gas monitor with discrete output to be used as a switch for triggering external equipment on an alarm state.
  - Ships with a separately specified Rosemount 628 Universal Gas Sensor.
- Rosemount 928UTX021
  - Wireless gas monitor with discrete output to be used as a switch for triggering external equipment on an alarm state.
  - Ships without a Rosemount 628 Universal Gas Sensor.

1.3 Device overview

The Rosemount 928 Wireless Gas Monitor uses the Rosemount 628 Universal Gas Sensor to monitor the presence of toxic gases. The Rosemount 628 Universal Gas Sensor consists of an electrochemical sensor inside a hot-swappable sensor module installed into the transmitter housing. The transmitter sends the gas concentrations measured by the sensor to the host system using the *Wireless*HART® protocol.

Electrochemical toxic sensors, such as those contained in the Rosemount 628 Series Gas Sensor Module, consist of a set of electrodes separated by electrolyte material. When the target gas is present inside the sensor housing, it oxidizes or reduces on the sensing electrode. This creates an electric signal across the cell, which the transmitter interprets and converts into a wireless-enabled signal.

1.4 Product recycling/disposal

Consider recycling equipment and packaging. Dispose of the product and packaging in accordance with local and national legislations and regulations.

2 Configuration

2.1 Overview

This section contains information on configuring the transmitter, including the sensor, using Field Communicator or AMS Wireless Configurator. It also includes sensor calibration information.

2.2 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing them.

⚠ WARNING

Follow installation guidelines.

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

Ensure that only qualified persons perform the installation.

⚠ WARNING

Explosions

Explosions could result in death or serious injury.

Before connecting a handheld communication device in an explosive atmosphere, make sure that the instruments are installed in accordance with Intrinsically Safe or non-incendive field wiring practices.

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

⚠ WARNING

Electrical shock

Electrical shock could cause death or serious injury.

Use extreme caution when making contact with the leads and terminals.

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

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge buildup, do not rub or clean the antenna with solvents or a dry cloth.

Substitution of components may impair intrinsic safety.

2.3 Install the sensor

The Rosemount™ 928 Wireless Gas Monitor is compatible with the Rosemount 628 Universal Gas Sensors. These sensors are contained within a sensor module that fits integrally into the transmitter housing without using tools. Make electrical connections when the sensor module is fully seated in the transmitter sensor module housing.

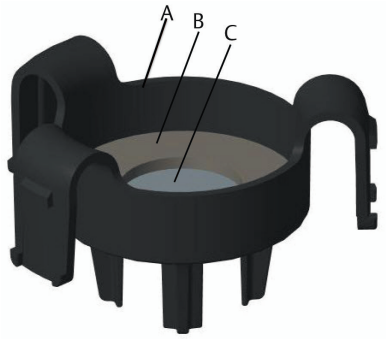
⚠ CAUTION

Install the Ingress Protection (IP) filter.

If the IP filter is not installed, damage may occur to the sensor inside the sensor.

Do not operate the transmitter without the correct IP filter installed in the sensor.
When installing the IP filter, verify that the IP filter gasket is in place and properly aligned and that it does not block the white filter media. Refer to Figure 2-1.
When handling the IP filter, avoid contact with the filter media.
Verify that all three legs are fully latched by pushing upward on each leg of the IP filter.
Avoid getting water inside the IP filter.
Do not attempt to clean the IP filter.
Do not rinse or spray the IP filter with water.
Do not immerse the IP filter in water.

Figure 2-1: IP Filter

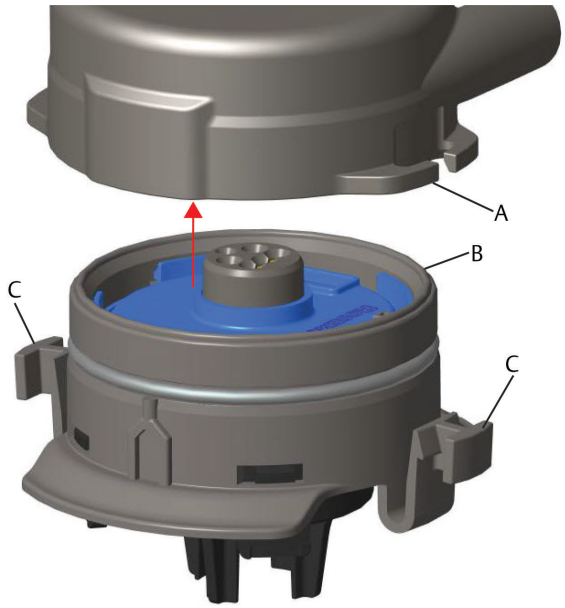


A. IP filter housing
B. IP filter gasket
C. Filter media

Note
Use Rosemount 628 Universal Gas Sensors only with the Rosemount 928 Transmitter.

The sensor is held in place using a tight-fitting seal and snap connections. The sensor is connected to the transmitter by two latching tabs that fit into the bottom portion of the housing as shown in Figure 2-2.

Figure 2-2: IP Filter Latching Tabs Locations



A. Transmitter housing
B. Gas sensor module
C. Latching tabs

The seal between the transmitter housing and the sensor assembly is designed so that a snug, airtight fit is achieved between the two assemblies when properly installed.

Procedure

1. Remove the sensor from its packaging.
2. If installing a sensor on the transmitter for the first time, remove the protective plastic cap from the sensor module housing.
3. The sensor contains a keying feature that ensures that the module cannot be forced into the transmitter housing incorrectly. Confirm that the keying feature is aligned by rotating it into position before installing the sensor into the transmitter.
4. Slide the sensor assembly up into the main transmitter housing until it is completely seated.
5. To ensure a firm latch and seal, push the sensor upward until the two latching tabs are fully engaged. Push up on the bottoms of the tabs after they are seated.
6. Allow the transmitter to warm up before continuing.

   Refer to Table 2-1 for maximum warm up times based on gas type. During the warm up period, the displayed values, alerts, and gas concentrations do not reflect actual measurements; readings are not transmitted.

Table 2-1: Maximum Warm up Periods

Gas type	Maximum warm up period
Hydrogen sulfide (H_2S)	One minute

Table 2-1: Maximum Warm up Periods *(continued)*

Gas type	Maximum warm up period
Oxygen (O_2)	Seven minutes
Carbon monoxide (CO)	One minute

Postrequisites

To remove the sensor, compress the two latching tabs and pull downward until the module is released from the transmitter housing.

2.4 Install the power module

The transmitter is powered by the Emerson 701 SmartPower™ Module - Black. To connect the module to the transmitter, do the following:

Procedure

1. Remove the rear housing cover.

A. Rear housing cover

2. Connect the Emerson 701 SmartPower Module - Black.

3. Verify the connection by viewing the LCD display.
4. Replace the rear housing cover and completely tighten.
5. Allow the transmitter to warm up before continuing.

   Refer to Table 2-2 for maximum warm up times based on gas type. During the warm up period, the displayed values, alerts, and gas concentrations do not reflect actual measurements; readings are not transmitted.

Table 2-2: Maximum Warm up Periods

Gas type	Maximum warm up period
Hydrogen sulfide (H_2S)	One minute
Oxygen (O_2)	Seven minutes
Carbon monoxide (CO)	One minute

2.5 Bench configuration

To configure, you must install the sensor in a functional transmitter. The transmitter receives any HART® communication from a handheld Field Communicator or from an AMS Wireless Configurator.

Remove the rear housing cover to expose the terminal block and HART communication terminals; then connect the power module to power the device for configuration.

2.5.1 Bench configure using a Field Communicator

A transmitter Device Description (DD) is required for HART® communication.

To connect to the transmitter using a handheld communication device, refer to Guided setup. To obtain the latest DD, go to EmersonProcess.com/DeviceFiles and then visit the Emerson web page for your handheld device.

Procedure

1. On the **Home** screen, select Configure.

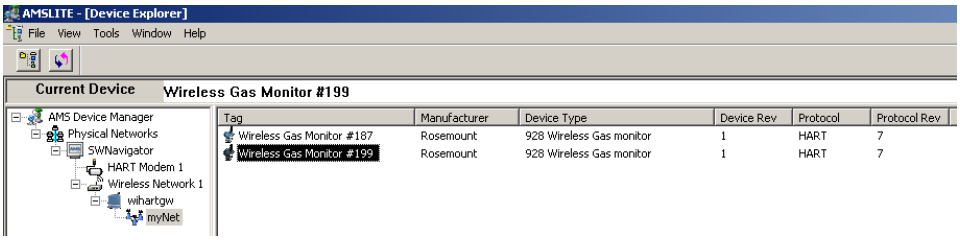
2. Do one of the following:
   - On the **Configure** screen, select Guided Setup to verify or change initial configuration settings. Refer to Guided setup. Refer to the Field Communicator subsections for each configuration task.
   - On the **Configure** screen, select Manual Setup to verify or change all configuration settings, including optional advanced settings. Refer to Manual setup. Refer to the Field Communicator subsections for each configuration task.
3. When finished, select **Send** to implement configuration changes.
4. When configuration is completed, remove the HART communications leads from the COMM terminals on the terminal block and replace the rear housing cover.

2.5.2 Bench configure AMS Wireless Configurator

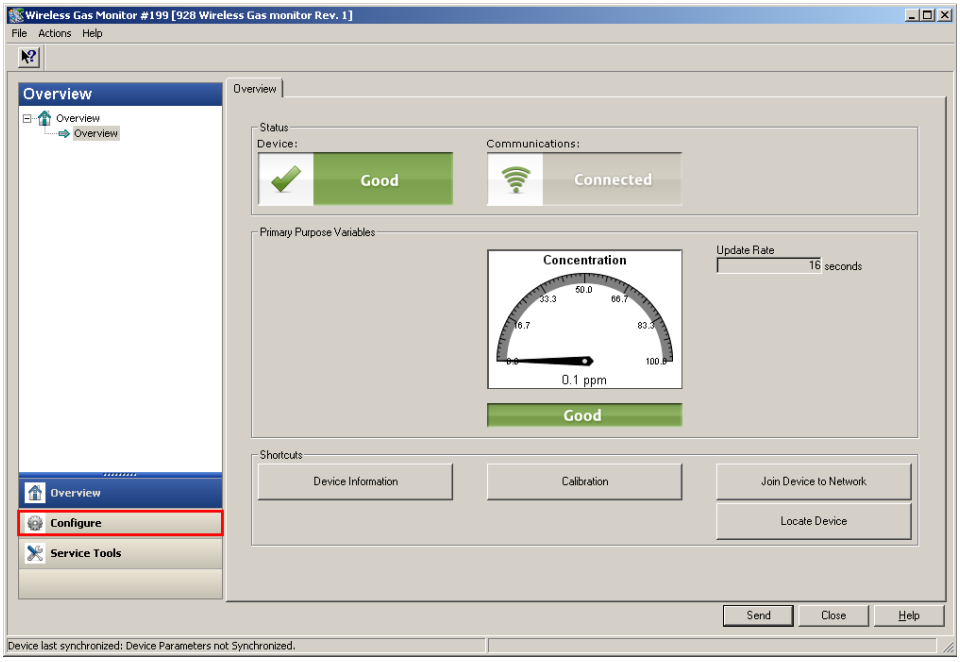
AMS Wireless Configurator is capable of connecting to devices directly, using a HART® modem, or though a Wireless Gateway.

Procedure

1. In the **AMS Device Manager** pane, select the HART modem.
2. In the device pane, double-click the device icon.



3. Select **Configure**.



4. In the **Configure** pane, do one of the following:
   - Select Guided Setup to verify or change initial configuration settings. Refer to Guided setup. Refer to the AMS Wireless Configurator subsections for each configuration task.
   - Select Manual Setup to verify or change all configuration settings, including optional advanced settings. Refer to Manual setup. Refer to the AMS Wireless Configurator subsections for each configuration task.
5. When finished, select **Send** to implement configuration changes.

2.6 HART® menu trees

The following figures show the navigation paths for Field Communicator commands and options. A Rosemount 928 Wireless Gas Monitor DD is required for HART Wireless transmitter communication. To obtain the latest Emerson DD, visit the **System Software and Device Description** web page for your handheld communicator device. Refer to the reference manual for your handheld communicator device.

Figure 2-3: Field Communicator Overview Menu Tree

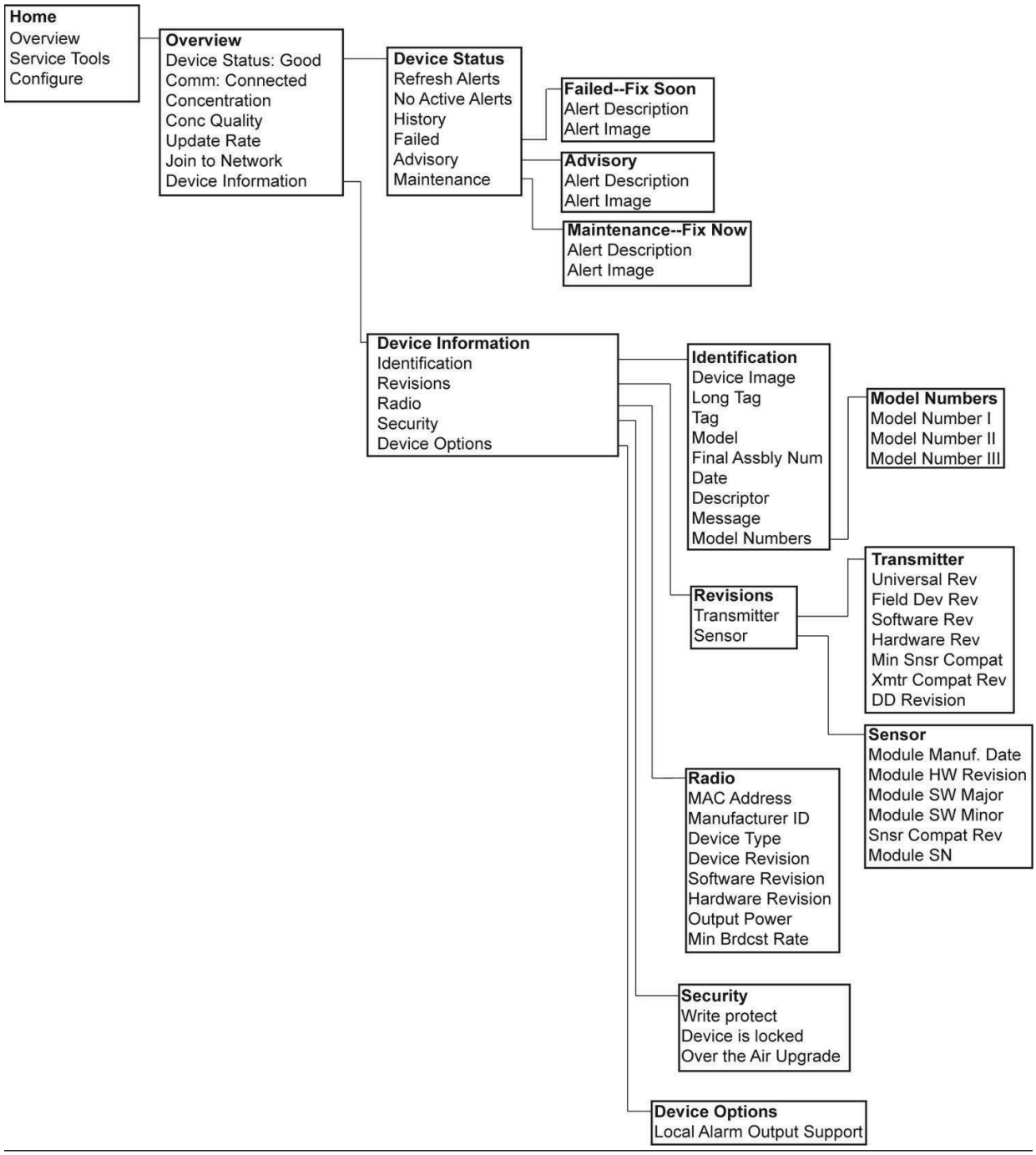


Figure 2-4: Field Communicator Configure Menu Tree

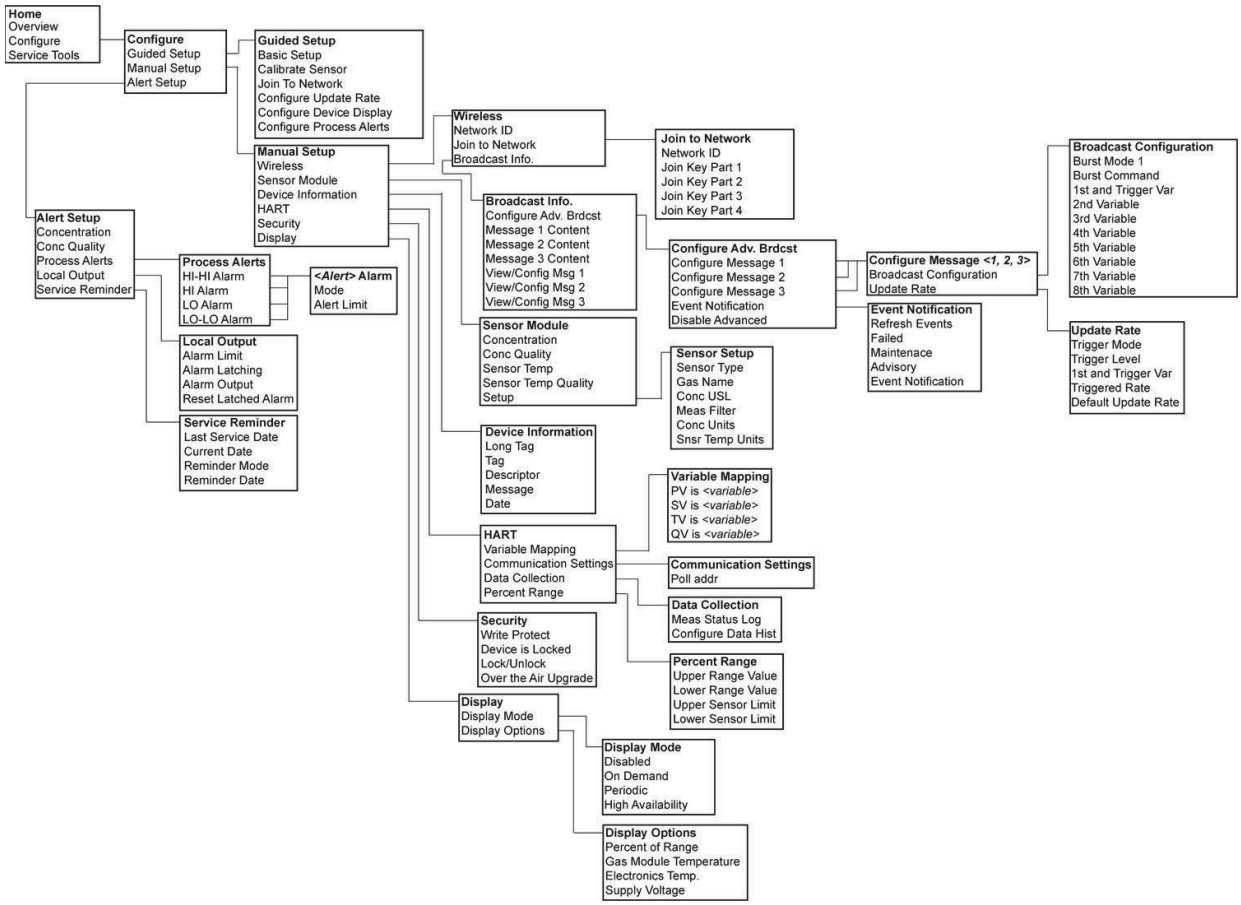
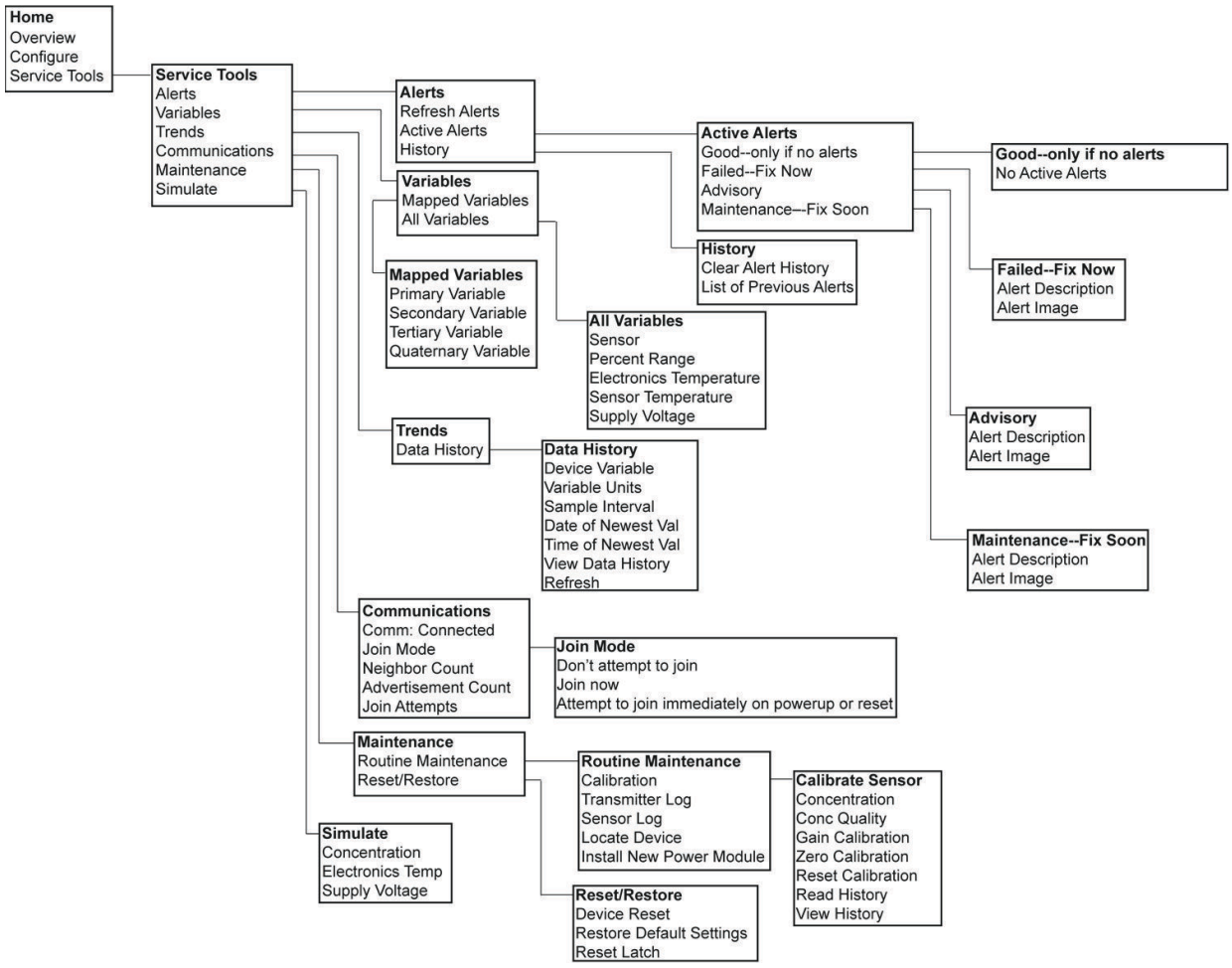


Figure 2-5: Field Communicator Service Tools Menu Tree



2.7 Guided setup

Guided setup contains basic configurations settings. The **Guided Setup** menus are useful during initial configuration.

Note

Emerson developed the Field Communicator Guided Setup configuration procedures using Emerson AMS Trex™ Device Communicator. The menus are identical to those found in other Field Communicators, but are navigated using touch screens rather than fast keys. Refer to the manual for your handheld communicator device for more information.

Procedure

1. **⚠ WARNING**

   Explosions

   Do not connect to the COMM terminals when an explosive atmopshere is present.

   Connect the HART® communication leads to the HART terminals on the handheld communicator.

2. **⚠ WARNING**

   Explosions

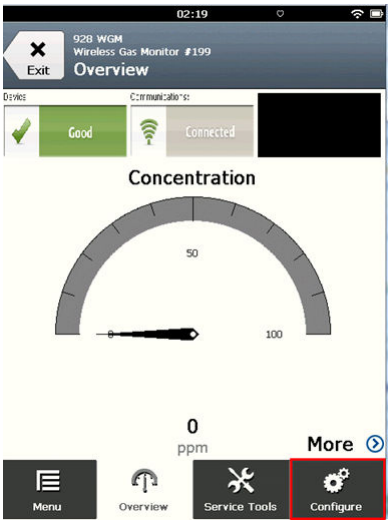
   Do not connect to the COMM terminals when an explosive atmopshere is present.

   Connect the HART communication leads to the COMM terminals on the transmitter terminal block.

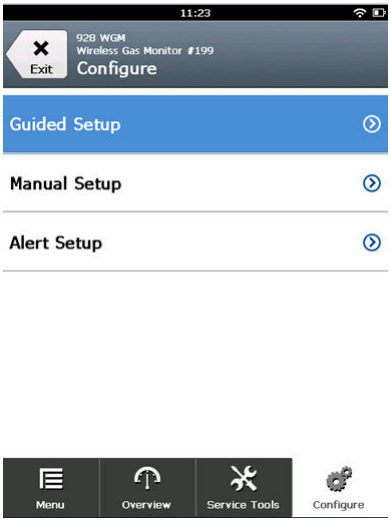
3. Start your handheld communicator device. If necessary, open the HART Field Communicator application on your handheld device to establish HART communication.

   Refer to the manual for your handheld communicator device for more information.

4. On the **Overview** screen, select **Configure**.



5. On the **Configure** screen, select **Guided Setup**.



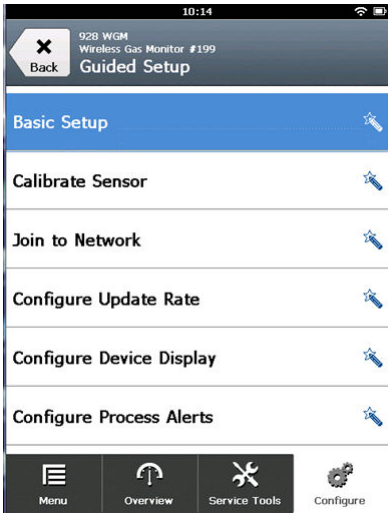
6. Perform each of the configuration tasks in the following subsections.

2.7.1 Basic setup

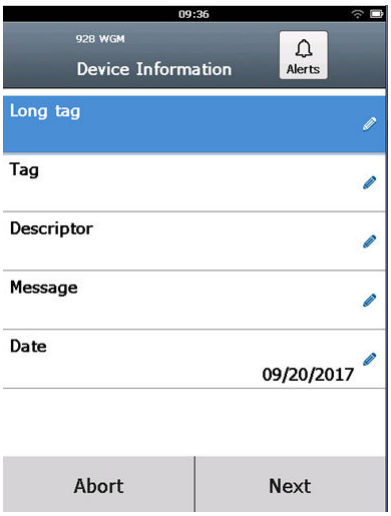
Basic setup using Field Communicator

Procedure

1. On the **Guided Setup** screen, select **Basic Setup**.



2. On the **Device Information** screen, select any of the following and configure as needed. Otherwise, continue with Step 3.

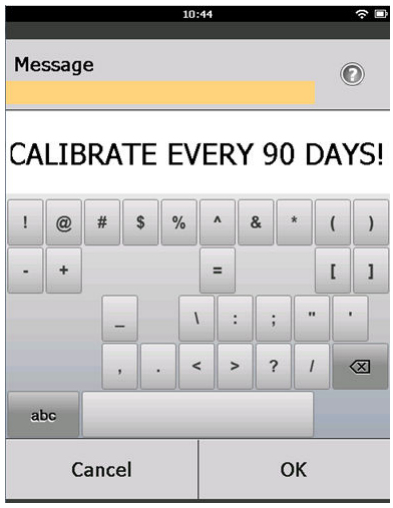


- Long tag: Enter an identifier for the device up to 32 characters long using the virtual keypad. The Long tag field is blank by default and does not display if left blank.

- Tag: Enter an identifier for the device up to eight uppercase alphabetic and numeric characters long using the virtual keypad. The Tag field is blank by default and does not display if left blank.

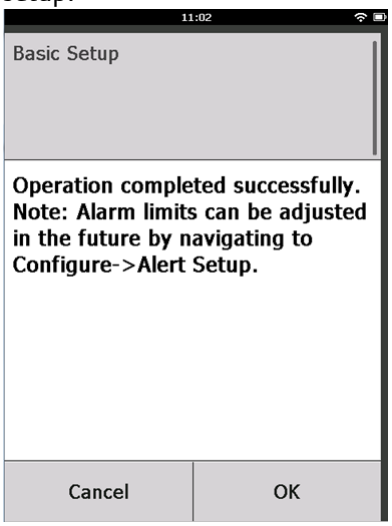
- Descriptor: Enter a description of the device up to 16 alphabetic, numeric, and special characters long. The Descriptor field is blank by default and does not display if left blank.

- Message: Enter a message up to 32 alphabetic, numeric, and special characters long. The Message field is blank by default, does not display if left blank, and may be used for any purpose.



3. On the **Device Information** screen, select **Next**.

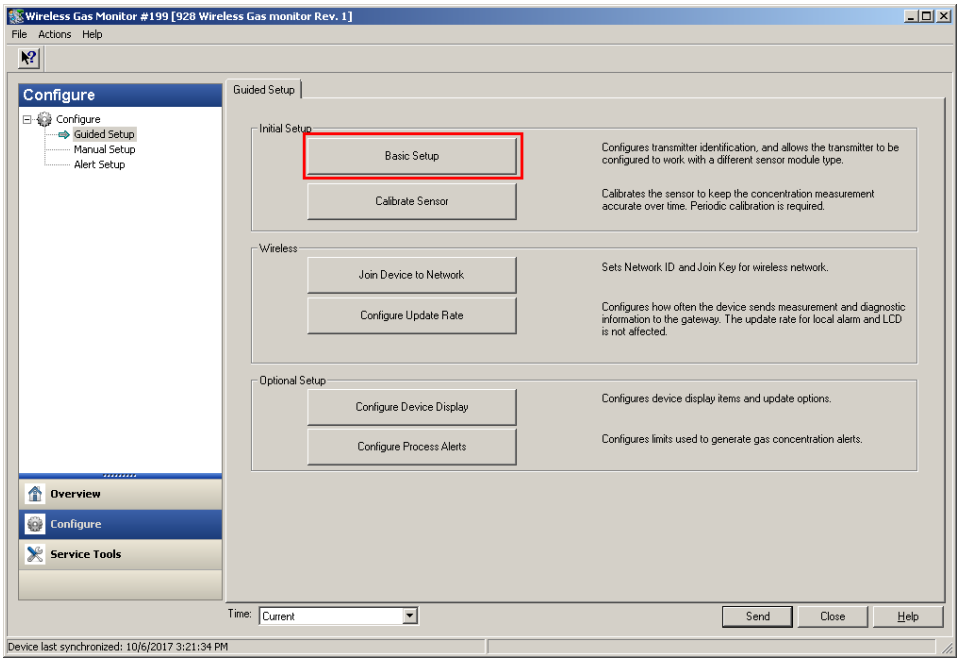
4. On the **Basic Setup** screen, select **OK** to confirm successful completion of basic setup.



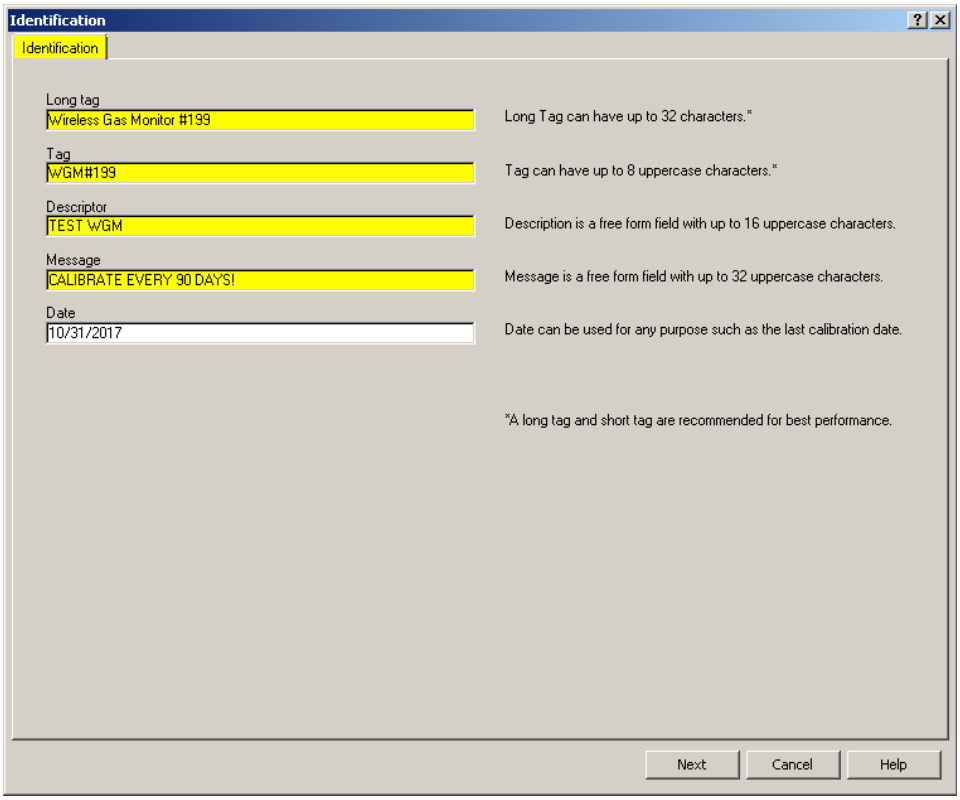
Basic setup using AMS Wireless Configurator

Procedure

1. On the **Guided Setup** tab, in the Initial Setup field, select **Basic Setup**.

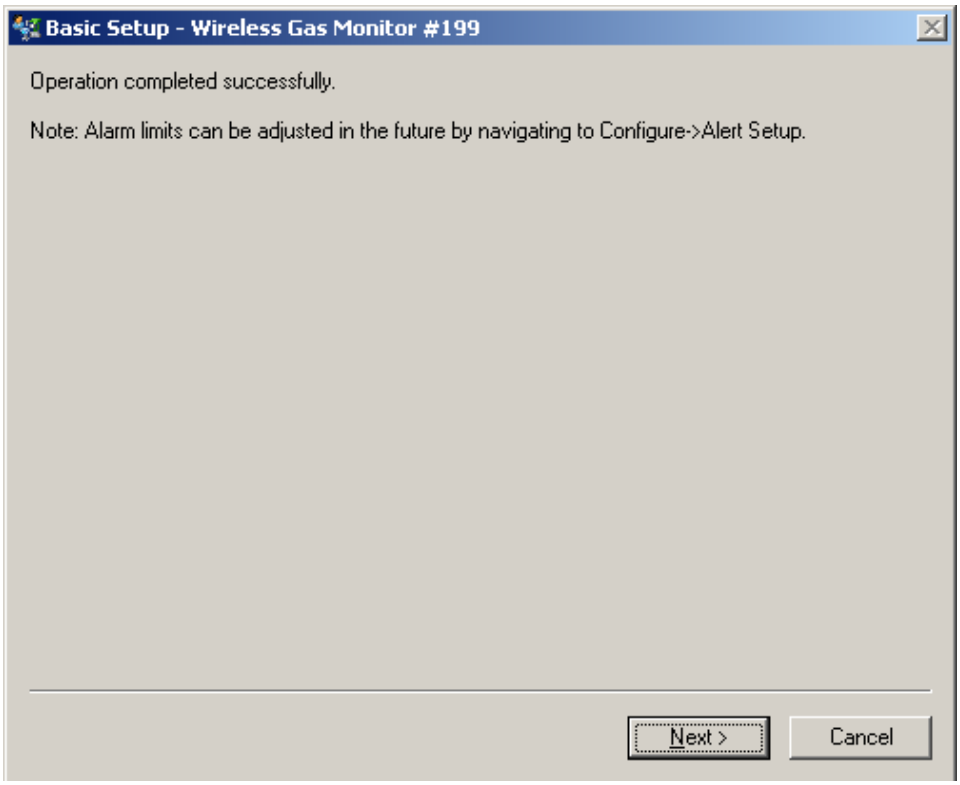


2. On the **Device Information** tab, configure any of the following as needed. Otherwise, continue with Step 3.



- Long tag: Enter an identifier for the device up to 32 characters long using the virtual keypad. The Long tag field is left blank by default and does not display if left blank.
- Tag: Enter an identifier for the device up to eight uppercase alphabetic and numeric characters long using the virtual keypad. The Tag field is blank by default and does not display if left blank.
- Descriptor: Enter a descriptor of the device up to 16 alphabetic, numeric, and special characters long. The Descriptor field is blank by default and does not display if left blank.
- Message: Enter a message up to 32 alphabetic, numeric, and special characters long. The Message field is left blank by default, does not display if left blank, and may be used for any purpose.

3. On the **Basic Setup** screen, select **Next**.



4. Select **Finish**.

2.7.2 Joining the transmitter to a wireless network

To communicate with the Wireless Gateway and the host system, you must use the wireless network to configure the transmitter.

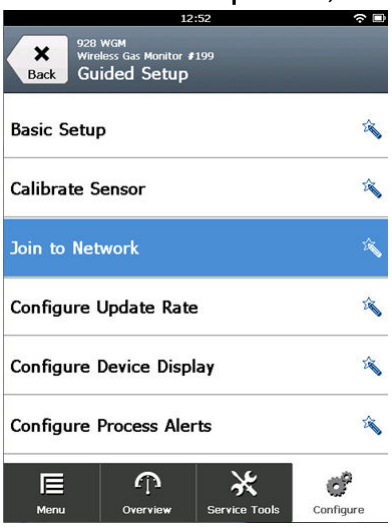
This procedure is the wireless equivalent of connecting wires from a transmitter to the host system. Using Field Communicator or AMS Wireless Configurator, enter the network ID and join key so that they match the network ID and join key of the Wireless Gateway and other devices in the network. If the network ID and join key are not identical, the transmitter will not communicate with the network. You can obtain the network ID and join key from the Wireless Gateway on the **Setup** → **Network** → **Settings** page on the web server.

Note
The amount of time required to join the new device or devices to the network is dependent on the number of devices being joined and the number of devices in the current network. One new device joining an existing network with multiple devices may take up to five minutes. Multiple new devices joining an existing network may take up to 60 minutes.

Join a wireless network using Field Communicator

Procedure

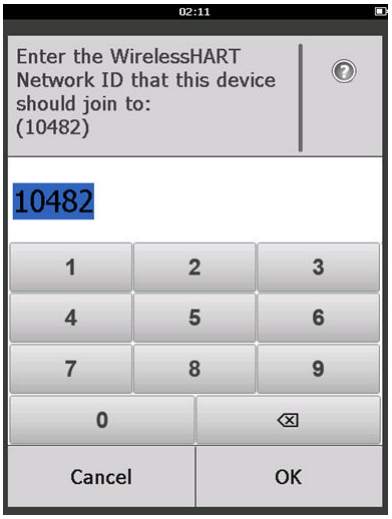
1. On the **Guided Setup** screen, select **Join to Network**.



2. On the **Join to Network** screen, use the numeric keypad to enter the *Wireless*HART® network ID.

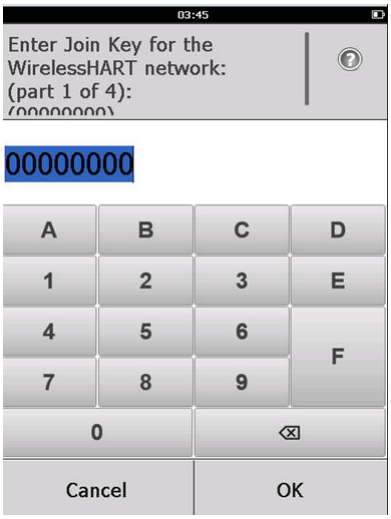
   The network ID must match the Wireless Gateway network ID. Refer to the **System Settings** → **Network** → **Network Settings** page in the Wireless Gateway web-based user interface for the network ID.

3. Select **OK**.



4. On the **Join Key** screen, use the hexadecimal keypad to enter the first part of the join key.

   Refer to the **System Settings** → **Network** → **Network Settings** page in the Wireless Gateway web-based user interface for the join key.



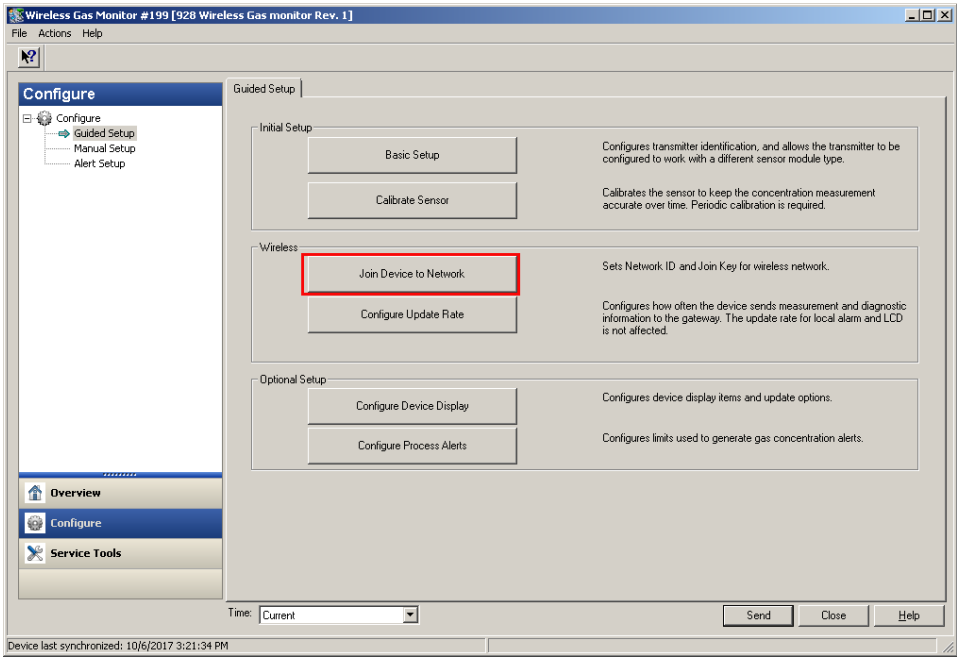
5. Select **OK**.

6. Repeat Step 4 and Step 5 for parts 2 - 4 of the join key.

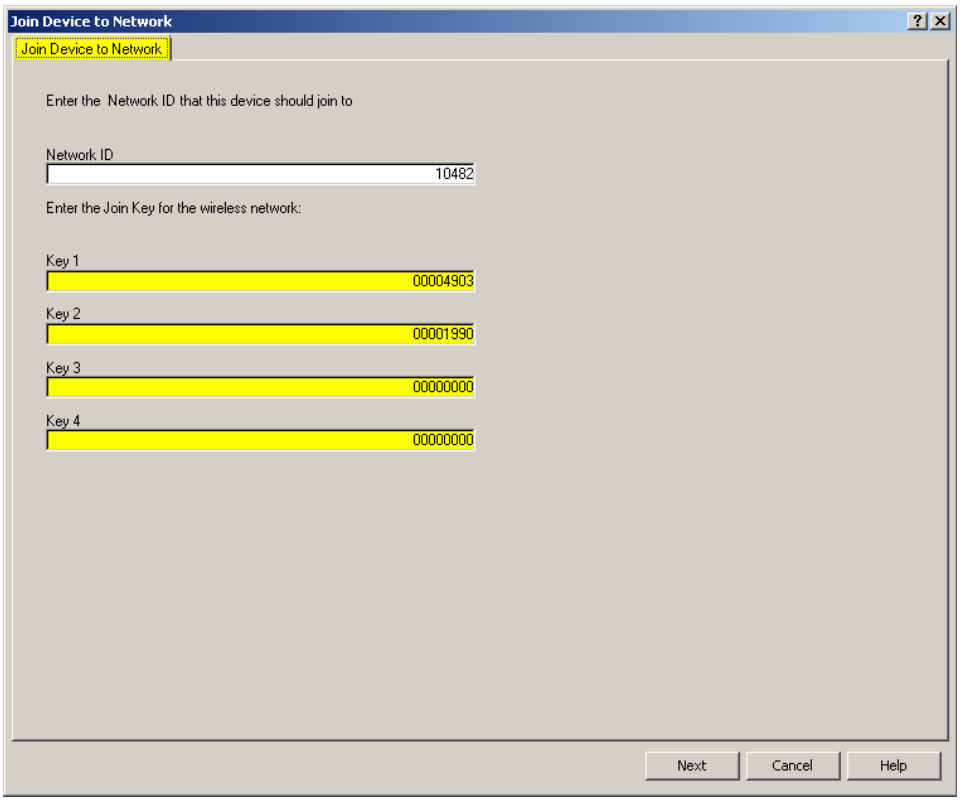
Join a wireless network using AMS Wireless Configurator

Procedure

1. On the **Guided Setup** tab, in the Wireless field, select **Join Device to Network**.



2. On the **Join Device to Network** tab, enter the network ID and join key.



3. Select **Next**.
4. Follow the steps in the wizard to complete the network configuration.

2.7.3 Update rate considerations

Before configuring the wireless update rate for your wireless devices, evaluate the safety concerns, conditions, and wireless network in your facility to select the current update rate to meet your needs.

When specifying the update rate, consider the potential for toxic gas release, the severity of potential gas concentration that may be released, and whether the device is located in a populated area. The default update rate is eight seconds and is appropriate for most applications. You may use a more frequent update rate if desired. A less frequent update rate extends transmitter power module life and optimizes Wireless Gateway device capacity.

Consider the speed with which you want to be alerted to a dangerous condition of toxic gas. Emerson does not recommend reporting by exception for the Rosemount 928 Wireless Gas Monitors or Emerson Wireless Gateways due to its potential adverse effect on Wireless Gateway capacity and network integrity. Therefore, select an update rate for all wireless gas monitors that corresponds to the safety needs of your facility but does not exceed the capacity of the Wireless Gateway or your wireless network.

Note
The configured wireless update rate does not affect the LCD display and the optional alarm output (if installed) update rates.

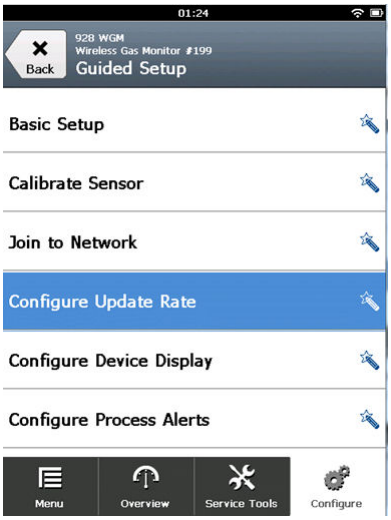
2.7.4 Configuring the update rate

The Rosemount 928 takes measurements every two seconds. The update rate is the frequency at which new measurements and device statuses are transmitted over the wireless network. You may change the update rate during configuration. The update rate range is one second to sixty minutes. The default update rate is eight seconds. Less frequent update rates help extend power module life and optimize Wireless Gateway capacity.

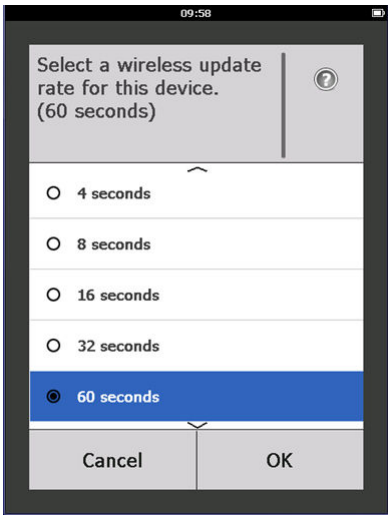
Configure the update rate using Field Communicator

Procedure

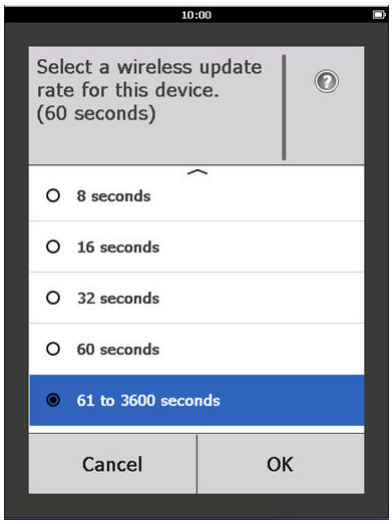
1. On the **Guided Setup** screen, select **Configure Update Rate**.



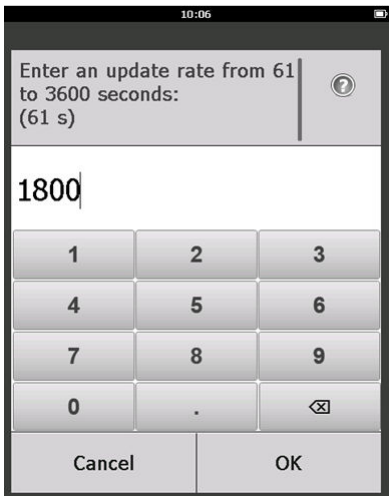
2. On the **Configure Update Rate** screen, do one of the following:
   - a. For an update rate from 1 to 60 seconds, select an update rate from the list.
   - b. Select **OK**.



- a. For update rates greater than 60 seconds, select 61-3600 seconds from the list.

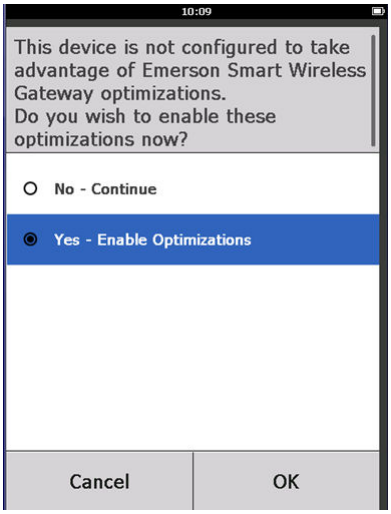


b. Enter the update rate in number of seconds. For example, enter `1800` seconds for 30 minutes.



c. Select **OK**.

3. On the Emerson **Wireless Gateway Optimizations** screen, select Yes - Enable Optimizations to save and use wireless optimizations or select No - Disable Optimizations to reject wireless optimizations.



Note

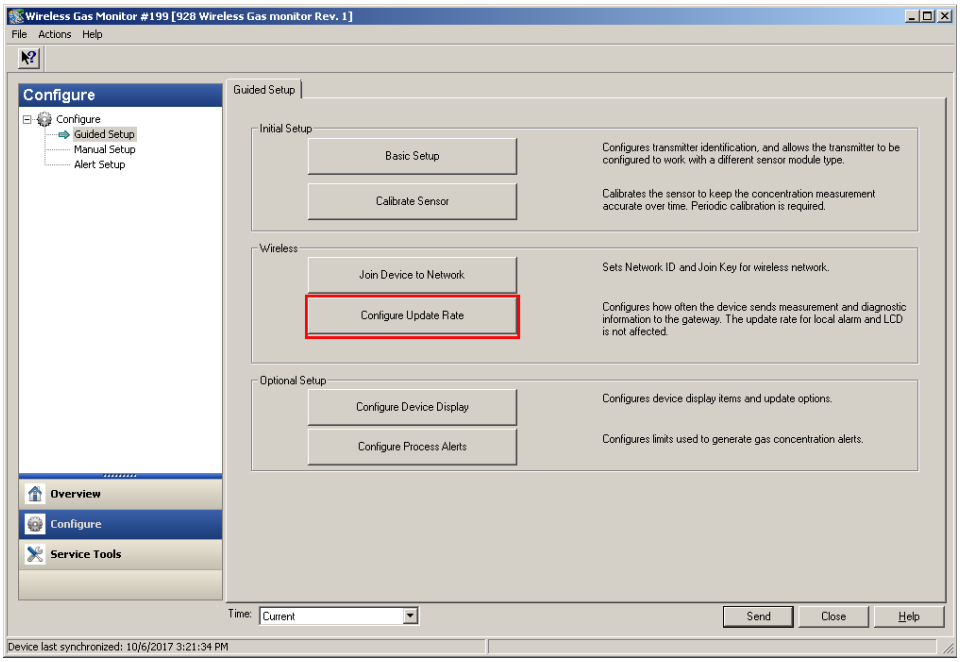
Wireless gateway optimizations combine process measurement and device diagnostic messages from field devices to the wireless gateway, saving network bandwidth. If you don't use optimizations, you will need more message packets to receive the same amount of information. Emerson recommends enabling wireless gateway optimizations unless they are incompatible with the wireless gateway.

4. Select **OK**.
5. On the **Configure Update Rate** screen, select **OK** to confirm successful update rate configuration.

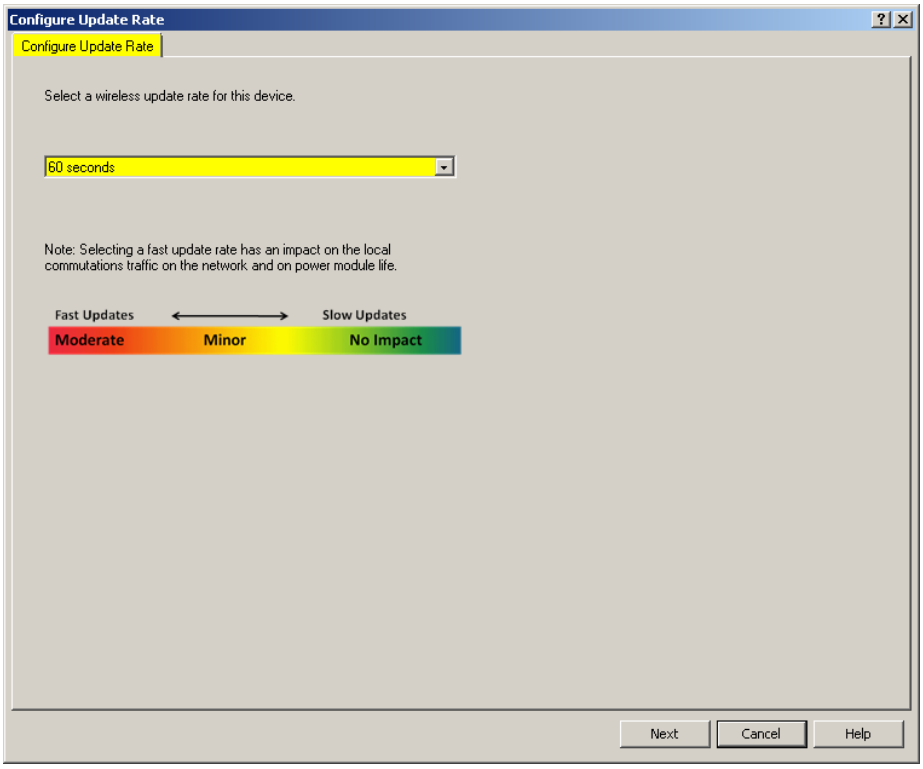
Configure the update rate using AMS Wireless Configurator

Procedure

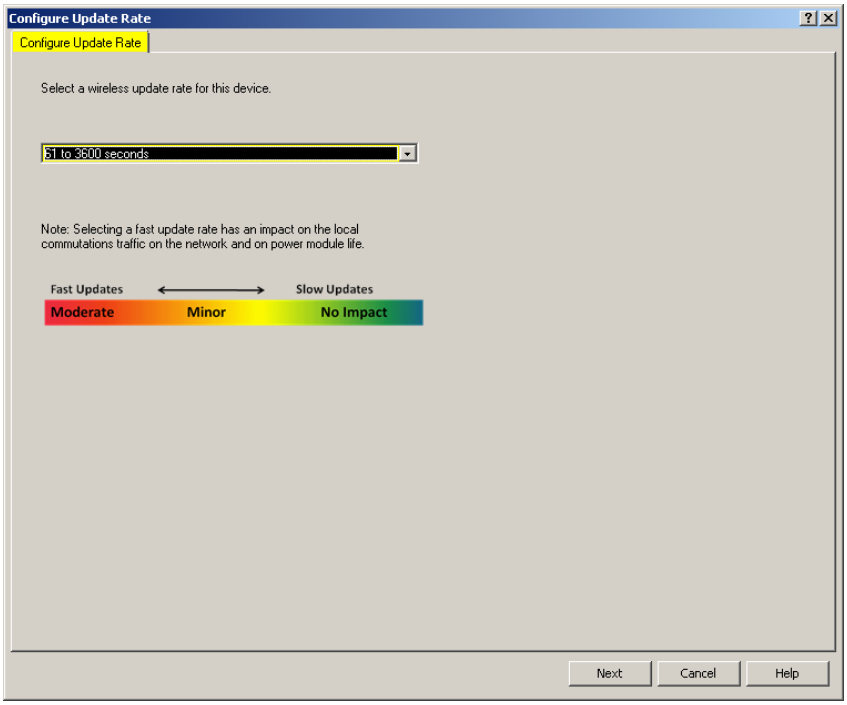
1. On the **Guided Setup** tab, in the Wireless field, select **Configure Update Rate** to configure the frequency at which the device reports measurement and diagnostic information.



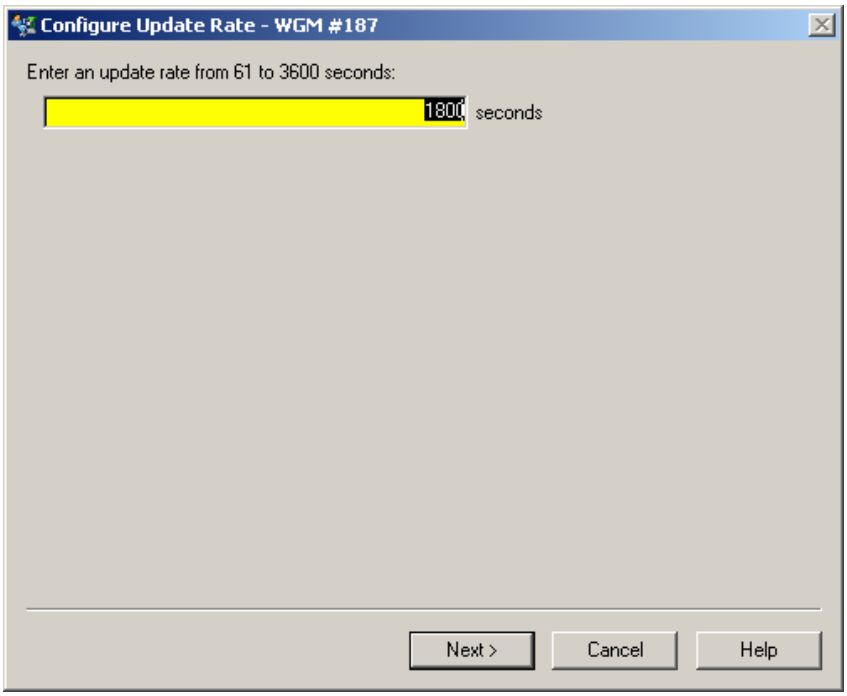
2. On the **Configure Update Rate** screen, do one of the following:
   - a. Select an update rate from 1 to 60 seconds from the list.
     b. Select **Next**.



- a. Select 61-3600 from the list.



b. Type the number of seconds for an update rate from 61 seconds to 60 minutes. For example, enter `1800` seconds for 30 minutes.

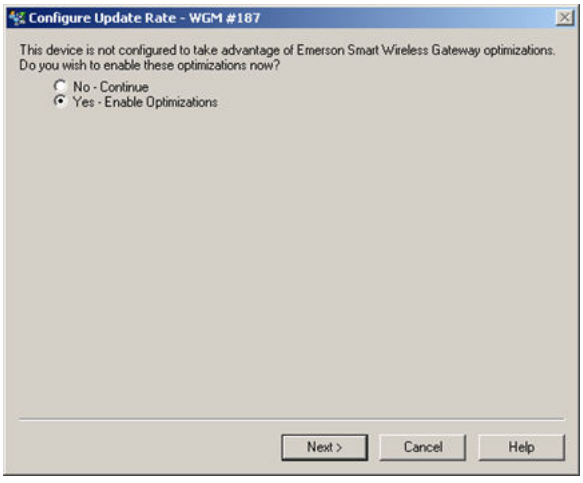


c. Select **Next**.

3. On the **Wireless Gateway Optimization** screen, select Yes - Enable Optimizations to save and use wireless optimizations or select No - Disable Optimizations to reject wireless optimizations.

Note
Wireless gateway optimizations combine process measurement and device diagnostic messages from field devices to the wireless gateway, saving network bandwidth. If you don't use optimizations, you will need more message packets to receive the same amount of information. Emerson recommends enabling wireless gateway optimizations unless they are incompatible with the wireless gateway.

4. Select **Next**.



5. Select **Next** and then select **Finish** to save the update rate configuration.

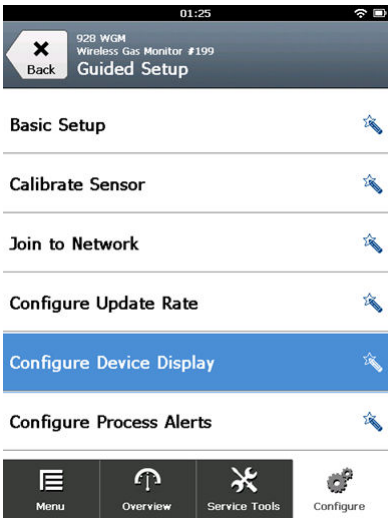
2.7.5 Configuring the device display mode

The device display mode defines whether or how frequently the LCD display is turned on to display selected dynamic variables screens. Disabling the display mode or selecting a less frequent display mode extends power module life.

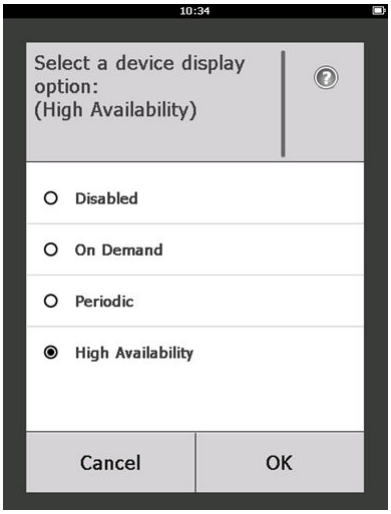
Configure the device display mode using Field Communicator

Procedure

1. On the **Guided Setup** screen, select **Configure Device Display**.



2. On the **Device Display Options** screen, select one of the following display mode options.
   - Disabled: The display is turned off. This is useful if the display will never be viewed locally.
   - On Demand: The display is on when the gas monitor is connected to a handheld communication device or when it receives a signal from its wireless gateway.
   - Periodic: The display is on only during updates at the configured update rate.
   - High Availability: The display is always on regardless of the configured update rate. This is the default display mode option.



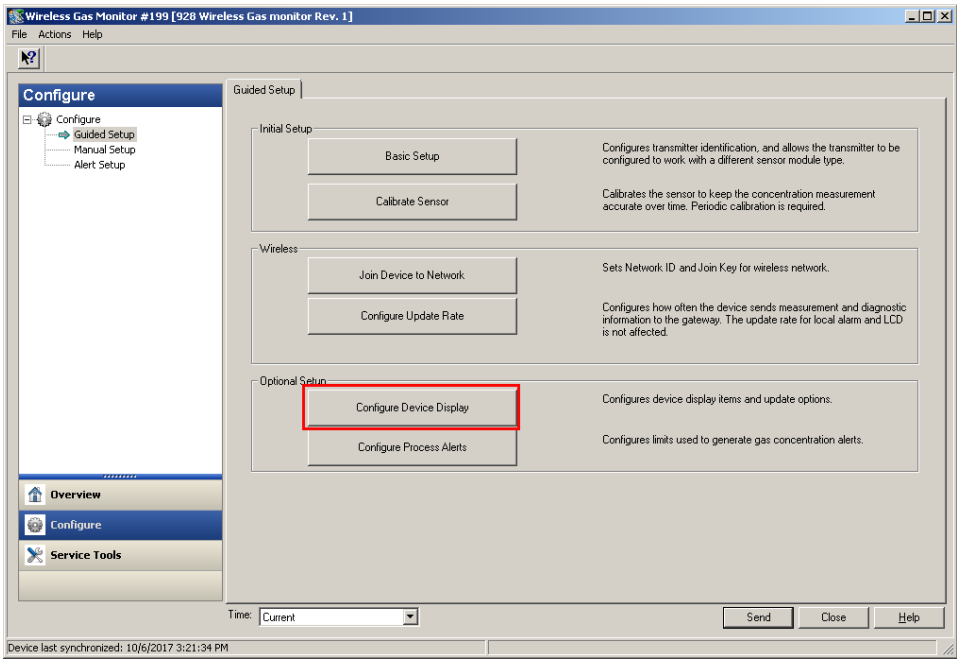
3. Select **OK** to save the selected device display options.

Note
When a handheld communication device is connected to the transmitter, the LCD display is in High Availability mode. Selecting and accepting the On Demand or Periodic options does not take effect until approximately five minutes after the handheld communicator device is disconnected. Selecting and displaying Disabled takes effect immediately.

Configure the device display mode using AMS Wireless Configurator

Procedure

1. On the **Guided Setup** tab, in the Optional Setup field, select **Configure Device Display**.



2. Select one of the following display mode options:
   - Disabled: The display is turned off. This is useful if the display will never be viewed locally.
   - On Demand: The display is on when the gas monitor is connected to a handheld communication device or when it receives a signal from its wireless gateway.
   - Periodic: The display is on only during updates at the configured update rate.
   - High Availability: The display is always on regardless of the configured update rate. This is the default display mode option.
3. Follow the steps in the wizard to configure the device display mode.

2.7.6 Configuring process alerts

Process alerts allow you to configure the device to send a HART® message when the configured data point is exceeded. Alerts remain active if the set points are exceeded and the alert mode is ON. Process alerts are displayed on a handheld communication device, on the AMS Device Manager status screen, on the Wireless Gateway web interface, on host systems with which the Wireless Gateway communicates, and in the error section of the LCD display (if so configured). Disable process alerts if the Rosemount 928 is not connected to a wireless network.

The gas concentration may be latched. If you select Latch Concentration Alarms, the alarm output is latched until the alert is manually cleared.

You can reset a latched gas concentration alarm by using Field Communicator or AMS Wireless Configurator. Refer to Resetting latched alarms for information about clearing latched local alarms. If you select Not Latched, the gas concentration alarm clears automatically when the gas concentration level dissipates below the specified High Concentration Threshold.

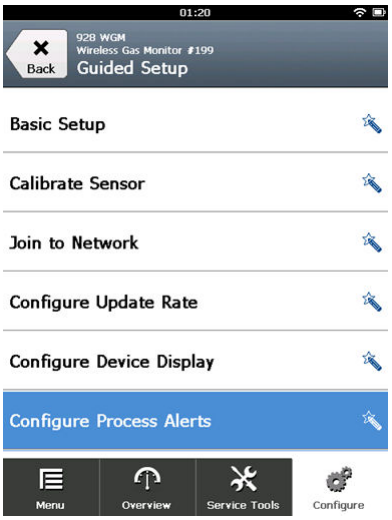
You can also clear latched alarms by resetting the alarm by removing and reinstalling the power module. Refer to Remove power module and Install the power module. Latched alarms do not remain latched following a device reset or power module failure.

Clearing alert history clears process alert history for other alerts, but does not clear latched gas concentration alerts. Refer to Clearing process alarm history. You may query alert history for other process alerts to determine whether they have been active.

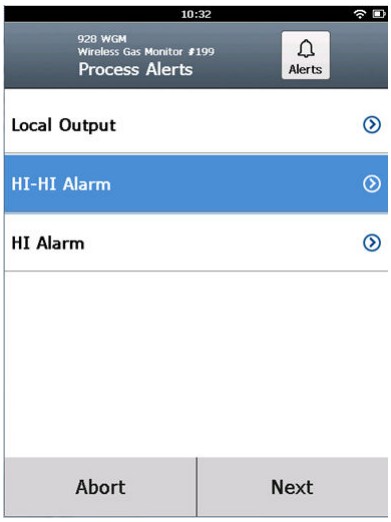
Configure process alerts using Field Communicator

Procedure

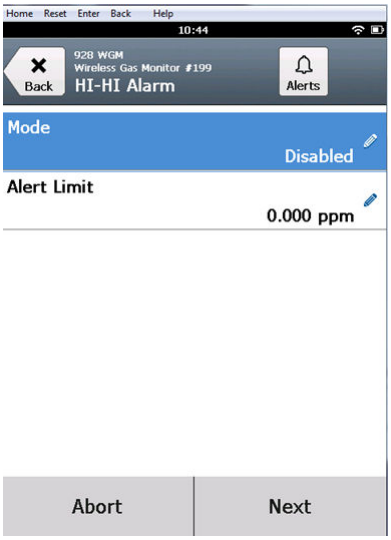
1. On the **Guided Setup** screen, select **Configure Process Alerts**.



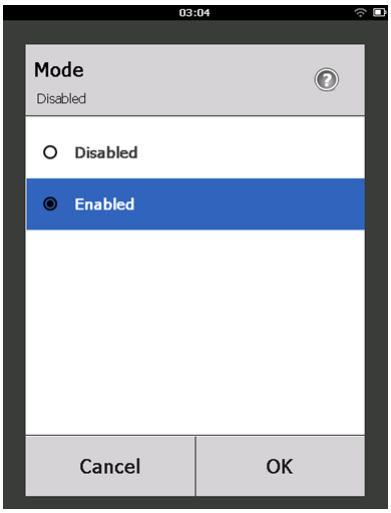
2. On the **Process Alerts** screen, select a process alert to configure.



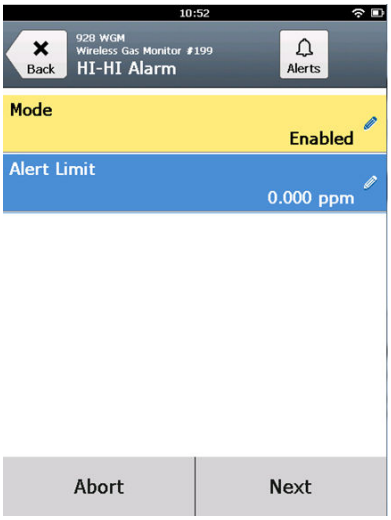
3. On the selected process alert screen, select **Mode**.



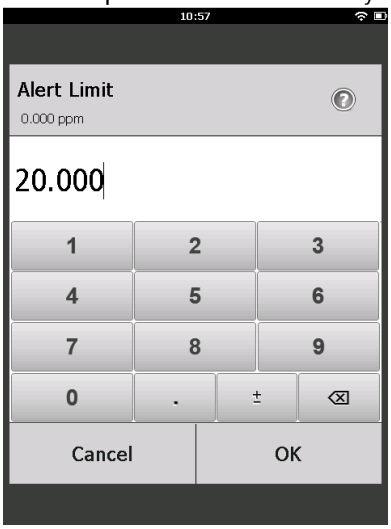
4. On the **Mode** screen, select **Enabled**.



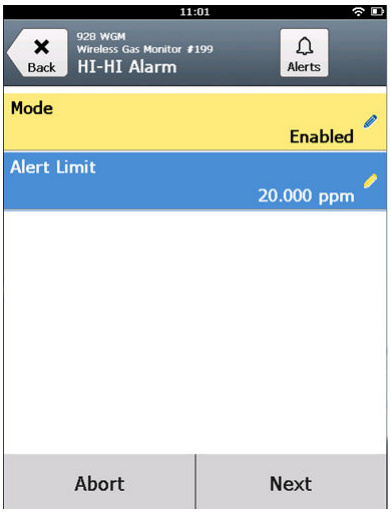
5. Select **OK**.
6. On the selected process alert screen, select **Alert Limit**.



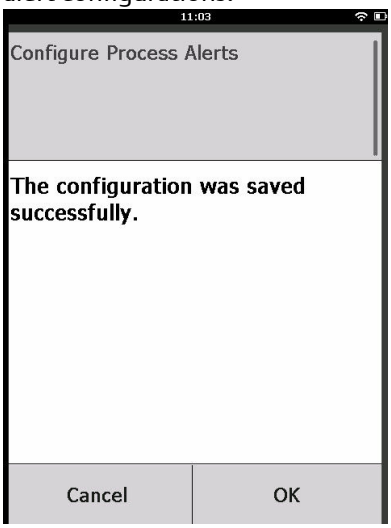
7. On the **Alert Limit** screen, use the numeric keypad to enter an alert limit for the selected process alert based on your needs and local regulations.



8. Select **OK**.
9. On the selected process alert screen, select **Next**.



10. On the **Configure Process Alerts** screen, select **OK** to confirm successful process alert configurations.

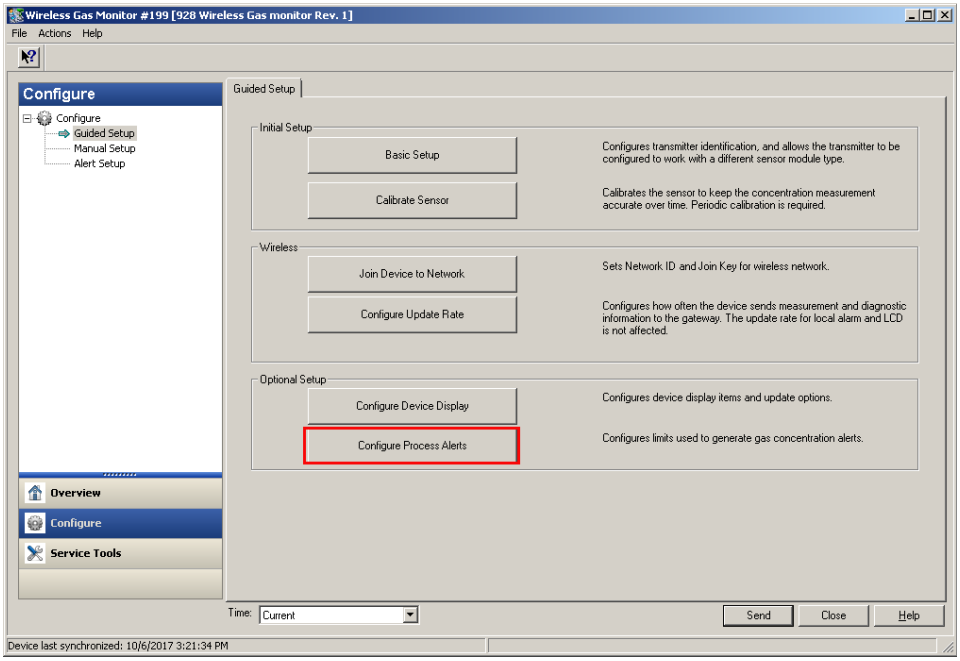


11. Repeat Step 2 through Step 10 as necessary to configure additional process alerts.
12. When you have completed configuration, remove the HART® communication leads from the Comm terminals on the terminal block and replace the rear housing cover.

Configure process alerts using AMS Wireless Configurator

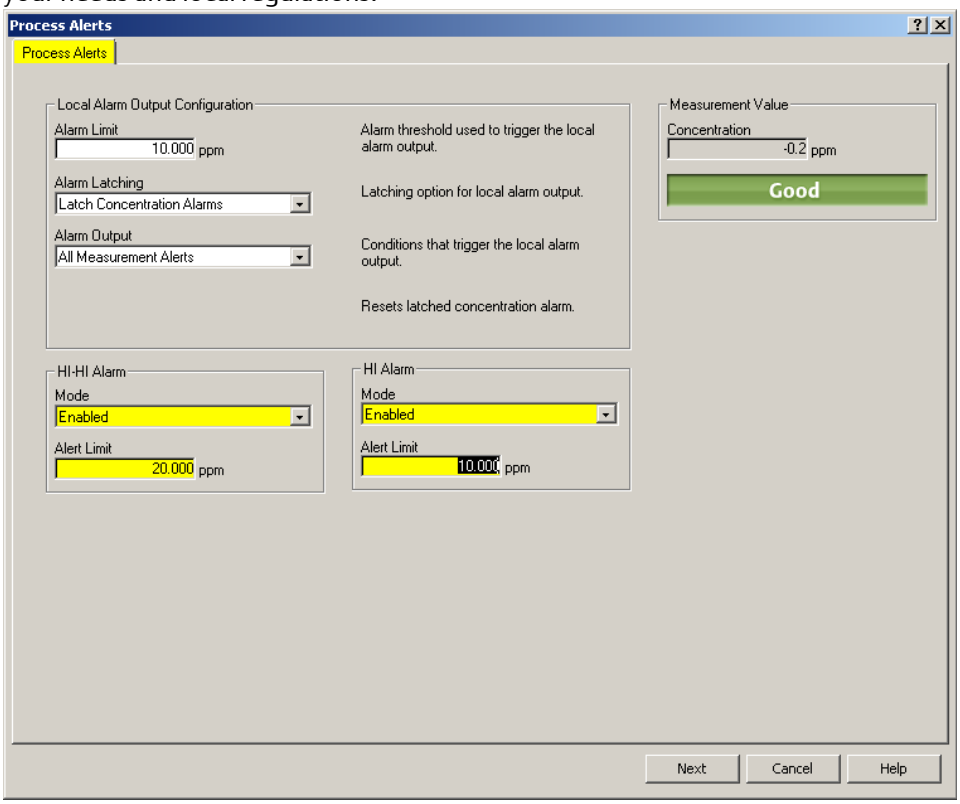
Procedure

1. On the **Guided Setup** tab, in the Optional Setup field, select **Configure Process Alerts**.



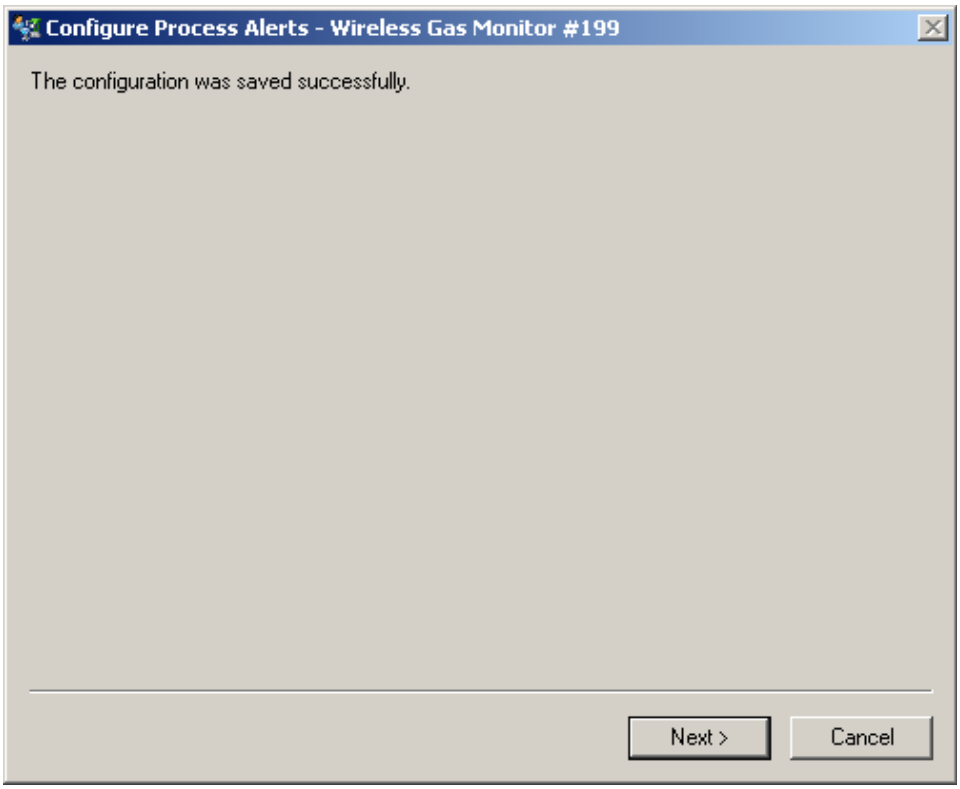
The **Process Alerts** window is displayed.

2. In the **Mode** list, in the HI-HI Alarm field, select **Enabled** to enable the alarm.
3. In the **Alert Limit** box, enter an alert limit for the selected process alert based on your needs and local regulations.



4. Repeat Step 2 and Step 3 if necessary to configure the Hi Alarm process alert.
5. Select **Next**.

6. Select **Next** to confirm successful process alert configuration.



7. Select **Finish**.

2.8 Calibrating the sensor

Calibrating the sensor ensures that the analog, digital, and discrete outputs accurately transmit the target gas concentrations registered by the module. Although Emerson calibrated the device at the factory, you must calibrate it at the following times to ensure accuracy and correct operation:

- During installation.
- At least every 90 days throughout the device's service life.
- When replacing the sensor.

The Rosemount 628 Universal Gas Sensor is a smart sensor. As such, it retains its own calibration information. It must be connected to a transmitter to calibrate, but the calibration settings are stored in the sensor itself rather than in the transmitter. You may uninstall the sensor from a transmitter and reinstall it in another transmitter without affecting its calibration.

⚠ CAUTION

If you are calibrating in a windy environment (over five mph), a calibration cup must be used to ensure calibration accuracy.

Note
You do not need a conventional calibration cup to calibrate the sensor. Connect calibration tubing (PVC tubing, 3/16-in. ID, 5/16-in. OD) directly to the fitting on the IP filter assembly (part number 00628-9000-0001).

2.8.1 Calibrate using Field Communicator

Note
Emerson developed the Field Communicator guided setup configuration procedures in this manual using Emerson AMS Trex Device Communicator. The menus are identical to those found in other Field Communicators, but you navigate using touch screens rather than fast keys. Refer to the manual for your handheld communication device for more information.

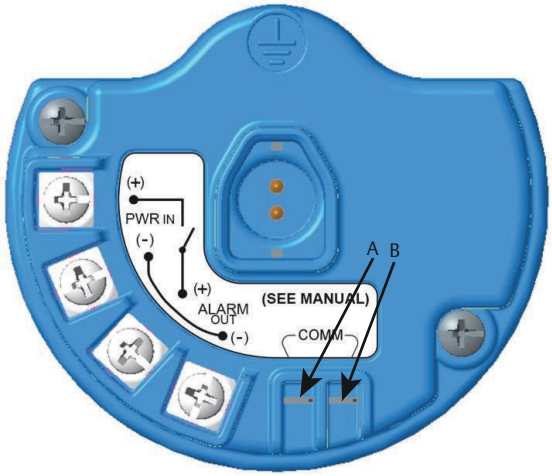
Procedure

1. **⚠ WARNING**

   Explosions

   Do not connect to the COMM terminals when an explosive atmosphere is present.

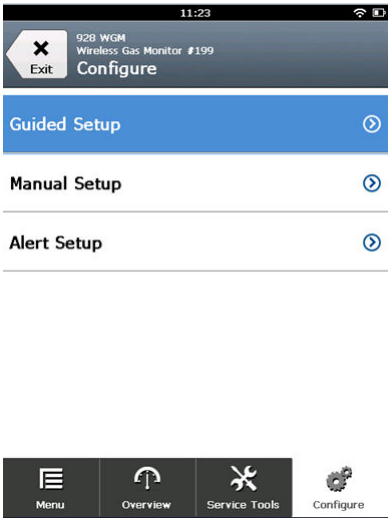
   Connect the HART® communication leads from the Field Communicator HART terminals to the COMM terminals on the terminal block of the transmitter.



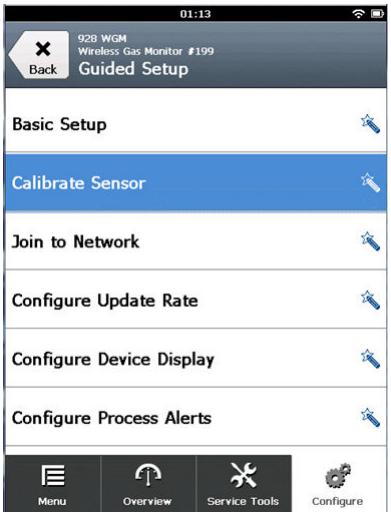
   A. +COMM terminal
   B. -COMM terminal

2. Establish communication between the transmitter and the Field Communicator.
3. On the **Home** screen, select **Configure**.

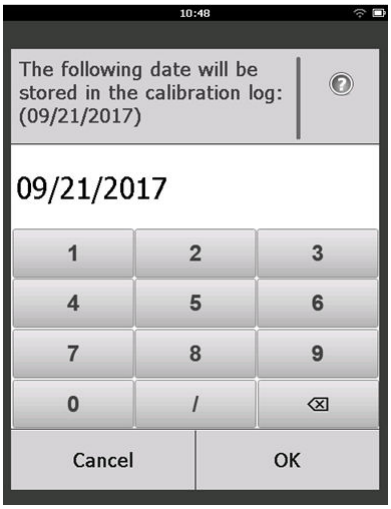
4. On the **Configure** screen, select **Guided Setup**.



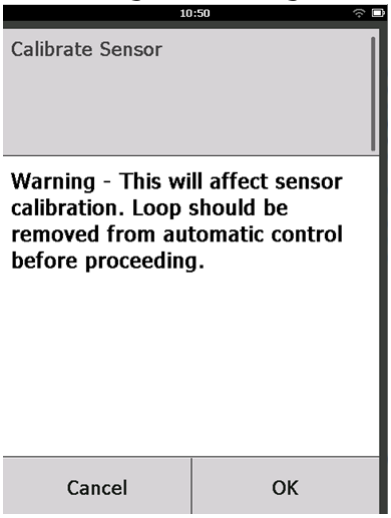
5. On the **Guided Setup** screen, select **Calibrate Sensor**.



6. Select **OK** to accept the current date as the calibration date and continue.



7. Acknowledge the warning. If necessary, remove the loop from automatic control.



Note
Calibration of an O_2 sensor is unlikely to use a true zero value for its lower limit; one must calibrate the sensor to a known lower percent oxygen value (such as 15 percent oxygen level by volume) in order to "zero" the sensor as outlined in the remainder of the calibration steps below.

8. When calibrating for H_2S and CO, expose the sensor to clean air to zero the reading. When calibrating for O_2, expose the sensor to a known percent of oxygen content calibration gas (recommended 15 percent oxygen by volume) to be used as the "zero" calibration value. If the ambient air may contain trace amounts of target gas or other gases (for example, carbon monoxide from engine exhaust) that may interfere with zeroing the device, do the following:
    a) Obtain a cylinder of verified clean air (H_2S and CO) or a cylinder of verified percent oxygen content calibration gas (O_2) and a length of calibration tubing (PVC tubing, 3/16-in. ID, 5/16-in. OD).

b) Install a regulator on the clean air/percent known oxygen content gas cylinder.

c) Attach a length of calibration tubing (PVC tubing, 3/16-in. ID, 5/16-in. OD) from the regulator on the cylinder to the fitting on the IP filter assembly (part number 00628-9000-0001).

d) Release the clean air/known percent oxygen specified calibration gas to the sensor.

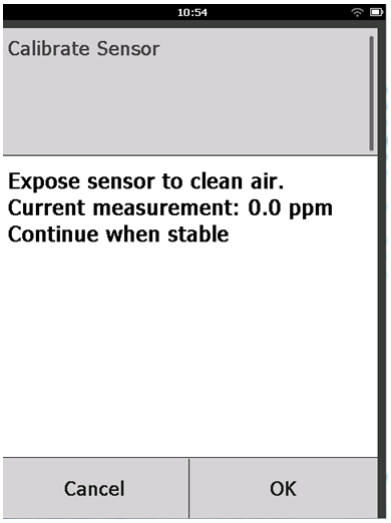
Note
If you need a long length of calibration tubing to reach the device, make allowances for a delay in response time from the sensor while the clean air travels the length of the calibration tubing.

e) Complete Step 9 through Step 11.

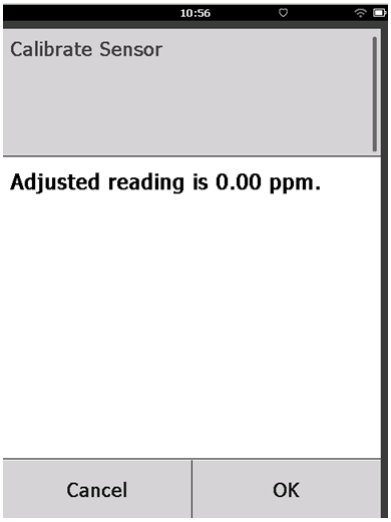
f) Turn off the clean air (or percent oxygen specified calibration gas) when the sensor is correctly zeroed.

9. Select **OK** when the zero measurement reading stabilizes.

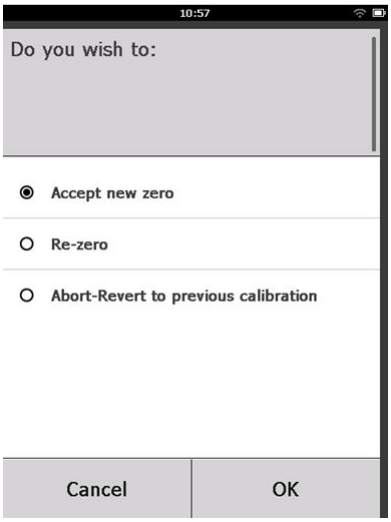
Note
Negative measurement readings may occur and are normal during zeroing.



10. Wait while the Field Communicator performs zero adjustment.

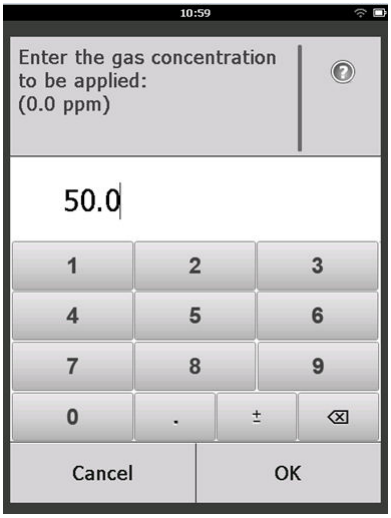


11. Select **OK** to accept the new zero.



12. On the **Calibrate Sensor** screen, enter a gas concentration level that corresponds to the concentration of calibration gas that will be applied during calibration.

    For oxygen, use 20.9 percent oxygen from clean air. This step may be performed with surrounding air if no contaminants are present.



13. Select **OK**.

14. **⚠ WARNING**

Toxic gas

Before performing the next step, verify that the regulator is closed to avoid releasing target gas into the air during calibration.

Install a regulator on the target gas source.

15. Attach a length of calibration tubing (PVC tubing, 3/16-in. ID, 5/16-in. OD) from the regulator on the target gas source to the fitting on the IP filter assembly (part number 00628-9000-0001).

16. Release the target gas from the target gas source.

    Emerson recommends a flow rate of 1.0 liters per minute to ensure a consistent sensor reading.

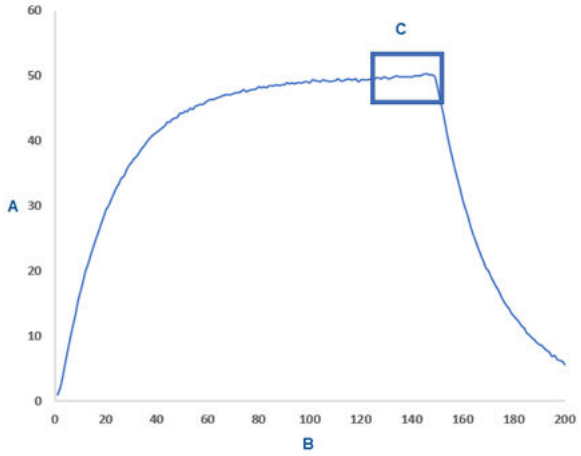
    Note
    If you need a long length of tubing to reach the device, make allowances for a delay in response time from the sensor while the target gas travels the length of the calibration tubing.

    A gas concentration should begin to register on the LCD display and gradually increase to the calibration gas concentration level. The gas concentration level shown on the device display may not exactly match that shown on the label of the target gas source.

17. Wait while the gas concentration measurement stabilizes.

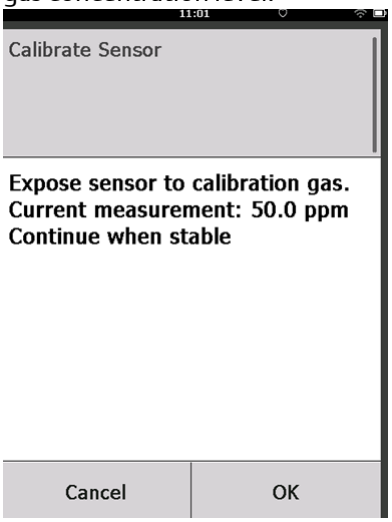
    Refer to Figure 2-6.

Figure 2-6: Typical Calibration Profile

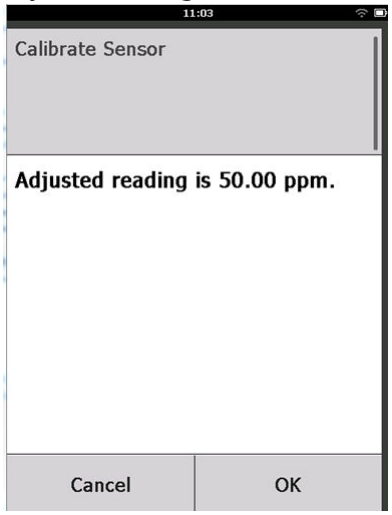


A. Gas concentration ppm
B. Time (in seconds)
C. Gas concentration measurement has stabilized

18. Select **OK** when the gas concentration measurement stabilizes at or near the target gas concentration level.



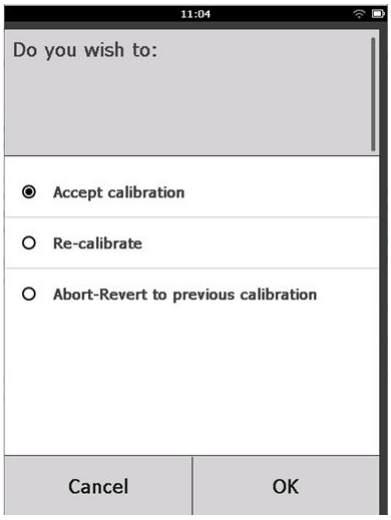
19. Wait while the Field Communicator calibrates.
When the calibration process finishes, the Field Communicator displays the new adjusted reading.



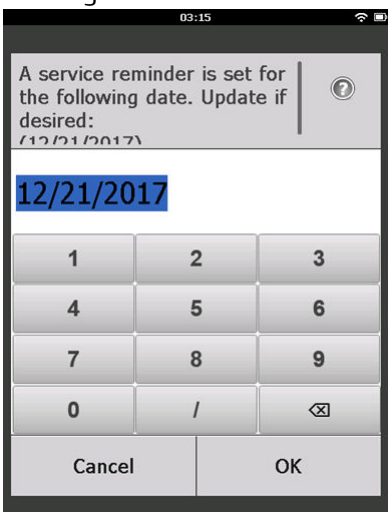
20. Select **OK**.

Note
If you can't calibrate the sensor, verify that the correct sensor is installed, the correct target gas is being applied, and the IP filter is not clogged or obstructed. A sensor that cannot accept a new calibration may have reached the end of its service life. Replace the sensor and repeat this procedure. Refer to Replace the gas sensor.

21. Select **Accept calibration** and then select **OK**.



The Field Communicator displays the **Service Reminder** screen if a service reminder is configured and enabled.



22. Select **OK** to accept the service reminder date or enter another date.

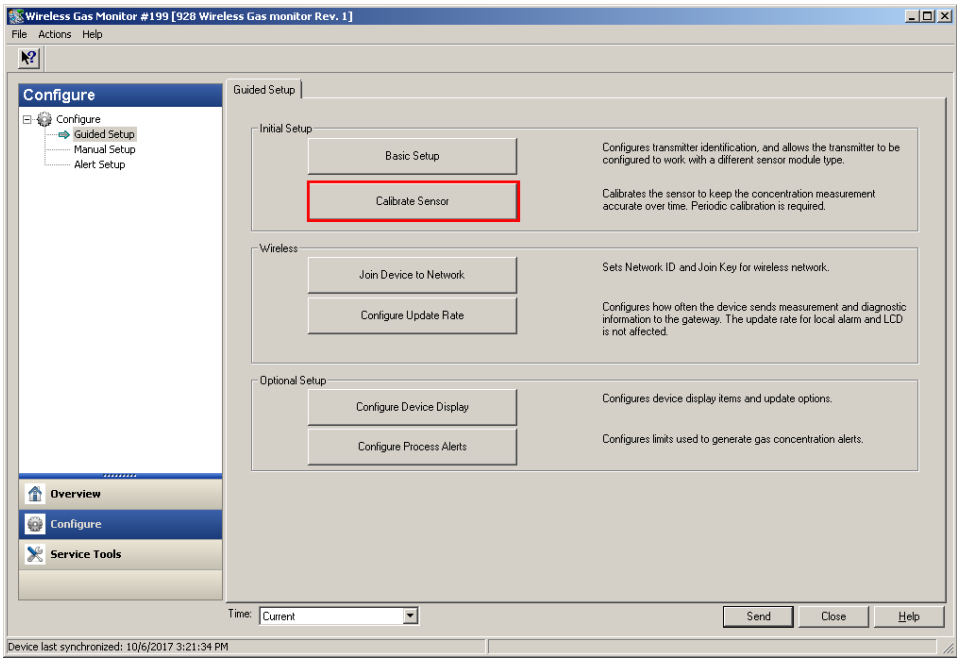
    Refer to Service reminders for more information.

23. Shut off the target gas flow at the regulator.
24. Detach the calibration tubing from the regulator on the target gas source and from the IP filter inlet on the bottom of the sensor.

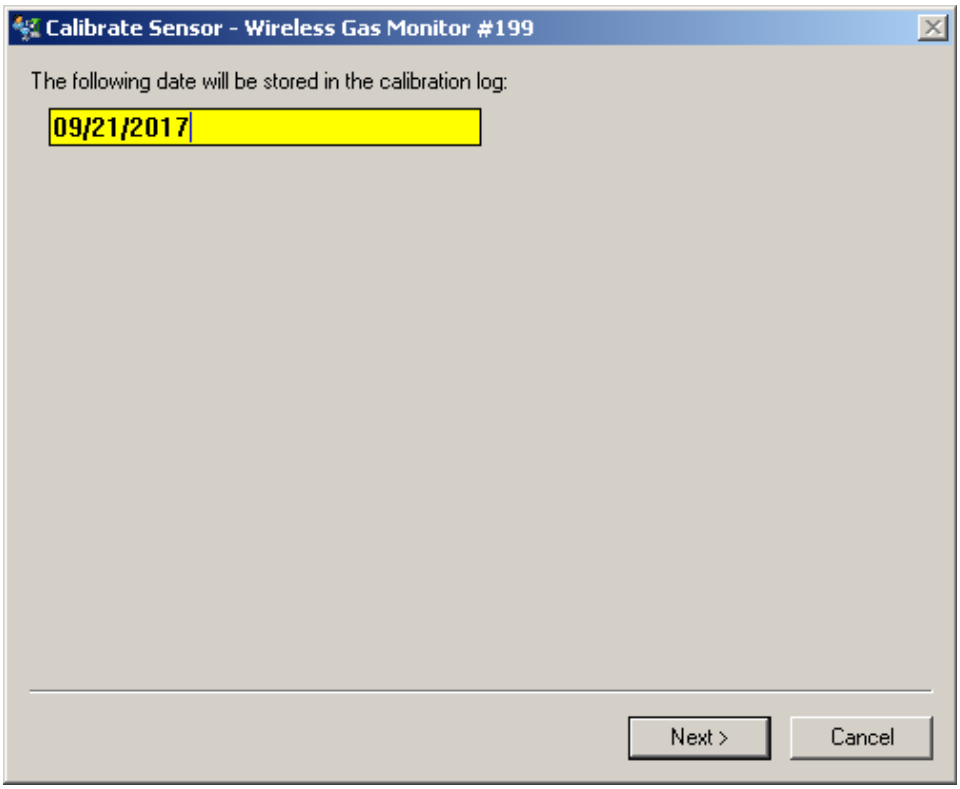
2.8.2 Calibrate using AMS Wireless Configurator

Procedure

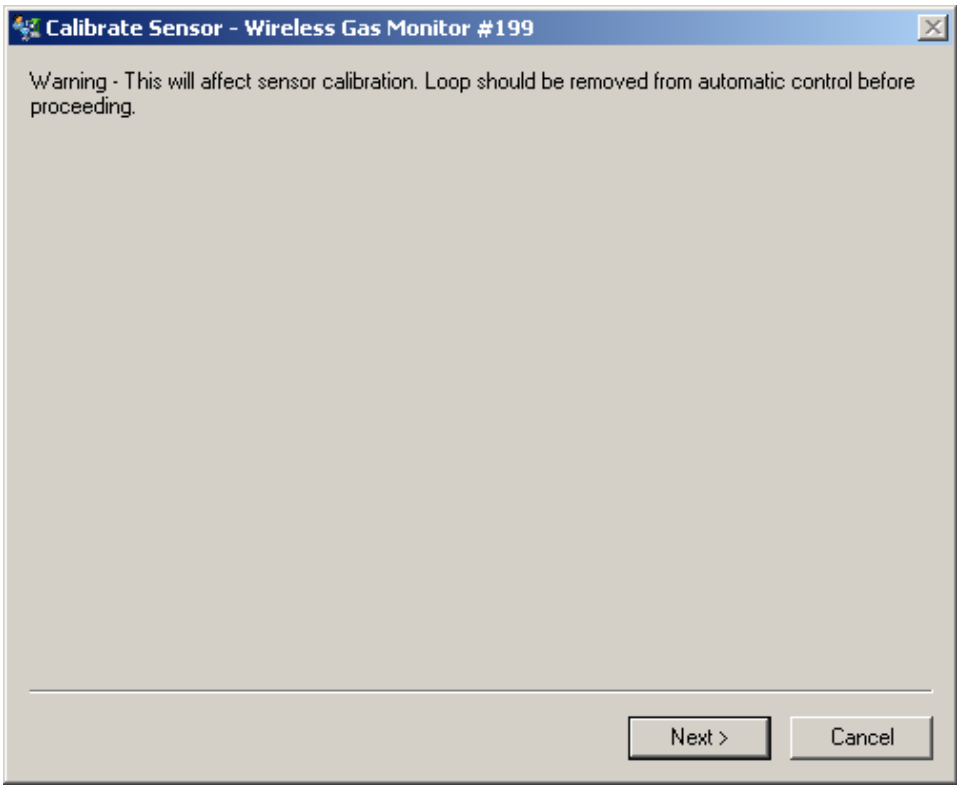
1. On the **Guided Setup** tab, in the Initial Setup field, select **Calibrate Sensor**.



2. On the **Calibrate Sensor** screen, select **Next** to accept the current date as the calibration date and continue.



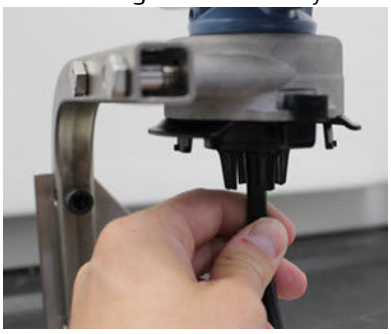
3. On the **Warning** screen, select **Next**.



4. When calibrating for H_2S, and CO, expose the sensor to clean air to zero the reading. When calibrating for O_2, expose the sensor to a known percent oxygen content calibration gas (recommended 15 percent oxygen by volume) to be used as the "zero" calibration value. If the ambient air may contain trace amounts of target gas or other gases (for example, carbon monoxide from engine exhaust) that may interfere with zeroing the device, do the following:
    a) Obtain a cylinder of verified clean air (H_2S and CO) or a cylinder of verified percent oxygen content calibration gas (O_2) and a length of calibration tubing (PVC tubing, 3/16-in. ID, 5/16-in. OD).

b) Install a regulator on the clean air/known percent oxygen content gas cylinder.

c) Attach a length of calibration tubing (PVC tubing, 3/16-in. OD, 5/16-in. OD) from the regulator on the cylinder to the IP filter on the bottom of the sensor.



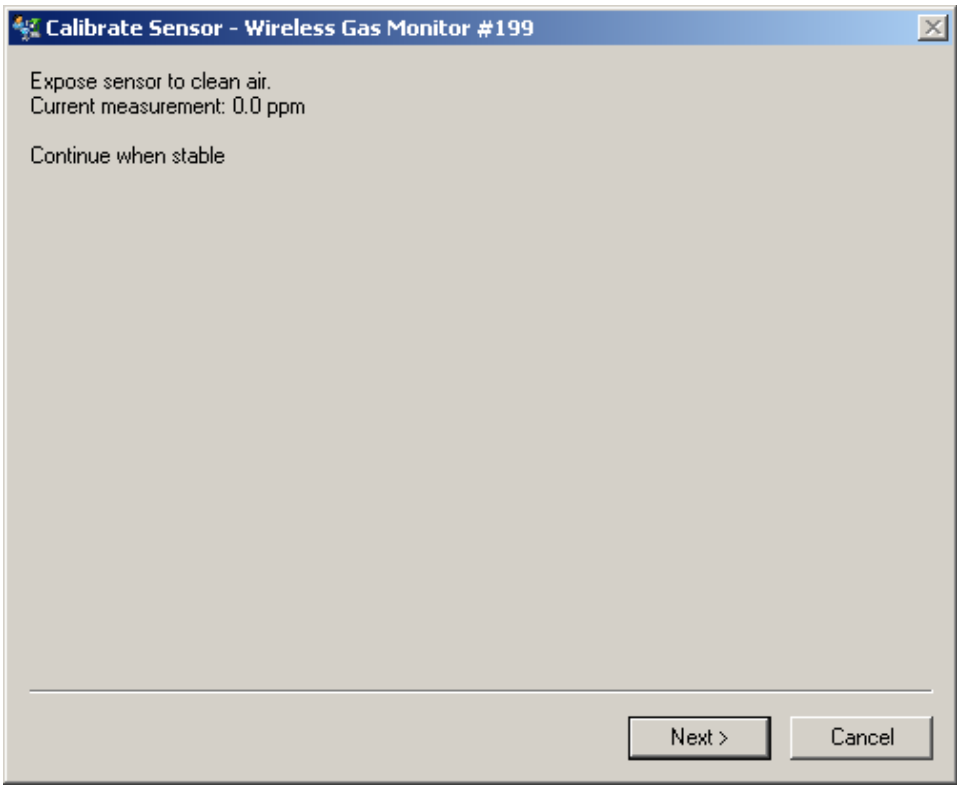
d) Release the clean air/known percent oxygen specified calibration gas to the sensor.

Note
If you need a long length of calibration tubing to reach the device, make allowances for a delay in response time from the sensor while the clean air travels the length of the calibration tubing.

e) Perform Step 5 through Step 7.

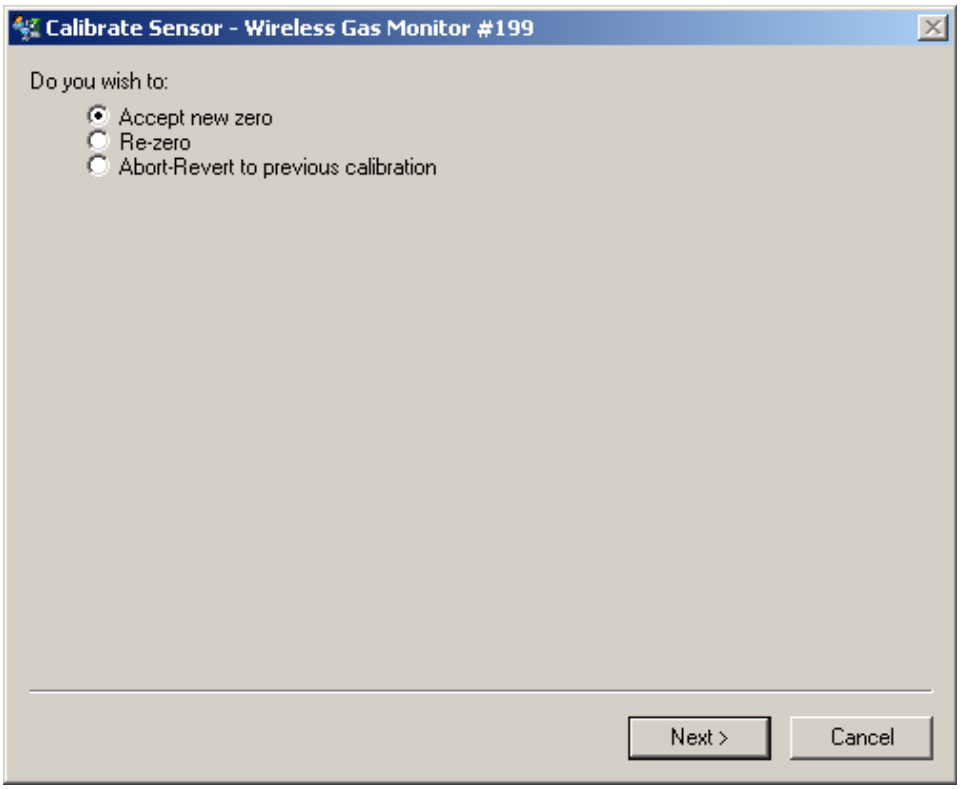
f) Turn off the clean air/known percent oxygen specified calibration gas when the sensor is correctly zeroed.

5. Select **Next** when the zero measurement reading stabilizes.

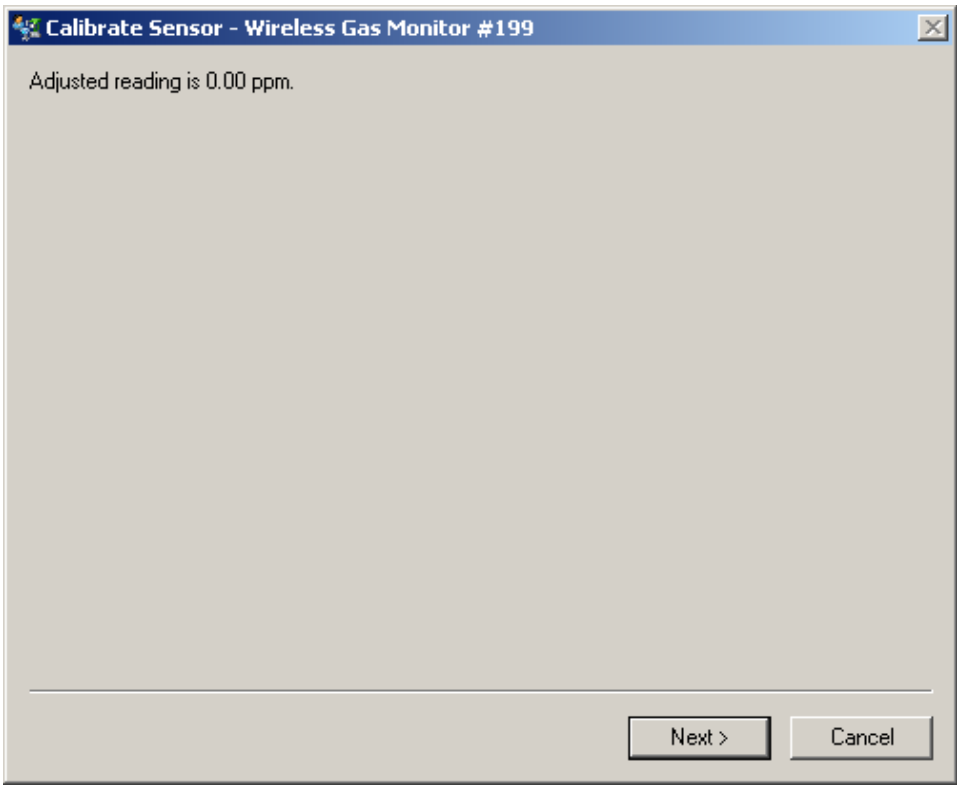


6. Select **Next**.

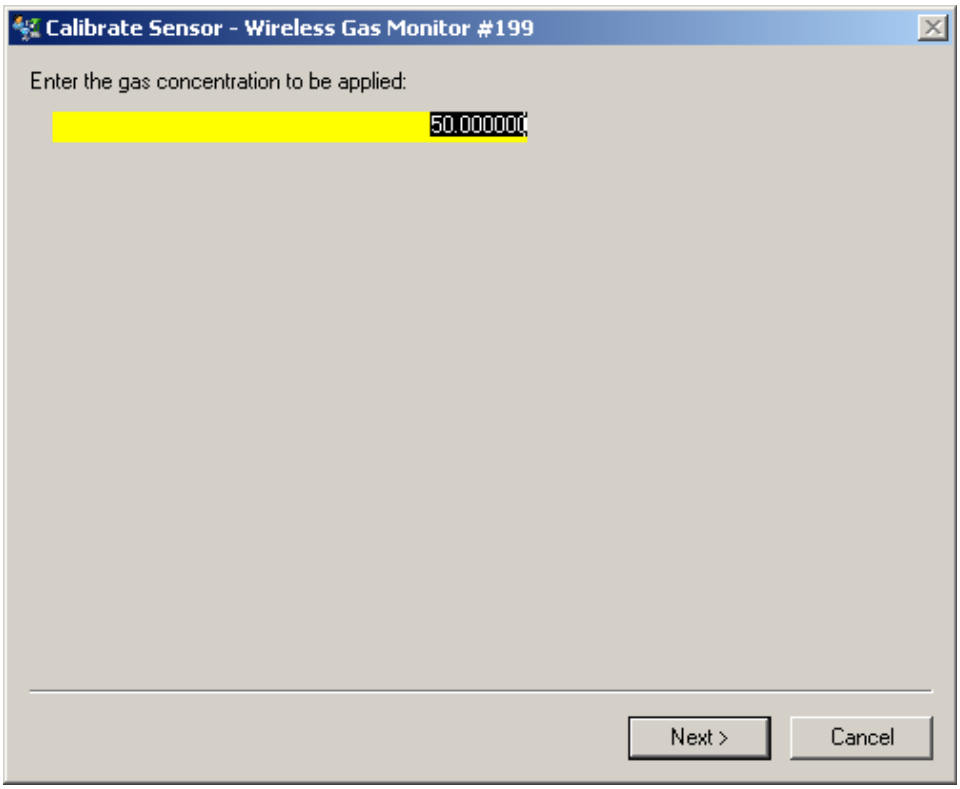
7. Select **Accept New Zero**.



8. Select **Next**.



9. On the **Calibrate Sensor** screen, enter a gas concentration level.



10. Select **Next**.

⚠ WARNING

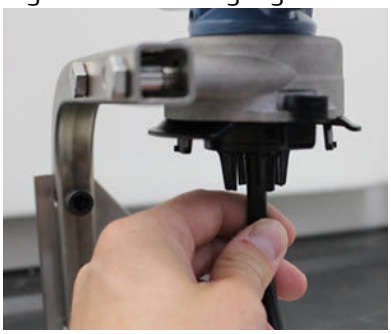
Toxic gas

The regulator may release gas into the air during calibration.

Before starting the next step, verify that the regulator is closed.

11. Install a regulator on the target gas source.

12. Attach a length of calibration tubing (PVC tubing, 3/16-in. ID, 5/16-in. OD) from the regulator on the target gas source to the IP filter inlet on the bottom of the sensor.



13. Release the target gas from the target gas source.

    Emerson recommends a flow rate of 1.0 liters per minute to ensure a consistent sensor reading.

Note

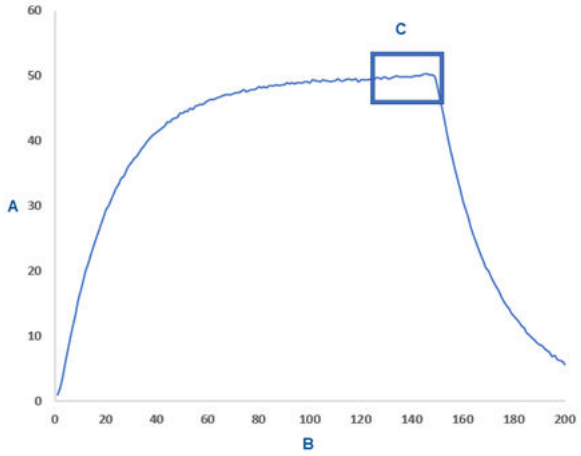
If you need a long length of calibration tubing to reach the device, make allowances for a delay in response time from the sensor while the target gas travels the length of the calibration tubing.

A gas concentration should begin to register on the device display and gradually increase to the calibration gas concentration level. The gas concentration level shown on the device display may not exactly match that shown on the label attached to the target gas source.

14. Wait while the gas concentration measurement stabilizes.

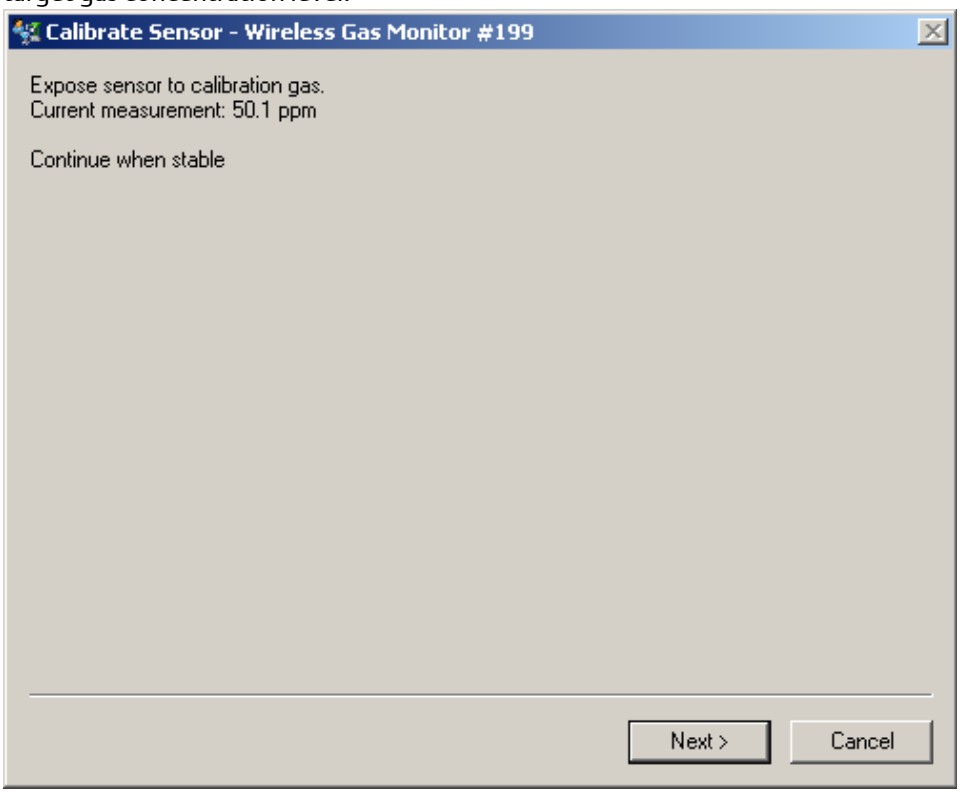
    Refer to Figure 2-7.

Figure 2-7: Typical Calibration Profile

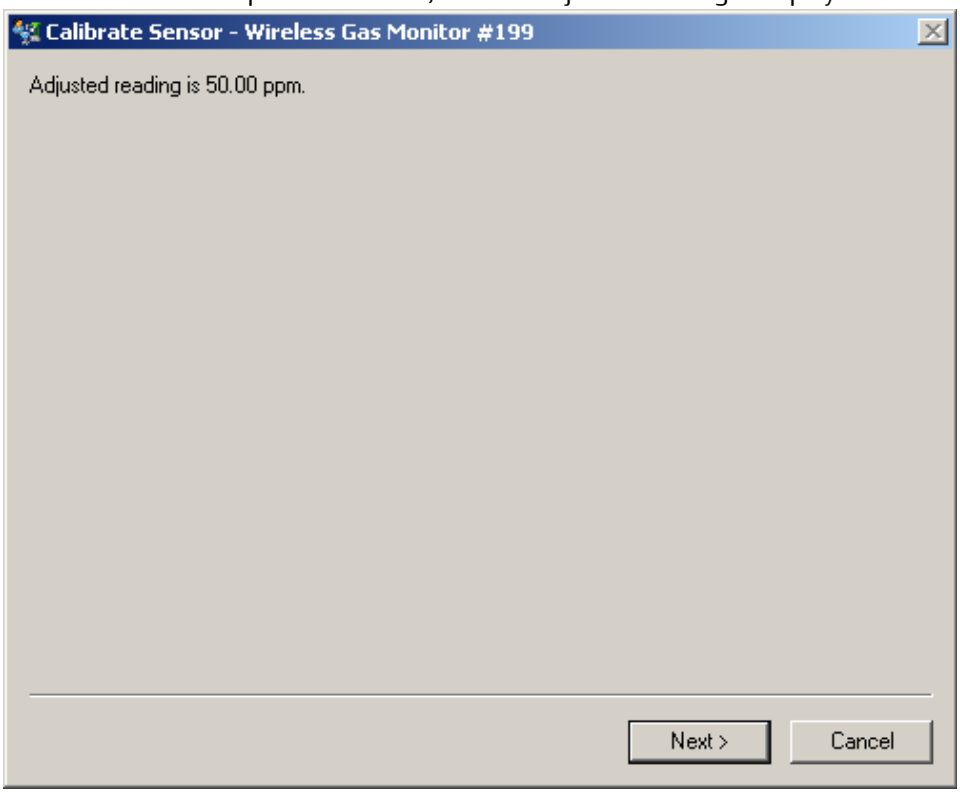


A. Gas concentration ppm
B. Time (in seconds)
C. Gas concentration measurement has stabilized

15. Select **Next** when the gas concentration measurement stabilizes at or near the target gas concentration level.

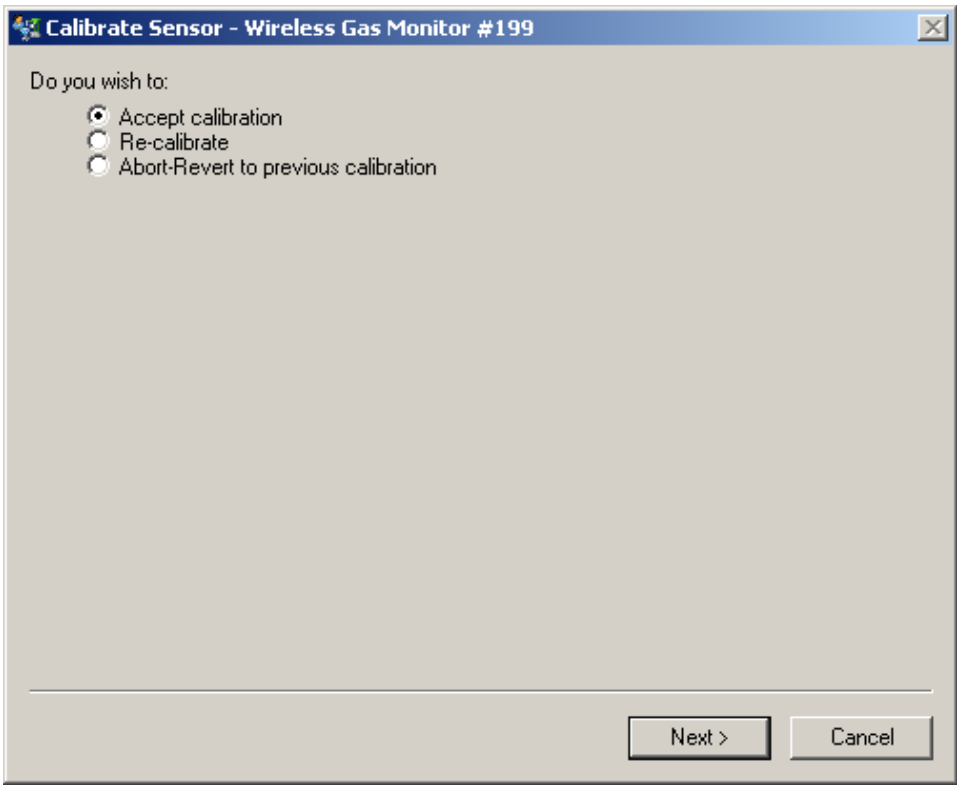


16. Wait while the AMS Wireless Configurator calibrates.
    When the calibration process finishes, the new adjusted reading is displayed.

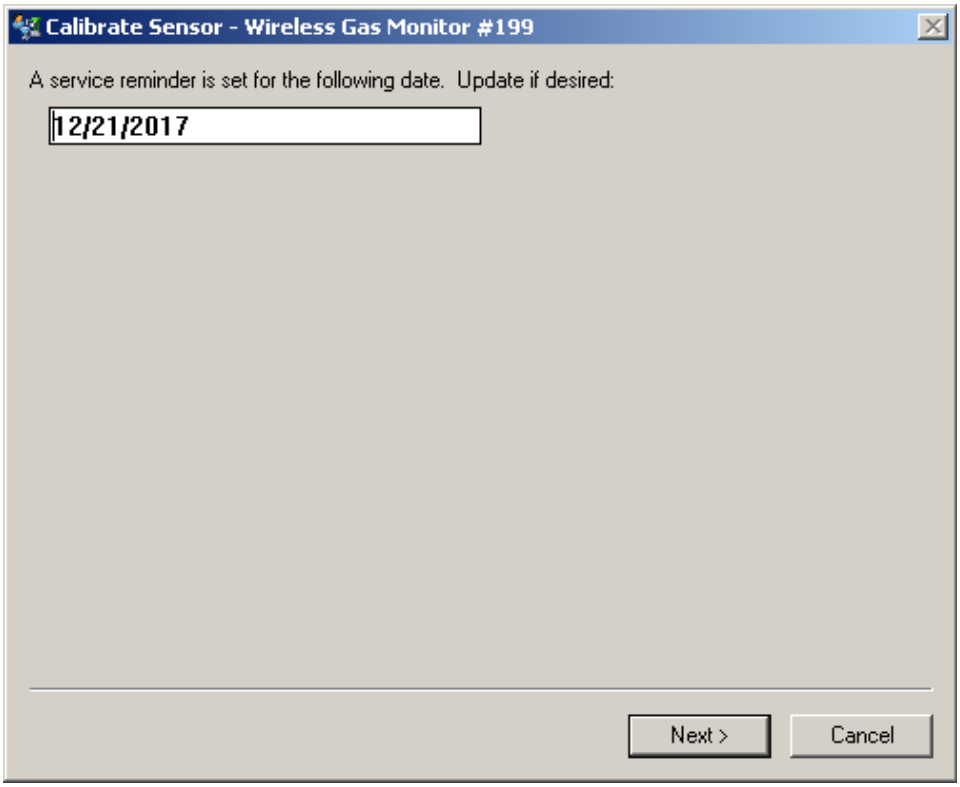


17. Select **Next**.

18. Select **Accept calibration**.



19. Select **Next**.
    The **Service Reminder** screen is displayed if a service reminder is configured and enabled.



20. Select **Next** to accept the service reminder date or enter another date.

    Refer to Service reminders for more information.

21. When the gas concentration reading stabilizes at or near the target gas concentration level, shut off the target gas flow at the regulator.
22. Detach the calibration tubing from the regulator on the target gas source and from the IP filter inlet on the bottom of the sensor.

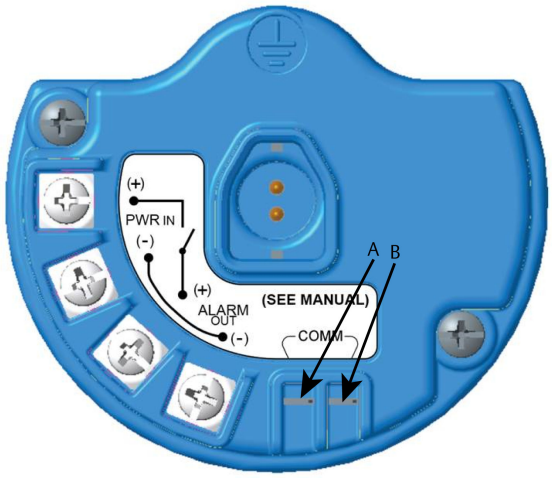
2.9 Manual setup

Manual setup includes all available configuration settings. You may use it to change specific settings configured during initial setup without using the **Guided Setup** menus. You may also use it to configure advanced optional settings.

Note
Emerson developed the Field Communicator manual setup configuration procedures in this manual using Emerson AMS Trex Device Communicator. The menus are identical to those found in other Field Communicators, but are navigated using touch screens rather than fast keys. Refer to the manual for your handheld communicator device for more information.

Procedure

1. Connect the HART® communications leads to the HART terminals on the handheld communicator.



A. +COMM terminal
B. -COMM terminal

2. **⚠ WARNING**

   Explosions

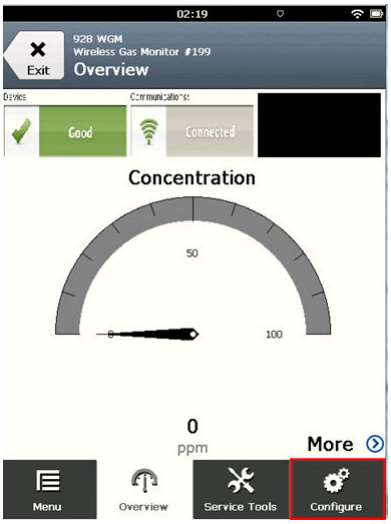
   Do not connect to the COMM terminals when an explosive atmosphere is present.

   Connect the HART communication leads to the COMM terminals on the terminal block.

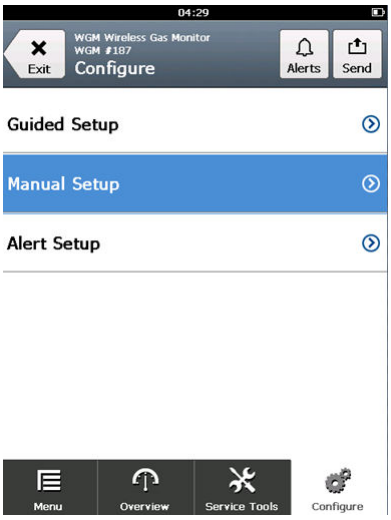
3. Start your handheld communicator device. If necessary, open the HART Field Communicator on your handheld device to establish HART communication.

   Refer to the manual for your handheld communicator device for more information.

4. On the **Overview** screen, select **Configure**.



5. On the **Configure** screen, select **Manual Setup**.



Postrequisites

Perform the configuration tasks in the following subsections as needed.

2.9.1 Configuring display options

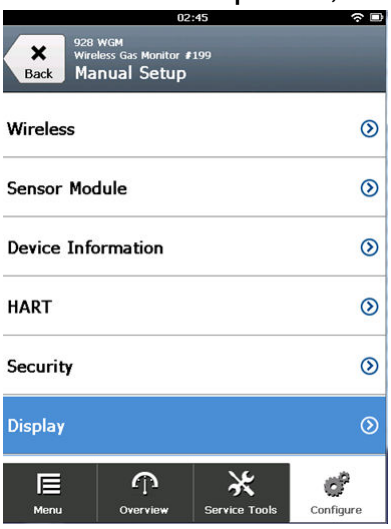
The primary variable (gas concentration) is displayed by default on the LCD display.

To configure the display of additional dynamic variable items, do the following:

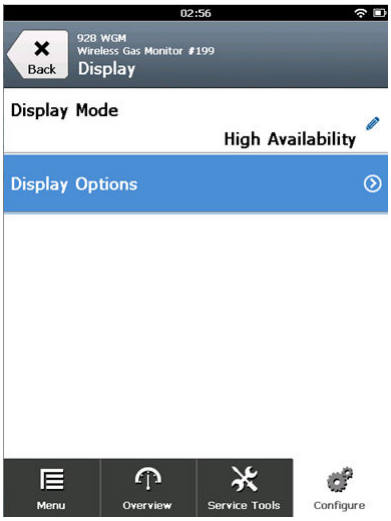
Configure display options using Field Communicator

Procedure

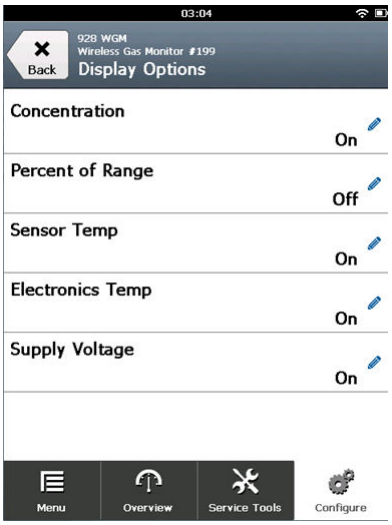
1. On the **Manual Setup** screen, select **Display**.



2. On the **Display** screen, select **Display Options**.

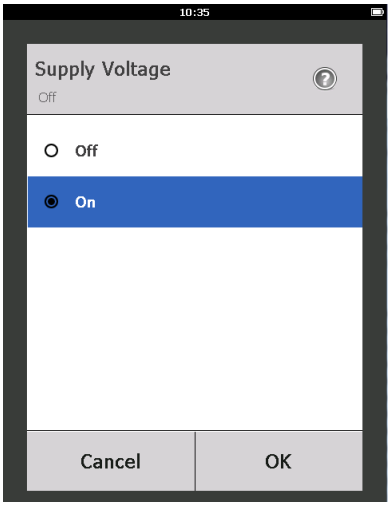


3. Select a display option or options to alternate displaying with the primary variable (gas concentration):



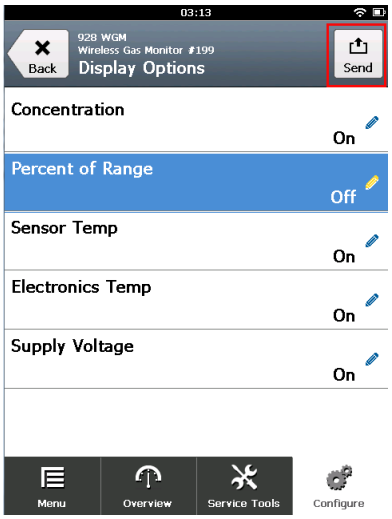
- Concentration
- Percent of Range
- Sensor Temp (gas sensor module temperature)
- Electronics Temp (electronics temperature)
- Supply Voltage

4. Select **On**.

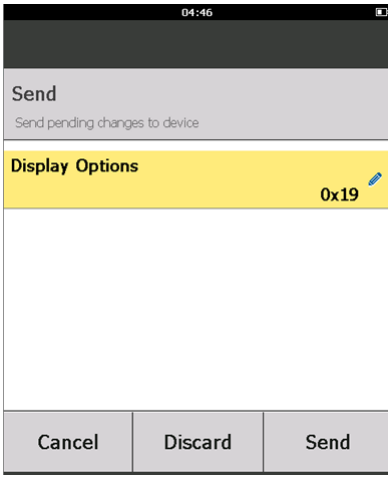


5. Select **OK**.
6. Repeat Step 3 through Step 5 for additional display options.

7. On the **Display Options** screen, select **Send**.



8. On the **Send** screen, do one or more of the following:



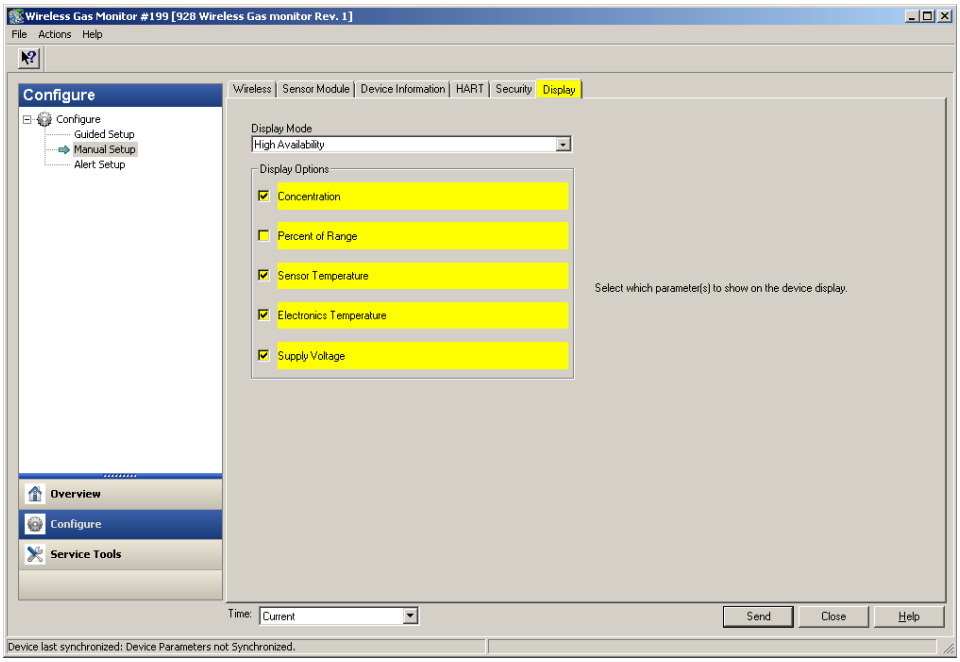
   - Select **Display Options** if you want to review the selected display options.
   - Select **Cancel** to return to the **Display Options** screen. Pending changes to display options are preserved.
   - Select **Discard** to return to the **Display Options** screen and discard pending changes. Select **OK** to confirm or **Cancel** to return to the previous screen.
   - Select **Send** to send display option changes to the device.

9. Select **Back** to return to the **Manual Setup** screen.

Configure display options using AMS Wireless Configurator

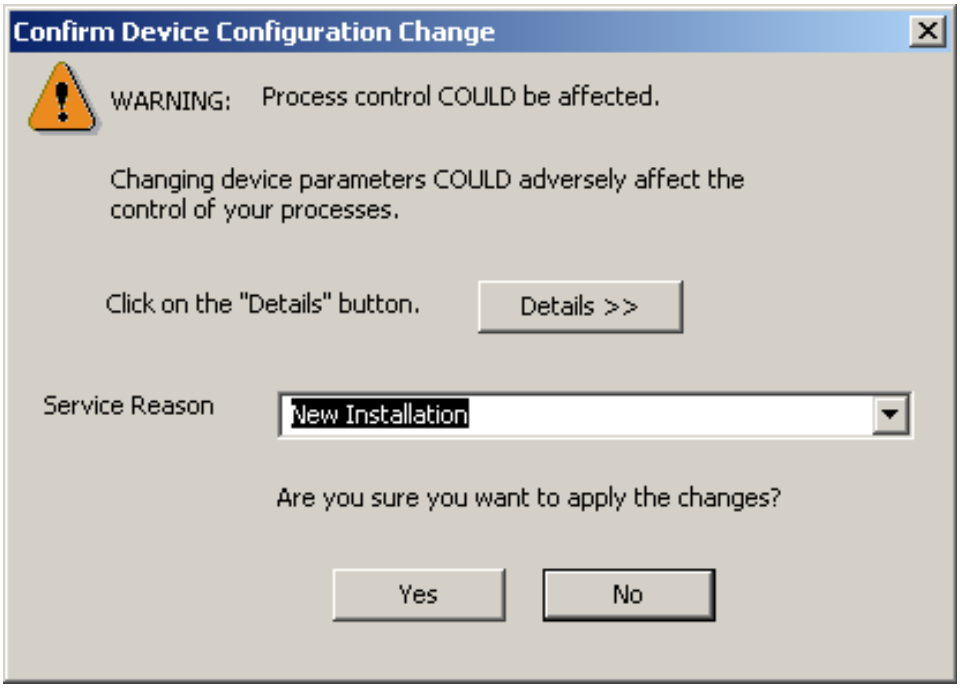
Procedure

1. On the **Manual Setup** page, select the **Display** tab.



2. On the **Display** tab, select a display option or options to alternate displaying with the primary variable (gas concentrations).
   - Concentration
   - Percent of Range
   - Sensor Temperature (gas sensor module temperature)
   - Electronics Temperature
   - Supply Voltage
3. Select **Send**.

4. In the **Confirm Device Configuration Change** dialog box, select a reason for the change from the Service Reason list. Select **Details** if you want to view additional information.



5. Select **Yes**.

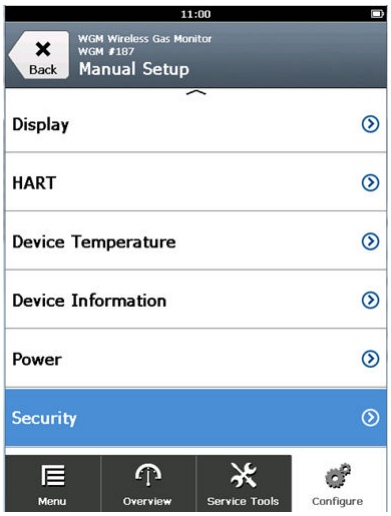
2.9.2 Configuring security settings

You have the option to configure security settings to protect the device from unauthorized configuration changes.

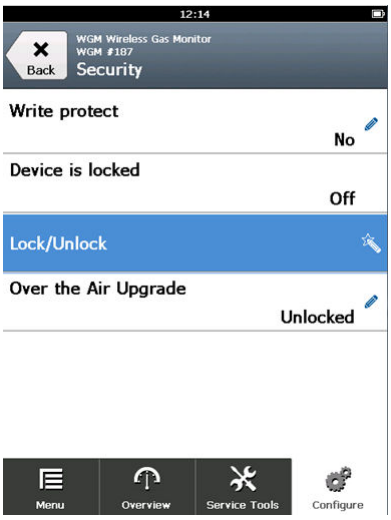
Configure security settings using a Field Communicator

Procedure

1. On the **Manual Setup** screen, select **Security**.



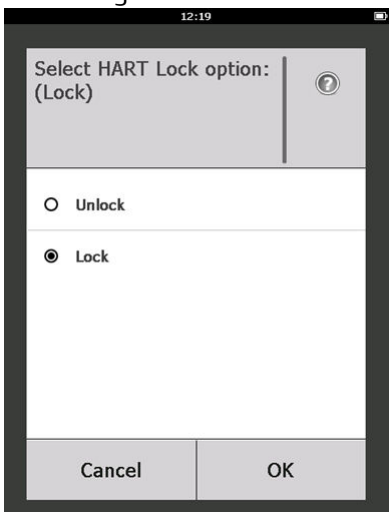
2. Configure the following security settings as required.



- Write Protect: If you select No (the default option), you may view and edit device configuration settings. If you select Yes, you may view device configuration settings but not edit them.
- Lock Device: If you select Unlock, you may access the device with any host to view and edit configuration settings. If you select Lock (the default option), you cannot access the device with any host to view and edit configuration settings until a host unlocks the device. To change this option, do the following:

a. On the **Security** screen, select **Lock/Unlock**.

b. On the **Select HART Lock option** screen, select **Lock** or **Unlock** to change the setting.



c. Select **OK**.

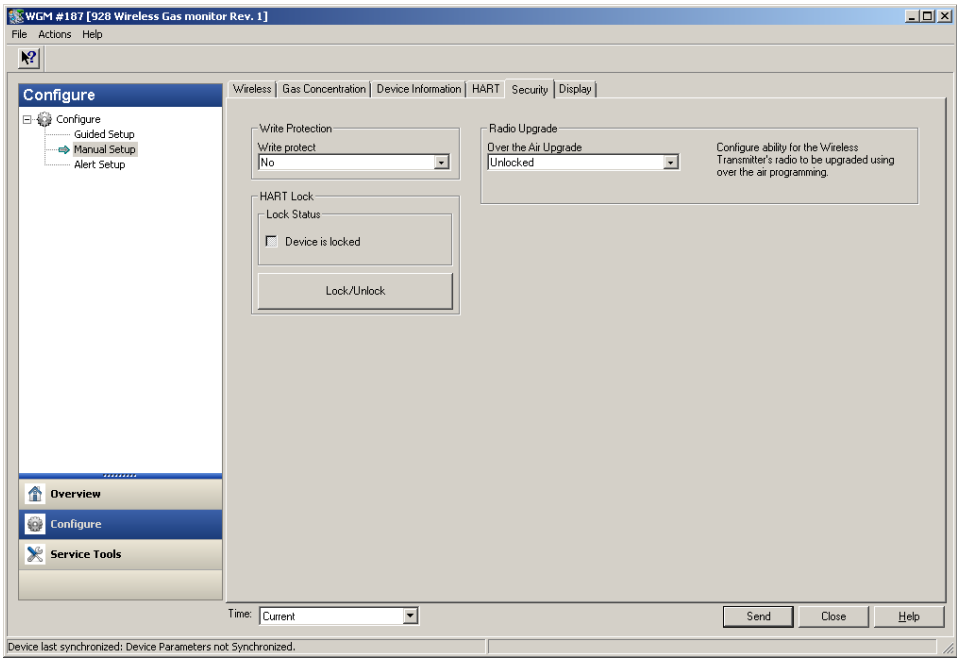
On the **Security** screen, the Device is Locked field displays On when the device is locked and Off when the device is unlocked.

- Over the Air Upgrade: If you select Unlock (the default option), you can upgrade the transmitter radio with programming sent over the air. If you select Lock, the transmitter prevents over-the-air radio upgrades.

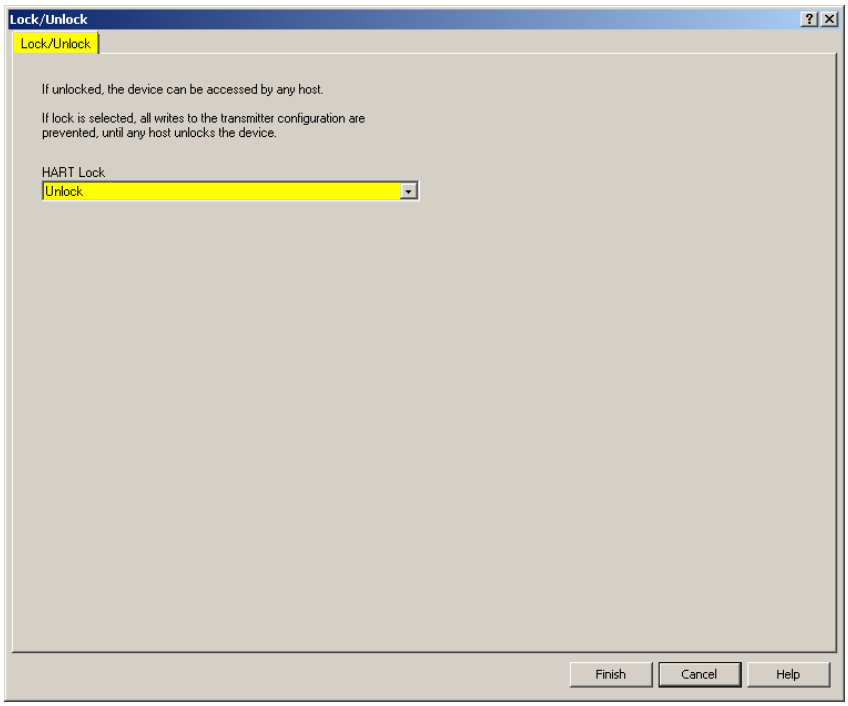
Configure security settings using AMS Wireless Configurator

Procedure

1. On the **Manual Setup** page, select the **Security** tab.

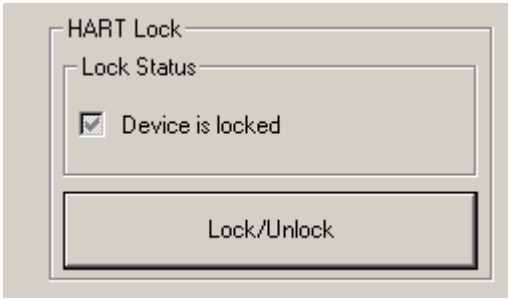


2. Configure the following security settings as needed:
   - Write Protection: If you select No (the default option) you can view and edit device configuration settings. If you select Yes, you will not be able to view and edit the configuration settings.
   - Radio Upgrade: If you select Unlock (the default option), you can upgrade the transmitter radio with programming sent over the air. If you select Lock, you will not be able to upgrade the radio over the air.
   - Lock Device: If you select Unlock (the default option), you can access the device with any host to view and edit configuration settings. If you select Lock, you will not be able to access the device with any host to view and edit configuration settings until a host unlocks the device. To change this option, do the following:
     a. Select Lock/Unlock.
     b. In the HART Lock list, select Lock or Unlock to change the setting.



c. Select **Finish**.

In the **HART Lock** field, the Device is Locked check box is selected when the device is locked.



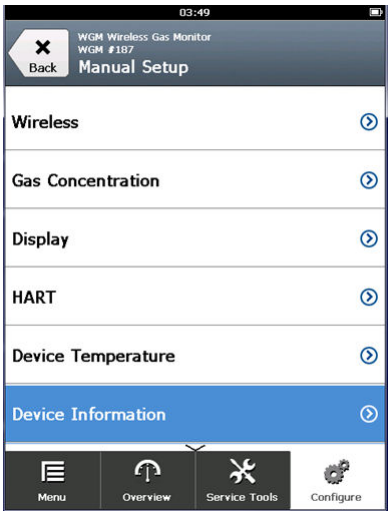
3. When you are finished making changes, select **Send** to update the device configuration.

2.9.3 Configuring device information

Configure device information using Field Communicator

Procedure

1. On the **Manual Setup** screen, select **Device Information**.

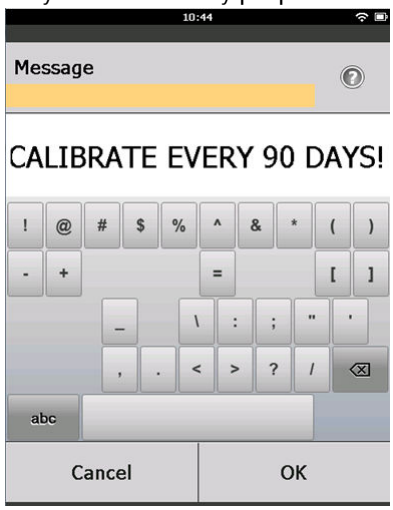


2. On the **Device Information** screen, select any of the following and configure as needed.

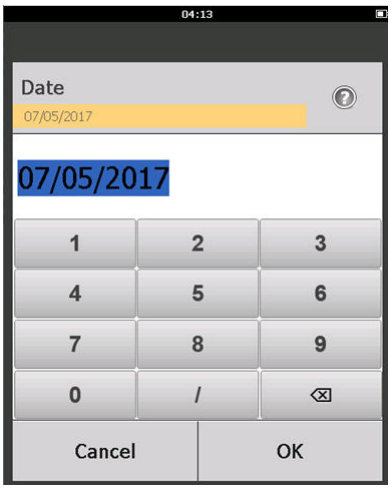
   - Long tag: Enter an identifier for the device up to 32 characters long using the virtual keypad. The Long tag field is blank by default and does not display if left blank.

   - Tag: Enter an identifier for the device up to eight uppercase alphabetic and numeric characters long using the virtual keypad. The Tag field is left blank by default and does not display if left blank.

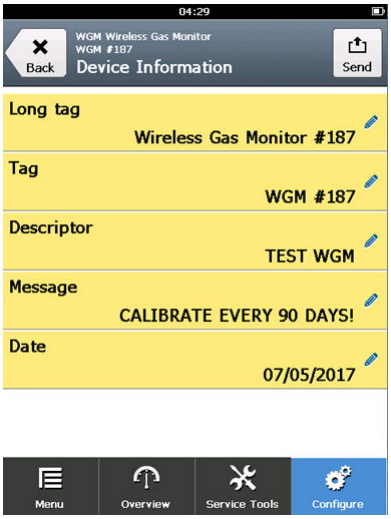
- Descriptor: Enter a description of the device up to 16 alphabetic, numeric, and special characters long. The Descriptor field is blank by default and does not display if left blank.
- Message: Enter a message up to 32 alphabetic, numeric, and special characters long. The Message field is blank by default, does not display if left blank, and may be used for any purpose.



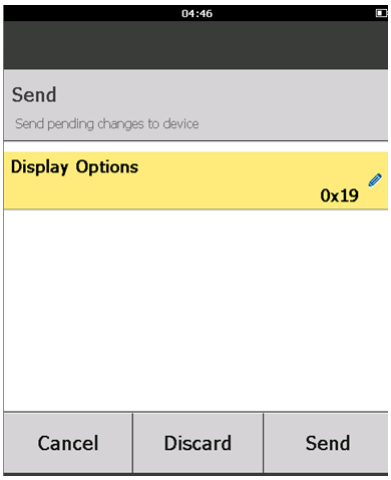
- Date: Enter a date in mm/dd/yyy format using the virtual keypad. The date may be used for any purpose, such as recording the date of the most recent calibration.



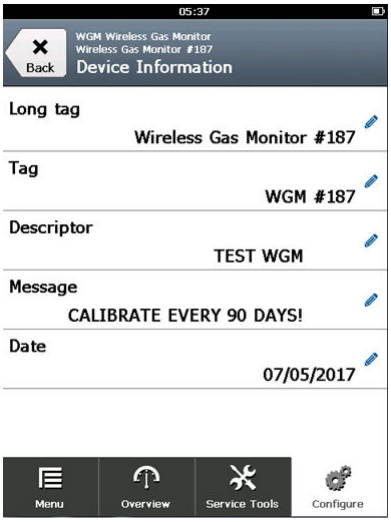
3. When you have finished making changes, select **Send**.



4. On the **Send** screen, do one of the following:



- Select **Cancel** to return to the **Device Information** screen. Pending changes are preserved.
- Select **Discard** to return to the **Device Information** screen and discard pending changes. Select **OK** to confirm or **Cancel** to return to the previous screen.
- Select **Send** to send display option changes to the device.



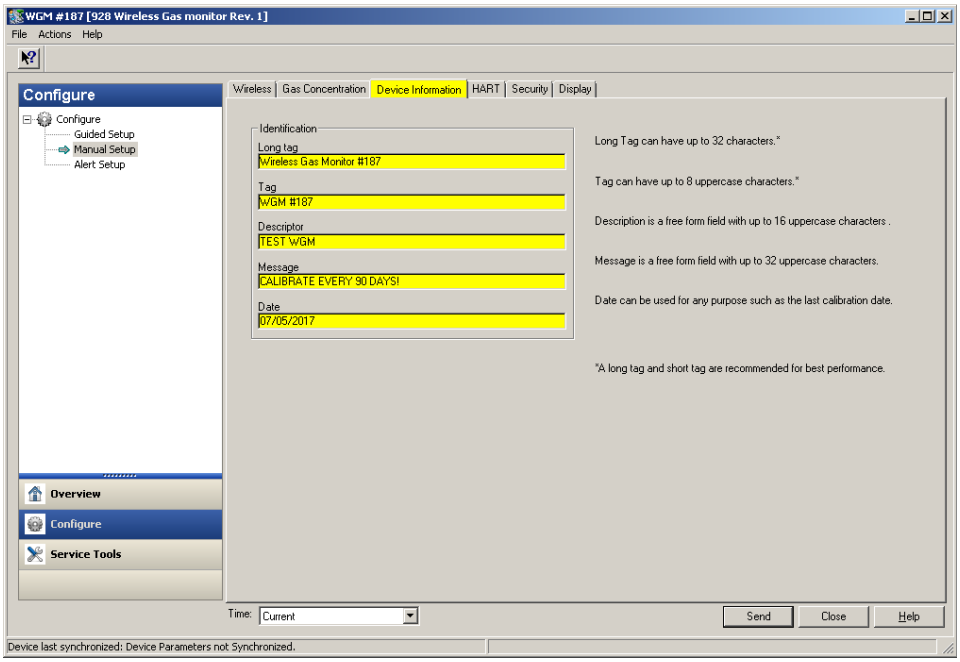
5. Select **Back** to return to the **Manual Setup** screen.

Configure device information using AMS Wireless Configurator

Procedure

1. On the **Manual Setup** page, select the **Device Information** tab.

2. Enter any of the following as needed:



- Long tag: Enter an identifier for the device up to 32 characters long. The Long Tag field is blank by default and does not display if left blank.
- Tag: Enter an identifier for the device up to eight uppercase alphabetic and numeric characters long. The Tag field is blank by default and does not display if left blank.
- Descriptor: Enter a description of the device up to 16 characters long. The Descriptor field is blank by default and does not display if left blank.
- Message: Enter text up to 32 characters long. The Message field is blank by default, does not display if left blank, and may be used for any purpose.
- Date: Enter a date in mm/dd/yyyy format. The date may be used for any purpose, such as recording the date of the most recent calibration.

3. When you have finished making changes, select **Send** to update the device configuration.

2.10 Advanced options

The following optional, advanced functionality is available to view calibration history for the sensor, set reminders to perform maintenance at regular intervals, and to reset or restore device settings.

2.10.1 Service reminders

You can configure service reminders for regular maintenance tasks such as calibration, bump testing, power module replacement, and sensor replacement. The device issues an

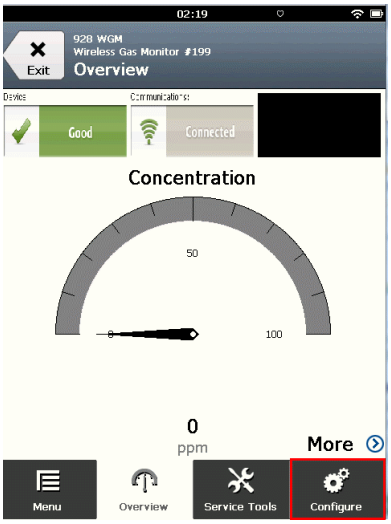
alert when the current date is after the configured service date. You may enable or disable service reminders.

Service reminders are not recurring. For example, if you create a service reminder to recalibrate the sensor in 90 days, you must create a new reminder for the next service interval by configuring a new service date. The transmitter must be connected to a wireless network to accurately maintain the current date.

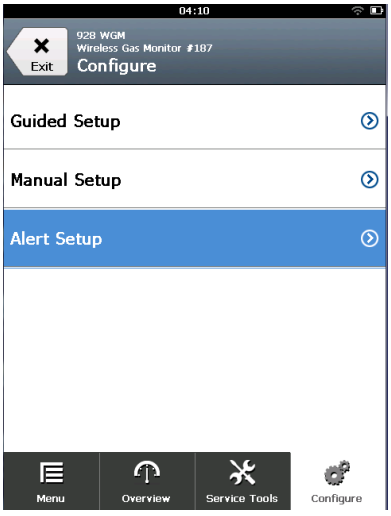
Configure service reminders using Field Communicator

Procedure

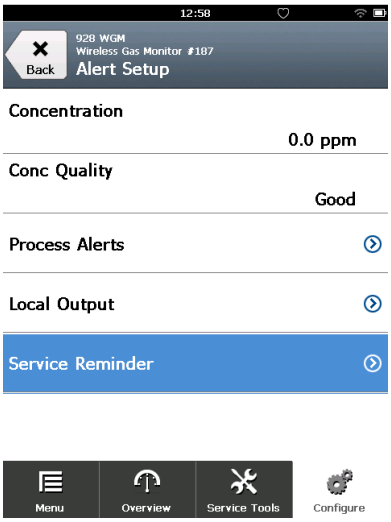
1. On the **Overview** screen, select **Configure**.



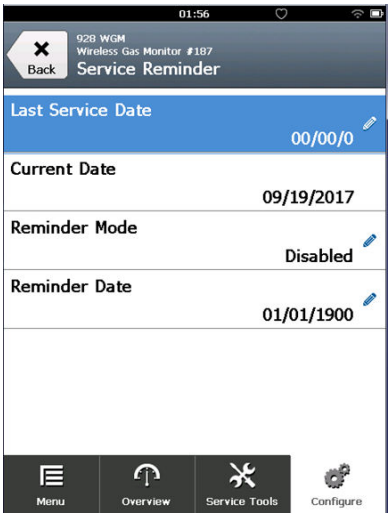
2. On the **Configure** screen, select **Alert Setup**.



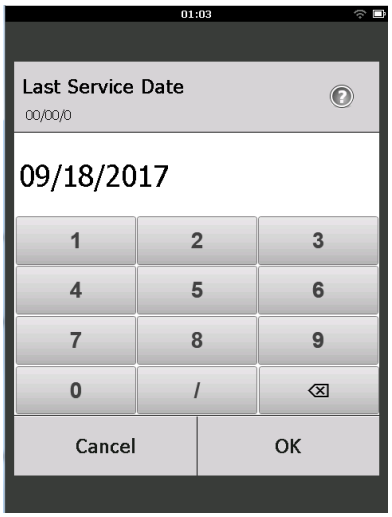
3. On the **Alert** screen, select **Service Reminder**.



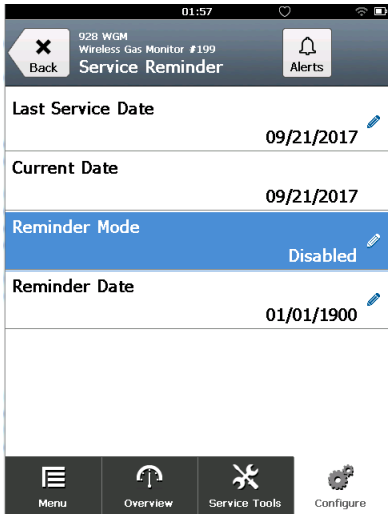
4. On the **Service Reminder** screen, select **Last Service Date**.



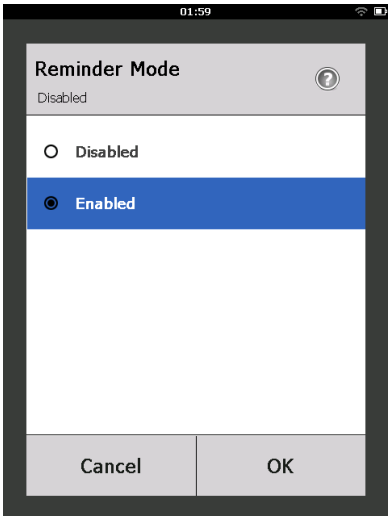
5. On the **Last Service Date** screen, use the numeric keypad to enter the date on which the last service was performed.



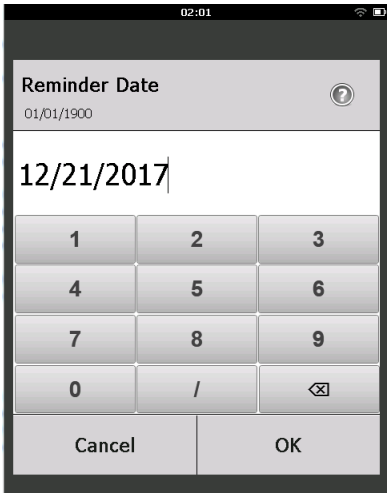
6. Select **OK**.
7. On the **Service Reminder** screen, select **Reminder Mode**.



8. On the **Reminder Mode** screen, do one of the following:
   - Select Disabled to disable the service reminder.
   - Select Enabled to enable the service reminder.



9. Select **OK**.
10. On the **Service Reminder** screen, select **Reminder Date**.
11. On the **Reminder Date** screen, use the numeric keypad to enter the date when the next service is due.

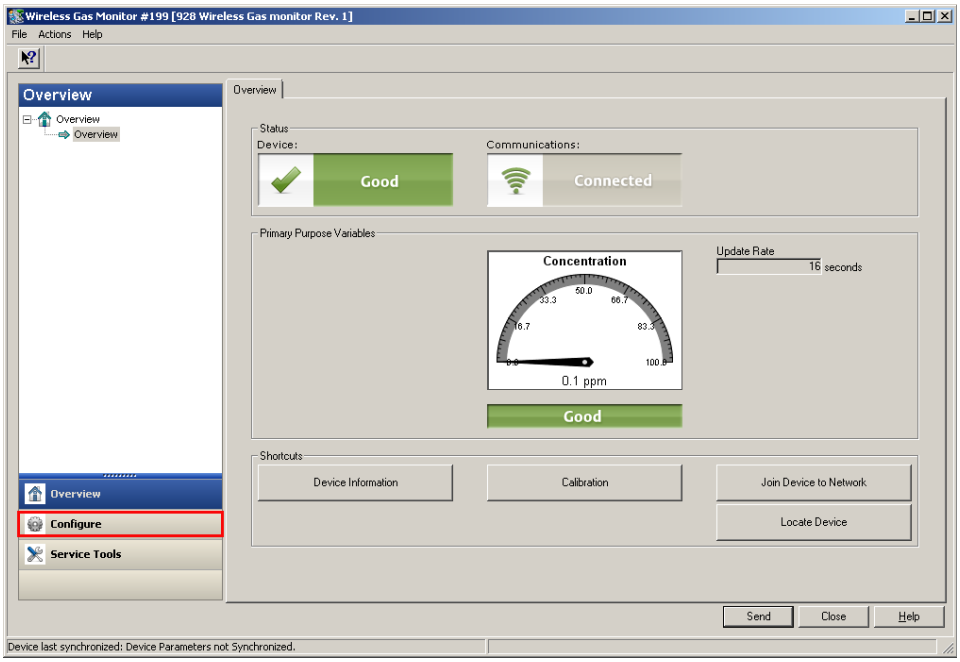


12. Select **OK**.
13. When you are finished, select **Send** to implement configuration changes.

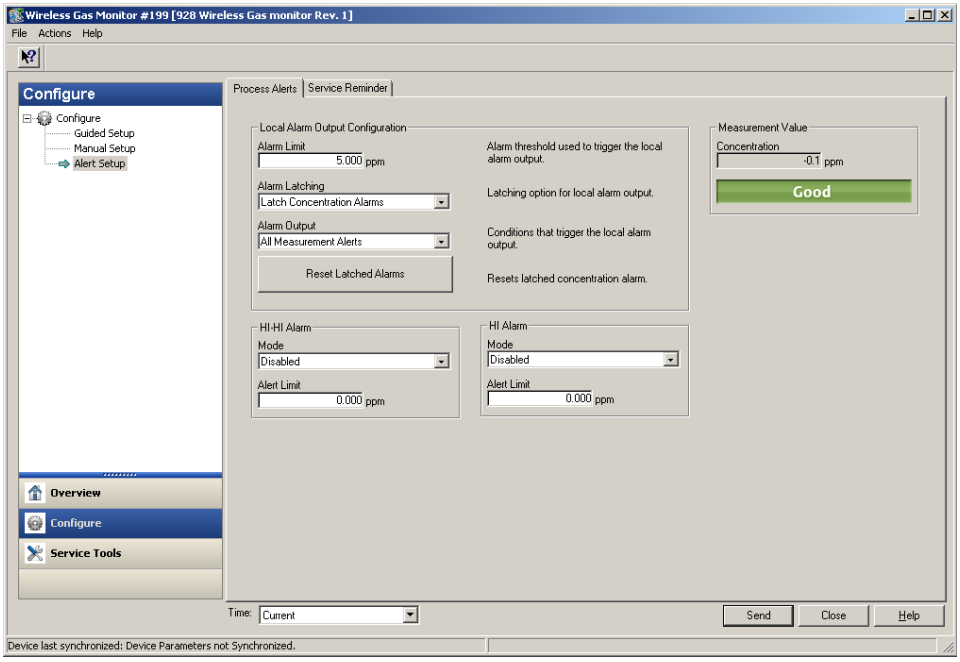
Configure service reminders using AMS Wireless Configurator

Procedure

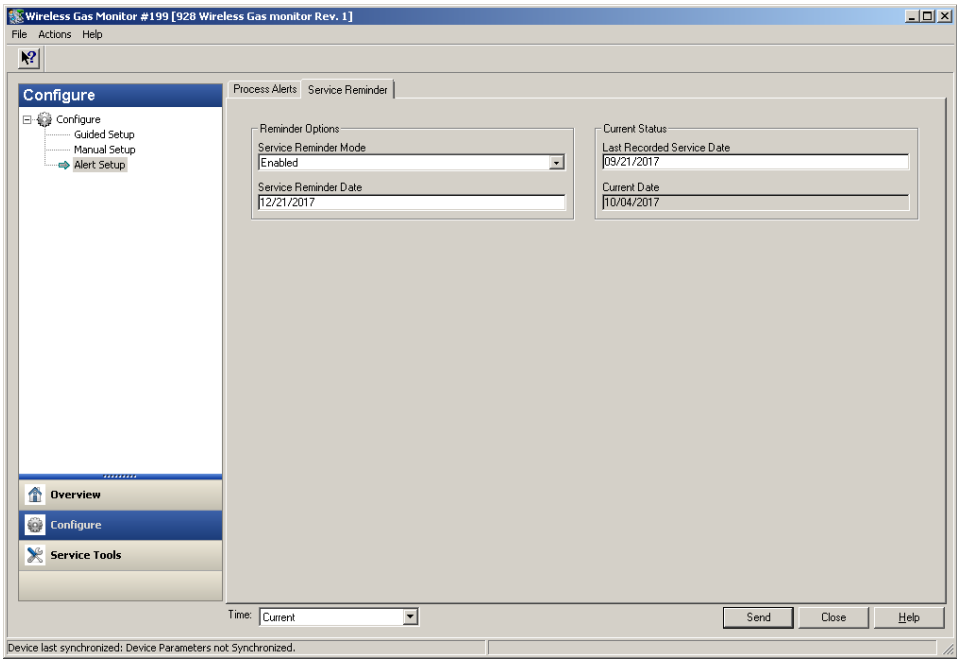
1. In the **Overview** pane, select **Configure**.



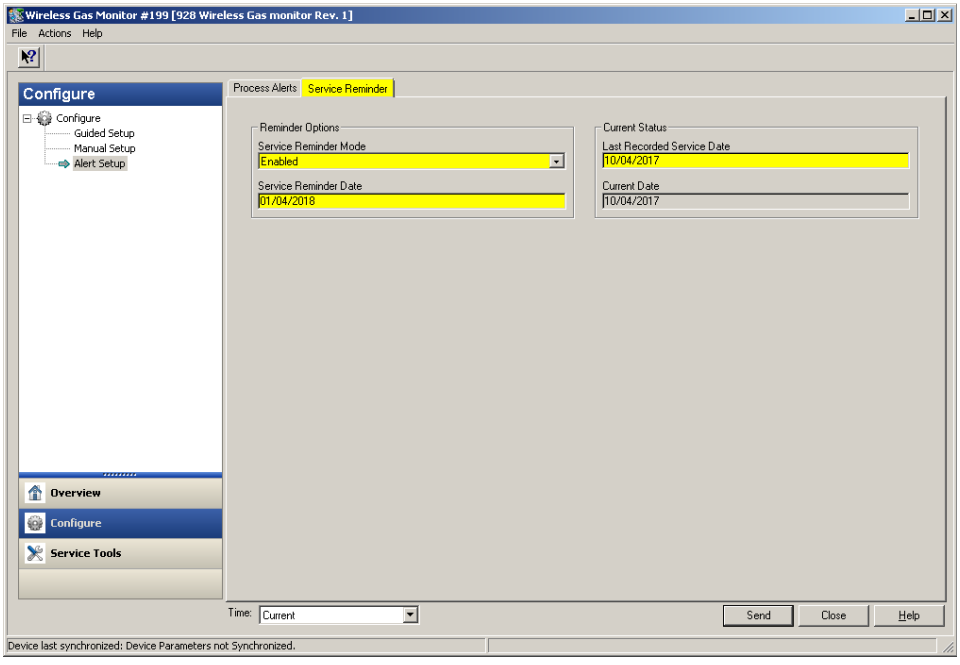
2. On the **Configure** pane, select **Alert Setup**.



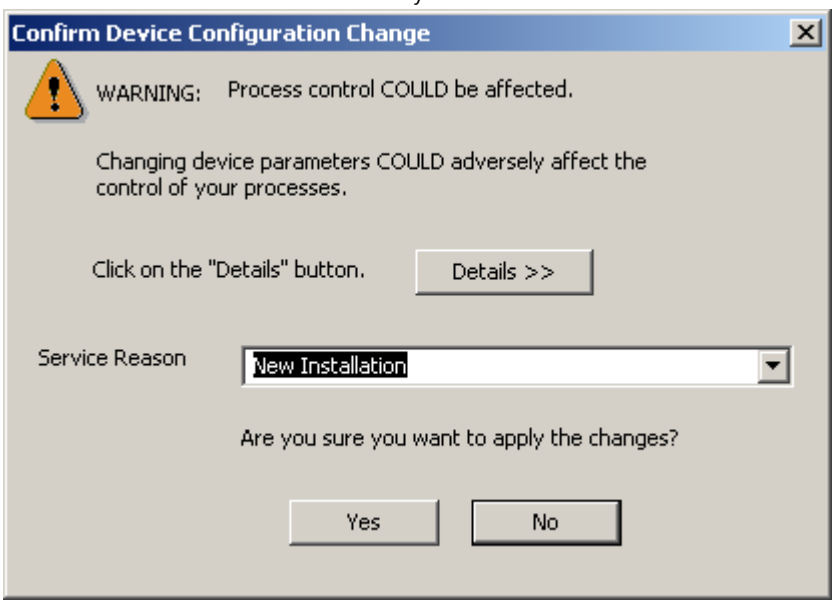
3. On the **Alert Setup** page, select the **Service Reminder** tab.



4. In the **Service Reminder Mode** list, do one of the following:
   - Select Disabled to disable the service reminder.
   - Select Enabled to enable the service reminder.
5. In the Last Recorded Service Date field, enter the date on which the last service was performed.
6. In the Service Reminder Date field, enter the date when the next service is due.



7. Select **Send**.
8. In the **Confirm Device Configuration Change** dialog box, select a reason from the **Service Reason** list. Select **Details** if you want to view additional information.



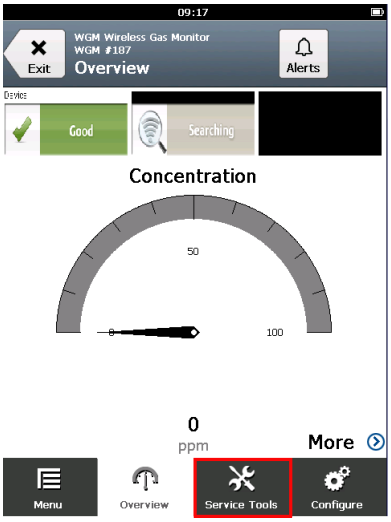
9. Select **Yes**.

2.10.2 Reset or restore device settings

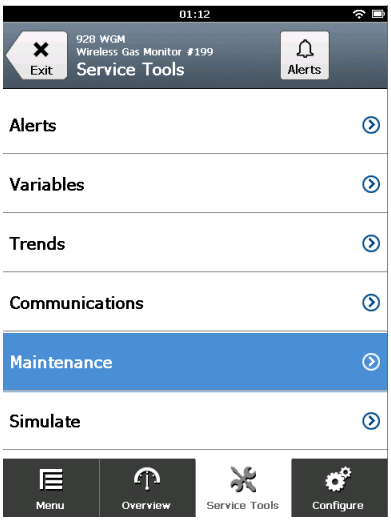
Reset or restore device settings using Field Communicator

Procedure

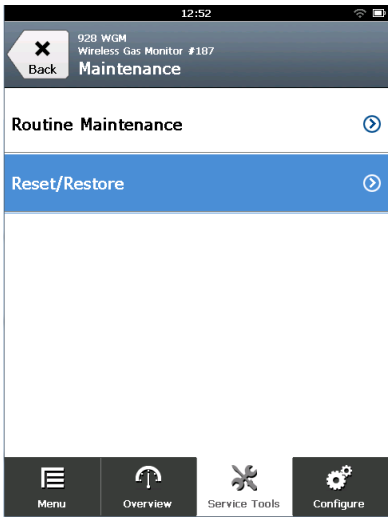
1. On the **Overview** screen, select **Service Tools**.



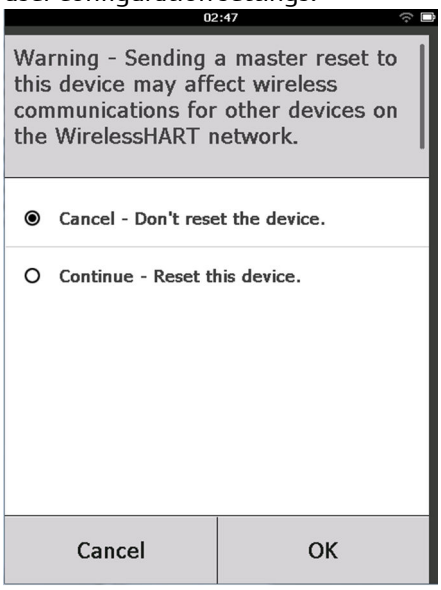
2. On the **Service Tools** screen, select **Maintenance**.



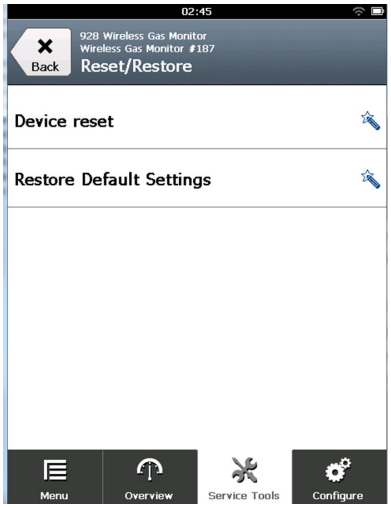
3. On the **Maintenance** screen, select **Reset/Restore**.



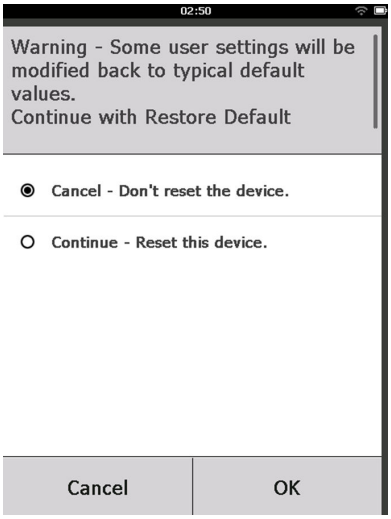
4. On the **Reset/Restore** screen, select one of the following:
   - Select Device reset to reset the transmitter electronics. This preserves current user configuration settings.



   - Select Restore Default Settings to return the monitor, including the currently installed sensor, to its factory default settings. This deletes user configuration settings.



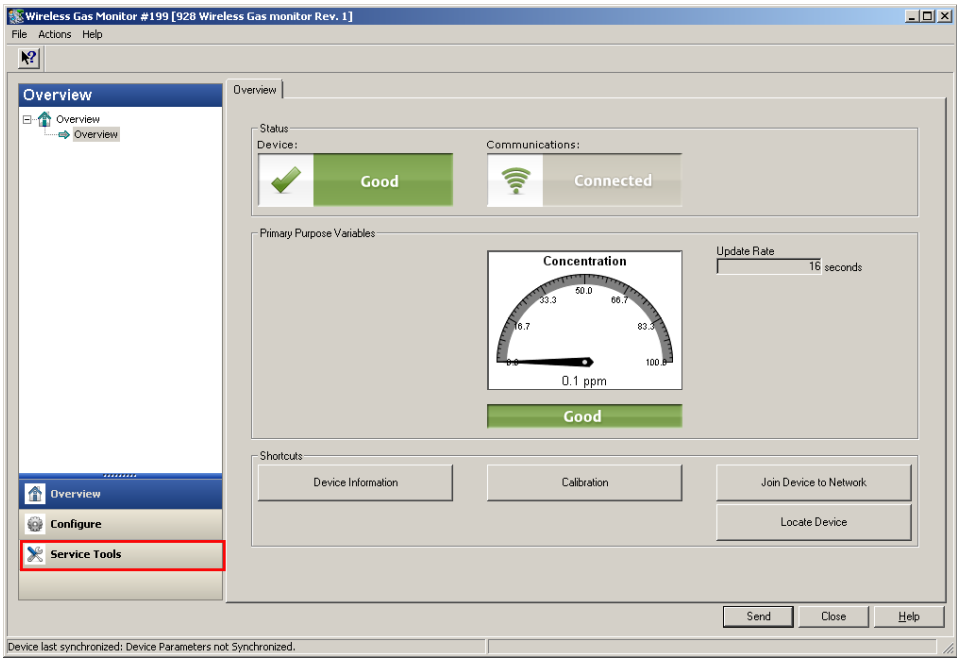
5. Do one of the following:
   - Select Cancel to retain the current settings.
   - Select Continue to reset configuration settings or to restore factory default settings.
   - Select **OK** to continue.
   - Select **Cancel** to return to the previous screen without making changes.



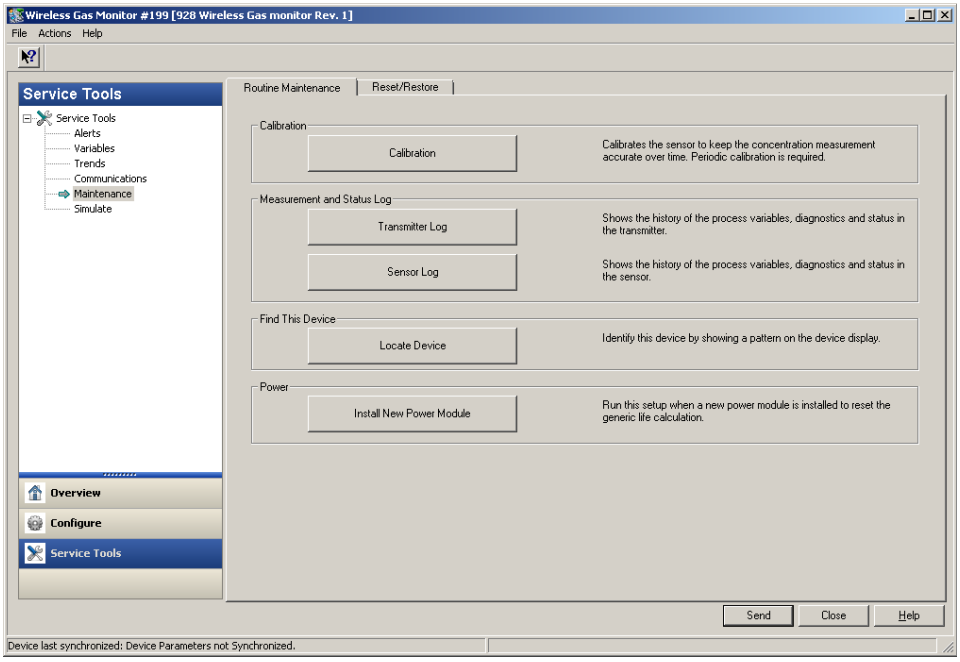
Reset or restore device settings using AMS Wireless Configurator

Procedure

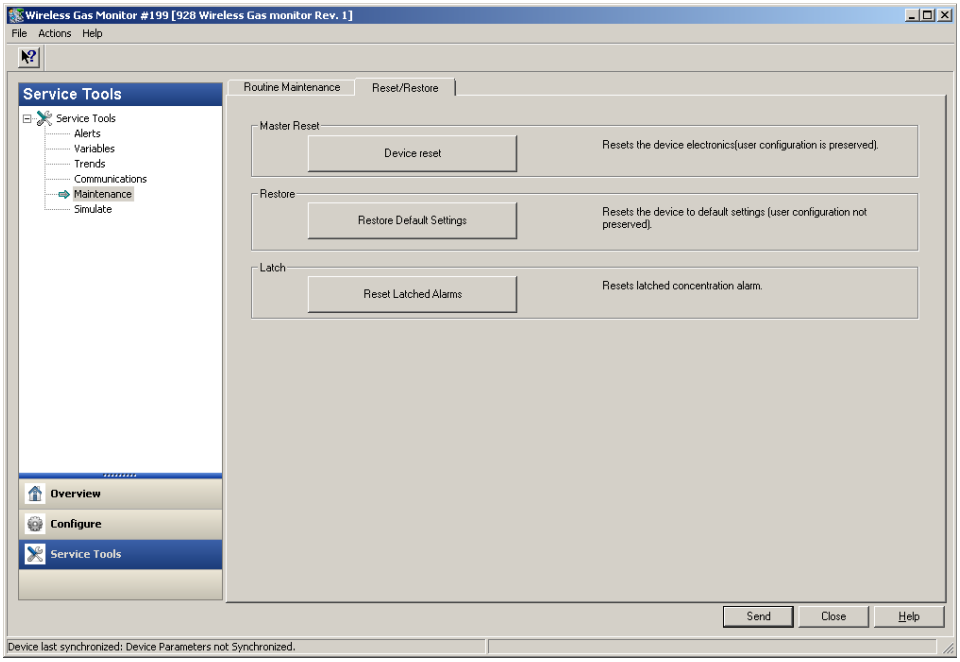
1. In the **Overview** pane, select **Service Tools**.



2. In the **Service Tools** pane, select **Maintenance**.



3. Select the **Reset/Restore** tab.



4. Do one of the following:
   - Select **Device reset** to reset the transmitter electronics. This preserves current user configuration settings.
   - Select **Restore Default Settings** to return the monitor, including the currently installed sensor, to its factory default settings. This deletes user configuration settings.
5. Follow the steps in the wizard to reset the device or restore factory default settings.

2.10.3 Configuring local alarm output

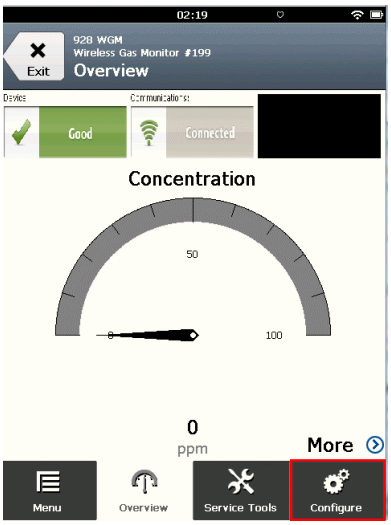
If an external device is connected to the transmitter, you can also configure local alarm output options.

Configure local alarm output using a Field Communicator

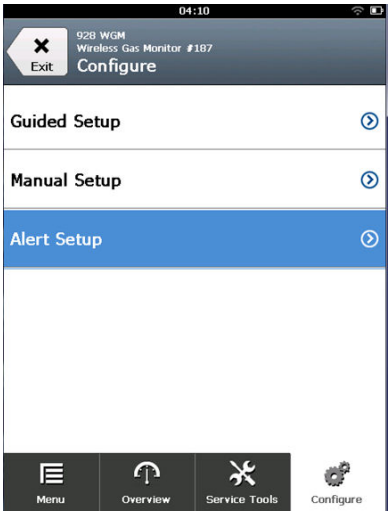
Complete the following steps to configure local alarm output options using a Field Communicator.

Procedure

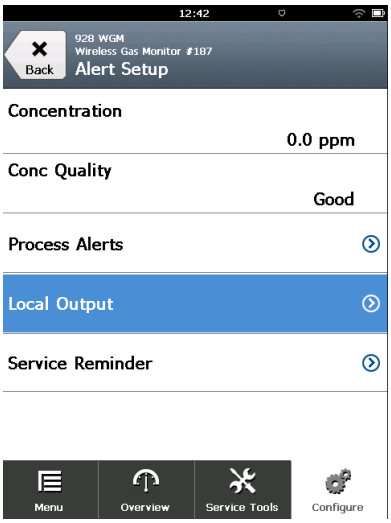
1. On the **Overview** screen, select **Configure**.



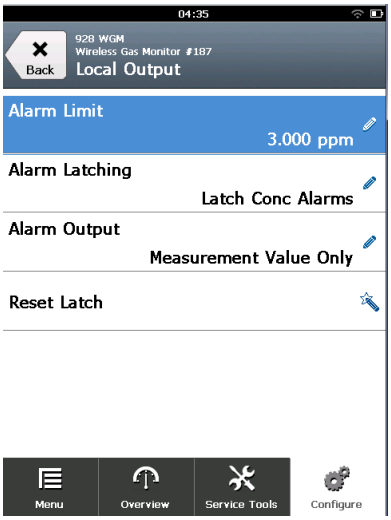
2. On the **Configure** screen, select **Alert Setup**.



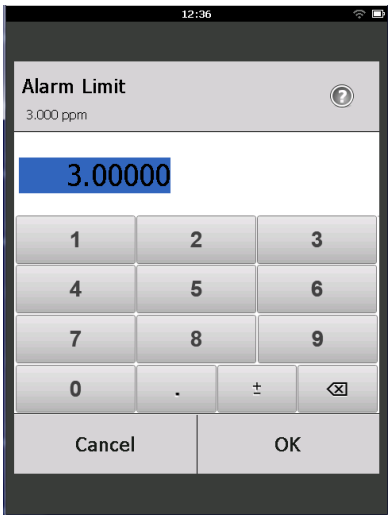
3. On the **Alert Setup** screen, select **Local Output**.



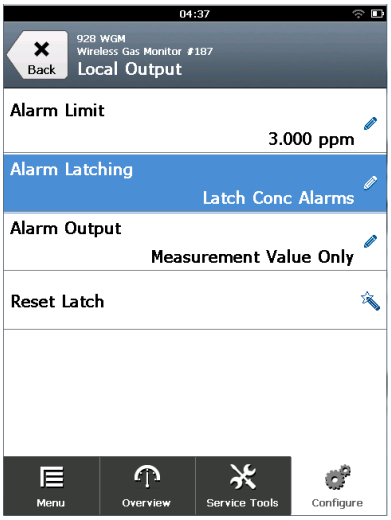
4. On the **Local Output** screen, select **Alarm Limit**.



5. On the **Alarm Limit** screen, enter a gas concentration limit to trigger the local alarm.

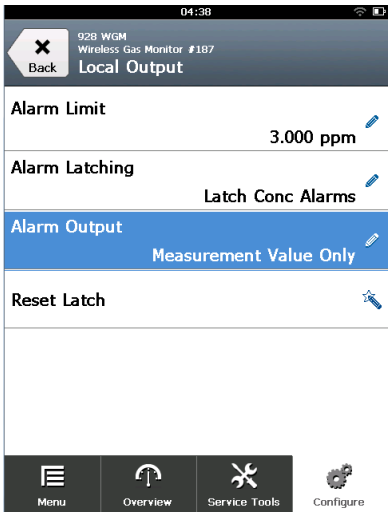


6. Select **OK**.
7. On the **Local Output** screen, select **Alarm Latching**.

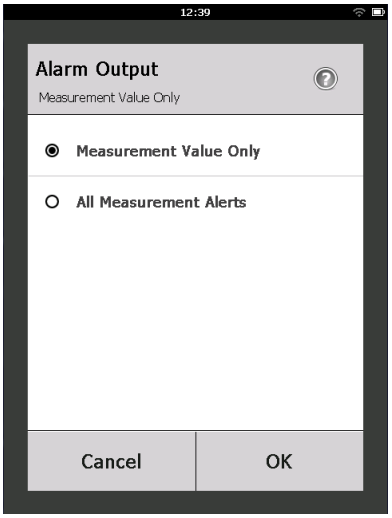


8. On the **Alarm Latching** screen, select one of the following:
   - Not Latched: If you select this option, the local alarm is not latched. This is the default option.
   - Latch Conc Alarms: If you select this option, the local alarm output latches for gas concentration alarms. Refer to Resetting latched alarms for information about resetting latched alarms.
9. Select **OK**.

10. On the **Local Output** screen, select **Alarm Output**.



11. On the **Alarm Output** screen, select one of the following:
    - Measurement Value Only: If you select this option, only gas concentration alerts above the specified threshold trigger the local alarm. This is the default option.
    - All Measurement Alerts: If you select this option, all gas concentration alerts trigger the local alarm.

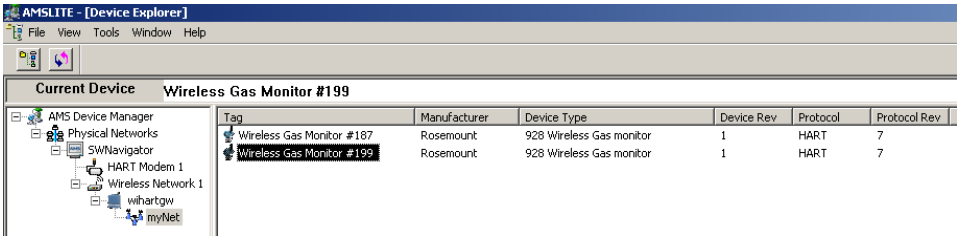


12. Select **OK**.

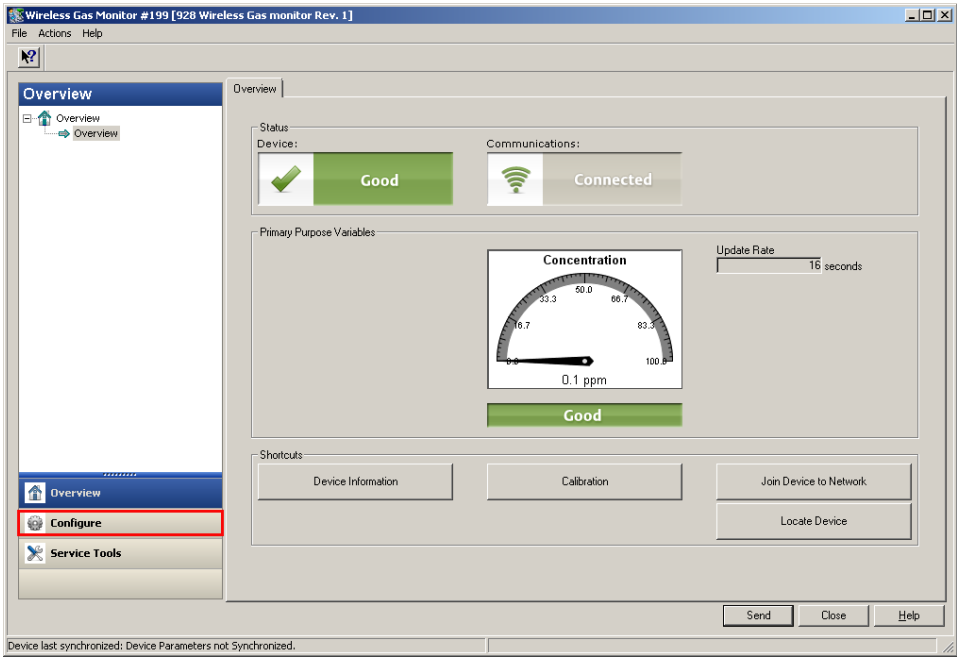
Configure local alarm output using AMS Device Configurator

Procedure

1. In the **AMS Device Manager** pane, double-click the device icon.

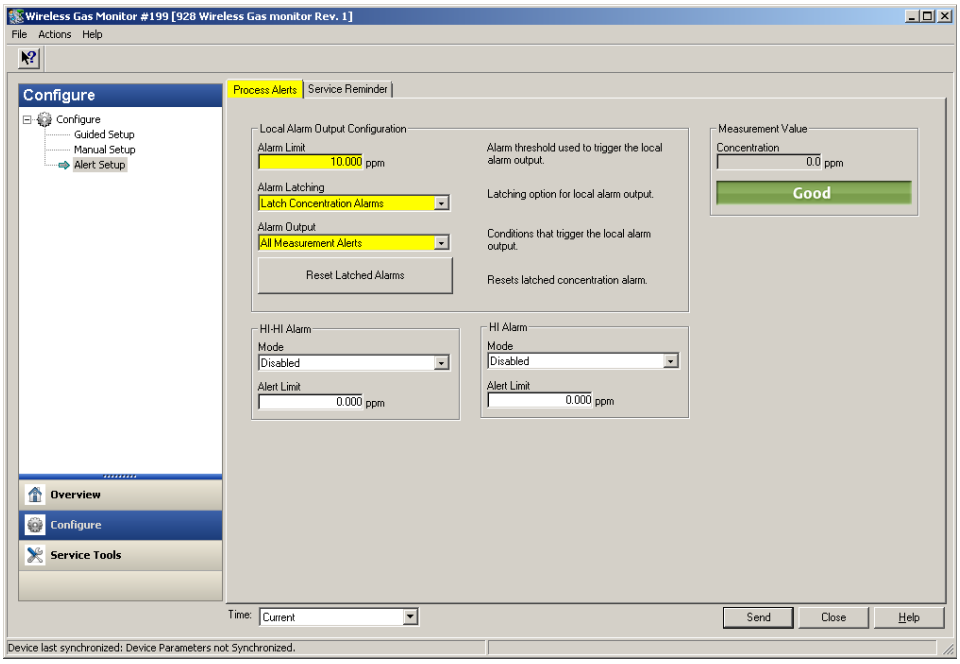


2. Select **Configure**.

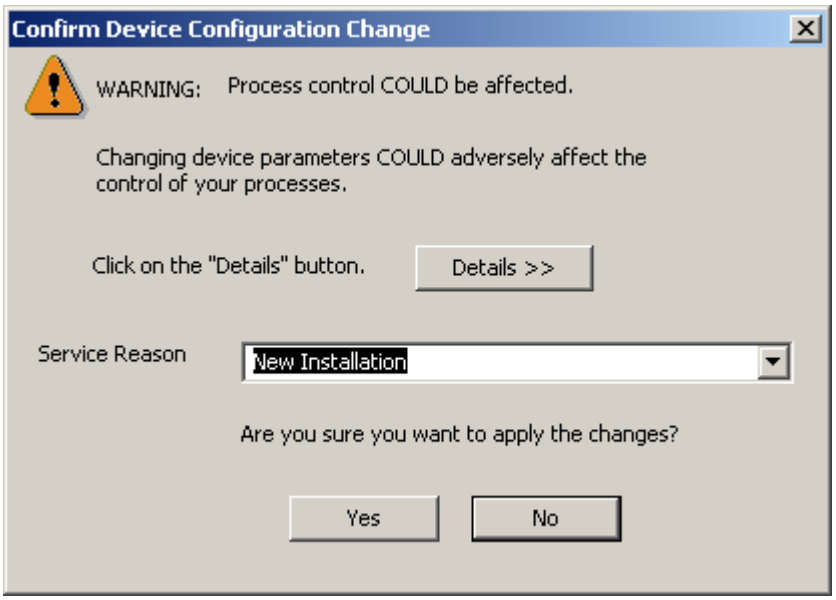


3. In the **Configure** pane, select **Alert Setup**.
4. In the Alarm Limit field, enter an alarm threshold at which to trigger the local alarm output. The default alarm threshold is `5 ppm`.

5. In the **Local Alarm Outputs** list, select one of the following:
   - All Measurement Alerts: If you select this option, all measurement alerts trigger the local alarm. This is the default option.
   - Measurement Value Only: If this option is selected, only gas concentration alerts above the specified alarm threshold trigger the local alarm.



6. Select **Send**.
7. In the **Confirm Device Configuration Change** dialog box, select a reason from the **Service Reason** list. Select **Details** if you want to view additional information.



8. Select **Yes**.

2.11 Remove power module

After you have configured the device and the network, remove the power module and replace the rear housing cover. Insert the power module only when the device is ready for commissioning.

⚠ CAUTION

The power module may be damaged if dropped from heights in excess of 20 ft. (6.10 m).

Use caution when handling it.

3 Install

3.1 Overview

A *Rosemount™ 928 Wireless Gas Monitor* Quick Start Guide that includes basic installation and setup information is shipped with each Rosemount 928. Refer to Dimensional drawings for dimensional drawings of each transmitter variation and mounting configuration. Refer to Figure B-1 for an instrinsically safe installation drawing.

A *Rosemount 628 Gas Universal Gas Sensor* Quick Start Guide is shipped with each Rosemount 628 that is sold separately.

Note
Always install the transmitter with the sensors facing downwards.

3.2 Safety messages

Instructions in this section may require special precautions to ensure the safety of personnel performing the operations.

⚠ WARNING

Follow installation guidelines.

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

Ensure that only qualified personnel perform the installation.

If installing an optional customer-supplied external alarm device, verify proper function. Refer to External alarm device electrical connections.

⚠ WARNING

Explosions

Explosions could result in death or serious injury.

Before connecting a handheld communication device in an explosive atmosphere, ensure that the instruments are installed in accordance with Intrinsically Safe or non-incendive field wiring practices.

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

When connecting an external device to the Rosemount 928's discrete output in a hazardous area, ensure that the external device is installed in accordance with Intrinsically Safe or non-incendive field wiring practices.

⚠ WARNING

Electrical shock

Electrical shock could cause death or serious injury.

Use extreme caution when making contact with the leads and terminals.

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

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operation.

This device must be installed to ensure a minimum antenna separation distance of 7.9 in. (20 cm) from all persons.

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

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge buildup, do not rub or clean the antenna with solvents or a dry cloth.

Substitution of components may impair intrinsic safety.

3.3 Wireless considerations

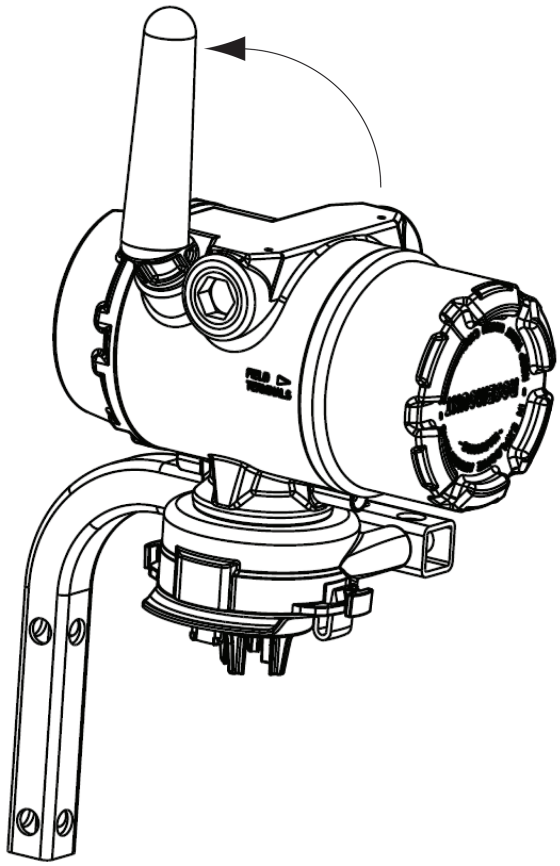
3.3.1 Power up sequence

Only install the transmitter and all other wireless devices after you have installed the wireless gateway and the gateway is functioning properly. Install the Emerson 701 SmartPower™ Module - Black into the transmitter to power the device. Power up wireless devices in order of proximity from the gateway, beginning with the closest. This results in a simpler and faster network installation. Enable active advertising on the gateway to ensure that new devices join the network faster. Refer to the reference manual for your wireless gateway for more information.

3.3.2 Antenna position

Position the antenna vertically straight up and, if the application requirements allow, approximately three feet (one meter) from any large structure, building, or conductive surface to allow for clear communication with other devices.

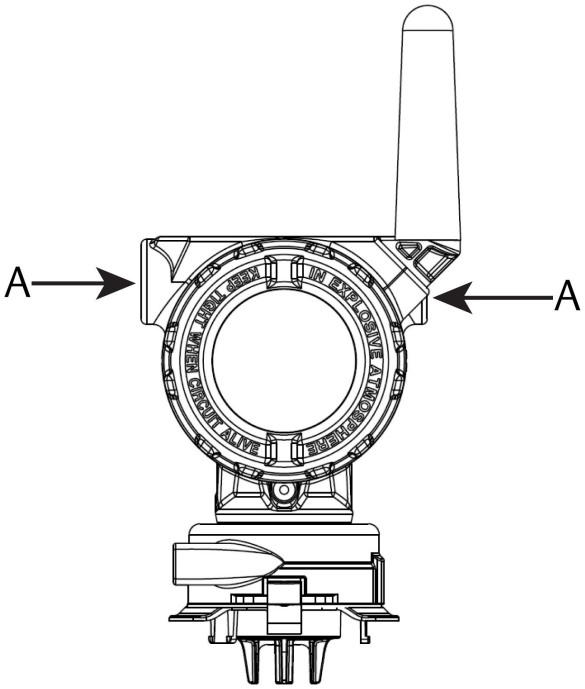
Figure 3-1: Antenna Position



3.3.3 Conduit entries

Upon installation, ensure that each conduit entry is either sealed with a conduit plug using appropriate thread sealant or has a conduit fitting or cable gland installed with appropriate thread sealant.

Figure 3-2: Conduit Entries



A. Conduit entries

3.3.4 Choosing an installation location and position

When choosing an installation location and position, take into account access to the transmitter for ease of power module and sensor replacement. For best performance, install the antenna vertically with space between objects in a parallel metal plane, such as a pipe or metal framework, as the pipes or framework may adversely affect the antenna's performance.

The Rosemount 928 is a diffusion-based gas monitor. This means that the target gas must actually come into contact with the electrochemical sensor for the device to register a signal. Each target gas has a unique density and behaves differently depending on the density of the surrounding atmosphere. For example, hydrogen sulfide is considered a heavier-than-air gas and tends to settle in low-lying areas when released into the air.

Install all transmitters with the sensor module facing downwards. Install devices with sensors for heavier-than-air gases close to ground level, ideally between 12 in. (30.5 cm) above the ground and a breathing zone of a worker (3- 6 ft. [9 - 1.8 m] above grade level).

3.4 Electrical

3.4.1 Handling the power module

The Rosemount 928 is self-powered. The included Emerson 701 SmartPower Module-Black contains two "C" size primary lithium/thionyl chloride batteries. Each battery contains approximately .1 oz. (2.5 grams) of lithum, for a total of .2 oz. (5 grams) in each pack. Under normal conditions, the battery materials are self-contained and are not reactive as long as the batteries and the power module are maintained. Take care to prevent thermal, electrical, or mechanical damage. Protect contacts to prevent premature discharge.

⚠ CAUTION

Equipment damage

The Power Module may be damaged if dropped from heights in excess of 20 ft. (6 m).

Use caution when handling the power module.

3.4.2 Making electrical connections (Rosemount 928XSS01 and 928XUT01 only)

Make electrical connections through the cable entry in the side of the connection head. Be sure to provide adequate clearance for cover removal.

3.5 Verify operating atmosphere

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

Table 3-1: Temperature Guidelines

Operating limit	Transmitter storage limit	Sensor storage recommendation
-40 to 122 °F -40 to 50 °C	-40 to 185 °F -40 to 85 °C	34 to 45 °F 1 to 7 °C

Note
The electrochemical cells in the sensor have a limited shelf life. Store sensor modules in a cool location that is not excessively humid or dry. Storing sensors for long periods may shorten their useful service life.

3.6 Install the transmitter

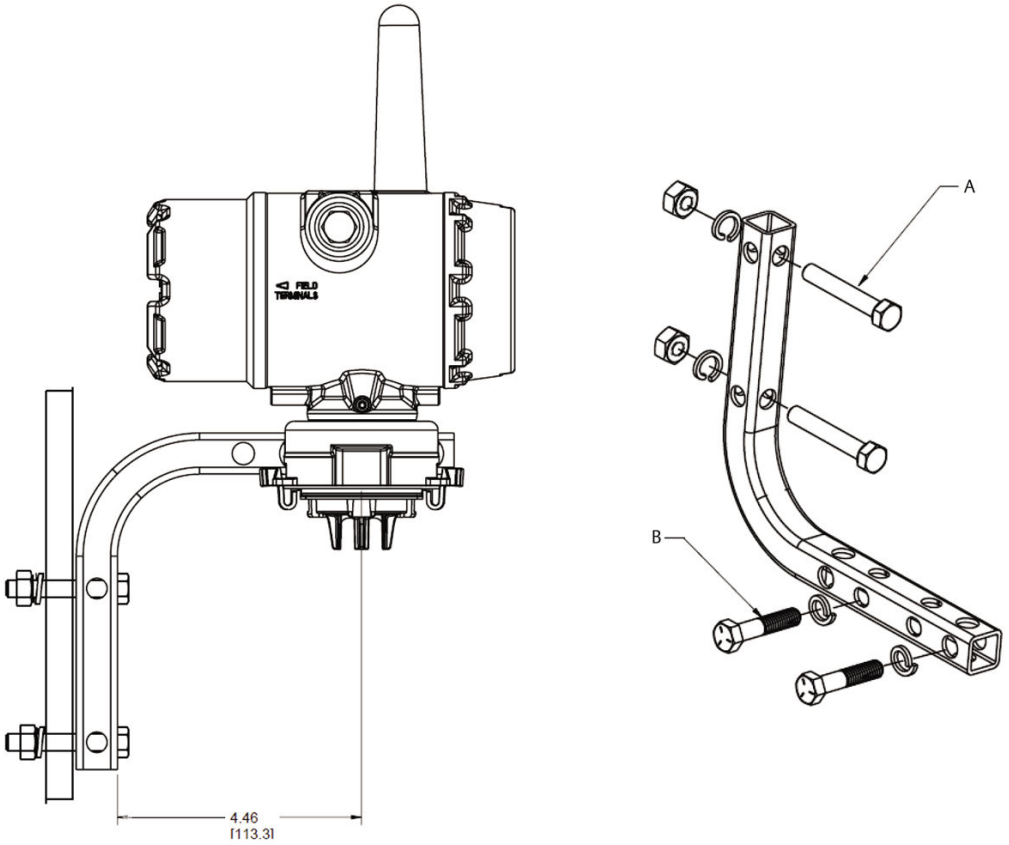
The transmitter is designed to use the B4 Universal Mounting Bracket. This curved, stainless steel bracket includes a U-bolt and fasteners for mounting the transmitter to a 2-in. (50.8 mm) pipe or pole. The B4 bracket attaches directly to the transmitter. You can also use the B4 bracket in other mounting configurations, such as mounting the transmitter to a wall or a panel.

3.6.1 Pipe mount

Required equipment

- Mounting kit (part number 03151-9270-0004)
  - One 2-in. (50.8 mm) U-bolt assembly
  - One B4 mounting bracket
  - Two 5/16-18 x 1¼-in. bolts
  - Two washers
- A ¼-in. combination wrench and adjustable wrench

Figure 3-3: Pipe Mounting



Dimensions are in inches [millimeters].

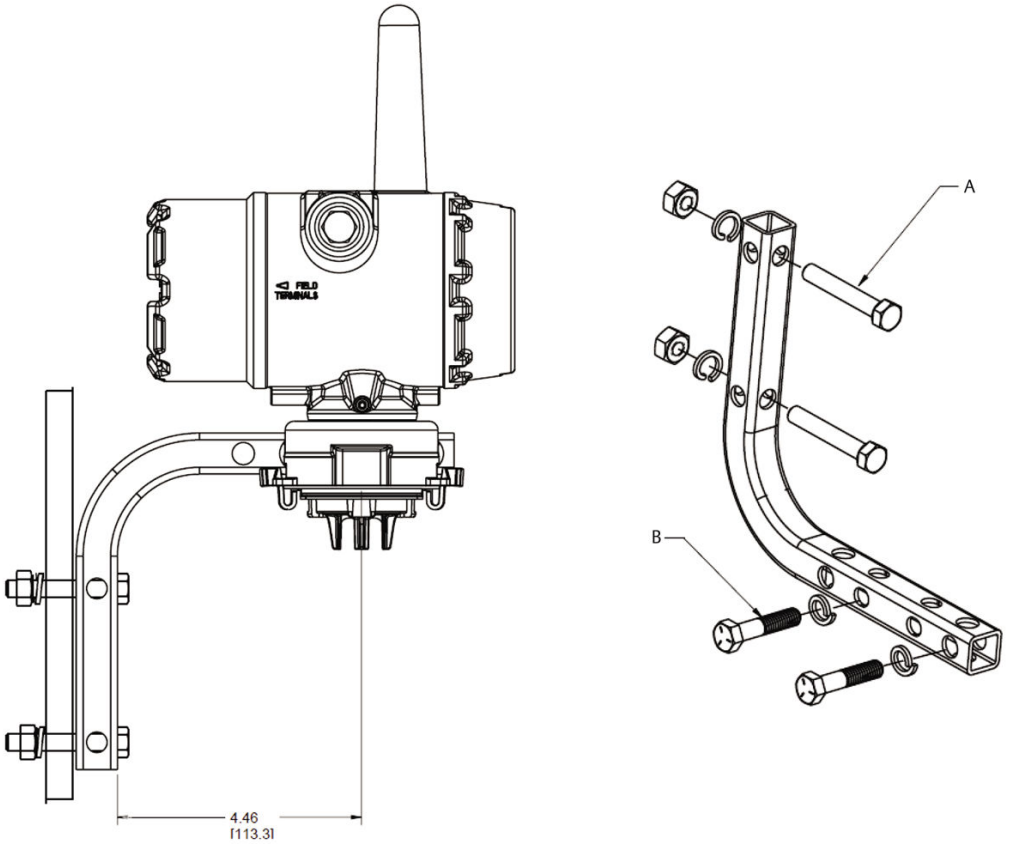
A. 2-in. bolt for pipe mounting (clamp shown)
B. 5/16-18 x 1¼-in. bolts for transmitter mounting

3.6.2 Panel mount

Required equipment

- Mounting kit (part number 03151-9270-0004)
  - One B4 mounting bracket
  - Two ¼-in. x 1¼-in. bolts
- A 5/16-in. combination wrench or adjustable wrench
- A ¼-in. combination wrench or adjustable wrench
- Two 5/16-18 bolts with nuts and washers (not included)

Figure 3-4: Panel Mounting



A. 5/16-18 bolts for panel mounting (not supplied)
B. 5/16-18 x 1¼-in. bolts for transmitter mounting

Dimensions are in inches [millimeters].

3.7 Rotate LCD display

You can rotate the LCD display in 90 degree increments by squeezing the two tabs, pulling the LCD display out, rotating it, and snapping it back into place.

Note
Although you can rotate the LCD display, always install the transmitter with the sensor facing downwards.

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

Note
Use only Rosemount Wireless LCD Display part number 00753-9004-0002.

3.8 Ground the transmitter

The transmitter operates with the housing grounded or floating. Floating systems, however, can cause extra noise that may affect many types of readout devices. If the signal appears noisy or erratic, grounding at a single point may solve the problem. Ground the electronics enclosure in accordance with local and national installation codes. Ground the electronics using the internal or external case grounding terminal.

3.9 External alarm device electrical connections

The discrete output of the transmitter (Models 928XSS01 and 928UTX01) can trigger an optional, customer-supplied external alarm device.

Note
The transmitter cannot power external devices. It acts as a switch that closes the power circuit of a connected external device when activated by a gas concentration threshold if configured to do so.

You can configure an external power supply and alert device to issue a local alarm when the detected gas concentration level exceeds the specified high concentration threshold. You can configure the local alarm to latch the alarm output until the alarm is manually cleared or query the device to detect whether this option is installed. Examples of alarm mechanism options include:

- Audible alarm
- Visual alarm (for example, a flashing light)
- Initiate action (for example, close valves, initiate facility evacuation, call emergency services)

⚠ WARNING

Alarm

If installing an optional, customer-supplied external alarm device, verify proper function.

Verify that gas concentrations in the area have dissipated to a safe level before clearing local or digital alarms.

When connecting an external device to the monitor's discrete output in a hazardous area, ensure that the external device is installed in accordance with Intrinsically Safe or non-incendive field wiring practices.

The transmitter does not need to be connected to a wireless network for the external alarm device to function. However, the low battery, no measurement, or sensor failure alerts will not be available.

There are two possible connection methods for the external alarm device:

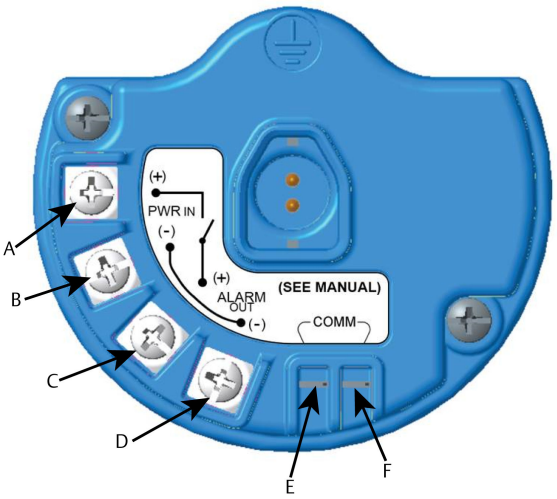
- Four-wire: This connection method (most common) uses a set of two wires for an IS input power supply. Another set of two input wires is used for a separate IS alarm mechanism.
- Two-wire: This connection method combines an IS power source, such as an internal battery, and alarm device into one package.

You may also add an optional, customer-supplied alarm suppression button.

3.9.1 Connect an external alarm device

Procedure

1. On the transmitter's main housing, remove the rear housing cover to expose the terminal block.

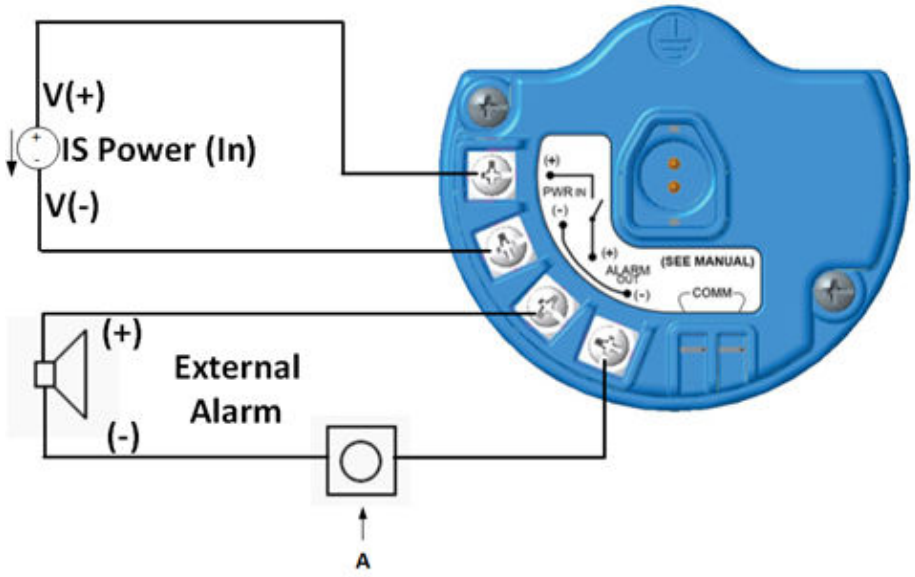


A. +Barrier power
B. -Barrier power
C. +Output to alarm
D. -Output to alarm
E. +Comm terminal
F. -Comm terminal

2. On the main housing, remove one of the conduit plugs.
   Refer to Figure 3-2.
3. Route the barrier power and alarm output wiring into the main housing.
4. Connect the wiring to the external device on the terminal block according to the terminal labels. Do one of the following:

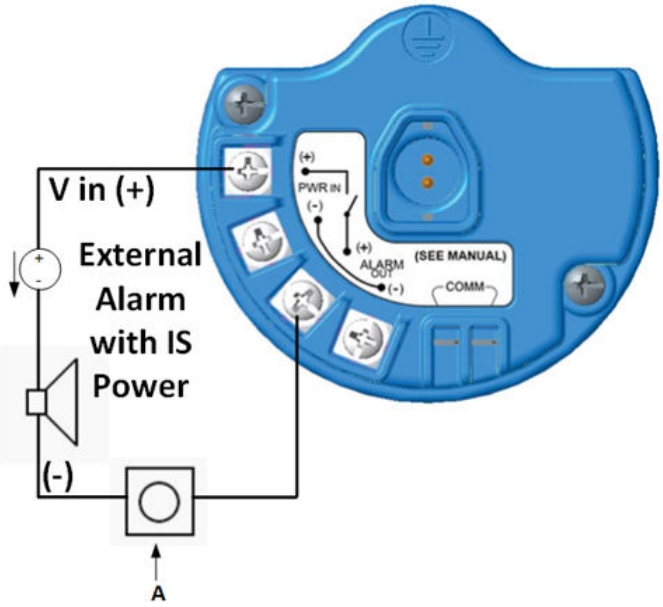
Note
Shield alarm wiring for noise immunity.

- Perform four wire installation. This is the most common configuration. Refer to the following diagram.



A. External alarm suppression button (optional)

- Perform two wire installation. Refer to the following diagram.



A. External alarm suppression button (optional)

5. Connect the wiring to the external device according to the manufacturer's instructions.
6. Verify that the external device functions properly.
   a) Perform a bump test.
      Refer to Bump testing.

b) If available, use the external device's manual test function to verify proper function.

   Refer to the external device documentation for more information.

4 Commissioning

4.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of personnel performing the operations.

⚠ WARNING

Follow installation guidelines.

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

Ensure that only qualified personnel perform the installation.

⚠ WARNING

Explosions

Explosions could result in death or serious injury.

Before connecting a handheld communication device in an explosive atmosphere, make sure the instruments are installed in accordance with Intrinsically Safe or non-incendive field wiring practices.

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

⚠ WARNING

Electrical shock

Electrical shock could cause death or serious injury.

Use extreme caution when making contact with the leads and terminals.

The power module may be replaced in a hazardous area. The power module has a surface resisitivity greater than one gigaohm and must be properly installed in the wireless device enclosure. Take care during transporation to and from the point of installation to prevent electrostatic charge buildup.

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge buildup, do not rub or clean the antenna with solvents or a dry cloth.

Substitution of components may impair intrinsic safety.

Note

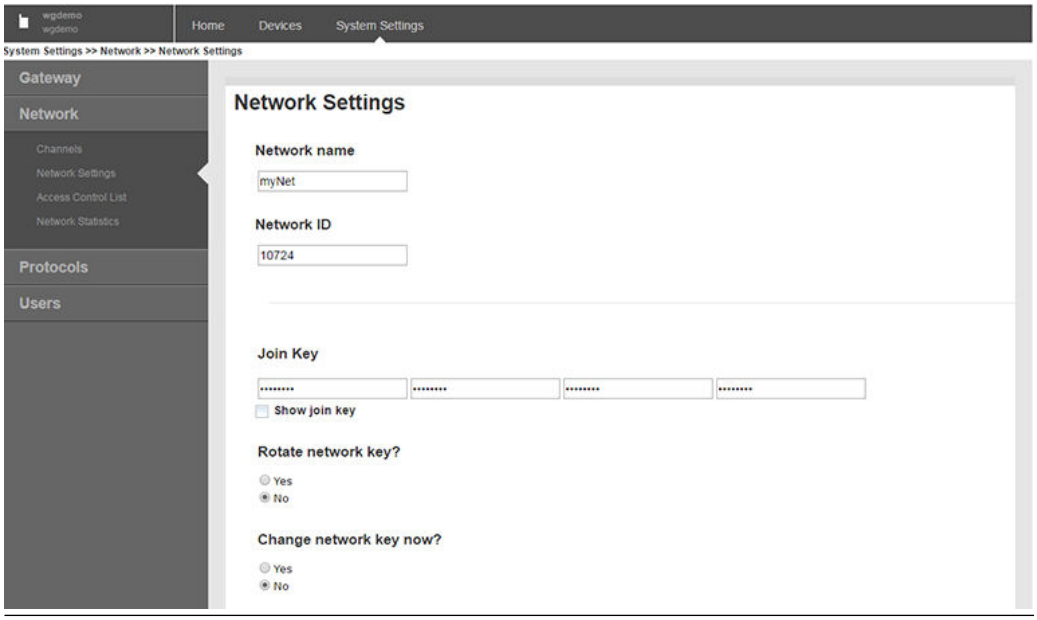
Only install the transmitter and all other devices after you have installed the wireless gateway and the gateway is functioning properly. Power up wireless devices in order of proximity from the wireless gateway, beginning with the device closest to the wireless gateway. This will result in a simpler and faster network installation.

4.2 Verify wireless network communication

In order for the transmitter to communicate with the wireless gateway, and ultimately the host system, you must configure the transmitter to communicate with the wireless network. This step is the wireless equivalent of connecting wires from a transmitter to the host system. If the network ID and join key are not identical, the transmitter will not communicate with the network.

You may obtain the network ID and join key from the Wireless Gateway on the **Setup** → **Network** → **Settings** page on the web server, shown in Figure 4-1.

Figure 4-1: Wireless Gateway Network Settings



Refer to Joining the transmitter to a wireless network.

4.2.1 Verify network join status

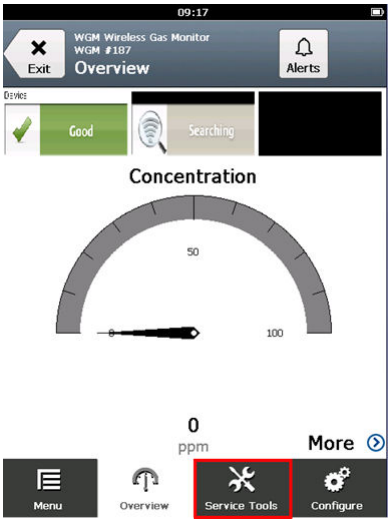
The chevron-shaped status bar at the top of the LCD screen indicates the progress of the network join process. When the status bar is filled, the device is successfully connected to the wireless network.

Refer to Device diagnostic LCD display screens.

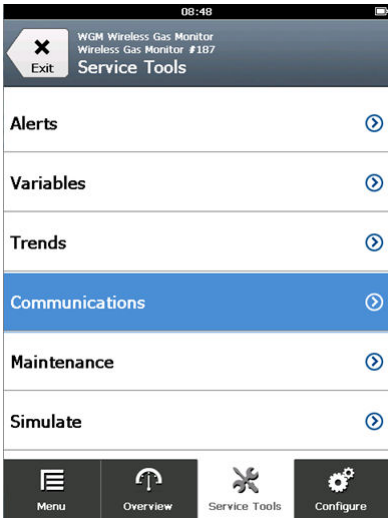
4.2.2 Verify communication using Field Communicator

Procedure

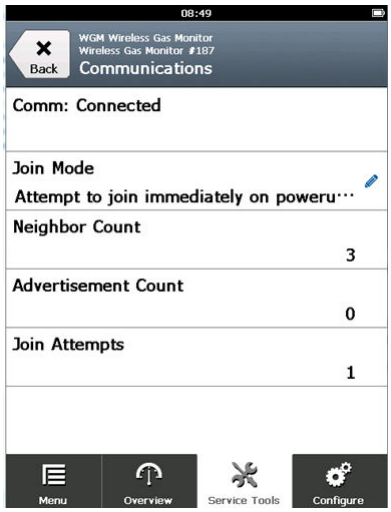
1. On the **Overview** screen, select **Service Tools**.



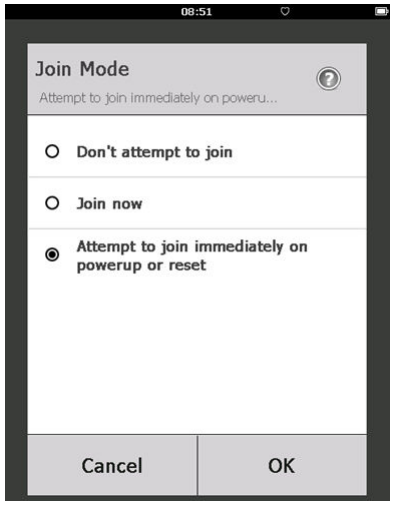
2. On the **Service Tools** screen, select **Communications**.



3. Verify the following communications information.



- Communication status: Displays whether the device is connected to the wireless network.
- Join Mode: Displays the current join mode. Select Join Mode to change the way that the device joins the wireless network.The default option is Attempt to join immediately on powerup or reset. Select **Send** twice to update the join mode.



- Neighbor Count: Displays the number of available neighboring devices.
- Advertisement Count: Displays the number of advertisement packets received.

4. When finished, select **Back** to return to the **Communications** screen.

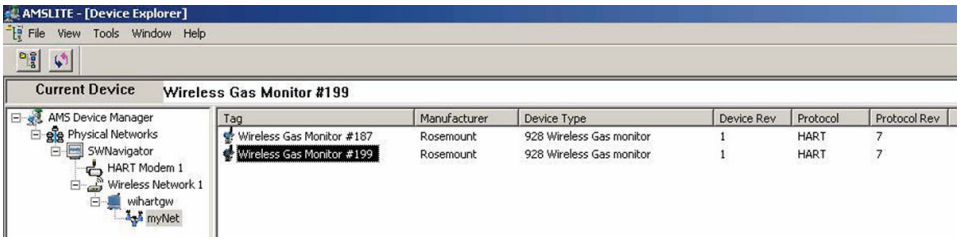
4.2.3 Verify communication using AMS Wireless Configurator

Complete the following steps to verify communications on the device using the AMS Wireless Configurator.

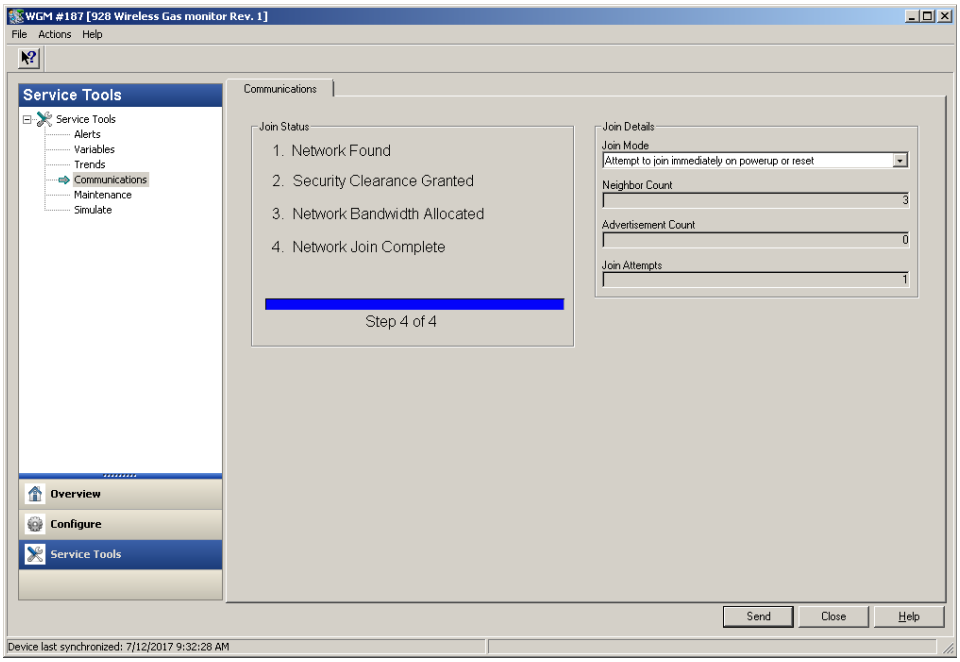
Procedure

1. Open AMS Wireless Configurator.

2. In the **Device Manager** pane, expand the wireless network menu.
3. Expand the wireless gateway menu.
4. Select the device list.



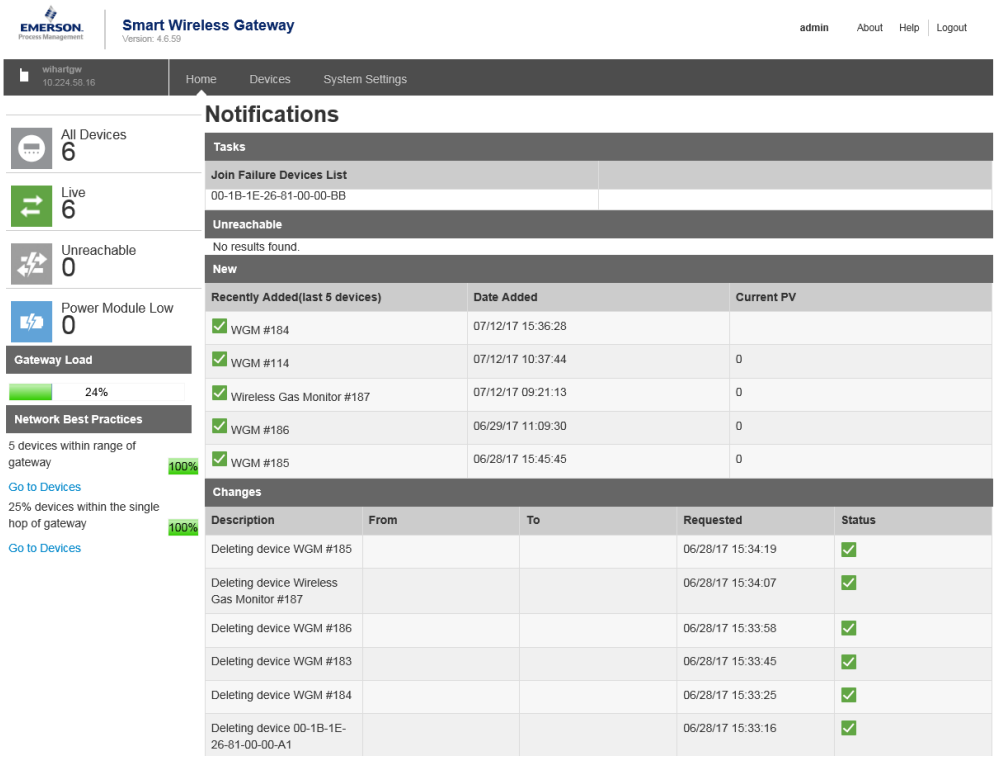
5. In the device panel, double-click the device icon.
6. Select Service Tools.
7. In the **Service Tools** pane, select Communications.



8. On the **Communications** tab, in the **Join Status** field, verify that all four network join steps are completed.

4.2.4 Verify communication using the Wireless Gateway

Open the Wireless Gateway web interface. This page shows whether the device has joined the network and is communicating properly.



4.3 Using Field Communicator to change the network ID and join key

If you need to change the network ID and join key, refer to Join a wireless network using Field Communicator.

4.4 Using AMS Wireless Configurator to change the network ID and join key

If you need to change the network ID and join key, refer to Join a wireless network using AMS Wireless Configurator.

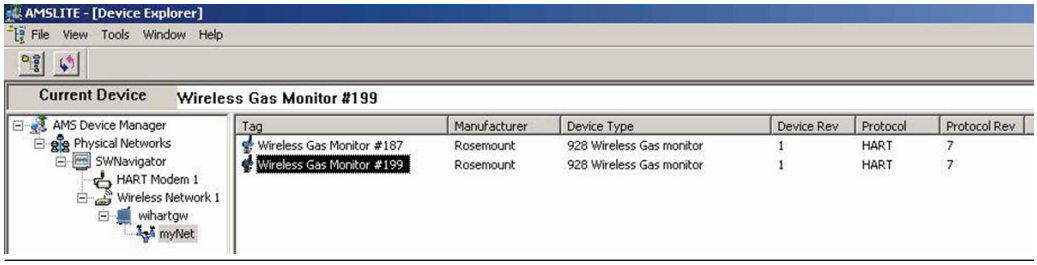
4.5 Verify operation

There are four ways to verify operation:

- Transmitter LCD display
- Handheld communication device
- Wireless Gateway's integrated web interface
- AMS Device Manager

If you have configured the transmitter with the network ID and join key and sufficient time has passed, the transmitter will be connected to the network. When the device has joined the network, it will be displayed in AMS Device Explorer.

Figure 4-2: AMS Device Explorer



4.5.1 Verify LCD display operation

Procedure

1. Verify that the display items are correct.

   The LCD displays the primary variable (Gas Concentration) by default. The other variables are:

   - Secondary variable (Gas Sensor Module Temperature)
   - Tertiary variable (Electronics Temperature)
   - Quaternary variable (Supply Voltage)

   You may configure these variables to alternate displaying with the primary variable at the configured update rate. Refer to Configuring display options if you need to change the display items.

2. Verify that the display mode is correct.

   Refer to Configuring the device display mode if you need to change the display mode.

   - Disabled: The display is turned off. This is useful if the display will never be viewed locally.
   - On Demand: The display is on when the transmitter is connected to a handheld communication device or when it receives a signal from its Wireless Gateway.
   - Periodic: The display is on only during updates at the configured update rate.
   - High Availability: The display is always on regardless of the configured update rate. This is the default display mode option.

3. Press the **Diagnostic** button to display the **TAG**, **Device ID**, **Network ID**, **Network Join Status**, and **Device Status** screens.

   Refer to Device diagnostic LCD display screens.

4.6 If there is an immediate alarm

⚠ WARNING

Alarm

If the device joins the network and immediately issues an alarm, respond as though the alarm is real until it is proven false.

If the alarm is false, it is likely due to sensor configuration. Verify the sensor configuration, alert set points, and alarm set points.

4.7 Troubleshoot communication

If the device is not joined to the network after power up, verify the correct configuration of the network ID and join key and verify that active advertising has been enabled on the wireless gateway. The network ID and join key in the device must match the network ID and join key of the wireless gateway.

You may obtain the network ID and join key from the wireless gateway on the **Setup** → **Network** → **Setttings** page on the web interface. You may change the Network ID and Join Key if necessary. Refer to Joining the transmitter to a wireless network.

5 Operation and maintenance

5.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of personnel performing them.

⚠ WARNING

Follow installation guidelines.

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

Ensure that only qualified personnel perform the installation.

Replace Rosemount™ 628 Universal Gas Sensors if the tabs do not latch as intended.

⚠ WARNING

Explosions

Explosions could result in death or serious injury.

Before connecting a handheld device in an explosive atmosphere, ensure that the instruments are installed in accordance with Intrinsically Safe or non-incendive field wiring practices.

When connecting an external device to the Rosemount 928's discrete output in a hazardous area, ensure that the external device is installed in accordance with Intrinsically Safe or non-incendive field wiring practices.

Verify that the transmitter operating atmosphere is consistent with the hazardous location certifications.

⚠ WARNING

Electrical shock

Electrical shock could cause death or serious injury.

Use extreme caution when making contact with the leads and terminals.

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

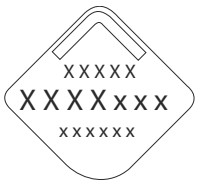
The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge buildup, do not rub or clean the antenna with solvents or a dry cloth.

Substitution of components may impair intrinsic safety.

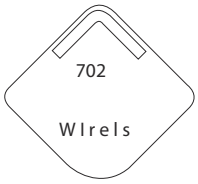
5.2 LCD display screens

5.2.1 Startup LCD display screens

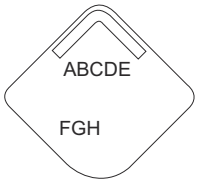
The following screens display when the power module is installed in the transmitter.



All Segments On: Used to visually determine if there are any bad segments on the LCD.

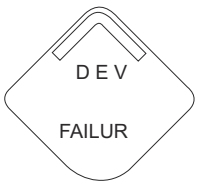


Device Identification: Used to determine the device type.



Device Information Tag: User-created tag eight characters long; will not display if all characters are blank.

Software Revision: Displays the current revision level.

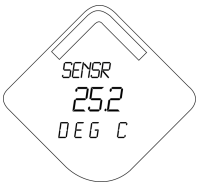


Device Status Information: The device has detected an electronics or memory fault.

5.2.2 Periodic LCD display screens

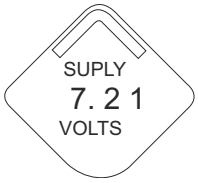
The periodic screens display during device startup after the startup screens and display after the diagnostics screens when you press the **Diagnostics** button.

Primary Variable (PV) screen: Displays the gas concentration level in the configured unit of measure.



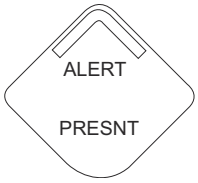
Secondary Variable (SV) screen: Displays the gas sensor module temperature.

Tertiary Variable (TV) screen: Displays the electronics temperature.

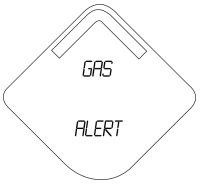


Quaternary Variable (QV) screen): Displays the supply voltage reading at the supply power terminals.

Percent of Range screen: Displays the percent of range.



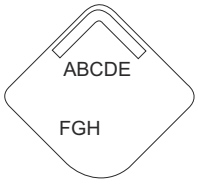
Alert screen: Displays when at least one alert is active. This screen does not display if no alerts are active.



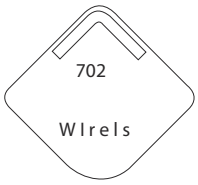
Gas Alert screen: Displays when the local discrete alert output or process alert for a gas concentration level is active. This screen does not display if no alerts are active.

5.2.3 Diagnostic button LCD display screens

These screens display automatically when the device is operating properly and you have pressed the **Diagnostic** button. These screens also display during startup.

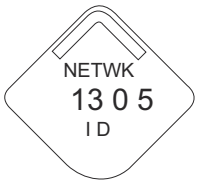


Device Information Tag: A user-created tag eight characters long that does not display if all characters are blank.



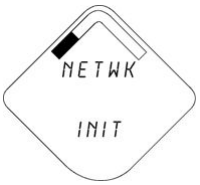
Device Identification: Displays the device's unique identifier used in the HART® long address.

Software Revision: Displays the current software revision level.



Network ID: Assuming that the device has the correct join key, this screen displays the ID of the network with which the device can connect.

Network Unknown: The DIM (feature board) has not retrieved network information from the NIM. The chevron bar graph displays 0 percent.



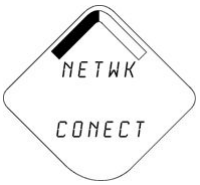
Network Initializing: The NIM is starting and waiting to complete its boot sequence. The chevron bar graph displays 25 percent.

Network Idle: The NIM is accepting configuration commands and waiting for the Join process to begin. The chevron bar graph displays 25 percent.

Network Disconnect: The NIM is disconnected and requires a `Force Join` to exit this mode.

Network Searching: The NIM is actively searching for the network. The chevron bar graph displays 50 percent.

Network Negotiating: The NIM is joining the network. The chevron bar graph displays 50 percent.



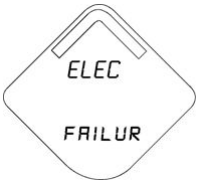
Network Connecting: The NIM has joined the network, but is not yet able to send data. The chevron bar graph displays 50 percent.

Network Limited Operation: The NIM has joined the network and is operational, but with limited bandwidth for sending periodic data. The chevron bar graph displays 75 percent.

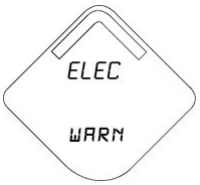
Network OK: The device has joined a network and has been fully configured and has multiple parents. The chevron bar graph displays 100 percent.

5.2.4 Device diagnostic LCD display screens

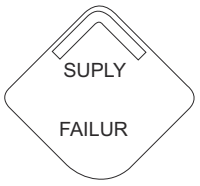
The following screens display the device diagnostics depending on the state of the device and appear after the **Diagnostic** button screen sequence.



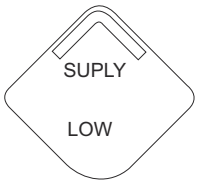
Electronics Failure: There is a critical error which may prevent the DIM (feature board) from operating correctly. Check additional status screens for more information about the failure source.



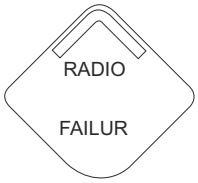
Electronics Warning: There is a warning that needs to be addressed, but should not affect device output. Check additional status screens for more information about the warning source.



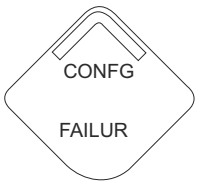
Supply Failure: The terminal voltage has dropped below the minimum level for safe operation. Variable readings, writing to non-volatile memory, and database storage may be susceptible to failure.



Supply Low: The terminal voltage is below the recommended operating range. For battery-operated devices, replace the power module. For line powered devices, increase the supply voltage.

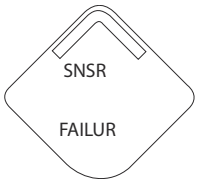


Radio Failure: The device cannot retrieve parameter information from the radio in the device. The device may still be operational and publishing HART® data.



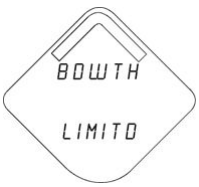
Configuration Failure: Invalid configuration of the transmitter may affect critical operation of the device. Check the extended configuration status to identify which configuration items require connection.

Configuration Warning: Invalid configuration of the transmitter may affect non-critical operation of the device. Check the extended configuration status to identify which configuration items require correction.



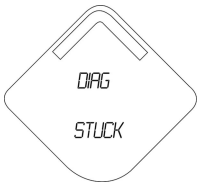
Sensor Failure: The sensor attached to the transmitter has failed; valid readings from that sensor are no longer possible. Check the sensor connections. Check additional status for more detailed information about the failure source.

Sensor Warning: The sensor attached to the transmitter has degraded; readings from that sensor may not be accurate. Check the sensor and sensor wiring connections. Check additional status for more detailed information about the failure source.



Bandwidth Limited: The device has not received all of the requested wireless bandwidth required to operate as configured.

5.2.5 Other LCD display screens



Diagnostic Button Stuck: This screen displays if the **Diagnostic** button is pressed and held for too long or is active upon device startup.

5.3 Software features

The following features are available in the Rosemount 928 software.

- Alert History: Displays latched device status alerts issued due to errors and warnings. You may clear latched status alerts manually by using the `Clear Alert History` command, by resetting the device, by cycling device power, or by changing device configuration settings.
- Clear Alert History: Manually clears the alerts displayed in **Alert History**. You cannot clear active alerts. You can also clear alert history by resetting the device or cycling device power.
- Process Alerts: Up to eight process alerts are available to trigger alerts when device variables exceed the configured alert threshold.
- Sensor Module Information: Information about the installed sensor module includes gas name, gas module type, serial number, date of manufacture, hardware revision level, software revision level, gas module compatibility revision level, and minimum feature board compatibility revision level. This is useful for review and tracking.
- Service Reminders: If selected, displays reminders when the installed gas sensor module is due for service based on the specified service date (the date on which the gas sensor module was last calibrated).
- Calibration History: Displays the calibration history of the installed gas sensor module.
- Gas Module Replacement: Displays a notification that the gas sensor module must be replaced soon. This can only be resolved by replacing the gas sensor module.
- Revert to Previous Gas Module Calibration: Restores the previously-stored gas module calibration settings. This is useful when a gas calibration result is unsatisfactory. You cannot successfully execute this command if the most recent calibration has been stored to history or if the device has been reset.
- Store Calibration to History: Stores the current gas module calibration settings in the calibration history log. Once you have executed this command or reset the device, reverting to the previous calibration is impossible.
- Local Alarm Output: If the device is equipped with this option, an external power supply and alert mechanism issue a local alarm when the detected gas concentration level exceeds the specified high concentration threshold. You can configure the local alarm to latch the alarm output until the alarm is manually cleared. Latched alarms do not remain latched following a device reset or power module failure. You may query the device to detect whether this option is installed. Examples of alarm mechanism options include:

— Audible

— Visual (for example, a flashing light)

— Initiate action (for example, close valves, initiate facility evacuation, call emergency services)

⚠ WARNING

Verify that gas concentrations in the area have dissipated to a safe level before clearing local or digital alarms.

- Gas Concentration Alarm Configuration: Displays the configuration settings for local and digital gas concentration alarms when the detected gas concentration level exceeds the specified high concentration threshold. This option allows configuring the following gas alarm options:
  — High Concentration Threshold: Gas concentration level alarm is activated when the detected gas concentration exceeds the specified high concentration threshold.
  — Alarm Latching: If you select Latch Gas Alarm, the alarm output is latched until you manually clear the alarm. If you select Not Latched, the alarm clears automatically when the gas concentration level dissipates below the specified high concentration threshold.
  — Alert Handling: If you select Alert Triggers Gas Alarm, the device issues an alarm in case of a device failure alert. If you select Alerts do not Trigger Gas Alarms, the device only issues an alarm when the detected gas concentration level exceeds the specified alarm threshold.
- Configurable Update Rate: Specifies the wireless update rate. The range is 1 second to 60 seconds. The default update rate is eight seconds. Refer to Update rate considerations.
- Gas Concentration Filtering: This setting controls the filtering of gas concentration measurements. By default, Report Small Readings as Zero is selected. Filtering is temporarily disabled during calibration. The options are:
  — No Filtering: When you select this setting, all gas concentration measurements are reported at their actual values.
  — Truncate Values Below Zero: Gas concentration measurements less than zero are reported as zero.
  — Report Small Readings as Zero: Gas concentration measurements near zero but within the degree of uncertainty are reported as zero. Refer to Table 5-1 for the degree of uncertainty based on gas type.

Table 5-1: Degrees of Uncertainty

Gas type	Degree of uncertainty
Hydrogen sulfide (H_2S)	0.5 ppm
Oxygen (O_2)	0.2 ppm
Carbon monoxide (CO)	3 ppm

5.4 Resetting latched alarms

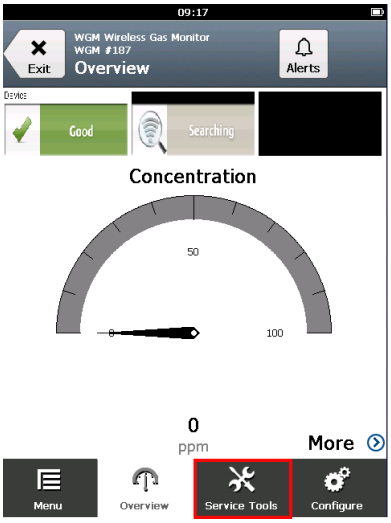
You can clear latched alarms by removing and reinstalling the power module to power the device off and back on again.

Refer to Remove power module and Install the power module. Latched alarms do not remain latched following a device reset or power mode failure. You can also clear latched alarms by using the Reset Latched Alarms functions in Field Communicator or AMS Wireless Configurator.

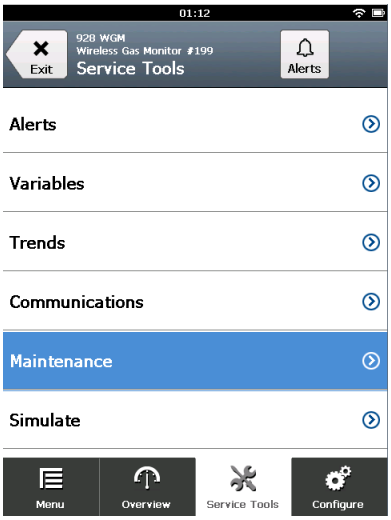
5.4.1 Reset latched alarms using Field Communicator

Procedure

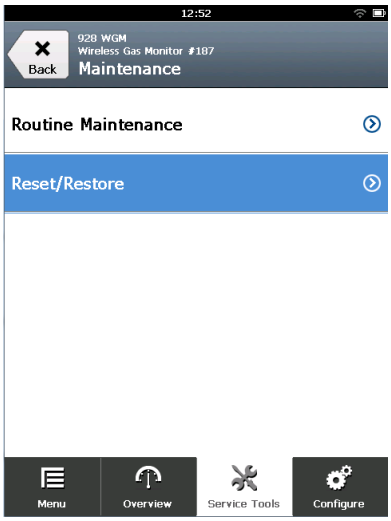
1. On the **Overview** screen, select **Service Tools**.



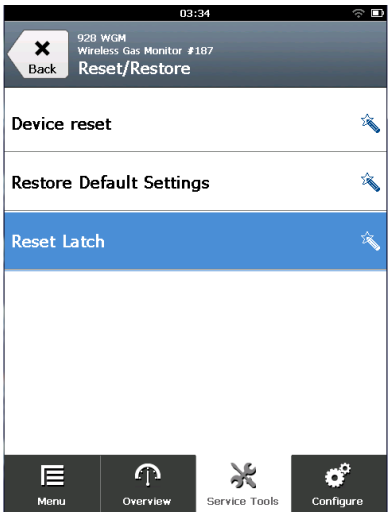
2. On the **Service Tools** screen, select **Maintenance**.



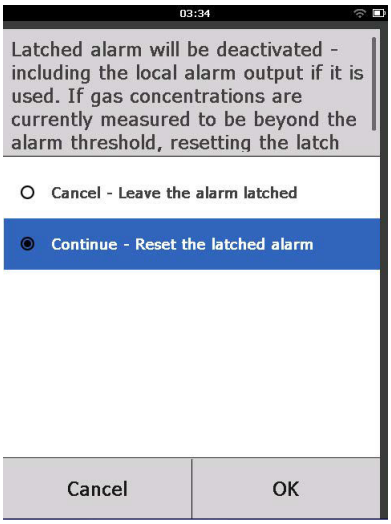
3. On the **Maintenance** screen, select **Reset/Restore**.



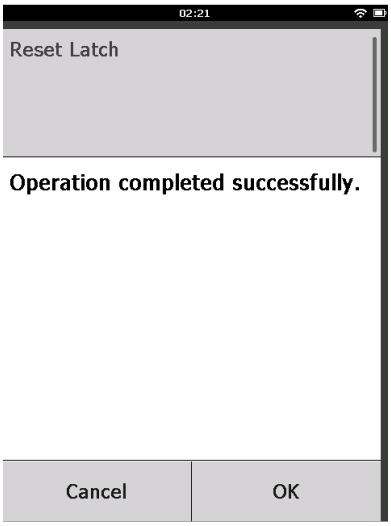
4. On the **Reset/Restore** screen, select **Reset Latch**.



5. On the **Latched alarm will be deactivated** screen, select **Continue**.



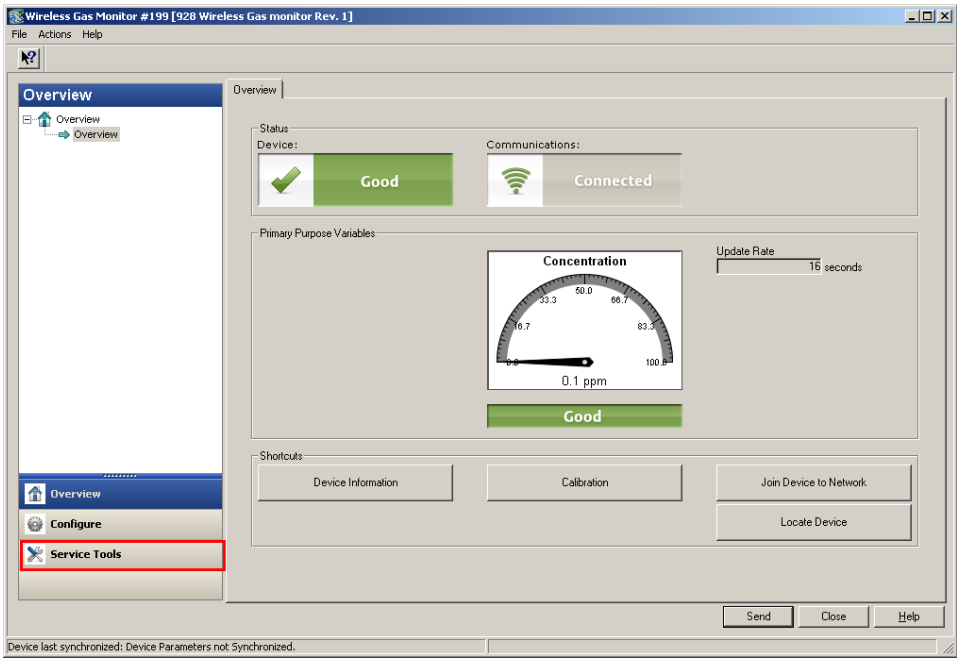
6. Select **OK**.
7. On the **Reset Latch** screen, select **OK**.



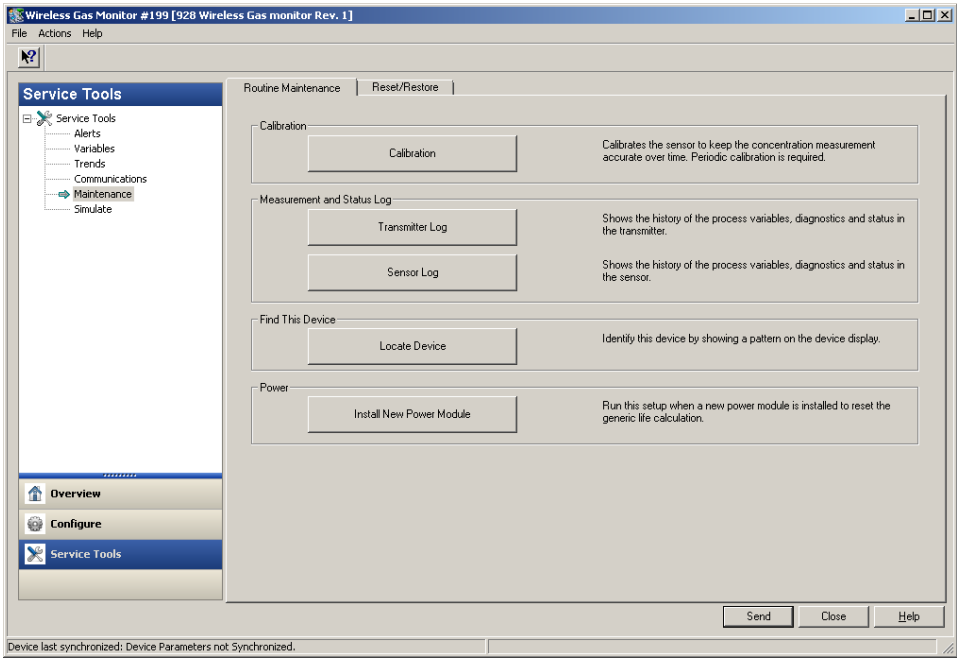
5.4.2 Reset latched alarms using AMS Wireless Configurator

Procedure

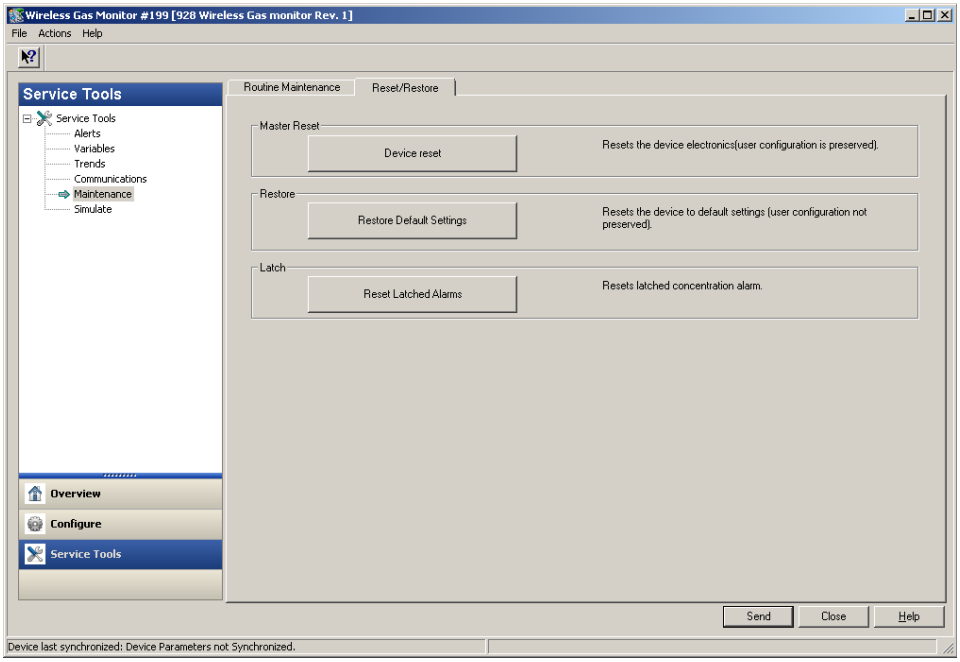
1. In AMS Wireless Configurator, select **Service Tools**.



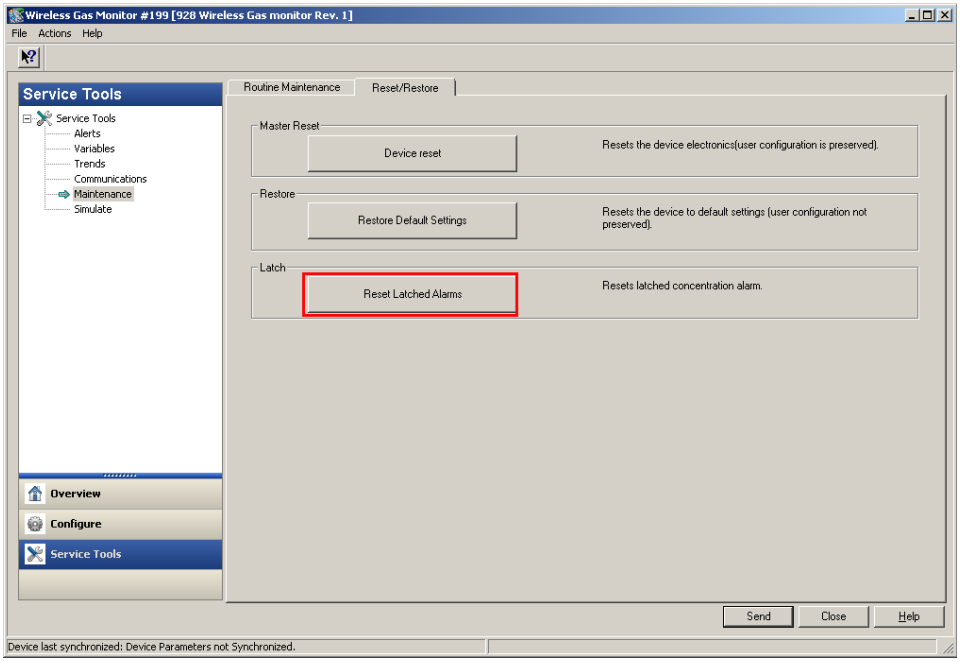
2. In the **Service Tools** pane, select **Maintenance**.



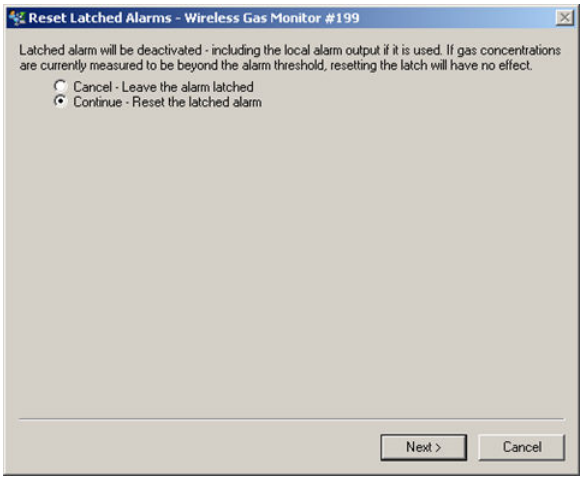
3. Select the **Reset/Restore** tab.



4. On the **Reset/Restore** tab, select **Reset Latched Alarms**.



5. On the **Reset Latched Alarms** window, select **Continue - Reset the latched alarm**.



6. On the **Reset Latched Alarms** window, select **Next**.
7. Select **Next**.
8. Select **Finish**.

Note
You can also access Reset Latched Alarms in Field Communicator and in AMS Wireless Configurator by navigating to **Service Tools** → **Active Alerts** and **Configure** → **Alert Setup** → **Process Alerts**.

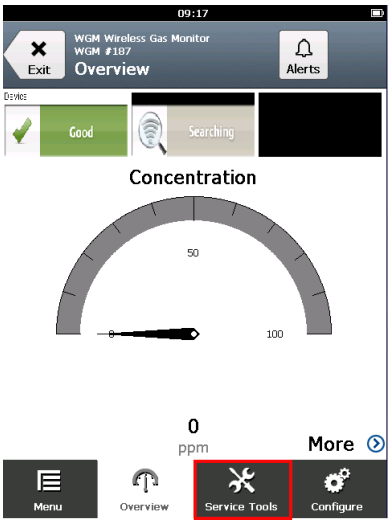
5.5 Clearing process alarm history

You can view and clear process alarm history using Field Communicator or AMS Wireless Configurator.

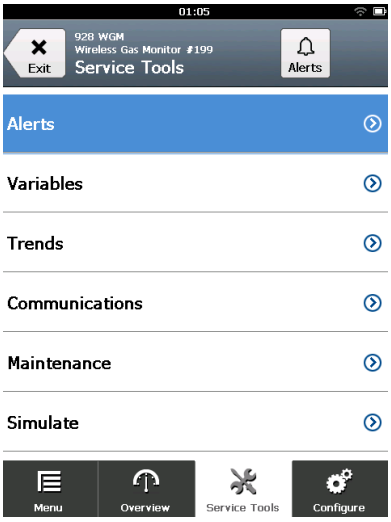
5.5.1 Clear process alarm history using Field Communicator

Procedure

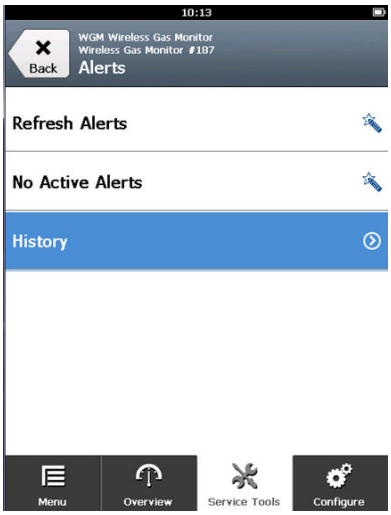
1. On the **Overview** screen, select **Service Tools**.



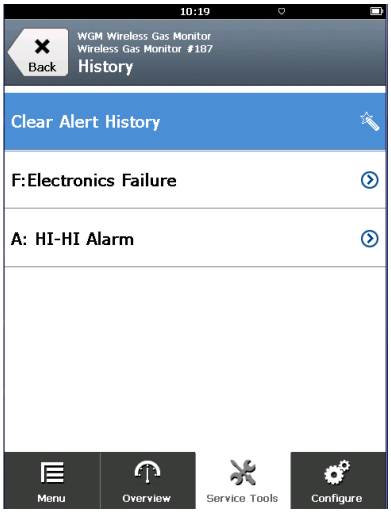
2. On the **Service Tools** screen, select **Alerts**.



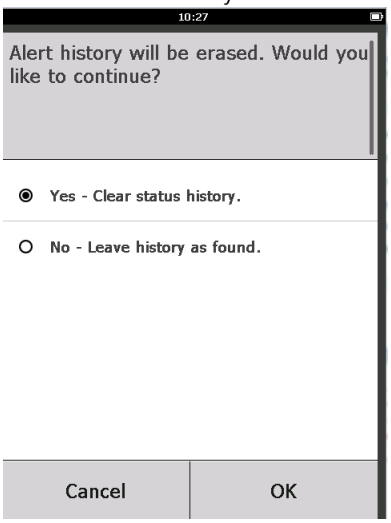
3. On the **Alerts** screen, select **History**.



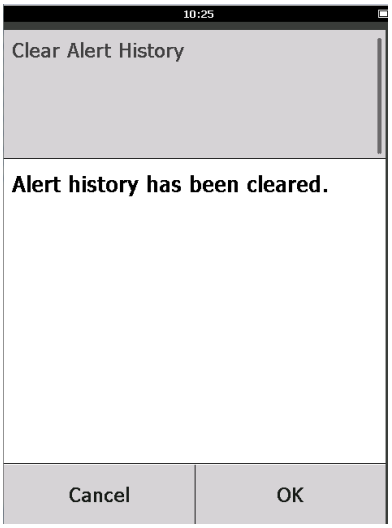
4. On the **History** screen, select **Clear Alert History**.



5. On the **Alert history will be erased** screen, the Yes is selected by default. Select **OK** to erase alert history.



6. On the **Clear Alert History** screen, select **OK** to confirm.



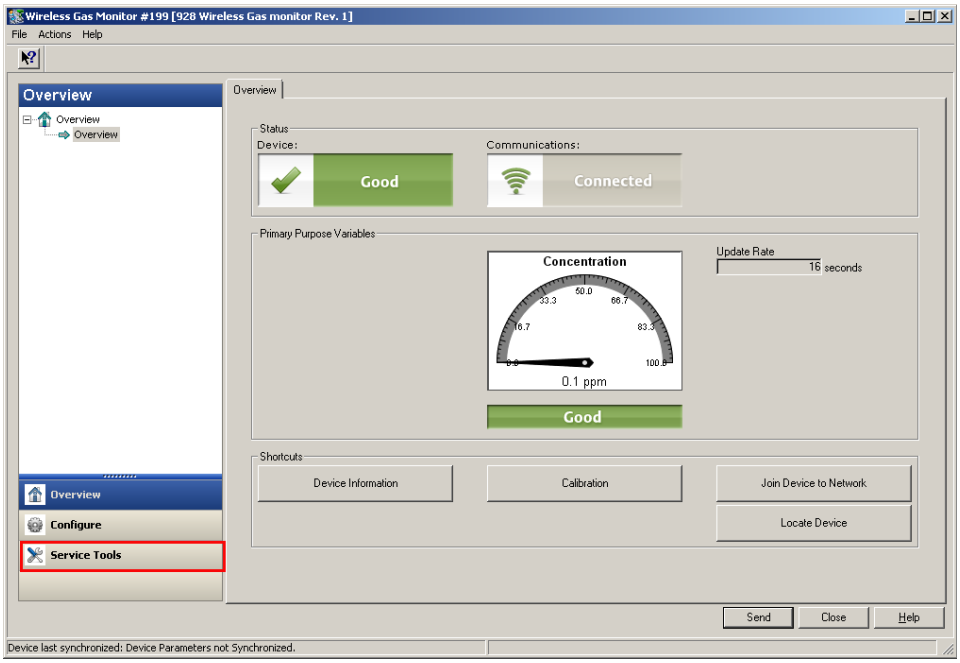
7. On the **Alerts** screen, verify that alert history is no longer available.

8. Select **Back** to return to the **Service Tools** screen.

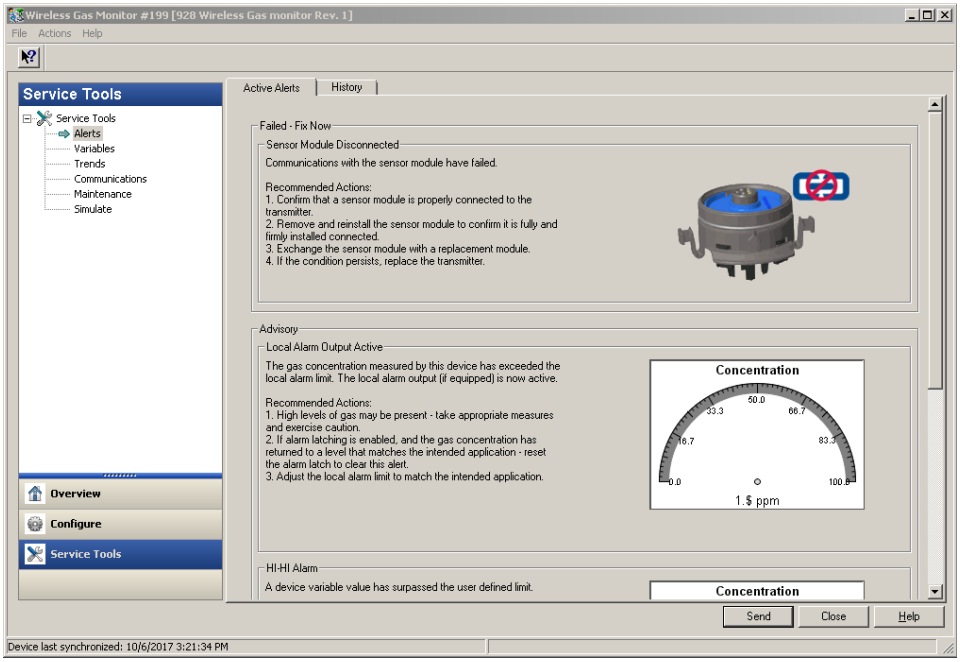
5.5.2 Clear process alarm history using AMS Wireless Configurator

Procedure

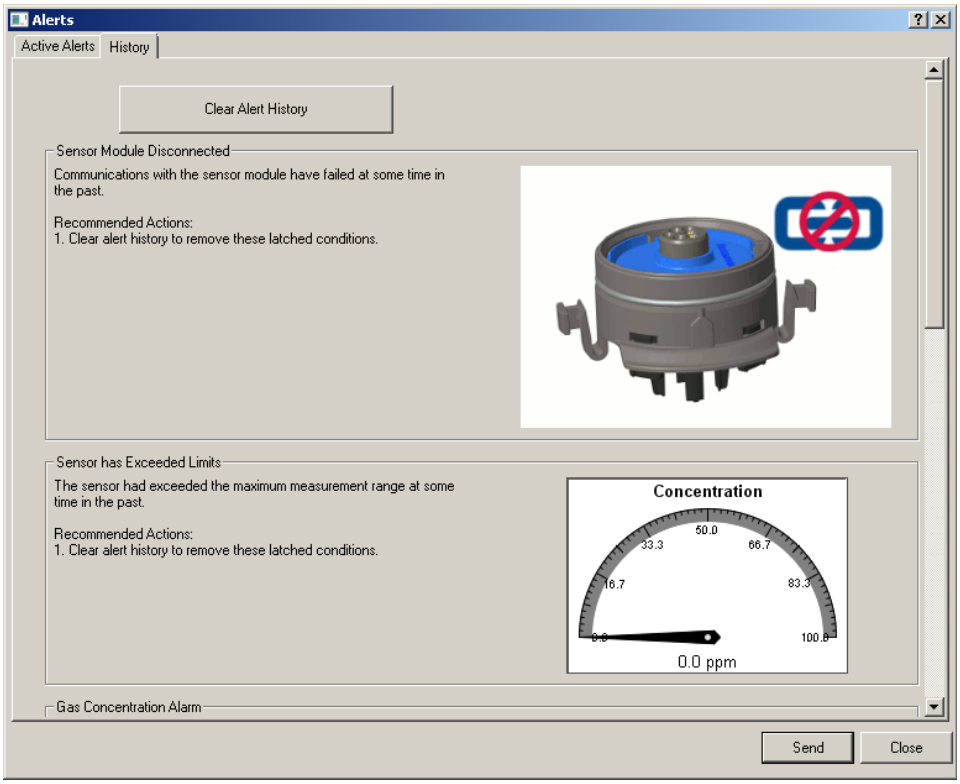
1. In AMS Wireless Configurator, select **Service Tools**.



2. In the **Service Tools** pane, select **Alerts**.

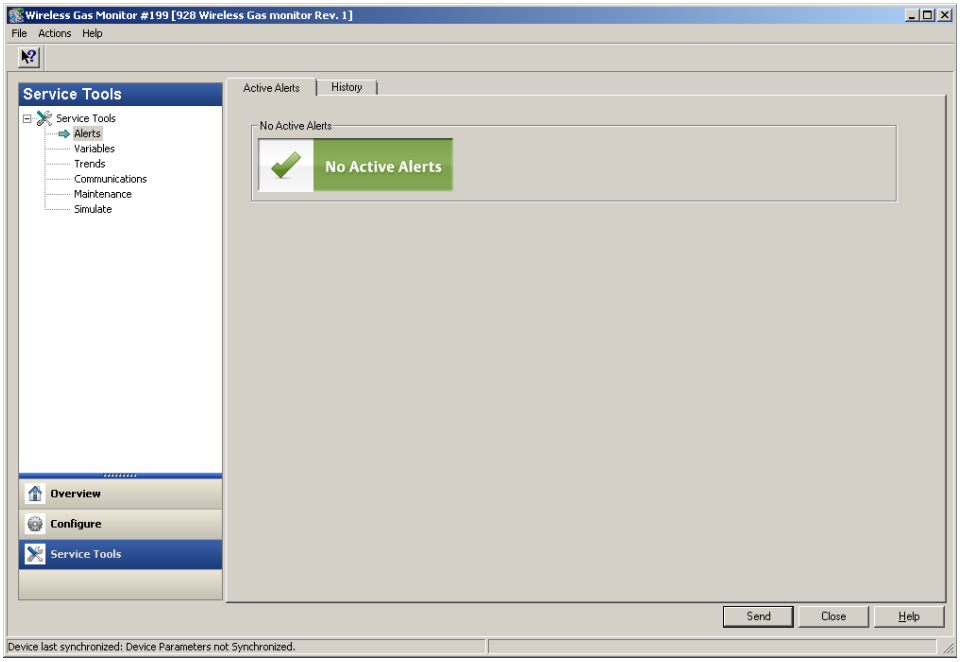


3. Select the **History** tab.



4. On the **History** tab, select **Clear Alarm History**.

5. On the **Active Alerts** tab, verify that the alert history is cleared.



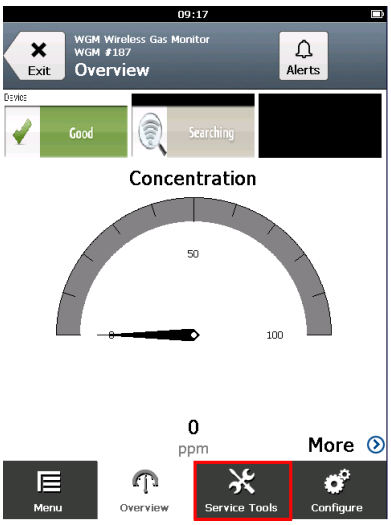
5.6 Calibration history

You can view previous calibration settings for the currently installed gas sensor module.

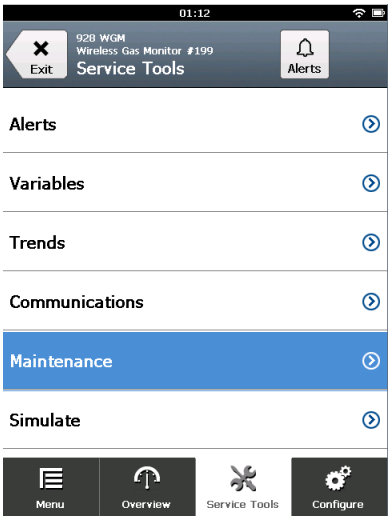
5.6.1 View calibration history using a Field Communicator

Procedure

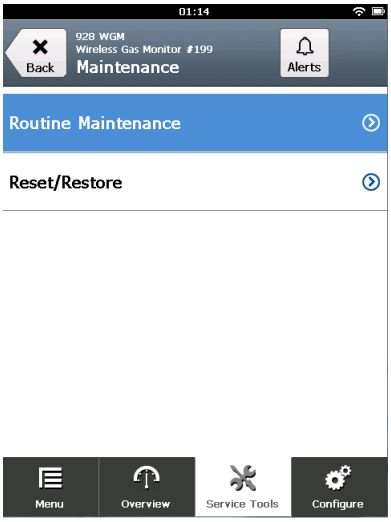
1. On the **Overview** screen, select **Service Tools**.



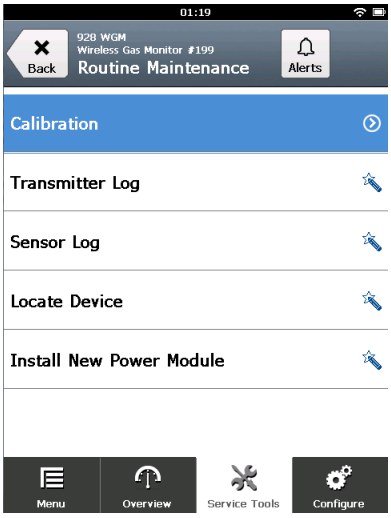
2. On the **Service Tools** screen, select **Maintenance**.



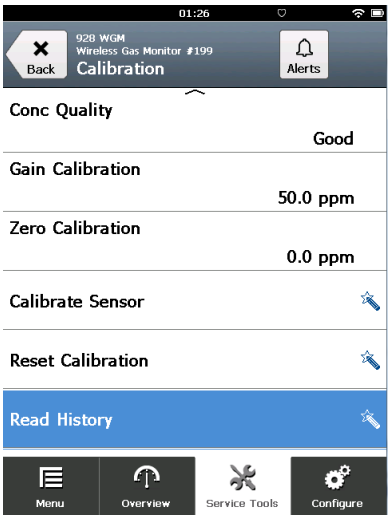
3. On the **Maintenance** screen, select **Routine Maintenance**.



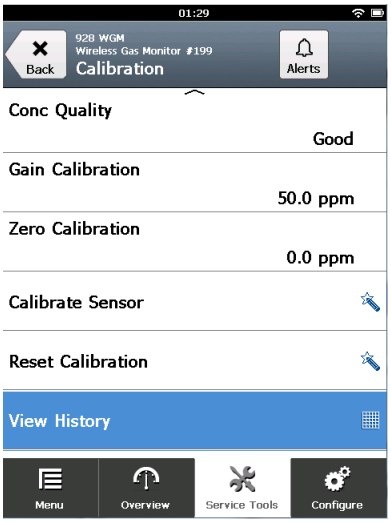
4. On the **Routine Maintenance** screen, select **Calibration**.



5. On the **Calibration** screen, select **Read History**.



6. On the **Calibration** screen, select **View History**.



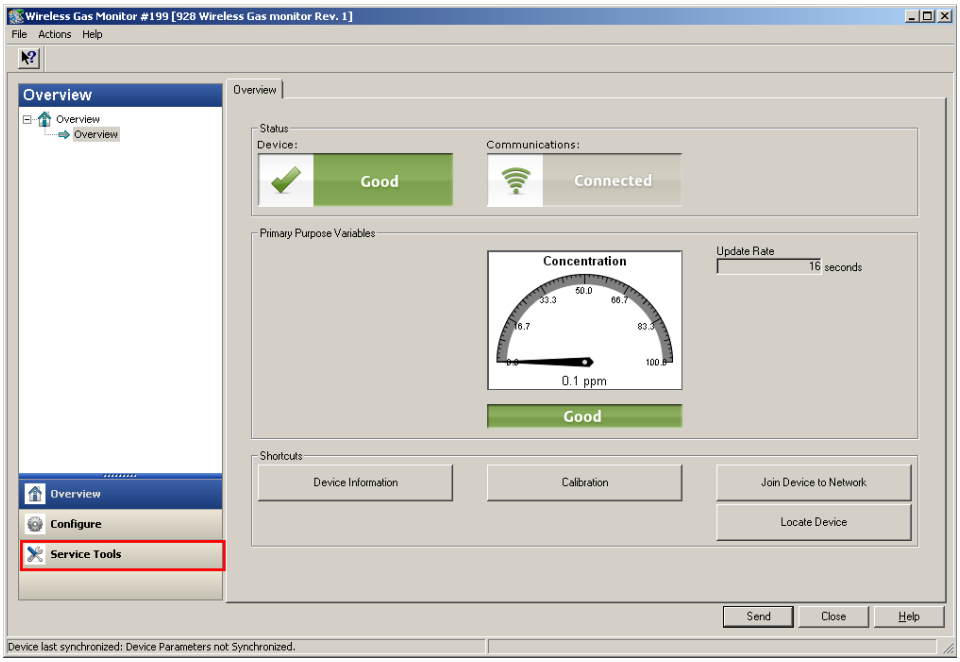
The **View History** screen displays the calibration history for the installed sensor.

7. When you have finished viewing calibration history, select **Back** to exit.

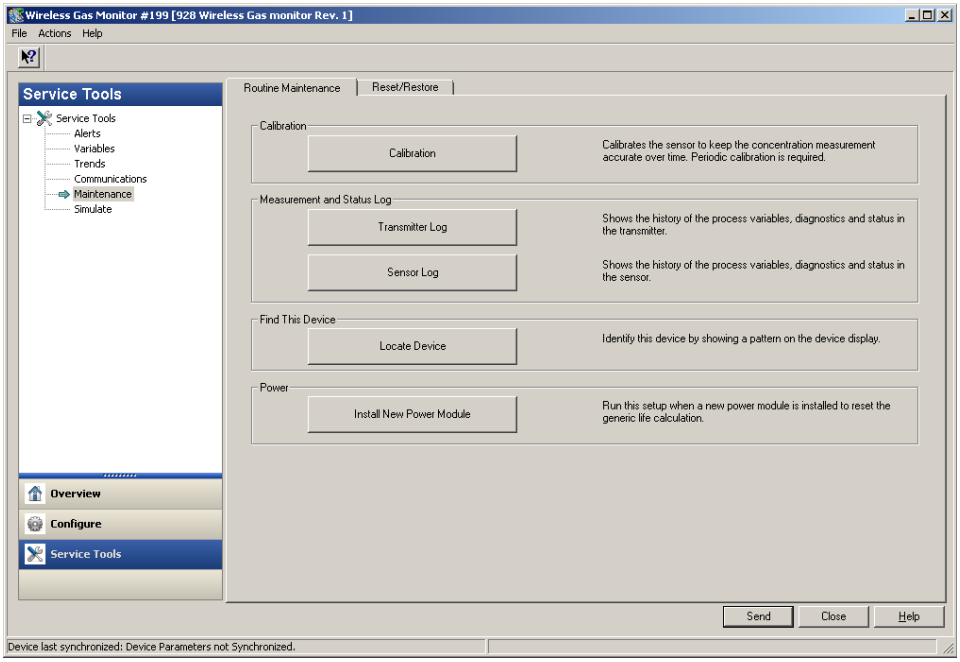
5.6.2 View calibration history using AMS Wireless Configurator

Procedure

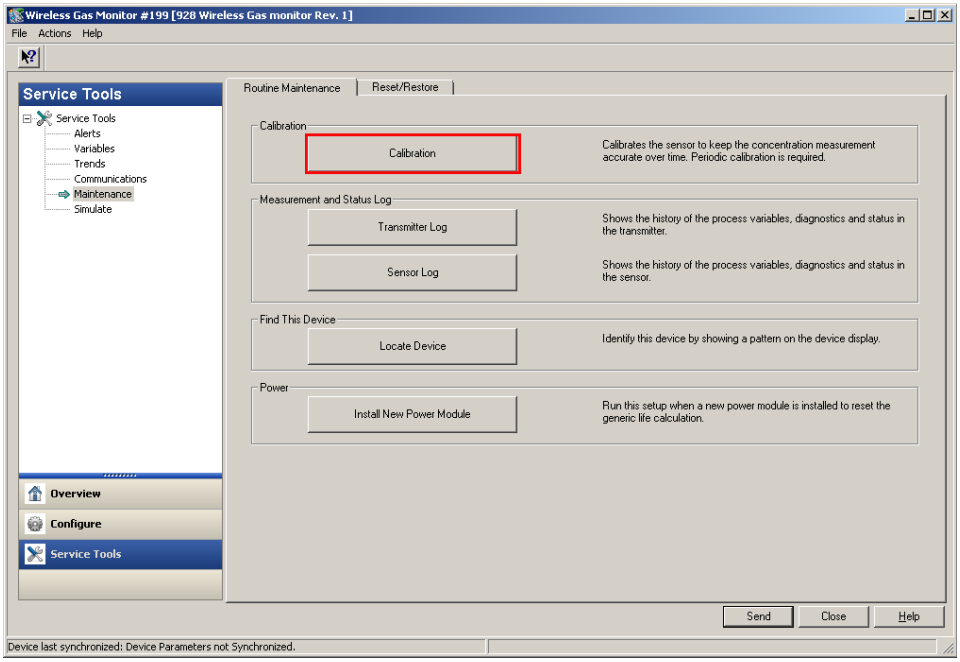
1. On the **Overview** screen, select **Service Tools**.



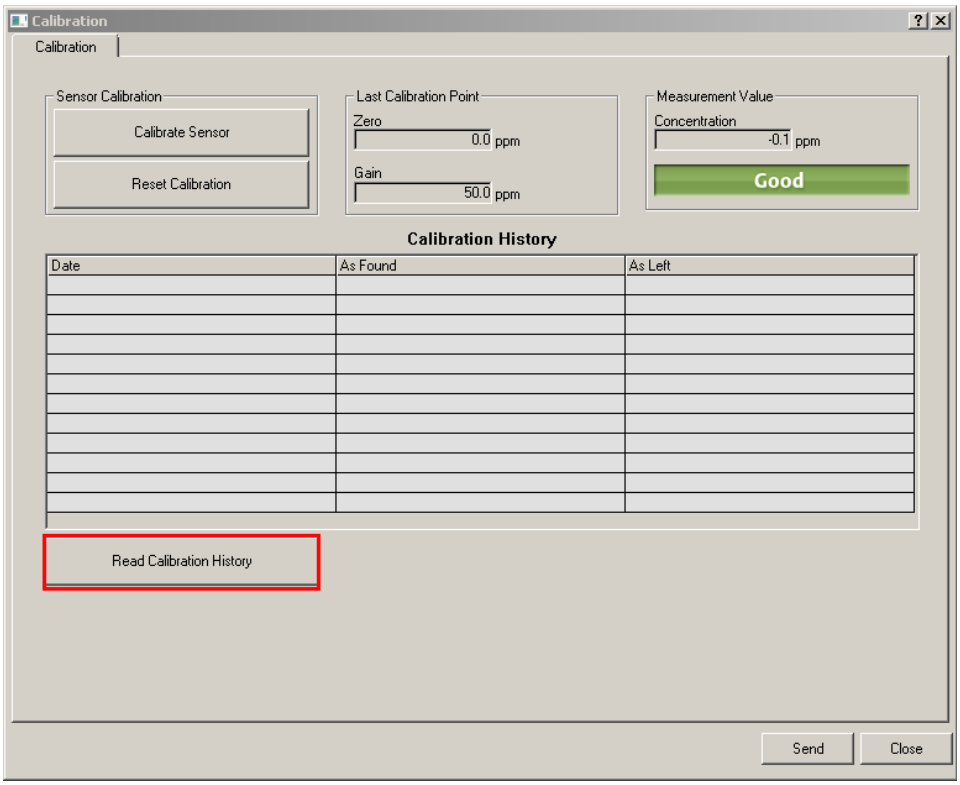
2. In the **Service Tools** pane, select **Maintenance**.



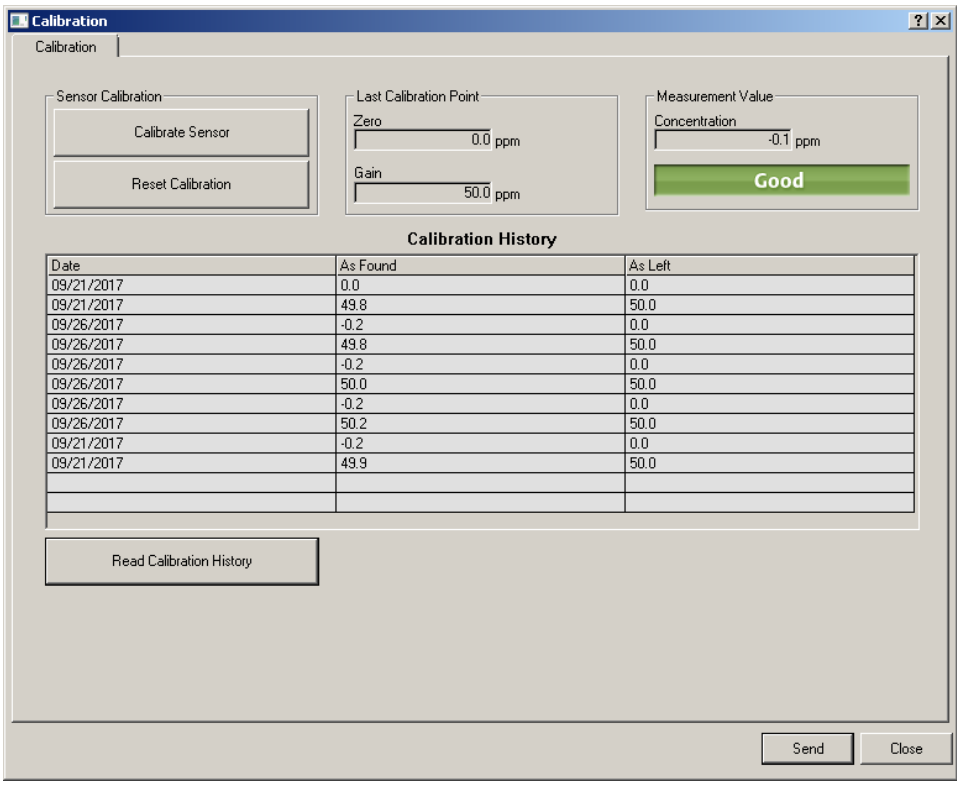
3. On the **Routine Maintenance** tab, select **Calibration**.



4. On the **Calibration** tab, select **Read Calibration History**.



In the Calibration History field, the calibration history for the installed sensor is displayed.



5. When you have finished viewing calibration history, select **Close**.

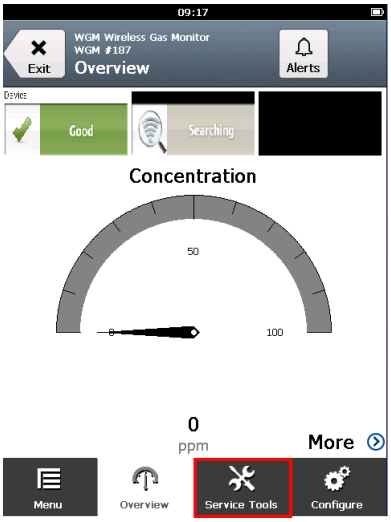
5.7 Sensor log

You can view status, process variable, and diagnostic history for the currently installed Rosemount 628.

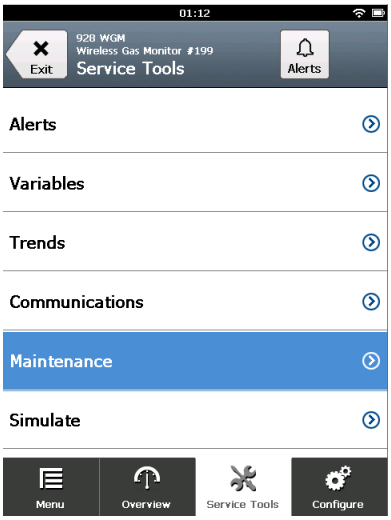
5.7.1 View the sensor log using Field Communicator

Procedure

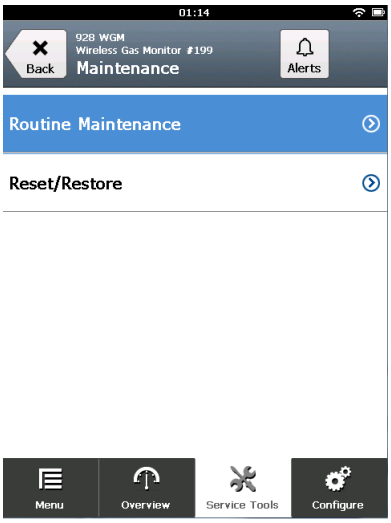
1. On the **Overview** screen, select **Service Tools**.



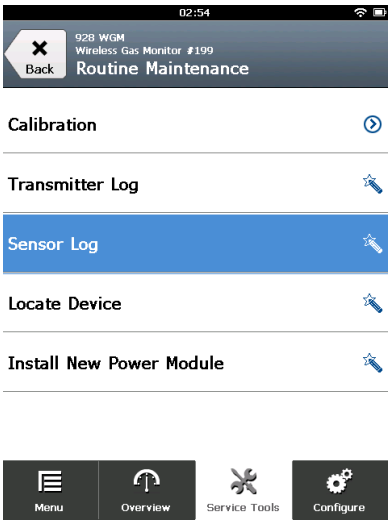
2. On the **Service Tools** screen, select **Maintenance**.



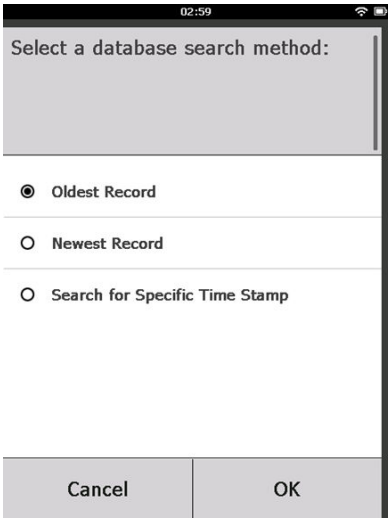
3. On the **Maintenance** screen, select **Routine Maintenance**.



4. On the **Routine Maintenance** screen, select **Sensor Log**.

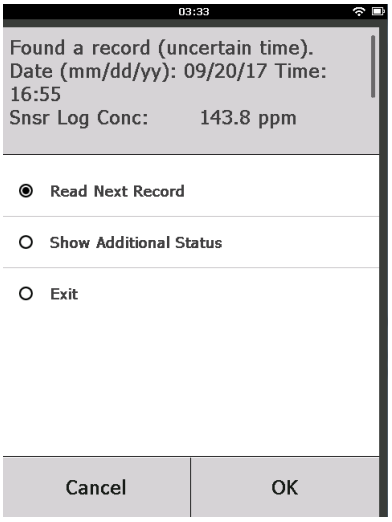


5. On the **Select a database search method** screen, select a database search method.

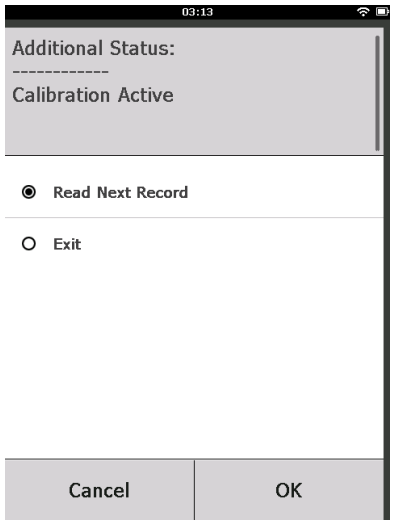


   - Oldest Record: View the oldest record first. This is the default option.
   - Newest Record: View the newest record in the database first.
   - Search for a Specific Time Stamp: Enter a specific time stamp by which to view records, including the date and time.

6. Select **OK**.
7. On the **Found a record** screen, view the sensor log information. Do one of the following:

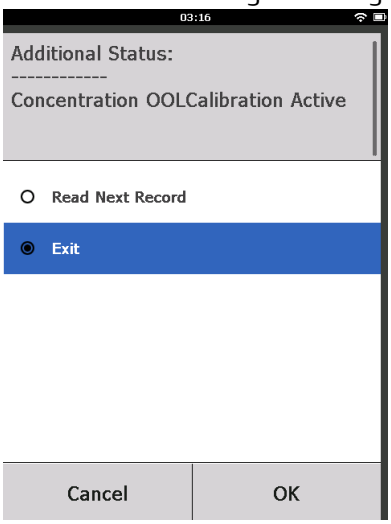


   - Select Read Next Record to go to the next record in the sensor log based on the selected database search method. This is the default option.



- Select Show Additional Status to view more information from the selected record. This option is available only if additional information is available for the selected record.
- Select Exit to leave the sensor log.

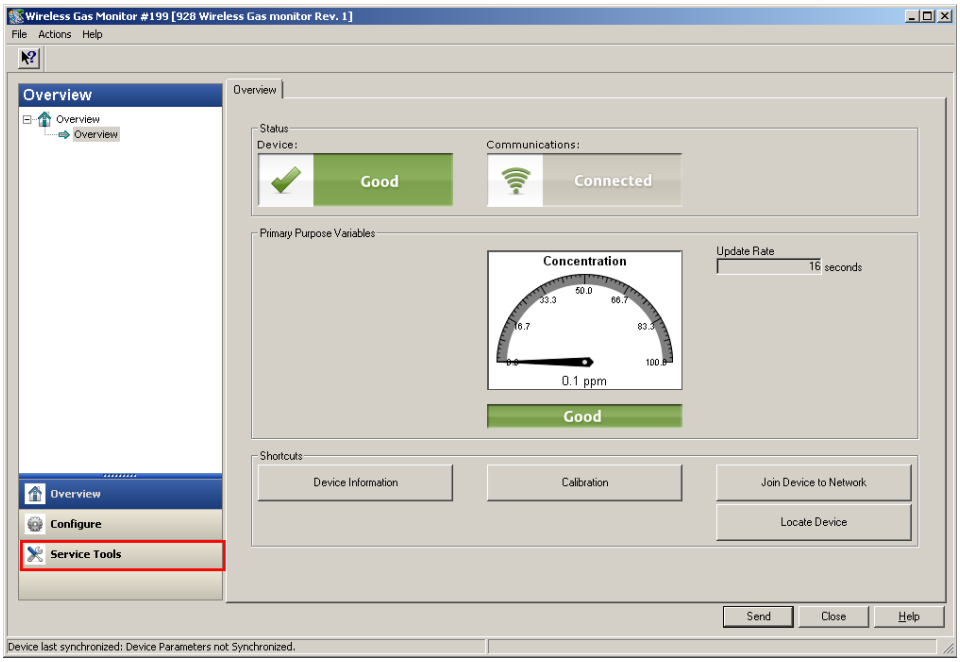
8. When finished viewing sensor log records, click Exit.



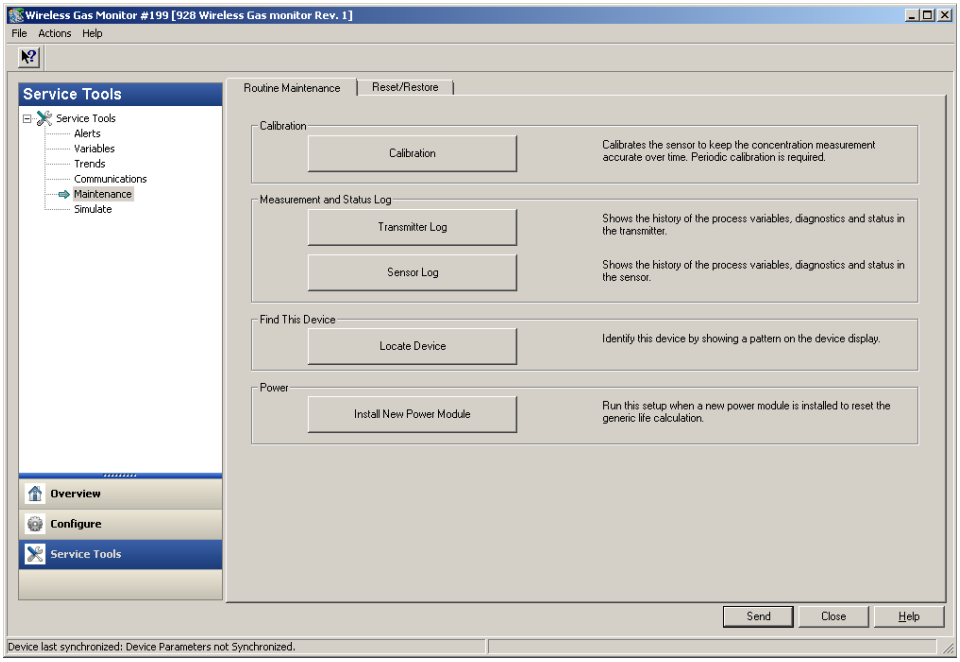
5.7.2 View sensor log using AMS Wireless Configurator

Procedure

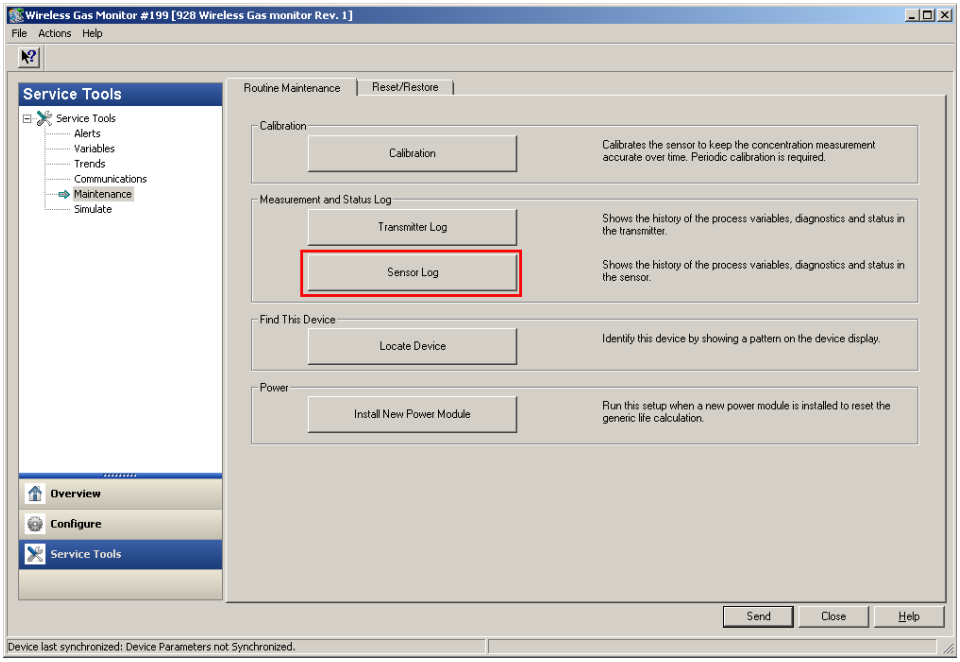
1. On the **Overview** screen, select **Service Tools**.



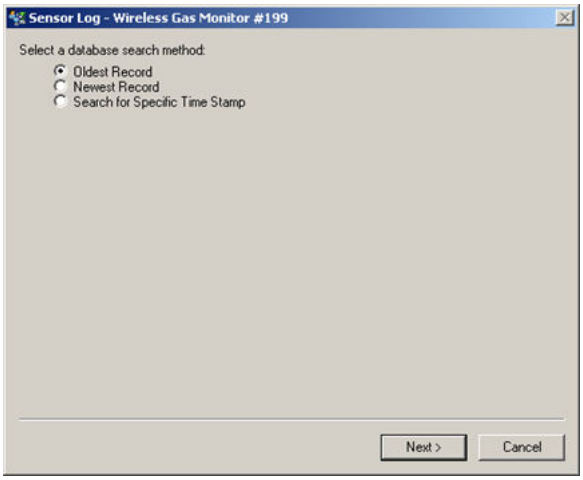
2. In the **Service Tools** pane, select **Maintenance**.



3. On the **Routine Maintenance** tab, select **Sensor Log**.

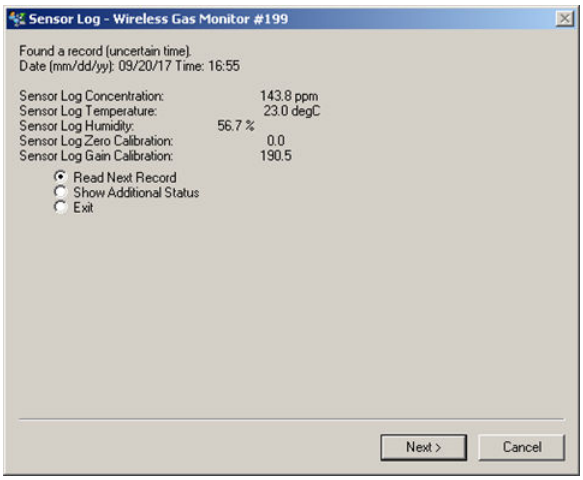


4. On the **Select a database search method** screen, select a database search method.

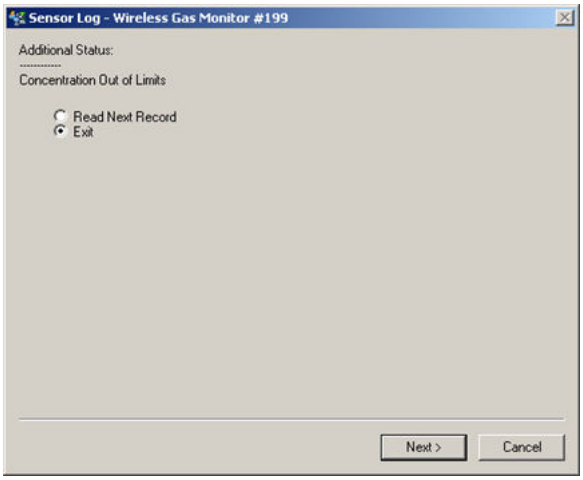


- Oldest Record: View the oldest record first. This is the default option.
- Newest record: View the newest record in the database first.
- Search for a Specific Time Stamp: Enter a specific time stamp by which to view records, including the date and time.

5. Select **Next**.
6. On the **Found a record** screen, view the sensor log information. Do one of the following:



- Select Read Next Record to go to the next record in the sensor log based on the selected database search method. This is the default option.
- Select Show Additional Status to view more information from the selected record. This option is available only if additional information is available for the selected record.



- Select Exit to leave the sensor log.

7. When you have finished viewing sensor log records, select **Exit**.
8. Select **Finish**.

5.8 Bump testing

Bump testing is a process by which the target gas is introduced to the sensor to verify that the device is functioning properly. Bump testing does not replace calibration. Emerson recommends bump testing throughout the sensor's service life as prescribed by your facility preventative maintenance procedures.

If bump testing fails, recalibrate the sensor. Refer to Calibrating the sensor. If the sensor fails to accept a new calibration, replace it. Refer to Replace the gas sensor.

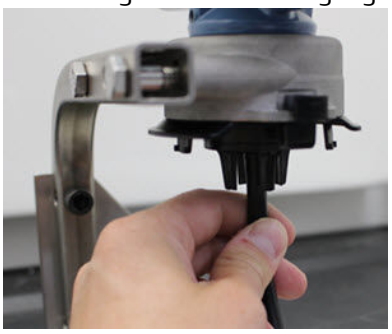
⚠ WARNING

Before performing the next step, verify that the regulator is closed to avoid releasing gas into the air during calibration.

Bump testing may trigger alarms. If alarms are configured to initiate action (for example, close valves, initiate facility evacuations, call emergency services) or to trigger alarms in the host system, take precautions to prevent unwanted automated responses during bump testing.

Procedure

1. Install a regulator on the target gas source.



2. Attach a length of calibration tubing from the regulator on the target gas source to the IP filter inlet on the bottom of the sensor.
3. Release the target gas from the target gas source.

   Emerson recommends a flow rate of 0.2642 gpm (1.0 lpm) to ensure a consistent sensor reading.

Note
If you need a long length of calibration tubing to reach the device, make allowances for a delay in response time from the sensor while the target gas travels the length of the calibration tubing.

A gas concentration begin to register on the device display and gradually increases to the target gas concentration level.

4. Shut off the target gas flow at the regulator.
5. Detach the calibration tubing from the regulator on the target gas source to the IP filter inlet on the bottom of the transmitter.

5.9 Calibration

Calibrate at least every 90 days throughout the detector's service life.

Refer to Calibrating the sensor.

5.10 Sensor storage

Follow these recommendations when storing the sensor.

- Store the sensor in its original sealed packaging with the IP filter side facing downward.
- To avoid damaging sensor electrodes, do not stack sensors on top of each other.
- Do not store or install the sensor in areas where it may be subject to solvent vapors. Doing so may result in any or all of the following:
  - Blocked sensor electrodes
  - Damaged sensor electrodes
  - Damaged sensor body
  - False baselines

5.11 Replace the gas sensor

The sensor is connected to the transmitter assembly by means of two tabs, which fit into the bottom portion of the housing. The seal between the transmitter housing and the sensor assembly is designed so that the fit is airtight between the two assemblies when the sensor is properly installed. Replace sensor if the tabs do not latch as intended.

Sensor life varies based on the sensing technology, the installation environment, and the ambient conditions in that environment. Typically, electrochemical sensors last from one and a half years to two years. You must replace a sensor when it cannot accept a new calibration due to having reached the end of its service life.

Procedure

1. Remove the old sensor assembly by firmly grasping both tabs and squeezing them together while simultaneously pulling downwards on the sensor assembly. If necessary, apply a slight rocking or twisting motion to remove the sensor.
2. Install the new sensor assembly.

a) Before installing the new sensor, take note of the alignment of the keying features on the sensor housing.

b) Align the tabs on the side of the sensor assembly housing.

c) Firmly push the sensor assembly into place until both tabs are fully latched to ensure a firm seal.

3. Calibrate the new sensor.

   Refer to Calibrating the sensor.

4. Allow the transmitter to warm up before continuing.

   Refer to Table 5-2 for maximum warm up times based on gas type. During the warm up period, the displayed values, alerts, and concentrations will not reflect actual measurements; readings will not be transmitted.

Table 5-2: Maximum Warm up Periods

Gas type	Maximum warm up period
Hydrogen sulfide (H_2S)	One minute
Oxygen (O_2)	Seven minutes
Carbon monoxide (CO)	One minute

5.12 Replace the power module

Expected power module life is 5.8 years at reference conditions.(1)

As shown in the following table, actual power module life expectancy in the field depends upon factors such as wireless update rate, network design, environmental conditions, and LCD settings.

⚠ CAUTION

If you do not replace the power module promptly, the device will cease to function.

Replace the power module as soon as possible after receiving a low battery warning. You may replace the power module in a hazardous area. The power module has a surface resistivity greater than one gigaohm, and you must install it properly in the wireless device enclosure. Take care during transportion to and from the point of installation to prevent electrostatic charge buildup.

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

Table 5-3: Power Module Life Expectancy

No data routing (77 °F [25 °C])			Routing data for three other devices (77 °F [25 °C])		
Update rate	**LCD off lifespan (years)**	**LCD on lifespan (years)**	**Update rate**	**LCD off lifespan (years)**	**LCD on lifespan (years)**
1	2.1	2.0	1	1.1	1.1
2	3.3	3.0	2	2.0	1.9
4	3.8	3.4	4	2.7	2.5
8	4.4	3.9	8	3.6	3.3
16	5.1	4.4	16	4.5	4.0
32	5.3	4.6	32	5.0	4.3
60	5.4	4.7	60	5.1	4.5

Procedure

1. Remove the rear housing cover from the transmitter.
2. Remove the depleted power module.
3. Install a new Emerson 701 SmartPower™ Module - Black.
4. Replace the rear housing cover and tighten it to specifications. Tighten until metal touches metal to ensure a proper seal, but do not overtighten.
5. Allow the transmitter to warm up before continuing.

   Refer to Table 5-4 for maximum warm up times, based on gas type. During the warm up period, the displayed values, alerts, and gas concentrations will not reflect actual measurements; the device will not transmit readings.

Table 5-4: Maximum Warm up Periods

Gas type	Maximum warm up period
Hydrogen sulfide (H_2S)	One minute
Oxygen (O_2)	Seven minutes
Carbon monoxide (CO)	One minute

5.12.1 Handling the power module

The Emerson 701 SmartPower™ Module - Black included with each Rosemount 928 contains two "C" size primary lithium/thionyl chloride batteries. Each battery contains approximately .08 oz. (2.5 grams) of lithium, for a total of .18 oz. (5 grams) in each pack.

Under normal conditions, the battery materials are self-contained and are not reactive as long as the batteries and the battery pack integrity are maintained. Take care to prevent thermal, electrical, or mechanical damage. Protect contacts to prevent premature discharge.

⚠ CAUTION

The power module may be damaged if dropped from a height in excess of 20 ft. (6 m).

Use caution when handling the power module.
Battery hazards remain when cells are discharged.

Environmental considerations

As with any battery, consult local environmental rules and regulations for proper management of spent batteries.

If no specific requirements exist, Emerson encourages recycling through a qualified recycling facility. Consult the materials safety data sheet for battery specific information.

Shipping considerations

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

Each power module contains two "C" size primary lithium batteries. The US Department of Transportation regulates primary lithium batteries in transportation, and the International Air Transport Association (IATA), International Civil Aviation Organization (ICAO), and European Ground Transportation of Dangerous Goods (ARD) also cover primary lithium batteries. The shipper is responsible for ensuring compliance with these or any other local requirements. Consult current regulations and requirements before shipping.

5.12.2 Blue Power Module

Alternatively, you can power the transmitter with the SmartPower™ Blue Power Module (Part Number MHM-89004).

Refer to the Quick Start Guide for the Blue Power Module for instructions detailing how to install and replace this alternative power module.

5.13 Replace the Ingress Protection filter

The Ingress Protection (IP) filter (part number 00628-9000-0001) protects the sensor inside the gas sensor module from ingress of fluids and solids. Replace the IP filter if it becomes clogged with foreign matter.

⚠ CAUTION

Ingress Protection (IP) filter

If you don't install the IP filter, damage may occur to the sensor inside the gas sensor module.

Do not operate the transmitter without the correct IP filter installed in the gas sensor module.

When installing the IP filter, verify that the IP filter gasket is in place, is properly aligned, and is not blocking the white filter media. Refer to Figure 5-1.

When handling the IP filter, avoid contact with the filter media.

Verify that all three legs are fully latched by pushing upward on each leg of the IP filter.

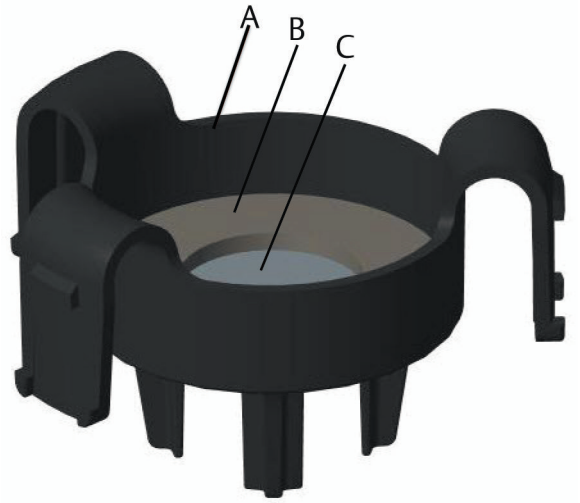
Avoid getting water inside the IP filter.

Do not attempt to clean the IP filter.

Do not rinse or spray the IP filter with water.

Do not immerse the IP filter in water.

Figure 5-1: IP Filter



A. IP filter housing
B. IP filter gasket
C. Filter media

Procedure

1. Remove the IP filter from the underside of the gas sensor module housing by compressing the three snap tabs and pulling the IP filter downwards.

2. Verify that the keying features on the new IP filter are aligned with those on the gas sensor module housing.

3. Push the new IP filter (part number 00628-9000-0001) upward into the gas sensor module housing and gently push each tab until the three tabs click into place.

5.14 Service support

To expedite the return process outside of North America, contact your Emerson representative.

Within the United States, call the Emerson Response Center toll-free number 1-800-654-7768. This center is available 24 hours a day to assist with any needed information or materials.

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

⚠ WARNING

Hazardous substances

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 the Occupational Safety and Health Administration (OSHA), a copy of the required Material Safety Data Sheet (MSDS) for each hazardous substance identified must be included with the returned goods.

6 Troubleshooting

6.1 Overview

The following sections provide troubleshooting suggestions for the most common operating problems. If you suspect malfunction despite the absence of any diagnostic messages, follow these procedures to verify that the transmitter hardware and the sensor module are in good working order.

6.2 Rosemount™ 928 troubleshooting

6.2.1 Electronics Failure

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

Recommended actions

1. Reset the device by removing and reinstalling the power module.
2. In AMS or Field Communicator, go to **Service Tools** → **Maintenance** → **Reset/ Restore** → **Restore Default Settings** to reset the device to default settings.
3. In AMS or Field Communicator, go to **Service Tools** → **Maintenance** → **Reset/ Restore** → **Device Reset** to reset the device electronics.
4. Reconfirm all configuration items in the device.
5. If the condition persists, replace the transmitter.

6.2.2 Radio Failure

The wireless radio has detected a failure or stopped communicating.

Recommended actions

1. Reset the device by removing and reinstalling the power module.
2. If the condition persists, replace the transmitter.

6.2.3 Capacity Denied

The device has failed to acquire the wireless communication bandwidth required for the configured update rate.

Recommended actions

1. Obtaining bandwidth may take time, depending on the configured update rate and other devices on the wireless network. Wait several minutes to allow the device to obtain bandwidth on its own.
2. The update rate for the transmitter may be too frequent to allow it to join a wireless gateway that is near capacity. Reconfigure the update rate of the device or other

devices on the wireless gateway to a less frequent update rate or increase network capacity by adding wireless gateways.

6.2.4 Supply Voltage Failure

The supply voltage is too low for the device to broadcast updates.

Recommended action

Replace the power module.

6.2.5 Sensor has Exceeded Limits

The sensor has exceeded its maximum measurement range.

⚠ WARNING

Always respond to all indications of dangerous concentrations of toxic gas as though they are real until they are proven false.

Recommended actions

1. Verify gas type and range.
2. Verify that the correct sensor is installed for the gas type.
3. Reconfirm sensor configuration.
4. Reset the device by removing and reinstalling the power module.
5. Replace the sensor module.

6.2.6 Sensor Module Temperature Exceeded

The gas sensor module's temperature has exceeded the sensor's maximum safe operating range.

Recommended actions

1. Verify that the environmental temperature is within the sensor's range.
2. If possible, mount the transmitter in an area with suitable environmental conditions. Refer to Table 3-1.
3. Reset the device by removing and reinstalling the power module.
4. If the condition persists, replace the sensor module.

6.2.7 Supply Voltage Low

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

Recommended action

Replace the power module.

6.2.8 Database Storage Error

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

Recommended actions

1. Reset the device by removing and reinstalling the power module.
2. If logging dynamic data is not needed, the advisory can be safely ignored.
3. If the condition persists, replace the transmitter.

6.2.9 Invalid Configuration

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

Recommended actions

1. In Field Communicator or AMS Wireless Configurator, go to **Service Tools** → **Active Alerts** for more information.
2. Correct the parameter that has a configuration error.
3. Reset the device by removing and reinstalling the power module.
4. If the condition persists, replace the transmitter.

6.2.10 HI-HI Alarm

The primary variable has surpassed the user-defined limit.

⚠ WARNING

Always respond to all indications of dangerous concentrations of toxic gas as though they are real until they are proven false.

Recommended actions

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

6.2.11 HI Alarm

The primary variable has surpassed the user-defined limit.

⚠ WARNING

Always respond to all indications of dangerous concentrations of toxic gas as though they are real until they are proven false.

Recommended actions

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

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

6.2.12 LO Alarm

The primary variable has surpassed the user-defined limit.

⚠ WARNING

Always respond to all indications of dangerous concentrations of toxic gas as though they are real until they are proven false.

Recommended actions

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

6.2.13 LO-LO Alarm

The primary variable has surpassed the user-defined limit.

⚠ WARNING

Always respond to all indications of dangerous concentrations of toxic gas as though they are real until they are proven false.

Recommended actions

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

6.2.14 Button Stuck

A button on the electronics board is detected as stuck in the active position.

Recommended actions

1. Check the buttons for obstructions.
2. Reset the device by removing and reinstallng the power module.
3. If condition persists, replace the transmitter.

6.2.15 URV/LRV Out of Limits

The percentage values are beyond the allowed limits.

⚠ WARNING

Always respond to all indications of dangerous concentrations of toxic gas as though they are real until they are proven false.

Recommended actions

1. Verify gas type and range.
2. Verify that the correct sensor is installed for the gas type and range.
3. Reconfirm sensor configuration.
4. Reset the device by removing and reinstalling the power module.
5. Replace the sensor module.

6.2.16 Gas Alarm Threshold Configuration Invalid

One of several user alert configurations is invalid.

Recommended actions

1. Check gas alarm threshold configuration is intact.
2. Verify that the correct sensor is installed for the gas type and range.

6.2.17 User Alert Configurations Invalid

One of several user alert configurations is invalid.

Recommended action

Verify the user alert configuration; reconfigure as required.

6.2.18 Configuration Warning

The device has detected an error in its configuration settings.

Recommended actions

1. Check all configuration settings to verify validity.
2. Reconfigure the invalid configuration settings.

6.2.19 Sensor Module Fault

The gas sensor module is reporting a memory error.

Recommended actions

1. Remove and reinstall the gas sensor module.
2. If the condition persists, replace the sensor module.

6.2.20 Sensor Module Disconnected

Communication with the gas sensor module has failed.

Recommended action

Verify that themodule is securely connected to the transmitter.

6.2.21 Sensor Module Incompatible

The attached gas sensor module is a type or revision incompatible with the Rosemount 928.

Recommended action

Verify that the module is the correct type or replace the transmitter with a transmitter compatible with the Rosemount 628 Universal Gas Sensor.

6.2.22 Local Alarm Output Active

The measured gas concentration level was or is above the specified alarm threshold. If so equipped, the local alarm has also been activated.

⚠ WARNING

Always respond to all indications of dangerous concentrations of toxic gas as though they are real until they are proven false.

Recommended actions

1. If alarm latching is enabled and the gas concentration level has returned to a level that matches the intended application, reset the alarm latch to clear this alert.
2. Adjust the local alarm limit to match the intended application.

6.2.23 Sensor Module Service Overdue

A bump test or calibration has not been performed for the gas sensor module for longer than the configured reminder date or required service interval.

Recommended actions

1. Perform the overdue service as soon as possible.
2. Set the service reminder date for the next service interval.
3. Disable the service reminder if it is no longer needed.

6.2.24 Sensor Depleted

The sensor module is depleted and can no longer measure gas concentration levels. A sensor that cannot accept a new calibration may have reached the end of its service life.

Recommended action

Replace the gas sensor module immediately.

6.2.25 Replace Sensor Module Soon

The sensor module is nearing the end of its service life. A sensor that cannot accept a new calibration may have reached the end of its service life.

Recommended action

Replace the sensor module within the next service interval.

6.2.26 Module Type Changed

The installed gas sensor module was replaced, but it is different from the type or range previously configured.

Recommended actions

1. If the intention was to replace the gas sensor module with the same type and range, replace the gas sensor with the same Rosemount 628 Universal Gas Sensor type and range used previously.
2. If the intention was to measure a different gas type or range, verify that the gas concentration alarm thresholds are correct for the new gas type. After confirming the thresholds, acknowledge the condition to clear the error. Perform sensor configuration and calibration. Refer to Basic setup and Calibrating the sensor.

6.2.27 Simulation Active

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

Recommended actions

1. Verify that the simulation is no longer required.
2. In **Service Tools**, disable Simulation mode.
3. Reset the device. Refer to Reset or restore device settings.

6.2.28 Discrete Variable Simulation Active

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

Recommended actions

1. Verify simulation is no longer required.
2. In **Service Tools**, disable Simulation mode.
3. Reset the device. Refer to Reset or restore device settings.

6.3 Digital concentration output is not reacting to presence of target gas

Potential cause

Clogged IP filter

Recommended action

Check whether the IP filter is clogged; replace if necessary.
Refer to Replace the Ingress Protection filter.

Potential cause

Gas sensor module is at the end of its service life.

Recommended action

Replace with a new module.

6.4 LCD display troubleshooting

6.4.1 LCD display is not operating

Potential cause

LCD display is not enabled.

Recommended action

Make sure the LCD display is enabled.

Potential cause

Connector is missing or invalid.

Recommended action

Make sure the LCD display pins are present and not bent.

Potential cause

LCD display is not fully connected.

Recommended action

Make sure the LCD display is properly seated with the tabs snapped in place and fully engaged.

6.5 Wireless network troubleshooting

6.5.1 Device not joining the network

Recommended actions

1. Verify network ID and join key.
2. Verify network is in active network advertise.
3. Wait longer (30 minutes).
4. Check power module.
5. Verify device is in range of at least one other device.
6. Power cycle device to try again.
7. Verify that the device is configured to join. Ensure that the Join mode is configured to Join on Power-up or Reset.
8. Refer to the troubleshooting section of your wireless gateway manual for more information.

6.5.2 Short power module life

Recommended actions

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

6.5.3 Limited bandwidth error

Recommended actions

1. Reduce the update rate on transmitter.
2. Increase communication paths by adding more wireless points.
3. Check that the device has not been online for at least an hour.
4. Check that the device is not routing through a limited routing node.
5. Create a new network with an additional wireless gateway.

A Specifications and reference data

A.1 Specifications

A.1.1 Functional specifications

Discrete output, models 928XSS01, 928XUT01

Maximum rating: 28 Vdc, 100 mA

On resistance: typical 1 Ohm

Wireless output

IEC 62591 (*Wireless*HART®) Compliant, 2.4 GHz

Antenna radio frequency power output

External (WK option) antenna: Maximum of 10 mW (10 dBm) EIRP

Extended range, external (WM option) antenna: Maximum of 18 mW (12.5 dBm) EIRP

High gain, remote (WN option) antenna: Maximum of 40 mW (16 dBm) EIRP

Remote, extended (WJ option) antenna: Maximum of 18 mW (12.5 dBm) EIRP

Local display

The integral LCD display can display alert state and diagnostic information. Configurable to display updates at each wireless update.

Humidity limits

See Table 1.

Maximum inputs for the Rosemount 928 (ordinary and IS environments)

28 Volts

95 milliamps

650 milliwatts

Wireless update rate

User selectable, 1 second to 60 minutes

A.1.2 Physical specifications

Environmental

Operating temperature: -40 to +122 °F (-40 to +50 °C)

Ingress protection: IP66 ingress protection (IP) filter

Electrical connections wireless power module

Replaceable, intrinsically safe lithium-thionyl chloride power module with PBT polymer enclosure. 5.8 years of life at one minute update rate.(2)

Switch terminals, models 928XSS01, 928UXT01

Screw terminals permanently fixed to terminal block

Field Communicator connections

Communication terminals

Clips permanently fixed to terminal block

Materials of construction

Enclosure:

- Housing: low-copper aluminum or stainless steel
- Paint: polyurethane
- Cover O-ring: Buna-N

Terminal block and power module pack: PBT

Antenna: PBT/PC integrated omnidirectional antenna

Conduit entries: ½-14 national pipe thread (NPT)

Rosemount 928 weight

Low-copper aluminum housing (2A ordering option): 73 ounces (2076 grams)

Stainless steel housing (2S ordering option): 143 ounces (4055 grams)

Enclosure ratings

NEMA® 4X and IP66

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

Note
Continuous exposure to ambient temperature limits (less than -40 °F or greater than 122 °F [less than -40 °C or greater than 50 °C]) may reduce specified power module life by less than 20 percent.

A.1.3 Performance specifications

Electromagnetic compatibility (EMC)

All models: meet all relevant requirements of EN-61326-2-3: 2006

Vibration effect

Wireless output unaffected when tested according to the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.2 mm displacement peak amplitude/ 60-2000 Hz 3g).

Wireless output unaffected when tested according to the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-60 Hz 0.15 mm displacement peak amplitude/60-500 Hz 2g).

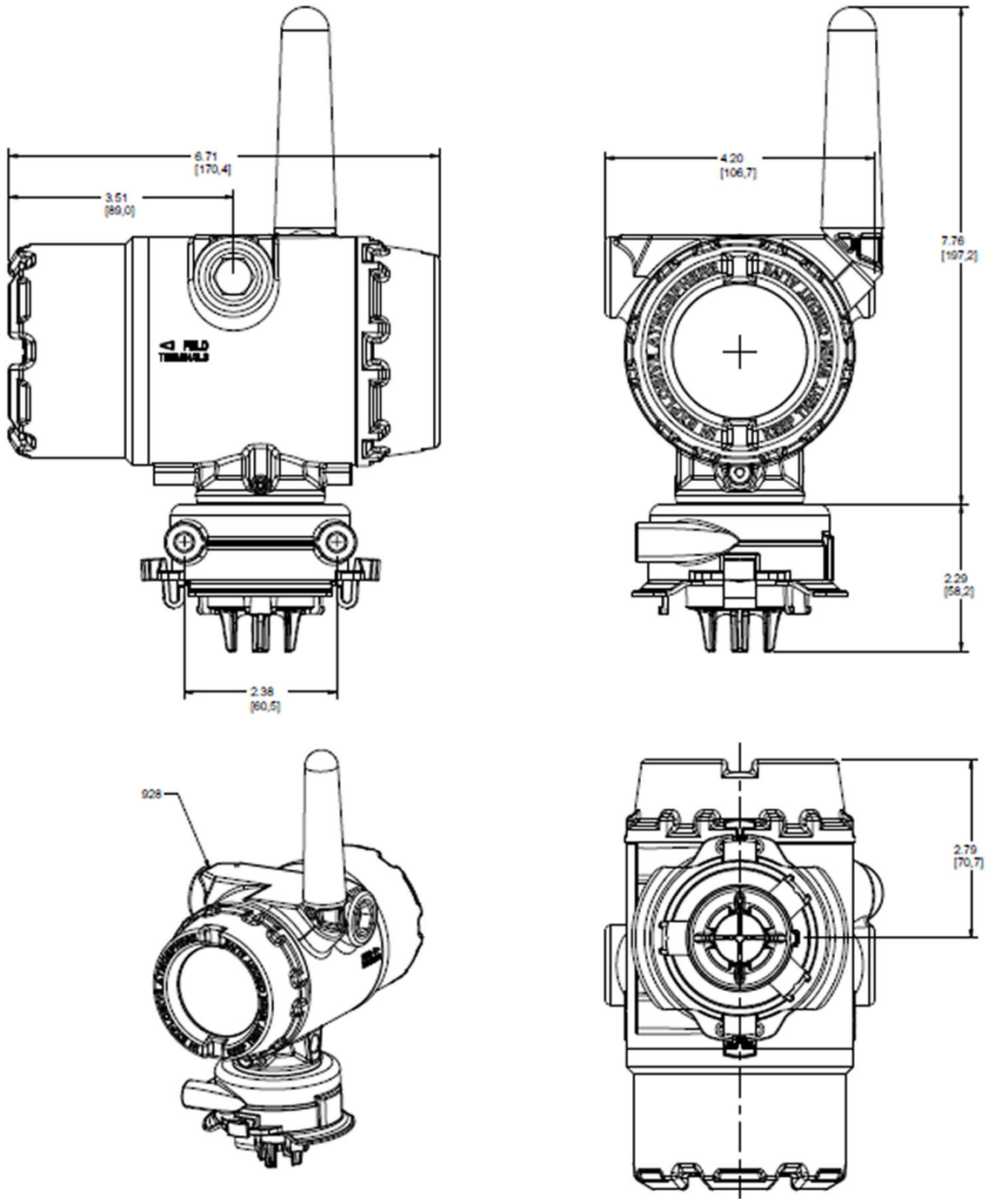
Temperature guidelines

Sensor type	Operating limit	Transmitter storage limit	Sensor storage recommendation
H_2S	-40 to 122 °F -40 to 50 °C	-40 to 185 °F -40 to 80 °C	34 to 45 °F 1 to 7 °C
O_2	-22 to 122 °F -30 to 50 °C	-40 to 185 °F -40 to 80 °C	34 to 45 °F 1 to 7 °C
CO	-22 to 122 °F -30 to 50 °C	-40 to 185 °F -40 to 80 °C	34 to 45 °F 1 to 7 °C

Note
The electrochemical cells in sensor modules have a limited shelf life. Store sensor modules in a cool location that is not excessively humid or dry. Storing sensor modules for long periods may shorten their useful service life.

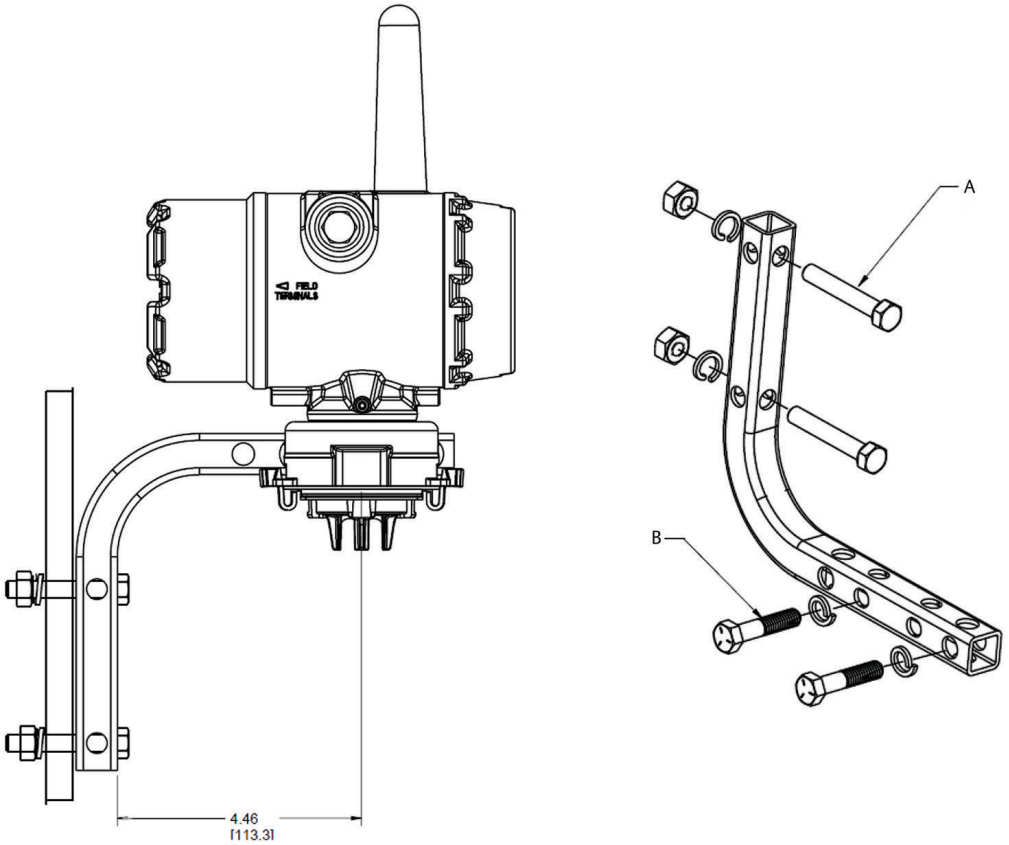
A.2 Dimensional drawings

Figure A-1: Rosemount 928



Dimensions are in inches [millimeters].

Figure A-2: Rosemount 928 Mounting Configurations



Dimensions are in inches [millimeters].

A. 2-in. bolt for pipe mounting (clamp shown)
B. ¼-in. x ¼-in. bolts for transmitter mounting

A.3 Ordering information

A.3.1 Standard options

The starred options (★) represent the most common options and should be selected for best delivery. The non-starred options are subject to additional delivery lead time.

Product description		
928	Wireless Gas Monitor	★
Transmitter output		
X	Wireless	★
Sensor options		
SS	Sensor specified separately and shipped with the transmitter (requires specification of the Rosemount 628).	★

UT	Universal transmitter (no sensor specified)	★
Discrete output		
00	No discrete output; wireless communication only	★
01	Discrete output and wireless communications	★
Housing material		
2A	Aluminum ½-14 national pipe thread (NPT) conduit	★
2S	Stainless steel ½-14 national pipe thread (NPT) conduit	★
Product certifications		
I5	USA Intrinsically Safe	★
I6	Canada Intrinsically Safe	★
I4	Japan Intrinsic Safety	★
I1	ATEX Intrinsic Safety	★
I3	China Intrinsic Safety	★
I7	IECEx Intrinsic Safety	★
KQ	USA CSA ATEX Intrinsic Safety	★
NA	No approvals	★

A.3.2 Wireless options

The starred options (★) represent the most common options and should be selected for best delivery. The non-starred options are subject to additional delivery lead time.

Wireless update range, operating frequency, and protocol		
WA3	User configurable update rate, 2.4 GHz DSSS, IEC 65291 (*Wireless*HART®)	★
Omnidirectional wireless antenna and SmartPower™ solutions		
WK1	External antenna, adapter for black power module. (I.S. power module sold separately)	★
WM1	Extended range, external antenna	★
WJ1	Remote antenna, adapter for black power module (I.S. power module sold separately)	★
WN1	High-gain remote antenna, adapter for black power module (I.S. power module sold separately)	★

A.3.3 Other options

The starred options (★) represent the most common options and should be selected for best delivery. The non-starred options are subject to additional delivery lead time.

Mounting bracket		
B4	Universal L mounting bracket for 2-in. (50.8 mm) pipe mounting, stainless steel bracket, and bolts	★
Configuration		
C1	Factory configuration date, descriptor, message fields, and wireless parameters	★
Quality documentation		
Q1	Certificate of Compliance	★
Typical model number: 928 X SS 00 2A I5 WA3 WK1 B4		

A.3.4 Rosemount 628 Universal Gas Sensor ordering information

The starred options (★) represent the most common options and should be selected for best delivery. The non-starred options are subject to additional delivery lead time.

Product description		
628	Universal Gas Sensor	★
Sensor technology		
EC	Electrochemical	★
Gas type		
T02	Hydrogen sulfide	★
A03	Oxygen	★
T04	Carbon monoxide	★
Unit of measurement		
2	ppm	★
3	% by volume	★
Sensor range		
F	0-100	★
D	0-25	
K	0-1000	
Typical model number: 628 EC TO2 2 F		

A.3.5 Spare parts

Description	Part number
Ingress Protection (IP) filter	00628-9000-0001
Spare B4 mounting bracket for Rosemount 928	03151-9270-0004

B Product certifications

Rev 3.3

B.1 European Directive information

The most recent revision of the EC Declaration of Conformity can be found at www.Emerson.com/Rosemount under *Documentation*.

B.2 Telecommunication compliance

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

B.3 FCC and IC

This device complies with Part 15 of the FCC rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 7.81 in. (20 cm) from all persons.

B.4 Ordinary location certification

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

B.5 Installing in North America

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

B.6 USA

I5 U.S.A. Intrinsically Safe (IS)

Certificate CSA 70138122

Standards FM 3600–2011, FM 3610–2010, UL Standard 50—Eleventh edition, UL 61010–1—3rd edition, ANSI/ISA–60079–0 (12.00.01)–2013, ANSI/ISA–60079–11 (12.02.01)–2014

Markings IS CL I, DIV 1, GP A, B, C, D T4 Ex ia IIC T4 Ga;

T4 (-40 °C ≤ Ta ≤ +50 °C) when installed according to Rosemount™ drawing 00928-1010;

Class 1, Zone 0, AEx ia IIC T4 Ga;

Type 4X

Table B-1: Entity Parameters

Input (power) parameters	Output (alarm) parameters
Ui - 28 Vdc	Uo - 28 Vdc
Ii - 93.3 mA	Io -93.3 mA
Pi - 653 mW	Po - 653 mW
Ci - 5.72 nF	Co - 77 nF
Li - 0	Lo - 2 mH

Table B-2: HART® Comm Parameters

Uo - 1.9 Vdc
Io - 32 μA

Special Conditions for Safe Use (X):

1. For use only with the Emerson Model 701PBKKF, the Computation Systems, Inc. MHM-89004, or the Perpetuum Ltd. IPM71008/IPM74001.
2. The surface resistivity of the antenna is greater than 1 GΩ. To avoid electrostatic discharge buildup, it must not be rubbed or cleaned with solvents or dry cloth.
3. Substitution of components may impair Intrinsic Safety.

B.7 Canada

I6 Canada Intrinsically Safe (IS)

Certificate CSA 70138122

Standards CAN/CSA C22 No. 0–10, CAN/CSA C22.2 No. 94.2-15, CAN/CSA-60079-0–2015, CAN/CSA-60079-11–2014, CAN/CSA-C22.2 61010-1–2012

Markings IS CL I, DIV 1, GP A, B, C, D T4;

Ex ia IIC T4 Ga;

T4 (-40 °C ≤ Ta ≤ +50 °C) when installed according to Rosemount drawing 00928-1010;

Type 4X

Refer to Table B-1.

Special Conditions for Safe Use (X):

1. For use only with the Emerson Model 701PBKKF, the Computations Systems, Inc. MHM-89004, or the Perpetuum Ltd. IPM71008/IPM74001.
   Pour utilization uniquement avec Emerson Model 701PBKKF, Computation Systems, Inc MHM-89004, ou Perpetuum Ltd. IPM71008/IPM74001.
2. The surface resistivity of the antenna is greater than 1 GΩ. To avoid electrostatic discharge buildup, it must not be rubbed or cleaned with solvents or a dry cloth.
   La résistivité de surface du boîtier est supérieure à un gigaohm. Pour éviter l'accumulation de charge électrostatique, ne pas frotter ou nettoyer avec des produits solvants ou un chiffon sec.
3. Substitution of components may impair Intrinsic Safety.
   La substitution de composants peut compromettre la sécurité intrinsèque.

B.8 Europe

I1 ATEX Intrinsically Safe (IS)

Certificate	Sira17ATEX2371X
Standards	EN 60079-0:2012 + A11:2013, EN 60079-11:2012
Markings	Ex II1 G Ex ia IIC T4 Ga; T4 (-40 °C ≤ Ta ≤ +50 °C) Type IP66

Refer to Table B-1 and Table B-2.

Special Conditions for Safe Use (X):

1. Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition capable of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. In addition, the equipment shall only be cleaned with a damp cloth.
2. The transmitter may contain more than 10 percent aluminum and is considered a potential risk ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
3. The equipment shall be powered by Emerson 701PBKKF. An alternative power source shall be the CSI MHM-89004, as these devices have output parameters that are equal or less onerous than the parameters of the 701PBKKF.
4. Only the 375, 475, or AMS Trex Communicators may be used with the Rosemount 928.

B.9 International

I7 IECEx Intrinsically Safe (IS)

Certificate	IECEx SIR 17.0091X
Standards	IEC 60079-0:2011, IEC 60079-11:2011
Markings	Ex ia IIC T4 Ga; T4 (-40 °C ≤ Ta ≤ +50 °C) Type IP66

Refer to Table B-1 and Table B-2.

Special Conditions for Safe Use (X):

1. Under extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. In addition, the equipment shall only be cleaned with a damp cloth.
2. The transmitter may contain more than 10 percent aluminum and is considered a potential risk ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
3. The equipment shall be powered by Emerson 701PBKKF. An alternative power source shall be the the CSI MHM-89004, as these devices have output parameters that are equal or less onerous than the parameters of the 701PBKKF.
4. Only the 375, 475, or AMS Trex Communicators may be used with the Rosemount 928.

B.10 China

I3 NEPSI Intrinsically Safe (IS)

Certificate	GYJ18.1438X
Standards	GB 3836.1-2010, GB 3836.4-2010, GB 3836.20-2010
Markings	Ex ia IIC T4 Ga (Ta= -40 °C to +50 °C)

Special Conditions for Safe Use (X):

See certificate.

B.11 Japan

CML Intrinsically Safe (IS)

Certificate	CML 18JPN2345X
Standards	IEC 60079-0:2011, IEC 60079-11:2011

Markings	Ex ia IIC T4 Ga; T4 (-40 °C ≤ Ta ≤ +50 °C)

Special Conditions for Safe Use (X):

See certificate.

B.12 Brazil

IM INMETRO Intrinsically Safe

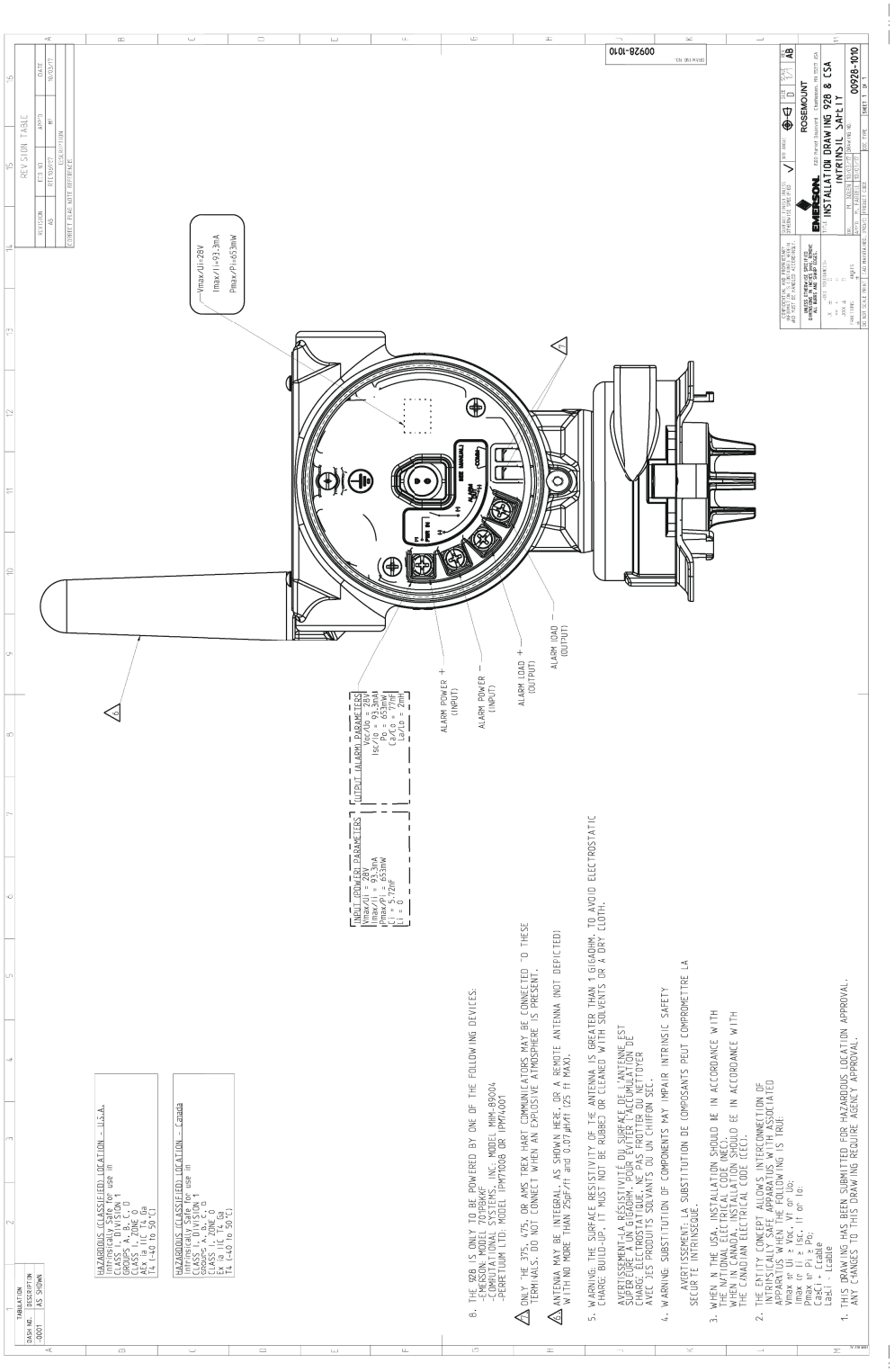
Certificate	UL-BR 19.0096X
Standards	ABNT NBR IEC 60079-0:2013, ABNT NBR IEC 60079-11:2013
Markings	Ex ia IIC T4 Ga; T4 (-40°C ≤ Ta ≤ +50°C)

Special Conditions for Safe Use (X):

See certificate.

B.13 Intrinsically Safe installation drawing

Figure B-1: Rosemount 928 Wireless Gas Monitor Intrinisically Safe Installation Drawing



C High gain remote antenna option

C.1 Safety messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operation.

⚠ WARNING

When installing remote mount antennas for the wireless field device, always use established safety procedures to avoid falling or contact with high-power electrical lines.

Install remote antenna components for the transmitter in compliance with local and national electrical codes and use best practices for lightning protection.

Before installing, consult with the local area electrical inspector, electrical officer, and work area supervisor.

The wireless field device remote antenna option is specifically engineered to provide installation flexibility while optimizing wireless performance and local spectrum approvals.

To maintain wireless performance and avoid non-compliance with spectrum regulations, do not change the length of cable or the antenna type.

If the supplied remote mount antenna kit is not installed per these instructions, Emerson is not responsible for wireless performance or non-compliance with spectrum regulations.

Be aware of overhead electrical power lines.

C.2 Antenna functional specifications

C.2.1 Output

*Wireless*HART® 2.4 GHz DSSS (direct sequence spread spectrum).

Radio frequency power output from antenna:

- High gain remote (WN option) antennal: maximum of 40 mW (16 dBm) EIRP (equivalent isotropically radiated power)

C.2.2 Communications range

⅔ mile (3,300 ft.)(1.0 km) with L.O.S.

C.2.3 Coaxial length

25 ft. (7.6 m) with type N connections

C.2.4 Coaxial material

- Heavy duty, low loss LMR400 cable
- Minimum coaxial bend diameter 1.0 ft. (3.0 m)

C.2.5 Antenna

- Remote-mount omni directional antenna
- Fiberglass and aluminum construction
- 8 Db Gain
- Meets MIL-STD-810G (method 510.5, procedure I and II)

C.2.6 Physical specifications

Weight: 1.0 lb. (0.4 kg)

C.2.7 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 to 2.5-in. (2.5 to 6.4 cm)
- Aluminum bracket
- Nickel/zinc plated mounting U-bolts

C.2.8 Ratings

NEMA® 4X and IP66/67

C.2.9 Vibration

3 g maximum vibration

C.3 Installation considerations

C.3.1 Antenna mounting

Mount antenna vertically (±5°).

C.3.2 Antenna height

Mount antenna 14 ft. (4.3 m) above infrastructure with clear line of sight.

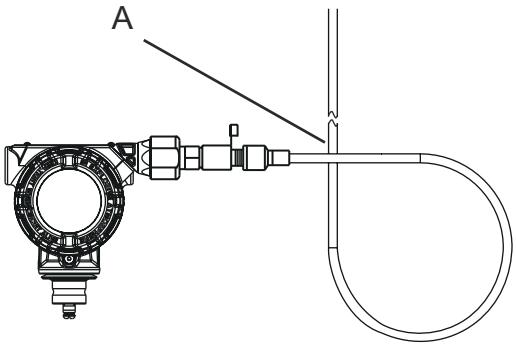
C.3.3 Coaxial cable

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

C.3.4 Install coaxial drip loop

Ensure a drip loop is installed not closer than 1 ft. (0.3 m) from the transmitter. It may also be convenient to affix the drip loop to the lower portion of the mast ensuring that condensation or rainwater will flow away from the coaxial connections.

Figure C-1: Coaxial Drip Loop



A. Coaxial drip loop

C.3.5 Apply coaxial sealant moisture protection

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

C.4 Transient and lightning considerations

C.4.1 Wireless gateway transient protection

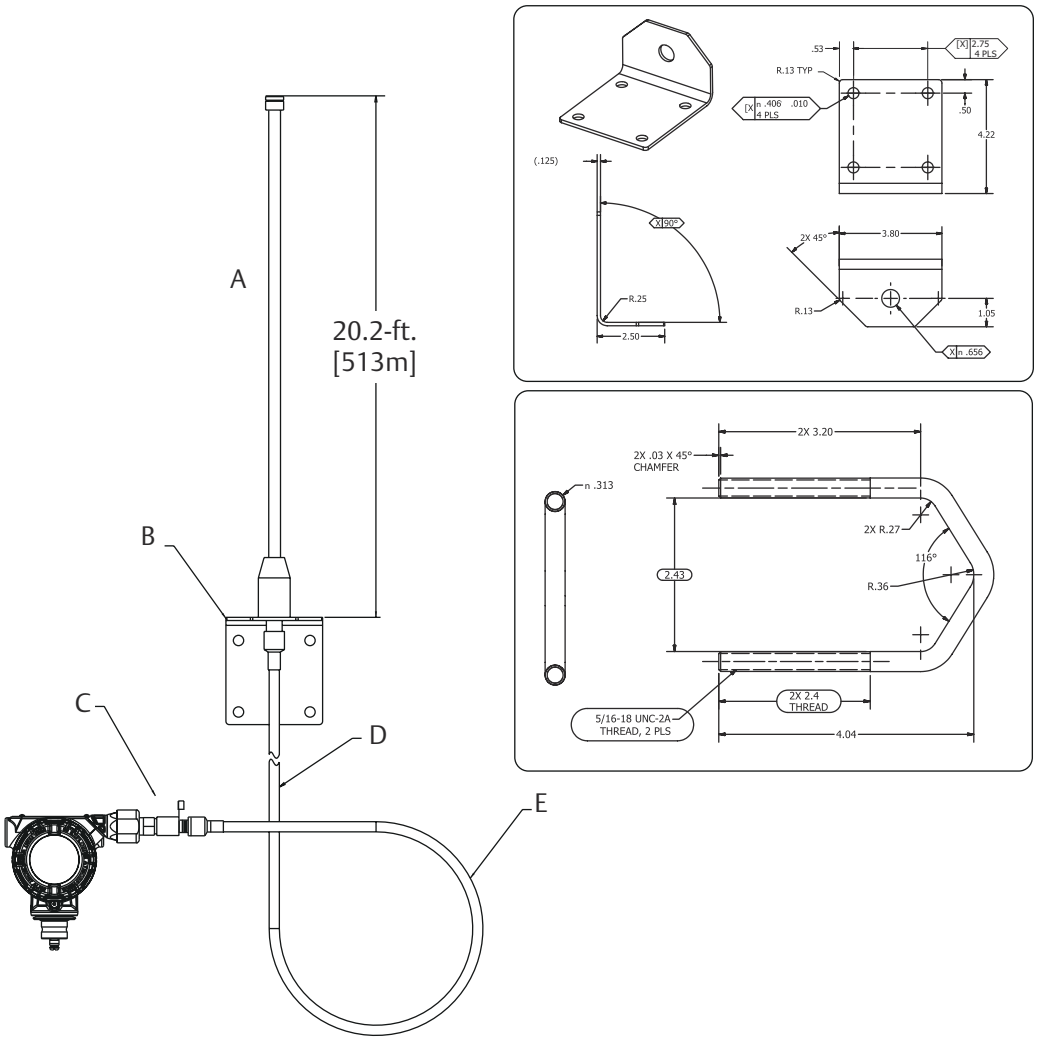
When installing the antenna, consider using transient and lightning protection (customer-supplied) on Ethernet, Modbus®, and coaxial interface to other equipment.

C.4.2 RF lightning arrestor ground connection

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

C.5 Dimensional drawing

Figure C-2: Device Connection and RF Lightning Arrestor



A. Antenna
B. Mounting bracket
C. Mounting arrester
D. 25 ft. (7.5 m) cable
E. Min drip loop Ø12-in. (0.3 m)

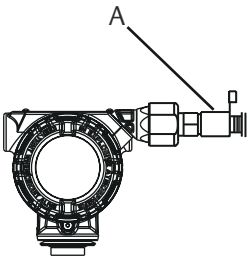
C.6 Install the high gain remote antenna

Complete the following steps to install the high gain remote antenna on the transmitter.

Procedure

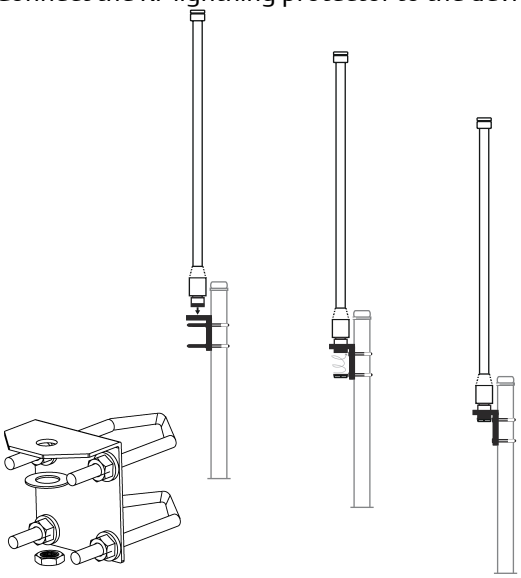
1. Mount the transmitter.
   Refer to Install the transmitter.

Figure C-3: High Gain Remote Antenna

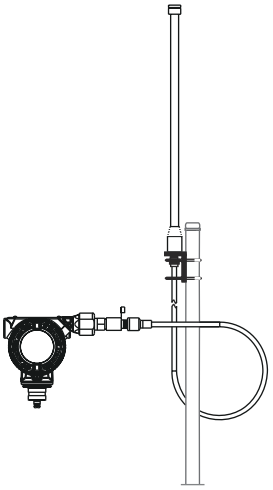


A. RF lightning protector

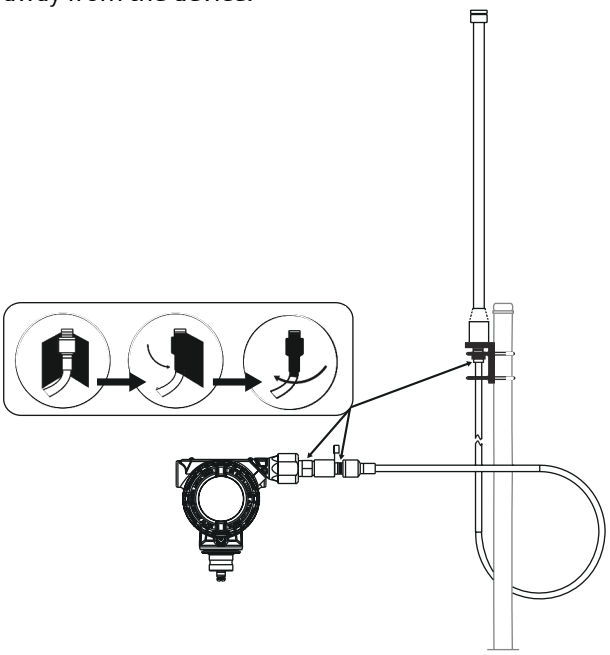
2. Connect the RF lightning protector to the device and tighten.



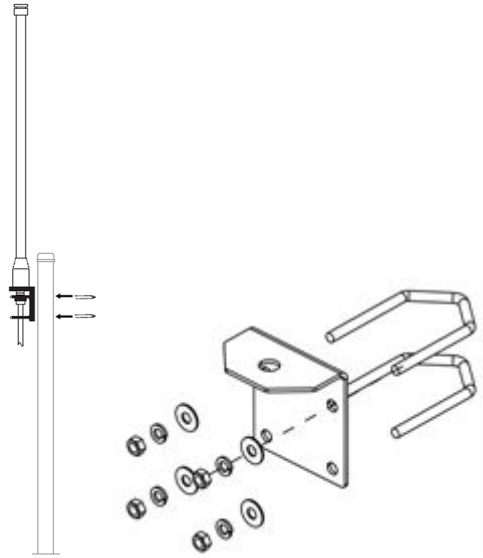
3. Connect antenna to mounting bracket and tighten nut carefully.



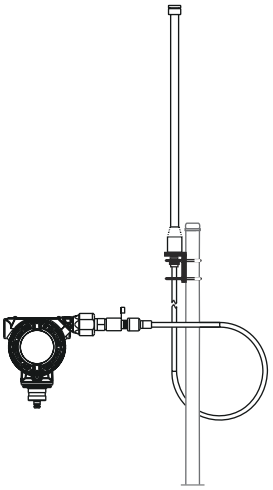
4. Unwind the coaxial cable and connect the cable to both the antenna and the lightning protector connected to the transmitter, leaving one loop minimum for a drip loop. Ensure that the drip loop is lower than the device to allow water to flow away from the device.



5. Apply the coaxial sealant around each of the coaxial connections and the lightning arrestor. Verify that the RF connections are completely sealed.



6. Attach the U-bolts to the mounting bracket to position the antenna vertically.



7. Verify that the antenna is positioned vertically. Tighten the U-bolts to the mast.

D Alert message mapping

This appendix outlines the most important alerts in the HART® command 48 Additional Status field for the Rosemount® 928. The information in this section can be used by DeltaV™ for alert monitoring and in the Wireless Gateway for Additional Status mapping in Modbus®, OPC, and other communication protocols. A complete list of Additional Status bits is available in the wireless gateway.

Variable mapping contains the device variable and variable mapping indexes for the transmitter.

Alert mapping contains the most important alert messages that may be displayed in the AMS Device Manager and Field Communication together with the location of the alert in the HART command 48 Additional Status field.

To view active alerts in Field Communicator or AMS Device Manager, from the **Home** screen, go to **Service Tools** → **Active Alerts**.

D.1 Variable mapping

Table D-1: Device Variable Index

Device variable	Index
0	Supply voltage
1	Electronics temperature
2	Gas concentration
3	Sensor temperature

Table D-2: Device Variable Mapping Index (Cannot be Modified)

Variables	Index
PV	Gas concentration
SV	Sensor module temperature
TV	Electronics temperature
QV	Supply voltage

D.2 Alert mapping

Table D-3: Failure Alerts (F)

Message	Additional status(1)	Description
Electronics Failure	Byte 8 :: Bit 6	A failure has been detected in the device memory, electronics, or both.

Table D-3: Failure Alerts (F) *(continued)*

Message	Additional status(1)	Description
Invalid Configuration	Byte 2 :: Bit 6	The device has detected a configuration error based on a change to the device.
Radio Failure	Byte 12 :: Bit 4	The wireless radio has detected a failure or has stopped communicating.
Supply Voltage Failure	Byte 6 :: Bit 2	The supply voltage is too low for the device to broadcast updates.
Sensor Module Fault	Byte 3 :: Bit 7	The sensor module has detected an internal electronics failure.
Sensor Module Disconnected	Byte 3 :: Bit 6	Communications with the sensor module have failed.
Sensor Module Incompatible	Byte 3 :: Bit 5	The sensor module is a type or revision that is not compatible with the transmitter.
Sensor Depleted	Byte 3 :: Bit 1	The gas concentration level cannot be measured.

(1) Location of the alert in the HART® command 48 Status field.

Table D-4: Maintenance Alerts (M)

Message	Additional status(1)	Description
Button Stuck	Byte 1 :: Bit 5	A button on the electronics board is stuck in the active position.
Sensor Module Service Overdue	Byte 3 :: Bit 2	The sensor module has not been serviced for longer than the configured reminder date or required service interval.
Replace Sensor Module Soon	Byte 3 :: Bit 0	The sensor module has been in operation for longer than the recommended duration.
Sensor Module Temperature Exceeded	Byte 4 :: Bit 6	The sensor module temperature has exceeded its safe operating range.
Electronics Temperature Beyond Limits	Byte 8 :: Bit 5	The transmitter electronics temperature has exceeded its safe operating range.
Supply Voltage Low	Byte 8 :: Bit 4	The supply voltage is low and may soon affect broadcast updates.

Table D-4: Maintenance Alerts (M) *(continued)*

Message	Additional status(1)	Description
Capacity Denied	Byte 12 :: Bit 0	The device has failed to acquire the wireless communication bandwidth required for the configured update rate.

(1) Location of the alert in the HART command 48 Status field

Table D-5: Advisory Alerts (A)

Message	Additional status(1)	Description
Database Storage Error	Byte 0 :: Bit 2	The device has failed to write to the database memory. Any data written during this time may have been lost.
Configuration Warning	Byte 2 :: Bit 1	A user configuration is corrupt and has reverted to a default value.
Sensor has Exceeded Limits	Byte 3 :: Bit 4	The measured gas concentration level is beyond the range supported by the gas sensor.
Local Alarm Output Active	Byte 3 :: Bit 3	The gas concentration measured by this device has exceeded the local alarm limit. The local alarm output (if equipped) is now active.
Module Type Change	Byte 4 :: Bit 5	The installed gas sensor module was replaced, but is different from the type or range previously configured.
HI-HI Alarm	Byte 5 :: Bit 4	A device variable value has surpassed the user-defined limit.
HI Alarm	Byte 5 :: Bit 5	A device variable value has surpassed the user-defined limit.
LO Alarm	Byte 5 :: Bit 6	A device variable value has surpassed the user-defined limit.
LO-LO Alarm	Byte 5 :: Bit 7	A device variable value has surpassed the user-defined limit.
Simulation Active	Byte 8 :: Bit 0	The device is in simulation mode and may not be reporting actual information.

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

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