Reference Manual
00809-0400-4702, Rev AA
June 2018

Rosemount™ 702 Wireless Discrete Transmitter for plunger arrival

ROSEMOUNT™

EMERSON™

Rosemount 702 Wireless Discrete Transmitter for plunger arrival

NOTICE

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

Customer Central>

1 800 999 9307 (7:00 a.m. to 7:00 p.m. CST)

National Response Center

1 800 654 7768 (24 hours a day)

Equipment service needs

International

1 952 906 8888

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.

⚠ WARNING!

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

- **Ensure only qualified personnel perform the installation.**

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 the plunger arrival sensor in a hazardous area, ensure that it is installed in accordance with Intrinsically Safe or non-incendive field wiring practices.**
- **The power module may be replaced in a hazardous area. The power module has a surface resistivity greater than 1 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 1 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.**

Electrical shock could cause death or serious injury.

- **Use extreme caution when making contact with leads and terminals.**

Radio frequency hazard considerations:

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

⚠ CAUTION!

Shipping considerations for wireless products.

- **The unit was shipped to you without the power module installed. Remove the power module prior to shipping.**
- **Each Black Power Module contains two “C” size primary lithium-thionyl chloride battery. Primary lithium batteries are regulated in transportation by the U. S. Department of Transportation, and are also covered by IATA (International Air Transport Association), ICAO (International Civil Aviation Organization), and ARD (European Ground Transportation of Dangerous Goods). It is the responsibility of the shipper to ensure compliance with these or any other local requirements. Consult current regulations and requirements before shipping.**
- **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. Care should be taken to prevent thermal, electrical, or mechanical damage. Contacts should be protected to prevent premature discharge.**

Contents

1 Introduction

1.1 Using the manual

This manual provides information on installing, operating, and maintaining the Rosemount™ 702 Wireless Discrete Transmitter for plunger arrival detection. The table below lists the different variants of the Rosemount 702 transmitter; refer to the table if looking for documentation on different variants:

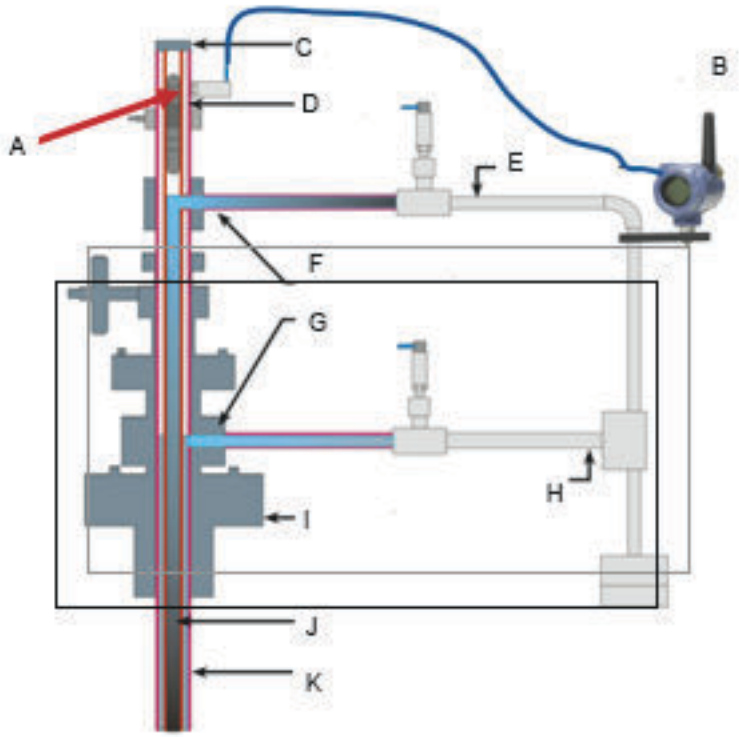
Model Number	Functionality	Manual
702DX22/32/42	Two channel discrete I/O	*Reference Manual*
702DX61	One channel for Tyco TraceTek liquid hydrocarbon leak detection	*Reference Manual*
702DX52	Discrete Transmitter for Plunger Arrival Detection	Reference Manual

Product description

The Rosemount 702 for plunger arrival detection is designed to work with the ETC Cyclops plunger arrival sensor (ET-11000). The transmitter provides power to the plunger arrival sensor, reads and communicates the sensor state via wirelessHART. Features of the Rosemount 702 Transmitter include:

- Simple and easy installation practices currently being used for robust installations
- Flexibility to meet your most demanding applications
- Wireless output with >99 percent data reliability delivers rich HART® data, protected by industry leading security
- Sensor state latching for host system compatibility
- Provides power to external plunger arrival sensor
- The integral LCD display conveniently displays the latched plunger sensor state, power output state, and diagnostics of the transmitter

Figure 1-1: 702 Plunger Arrival Sensor



A. Plunger arrival sensor (ETC Cyclops)

B. 702 plunger arrival

C. Lubricator

D. Plunger

E. Wastewater

F. Upper lubricator outlet

G. Lower lubricator outlet

H. Production gas

I. Well casing

J. Well casing/production tube

K. Well casing

1.2 Product recycling/disposal

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

2 Configuration

2.1 Safety messages

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

⚠ WARNING!

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- **Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.**
- **When connecting the plunger arrival sensor in a hazardous area, ensure that it is installed in accordance with Intrinsically Safe or non-incendive field wiring practices.**
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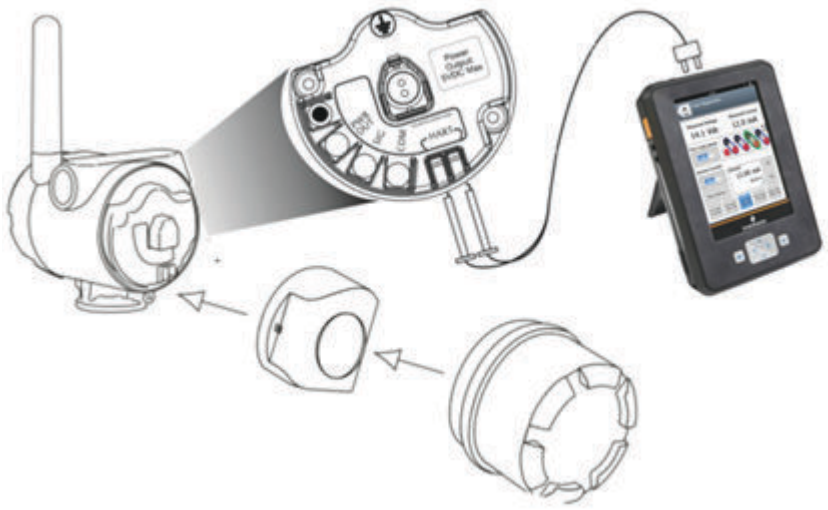
- **This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.**

2.2 Benchtop Configuration

Benchtop configuration includes only the steps necessary to securely join the device to the wireless network. Further configuration can be performed either locally or via the wireless network. See *Device network configuration*Section 2.4 for detailed configuration guidance. Remove the power module-side housing cover to expose the terminal block and HART® communication terminals, then connect the power module to power the unit for configuration.

The Rosemount 702 Transmitter is compatible with industry standard HART configuration tools such as the Emerson™ AMS TREX™ Device Communicator, AMS Wireless Configurator or AMS Device Manager. Refer to the documentation for the respective communication tool for proper operation.

Figure 2-1: Rosemount 702 Compatible with HART Configuration



2.2.1 Device Network Configuration

To communicate with the Gateway, the transmitter must be configured to securely join the wireless network.

Entering device tag

The long tag is used to identify this device on the wireless network. The long tag of each device must be unique. Configure the tag according to the site specific tagging convention.

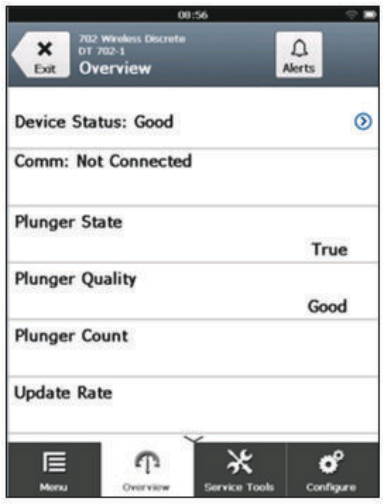
Entering the network ID and join key

Configure the Network ID and Join Key so they match the Network ID and Join Key of the Gateway. Refer to the wireless gateway documentation for further information.

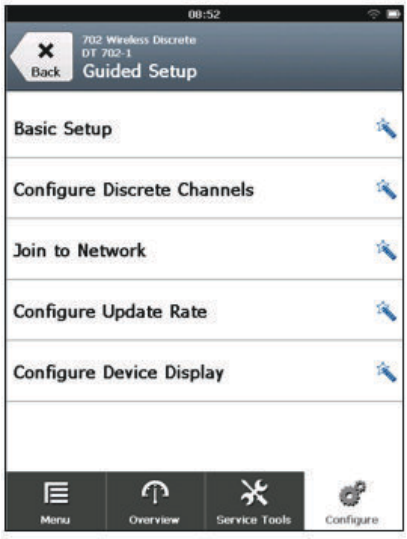
2.2.2 Entering Network ID and Join Key Via AMS TREX

Take the following steps to enter the network ID and join key via TREX.

1. The Overview screen shows at startup.

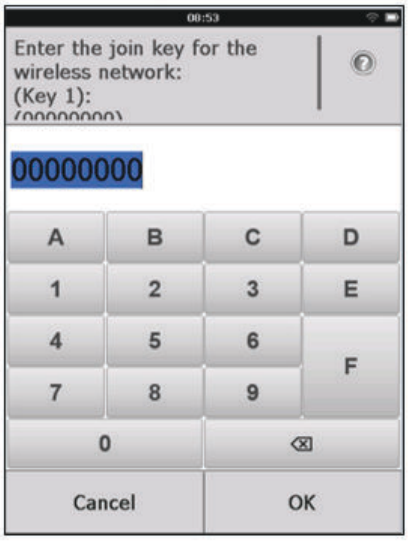


2. From the Overview screen, navigate to the Configure screen.

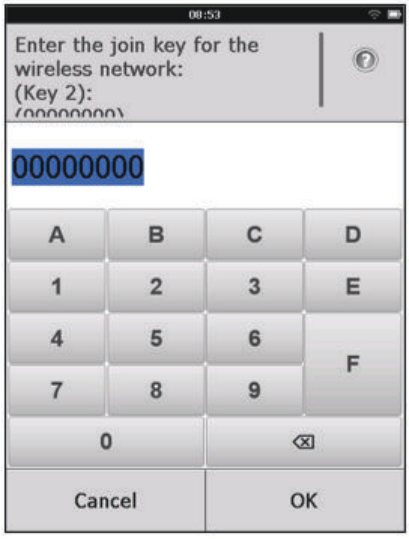


3. Enter the network ID.

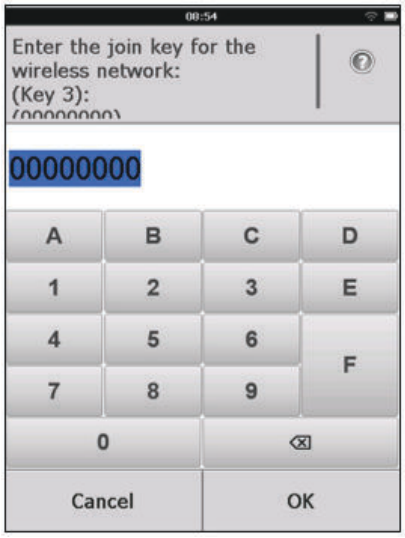
4. Enter the Key 1 join key.



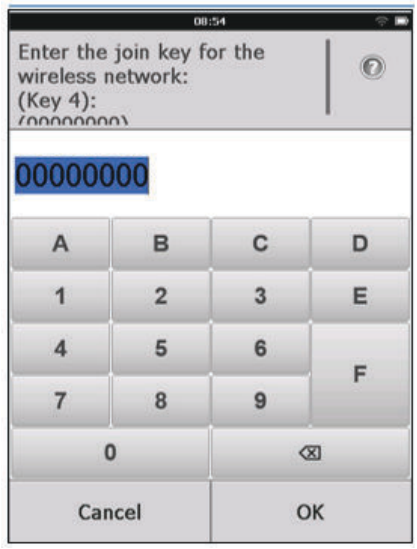
5. Enter the Key 2 join key.



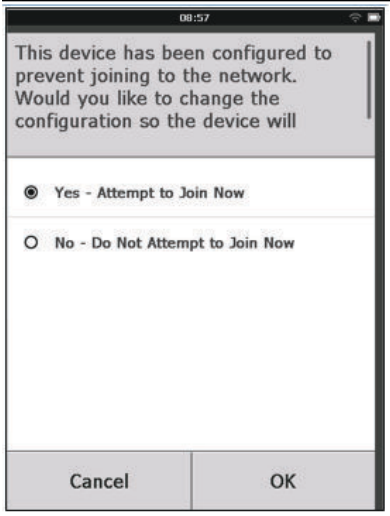
6. Enter the Key 3 join key.



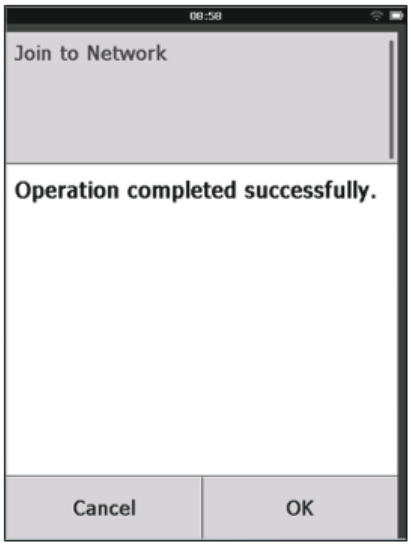
7. Enter the Key 4 join key.



8. Select the Yes - Attempt to Join Now button.



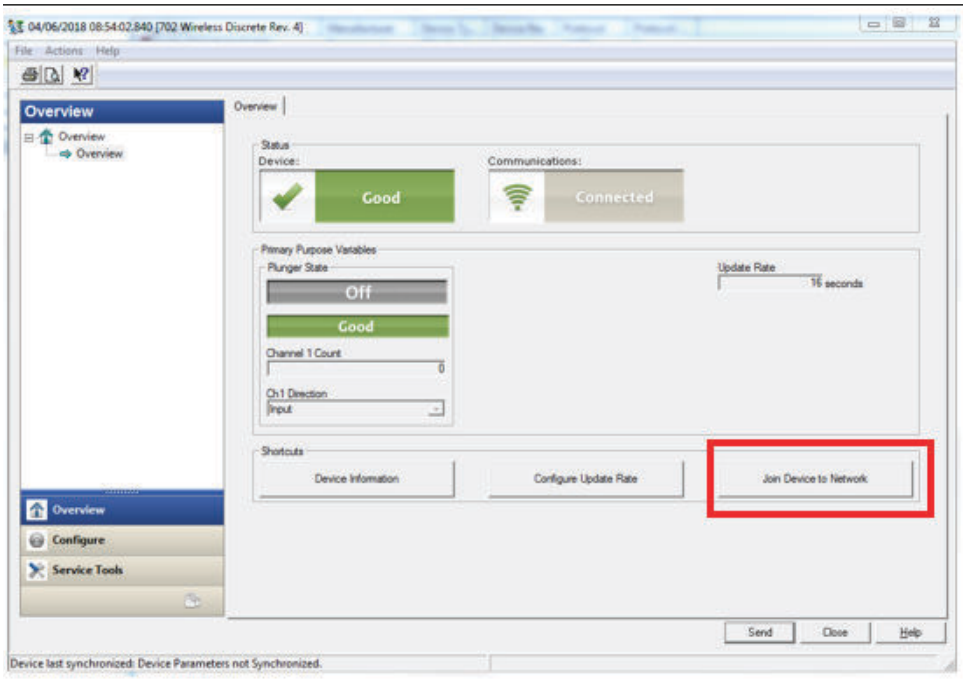
9. The validation screen displays.



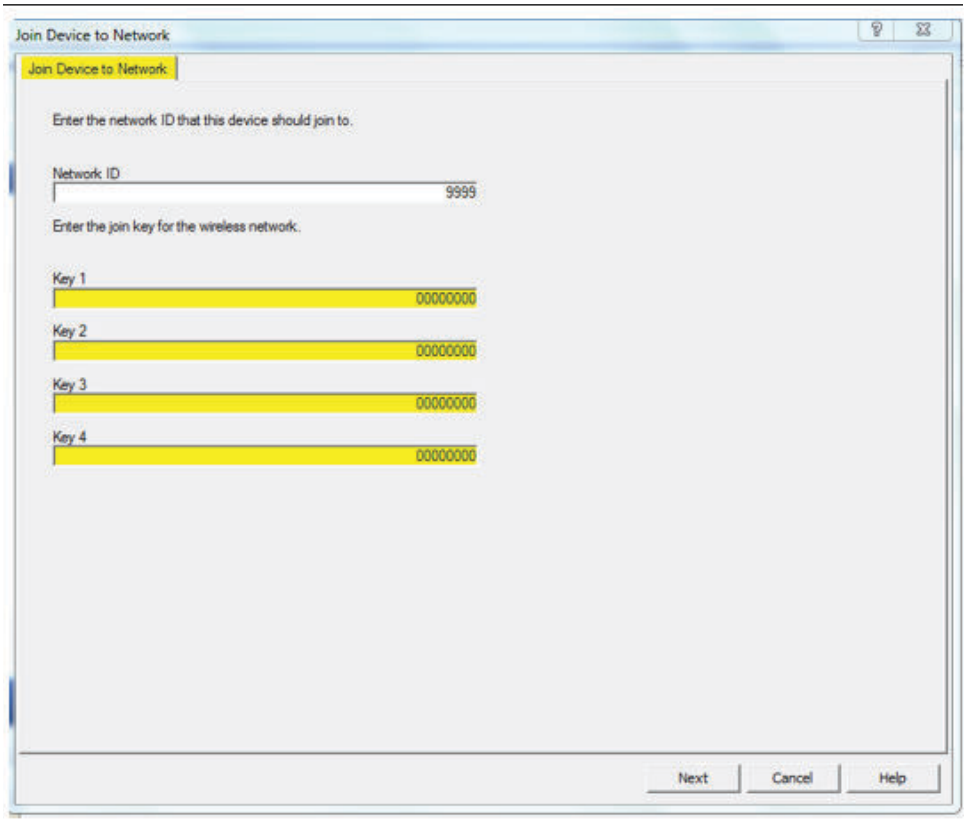
2.2.3 Entering the network and join key via AMS

Take the following steps to enter the network ID and join key via AMS.

1. From the AMS Overview screen, select the **Join Device to Network** tab.



2. The Join Device to Network screen opens. Enter all four key fields and select **Next** to complete.



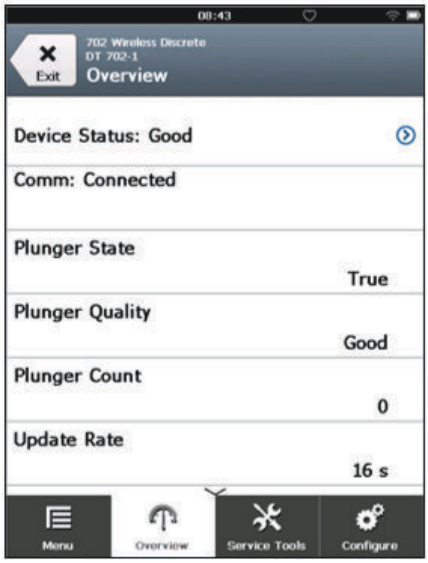
2.2.4 Field Communicator Bench Configuration

All of the below references and screenshots associated with Field Communicator is using the Emerson AMS TREX. Similar screens are present in other versions of field communicators; refer to the manual for your handheld communicator device for more information. The Transmitter Device Description (DD) is required for HART communication. To obtain the latest DD, go to *Emerson.com/Device Install Kits* and then visit the Emerson™ Web page for your handheld device.

Guided Setup for the Field Communicator

To connect to the Rosemount 702 Discrete Transmitter using a handheld communication device, first remove the rear housing cover, attach the HART communication leads to the COMM terminals on the terminal block, and follow the steps for the Guided setup, below.

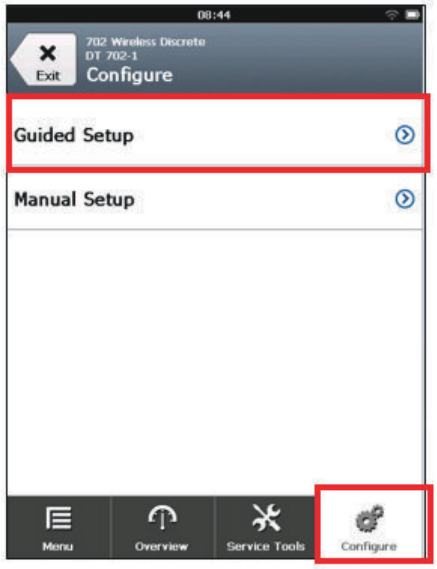
1. On the Home screen, select **Configure**.



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

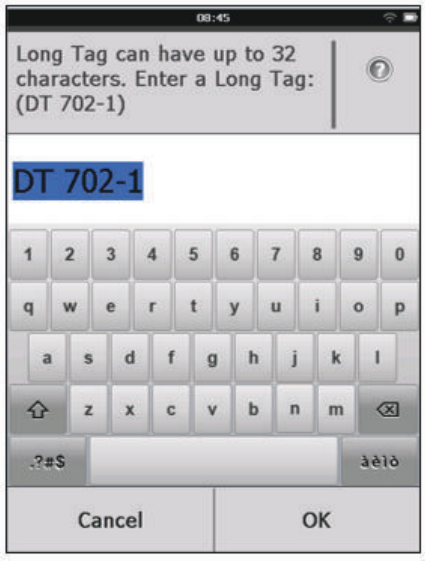
Note

Alternatively, Manual Setup can be selected to verify or change all configuration settings including option and advanced settings.

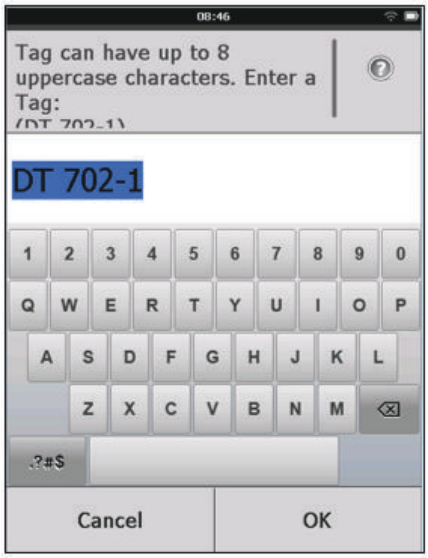


3. Select **Basic Setup**.

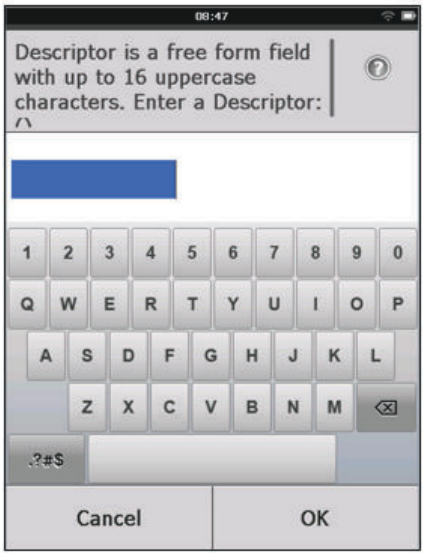
4. Enter a Long Tag. When completed, select **OK**.



5. Enter a Tag. When completed, select **OK**.

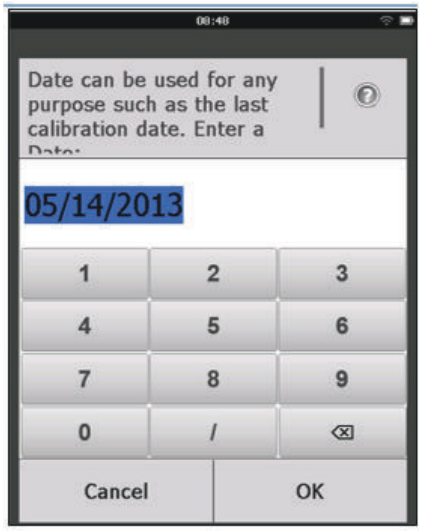


6. Enter a Descriptor. When completed, select **OK**.

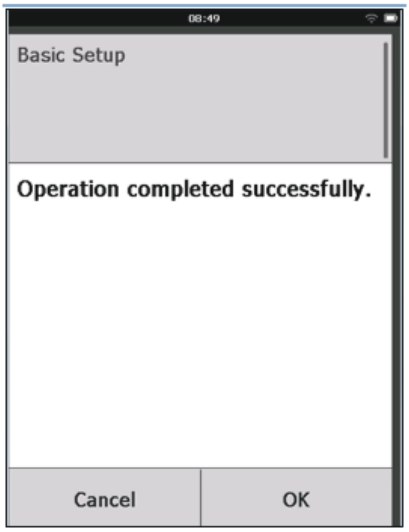


7. Enter a Message.When completed, select **OK**.

8. Enter a Date. When completed, select **OK**.



9. When finished, select Send to implement configuration changes.
10. Basic Setup "Operation completed successfully" screen appears.

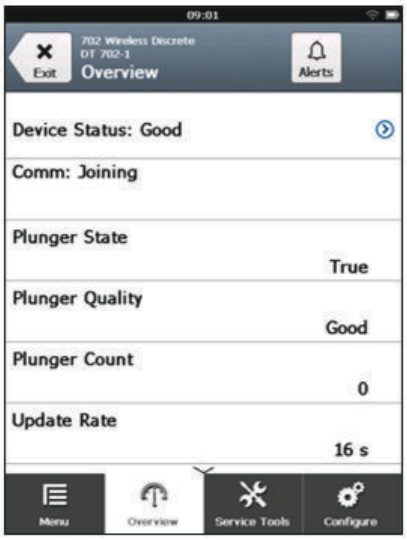


11. When configuration is completed, remove the HART communication leads from the COMM terminals on the terminal block and replace the rear housing cover.

2.2.5 Latching configuration

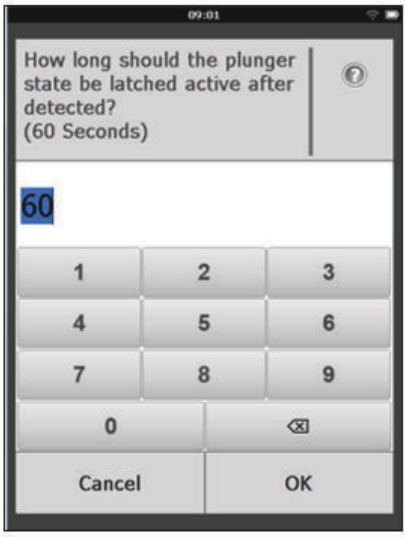
To configure Latching with AMS TREX, take the following steps.

1. At startup, the Overview screen displays.

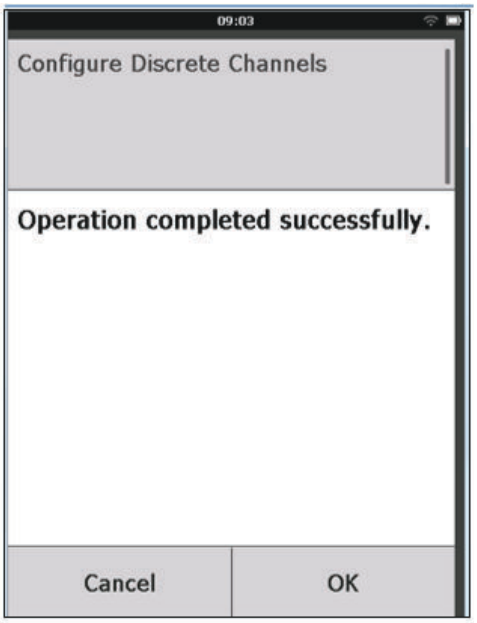


2. From the Overview screen, select **Configure**. Select C**onfigure Discrete Channels**.

3. Enter the duration the plunger state should be latched active after detected.



4. Operation completed successfully message displays when completed.



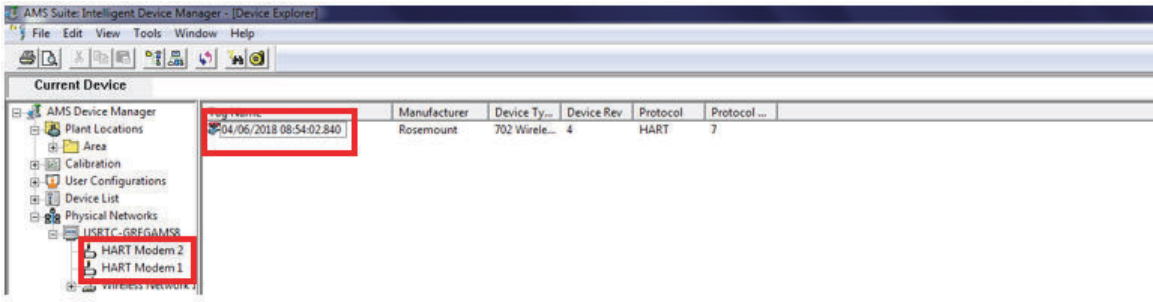
2.2.6 AMS Wireless Configurator Bench Configuration

AMS Wireless Configurator can connect to devices directly, using a HART modem, or through a Wireless Gateway.

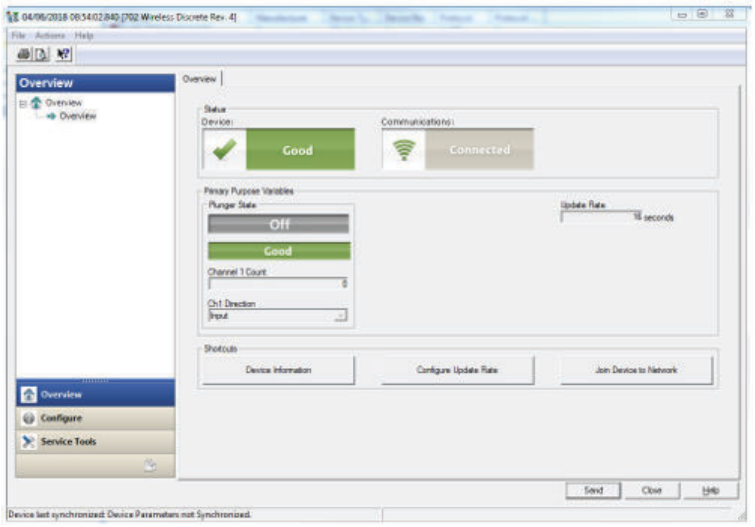
Guided Setup

Select Guided Setup to verify or change initial configuration settings.

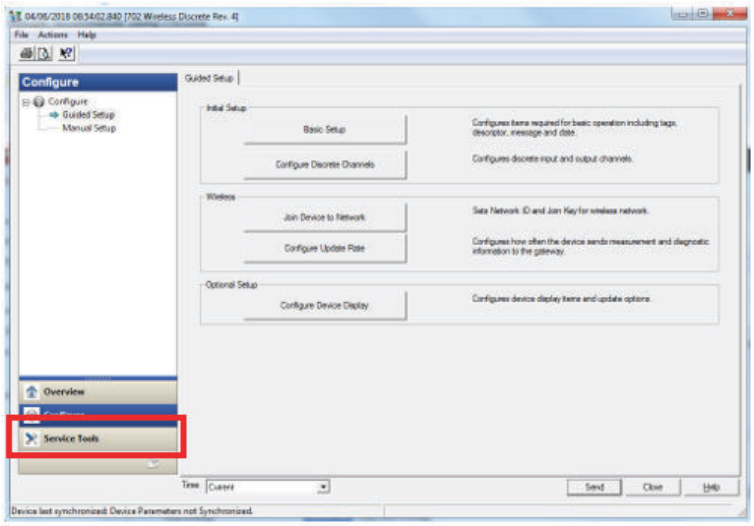
1. Open the AMS Intelligent Device Manager from Windows as shown.



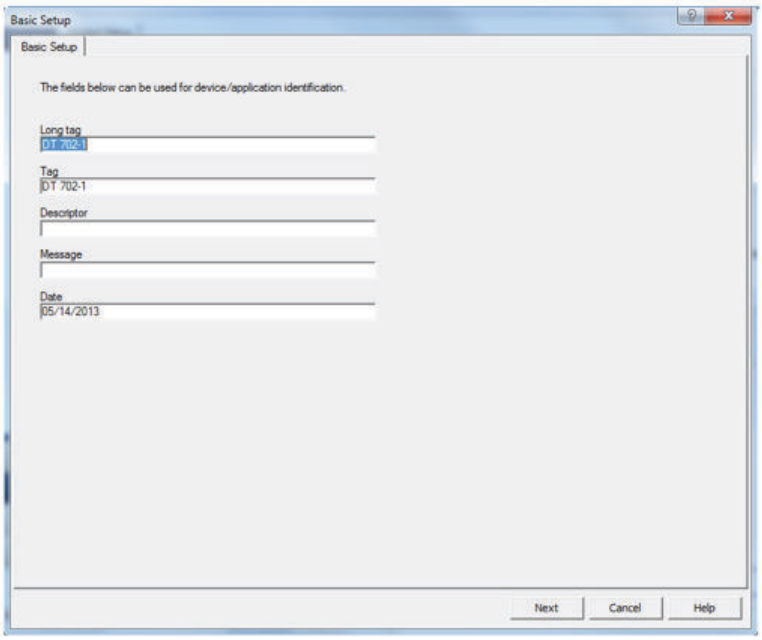
2. The Overview screen displays. Select the **Configure** tab.



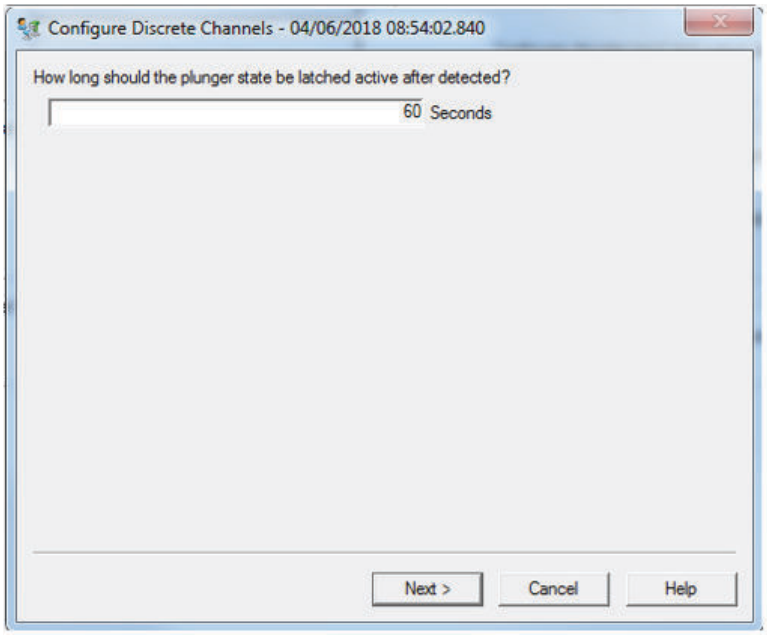
3. Select the **Service Tools** tab.



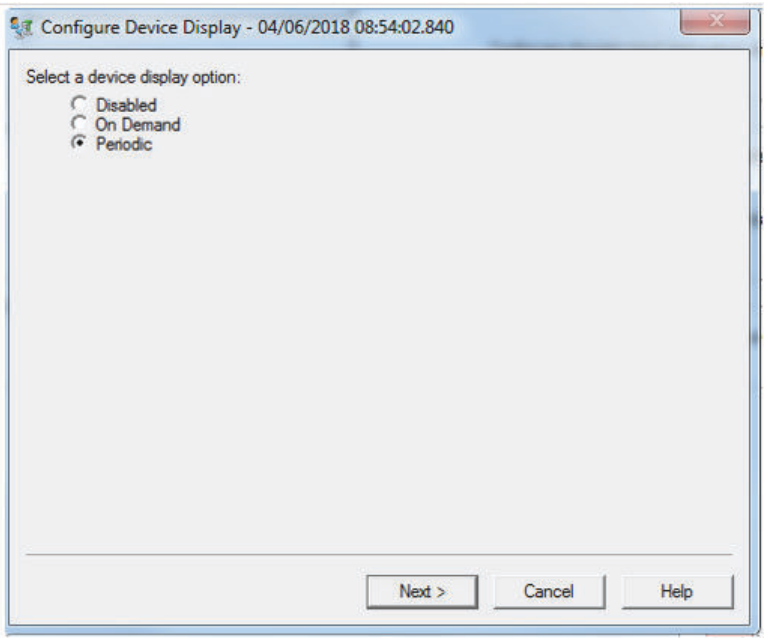
4. The Basic Setup screen opens. Enter the Long tag. When done, select **Next**.



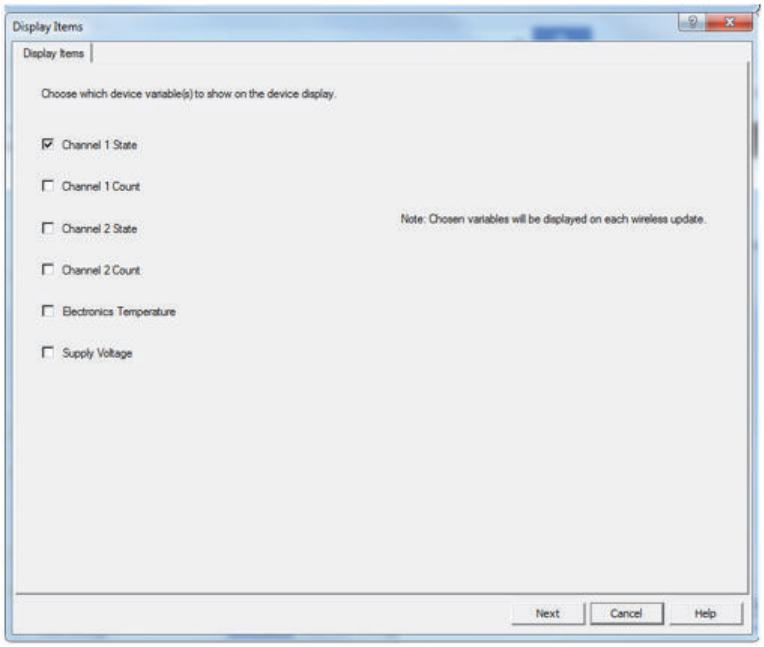
5. Enter the duration the plunger state should be latched active after detected. When done, select **Next**.



6. Select a device display option. When done, select **Next**.



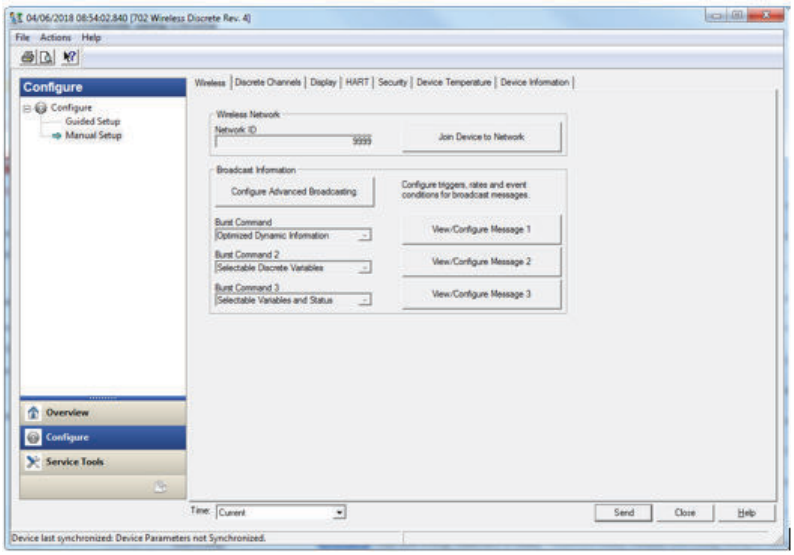
7. Choose which device variable to show on the device display, then select **Next**. When finished, select Send to implement configuration changes.The Guided Setup is complete.



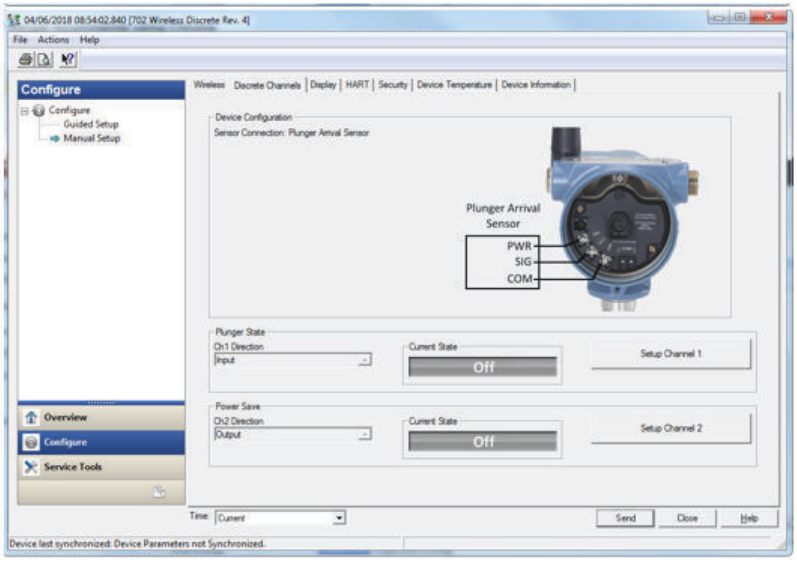
Manual Setup

Select Manual Setup to verify or change all configuration settings, including advanced, optional settings.

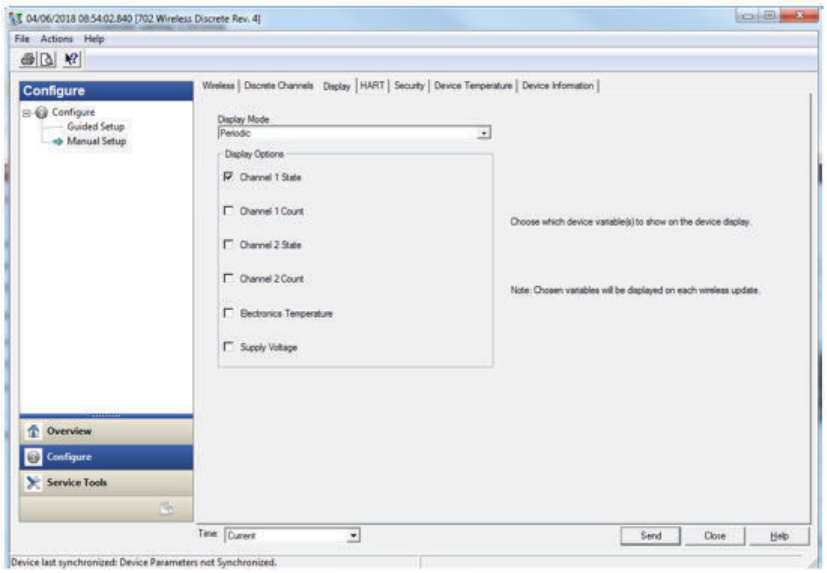
1. From the Configure screen, select Manual Setup.



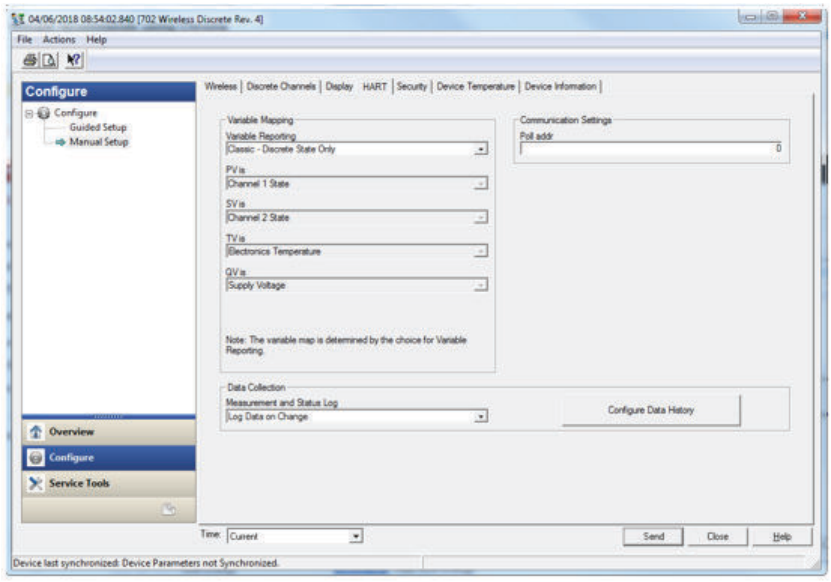
2. Setup Current State for Channels. When done, select **Send.**



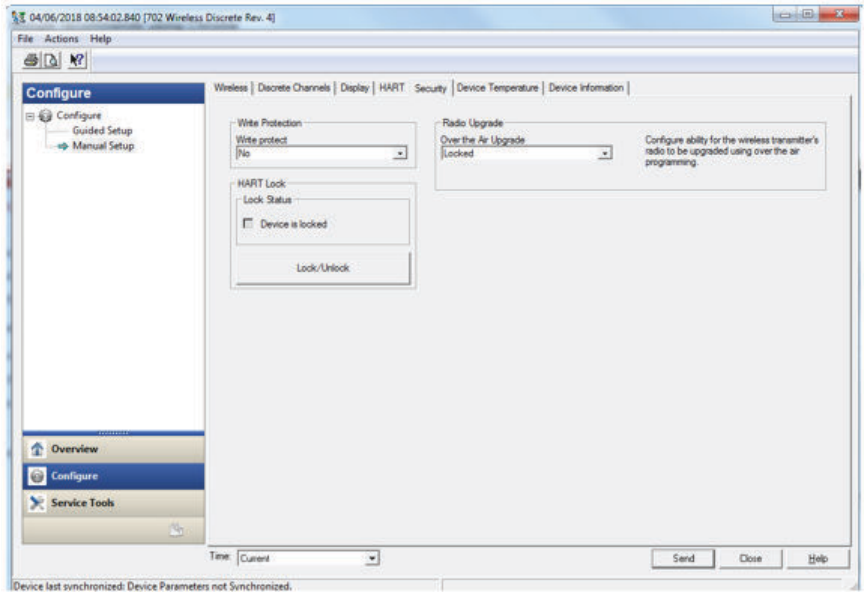
3. Select the Display Mode. When done, select **Send**.



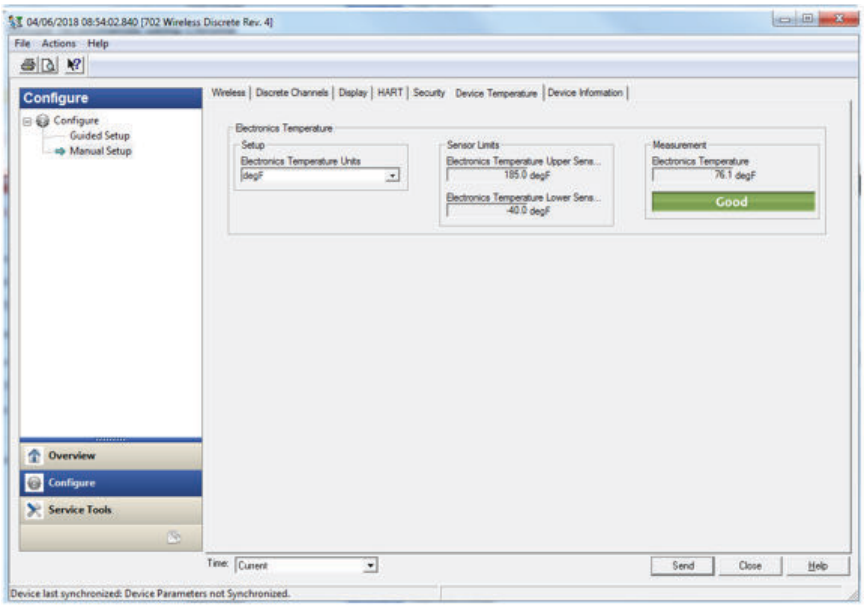
4. Select appropriate settings in the Variable Mapping, Data Collection, and Communications Settings fields. When done, select **Send**.



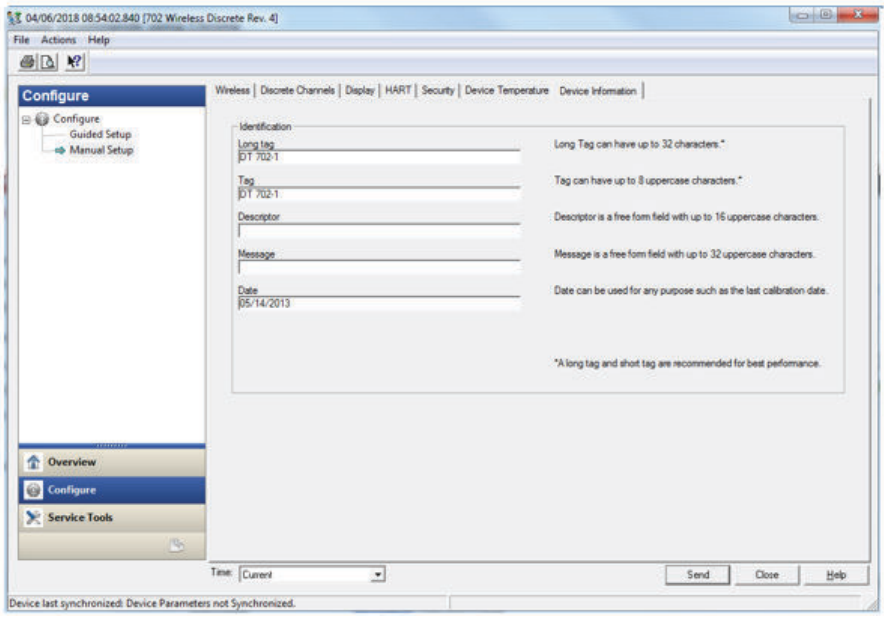
5. Select appropriate settings in the Write Protection, HART Lock, and Radio Upgrade fields. When done, select **Send**.



6. Select appropriate settings in the Electronics Temperature fields, beginning with the Setup field. When done, select **Send.**

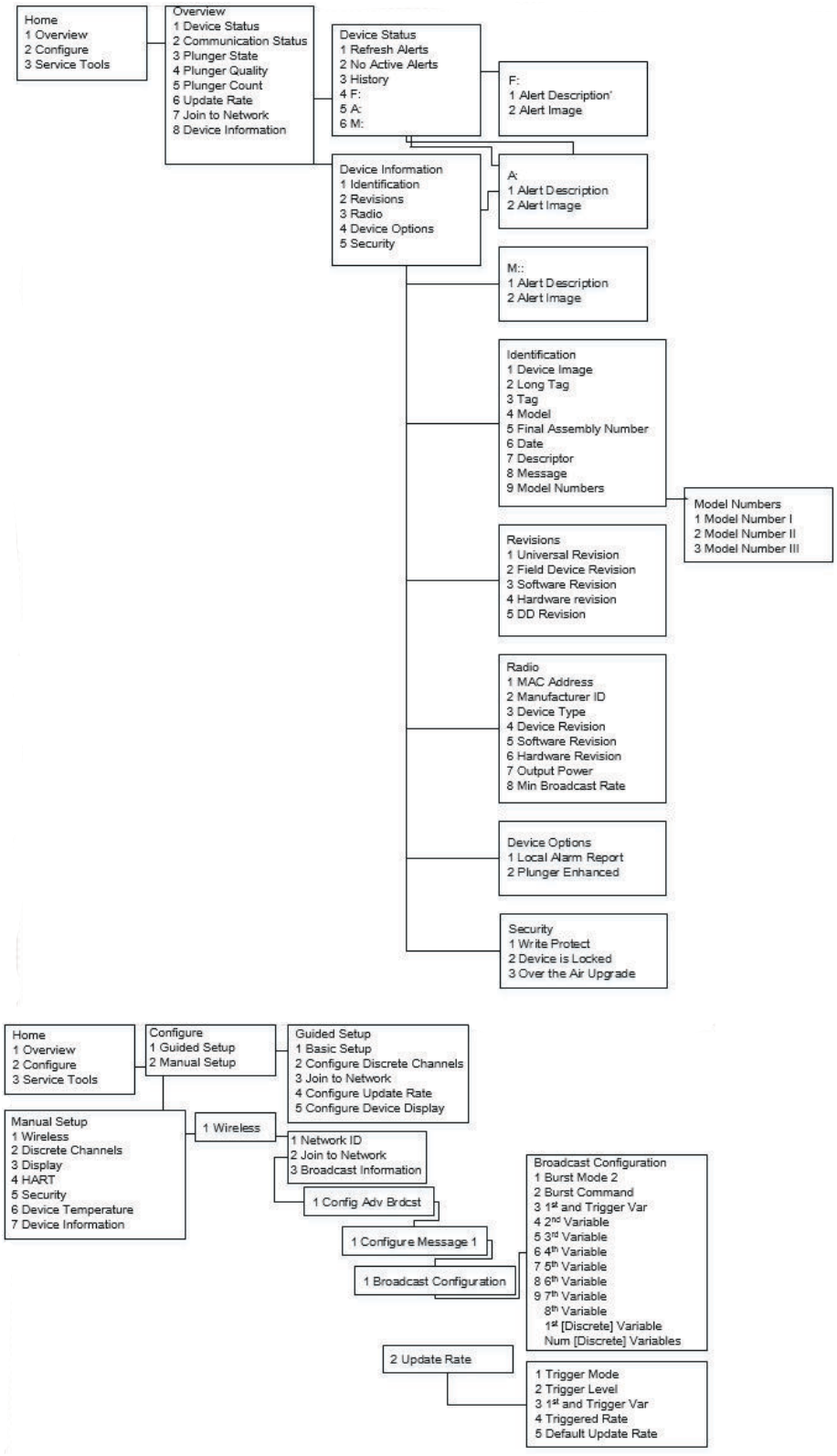


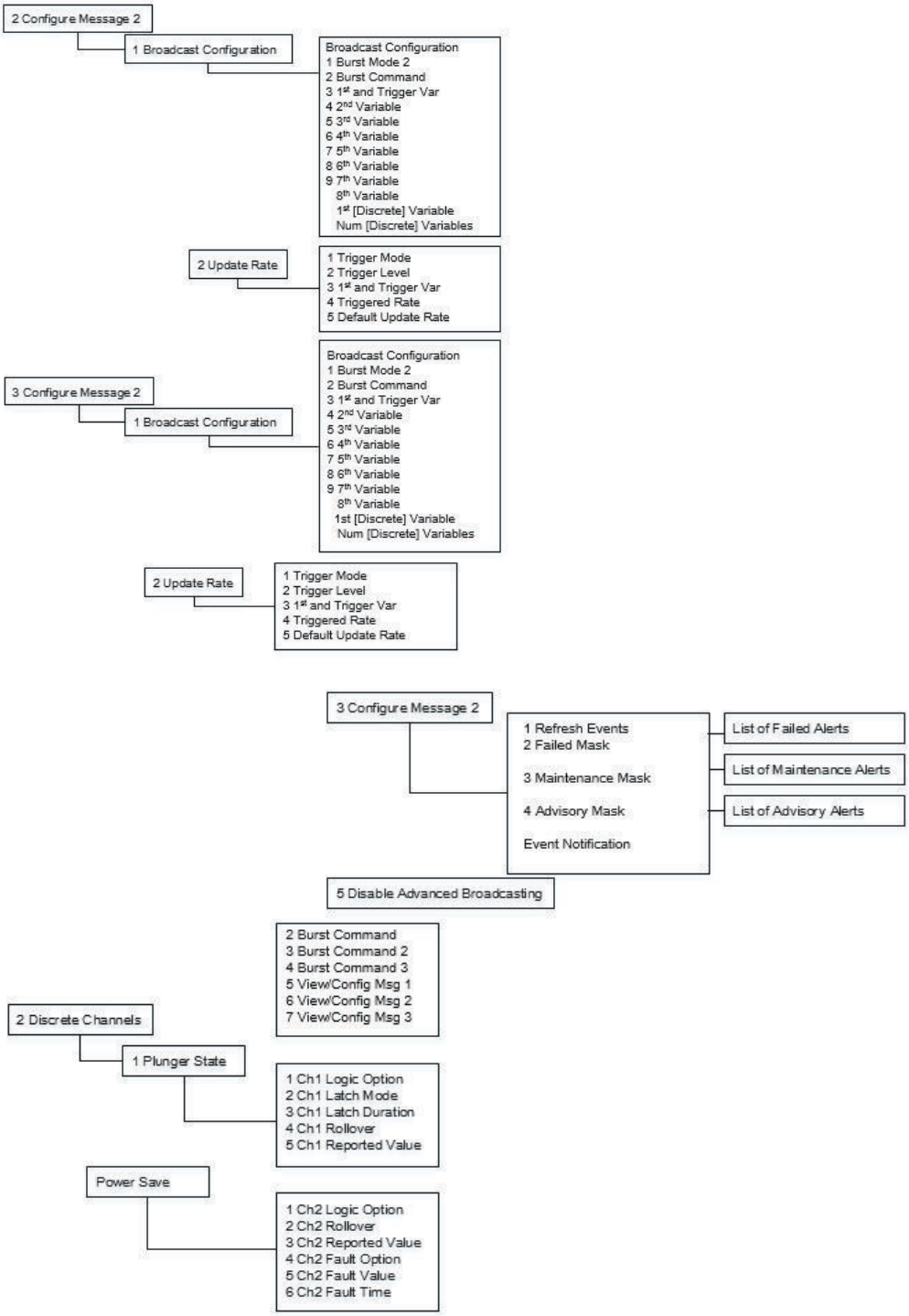
7. Add the Long Tag, Tag, and Descriptors in the Indentification fields. When done, select **Send**.

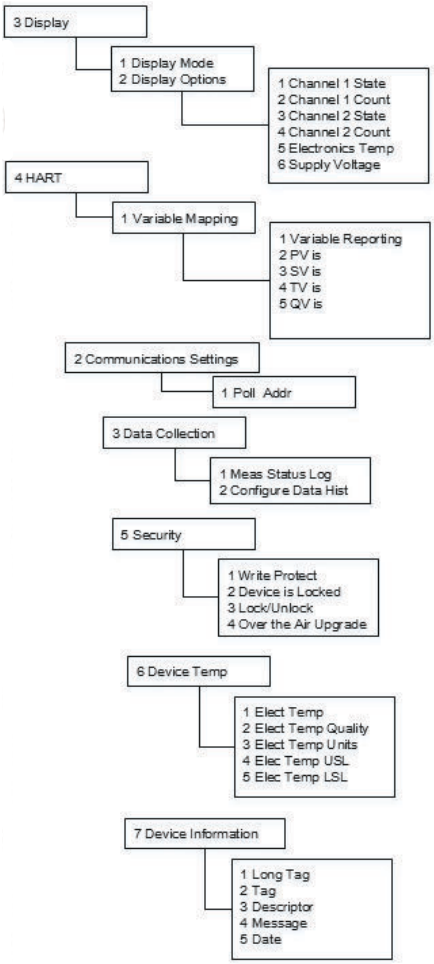


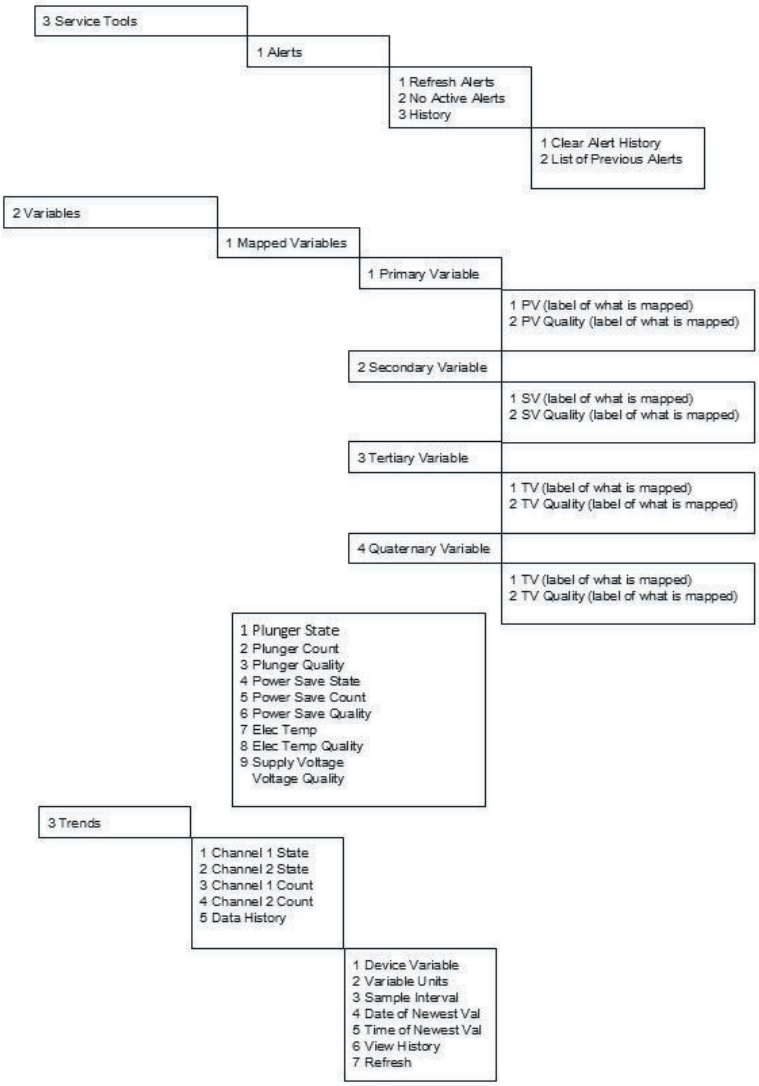
2.3 HART menu tree

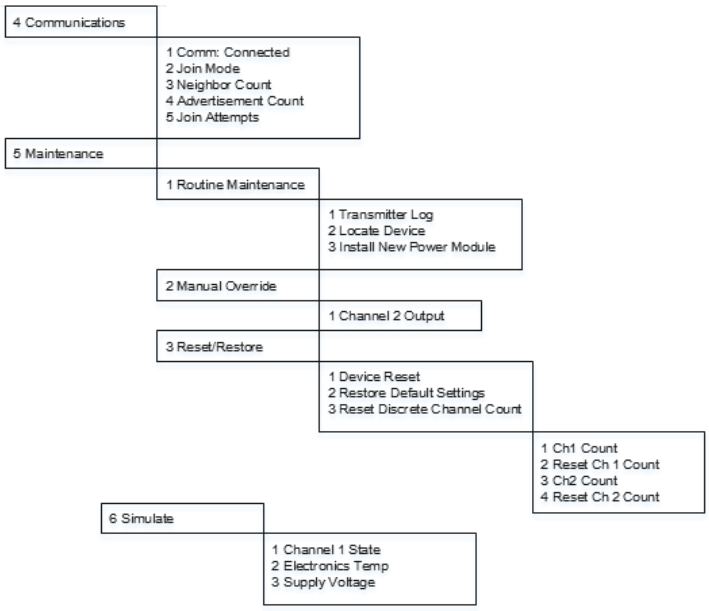
For ease of operation, changing setup, such as switch type, can be completed in several locations.


Home
1 Overview
2 Configure
3 Service Tools
Overview
1 Device Status
2 Communication Status
3 Plunger State
4 Plunger Quality
5 Plunger Count
6 Update Rate
7 Join to Network
8 Device Information
Device Status
1 Refresh Alerts
2 No Active Alerts
3 History
4 F:
5 A:
6 M:
F:
1 Alert Description'
2 Alert Image
A:
1 Alert Description
2 Alert Image
M::
1 Alert Description
2 Alert Image
Device Information
1 Identification
2 Revisions
3 Radio
4 Device Options
5 Security
Identification
1 Device Image
2 Long Tag
3 Tag
4 Model
5 Final Assembly Number
6 Date
7 Descriptor
8 Message
9 Model Numbers
Model Numbers
1 Model Number I
2 Model Number II
3 Model Number III
Revisions
1 Universal Revision
2 Field Device Revision
3 Software Revision
4 Hardware revision
5 DD Revision
Radio
1 MAC Address
2 Manufacturer ID
3 Device Type
4 Device Revision
5 Software Revision
6 Hardware Revision
7 Output Power
8 Min Broadcast Rate
Device Options
1 Local Alarm Report
2 Plunger Enhanced
Security
1 Write Protect
2 Device is Locked
3 Over the Air Upgrade
Home
1 Overview
2 Configure
3 Service Tools
Configure
1 Guided Setup
2 Manual Setup
Guided Setup
1 Basic Setup
2 Configure Discrete Channels
3 Join to Network
4 Configure Update Rate
5 Configure Device Display
Manual Setup
1 Wireless
2 Discrete Channels
3 Display
4 HART
5 Security
6 Device Temperature
7 Device Information
1 Wireless
1 Network ID
2 Join to Network
3 Broadcast Information
1 Config Adv Brdcst
1 Configure Message 1
1 Broadcast Configuration
Broadcast Configuration
1 Burst Mode 2
2 Burst Command
3 1st and Trigger Var
4 2nd Variable
5 3rd Variable
6 4th Variable
7 5th Variable
8 6th Variable
9 7th Variable
8th Variable
1st [Discrete] Variable
Num [Discrete] Variables
2 Update Rate
1 Trigger Mode
2 Trigger Level
3 1st and Trigger Var
4 Triggered Rate
5 Default Update Rate


2 Configure Message 2
1 Broadcast Configuration
Broadcast Configuration
1 Burst Mode 2
2 Burst Command
3 1st and Trigger Var
4 2nd Variable
5 3rd Variable
6 4th Variable
7 5th Variable
8 6th Variable
9 7th Variable
8th Variable
1st [Discrete] Variable
Num [Discrete] Variables
2 Update Rate
1 Trigger Mode
2 Trigger Level
3 1st and Trigger Var
4 Triggered Rate
5 Default Update Rate
3 Configure Message 2
1 Broadcast Configuration
Broadcast Configuration
1 Burst Mode 2
2 Burst Command
3 1st and Trigger Var
4 2nd Variable
5 3rd Variable
6 4th Variable
7 5th Variable
8 6th Variable
9 7th Variable
8th Variable
1st [Discrete] Variable
Num [Discrete] Variables
2 Update Rate
1 Trigger Mode
2 Trigger Level
3 1st and Trigger Var
4 Triggered Rate
5 Default Update Rate
3 Configure Message 2
1 Refresh Events
2 Failed Mask
3 Maintenance Mask
4 Advisory Mask
Event Notification
List of Failed Alerts
List of Maintenance Alerts
List of Advisory Alerts
5 Disable Advanced Broadcasting
2 Burst Command
3 Burst Command 2
4 Burst Command 3
5 View/Config Msg 1
6 View/Config Msg 2
7 View/Config Msg 3
2 Discrete Channels
1 Plunger State
1 Ch1 Logic Option
2 Ch1 Latch Mode
3 Ch1 Latch Duration
4 Ch1 Rollover
5 Ch1 Reported Value
Power Save
1 Ch2 Logic Option
2 Ch2 Rollover
3 Ch2 Reported Value
4 Ch2 Fault Option
5 Ch2 Fault Value
6 Ch2 Fault Time


3 Display
1 Display Mode
2 Display Options
1 Channel 1 State
2 Channel 1 Count
3 Channel 2 State
4 Channel 2 Count
5 Electronics Temp
6 Supply Voltage
4 HART
1 Variable Mapping
1 Variable Reporting
2 PV is
3 SV is
4 TV is
5 QV is
2 Communications Settings
1 Poll Addr
3 Data Collection
1 Meas Status Log
2 Configure Data Hist
5 Security
1 Write Protect
2 Device is Locked
3 Lock/Unlock
4 Over the Air Upgrade
6 Device Temp
1 Elect Temp
2 Elect Temp Quality
3 Elect Temp Units
4 Elec Temp USL
5 Elec Temp LSL
7 Device Information
1 Long Tag
2 Tag
3 Descriptor
4 Message
5 Date


3 Service Tools
1 Alerts
1 Refresh Alerts
2 No Active Alerts
3 History
1 Clear Alert History
2 List of Previous Alerts
2 Variables
1 Mapped Variables
1 Primary Variable
1 PV (label of what is mapped)
2 PV Quality (label of what is mapped)
2 Secondary Variable
1 SV (label of what is mapped)
2 SV Quality (label of what is mapped)
3 Tertiary Variable
1 TV (label of what is mapped)
2 TV Quality (label of what is mapped)
4 Quaternary Variable
1 TV (label of what is mapped)
2 TV Quality (label of what is mapped)
1 Plunger State
2 Plunger Count
3 Plunger Quality
4 Power Save State
5 Power Save Count
6 Power Save Quality
7 Elec Temp
8 Elec Temp Quality
9 Supply Voltage
Voltage Quality
3 Trends
1 Channel 1 State
2 Channel 2 State
3 Channel 1 Count
4 Channel 2 Count
5 Data History
1 Device Variable
2 Variable Units
3 Sample Interval
4 Date of Newest Val
5 Time of Newest Val
6 View History
7 Refresh

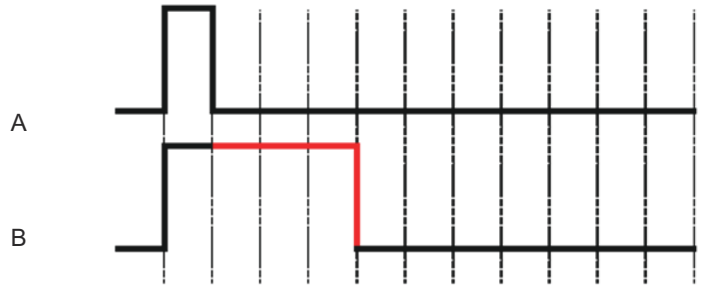


2.4 Detailed Configuration

Configuring Latching Period

The Rosemount 702 for plunger arrival includes the ability to latch plunger arrival events for a configurable duration. See figures below for an example of the latching period.

Figure 2-2: Short Latch Time Events



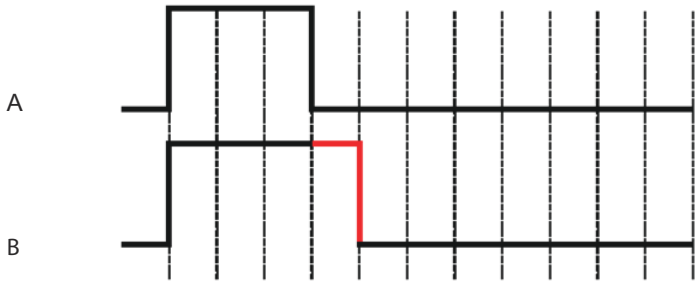
A: Measured

B: Reported

Short events (less than latch hold time) of the measured value will be latched to the reported value for the duration of latch hold time.

The start of latch hold timer will begin when the measure signal first transitions to active state.

Figure 2-3: Latch Hold Timer



A: Measured

B: Reported

Note

The default for the plunger arrival option will be to latch high. This is what is required to function with the ETC cyclops arrival sensor.

For full latching details refer to *Section 5.2* of this manual.

The duration should be configured to hold the plunger arrival event long enough for the rest of the system to react. Considerations such as wireless update rate, Modbus/OPC scan rates, etc. should be taken into account while setting the latch duration. To avoid the potential for missing arrival events, the latch duration should be greater than or at least equal to the configured wireless update rate. The default update rate for the plunger arrival option is 16 seconds and the default latch duration is 60 seconds.

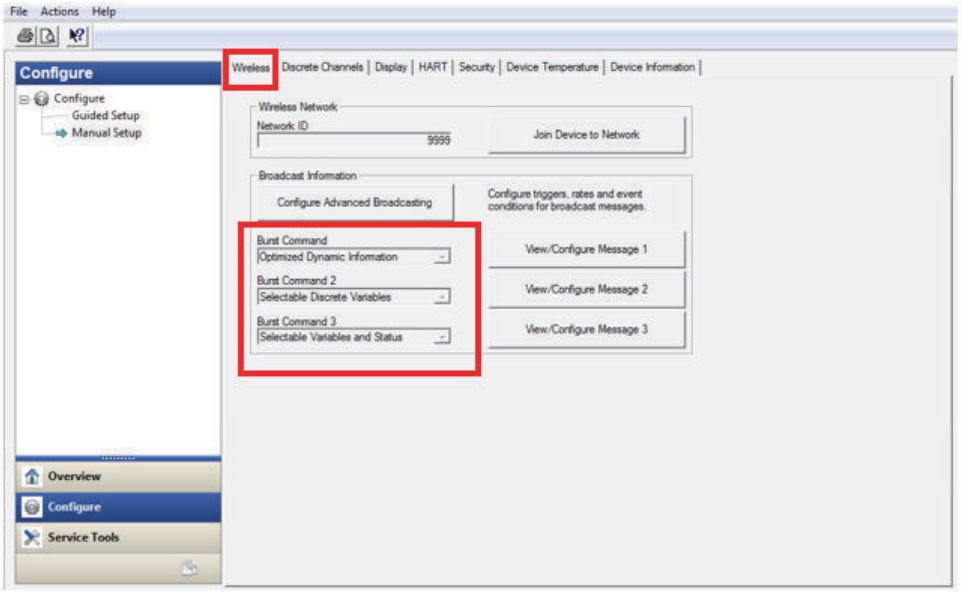
To configure the latch period refer back to *Section 2.2.5* and follow the steps to reach setup channel 1.

2.4.1 Advanced burst configuration

Procedure

For discrete inversion (advanced), select the **Wireless** tab from the Configure screen. The Burst Command, Burst Command 2, and Burst Command 3 fields may be populated by selecting from the dropdown menus in each field.

Figure 2-4: Burst Commands

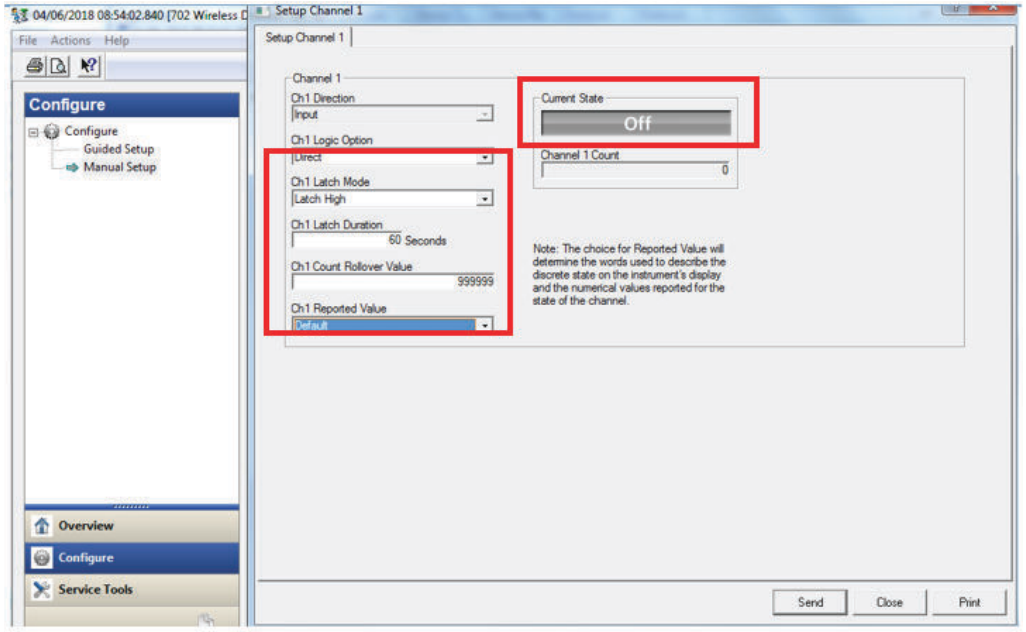


2.4.2 Advanced discrete inversion

To set the discrete inversion (advanced), count roll over, reported value, and fault state:

Go to manual setup, select discrete channels, select Setup Channel.

Figure 2-5: Discrete Inversion



A table of the Reported values is shown below for reference.

Plunger arrival application types

Table 2-1: Reported Values

Reported Value	Value Name		Analog Value		Discrete Value	
	Plunger Event Not Detected	Plunger Event Detected	Plunger Event Not Detected	Plunger Event Detected	Plunger Event Not Detected	Plunger Event Detected
Default	False	True	0.000	1.000	240	242
Off/On	Off	On	0.000	1.000	0	1
Open/ Closed	Opened	Cllosed	46.000	6.000	46	6
Running/ Stopped	Stopped	Running	25.000	26.000	25	26
Slow/Fast	Slow	Fast	8.000	7.000	8	7
Forward/Reverse	Forward	Reverse	9.000	10.000	9	10
Bottom/Top	Bottom	Top	12.000	11.000	12	11
Empty/Full	Empty	Full	14.000	13.000	14	13

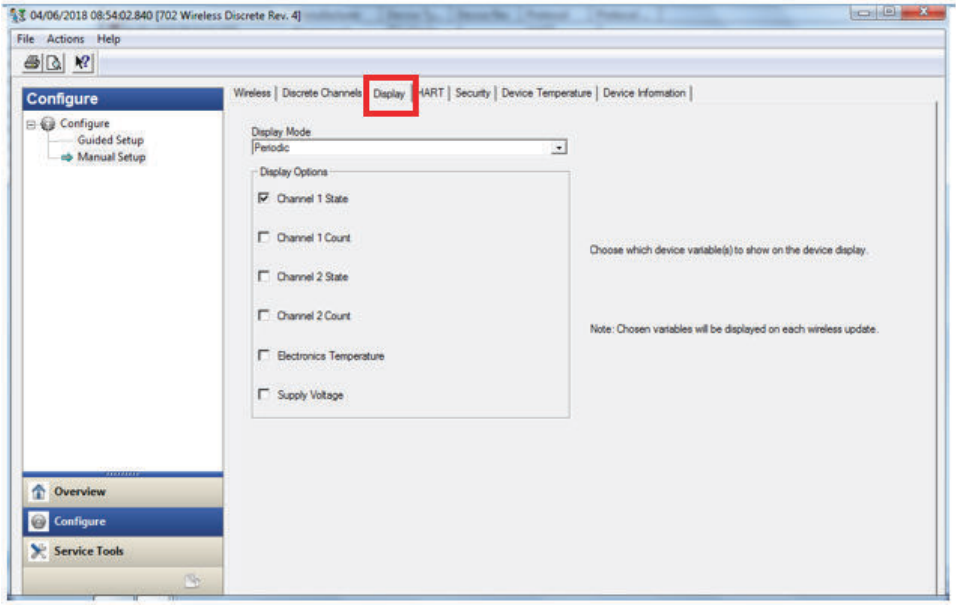
Table 2-1: Reported Values *(continued)*

Reported Value	Value Name		Analog Value		Discrete Value	
Cold/Hot	Cold	Hot	16.000	15.000	16	15
Dry/Wet	Dry	Dry	32.000	33.000	32	33
Absent/ Present	Absent	Present	45.000	44.000	45	44

2.4.3 Configure LCD

Select the Display tab to configure Display Modes, Display Options.

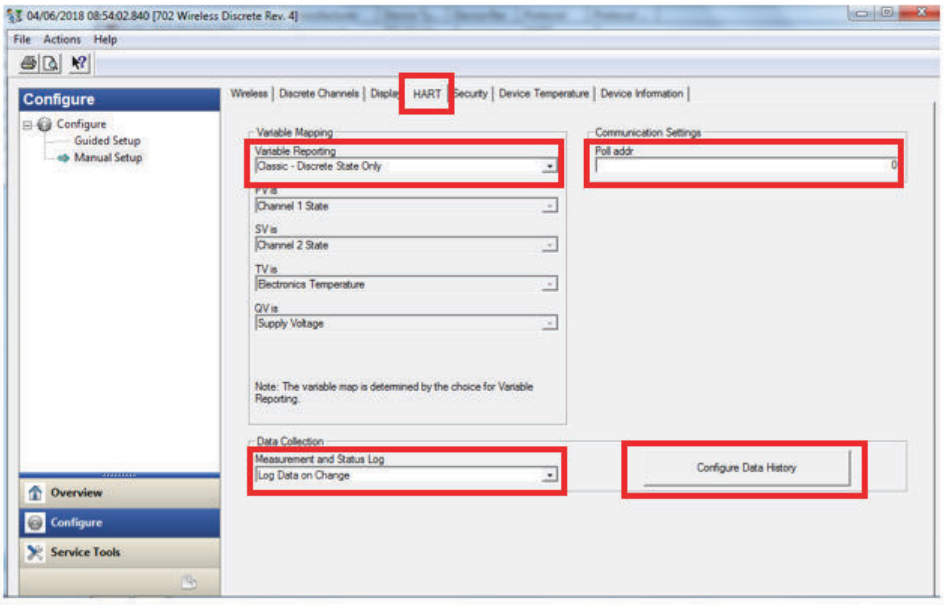
Figure 2-6: Configure LCD display



2.4.4 Configure Variable Reporting

To configure Variable Reporting, select the HART tab, and then the dropdown menus.

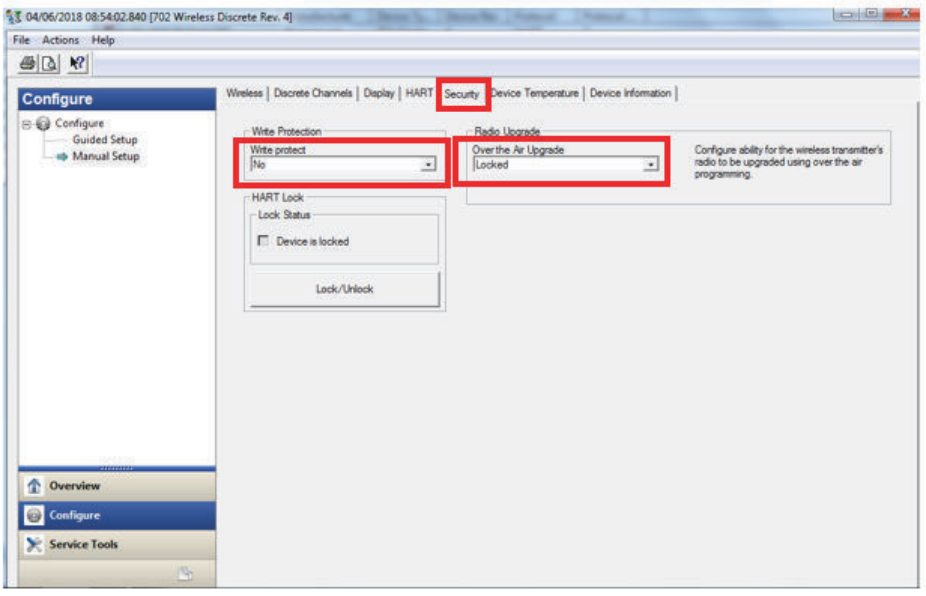
Figure 2-7: Configure Variable Reporting



2.4.5 Configure Security

To figure Write Protection and Otap block out, select the Security tab and access the dropdown menus to populate the fields.

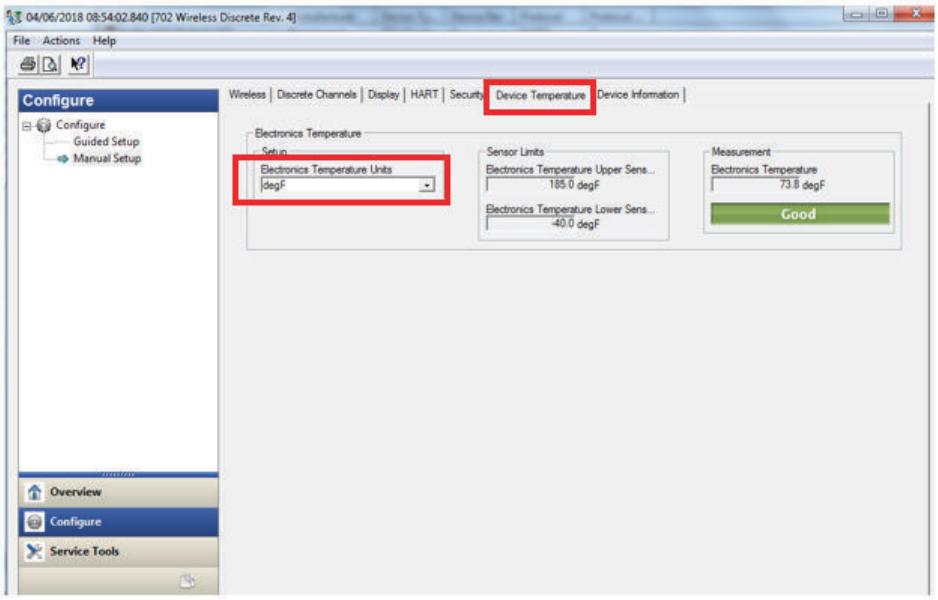
Figure 2-8: Configure Security.



2.4.6 Configure temperature units

Select the Device Temperature tab to setup temperature. Use the dropdown menu to populate the field.

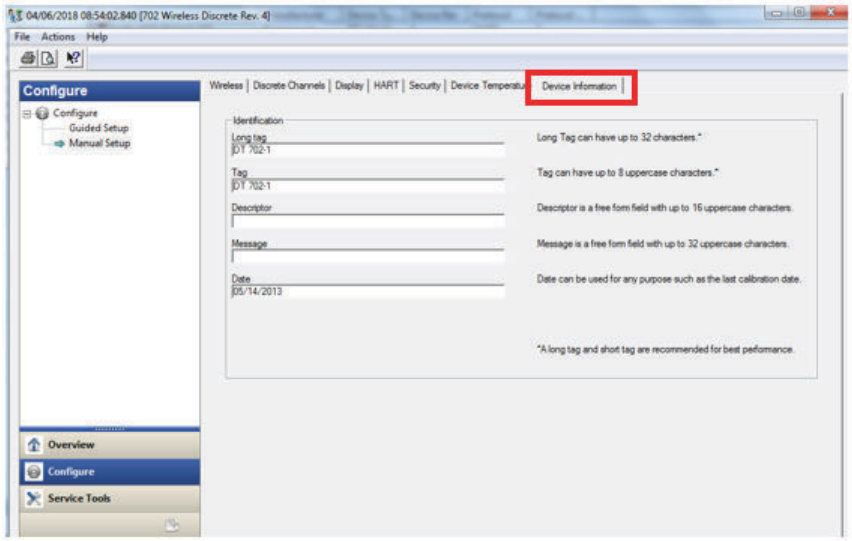
Figure 2-9: Configure Device Temperature



2.4.7 Configure the device tagging

Select the Device Information tab to configure the Tag and Identification fields.

Figure 2-10: Configure Device Identification



2.5 Removing the Power Module

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

3 Installation

3.1 Safety messages

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

⚠ WARNING!

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

- **Ensure only qualified personnel perform the installation.**

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 the plunger arrival sensor in a hazardous area, ensure that it is installed in accordance with Intrinsically Safe or non-incendive field wiring practices.**
- **The power module may be replaced in a hazardous area. The power module has a surface resistivity greater than 1 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 1 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.**

Electrical shock could cause death or serious injury.

- **Use extreme caution when making contact with leads and terminals.**

Radio frequency hazard considerations:

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

3.2 Physical installation

Choosing an installation location and position

When choosing an installation location and position, consider access to the Rosemount 702 Transmitter for ease of power module replacement. For best performance, the antenna should be vertical 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.

Refer to wireless best practices and *Wireless System Engineering Guide*.

Installing 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. pipe or pole. The B4 bracket attaches directly to the Transmitter. The B4 bracket may also be used to in other mounting configurations such as mounting the transmitter to a wall or a panel. For installation of the ETC cyclops sensor, please follow their specific guidelines noted in the installation manual

Required equipment

- Mounting Kit (part number 03151-9270-0003)
  - One bolt, 3/8-1 x 1-1/2
  - One lock washer
- Strap wrench for battery cover removal and installation
- 9/16-in. combination wrench or adjustable wrench
- #2 Phillips screwdriver

Other required equipment (not included)

- Shielded cable (minimum 3-wire)
- Cable glands

LCD display

If an LCD display is ordered, it will be shipped attached to the transmitter.

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

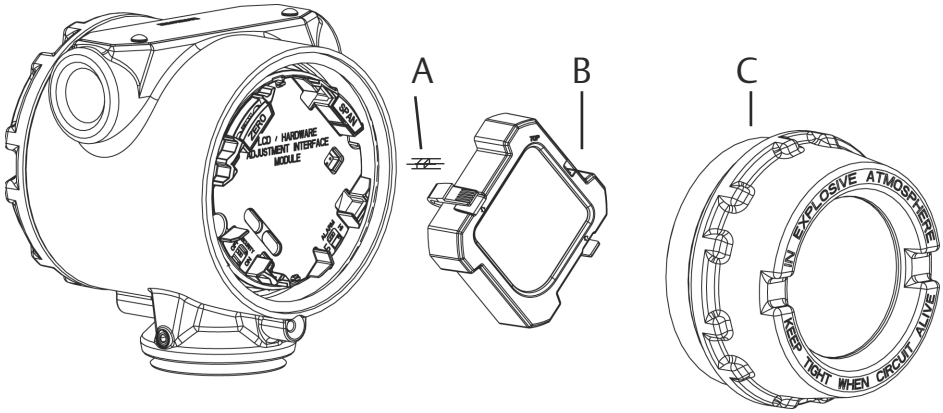
If the LCD pins are inadvertently removed from the interface board, carefully re-insert the pins before snapping the LCD display back into place.

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

Note

Only use Rosemount Wireless LCD part number: 00753-9004-0002.

Figure 3-1: LCD Display



A. LCD pins

B. LCD display

C. LCD cover

3.3 Electrical installation

Making electrical connections

Make electrical connections through the cable entry in the side of the connection head. Cabling/conduit may vary depending on installation practices; cabElecle glands are available to order as an option on the 702. Contact your local sales representative if cable glands are needed. Be sure to provide adequate clearance for cover removal. Make sure to route the sensor wiring so that the power module installation is not obstructed.

Wiring the arrival sensor

The Rosemount 702 Transmitter has screw terminals corresponding to each of the plunger arrival sensor's wiring terminals. These terminals are labeled as follows:

PWR OUT:	Power out to the arrival sensor
SIG:	Input signal from the arrival sensor
COM:	Common ground for both the power output and the signal

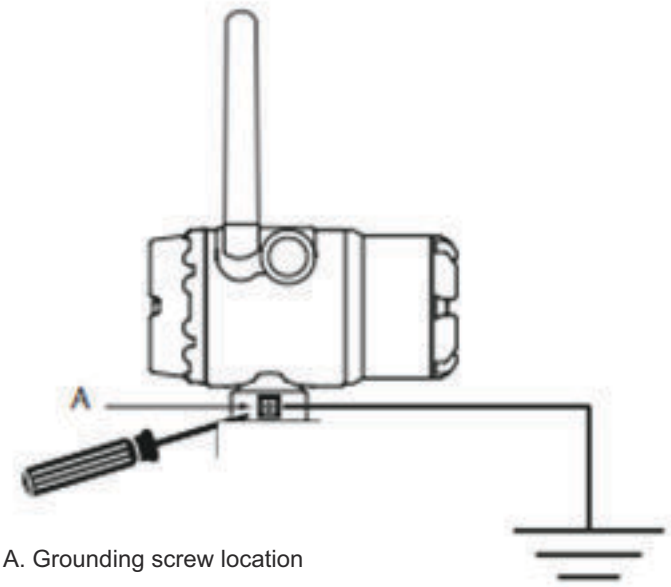
Figure 3-2: Wiring the Arrival Sensor

Rosemount 702 Transmitter	***ETC Cyclops Sensor***
A. PWR OUT	*A. PWR*
B. SIG	*B. SIG*
C. COM	*C. COM*

Grounding

Grounding of the electronics enclosure should be done in accordance with local/national installation codes and with facility recommended wiring practices. Grounding is accomplished by using the external case grounding terminal.

Figure 3-3: Grounding screw location



A. Grounding screw location

Grounding of the sensor shield wire is accomplished by using the internal case grounding screw inside the terminal side cover. There is one grounding screw connection provided, located inside the housing, see Figure 3-xx. The ground screw is identified by a ground symbol ⏚. Ensure that the sensor shield does not come into contact with any of the other screw terminals.

4 Commisioning and verification

4.1 Safety messages

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

⚠ WARNING!

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

- **Ensure only qualified personnel perform the installation.**

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 the plunger arrival sensor in a hazardous area, ensure that it is installed in accordance with Intrinsically Safe or non-incendive field wiring practices.**
- **The power module may be replaced in a hazardous area. The power module has a surface resistivity greater than 1 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 1 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.**

Electrical shock could cause death or serious injury.

- **Use extreme caution when making contact with leads and terminals.**

Radio frequency hazard considerations:

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

4.2 Wireless connectivity and power module

The Wireless Gateway should be installed and functioning properly before any wireless field devices are powered. Install the Black Power Module, SmartPower™ Solutions model number 701PBK into the Rosemount 702 Transmitter to power the device. Wireless devices should be powered up in order of proximity from the Gateway, beginning with the closest device, then working outward from the Gateway. This results in a simpler and faster network installation. Enable Active Advertising on the Gateway to ensure new devices can join the network faster. For more information see the Smart Wireless Gateway Manual (document number 00809-0200-4420).

Wireless network communication

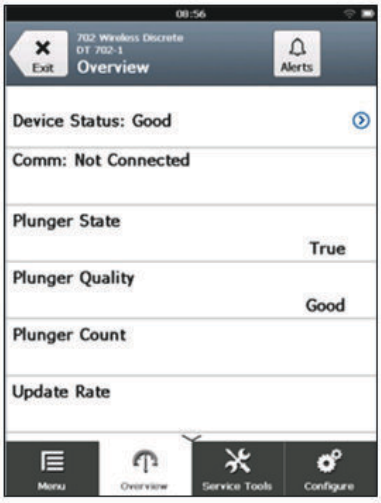
To communicate with the Wireless Gateway, and ultimately the host system, the transmitter must be configured to communicate with the wireless network. See benchtop testing in section 2.3.

4.2.1 Verify Connectivity using the Field Communicator

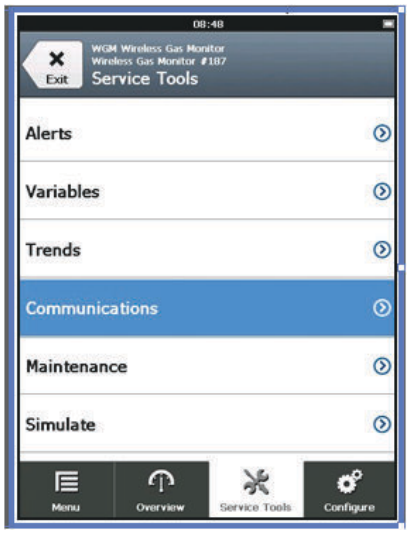
The chevron-shaped status bar at the top of the LCD screen indicates the progress of the network join process. When the status bar is filled, the device is successfully connected to the wireless network. Refer to section 5.3. To verify the wireless connectivity, use one the following methods.

Procedure

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

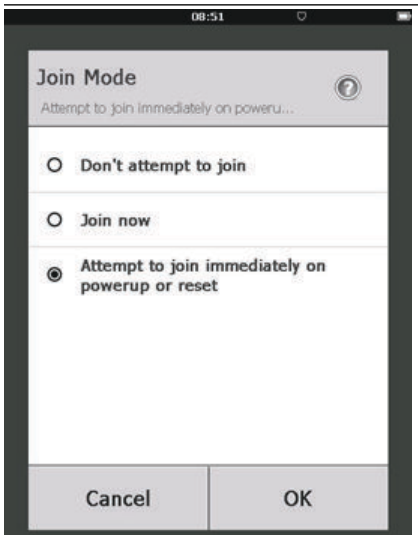


2. On the Service Tools screen, select **Communications**.



3. View the following communications information:

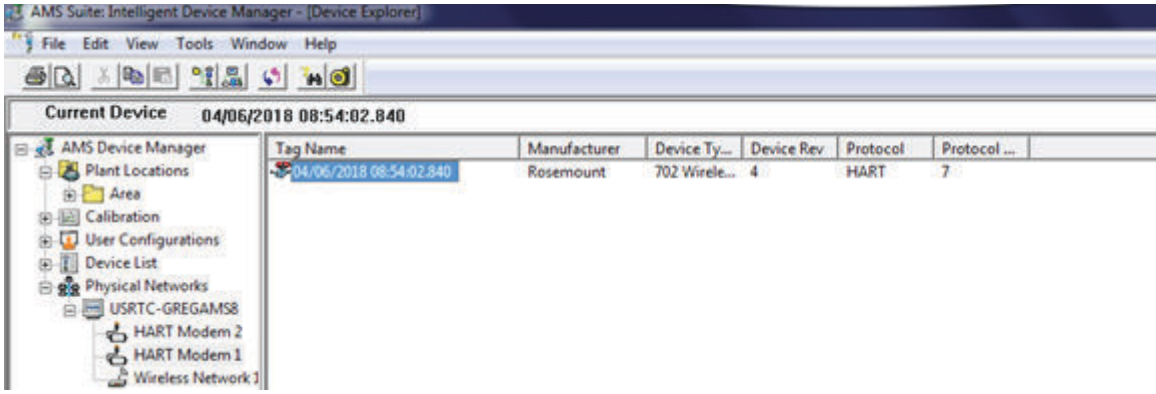
1.
   - **Communication status**: displays whether the device is or is not connected to the wireless network.
   - **Join Mode**: Displays the current join mode.
4. Select Join Mode to change the way that the device joins the wireless network. **Attempt to join immediately on powerup or reset** is the default option.
5. Select send twice to update the Join Mode.



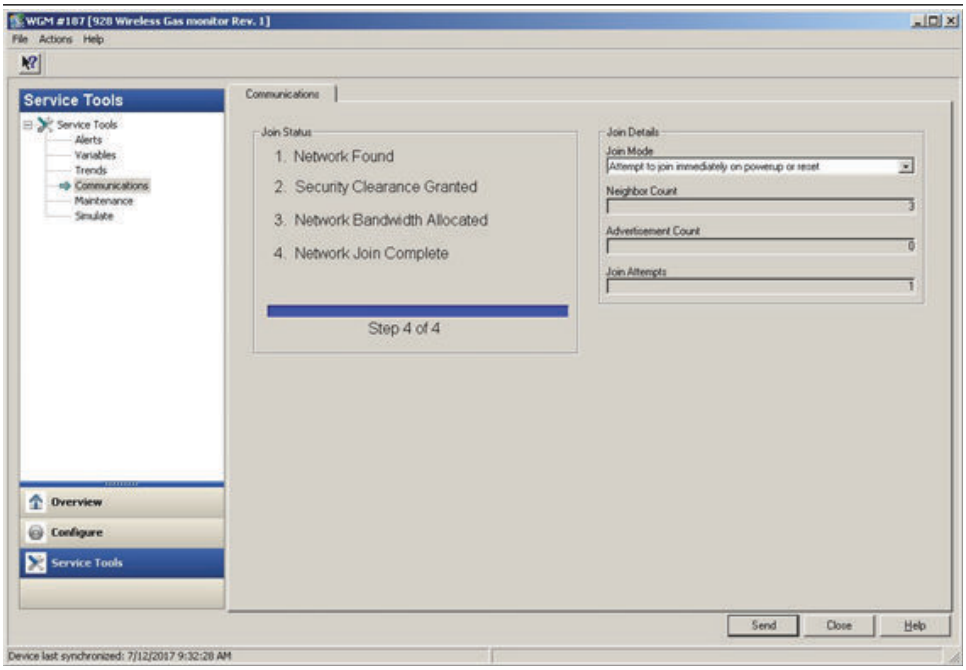
2. • **Neighbor Count**: Displays the number of available neighboring devices.
   • **Advertisement Count**: Displays the number of advertisement packets received.
6. When finished, select **Back** to return to the Communications screen.

4.2.2 Verify Communication using AMS Wireless Configurator

1. Open the AMS Wireless Configurator.
2. In the Device Manager pane, expand the wireless network.
3. Expland the wireless Gateway.
4. Select the device list.
5. In the device pane, double-click the device icon.



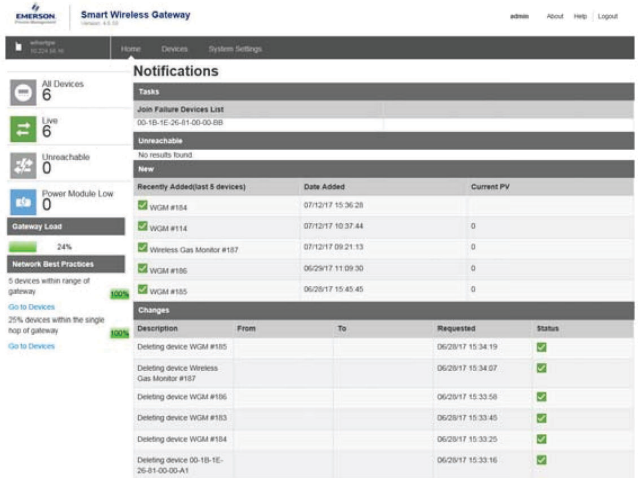
6. Select service tools.
7. In the service tools pane, select communications.
8. On the Communications tab, in the join status area, verify that all four network join steps are completed.



4.2.3 Verify communication using Wireless Gateway

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

Figure 4-2. Wireless Gateway Home Page



4.3 Change the network ID and join key

Using the field communicator to change the Network ID and Join Key

If the Network ID and Join Key need to be changed, refer to “Joining a wireless network using Field Communicator” in *Guided Setup for the Field Communicator*.

Using AMS Wireless Configurator to change the Network ID and Join Key

If the network ID and Join Key need to be changed, see *Section 2.2.3*.

System verification

After installation of the 702DX52 for plunger arrival one must verify functionality.

- Verify the sensor: To do so, pass a ferrous object (ex. Wrench) past the cyclops sensor to simulate an arrival. Verify via the LCD screen and/or field communicator that channel 1 indicates a state change. If a state change is seen, sensor wiring is correct; if nothing is seen, please go back through the installation steps and confirm that everything has been done accordingly.
- Verify System integration: It is important to verify the latch time is configured correctly. The default latch period is set to one minute. Verify the host system can detect the arrival event by moving a ferrous metal object (ex. Wrench) past the arrival sensor. The signal should be passed from the device, through the Wireless Gateway and detected at the final host application (ex. PLC, Modbus/OPC , etc.). If nothing is seen, confirm the latch time is appropriate considering the full system scan cycle.

5 Operation

5.1 Safety messaages

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

⚠ WARNING!

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- **Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.**
- **When connecting the plunger arrival sensor in a hazardous area, ensure that it is installed in accordance with Intrinsically Safe or non-incendive field wiring practices.**
- **The power module may be replaced in a hazardous area. The power module has a surface resistivity greater than 1 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 1 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.**

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- **Use extreme caution when making contact with leads and terminals.**

Radio frequency hazard considerations:

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

5.2 Defining channel descriptions

The 702 provides four device variables:

- Plunger arrival state (channel 1) – By default when a plunger event is detected, this value state will indicate “True” and will remain true for the duration of the configured latching time. A reported value of “False” indicates that a plunger event has not been detected. Other reported values can also be configured, refer to *AMS Wireless Bench Config.*
- Plunger arrival counts (channel 1) – Reports the number of plunger state transitions that have occurred since the last reset.
- Power savings state (channel 2) – By default power savings state is set to “False.” This indicates that power is being provided from the 702 to the plunger arrival sensor. The setpoint for this variable can be set to “True” which would remove power from the sensor if desired. WARNING - This is an advanced setting and not recommended for most applications. When power is removed, plunger arrival states WILL NOT be detected. If more information on this feature is desired contact your local sales representative.
- Power saving counts (channel 2) – Reports the number of times power savings state has been enabled. (This would normally be reported at zero for most applications).
- Electronics temperature – This indicates the internal operating temperature of the device. For normal operation, this should be within the limits specified in *Section 9.3.3*. The value can be configured to report either Celsius or Fahrenheit, see *AMS Wireless Bench Config.*
- Supply Voltage – This indicates the effective voltage delivered by the power module. When the voltage falls below 6V, the power module should be replaced soon. When the voltage falls below 5.2V the 702 will no longer provide plunger state measurements and the power module must be replaced to restore proper operation.

5.3 Latching feature

The Rosemount 702 has a latching feature that, when enabled, allows detection of momentary state changes to be held for a configurable latch period. The latching feature can be configured to detect either high or low state changes. By default, the Plunger state (channel 1) is enabled to latch high state changes for a period of one minute.

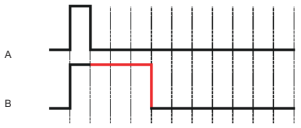
The following are some examples to demonstrate how the latching time works.

Note

Hold time is set to four seconds for illustration in the following examples.

Short events (less than latch hold time) of the measured value will be latched to the reported value for the duration of latch hold time.

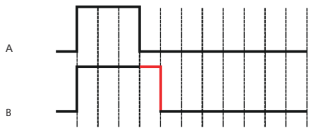
Figure 5-1: Latch Time Short Events



A. Measured
B. Reported

The start of the latch hold timer begins when the measured signal first transitions to active state.

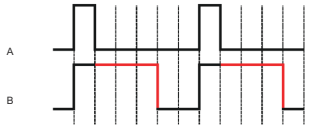
Figure 5-2: Latch Hold Time Start



A. Measured
B. Reported

The latch only applies to transitions into the active state. As soon as the reported value is no longer latched,the devices is armed for the next event.

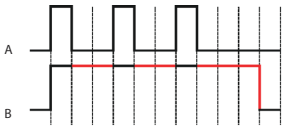
Figure 5-3: Latch Applies to Transitions to Active State



A. Measured
B. Reported

If the measured value goes inactive and active again before the initial latch hold timer experies, the latch hold timer will restart from the beginning of the most recent event.

Figure 5-4: Latch Hold Timer Restarts

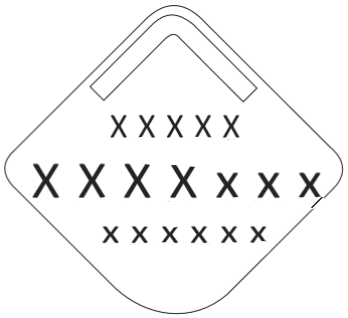


A. Measured
B. Reported

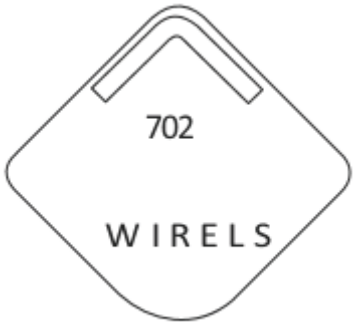
5.4 Interpreting LCD display

Procedure

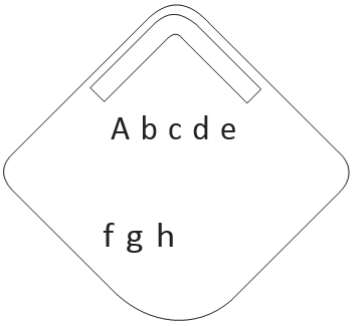
1. All Segments On: used to visually determine if there are any bad segments on the LCD display.



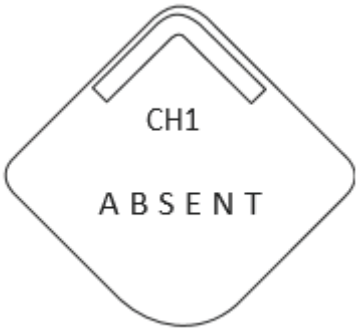
2. Device Identification: used to determine Device Type.



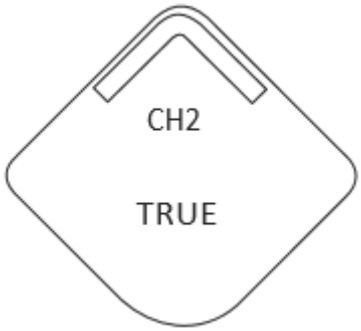
3. Device Information - Tag: user entered tag which is eight characters long - will not display if all characters are blank.



4. PV Screen – Plunger State (Channel 1). If the 702 is reporting a latched state, the word “Hold” will be displayed on the center line.



5. SV Screen – Power Savings (Channel 2).



6. Electronics Temperature.

7. Supply Voltage.

8. Channel 1 Count of close/open cycles.

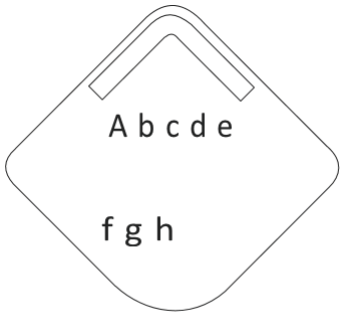
9. Channel 2 Count of close/open cycles.

5.4.1 Diagnostic button screen sequence

The following five screens will display when the device is operating properly and the Diagnostic Button has been pressed and held for longer than two seconds.

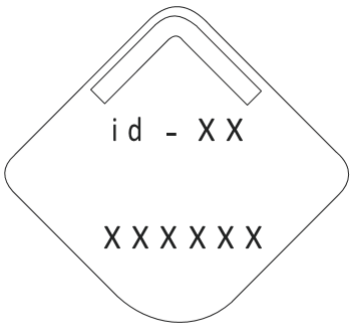
Procedure

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

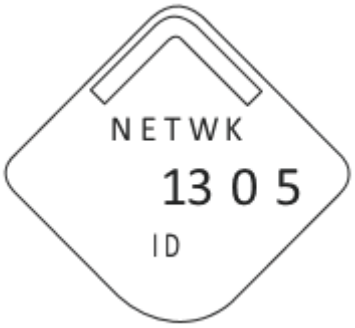


>

2. Diagnostic Button Screen 2: Device Identification - used to determine Device ID.



3. Diagnostic Button Screen 3: Network ID



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

5. 5. Diagnostic Button Screen 5: voltage reading at the power module terminals.

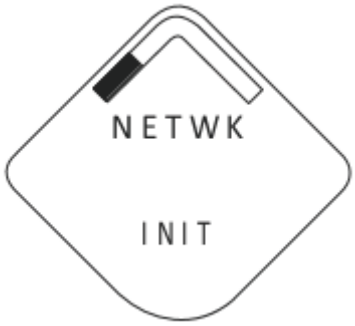
5.4.2 Network connection status screens

One of the following network diagnostic status screens will display in the fourth position of the Diagnostic Button Screen sequence. The screen displayed is dependent on the progress of the device in joining the wireless network

Procedure

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

2. Diagnostic Button Screen 4.2: the device has just restarted.

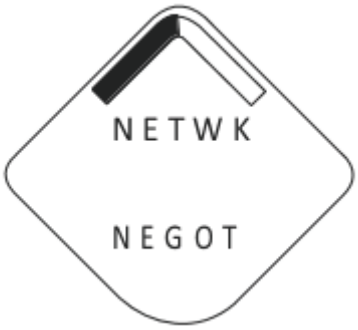


3. Diagnostic Button Screen 4.3: the device is starting to join the process.

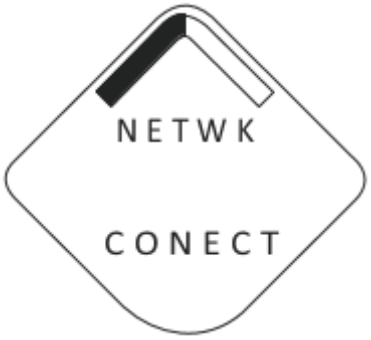
4. Diagnostic Button Screen 4.4: the device is in a disconnected state and requires a “Force Join” command to join the network.

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

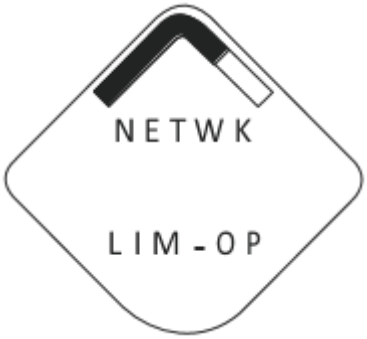
6. Diagnostic Button Screen 4.6: the device is attempting to join a network.



7. Diagnostic Button Screen 4.7: the device is connected to the Network, but is in a "Quarantined" state.



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



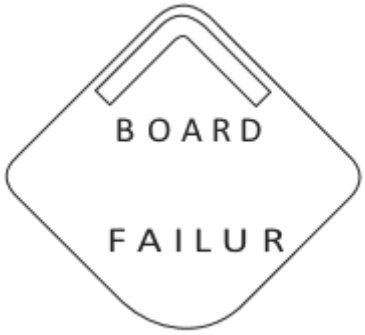
9. Diagnostic Button Screen 4.9: the device has joined a network and has been fully configured and has multiple parents.

5.4.3 Device diagnostic screens

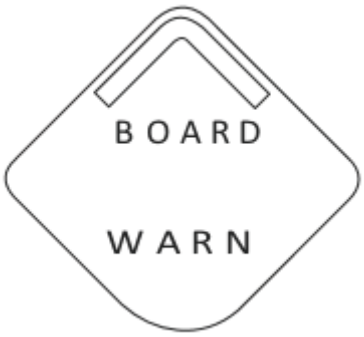
The following screens will show the device diagnostics depending on the state of the device, continuing after Diagnostic Button Screen 5.

Procedure

1. Diagnostic Button Screen 6.1: There is a critical error which may prevent the electronics board from operating correctly.

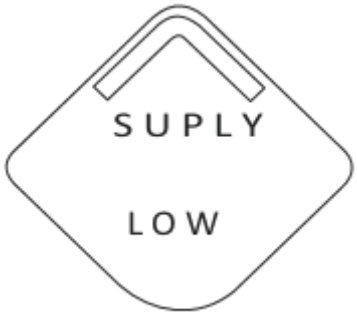


2. Diagnostic Button Screen 6.2: There is a warning which should be addressed, but should not affect the device output.



3. Diagnostic Button Screen 7.1: the terminal voltage has dropped below level of operating limit. Replace the Black Power Module model number 701PBKKF (Part Number: 00753-9220-0001).

4. Diagnostic Button Screen 7.2: the terminal voltage is below the recommended operating range - if this is a self-operated device, the power module should be replaced. - for line powered devices, the supply voltage should be increased.

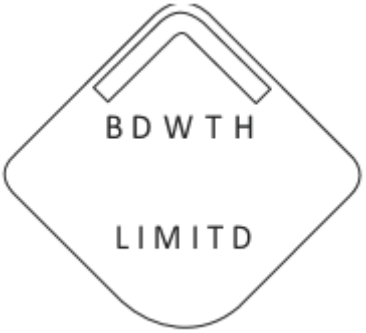


5. Diagnostic Button Screen 8: the device cannot retrieve information from the radio in the device - the device may still be operational and publishing HART data.

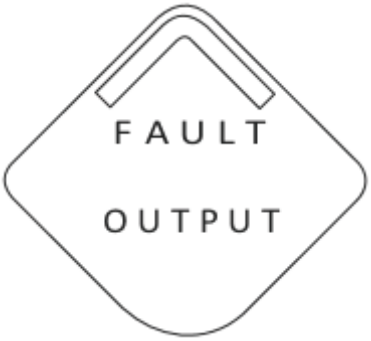
6. Diagnostic Button Screen 9: configuration of the transmitter is invalid such that critical operation of the device may be affected - check the extended configuration status to identify which configuration item(s) need to be corrected.

7. Diagnostic Button Screen 10: a switch attached to the transmitter has failed, and valid readings from that switch are no longer possible - check the switch and switch wiring connections - check additional status for more detailed information of the failure source.

8. Diagnostic Button Screen 11: The device has not yet received all of the requested wireless bandwidth needed to operate as configured.



9. Diagnostic Button Screen 12: One or more output channels are being driven to a fault state.



10. Diagnostic Button Screens 13 +: All of the periodic screens except supply voltage will now be displayed to conclude the Diagnostic Button Screen Sequence. These screens are:

    - Channel 1 State
    - Channel 2 State
    - Electronics Temperature
    - Channel 1 Count
    - Channel 2 Count

5.5 Modbus and OPC mapping

Following is a table of parameters that can be used for Modbus and OPC mapping. These parameters are used by the Emerson Wireless Gateway and can be found in the web interface of the gateway. some of these parameters are analog values and some are discrete, and this is noted in the description. The setpoint parameters are used to drive the output channel and for the readback of the state of the output channel.

Table 5-1: Modbus and OPC Parameter Mapping

Parameter Name	Description	Read/Write
CHANNEL_1_STATE	Analog value for plunger state	Read
CHANNEL_1_COUNTS	Analog value for plunger counts	Read
CHANNEL_1_STATE_D	Discrete value for plunger state	Read
CHANNEL_2_STATE	Analog value for power savings state	Read
CHANNEL_2_COUNTS	Analog value for power savings count	Read
CHANNEL_2_STATE_D	Discrete value for power savings state	Read
CHANNEL_2_SETPOINT_D	Discrete value for power savings setpoint	Read/Write
SUPPLY_VOLTAGE	Analog value for power module voltage	Read
DEVICE_TEMPERATURE	Analog value for device temperature	Read

6 Maintenance

6.1 Safety messages

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

⚠ WARNING!

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

- **Ensure only qualified personnel perform the installation.**

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 the plunger arrival sensor in a hazardous area, ensure that it is installed in accordance with Intrinsically Safe or non-incendive field wiring practices.**
- **The power module may be replaced in a hazardous area. The power module has a surface resistivity greater than 1 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 1 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.**

Electrical shock could cause death or serious injury.

- **Use extreme caution when making contact with leads and terminals.**

Radio frequency hazard considerations:

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

6.2 Power module replacement

Expected power module life is 10 years at reference conditions.

When the power module needs to be replaced, remove the power module cover and the depleted power module. Replace the power module with a new Black Power Module, SmartPower™ Solutions model number 701PBK (part number 00753-9220-0001). Then replace the cover and tighten it specification. Always ensure a proper seal so that metal touches metal, but do not overtighten.

Handling the power module

The Black 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 battery pack integrity are maintained. Care should be taken to prevent thermal, electrical or mechanical damage. Contacts should be protected to prevent premature discharge.

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

⚠ Battery hazards remain when cells are discharged.

Environmental considerations

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

Shipping considerations

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

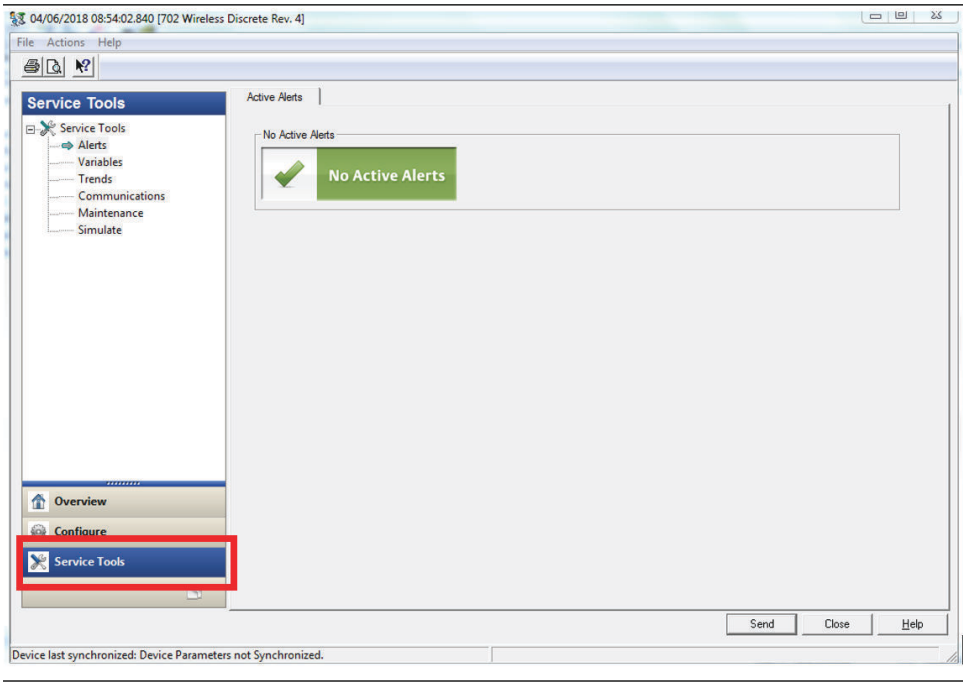
Each Black Power Module contains two “C” size primary lithium batteries. Primary lithium batteries are regulated in transportation by the U.S. Department of Transportation, and are also covered by International Air Transport Association (IATA), International Civil Aviation Organization (ICAO), and European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

Cyclops

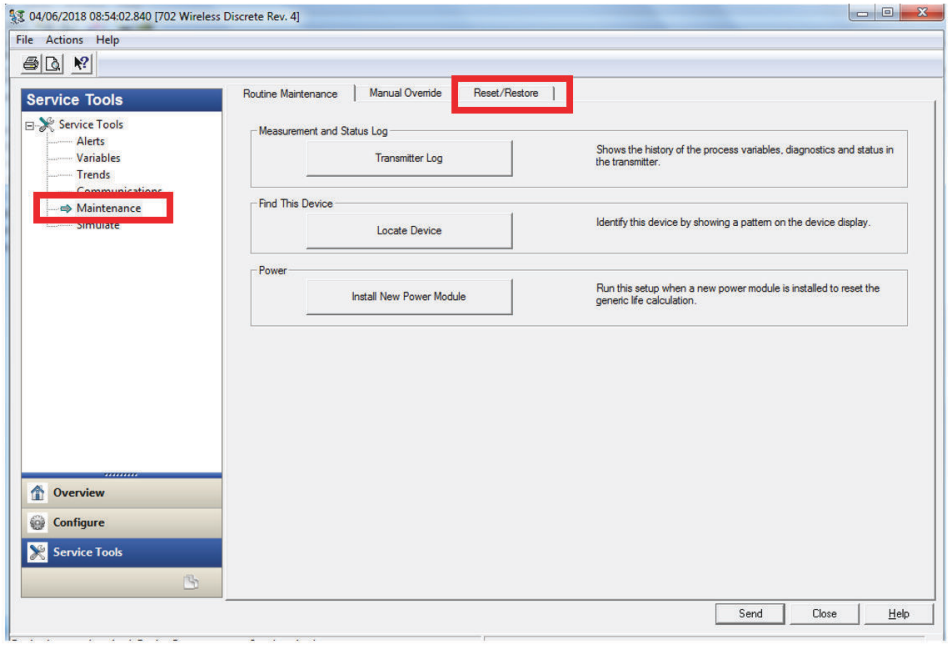
For maintenance on the ETC Cyclops sensor please refer to the manual found on the *ETC website.*

6.3 Resetting counts

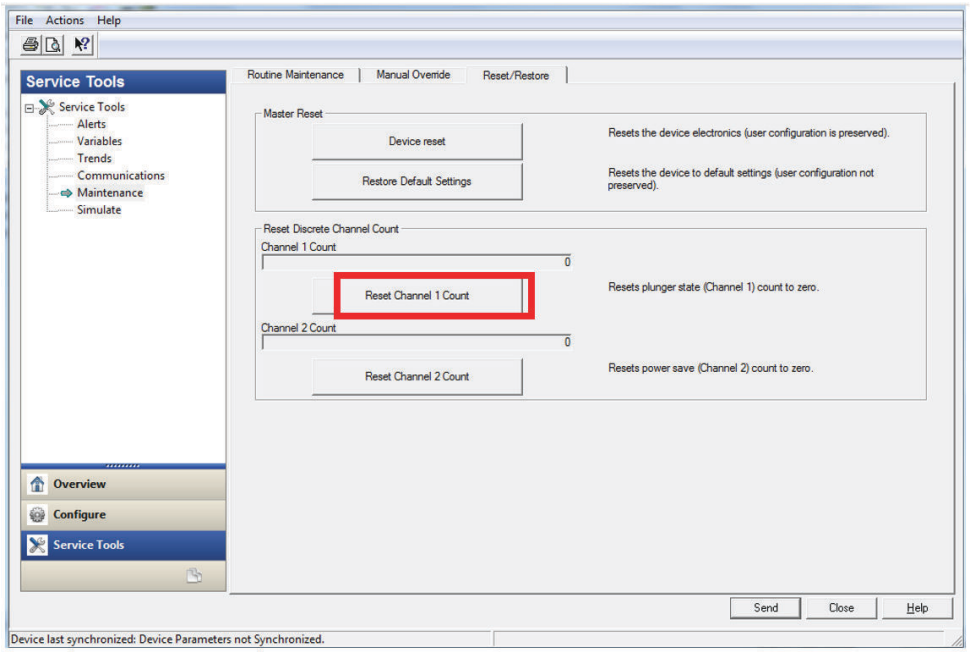
1. To reset the counts for the transmitter, use your configuration tool to navigate from the “Overview” screen to the “Service Tools” screen.



2. Select “Maintenance” tab and then select “Reset/Restore.”



3. Use the “Reset Channel 1” button to restore the counts back to 0. See the Example for AMS below:



6.4 Service support

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

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

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

⚠ CAUTION!

Individuals who handle products exposed to a hazardous substance can avoid injury if they are informed of and understand the hazard. Returned products must include a copy of the required Safety Data Sheet (SDS) for each substance.

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

NOTICE

Shipping considerations for wireless products.

- **The unit was shipped to you without the Power Module installed. Please remove the Power Module prior to shipping the unit.**
- **Each Power Module contains two "C" size primary lithium/thionyl chloride batteries. Primary lithium batteries (charged or discharged) are regulated during transportation by the U.S. Department of Transportation. They are also covered by IATA (International Air Transport Association), ICAO (International Civil Aviation Organization), and ARD (European Ground Transportation of Dangerous Goods). It is the responsibility of the shipper to ensure compliance with these or any other local requirements. Consult current regulations and requirements before shipping.**

7 Diagnostics and troubleshooting

7.1 Safety messages

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

⚠ WARNING!

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

- **Ensure only qualified personnel perform the installation.**

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 the plunger arrival sensor in a hazardous area, ensure that it is installed in accordance with Intrinsically Safe or non-incendive field wiring practices.**
- **The power module may be replaced in a hazardous area. The power module has a surface resistivity greater than 1 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 1 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.**

Electrical shock could cause death or serious injury.

- **Use extreme caution when making contact with leads and terminals.**

Radio frequency hazard considerations:

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

7.2 Troubleshooting

Wireless

Verify that you are using the 702DX52 option transmitter and not another option; if so, verify the channel 2 state is “off” or “False.” 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 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.

Sensor

If the channel is not measuring proper, verify wiring is correct (refer to section 3.2.2). If wiring is correct, verify the latching configuration is set correctly (refer to section 5.2). Note once again that latching duration should be longer than the update rate. Finally verify that you are using the correct arrival sensor and check that the power module is not depleted.

Power

If the wireless device does not turn on after the power module is installed, the power module may be depleted. Change out the power module and see if the wireless device turns on.

Table 7-1: Diagnostics

Device Status	State the Problem	Recommended Actions	Associated Device Status Bits
Invalid Configuration	The user specified configuration of this device is invalid.	1. Click on details for more information. 2. Correct the parameter that has a configuration error. 3. Reset the device. 4. If the condition persists, replace the transmitter.	Byte 2; bit 6
Input Failure	A fault has been detected with the discrete input wiring or switch.	1. Check the discrete circuit wiring, connections and switches. 2. If the condition persists, replace the transmitter.	Byte 3; bit 6

Table 7-1: Diagnostics *(continued)*

Device Status	State the Problem	Recommended Actions	Associated Device Status Bits
Output Failure	The discrete output has not reached its intended output state.	1. Check the discrete circuit wiring, connections, switches and indicators. 2. Check that the load being driven by the discrete output is within the product specifications. 3. Reset output protection by de-activating the output for five seconds. This can be done by using Service Tools/ Maintenance/Manual Override. 4. If the condition persists, replace the transmitter.	Byte 3; bit 7
Critical Power Failure	The supply voltage is too low for the device to broadcast updates.	1. Replace the power module.	Byte 6; bit 2
Electronic Failure	A failure has been detected in the device memory and/or electronics.	1. Confirm and correct all configuration parameters. 2. Restore device to default settings under Service Tools->Maintenance->Reset/Restore. 3. Perform a device reset. 4. If the condition persists, replace the transmitter.	Byte 0; bit 0 Byte 0; bit 1 Byte 0; bit 3 Byte 0; bit 6 Byte 0; bit 7
Radio Failure	The wireless radio has detected a failure or stopped communicating.	1. Reset the device. 2. If the condition persists, replace the transmitter.	Byte 12; bit 4
Button Stuck	A button on the electronics board is detected as stuck in the active position.	1. Reset the device. 2. If the condition persists, replace the transmitter.	Byte 12; bit 4

Table 7-1: Diagnostics *(continued)*

Device Status	State the Problem	Recommended Actions	Associated Device Status Bits
Electronic Warning	The device has detected an electronics error that does not currently impact the device measurement reading.	1. Confirm and correct all configuration parameters. 2. Restore device to default settings under Service Tools->Maintenance->Reset/Restore. 3. Perform a device reset. 4. If the condition persists, replace the transmitter.	Byte 0; bit 4 Byte 0; bit 5
Environmental Conditions Out of Range	The temperature of the transmitter electronics has exceeded its safe operating range.	1. Verify ambient temperature is within the transmitter's operating range. 2. Mount the transmitter away from process and environmental conditions.	Byte 8; bit 5
Voltage Conditions Out of Range	The supply voltage is low and may soon affect broadcast updates.	1. Replace the power module.	Byte 8; bit 4
Capacity Denied	The device has failed to acquire the wireless communication bandwidth necessary to support the configured update rates.	1. Obtaining the bandwidth may take some time depending on the configured update rates and other devices in the network. Wait several minutes to see if the error resolves itself. 2. There may be too many devices attached to the wirelessHART network, or the update rates may be too fast. Try using a different network, or slowing down the update rate on one or more devices.	Byte 12; bit 0

Table 7-1: Diagnostics *(continued)*

Device Status	State the Problem	Recommended Actions	Associated Device Status Bits
Database Storage Warning	The device has failed to write to the database memory. Any data written during this time may have been lost	1. Reset the device. 2. If logging dynamic data is not needed, this advisory can be safely ignored. 3. If the condition persists, replace the transmitter.	Byte 0; bit 2
Fault State Active	Either the host has not delivered a discrete command with in the fault state time, or the delivered discrete command from the host indicates a bad status.	1. Verify that the discrete control host is on line and sending discrete commands. 2. Ensure that the discrete control host is sending commands at least once within the fault state time (fault state time can be adjusted to meet the needs of the application). 3. Verify that the discrete control host is sending commands with good status . 4. If the condition persists, replace the transmitter.	Byte 1, Bit 0
Simulation Active	The device is in simulation mode and may not be reporting actual information.	1. Verify that simulation is no longer required. 2. Disable Simulation Mode in Service Tools. 3. Reset the device.	Byte 8; bit 0
High Power Active	The device is operating in a high power mode. This is not recommended for this device.	1. Disable high power mode.	Byte 2; bit 7 only if device_powerMode == 1

8 Appendix A

8.1 Product Certifications

To view current Product Certifications, follow these steps:

Procedure

1. Go to *Emerson.com/Rosemount/702*.
2. Scroll as needed to the green menu bar and click Documents & Drawings.
3. Click Manuals & Guides.
4. Select the appropriate Quick Start Guide.

8.2 Ordering Information, Specifications, and Dimensional Drawings

To view current Rosemount 702 Ordering Information, Specifications, and Dimensional Drawings, follow these steps:

1. Go to *Emerson.com/Rosemount/702*.
2. Scroll as needed to the green menu bar and click **Documents & Drawings**.
3. Click **Data Sheets & Bulletins**.
4. Select the appropriate Product Data Sheet.

9 Appendix B specifications and reference data

9.1 Functional specifications

9.1.1 Discrete input

Single or dual SPST dry contacts, single SPDT dry contacts or leak detection. To maintain I.S. ratings, contacts must be limited to simple switches or leak detection only.

A.1.3 Switching threshold, models 702DX32, 702DX42

- Open greater than 100 K Ohm
- Closed less than 5 K Ohm

A.1.4 Momentary discrete input, models 702DX32, 702DX42

Detects momentary discrete inputs of 10 millisecond or more duration. At each wireless update, device reports current discrete state and accumulating count of close-open cycles. Accumulating count registers from 0 to 999,999, then re-sets to 0.

A.1.5 Discrete output, model 702DX42

Maximum rating: 26 Vdc, 100 mA

On resistance: typical 1 Ohm

9.1.2 Wireless output

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

A.1.7 Radio frequency power output from antenna

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

A.1.8 Local display(1)

The optional integral LCD can display discrete state and diagnostic information. Display updates at each wireless update.

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

9.1.3 Humidity limits

0–100 percent relative humidity

9.1.4 Wireless update rate, models 702DX32, 702DX42

User selectable, 1 sec. to 60 minute.

9.2 Physical specifications

9.2.1 Wireless power module electrical connections

Replaceable, Intrinsically Safe Lithium-Thionyl Chloride power module with PBT polymer enclosure. Ten year life at one minute update rate.

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

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

9.2.2 Switch terminals

Screw terminals permanently fixed to terminal block

A.2.3 Field Communicator connections

Communication terminals

Clips permanently fixed to terminal block.

A.2.4 Materials of construction

Enclosure

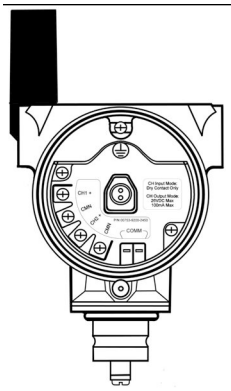
- Housing - low-copper aluminum, or stainless steel
- Paint - Polyurethane
- Cover O-ring - Buna-N

9.2.3 Terminal block connections

The Rosemount 702 has a pair of screw terminals for each of two channels, and a pair of communication terminals. These terminals are labeled as follows:

- CH1+: Channel one positive

- CMN: Common
- CH2+: Channel two positive
- CMN: Common
- COMM: Communication terminals



9.2.4 Antenna

- PBT/PC integrated omnidirectional antenna

9.2.5 Conduit entries

½–14 NPT

9.2.6 Enclosure ratings (702)

NEMA® 4X and IP66/67

9.2.7 Mounting

Transmitters may be attached directly to switch, brackets also permit remote mounting. See *Dimensional drawings* for more information.

9.3 Performance specifications

9.3.1 Electromagnetic compatibility (EMC)

Meets all industrial environment requirements of EN61326 and NAMUR NE-21. Maximum deviation <1% span during EMC disturbance.(2)

(2) During surge event device may exceed maximum EMC deviation limit or reset; however, device will self-recover and return to normal operation within specified start-up time.

9.3.2 Vibration effect

Wireless output unaffected when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10–60 Hz 0.21 mm displacement peak amplitude/ 60–2000 Hz 3 g).

Wireless output unaffected when tested per 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 2 g).

9.3.3 Temperature limits

Description	Operating limit	Storage limit
Without LCD display	-40 to 185 °F -40 to 85 °C	-40 to 185 °F -40 to 85 °C
With LCD display	-4 to 175 °F -20 to 80 °C	-40 to 185 °F -40 to 85 °C

9.4 High-gain remote antenna functional specifications

Output

WirelessHART® 2.4 GHz DSSS (direct sequence spread spectrum). Radio frequency power output from antenna:

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

Communications range

2/3 mile (3,300 ft.) (1.0 km) with L.O.S.

Coaxial length

25 ft. (7.6 m) with type N connections

Coaxial material

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

Antenna

- Remote-mount omni directional antenna
- Fiberglass and aluminum construction
- 8 Db Gain

- Meets MIL-STD-810G (method 510.5, procedure I and II)

Physical specifications

Weight: 1.0 lb (0.4 kg)

RF lightning arrestor

In-line lightning arrestor

Electrical connection: lightning arrestor MUST be grounded per local electrical codes and regulations.

Mounting bracket

- Horizontal or vertical mast accommodation
- Supported mast diameter: 1.0- to 2.5-in. (2.5 to 6.4 cm)
- Aluminum bracket
- Nickel/zinc plated mounting U-bolts

Ratings

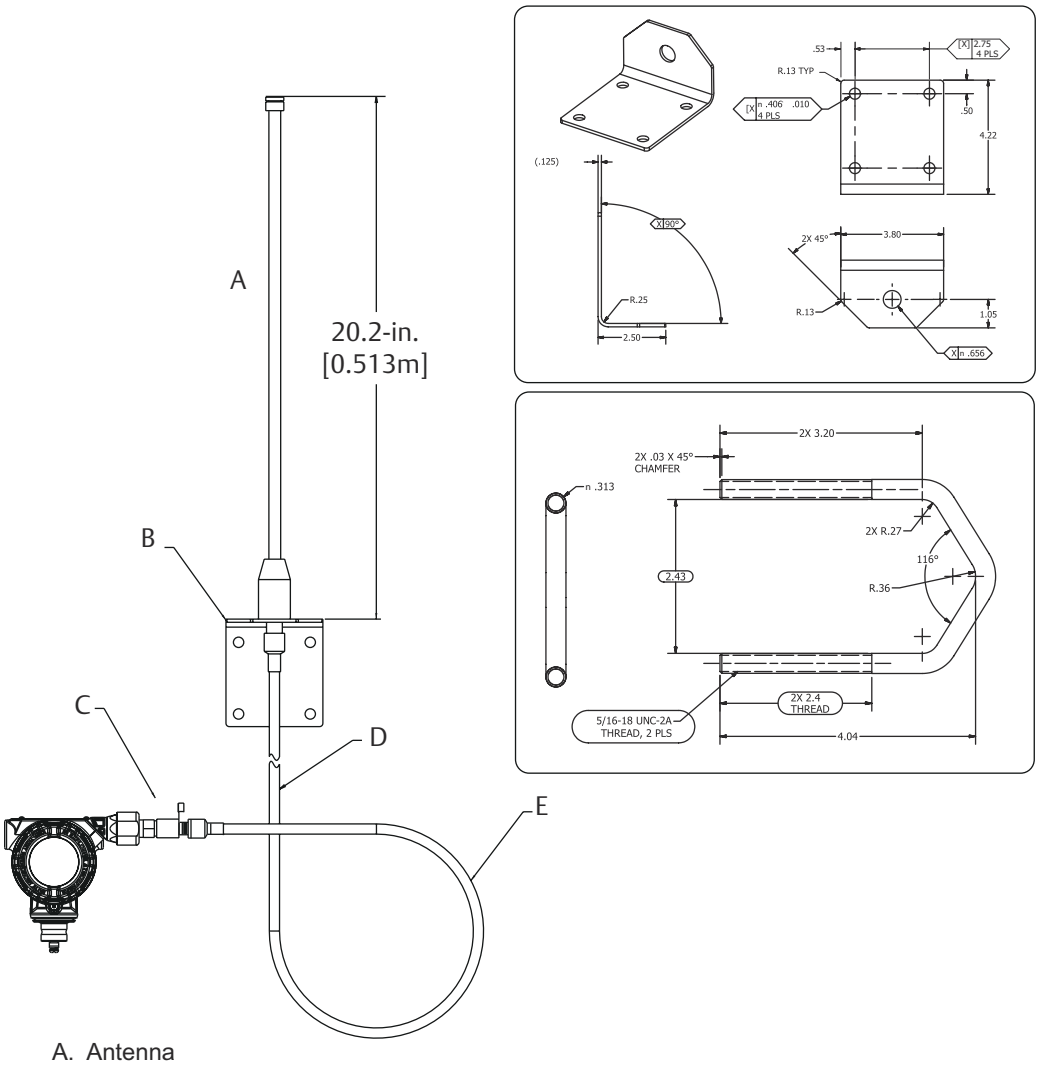
NEMA® 4X, and IP66/67

Vibration

3g max vibration

9.5 Dimensional drawings

Figure 9-1: Device Connection and RF Lightning Arrestor

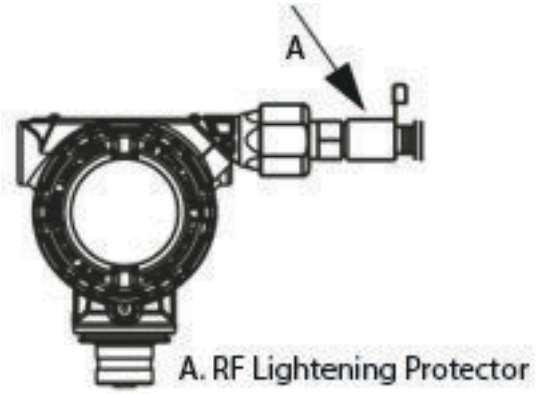


A. Antenna
B. Mounting bracket
C. Mounting arrester
D. 25 th (7.5 m) cable
E. Min drip loop Ø12-in. (0.3 m)

9.6 Installing the high gain remote antenna

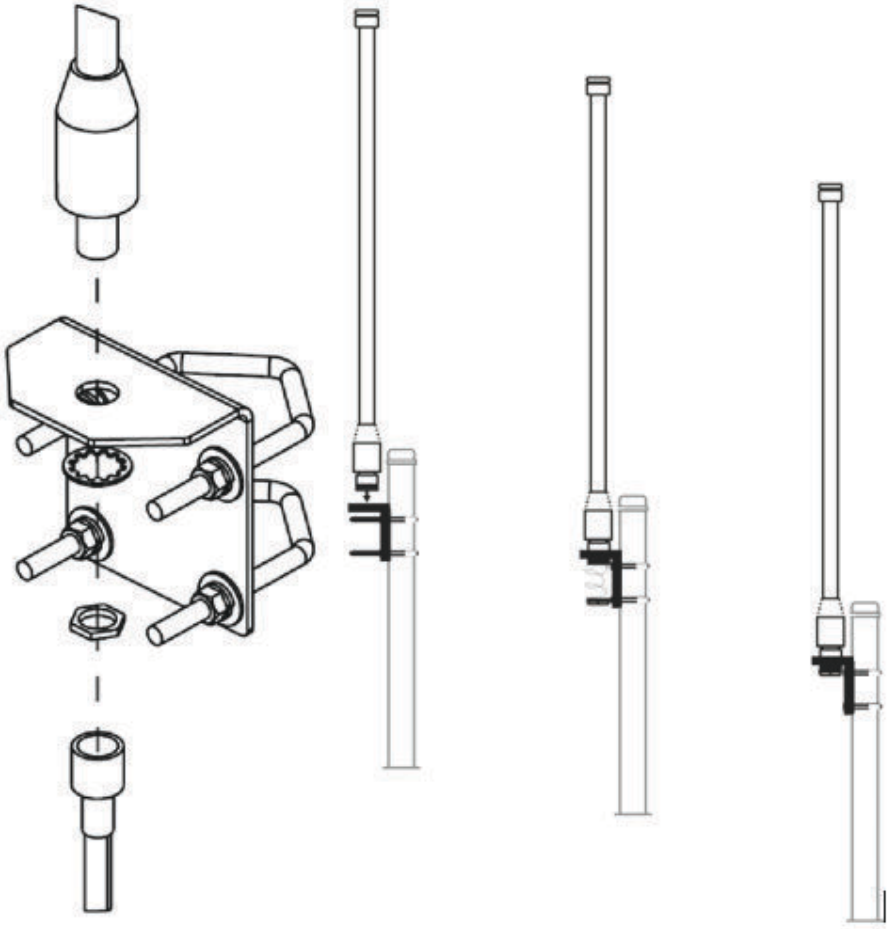
1. Mount the transmitter following best practice mounting procedures as outlined in the Quick Start Guide and Manual.
2. Connect the RF lightning protector to the device and tighten.

Figure 9-2: RF Lightning Protector



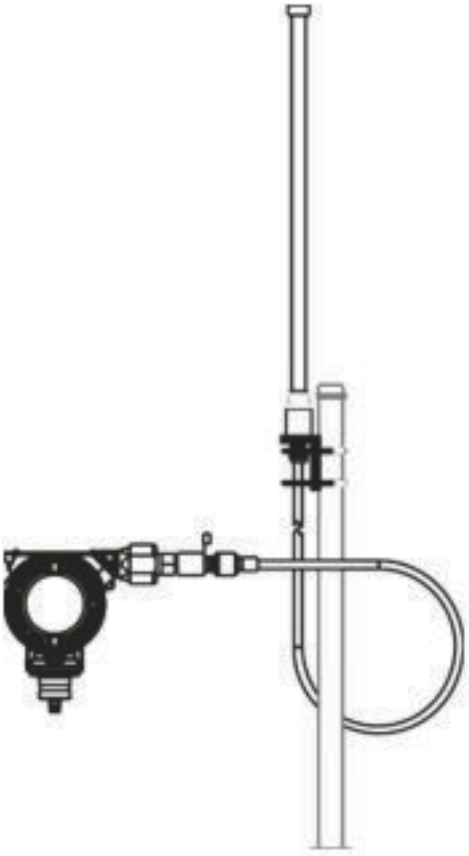
3. Connect antenna to mounting bracket and tighten nut carefully.

Figure 9-3: Connect Antenna to Mounting Bracket



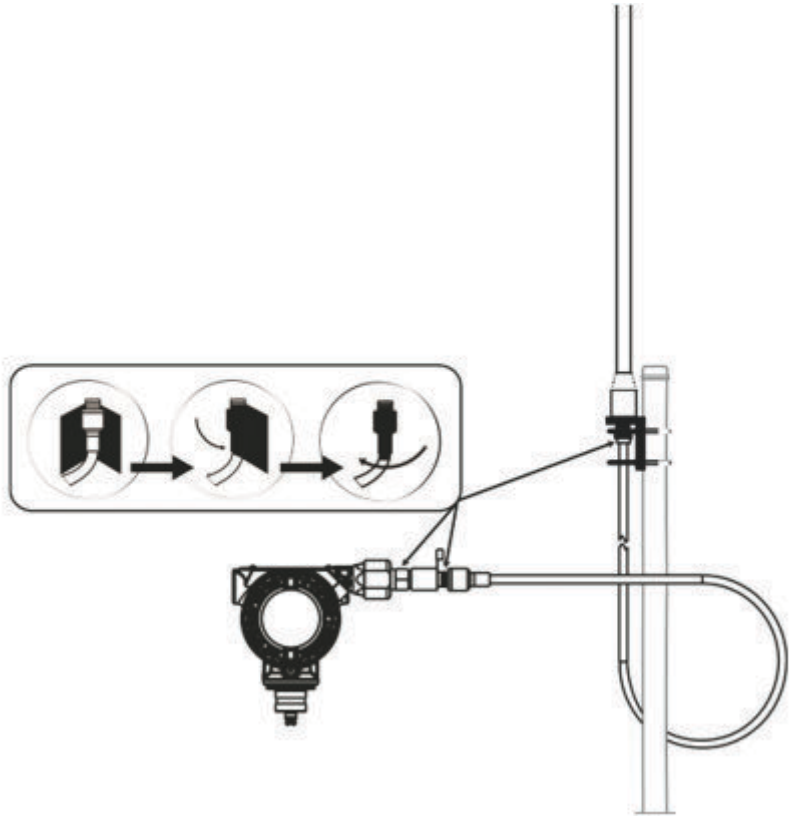
4. Unwind coaxial cable and connect the cable to both the antenna and the lightning protector connected to the transmitter, leaving one loop minimum for a drip loop. Ensure the drip loop is lower than the device, allowing water to flow away from the device.

Figure 9-4: Create a Drip Loop



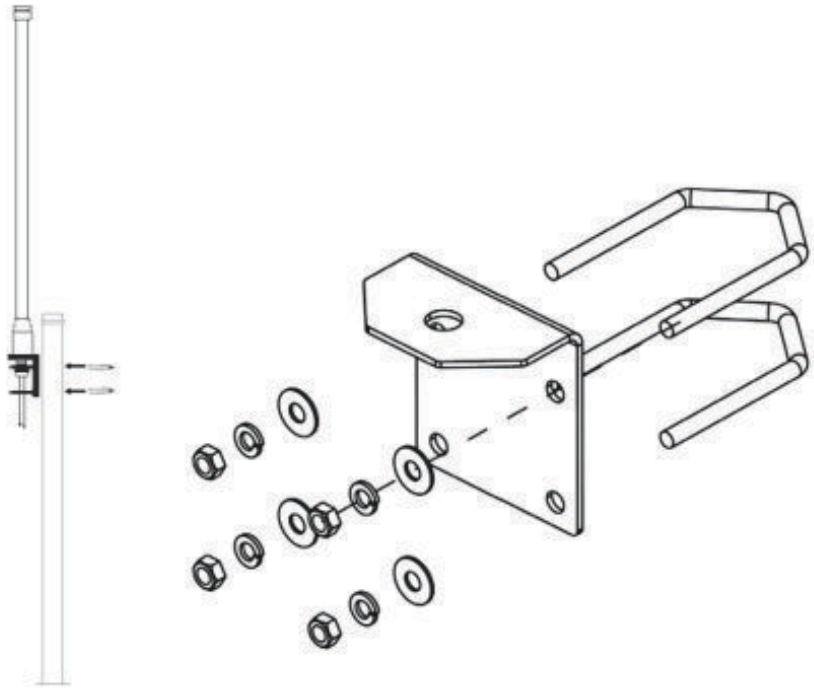
5. Apply the coaxial sealant around each of the coaxial connections and at the lightning arrestor, making sure the RF connections are completely sealed.

Figure 9-5: Apply Coaxial Sealant



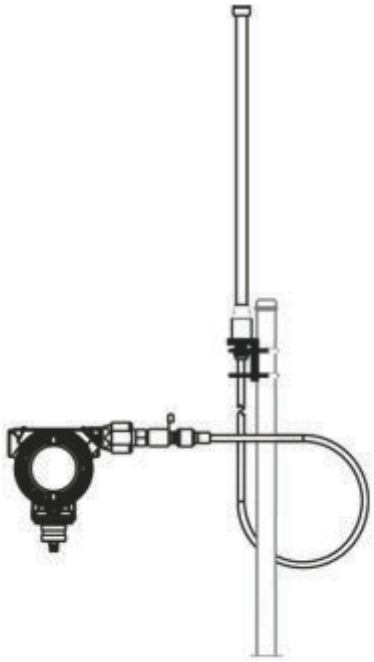
6. Attach U-bolts to mounting bracket in correct orientation ensuring that antenna will be positioned in a vertical position.

Figure 9-6: Attach U-bolts



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

Figure 9-7: Tighten U-bolts



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Global Headquarters
Emerson Automation Solutions
6021 Innovation Blvd
Shakopee, MN 55379 USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RFQ.RMD-RCC@Emerson.com

North America Regional Office
Emerson Automation Solutions
8200 Market Blvd.
Chanhassen, MN 55317, USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RMT-NA.RCCRF@Emerson.com

Latin America Regional Office
Emerson Automation Solutions
Sunrise, FL 33323, USA
T +1 954 846 5030
+1 954 846 5121
RFQ.RMD-RCC@Emerson.com

Europe Regional Office
Emerson Automation Solutions Europe GmbH
Neuhofstrasse 19a P.O. Box 1046
CH 6340 Baar
Switzerland
T +41 (0) 41 768 6111
+41 (0) 41 768 6300
RFQ.RMD-RCC@Emerson.com

Asia Pacific Regional Office
Emerson Automation Solutions
1 Pandan Crescent
Singapore 128461
Republic of Singapore
+65 6777 8211
+65 6777 0947
Enquiries@AP.Emerson.com

Middle East and Africa Regional Office
Emerson Automation Solutions
Emerson FZE P.O. Box 17033
Jebel Ali Free Zone - South 2
Dubai, United Arab Emirates
+971 4 8118100
+971 4 8865465
RFQ.RMTMEA@Emerson.com

Linkedin.com/company/Emerson-Automation-Solutions
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