

Rosemount™ 644 Temperature Transmitter

HART® Protocol
Configuration Methods



Overview

The Rosemount 644 Head Mount and Field Mount Temperature Transmitter is engineered for versatility, with HART™, FOUNDATION™ Fieldbus or PROFIBUS™ protocols in head, field or rail mount styles and a variety of enclosure options. By adding a Local Operator Interface (LOI), you can update your transmitter configuration in the field without tools. For diverse application requirements, this transmitter includes diagnostic capabilities, such as Hot Backup™ capability, sensor drift alert and thermocouple degradation.

Features:

- HART configuration with Selectable HART revision capability (Revisions 5 or 7)
- Capable of receiving one or two inputs from a wide variety of sensor types (2-, 3-, and 4-wire RTD, thermocouple, mV and ohm)
- Compact transmitter size with electronics completely encapsulated in protective silicone and enclosed in a plastic housing ensuring long-term transmitter reliability
- Safety Certification Option (IEC 61508 SIL 2)
- LCD display with extended temperature ratings of -40 to 185 °F (-40 to 85 °C)

Compatibility:

- Support for 4–20 mA/HART protocol (Revision 5)
- Accepts one sensor input from a wide variety of sensor types (2-, 3-, and 4-wire RTD, Thermocouple, mV and ohm)

Options:

- Advanced LCD display with local operator interface (LOI)
- The Rosemount 644 Head Mount Transmitter is available in two housing materials (Aluminum and SST) and various housing options that allow for mounting flexibility in a variety of environmental conditions. The Rosemount 644 Field Mount is available in an aluminum housing.
- Special dual-sensor features include Hot Backup™, Sensor Drift Alert, first good, differential and average temperature measurements, and four simultaneous measurement variable outputs in addition to the analog output signal.
- Additional advanced features include thermocouple degradation diagnostic, which monitors thermocouple health, and process and transmitter minimum/maximum temperature tracking.
- Completely encapsulated electronics to ensure long term transmitter reliability

Improvements:

This year's Rosemount 644 Headmount and Railmount HART device revisions.

Table 1: 644 Headmount

Software release date	Identify device			Field device driver		Review instructions
	NAMUR software revision	NAMUR hardware revision ⁽¹⁾	HART software revision	HART universal revision ⁽²⁾	Device revision	Manual document number

Feb-2020	1.1.xx	1.0.xx	4	7	9	00809-02004728
				5	8	
Aug-2012	1.1.xx	1.0.xx	3	7	9	00809-02004728

- (1) NAMUR Software Revision is located in the hardware tag of the device. HART Software Revision can be read using a HART-capable configuration tool.
- (2) Device Driver file names use Device and DD Revision (e.g. 10_07). HART Protocol is designed to enable legacy driver revisions to continue to communicate with new HART devices. To access this functionality, the new device driver must be downloaded. It is recommended to download the new device driver to ensure new functionality.

Table 2: Railmount HART

	Railmount
Rosemount 644 Hardware revision	31
Device revision	7
HART revision	5

Configuration

The Rosemount 644 Headmount transmitter can be configured before or after installation and either online or offline. The tools you will need are a bench, Field Communicator, AMS Device Manager, or the optional LOI (head-mount and field-mount).

Online Configuration

The transmitter is connected to a Field communicator. Data is entered in the working register of the communicator and sent directly to the transmitter.

Offline Configuration

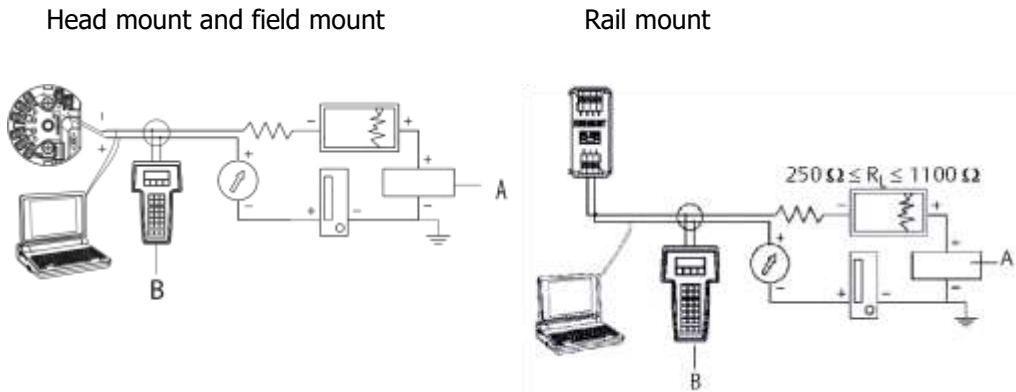
The configuration data needs to be stored in a Field Communicator when it is not connected to a transmitter. Data needs to be stored in a nonvolatile memory and downloaded from to the transmitter at another date and time.

Configuration on the Bench

To configure on the bench, required equipment includes a power supply, a digital multimeter (DMM), and Field Communicator, AMS Device Manager, or a LOI – option M4.

Connect the equipment as shown in [Figure 2-1](#). Connect HART Communication leads at any termination point in the signal loop. To ensure successful HART Communication, a resistance of at least 250 ohms must be present between the transmitter and the power supply. Connect the Field Communicator leads to the clips behind the power (+,-) terminals on the top of the device. Avoid exposing the transmitter electronics to the plant environment after installation by setting all transmitter jumpers during the commissioning stage on the bench.

Figure 2-1: Powering the Transmitter for Bench Configuration



- A. Power supply
- B. Field Communicator

Note

- Signal loop may be grounded at any point or left ungrounded.
- A Field Communicator may be connected at any termination point in the signal loop. The signal loop must have between 250 and 1100 ohms load for communications.
- Max torque is 6 in-lb (0.7 N-m).

Configuration Tools

Field Communicator

The Field Communicator is a handheld device that exchanges information with the transmitter from the control room, the instrument site, or any wiring termination point in the loop. To facilitate communication, connect the Field Communicator, shown in this manual, in parallel with the transmitter (see Figure 2-1). Use the loop connection ports on the rear panel of the Field Communicator. The connections are non-polarized.

Do not make connections to the serial port or the nickel cadmium (NiCd) recharger jack in explosive atmospheres. Before connecting the Field Communicator in an explosive atmosphere make sure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.

There are two interfaces available with the Field Communicator: Traditional and Dashboard interfaces. All steps using a Field Communicator will be using Dashboard interfaces. Figure 2-2 shows the Device Dashboard interface. As stated in "System Readiness", it is critical that the latest DDs are loaded into the Field Communicator for optimal transmitter performance.

Visit Emerson.com/Rosemount to download latest DD library.

Turn on the Field Communicator by pressing the ON/OFF key. The Field Communicator will search for a HART-compatible device and indicate when the connection is made. If the Field Communicator fails to connect, it indicates that no device was found. If this occurs, refer to

Troubleshooting

Figure 2-2: Field Communicator Device Dashboard Interface



Field Communicator menu trees and Fast Keys are available in [Field Communicator Menu Trees and Fast Keys](#).

AMS Device Manager

With an AMS Device Manager software package, you can commission and configure instruments, monitor status and alerts, troubleshoot from the control room, perform advanced diagnostics, manage calibration, and automatically document activities with a single application.

Full configuration capability with AMS Device Manager requires loading the most current Device Descriptor (DD) for this device. Download the latest DD at Emerson.com/Rosemount or Fieldcomm.org.

Note

All steps listed in this product manual using AMS Device Manager assume the use of Version 11.5.

Local Operator Interface (LOI)

The LOI requires option code M4 to be ordered.

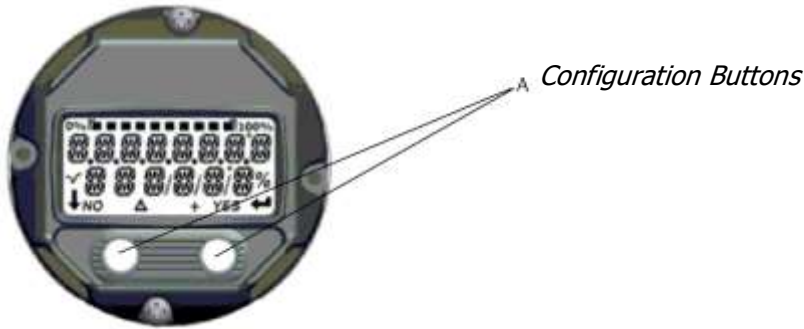
To activate the LOI, push either of the configuration buttons. Configuration buttons are located on the LCD display (remove the housing cover to access the interface. See [Table 2-2](#) for configuration button functionality and [Figure 2-3](#) for configuration button location.)

When using the LOI for configuration, several features require multiple screens for a successful configuration. Data entered will be saved on a screen-by-screen basis; the LOI will indicate this by flashing **SAVED** on the LCD display each time.

Note

Entering data into the LOI menu effectively disables the ability to write to the device by any other host or configuration tool. Ensure this is communicated to necessary personnel before using the LOI for device configuration.

Figure 2-3: LOI Configuration Buttons - LOI Button Operation



Button	Left	Right
Left	No	SCROLL
Right	Yes	ENTER

LOI password

An LOI password can be entered and enabled to prevent review and modification of device configuration via the LOI. This does not prevent configuration from HART or through the control system. The LOI password is a four-digit code that is to be set by the user. If the password is lost or forgotten the master password is "9307". The LOI password can be configured and enabled/disabled by HART communication via a Field Communicator, AMS Device Manager, or the LOI.

LOI menu trees are available in [Local Operator Interface \(LOI\)](#).

Setting the Loop to Manual

When sending or requesting data that would disrupt the loop or change the output of the transmitter, set the process application loop to manual. The Field Communicator, AMS Device Manager, or LOI will prompt you to set the loop to manual when necessary. Acknowledging this prompt does not set the loop to manual. The prompt is only a reminder; set the loop to manual as a separate operation.

Failure mode

As part of normal operation, each transmitter continuously monitors its own performance. This automatic diagnostics routine is a timed series of checks repeated continuously. If diagnostics

detect an input sensor failure or a failure in the transmitter electronics, the transmitter drives its output to low or high depending on the position of the failure mode switch. If the sensor temperature is outside the range limits, the transmitter saturates its output to 3.9 mA for standard configuration on the low end (3.8 mA if configured for NAMUR-compliant operation) and 20.5 mA on the high end (or NAMUR-compliant).

These values are also custom configurable by the factory or using the Field Communicator. The values to which the transmitter drives its output in failure mode depend on whether it is configured to standard, NAMUR-compliant, or custom operation. See Rosemount 644 Temperature Transmitter [Product Data Sheet](#) for standard and NAMUR-compliant operation parameters.

HART Software Lock

The HART software lock prevents changes to the transmitter configuration from all sources; all changes requested via HART by the Field Communicator, AMS Device manager or the LOI will be rejected. The HART Lock can only be set via HART communication and is only available in HART Revision 7 mode. The HART Lock can be enabled or disabled with a Field Communicator or AMS Device Manager.

Lock HART software using the Field Communicator

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

Device Dashboard Fast Keys	3, 2, 1
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Lock HART software using the AMS Device Manager

Procedure

1. Right click on the device and select Configure.
2. Under Manual Setup select the Security tab.
3. Select the Lock/Unlock button under HART Lock (Software) and follow the screen prompts.

Verify Configuration

It is recommended that various configuration parameters are verified prior to installation into the process. The various parameters are detailed out for each configuration tool. Depending on what configuration tool(s) are available, follow the steps listed relevant to each tool.

Verify configuration using the Field Communicator

Configuration parameters listed in [Table 2-3](#) below are the basic parameters that should be reviewed prior to transmitter installation. A full list of configuration parameters that can be reviewed and configured using a Field Communicator are in the [Field Communicator Menu Trees and Fast Keys](#).

A Rosemount 644 Device Descriptor (DD) must be installed on the Field Communicator to verify configuration.

Verify device configuration using Fast Key sequences in [Table 2-3](#).

From the *HOME* screen, enter the Fast Key sequences listed in [Table 2-3](#).

[Table 2-3: Device Dashboard Fast Key Sequences](#)

Function	HART 5	HART 7
Alarm Values	2, 2, 5, 6	2, 2, 5, 6
Damping Values	2, 2, 1, 5	2, 2, 1, 6
Lower Range Value (LRV)	2, 2, 5, 5, 3	2, 2, 5, 5, 3
Upper Range Value (URV)	2, 2, 5, 5, 2	2, 2, 5, 5, 2
Primary Variable	2, 2, 5, 5, 1	2, 2, 5, 5, 1
Sensor 1 Configuration	2, 1, 1	2, 1, 1
Sensor 2 Configuration ⁽¹⁾	2, 1, 1	2, 1, 1
Tag	2, 2, 7, 1, 1	2, 2, 7, 1, 1
Units	2, 2, 1, 5	2, 2, 1, 4

(1) Available only if option code (S) or (D) is ordered.

Verify configuration using the AMS Device Manager

Procedure

1. Right click on the device and select Configuration Properties from the menu.
2. Navigate the tabs to review the transmitter configuration data.

Verify configuration using the LOI

Procedure

1. Press any configuration button to activate the LOI.
2. Select VIEW CONFIG to review the below parameters.
3. Use the configuration buttons to navigate through the menu.

The parameters to be reviewed prior to installation include:

- Tag
- Sensor configuration
- Units
- Alarm and saturation levels
- Primary variable
- Range values
- Damping