

Rosemount® 333 HART® Tri-Loop™



CE

HART-to-Analog Signal Converter

- Convert a digital HART signal into three additional analog signals
- Easy to configure and install
- Accessory product for multivariable instruments
- Available as either high-alarm or low-alarm device

HART Tri-Loop HART-to-Analog Signal Converter

Convert a digital HART signal into three analog signals

Convert a multivariable digital HART signal into independent 4-20 mA analog process variables using the Rosemount 333 HART Tri-Loop. Apply in control or monitoring applications to obtain up to three additional analog outputs without additional process penetrations.

Accessory product for multivariable instruments

For use with the Rosemount 3051S MultiVariable™, 3051S Advanced HART Diagnostics, and 3144P products. When used with the 3051S MultiVariable Transmitter, the 333 HART Tri-Loop allows possible outputs of Differential, Absolute or Gage pressure, Process Temperature, Mass or Volumetric Flow, Energy Flow, Totalized Flow, and Sensor Module Temperature. When used with the 3051S Advanced HART Diagnostics, possible outputs include Pressure, Sensor Module Temperature, Scaled Variable, Standard Deviation, and Mean. When used with the Rosemount 3144P, possible outputs include Sensor 1, Sensor 2, Differential and Transmitter Terminal Temperature.

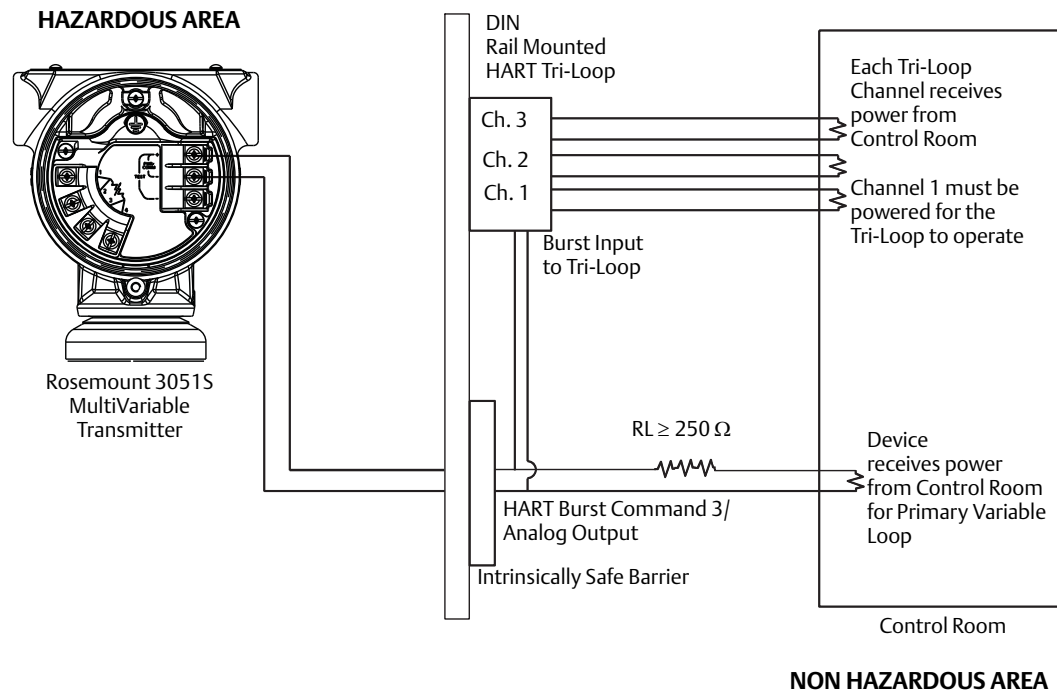
Easy to configure and install

The 333 HART Tri-Loop is easy to configure and maintain using the 475 Field Communicator. AMS® Device Manager provides easy PC-based user configuration. Installation is quick and easy with three DIN rail mount options and electrically isolated analog output channels for flexible grounding.

Available as either high-alarm or low-alarm device

Tri-Loop alarm channels are factory configured. All channels alarm if the attached device indicates a sensor failure or transmitter malfunction.

Figure 1. Example Tri-Loop Installation with Rosemount 3051S MultiVariable Transmitter



Contents

Ordering Information 3
 Specifications 3

Dimensional Drawings 5

Ordering Information

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See [page 4](#) for more information on Material Selection.

Table 1. Rosemount 333 HART Tri-Loop

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

| Model | Product description | |
|------------------------------------|---|---|
| 333 | HART Tri-Loop | |
| Alarm option | | |
| U | High alarm | ★ |
| D | Low alarm | ★ |
| Configuration option | | |
| C2 | Custom configuration (Configuration Data Sheet must be completed) | ★ |
| Typical model number: 333 U | | |

Specifications

Functional specifications

Service

Accessory product for use with the 3051S MultiVariable Transmitter, 3051S Advanced HART Diagnostics Transmitter, 3144P Temperature Transmitter, or any other HART device with a burst mode output.

Output

One, two, or three 4–20 mA user-selectable output signals.

| Device | Output options |
|---------------------|--|
| 3051S MultiVariable | DP, AP, GP, PT, Mass or Volumetric, Energy Flow, Totalized Flow, and Sensor Module Temperature |
| 3051S | Pressure, Sensor Module Temperature, Scaled Variable, Standard Deviation, and Mean |
| 3144P | Sensor 1, Sensor 2, Differential Temperature, or Transmitter Terminal Temperature |

Power supply

External power supply required for each channel. Each channel operates on terminal voltage of 11–42.4 Vdc.

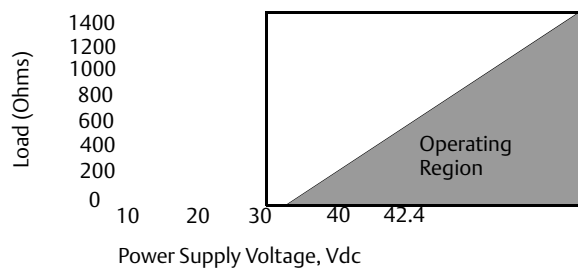
Note

Channel 1 must be powered for Tri-Loop operation.

Load limitations

Loop resistance is determined by the voltage level of the external power supply, as described below:

$$\text{Max. Loop Resistance} = \frac{\text{Power Supply Voltage} - 11.0}{0.022}$$



Turn-on time

Analog signals will be within specifications five seconds after power is applied to Tri-Loop.

Installation locations

Approved for FM ordinary locations, approved for CSA ordinary locations.

Temperature limits

Ambient

50 to 104 °F (10 to 40 °C)

Storage

–40 to 158 °F (–40 to 70 °C)

Humidity limits

0–95% non-condensing relative humidity

Failure mode alarm

If Tri-Loop diagnostics detect a Tri-Loop failure or the transmitter indicates a transmitter malfunction, the analog signal for all channels will be driven either below 3.75 mA or above 21.75 mA to alert the user. The high or low alarm signal is determined by the Tri-Loop Model Number, see “Alarm configuration” on page 4.

Performance specifications

(Performance specifications are for the HART Tri-Loop only.)

Reference accuracy

±0.045% of span

Ambient temperature effect per 50 °F (28 °C)

±0.15% of span

Stability

±0.1% of span for 12 months

Analog output update

Tri-Loop responds to every HART burst update (typical transmitter burst update rate: 0.3 to 0.5 s.)

Tri-Loop Response Time (after each burst update)

Channel 1:120 ms; Channel 2:220 ms; Channel 3:320 ms

Total Response Time

Typical response time from sensor change to transmitter to Tri-Loop analog update: 0.7 to 1.0 seconds.

Electromagnetic Compatibility (EMC)

Meets all basic environment requirements of EN61326-1⁽¹⁾⁽²⁾.

Performance criterion A: maximum deviation < 0.1% span during EMC disturbance.

Physical specifications

Material selection

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

Electrical connections

Screw clamps—accepts 24–12 AWG solid or stranded wire.

Dimensions

1.57 x 3.11 x 3.36 in. (40.3 x 79.3 x 85.5 mm)

DIN rail mounting options

Asymmetrical 32 mm G rail, symmetrical 35 x 7.5 mm top hat rail, or symmetrical 35 x 15 mm top hat rail (see “Dimensional Drawings” on page 5).

Weight

0.27 lb (0.12 kg)

Alarm configuration

Tri-Loops are configured with all channels to alarm in the same direction. Alarm direction is configured at the factory, and cannot be changed in the field. In addition, all channels alarm if the attached device indicates a sensor failure or transmitter malfunction. Tri-Loops are ordered according to the desired alarm direction.

Standard configuration

Unless otherwise specified with a C2 option, Tri-Loop is shipped as described in Table 2.

Tri-Loop label

Each Tri-Loop is labeled with serial number, part number, and factory configuration.

Custom configuration

If a Tri-Loop is ordered with a C2 option for custom configuration, the assigned variable, variable range, variable units, and channel status are assigned for all three channels.

333 HART Tri-Loop configuration

The 333 HART Tri-Loop can be fully configured using the 475 Field Communicator. AMS Device Manager software provides a PC-based user configuration.

1. ESD tested to 8 KV air with power supply grounded.

2. Testing performed with shielded cable.

Table 2. Standard Configuration

| Tri-Loop channel | Assigned variable | Variable range | Variable units | Channel status |
|------------------|-------------------|----------------|-----------------------------|----------------|
| Channel 1 | Second | 0–250 | inH ₂ O at 68 °F | Disabled |
| Channel 2 | Third | 0–800 | psi | Disabled |
| Channel 3 | Fourth | –40 to 400 | Degree F | Disabled |

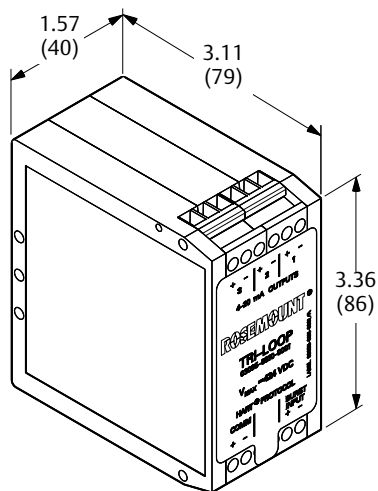
Figure 2. DIN Rail Mounting Options



- A. Symmetrical 35 x 7.5 mm top hat rail
- B. Symmetrical 35 x 15 mm top hat rail
- C. Asymmetrical 32 mm G rail

Dimensional Drawings

Figure 3. Tri-Loop Dimensions



Dimensions are in inches (millimeters).

Global Headquarters

Emerson Process Management

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

North America Regional Office

Emerson Process Management

8200 Market Blvd.
Chanhassen, MN 55317, USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RMT-NA.RCCRFQ@Emerson.com

Latin America Regional Office

Emerson Process Management

1300 Concord Terrace, Suite 400
Sunrise, FL 33323, USA
+1 954 846 5030
+1 954 846 5121
RFQ.RMD-RCC@EmersonProcess.com

Europe Regional Office

Emerson Process Management Europe GmbH

Neuhofstrasse 19a P.O. Box 1046
CH 6340 Baar
Switzerland
+41 (0) 41 768 6111
+41 (0) 41 768 6300
RFQ.RMD-RCC@EmersonProcess.com

Asia Pacific Regional Office

Emerson Process Management Asia Pacific Pte Ltd

1 Pandan Crescent
Singapore 128461
+65 6777 8211
+65 6777 0947
Enquiries@AP.EmersonProcess.com

Middle East and Africa Regional Office

Emerson Process Management

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

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