

Rosemount™ 333 HART® Tri-Loop™ Signal Converter



Product overview

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 Signal Converter. 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 Signal Converter allows the following possible outputs:

- Differential, absolute, or gage pressure
- Process temperature
- Mass or volumetric flow
- Energy flow
- Totalized flow
- Sensor module temperature

When used with the Rosemount 3051S Advanced HART Diagnostics, possible outputs include:

- Pressure
- Sensor module temperature
- Scaled variable
- Standard deviation
- Mean

When used with the Rosemount 3144P, possible outputs include:

- Sensor 1
- Sensor 2
- Differential and transmitter terminal temperature

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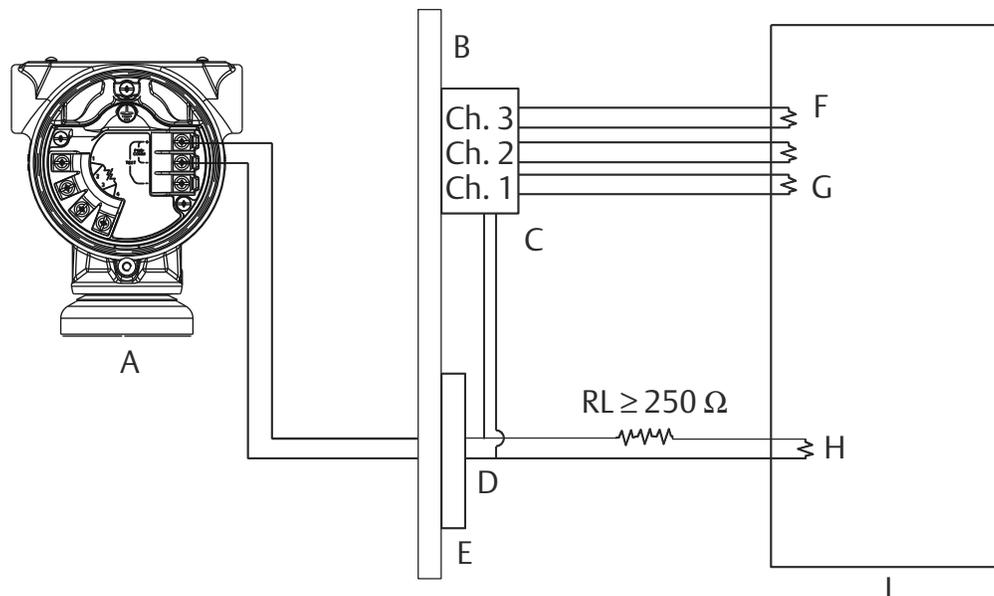
Easy to configure and install

The device is easy to configure and maintain using a 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.

Example installation with Rosemount 3051S MultiVariable™ Transmitter



- A. Rosemount 3051S MultiVariable Transmitter
- B. DIN rail mounted signal converter
- C. Burst input to signal converter
- D. HART® burst command 3/analog output
- E. Intrinsically safe barrier
- F. Each channel receives power from control room
- G. Channel 1 must be powered for signal converter operation
- H. Device receives power from control room for primary variable loop
- I. Control room

Ordering information

With the Rosemount 333 HART® Tri-Loop™ Signal Converter, you can easily obtain up to three additional analog outputs. This signal converter is designed to convert a digital HART multivariable signal into three independent 4-20 mA analog process variables without additional transmitters and wiring. Available options include:

- Configurable as high-alarm or low-alarm device
- DIN rail mount options
- Electrically isolated analog output channels for flexible configurations



Online product configurator

Many products are configurable online using our Product Configurator. Select the **Configure** button or visit our [website](#) to start. With this tool's built-in logic and continuous validation, you can configure your products more quickly and accurately.

Specifications and options

See the Specifications and options section for more details on each configuration. Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See the Material selection section for more information.

Model codes

Model codes contain the details related to each product. Exact model codes will vary; an example of a typical model code is shown in [Figure 1](#).

Figure 1: Model Code Example

3051C D 2 X 2 2 M5 B4

1 2

1. Required model components (choices available on most)
2. Additional options (variety of features and functions that may be added to products)

Optimizing lead time

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

Required model components

Model

Code	Description	
333	HART® Tri-Loop™	★

Alarm option

Code	Description	
U	High alarm	★
D	Low alarm	★

Configuration option

Code	Description	
C2	Custom configuration (Configuration Data Sheet must be completed)	★

Specifications

Functional specifications

Service

Accessory product for use with the Rosemount 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.

Rosemount 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.

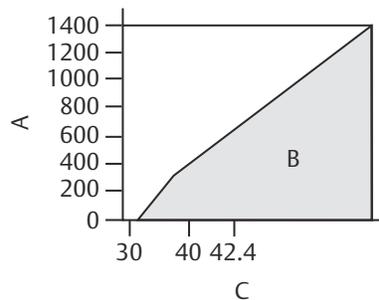
Note

Channel 1 must be powered for operation.

Load limitations

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

$$\text{Maximum loop resistance} = (\text{power supply voltage} - 11.0) / 0.022$$



- A. Load (ohms)
- B. Operating region
- C. Power supply voltage (Vdc)

Turn-on time

Analog signals will be within specifications five seconds after power is applied to the device.

Installation locations

Approved for USA ordinary locations; approved for Canada ordinary locations.

Temperature limits

Ambient

50 to 104 °F (10 to 40 °C)

Storage

-40 to 158 °F (-40 to 70 °C)

Failure mode alarm

If device 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 device model number (see [Alarm configuration](#)).

Performance specifications

Note

Performance specifications are for the HART® Tri-Loop™ device only.

Reference accuracy

±0.045% of span

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

±0.15% of span

Stability

±0.15% of span for 12 months

Analog output update

The device responds to every HART® burst update (typical transmitter burst update rate: 0.3 to 0.5 seconds).

Device 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. Maximum deviation <1 percent span during EMC disturbance.⁽¹⁾⁽²⁾

(1) Shielded cables are required.

(2) Power supply must be earth grounded.

During surge and ESD events, device may exceed maximum EMC deviation limit or reset; however, device will self-recover and return to normal operation within specified startup time.

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 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 accept 24–12 AWG solid or stranded wire.

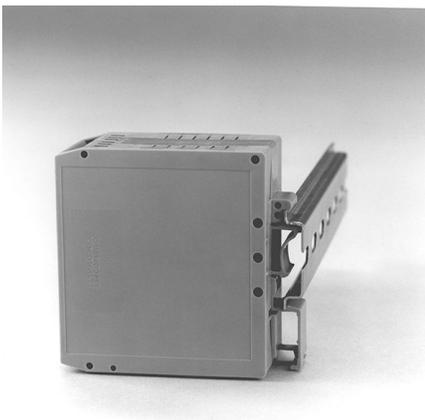
Dimensions

1.57 x 3.11 x 3.36 in. (40 x 79 x 85.5 mm)

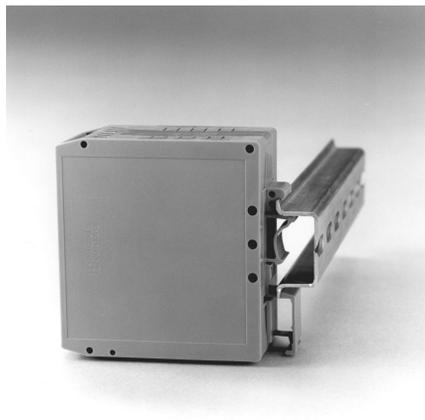
DIN rail mounting options

Asymmetrical 32 mm G rail, symmetrical 35 x 7.5 mm top hat rail, or symmetrical 35 x 15 mm top hat rail (see [Table 1](#)).

Table 1: DIN Rail Mounting Options



Symmetrical 35 x 7.5 mm top hat rail



Symmetrical 35 x 15 mm top hat rail



Asymmetrical 32 mm G rail

Weight

0.27 lb (0.12 kg)

Alarm configuration

This device is 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. This device must be ordered according to the desired alarm direction.

Standard configuration

Unless otherwise specified with a C2 option, this device is shipped as described in [Table 2](#).

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

Device label

Each device is labeled with serial number, part number, and factory configuration.

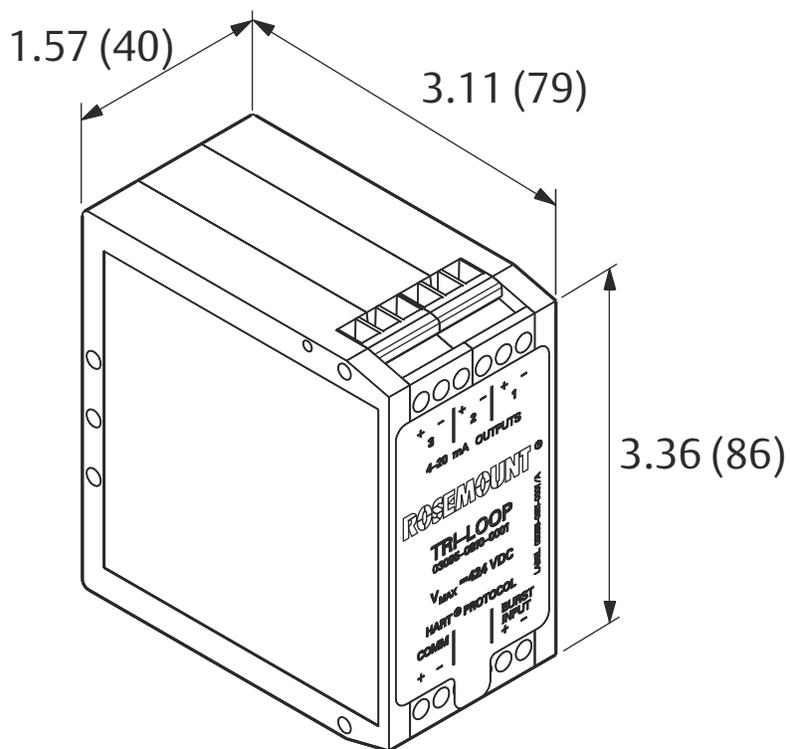
Custom configuration

If a device 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.

Device configuration

The device can be fully configured using a Field Communicator. AMS Device Manager software provides a PC-based user configuration.

Dimensional drawings



Dimensions are in inches (millimeters).

For more information: www.emerson.com

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