

00809-0100-4754
English
Rev. BB

Model 333 HART[®] Tri-Loop[™] HART-to-Analog Signal Converter



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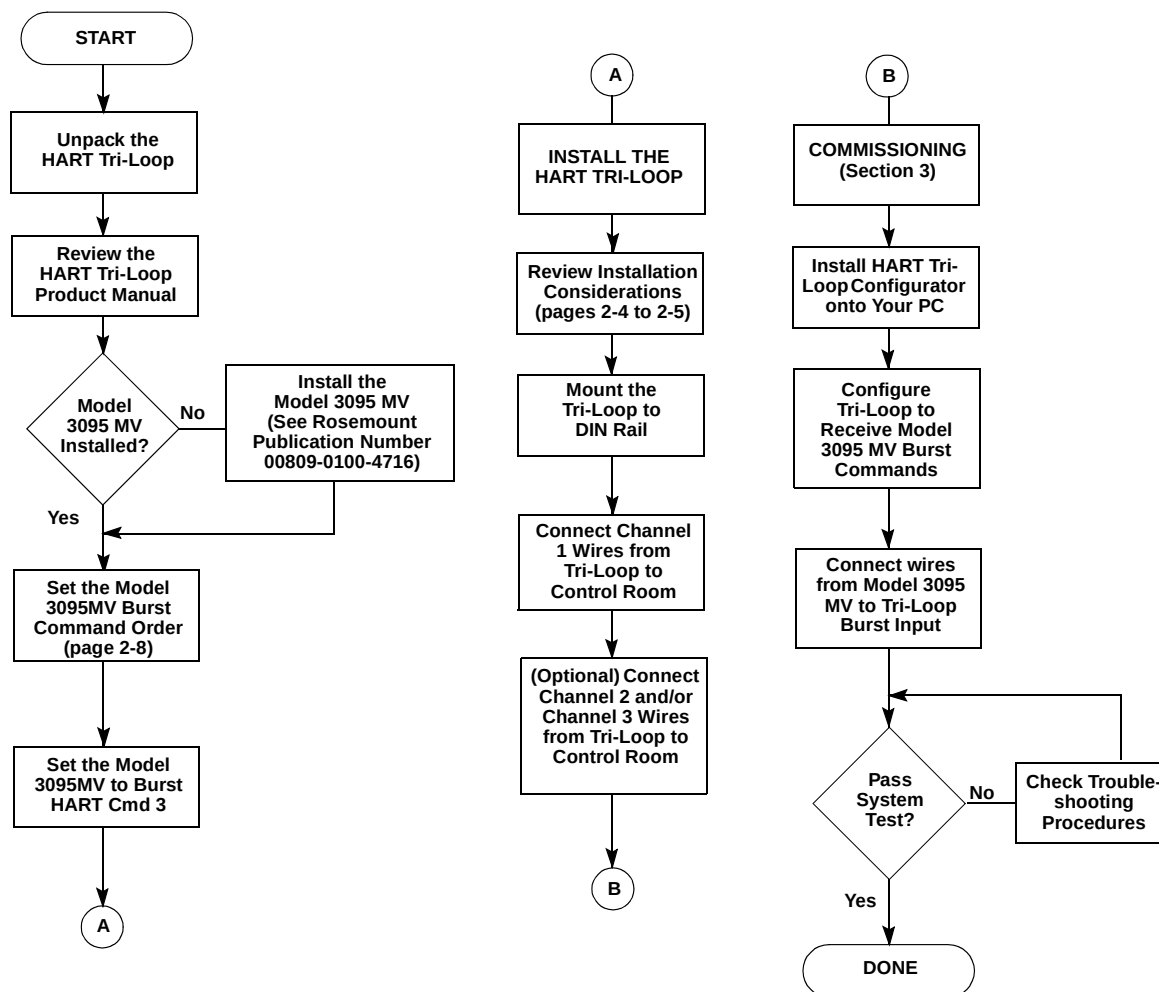
Section

2

Installation

This section contains an installation flowchart, an overview of the Model 333 HART Tri-Loop, and procedures for installation and wiring. The suggested sequence of HART Tri-Loop installation and wiring is shown in Figure 2-1.

FIGURE 2-1. HART Tri-Loop Installation Flowchart.



HART Tri-Loop HART-to-Analog Signal Converter

SYSTEM OVERVIEW

Figure 2-2 illustrates an installation where a Tri-Loop has been added to a Model 3095 MV installation.

The Tri-Loop design allows three different rail mounting options: asymmetrical 32mm G rail, symmetrical 35 × 7.5 mm top hat rail, and symmetrical 35 × 15 mm top hat rail. Since the Tri-Loop is designed for non-hazardous locations, the Tri-Loop can only be installed on the safe side of an IS barrier.

In this type of installation, the Model 3095 MV is configured to output HART Burst Command 3. The Tri-Loop converts each burst update to a corresponding analog value for up to three process variables. Any of the Model 3095 MV process variables can be provided via the Tri-Loop (DP, AP, GP, PT, or flow).

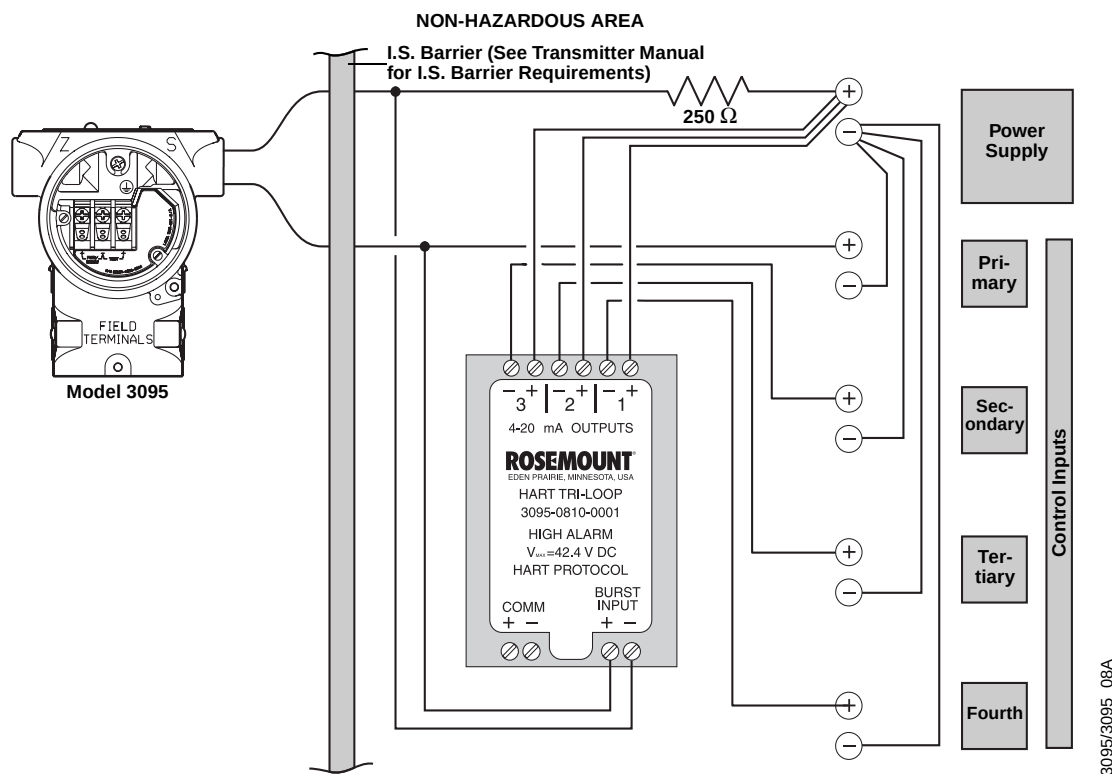
For each desired analog output, a separate pair of wires is installed from the Tri-Loop to the control room. However, Channel 1 wires must be installed and powered for the Tri-Loop to operate.

The initial Model 3095 MV analog output is not altered by the Tri-Loop installation.

UNPACKING THE HART TRI-LOOP

When custom configuration Tri-Loops are shipped, the filled-out configuration data sheet (CDS) is included in the box. If the CDS is separated from the configured Tri-Loop, the serial number on the side of the Tri-Loop can be matched with the serial number written on the CDS. A label is also printed on the side of the Tri-Loop identifying configuration information.

FIGURE 2-2. Example Tri-Loop Installation Site.



Installation

Initial Inspection

1. Place the shipping containers on a secure bench and open them, taking care not to damage the contents.
2. Review the packing list to verify that all equipment was received.
3. Inspect the equipment and report any shipping damage to the carrier.

Model 3095 MV (or HART Multivariable Device)

Before mounting the Tri-Loop in the control room, the Model 3095 MV or HART Multivariable device must first be installed. Refer to the Model 3095 MV product manual (00809-0100-4716) for information on installing the Model 3095 MV.

Alarms

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 Tri-Loop channels will alarm if a Tri-Loop detects a sensor malfunction in the attached device.

Tri-Loops are ordered according to the desired alarm direction:

Tri-Loop Version	Part Number
High Alarm Tri-Loop	03095-0810-0001
Low Alarm Tri-Loop	03095-0810-0002
High Alarm Tri-Loop, Custom Configuration	03095-0810-0003
Low Alarm Tri-Loop, Custom Configuration	03095-0810-0004

Failure Mode Alarm vs. Saturation Output Values

The failure mode alarm output levels differ from the output values that occur when the measured value is outside the range points. When the measured value is outside the range points, the analog output continues to track the input value until reaching the saturation value listed below; the output does not exceed the listed saturation value regardless of the measured value. For example, for values outside the 4–20 range points, the output saturates at 3.9 mA or 20.8 mA.

When the Tri-Loop diagnostics detect a Tri-Loop failure or a Model 3095 MV malfunction, the analog outputs are set to an alarm value that differs from the saturation value to allow for proper troubleshooting.

NOTE

The output values listed below can be altered by an analog output trim procedure.

Level	4–20 mA Saturation Value	4–20 mA Alarm Value
Low	3.9 mA	< 3.75 mA
High	20.8 mA	> 21.75 mA

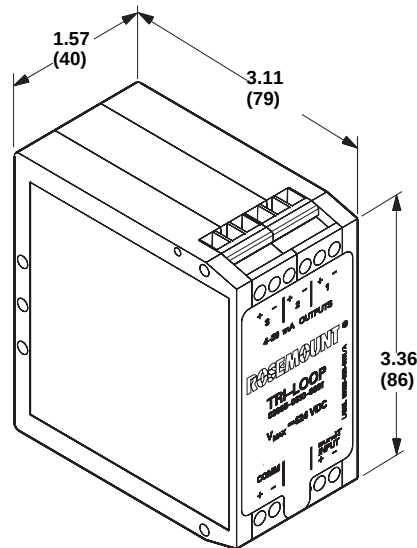
NOTE

If a Tri-Loop channel sets a range different than the attached device, the Tri-Loop range will be used.

For example, if a Model 3095 MV sets the primary variable to DP with a range of 0–250 inH₂O, and the Tri-Loop Configurator sets Tri-Loop channel 1 to receive this DP variable but enters a range of 0–100 inH₂O, the Tri-Loop will use the 0–100 inH₂O range.

Installation

FIGURE 2-4. Tri-Loop Dimensions.



NOTE
Dimensions are in inches (millimeters).

3095-0810A01A

ELECTRICAL CONSIDERATIONS

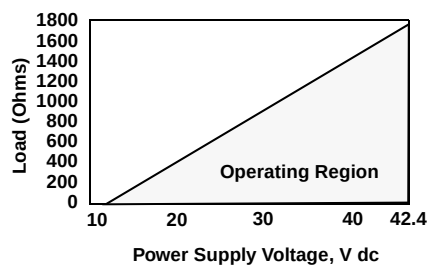
Power Supply

FIGURE 2-5. Power Supply Load Limitations.

Figure 2-5 illustrates power supply load limitations for each channel of the device. Each channel operates on terminal voltage of 11–42.4 V dc. Channel 1 must be powered for Tri-Loop operation.

The dc power supply should provide power with less than 2% ripple. The total resistance load is the sum of the resistance of the signal leads and the load resistance of the controller, indicator, and related pieces.

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



3051-0103A

NOTE

Wiring connections must be made in accordance with local or national installation codes such as the NEC NFPA 70.

HART Tri-Loop HART-to-Analog Signal Converter

CONFIGURE THE MODEL 3095 MV FOR TRI-LOOP OPERATION

Select Process Variables

Maintenance
Analog Output
Range Values...

The following information is an abbreviated guide for using the Model 3095 MV Engineering Assistant (EA) to configure the Model 3095 MV for operation with a HART Tri-Loop. For additional information on the EA or the Model 3095 MV, refer to the Model 3095 MV product manual (Rosemount publication number 00809-0100-4716).

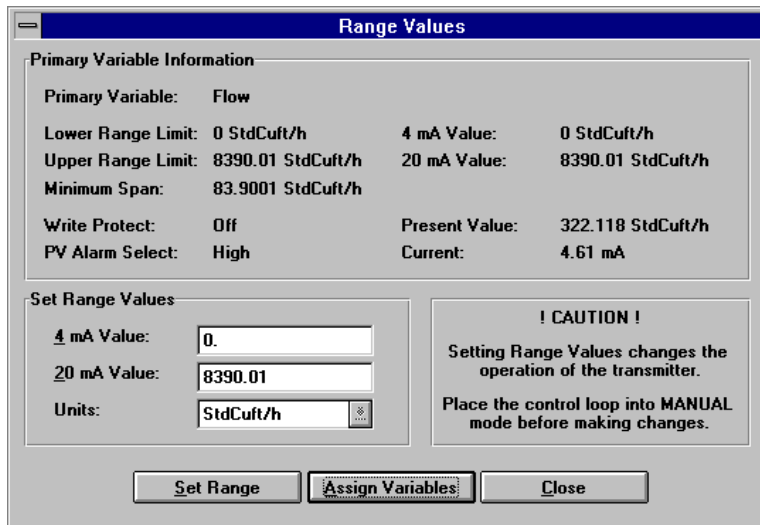
This screen sets the range values for the primary variable, and also allows for reassigning the process variable output order. This determines both which process variables are burst by the Model 3095 MV, and in which order the variables are sent.

NOTE

The Primary Variable (Figure 2-7) is also assigned as the Model 3095 MV 4–20 mA analog output.

1. Using the Model 3095 MV EA, access the Range Values Screen (**Maintenance**, **Analog Output**, **Range Values...**).
2. Select Assign Variables, then set the desired variable order (see Figure 2-8).
3. Record the selected process variables in Table 2-1.

FIGURE 2-7. Range Values Screen.



The Range Values screen displays the following information:

Primary Variable Information			
Primary Variable:	Flow		
Lower Range Limit:	0 StdCuft/h	4 mA Value:	0 StdCuft/h
Upper Range Limit:	8390.01 StdCuft/h	20 mA Value:	8390.01 StdCuft/h
Minimum Span:	83.9001 StdCuft/h		
Write Protect:	Off	Present Value:	322.118 StdCuft/h
PV Alarm Select:	High	Current:	4.61 mA

Set Range Values:

4 mA Value:

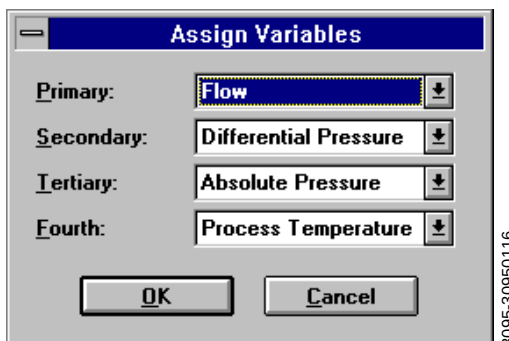
20 mA Value:

Units:

! CAUTION !
 Setting Range Values changes the operation of the transmitter.
 Place the control loop into MANUAL mode before making changes.

Buttons: Set Range, Assign Variables, Close

FIGURE 2-8. Assign Variables Screen.



The Assign Variables screen displays the following information:

Primary:

Secondary:

Tertiary:

Fourth:

Buttons: OK, Cancel

3095-30950116

Installation

Record Model 3095 MV Units

NOTE
The Tri-Loop will alarm if there is a unit mismatch between the Model 3095 MV and the Tri-Loop Channel.

To assist in Tri-Loop commissioning, (Section 3), we recommend that you record the Model 3095 MV process variables and units in Table 2-1.

Transmitter Units

- This screen sets the units for the five process variables: Differential Pressure, Absolute Pressure, Gage Pressure, Process Temperature, and Flow Applications.
1. Using the Model 3095 MV Engineering Assistant, access the Transmitter, Units Screen.
 2. If desired, change the displayed units. Modifying the information on this screen and selecting OK immediately changes the connected transmitter.
 3. Record in Table 2-1 the selected units for each process variable.

FIGURE 2-9. Units Screen.

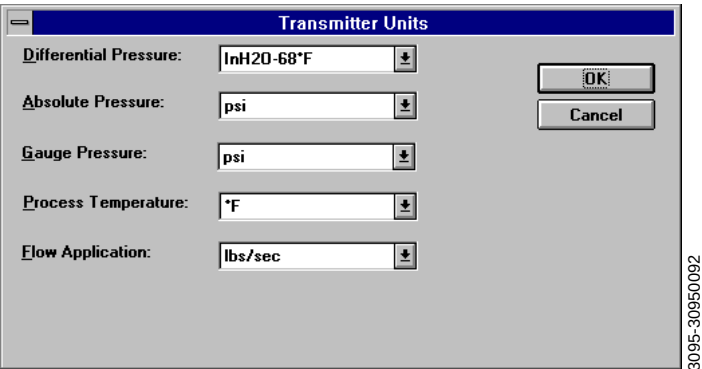


TABLE 2-1. Table for entering Model 3095 MV Process Variables and Units.

Model 3095 MV Process Variable	User-Assigned Variables	User-Assigned Units
Primary		
Secondary		
Tertiary		
Fourth		

HART Tri-Loop HART-to-Analog Signal Converter

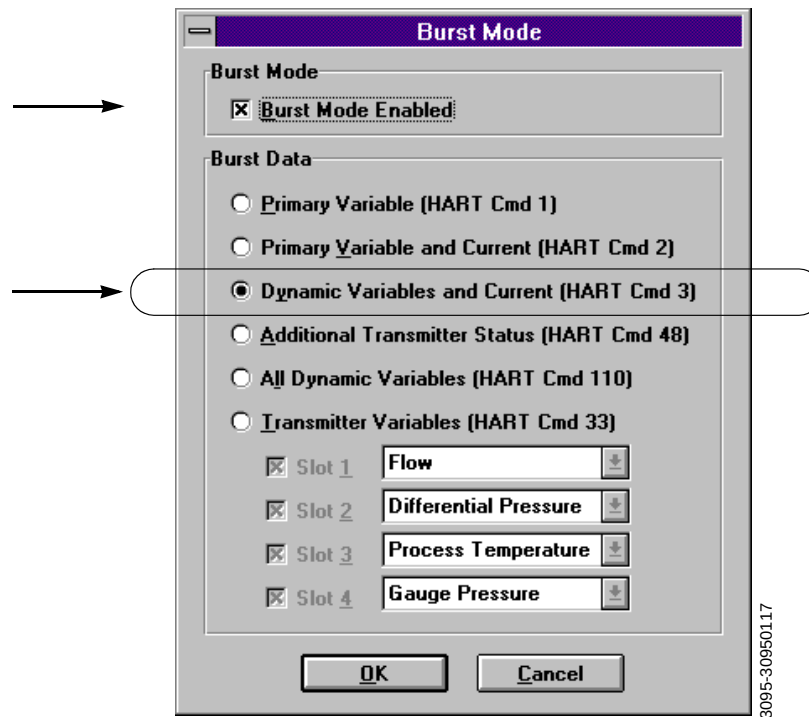
Set the Model 3095 MV to Burst Mode

For the Tri-Loop to receive the process variables, the Model 3095 MV must be set to Burst Command 3. Burst mode is compatible with use of the analog signal. Burst mode applies only to the transmission of burst data, and does not affect the way other Model 3095 MV data is accessed.

Transmitter HART Output Burst Mode

1. Using the Model 3095 MV Engineering Assistant, access the Burst Mode Screen.
2. If required, click on the Burst Mode Enabled box.
3. Select Dynamic Variables and Current (HART Cmd 3), then select OK.

FIGURE 2-10. Burst Mode Screen.



Section

3

Commissioning

OVERVIEW

This section summarizes procedures needed to commission the HART Tri-Loop HART-to-Analog Signal Converter.

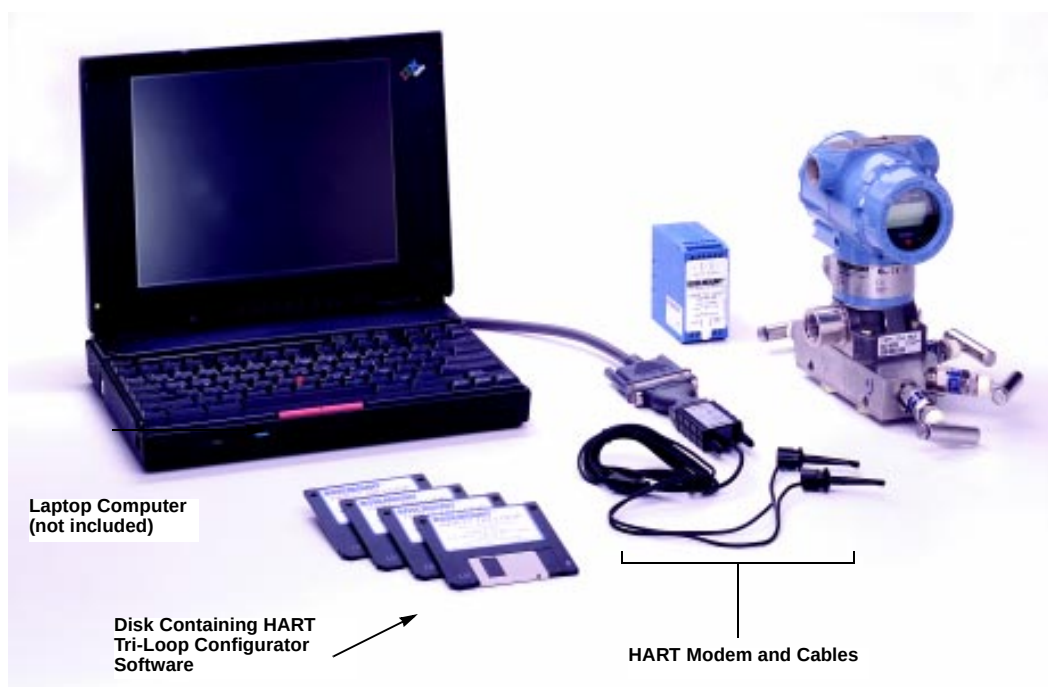
The following tasks are described in this section:

- Install the Tri-Loop Configurator software
- Configure the Tri-Loop
- Complete Burst Input Connection
- Perform system test

INSTALL THE TRI-LOOP CONFIGURATOR SOFTWARE

The HART Tri-Loop Configurator software package is available with or without the HART modem and connecting cables (see page 5-1 for part numbers). The complete Configurator package contains four 3.5-in. floppy disks, one HART modem, and a set of cables for connecting the computer to the HART Tri-Loop (see Figure 3-1).

FIGURE 3-1. Tri-Loop Configurator Software Equipment.



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HART Tri-Loop HART-to-Analog Signal Converter

Minimum Equipment and Software

- MS-DOS based 386 computer or above
- MS DOS® 5.0 or higher
- 640K base RAM with 8 MB extended
- Microsoft® Windows® 3.1, Windows for Workgroups 3.11, or Windows 95
- Mouse or other pointing device (optional)
- Color computer display (optional)
- HART Tri-Loop Configurator Software, HART modem, set of modem cables

Installation Procedure

This procedure assumes that both DOS and Windows are already installed.

NOTE

In this manual, **return** indicates to press the return or enter key.

1. Power on the computer
2. After completion of boot-up procedures, verify that the computer is in Microsoft Windows. If the computer is at the DOS prompt (for example, C:\), type win **return** to start Windows.
3. Insert the floppy disk containing the first HART Tri-Loop Configurator Software into the personal computer disk drive.
4. Select **F**ile, then select **R**un from the Program Manager to display the Run window. Depending on the disk drive, enter either a: setup or b: setup, then click OK.
5. Follow the directions provided by the setup utility to install the HART Tri-Loop Configurator Software. Setup may require 3 or 4 disks, depending on the computer operating system.

NOTE

The HART communications port can be either COM1 or COM 2. The HART communications port must be different than the mouse port.

Section

5

Specifications and Reference Data

This section contains the following reference data for the HART Tri-Loop HART-to-Analog Signal Converter:

- Ordering information
- Specifications
- Configuration Data Sheet (00806-0100-4754)

ORDERING INFORMATION

Model No. (Part No.)	Description
Model 333U (03095-0810-0001)	High Alarm Tri-Loop, Standard Configuration.
Model 333D (03095-0810-0002)	Low Alarm Tri-Loop, Standard Configuration.
Model 333UC2 (03095-0810-0003)	High Alarm Tri-Loop, Custom Configuration. Requires a completed Configuration Data Sheet (00806-0100-4754).
Model 333DC2 (03095-0810-0004)	Low Alarm Tri-Loop, Custom Configuration. Requires a completed Configuration Data Sheet (00806-0100-4754).
03095-0821-0001	HART Tri-Loop Configurator Software—Site License, HART Modem, Cables.
03095-0820-0002	HART Tri-Loop Configurator Software—Site License.
03095-5105-0001	HART Modem and Cables.

NOTE

There are no user-serviceable parts for the HART Tri-Loop.

SPECIFICATIONS

Functional Specifications

Service

Accessory product for the Model 3095 MV and Model 3244MV.

Output

One, two, or three 4–20 mA output signals, user-selectable for DP, AP, GP, PT, or flow.

Power Supply

External power supply required for each channel. Channel 1 must be powered for Tri-Loop operation. Each channel operates on terminal voltage of 11–42.4 V dc.

Turn-on Time

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

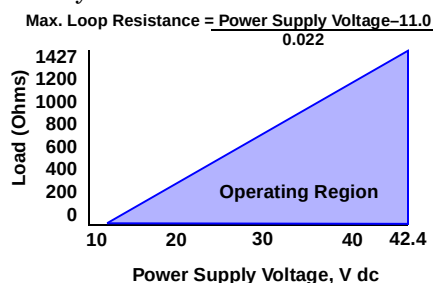
Installation Locations

Approved for FM ordinary locations.
Approved for CSA ordinary locations.

HART Tri-Loop HART-to-Analog Signal Converter

Load Limitations

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



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 transmitter malfunction or a Tri-Loop failure, the analog signal will be driven either below 3.75 mA or above 21.75 mA to alert the user. The high or low alarm signal is selectable by the Tri-Loop Model Number.

Performance Specifications

NOTE

The performance specifications below 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 s.

Physical Specifications

Electrical Connections

Screw clamps. Accepts 24-12 AWG solid or stranded wire.

Dimensions

1.57 × 3.11 × 3.36 in. (40 × 79 × 85,5 mm)

DIN Rail Mounting Options

Asymmetrical 32mm G rail, symmetrical 35 × 7.5 mm top hat rail, or symmetrical 35 × 15 mm top hat rail.

Weight

0.27 lb (0,12 kg)

Specifications and Reference Data

CONFIGURATION DATA SHEET 00806-0100-4754

Complete this data sheet to define a custom configuration for the Model 333 HART Tri-Loop.
Unless specified, the Tri-Loop will ship with the default values identified by the ★ symbol.

CONFIGURATION DATA SHEET

Customer: _____

Customer P.O. No.: _____

Customer Line Item: _____

Model No. (select one) ☐ High Alarm – Model No. 333UC2
(previously: 03095-0810-0003)

☐ Low Alarm – Model No. 333DC2
(previously: 03095-0810-0004)

DEVICE INFORMATION (optional)

Tag: _____
(8 characters)

Descriptor: _____
(16 characters)

Message: _____

(32 characters)

Date: _____
(dd) (mmm) (yy)

CHANNEL 1

Channel Status (select one): ☐ Enabled ☐ Disabled ★

Assigned Variable (select one) ⁽¹⁾: ☐ Primary Variable ☐ Secondary Variable ★
☐ Tertiary Variable ☐ Fourth Variable

Variable Range: Zero (4 mA) Value _____ (2)

Full Scale (20 mA) Value _____ (2)

Variable Units _____ (2) (3)

(1) Verify process variable assignment for your instrument.

(2) This information must be completed for each enabled channel before the CDS can be accepted.

(3) Selected units must match device units or the Tri-Loop will alarm. Verify unit assignment for your instrument.

For RMD internal use only:

House Order No: _____

Line Item No: _____

Tri-Loop Serial No: _____



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